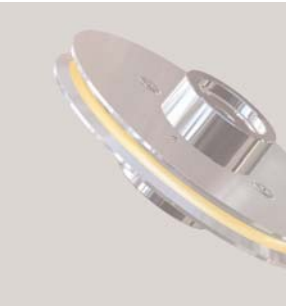
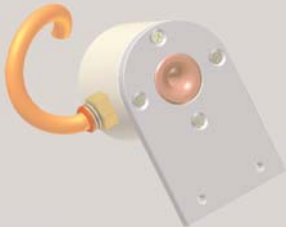
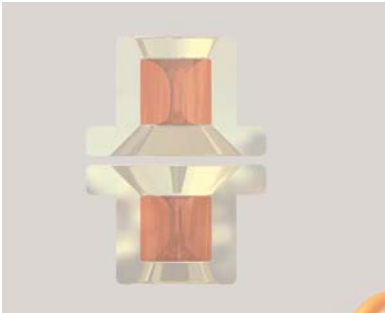


Ceramic Guides

Diamond lapped

by **COSMOS**

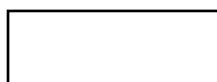
upgrade Wire Quality



www.wireguides.com
info@cosmos-na.com

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INTRODUCTION

COSMOS diamond laps wire guides in ultra-hard materials to improve the surface finish. These materials include Alumina, Ruby, Sapphire, Titania, Tungsten Carbide and Zirconia. The diamond lapping covers all the area that comes in contact with the moving wire. **In addition to reducing friction, the processing improves wire quality.**

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 micro inches (10^{-6} inch) Ra*, 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 deprecated.

Suffix to part No.	Readings in micro inches Ra
D L	4 - 8
P 1	10 - 18
S F	20 - 30

Characteristics pertinent to wire processing of the ultra-hard materials that we offer can be found in the opposite page.

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	-	95	-	DL

For example, part No. BG 5 - 95 -DL stands for Bow Guide No. 5 of 95% alumina content, diamond lapped to 4 - 8 micro inches Ra.

Needle guides (guide tubes) part number for coil winding are more complex, and a separate page is dedicated to describing the numbering system in the coil winding section.

The **date** at the lower center of the **contents** page tells when this catalog was updated. To keep this catalog briefcase friendly, only the very essentials are introduced, additional information can be found in our website:

www.wireguides.com

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

info@cosmos-na.com

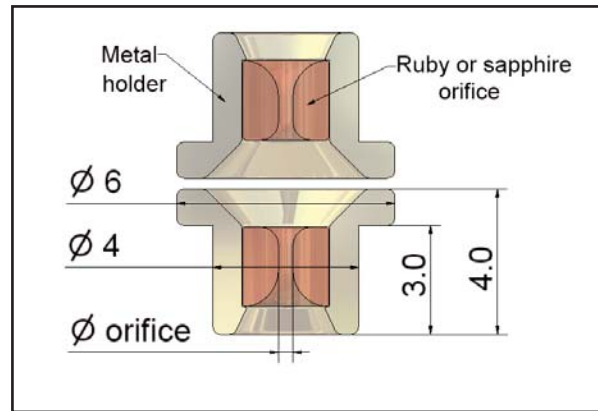
* 40 micro inches = 1 micron (10^{-6} meters) The micro inch is a smaller unit, which can usually be expressed in integers in the present application.

COSMOS Wire Guides Material Characteristics

Material	Vickers Hardness kg/mm²	Fracture Toughness MPa m^{1/2} @ 20 ° C	Flexural Strength MPa @ 20 ° C	Density g/cm³	Color	Maximum Service Temperature ° C
Alumina 90%	1,050~1,100	3~4	250	3.6~3.7	Dark red	1,500
Alumina 95%	1,150~1,200	3~4	310	3.7~3.8	Pink	1,600
Alumina 99%	1,300~1,400	3~4	340	3.8	Ivory	1,700
Alumina 99.5%	1,300~1,400	3~4	340	3.9	Light pink	1,700
Ruby	1,800~2,200	4~5	550	3.99	Red	1,750
Sapphire	1,800~2,200	4~5	550	3.99	White	1,750
Tungsten carbide	1,500~1,600	6~8	1,930	14~15	Gray	1,000
Titania black	950	3~4	350	4.2	Black	1,000
Titania yellow	950	3~4	350	4.2	Yellow	1,000
TZP Zirconia	1,200~1,300	10~13	940	5.95~6.05	Ivory	1,500
ZTA Alumina	1,500	6	760	4.0	Ivory	1,500

COSMOS AW 5 *Ruby* air wipe outlasts ceramic air wipe eyelets in Niehoff Multiwire Drawing Lines

Air wipes by COSMOS are available for replacement on existing equipment or in modules for new installations. The AW 5 features a diamond lapped *Ruby* or Sapphire orifice in a metal holder configured for direct replacement of the ceramic air wipe eyelets found in Niehoff multiwire drawing line annealer. Figure at right depicts the arrangement.



AW 5's arranged in tandem

- The attributes:**
- 1) **Upgrades wire quality**
 - 2) **4 - 5 times service life**
 - 3) **Reduces machine down time**

AW 5 Part No. with the suggested wire diameters are shown in Table 1. The permutation of colors and ring(s) cut on the metal holder facilitates orifice identification on the factory floor.

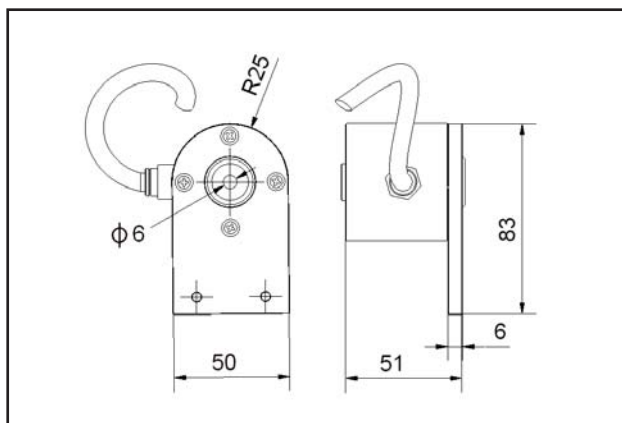
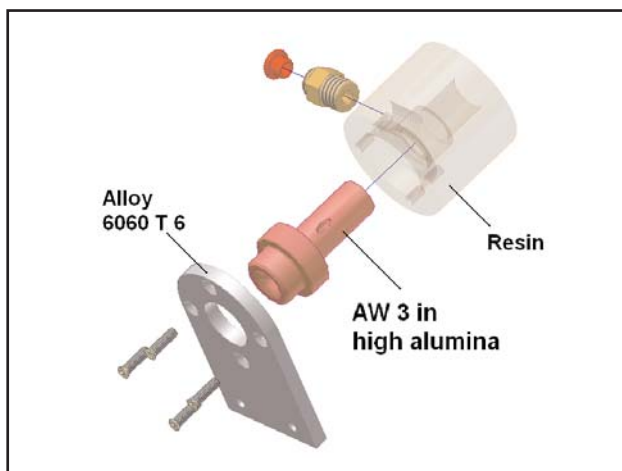
Part No.	Suggested wire dia. mm	Color metal holder	Color orifice	Ring(s) on holder
AW 5 - 0.3	0.2 - 0.25	Brass	Sapphire	None
AW 5 - 0.4	0.3 - 0.35	Brass	Sapphire	1
AW 5 - 0.5	0.4 - 0.45	Nickel	Sapphire	None
AW 5 - 0.6	0.5 - 0.55	Brass	Ruby	None
AW 5 - 0.8	0.6 - 0.75	Nickel	Ruby	None
AW 5 - 1.4	0.8 - 1.3	Brass	Ruby	1

Table 1

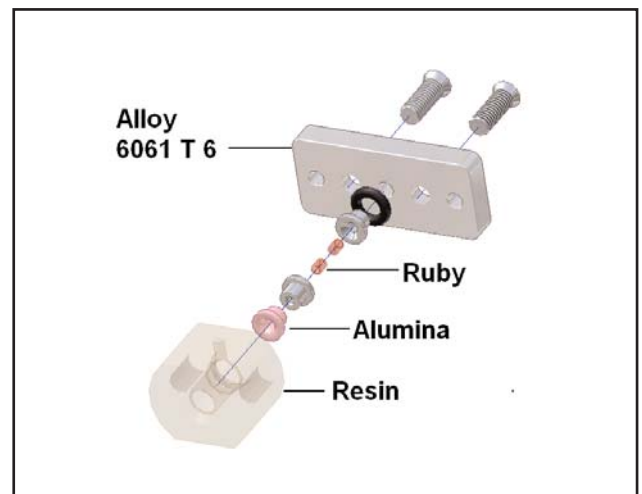
Modular Air Wipes by COSMOS are *Non-marking*

Modular wipes AWM 3 , AWM 5 made of ultra-hard materials not only leave no marks on the wire, but also last longer.

An exploded view of the AWM 3 - 6, of bore diameter 6 mm designed for jacketed cable of diameters up to 5.5 mm, is shown below. The dimensions are depicted at lower left.

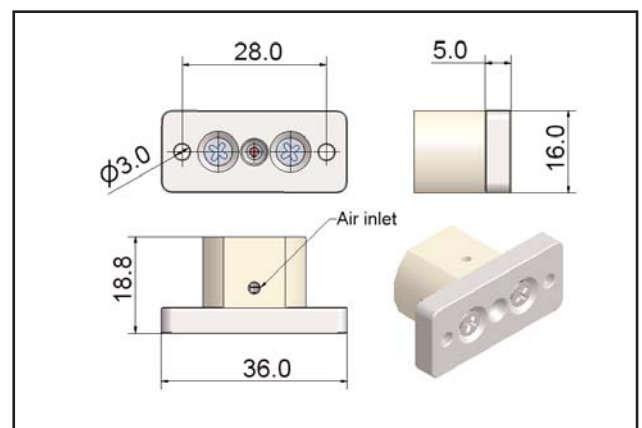


Dimensions, AWM 3 - 6



Exploded view, AWM 5

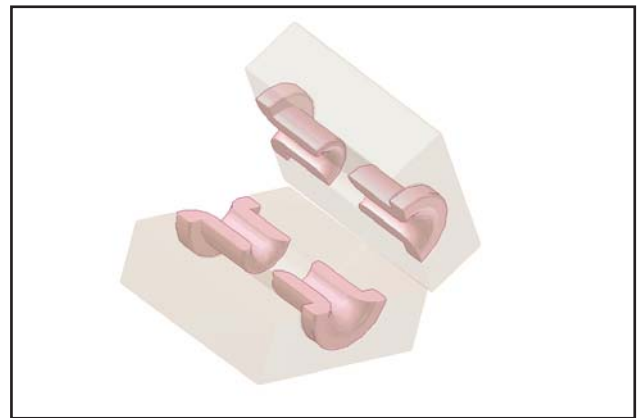
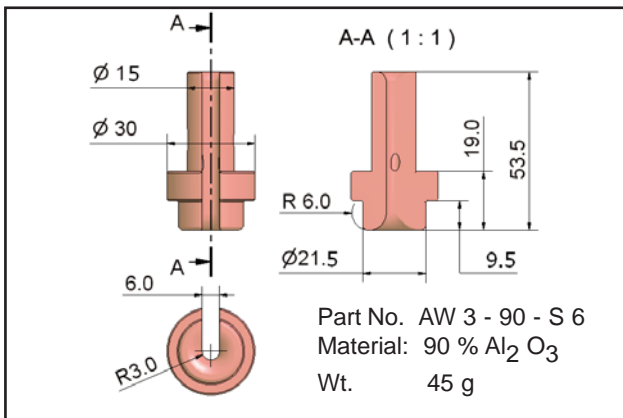
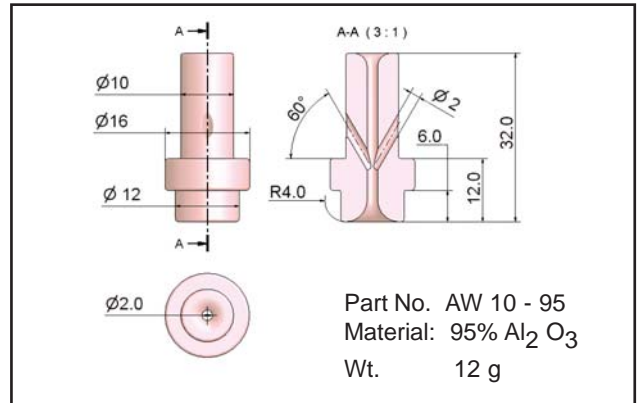
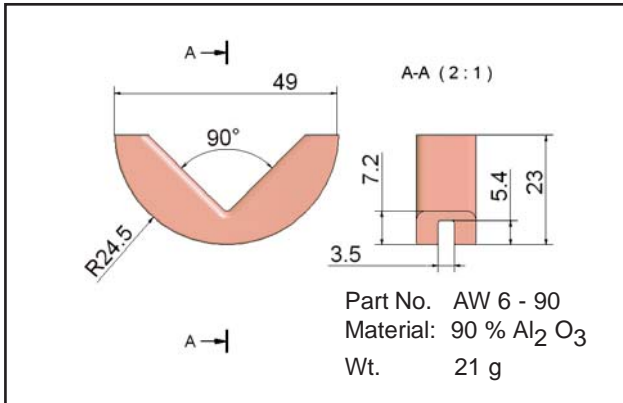
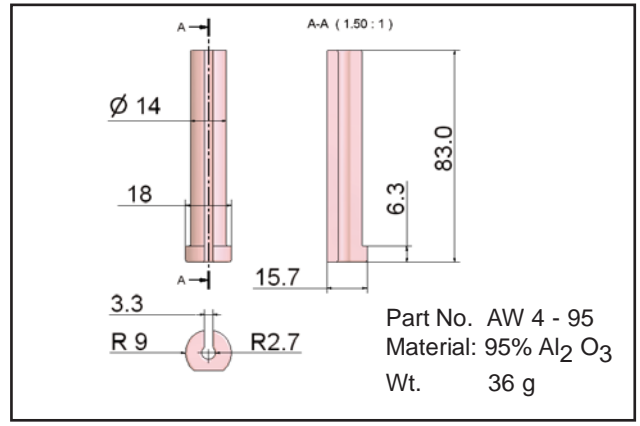
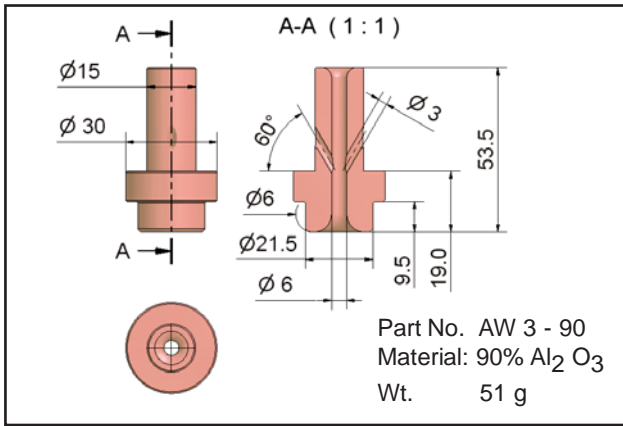
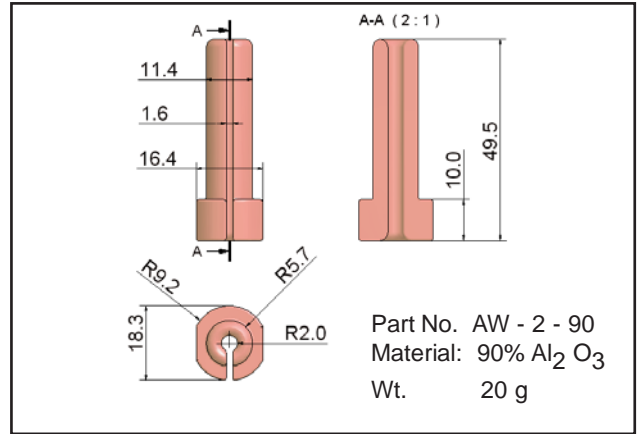
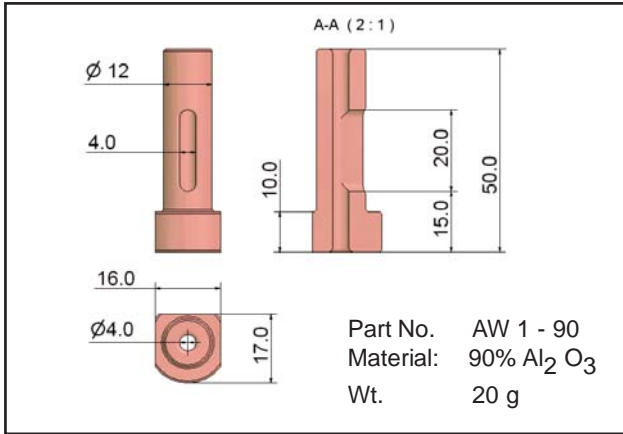
The AWM 5, of which an exploded view is shown above, is the AW 5 assembled in module for new installation. Part numbers and data listed in Table 1, Page 1 - 1 apply. The dimensions are shown underneath.



Dimensions, AWM 5

The high alumina core AW 3 - 6 is diamond lapped in the interior. The cores of the AWM 5, being of the same material as AW 5, are all mirror finished.

Note: The resin bodies in the exploded views have been deliberately rendered opaque to reveal details.



This is AW - 3 with a 6 mm wide slit, which covers the full length of the wipe. The slit facilitates string up in corrosive environments, such as: H₂ SO₄ bath.

COSMOS' bisected eyelets are available to improving wear-resistance at the wire inlet and outlet of hinged air wipes. Please choose eyelet(s) from page 3-1, 3 - 4.

Modular Air Wipes

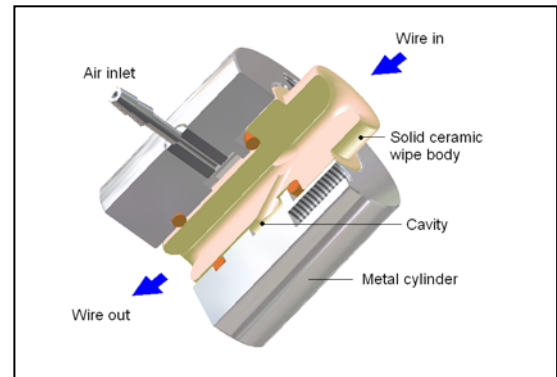
Patent pending

COSMOS has created the diamond-lapped Modular Air Wipe in ultra-hard materials exclusively for the purpose of cleaning wires measuring **0.05 to 2.0 mm** in diameter. The benefits:

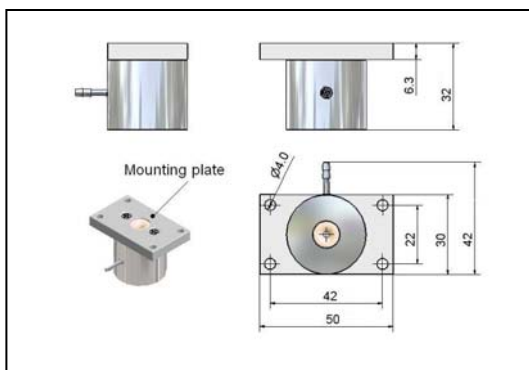
Improves wire quality
Reduces machine down time
Saves on air consumption

The sectioned view at right depicts the basic construction of a COSMOS Modular Air Wipe. Here is how it works:

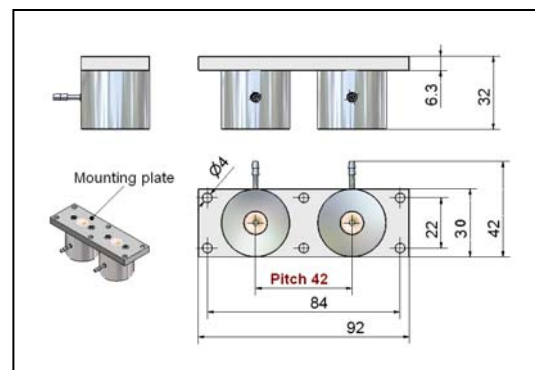
Air enters the metal cylinder through a barbed metal connector into the circumferential cavity, routing the air to the air jet passages on the solid ceramic wipe body. The wire is cleaned (not shown) when debris is carried through the wire-in opening. Clean wire emerges from wire-out.



The mounting plates provide an easy means of installation, in single or multiple modules, to the machine frame. The pitch, or spacing between modules, is **42 mm**.



AWM 10 single unit



AWM 10 twin mount

The solid ceramic wipe body is precision-ground on the O.D., insuring an airtight fit onto the "O" rings in the metal cylinder; yet it can be easily removed for switching to another wire diameter by loosening 2 mounting screws to mutate the wipe body.

The solid ceramic wipe body (Part Number AW 10) is available from stock in the following bore sizes: **0.2, 0.3, 0.5, 0.7, 0.8, 1.0, 1.2, 1.5, 2.0 and 2.3 mm**

COSMOS ENTERPRISES CO., LTD.

Introducing Top-Loading Air Wipe AWM 1 by COSMOS

Patent Pending

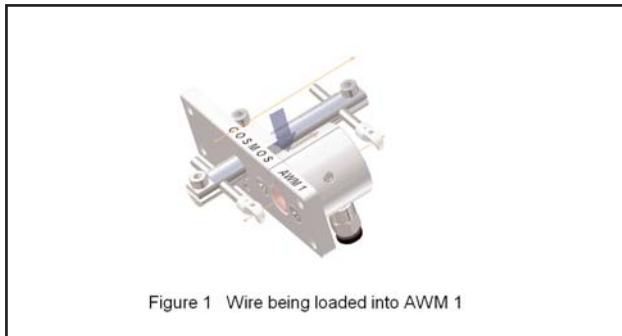


Figure 1 Wire being loaded into AWM 1

COSMOS innovated the Top-Loading Air Wipe AWM 1 for wiping wire diameters 0.5 mm - 0.05 mm. The salient features are:

1. Non-stop loading;
2. One-diameter, diamond polished wipe bore;
3. Independent, adjustable wire centering.

Non-stop threading

See figure 1. You thread the wire without stopping the line. The wire is dropped into the wipe body through an open slot, then slides into 2 centering guides, one on each side of the wipe body. Turn on the compressed air. The decompressed air exhausts from the wire entrance, carrying the water and particulates, without leaking through the open slot.

Diamond polished wipe body

The wipe body, being made of 99% high alumina, is thoroughly diamond polished in the one - diameter, straight bore, not in an attempt to reduce friction between the wire and the bore, but to enhance the laminar flow of the air stream to raise wiping efficiency. Actually, the chance of the wire rubbing against the bore is nil, as the wire is not centered by reducing the bore diameter.

Independent, adjustable wire centering

In air wiping the centering of the wire within the wipe body governs the efficiency of the air wipe or the cost of wire cleaning. Conventional air wipes incorporate a reduced bore diameter next to the cleaning portion to keep the wire centered. The design works, but it suffers from wear of the bore, particularly if it is not polished, plus an accumulation of debris at the shoulder between the larger and the smaller bore.

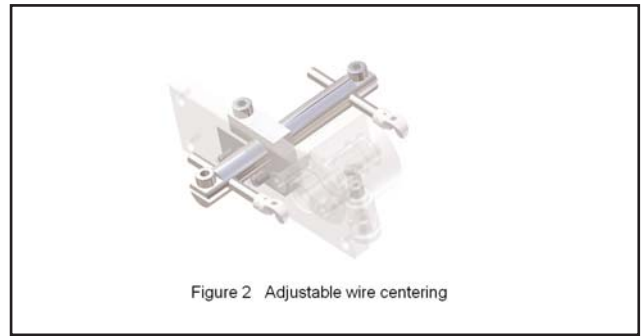


Figure 2 Adjustable wire centering

COSMOS addressed the issue by centering the wire externally, independent of the wipe body, thus achieving the one - diameter, straight bore without constriction. See Figure 2 in which all components irrelevant to wire centering are rendered transparent. The hook guides are adjustable in 3 dimensions, allowing a perfect centering of the wire. Being made of 99% alumina and diamond polished, they offer very little friction to the wire, plus the fact that replacements can easily be made by loosening one screw holding each guide.

Installation

There are four $\varnothing 4.0$ mounting holes on the mounting plate, see figure 3.

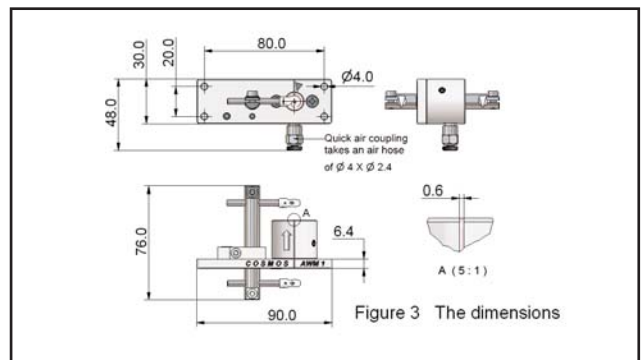


Figure 3 The dimensions

Air consumption and sound level

Air consumption of the AWM 1 is modest and the sound level low. Shown below:

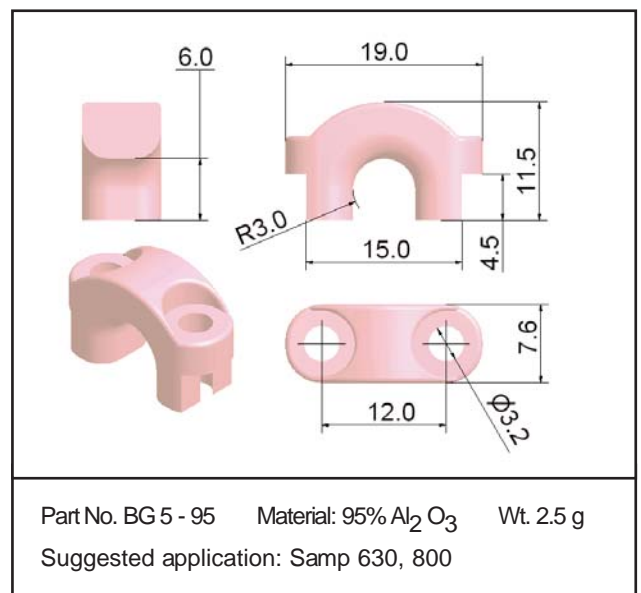
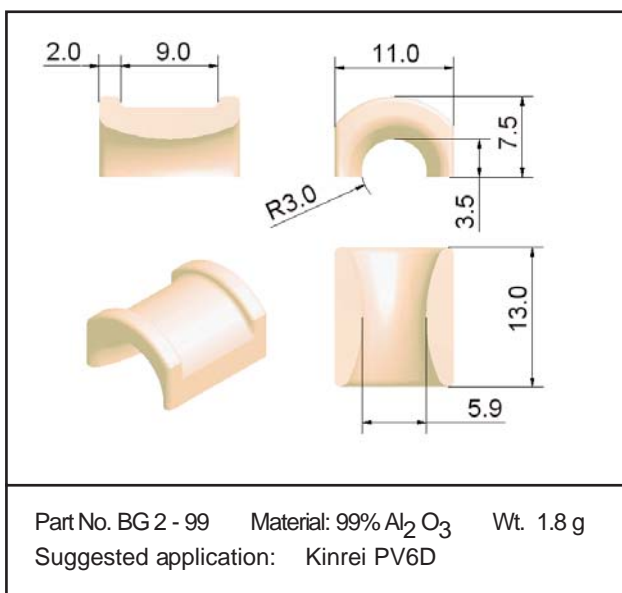
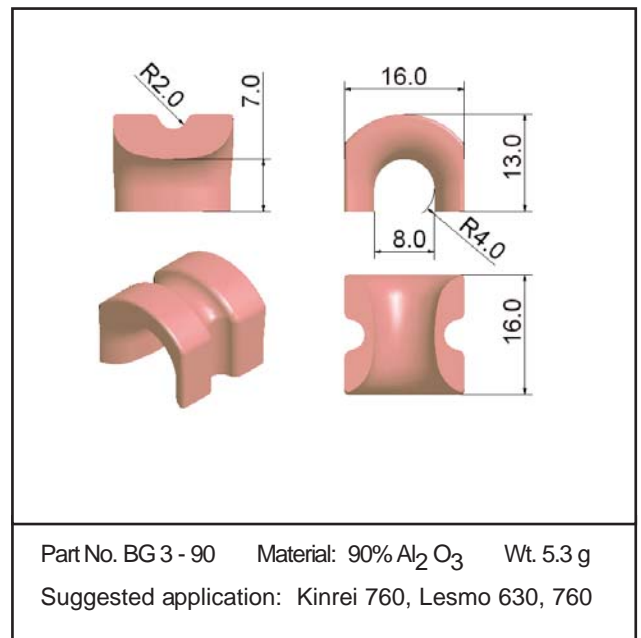
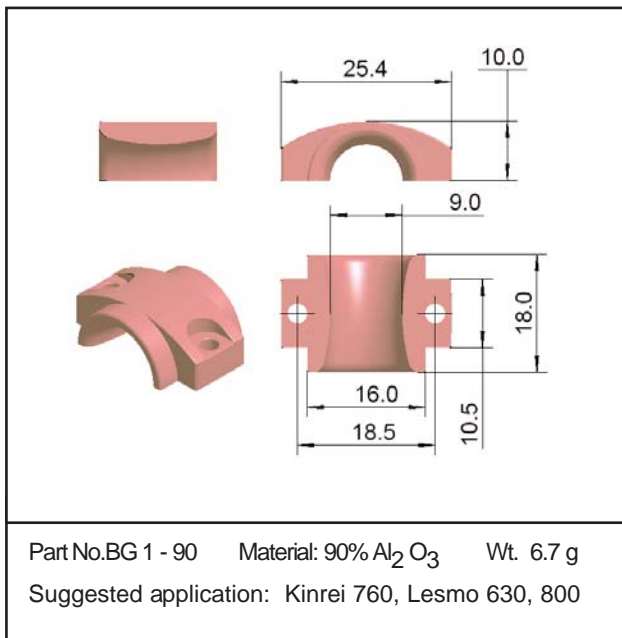
Air Pressure in Bars	Air Consumption in Liters/Minute	Sound Level at 1 Meter in dBA
2	26.4	67.0
3	34.2	70.0
4	42.1	74.5
5	51.9	76.5

COSMOS ENTERPRISES CO., LTD.

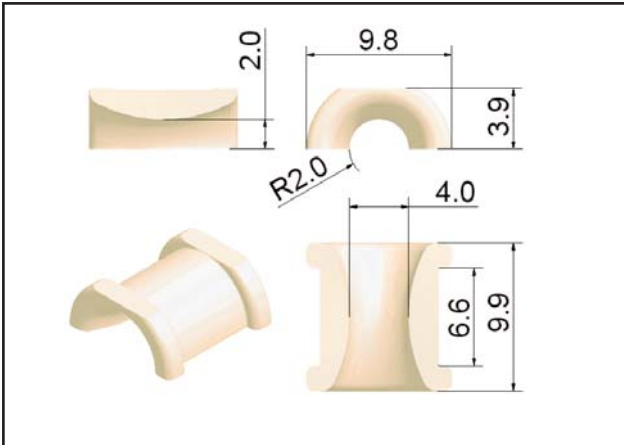
Phone: +886-2-2218-1292 Fax: +886-2-2218-5320 info@cosmos-na.com www.cosmos-na.com

Three reasons to choose COSMOS bow guides:

- 1) COSMOS bow guides, diamond lapped, reduce friction, which improves not only the wire quality but also the machine efficiency.
- 2) COSMOS bow guides, precision ground at the base, mount perfectly flat onto the bow. The base is flat to within 0.02 mm (.0008 inches), which positively eliminates wire damage from wedged mounting.
- 3) COSMOS bow guides, lapped to 10 – 18 micro inches Ra, are considered moderately smooth and field-approved to be the most cost-effective.

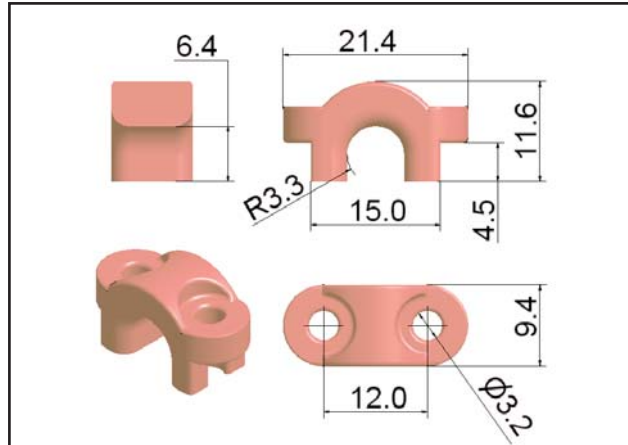


Bow Guides



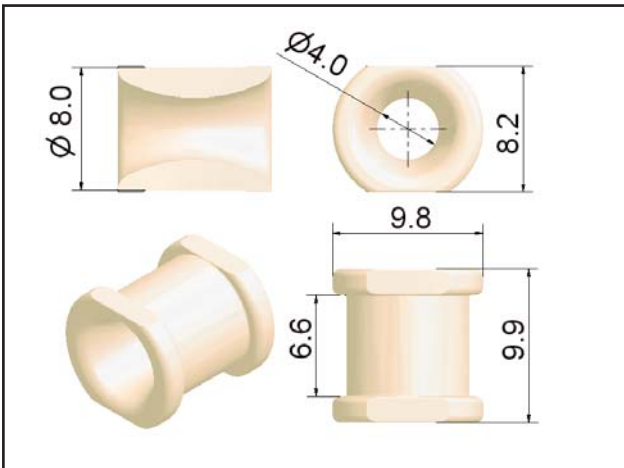
Part No. BG6 - 99 Material: 99% Al₂O₃ Wt. 0.75 g

Suggested application: Kinrei 450, 560



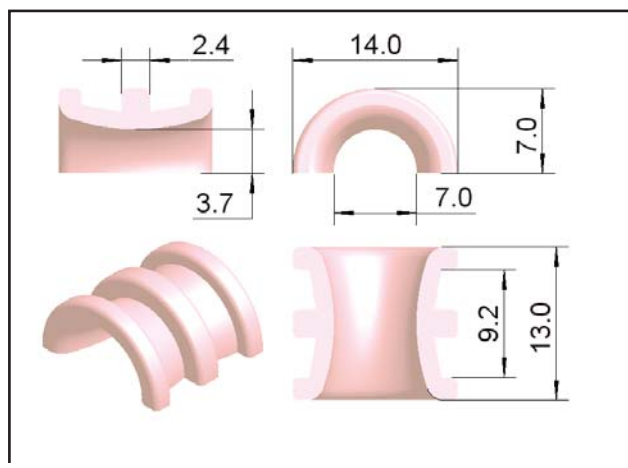
Part No. BG9 - 90 Material: 90% Al₂O₃ Wt. 3.7 g

Suggested application: To replace BG 5, but with a width of 9.4 mm instead of 7.6 mm. It is more robust compared with BG 5.



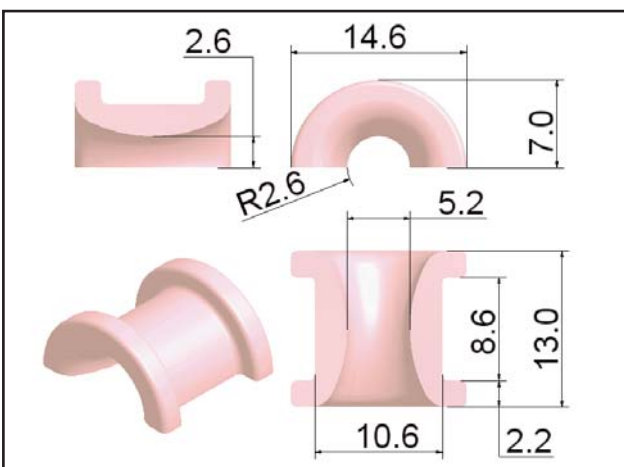
Part No. BG7 - 99 Material: 99% Al₂O₃ Wt. 1.5 g

Suggested Application: Samp BM 630, Kinrei 760



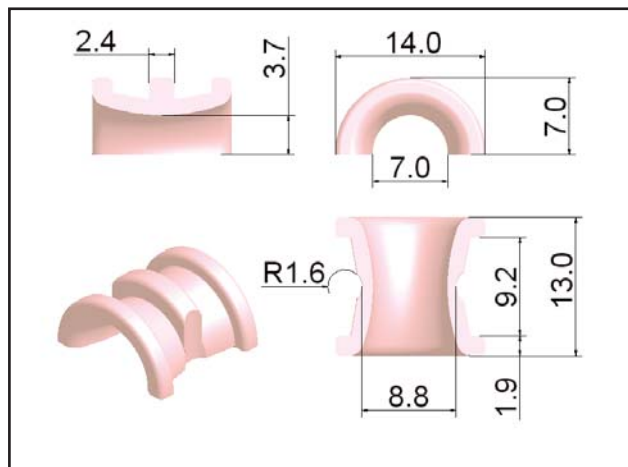
Part No. BG10 - 95 Material: 95% Al₂O₃ Wt. 1.5 g

Suggested Application: Niehoff D 630



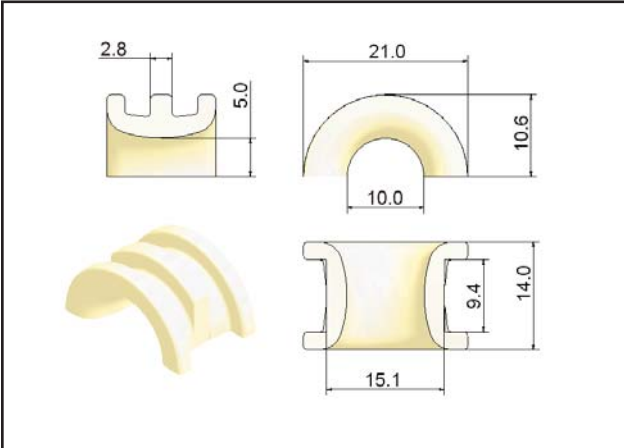
Part No. BG8 - 95 Material: 95% Al₂O₃ Wt. 1.0 g

Suggested application: Kinrei 630, 760, Niehoff 630

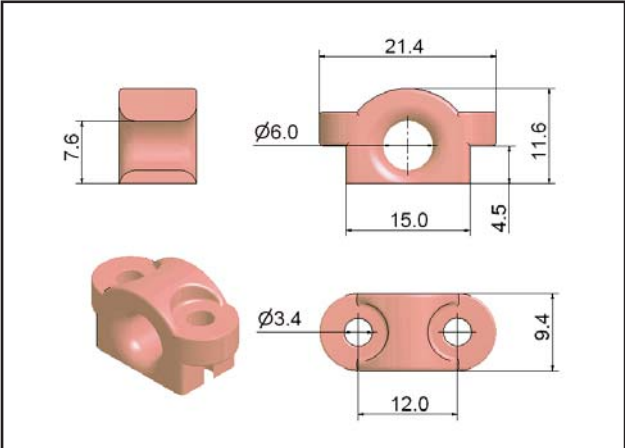


Part No. BG10 - 4 - 95 Material: 95% Al₂O₃ Wt. 1.5 g

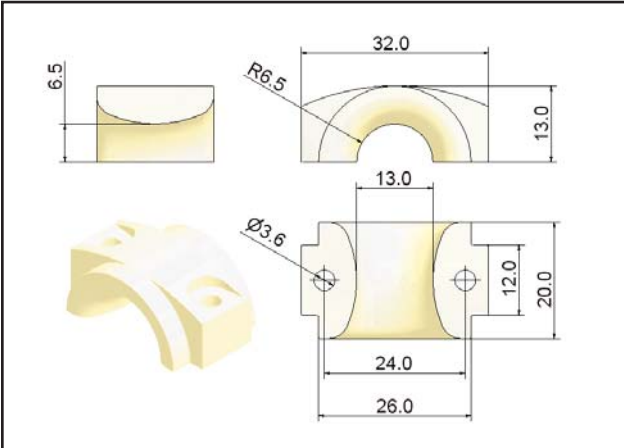
Suggested Application: Niehoff D 631



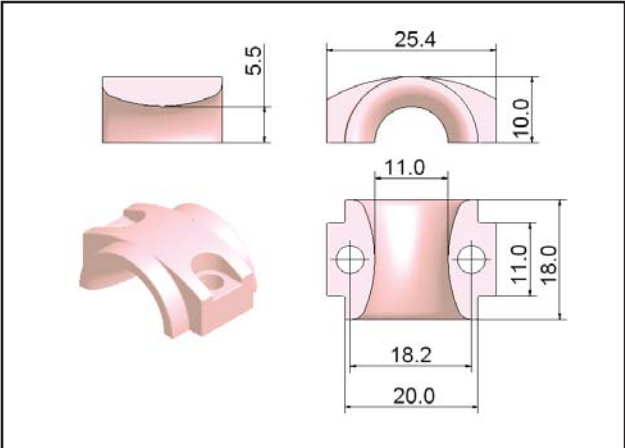
Part No. BG 18 - 99 Material: 99% Al₂ O₃ Wt. 3.9 g
Suggested application: Niehoff D 801



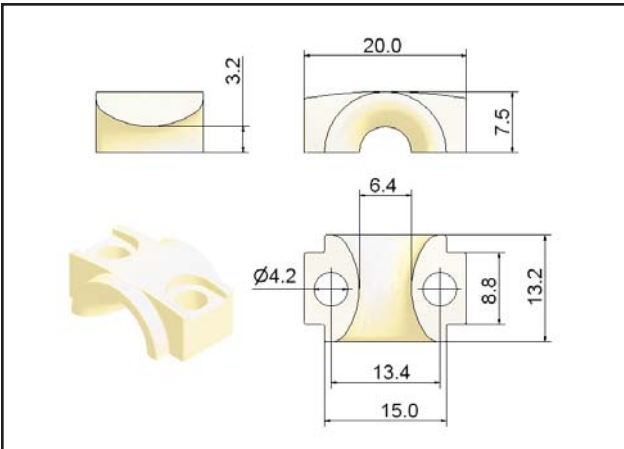
Part No. BG 19 - 90 Material: 90% Al₂ O₃ Wt. 4.0 g
Suggested application: Samp 630, 760, 800 to reduce wear of the steel stripe



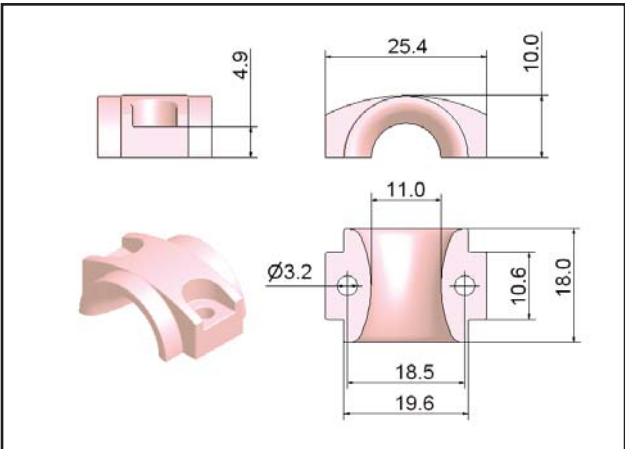
Part No. BG 21-99 Material: 99% Al₂ O₃ Wt. 17 g
Suggested application: Lesmo 800, 1000



Part No. BG 22 - 95 Material: 95% Al₂ O₃ Wt. 8 g
Suggested application: Lesmo 630, 760, 800



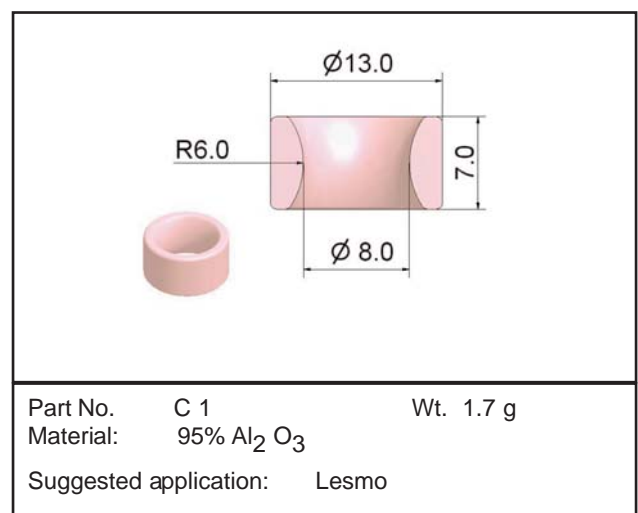
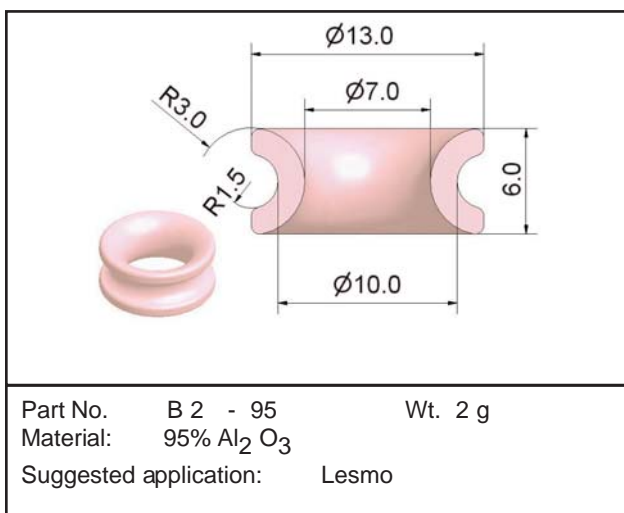
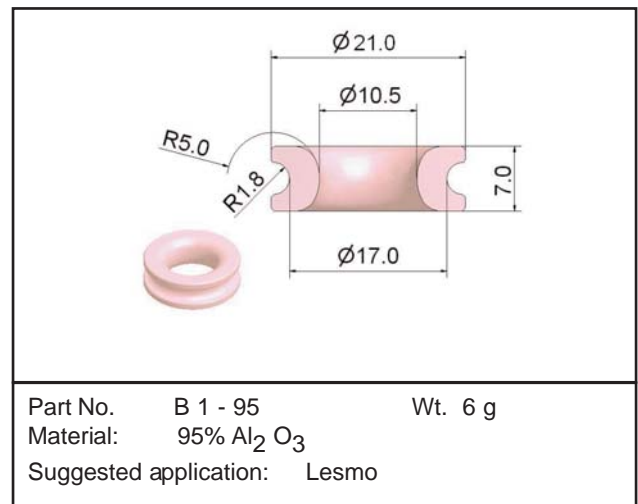
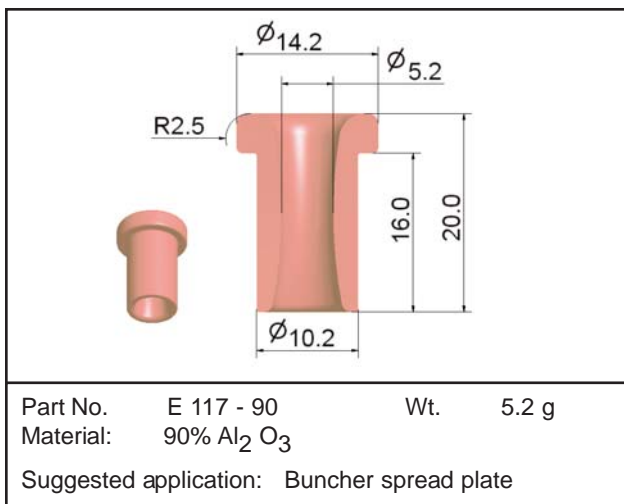
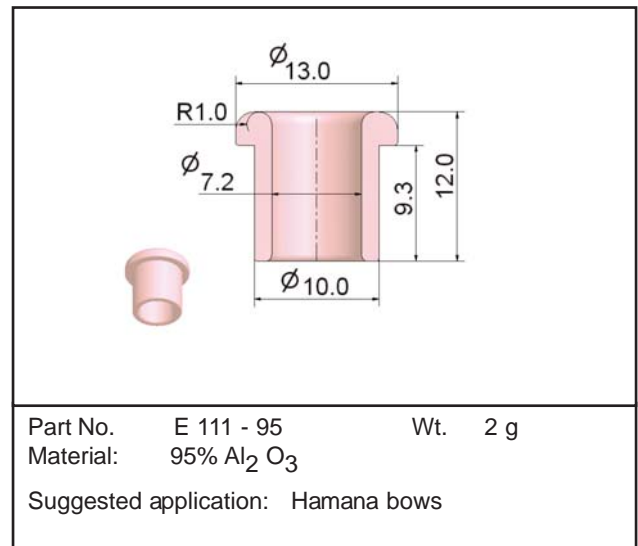
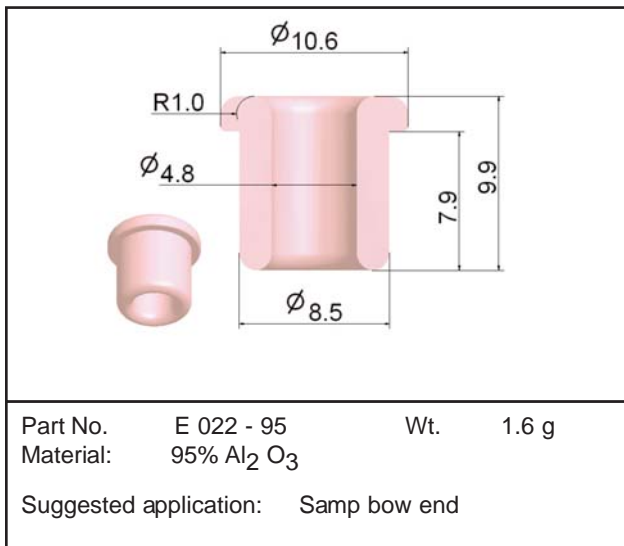
Part No BG 23 - 99 Material: 99% Al₂ O₃ Wt. 4 g
Suggested application: Lesmo 630



Part No. BG 24 - 95 Material: 95% Al₂ O₃ Wt. 7 g
Suggested application: To replace BG 1, but of a more robust construction.

Eyelets for Bunchers

COSMOS eyelets and rings are finding applications in bunching, stranding and twisting machines, in conjunction with COSMOS bow guides. The popular ones are depicted.



Part No. E 004 - 99
Material: 99 % Al₂O₃
Wt. 0.4 g

Part No. E 016 - 95
Material: 95 % Al₂O₃
Wt. 0.3 g

Part No. E 006 - 95
Material: 95 % Al₂O₃
Wt. 1.2 g

Part No. E 017 - 90
Material: 90 % Al₂O₃
Wt. 0.1 g

Part No. E 007 - 90
Material: 90 % Al₂O₃
Wt. 1.1 g

Part No. E 018 - 99
Material: 99 % Al₂O₃
Wt. 0.4 g

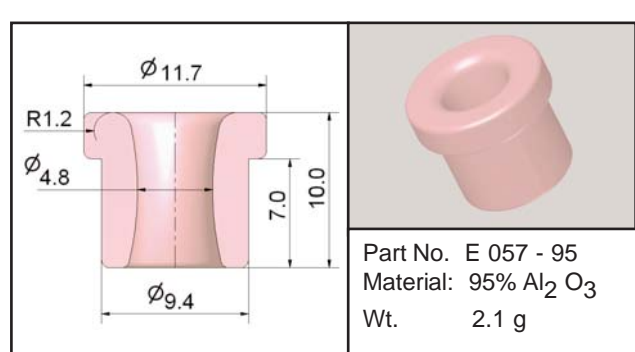
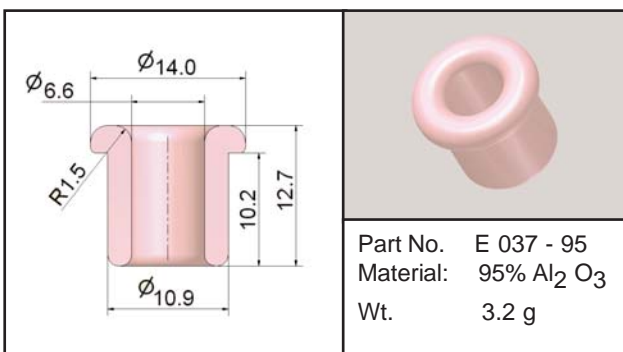
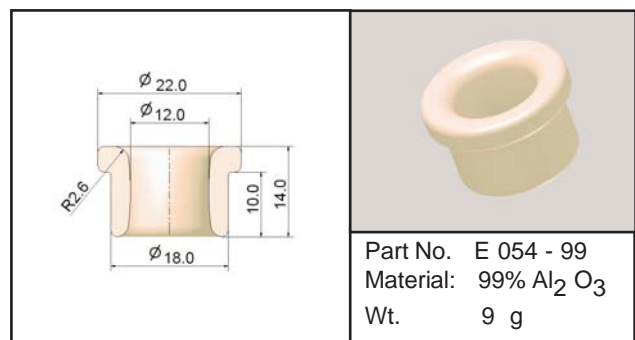
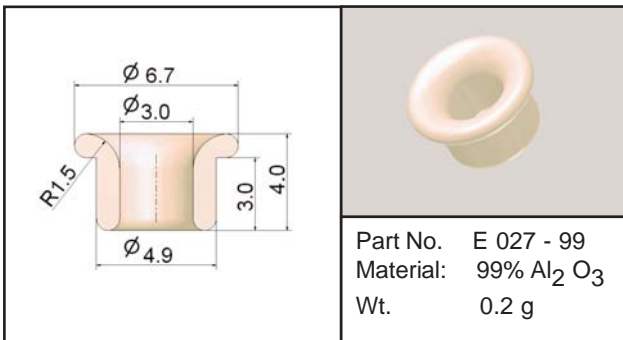
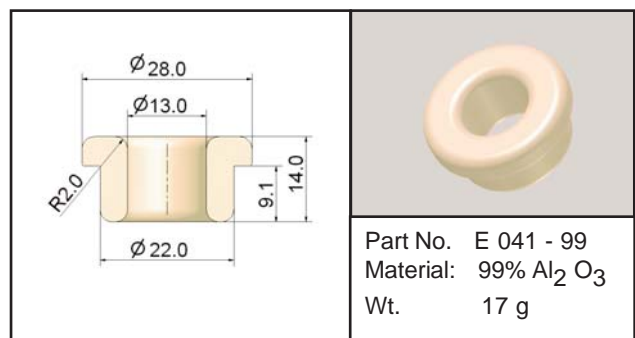
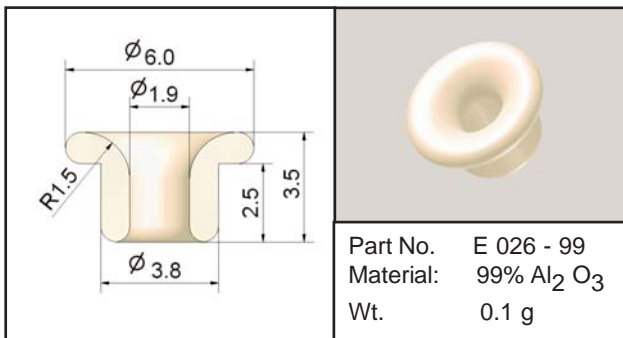
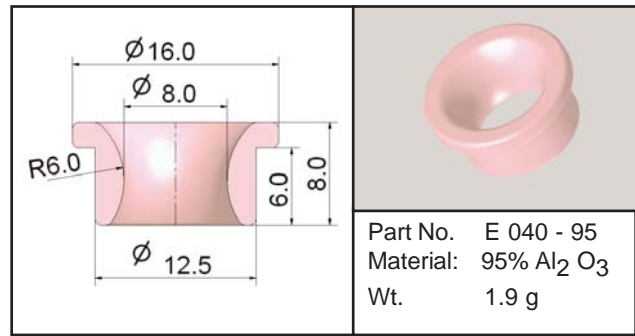
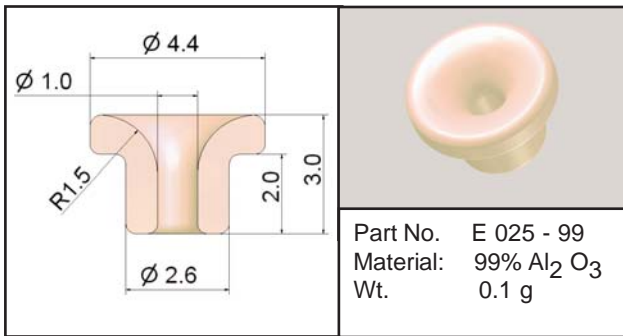
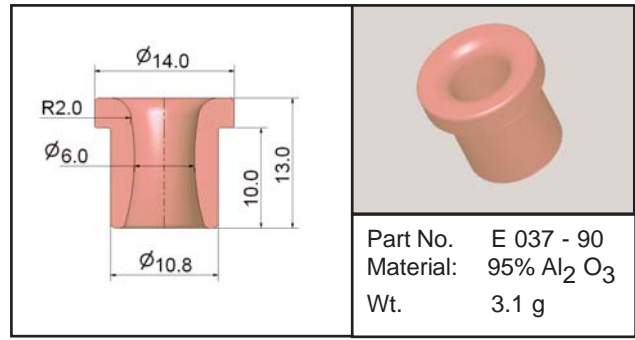
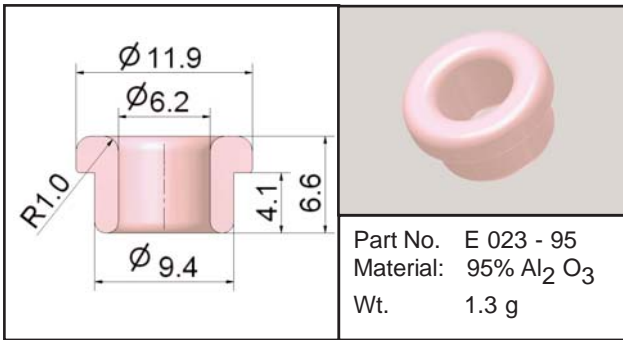
Part No. E 012 - 99
Material: 99 % Al₂O₃
Wt. 0.55 g

Part No. E 019 - 99
Material: 99 % Al₂O₃
Wt. 0.5 g

Part No. E 014 - 99
Material: 99 % Al₂O₃
Wt. 0.7 g

Part No. E 022 - 95
Material: 95 % Al₂O₃

Eyelets/Flanged



Part No. E 064 - 95
Material: 95% Al₂ O₃
Wt. 12 g

Part No. E 117 - 90
Material: 90% Al₂ O₃
Wt. 5.2 g

Part No. E 093 - 95
Material: 95% Al₂ O₃
Wt. 0.5 g

Part No. E 122 - 95
Material: 95% Al₂ O₃
Wt. 0.8 g

Part No. E 104 - 99
Material: 99% Al₂ O₃
Wt. 0.8 g

Part No. E 123 - 90
Material: 90% Al₂ O₃
Wt. 1.4 g

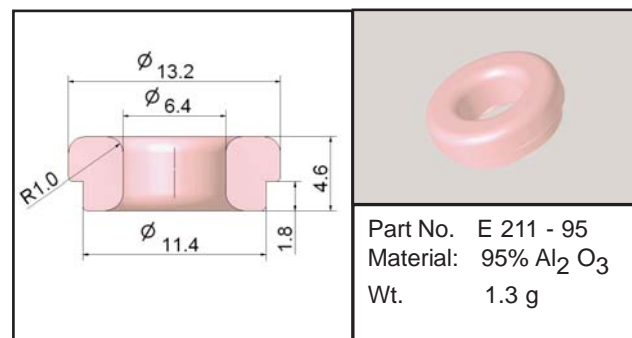
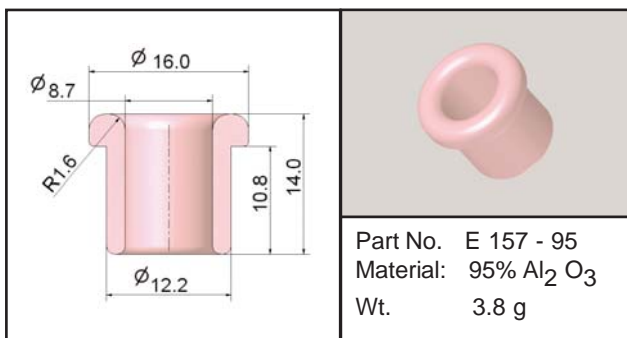
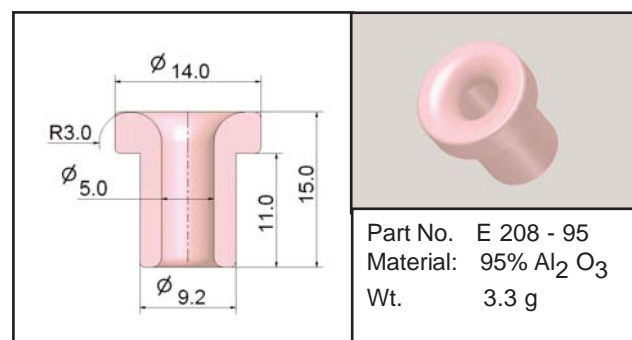
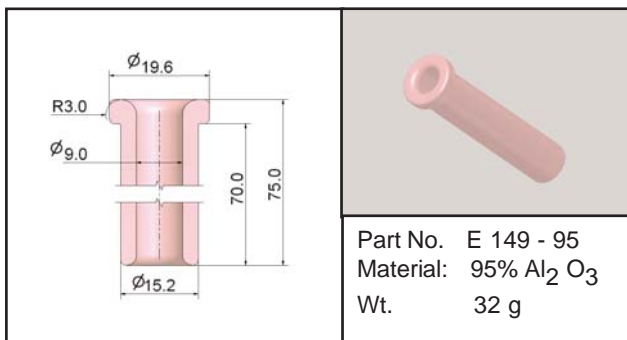
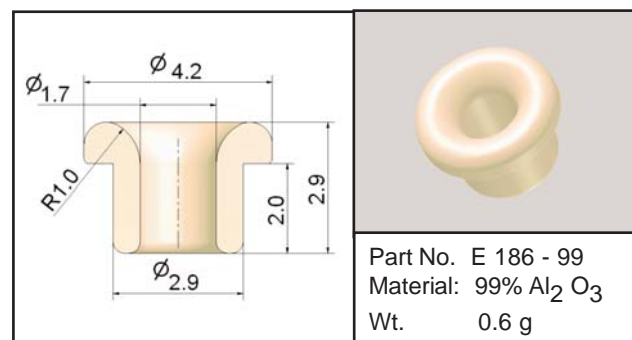
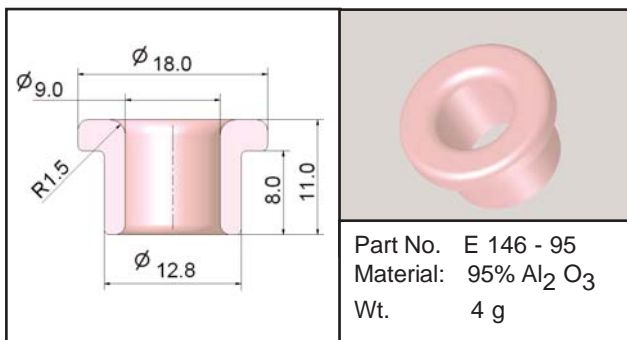
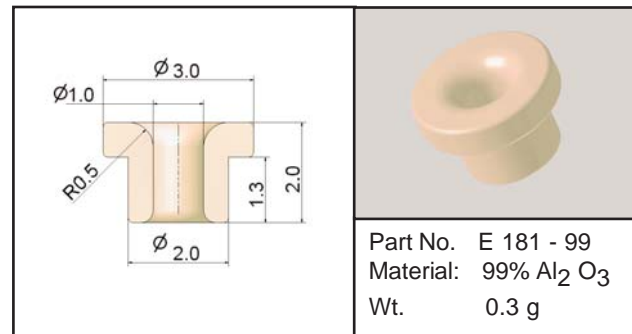
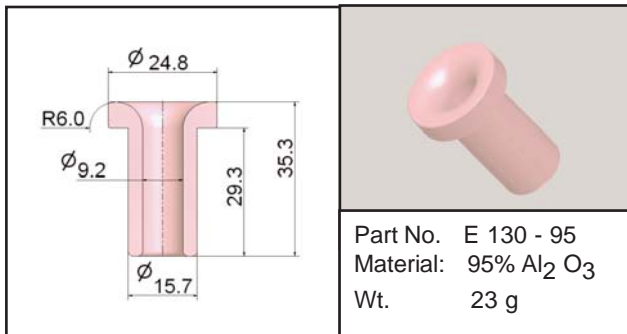
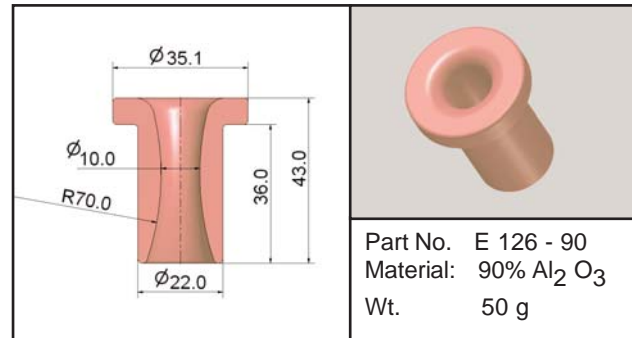
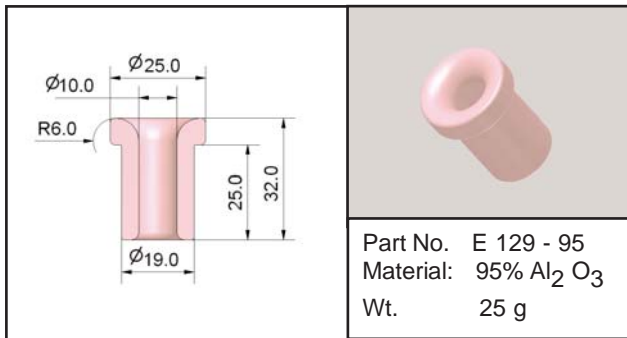
Part No. E 110 - 90
Material: 90% Al₂ O₃
Wt. 2.5 g

Part No. E 124 - 90
Material: 90% Al₂ O₃
Wt. 3.3 g

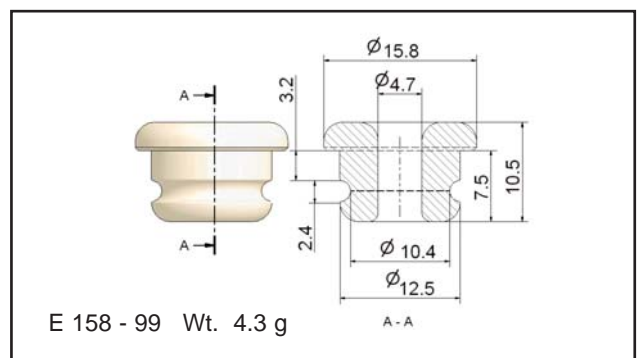
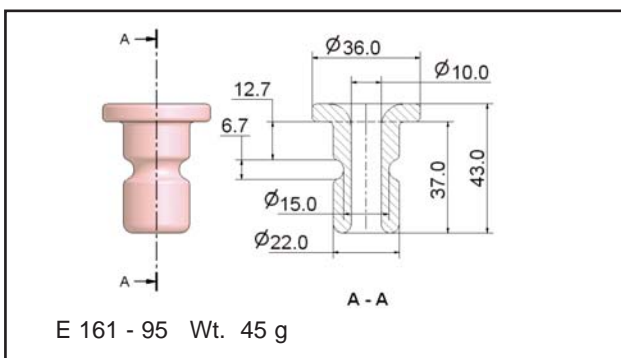
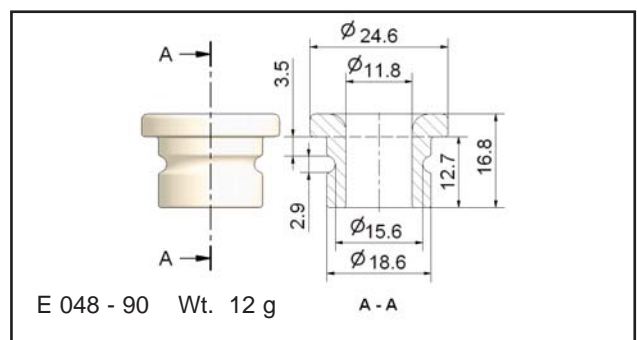
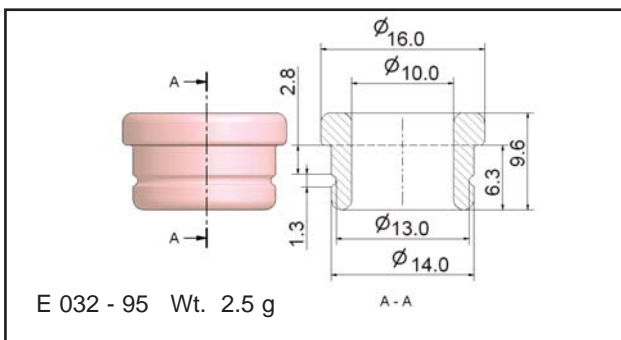
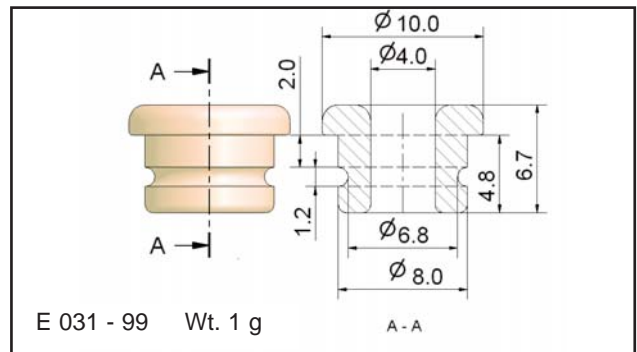
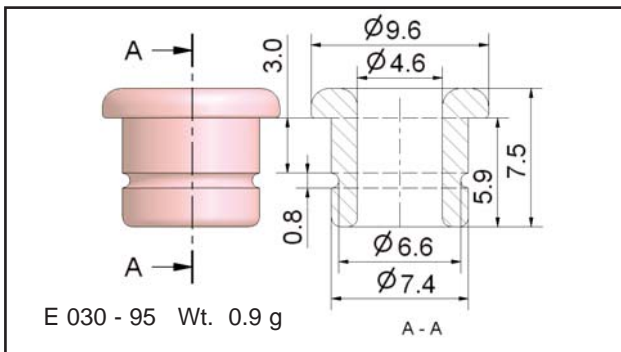
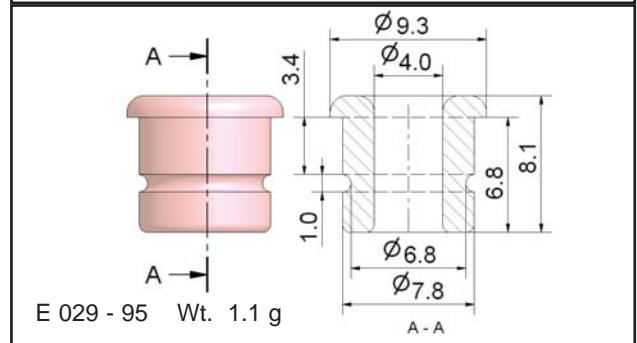
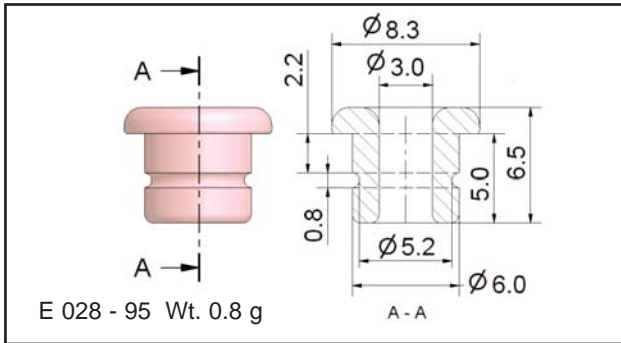
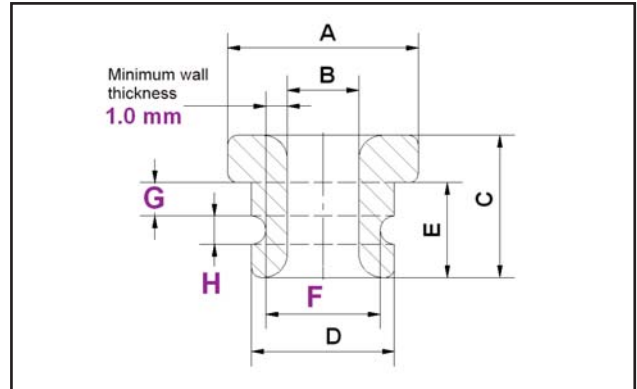
Part No. E 111 - 95
Material: 95% Al₂ O₃
Wt. 2 g

Part No. E 128 - 90
Material: 90% Al₂ O₃
Wt. 6.5 g

Eyelets/Flanged

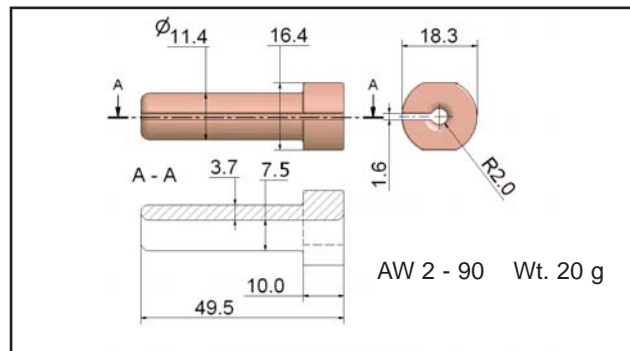
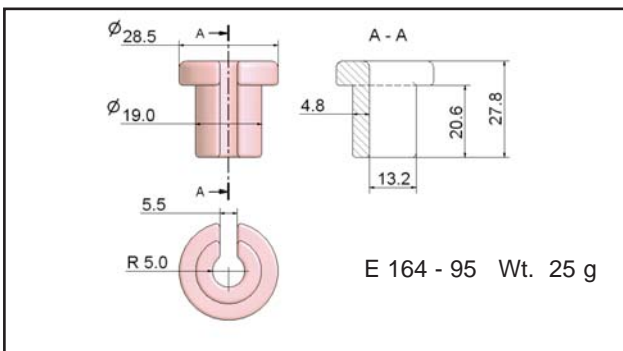
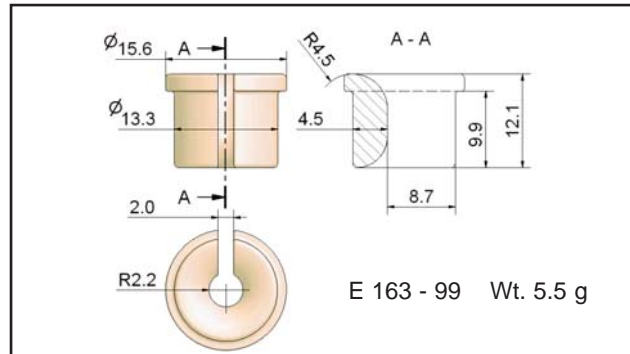
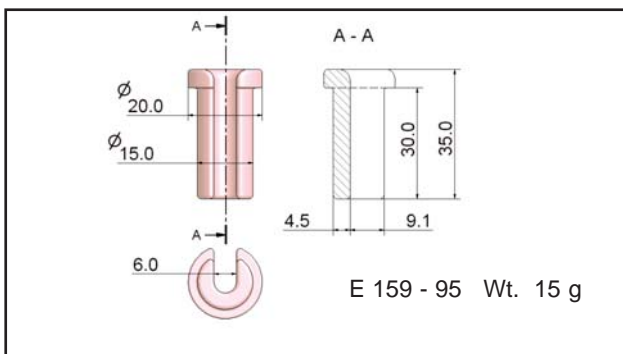
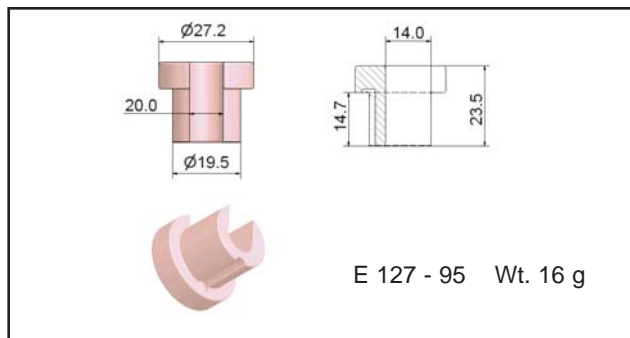
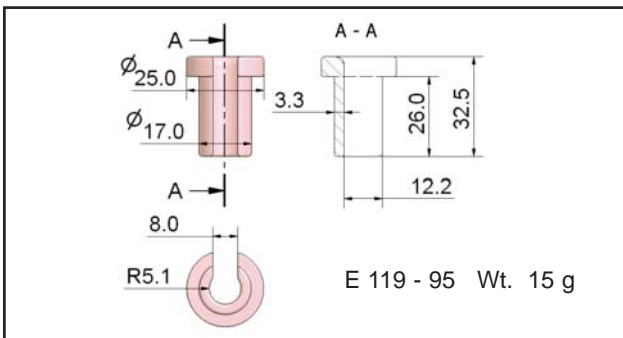
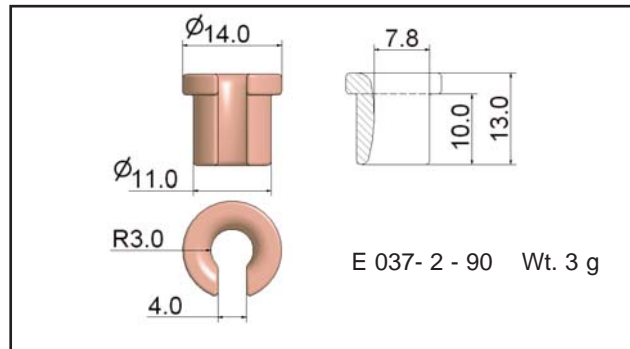
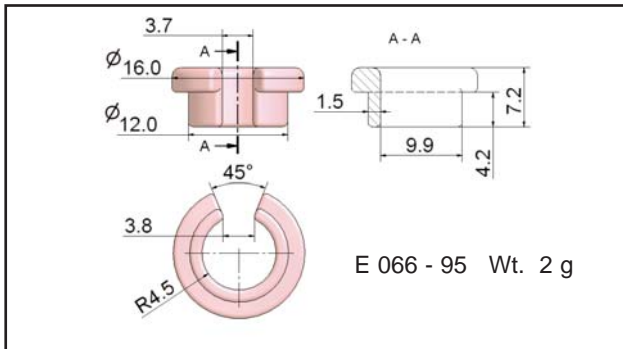
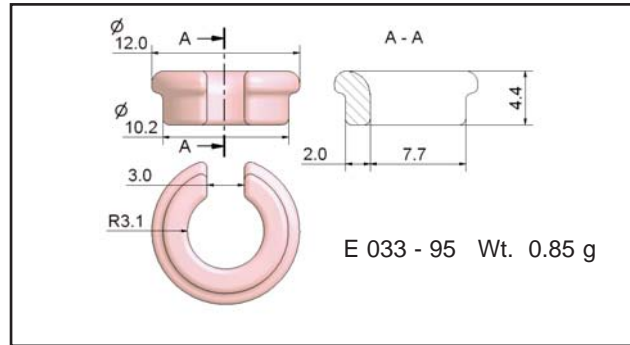


All flanged eyelets by COSMOS can be grooved at the request of the customer by indicating the dimensions **F, G, H** depicted at right. For structural rigidity, it is recommended that the wall thickness at the groove should not be less than 1.0 mm. Some of the frequently grooved eyelets are illustrated.



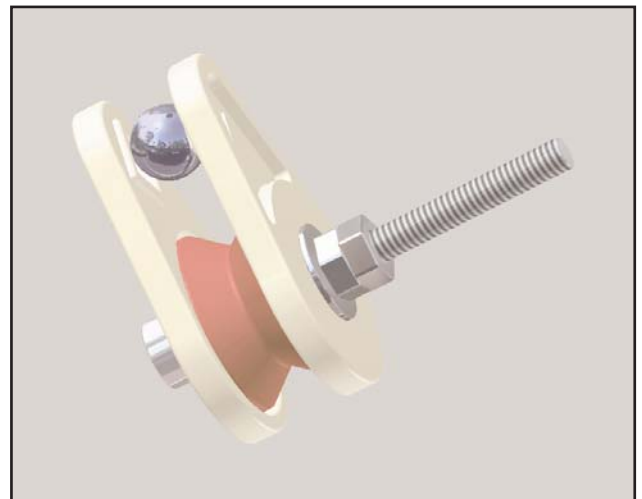
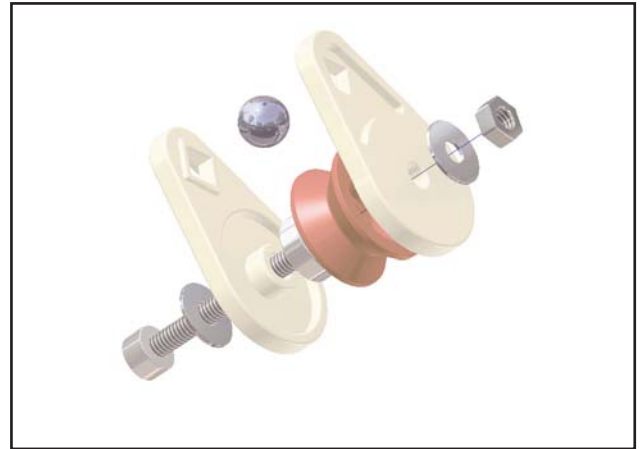
Eyelets/Slotted

Slotted eyelets not only facilitate stringing up, but also can be improvised to catch lumps on the wire, such as: zinc coating. While slotting flanged eyelets is feasible, it is not a cost-effective process. We offer slotting on eyelets of our produce of length up to 15 mm and width up to 2 mm. For routine application, a new tool (mold) is recommended.

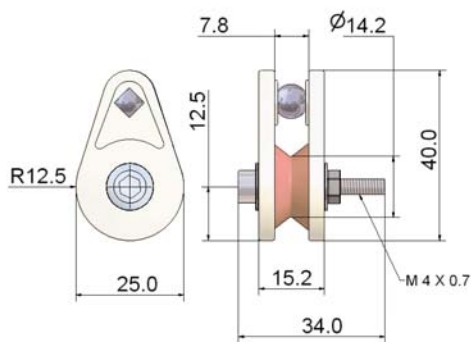


Caged Pulleys stop Wire Jumping + Easy Threading

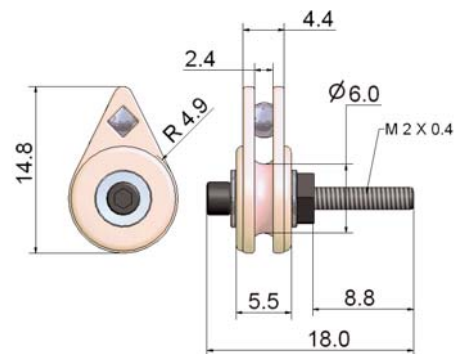
Caged pulleys are recommended where the wire turns at acute angles, and wire jumping is an issue. Wire guided by caged pulley runs on a surface that is revolving, rather than stationary. In the meantime, it is caged between 2 side plates with protruding ears or a floating ball, which further restrict wire movement in the vertical and lateral direction. It is highly desirable that not only the pulley but also the side plates should be diamond lapped, as the wire does occasionally come into contact with the side plates, as shown in photo below, due to misalignment. Diamond lapped side plates offer additional protection to the wire.



Where reduced weight is a crucial consideration, such as, in precision coil winding or fine wire processing, we offer the NT 067 at 1.8 g.

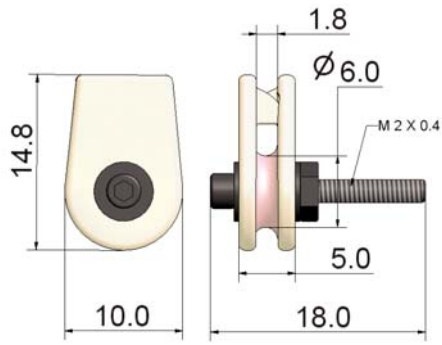


Part No. NT 064 Material: 90 % Al₂O₃
 Bearing No. 694 ZZ Wt. 27 g

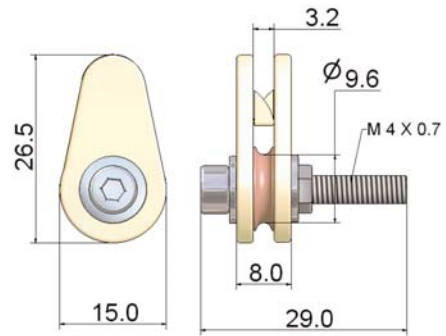


Part No. NT 067 Material: 99 % Al₂O₃
 Bearing No. 520 ZZ Wt. 1.8 g

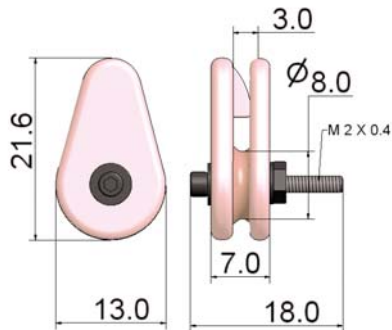
Caged Pulleys



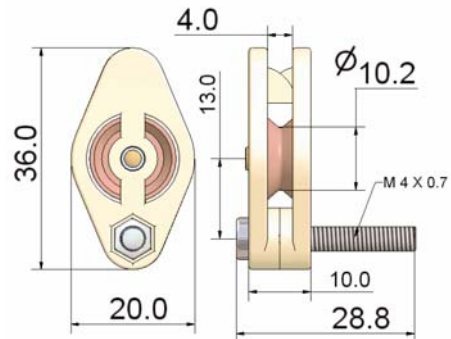
Part No. NT 058 Material: 99% Al₂O₃
 Bearing No. 520 ZZ Wt. 2.0 g



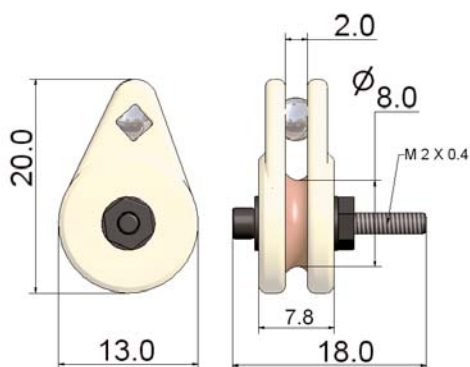
Part No. NT 002 Material: 99% Al₂O₃
 Bearing No. 840 ZZ Wt. 9.2 g



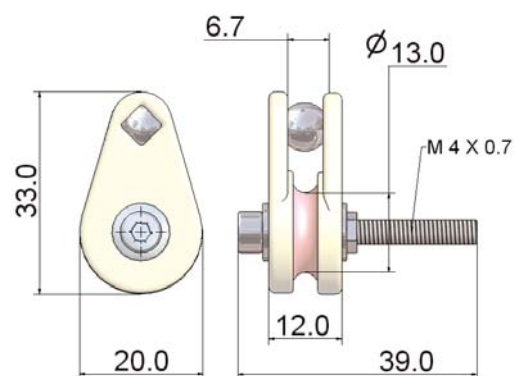
Part No. NT 001 Material: 95% Al₂O₃
 Bearing No. 692 ZZ Wt. 4.7 g



Part No. NT 003 Material: 95% Al₂O₃
 Bearing No. 683 ZZ Wt. 14 g

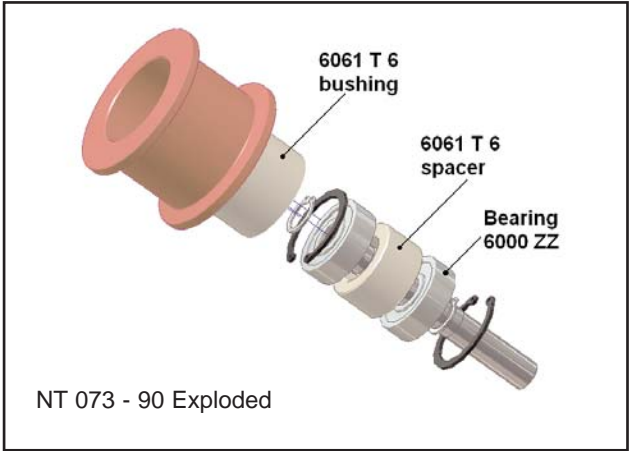
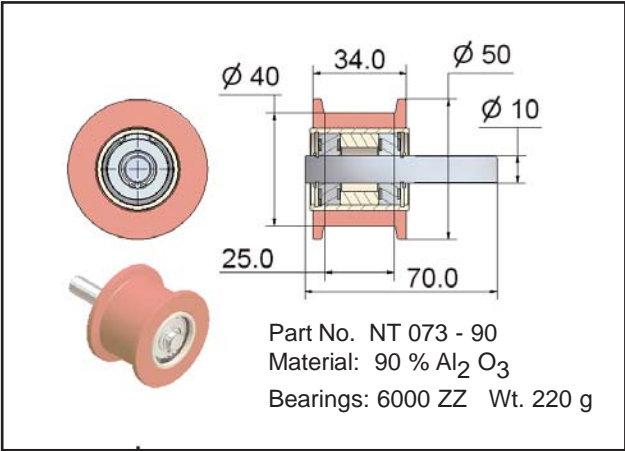


Part No. NT 001 B Material: 95% Al₂O₃
 Bearing No. 692 ZZ Wt. 4.9 g



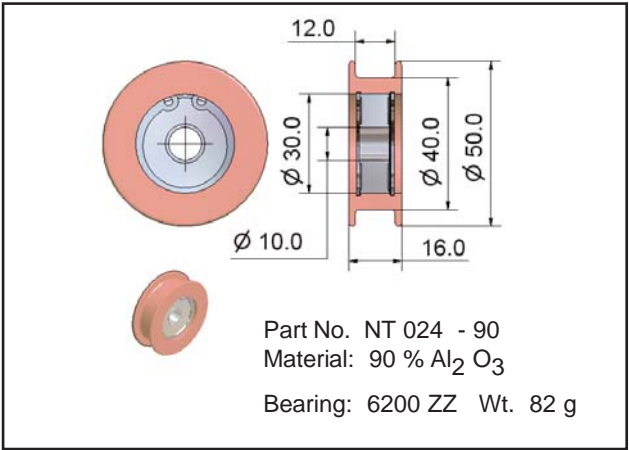
Part No. NT 062 Material: 99% Al₂O₃
 Bearing No. 694 ZZ Wt. 19 g

Flat Groove Pulleys are dedicated for Flat Wires, Ribbons and Stripes



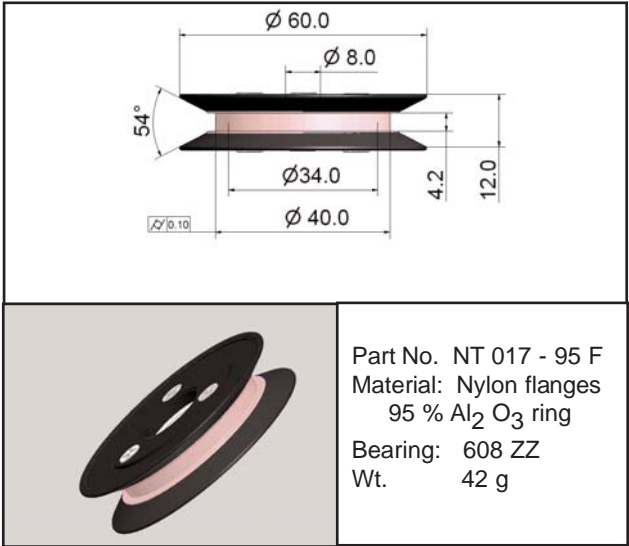
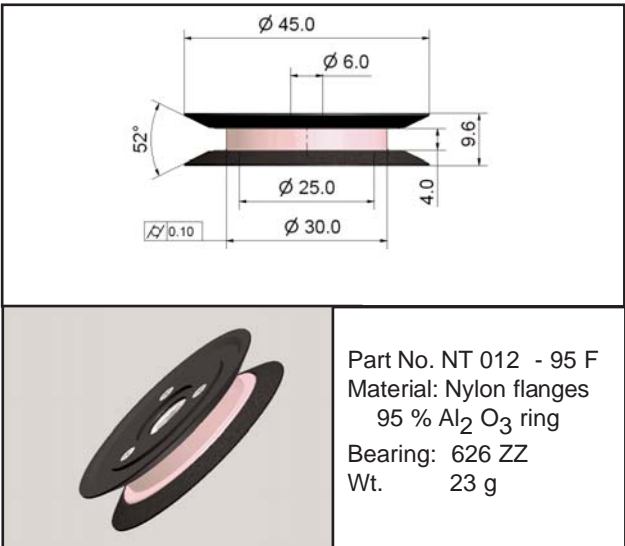
Solid alumina pulleys with flat groove are available with or without bearing(s). However, when bearing(s) and mounting shaft are factory fit, as in the exploded view at upper right, the running accuracy can be calibrated to within 0.05 mm T. I. R. (Total Indicator Reading).

Additional flat groove solid alumina pulleys can be found on page 4 - 6.



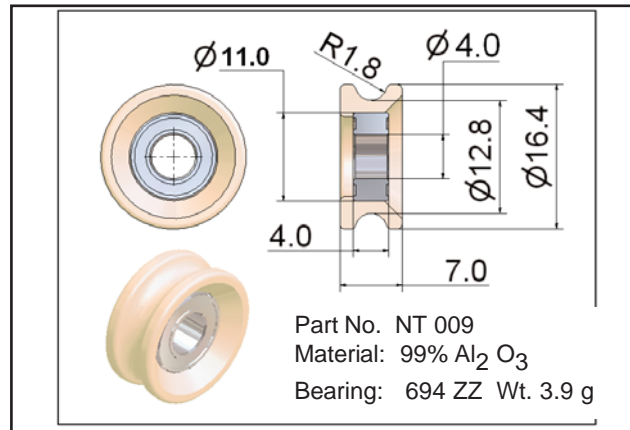
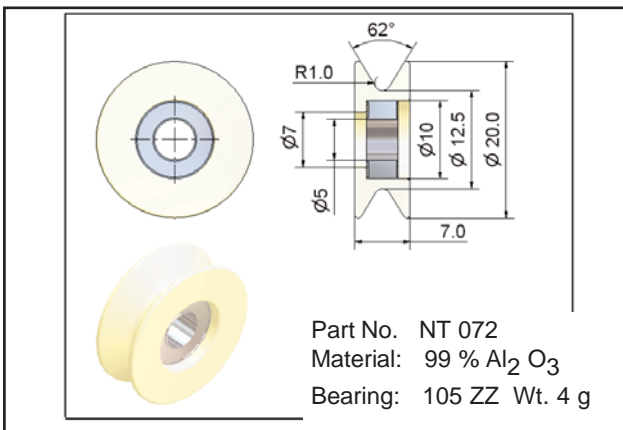
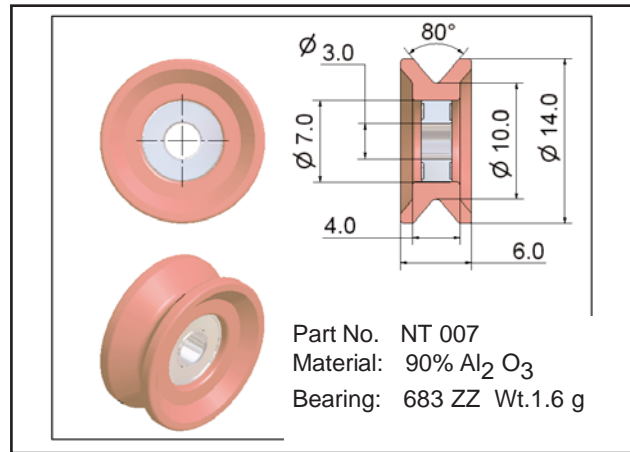
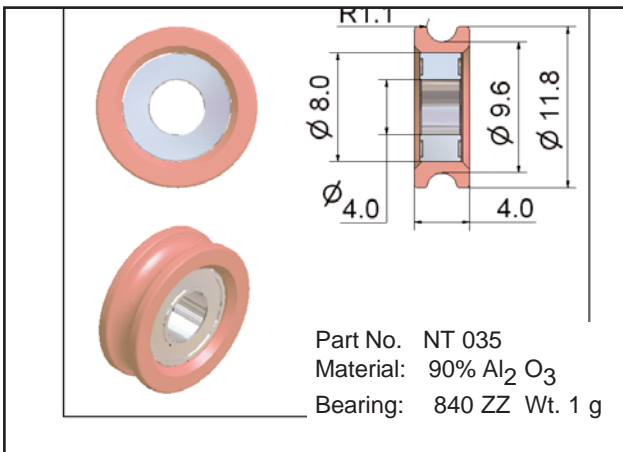
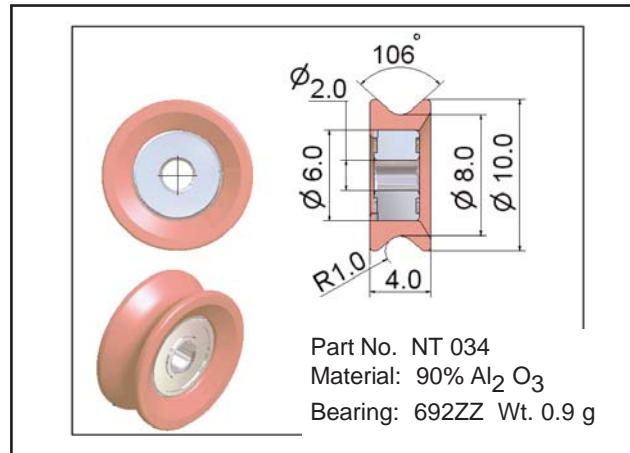
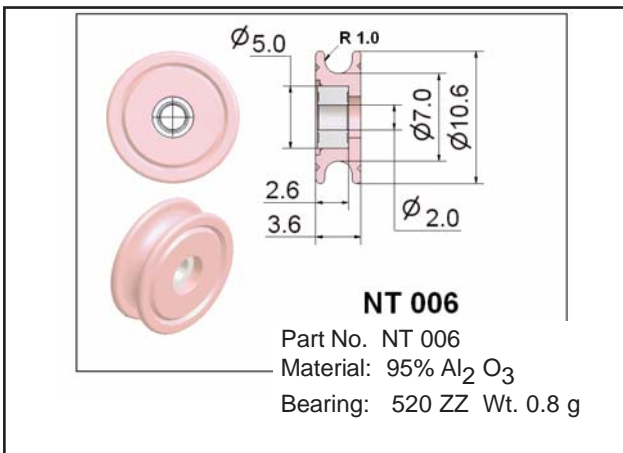
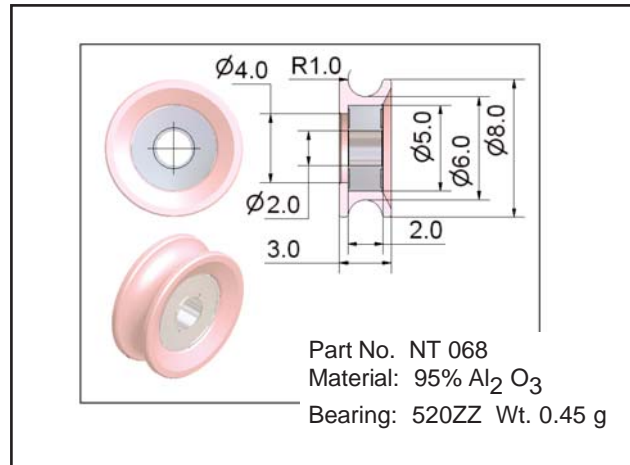
All COSMOS flanged pulleys can be fit with flat groove alumina rings upon request.

Below are 2 examples. The suffix "F" designates a flat groove ring.



Miniature Pulleys

COSMOS offers miniature pulleys of groove diameter under **20 mm** for precision coil winding and fine wire processing. These pulleys can be ground to a concentricity of 0.05 mm T. I. R. upon request to eliminate variations in wire tension due to eccentric rotation. 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.



Solid alumina pulleys can be fitted with:

- 1) Metric Ball Bearing
- 2) Imperial Ball Bearing
- 3) Resin Bearing.

For imperial and resin bearings, please designate the shaft diameter.

Part No. NT 024 R - 90
 Material: 90% Al₂ O₃
 Bearing: 6200 ZZ Wt. 80 g

Part No. NT 021 - 90
 Material: 90% Al₂ O₃
 Bearing: 694 ZZ Wt. 7 g

Part No. NT 025 - 95
 Material: 95% Al₂ O₃
 Bearing: 623 ZZ Wt. 8 g

Part No. NT 022 - 90
 Material: 90% Al₂ O₃
 Bearing: MF105ZZ Wt.12 g

Part No. NT 027 - 95
 Material: 95% Al₂ O₃
 Bearing: 634 ZZ Wt. 27 g

Part No. NT 032R - 90
 Material: 90% Al₂ O₃
 Bearing: 625 ZZ Wt. 16 g

Part No. NT 028 - 90
 Material: 90% Al₂ O₃
 Bearing: 608 ZZ Wt. 50 g

Solid Alumina Pulleys

Part No. NT 030 - 90
 Material: 90% Al₂ O₃
 Bearing: 685 ZZ Wt. 14 g

Part No. NT 044 - 99
 Material: 99% Al₂ O₃
 Bearing: 6002 ZZ Wt.138 g

Part No. NT 031 - 95
 Material: 95% Al₂ O₃
 Bearings: MF 105 ZZ X 2
 Wt. 16 g

Part No. NTA 051 - 95
 Material: 95% Al₂ O₃
 Bearings: Resin Wt. 28 g

Part No. NT 032 - 90 - U
 Material: 90% Al₂O₃
 Bearing: 625 ZZ Wt. 17 g

Part No. NTA 052 - 95
 Material: 95% Al₂ O₃
 Bearings: Resin Wt. 14 g

Part No. NTA 033 - 95
 Material: 95% Al₂ O₃
 Bearing: Resin Wt.47 g

Part No. NTA 201 - 95
 Material: 95% Al₂ O₃
 Bearing: R 6 ZZ Wt. 45 g

V-groove flanged pulleys are available upon request.

	Part No.	NT 004 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	694 ZZ
	Wt.	6.4 g

	Part No.	NT 012 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	626 ZZ
	Wt.	23 g

	Part No.	NT 005 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	683 ZZ
	Wt.	2.2 g

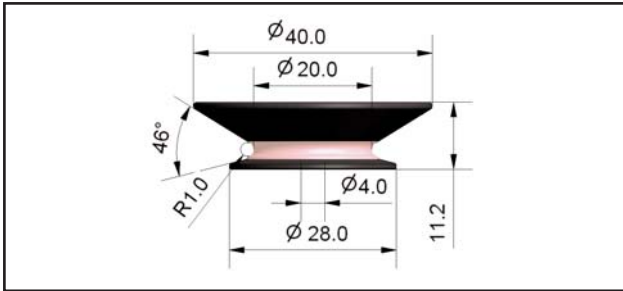
	Part No.	NT 017 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	608 ZZ
	Wt.	42 g

	Part No.	NT 010 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	694 ZZ
	Wt.	11 g

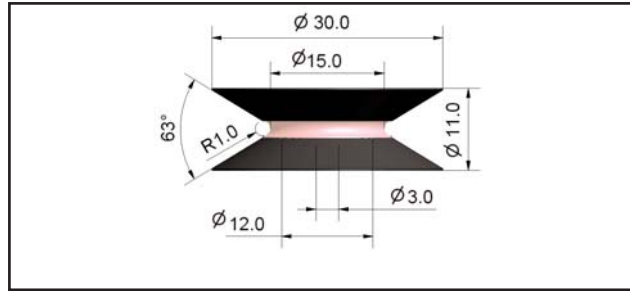
	Part No.	NT 065 - 99
	Material:	Nylon flanges, 99% Al ₂ O ₃ pulley
	Bearing:	6200 ZZ
	Wt.	110 g

	Part No.	NT 080 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearings:	6200 ZZ

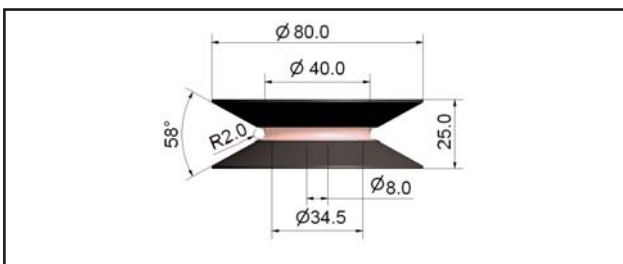
Flanged Pulleys



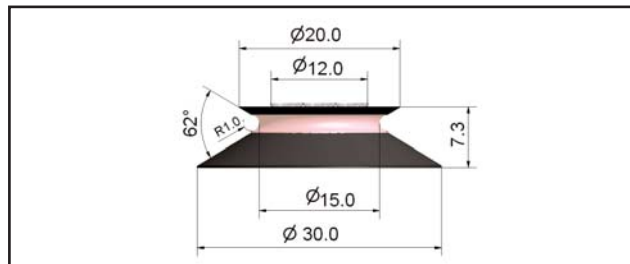
	Part No.	NT 014 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	694 ZZ
	Wt.	8.3 g



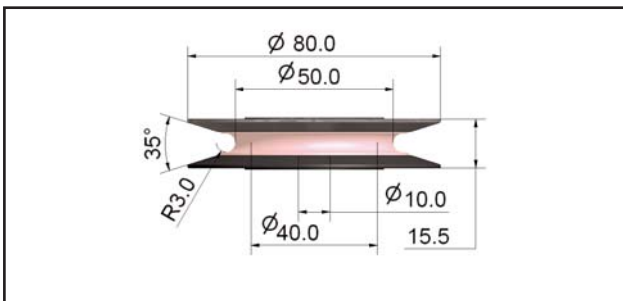
	Part No.	NT 029 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	683 ZZ
	Wt.	5 g



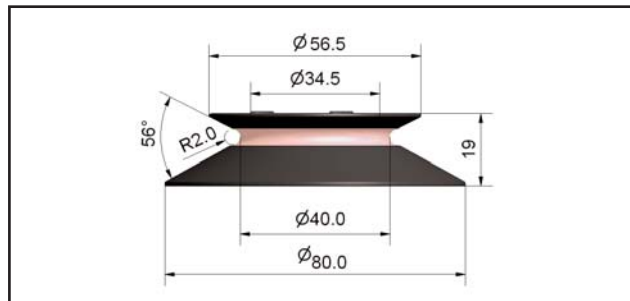
	Part No.	NT 018 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	608 ZZ
	Wt.	62 g



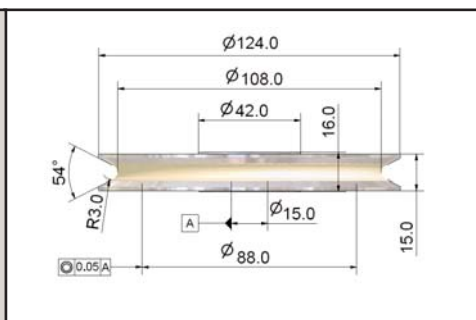
	Part No.	NT 069 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	683 ZZ
	Wt.	4 g



	Part No.	NT 019 - 95
	Material:	Nylon flanges, 95% Al ₂ O ₃ pulley
	Bearing:	6200 ZZ
	Wt.	96 g



	Part No.	NT 016 - 95
	Material:	Aluminum flanges, 95% Al ₂ O ₃ pulley
	Bearing:	608 ZZ
	Wt.	50 g



Part No.	NT 110 - 99
Material:	Aluminum flanges, 99% Al ₂ O ₃ pulley
Bearing :	6002 ZZ
Wt.	380 g

Harsh Environment Pulleys

In the course of manufacturing, wires are subjected to harsh environments like:

Elevated temperature

Acid bath

Acid bath at elevated temperature

Rotating pulleys are preferred to guide the wire in the air or submerged to reduce friction and improve efficiency.

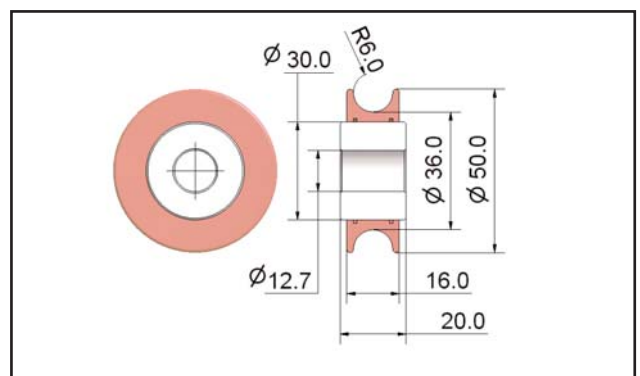
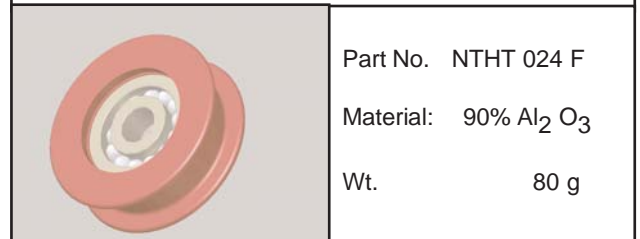
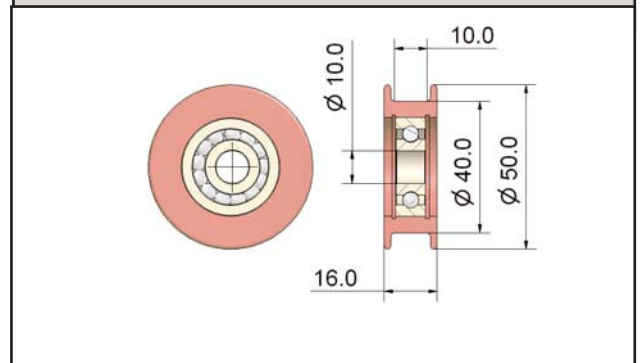
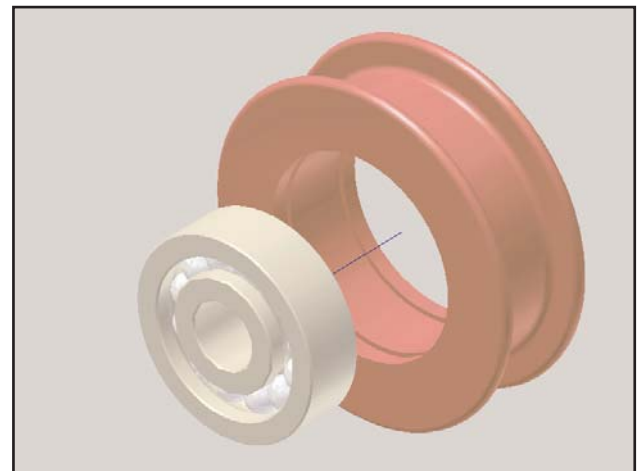
While all solid ceramic pulleys by COSMOS are capable of withstanding high temperature and acid erosion, the traditional grease lubricated steel ball bearings introduced so far do not. The maximum service temperature of the general purpose bearing grease is 130^o C, and none of the steel ball bearings are immune to acid.

Harsh Environment Pulleys

by **COSMOS** withstand **not only high temperature but also acid attack**. They are available with sleeve bearings made of wear-resistant resin, sintered metal, or ball bearings in ceramics, all tailored to meet your unique application requirements. When **inquiring**, please let us know the following parameters:

1. Maximum temperature
2. Composition of the bath
3. Wire diameter and material
4. Wire speed
5. Load
6. Shaft diameter, material and surface finish.

based upon which we may submit a **cost-effective quote**.



High Temperature - Harsh Environment Pulleys by COSMOS



Figure 1 NT 028 - 6000 TZP

Where do they apply?

COSMOS innovated high temperature pulleys, also known as harsh environment pulleys, for wire processing under:

1. Elevated temperature
2. Corrosive baths
3. Corrosive baths at elevated temperature

For example: Zinc galvanizing bath at 440° C or the hydrochloric acid pickling bath preceding the galvanizing bath where pulleys in metallic bearings fail. Furthermore, metal adhesion to guides submerged in molten metallic baths has always been an issue.

What are they?

A COSMOS High Temperature Pulley consists of:

1. A solid ceramic pulley
2. A full ceramic ball bearing
3. A ceramic-to-ceramic bond between the pulley and the bearing
4. A non-sticking pulley surface
5. An optional, factory-fit, thermally matched ceramic shaft.

The superior high temperature resistance of the solid alumina pulleys is well-known. It is less familiar only the full ceramic ball bearings qualify. The ceramic-to-ceramic bond addresses the issue of bond failure between different materials due to mismatched thermal expansion. For example: sink rolls in galvanizing baths that need frequent replacement.

Figure 1 illustrates a NT 028 - 6000 TZP High Temperature Pulley by COSMOS.

The service temperature

The service temperature of the solid alumina pulleys and the ceramic-to-ceramic bond all exceeds 1,000° C. The governing parameter is the temperature ceiling of the bearing material. Two of the most prominent are

TZP (Tetragonal Zirconia Polycrystal) to 450° C
Silicon Nitride (Si₃N₄) to 1,000° C

The above figures apply to full ceramic ball bearings. Ceramic ball bearings with cages made of Teflon are subject to failure as temperature rises beyond 180° C. Cages made of TZP ceramics are available, which offer higher speeds and loading capacity, but need not be cost-effective in high temperature application.

All components in COSMOS high temperature pulleys are immune to corrosive baths commonly encountered in wire processing.

Thermally matched shafts

COSMOS High Temperature Pulleys are available with or without a thermally matched ceramic shaft. You may use stainless steel shafts in corrosive baths at room temperature. For temperatures exceeding 100° C, we offer high alumina shafts with matched thermal expansion coefficient. See figure 2. These shafts are factory-fit onto the high temperature pulley of our produce, available in:

- Ø 6.0 x 50 - 100 mm long
- Ø 8.0 x 50 - 100 mm long
- Ø 10.0 x 50 - 100 mm long

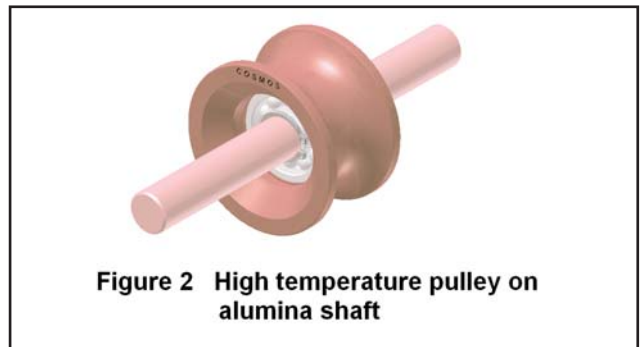


Figure 2 High temperature pulley on alumina shaft

Please turn page to view COSMOS High Temperature Pulleys available from stock.

COSMOS High Temperature Pulleys

Available from Stock

Part No. NT 024 F - 6200 TZP
 Service Temp. 450 °C
 Wt. 71 g

Part No. NT 032 R - 625 TZP
 Service Temp. 450 °C
 Wt. 16.4 g

Part No. NT 027 - 625 TZP
 Service Temp. 450 °C
 Wt. 35.4 g

Part No. NT 040 - 6000 SN
 Service Temp. 1,000 °C
 Wt. 42.7 g

Part No. NT 028 - 608 TZP
 Service Temp. 450 °C
 Wt. 46.3 g

Part No. NT 073 - 6200 TZP
 Service Temp. 450 °C
 Wt. 130 g

Part No. NT 032 - 625 TZP
 Service Temp. 450 °C
 Wt. 14.6 g

Part No. NT 201 - 6200 TZP
 Service Temp. 450 °C
 Wt. 57.5 g

COSMOS ENTERPRISES CO., LTD.
 Phone: +886-2-2218-1292 Fax: +886-2-2218-5320 info@cosmos-na.com www.cosmos-na.com

Where do COSMOS wire guides apply in Coil Winding ?



Pigtail



Tension plate



Eyelet



Flanged pulley



Carbide nozzle



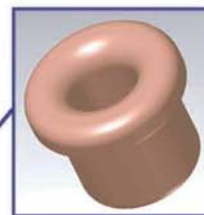
Flanged pulley



Caged pulley



Ruby nozzle



Eyelet



Miniature pulley



Tungsten Carbide Needle Guides offer the best Concentricity and Complex Geometries for Coil Winding

In automatic coil winding, the precise, scratch-proof alignment of the enameled wire governs the service life of the coil. The guide responsible for this end is known as the **needle guide**, also called **nozzle** or **guide tube**. The enameled wire passes through the needle guide at high speed before laying in coils. A rough passage scratches the enameled layer, sometimes going undetected until it manifesting itself years after installation, resulting in recalls of defective devices. Instances of mass recalls can be cited.

We at COSMOS has addressed the issue by selecting the best grade tungsten carbide for the raw material, fabricate into needle guides of quality fitting for the most demanding precision coil winding.

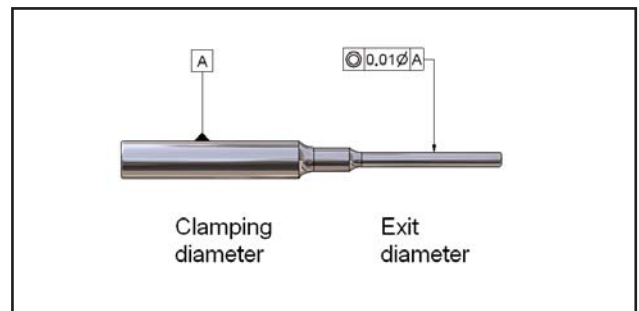
Featuring:

1. Diamond-lapped entrance, **bore** and exit to eliminate scratching.
2. A concentricity of 0.01 mm (0.0004") total indicator reading (T. I. R.)
3. Hardness is 2 times that of the case - hardened carbon steel.

Technical data:

Hardness(Vickers):	1,500-1,600 kg/mm²
Flexural Strength:	1,930 M Pa
Inside diameter:	0.10 - 1.5 mm
Outside diameter:	0.5 - 6.0 mm
Minimum wall thickness	0.15 mm
Length:	10 - 100 mm

Note: For comparison, the hardness of case-hardened high carbon steel is specified at RC 62 = Vickers 746.



Good concentricity is a prerequisite for precision coil winding



Complex geometries for motor winding



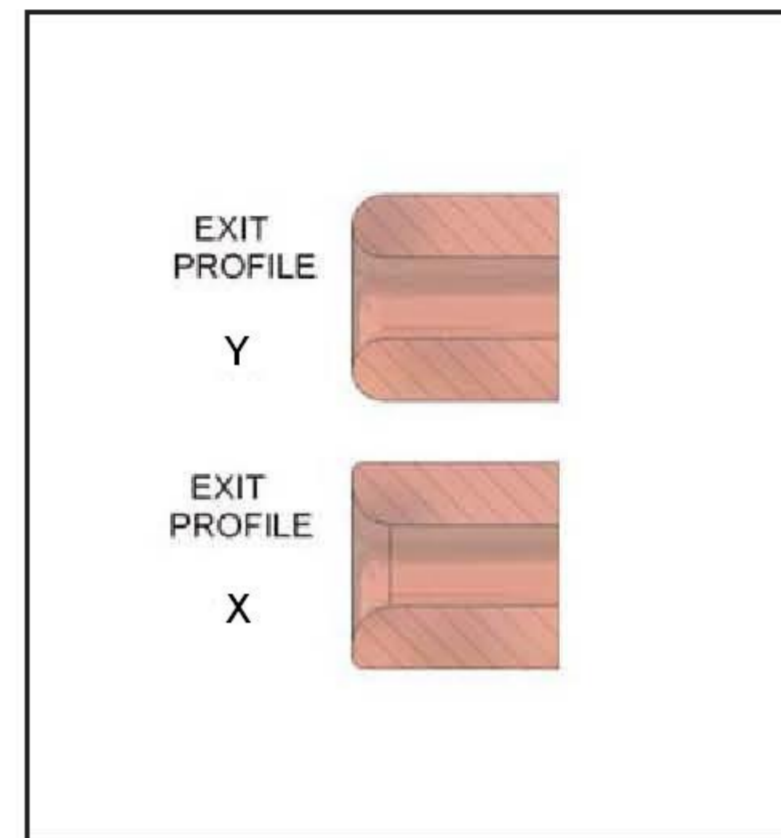
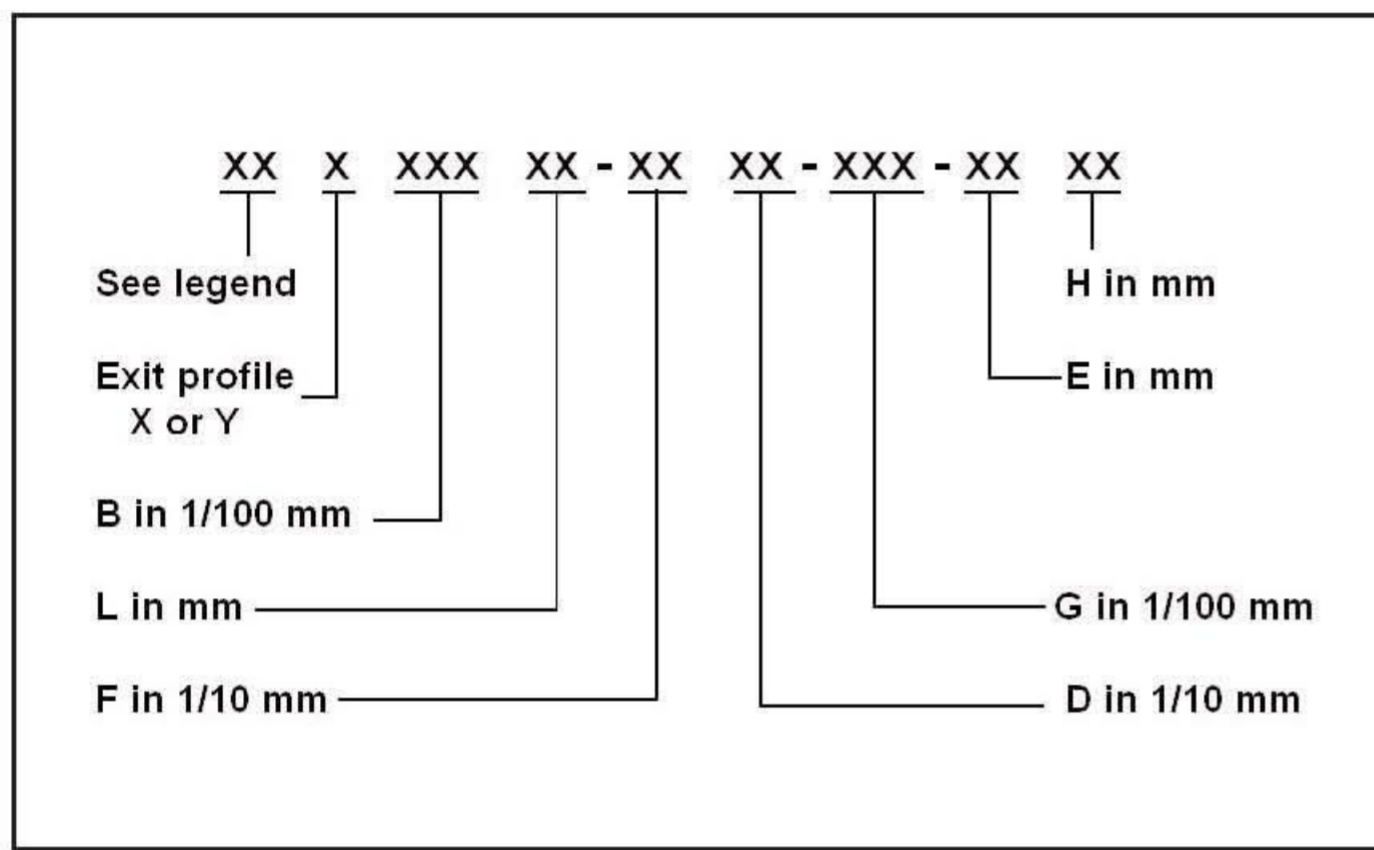
To eliminate damage to the wire insulation, not only the entrance and exit but also the entire length of the bore should be diamond lapped to a profilometer reading of 0.05 - 0.1 microns

A Needle Guides Part Numbering system is described on page 5 - 3.

Drawings of the motor winding and more popular needle guides can be found on page 5 - 5.

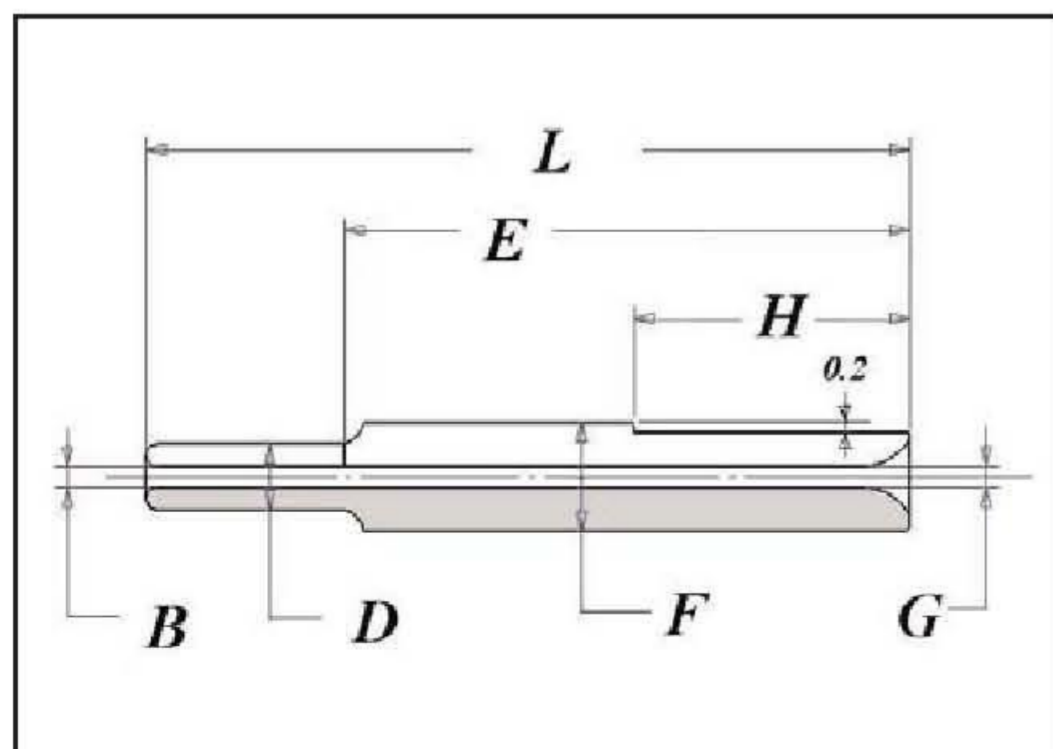
COSMOS Needle Guides Part Number System

This system, introduced May 1, 1988, supplements the alphabetical system (bottom left) adopted in 1995, describing the popular 1 - diameter and 2 - diameter needle guides. Needle guides of complex geometries for motor winding are best described in dimensional drawings, some are depicted on page 6 -4.



The Legend:

- AA** Alumina exit, alumina entrance, stainless steel body.
- RA** Ruby exit, alumina entrance, stainless steel body.
- WS** One piece solid tungsten carbide.
- WT** One piece solid tungsten carbide, in a stainless steel sleeve.
- ZS** One piece solid Zirconia - TZP



Example:

WSY 020 20 - 1006 - 020 - 1800
stands for nozzle in solid tungsten carbide of exit profile **Y**,
2 - diameter, of:
B = 0.2 L = 20 F = 1.0 D = 0.6
G = 0.2 E = 18 H = 0

Ruby offers Maximum Hardness



The exit orifice of a ruby needle guide, epoxy-bond to a stainless steel tube

Advantages:

Among all materials chosen for coil winding needle guides, ruby (upper left) offers a hardness value of 1,800 - 2,200 kg/mm² on the Vickers scale. This superior hardness, coupled with the monocrystalline structure of the ruby material, allows diamond lapping to a mirror finish surpassing other materials. Profilometer reading is 0.05 microns (2 micro-inches) Ra, which offers the lowest coefficient of friction to the wire. While ruby is available for the entrance, Alumina or Zirconia is more common for ease of threading.

Disadvantage:

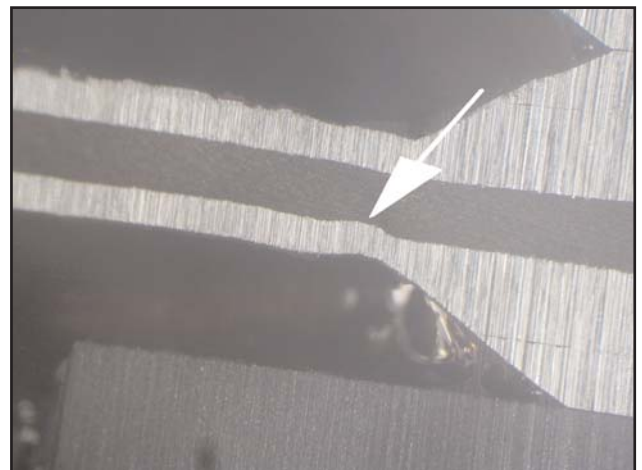
The body material can be either stainless or carbon steel, stainless steel being the more popular. However, both materials suffer from a rough bore surface finish, usually in the range of:

**20 - 40 micro-inches Ra,
which are 5 - 10 times rougher**

compared with the bore surface of diamond lapped tungsten carbide or Zirconia.

Caution:

Stainless or carbon steel bodies, due to the inherent high **ductility**, do not break as tungsten carbide or Zirconia do, but bend upon impact. Without instruction to the contrary, operators on the factory floor are inclined to reuse the bent needle guide, provided it is not beyond salvaging, without the knowledge that a permanent deformation has been created within the bore at the point of bending, even though the tube seemingly has been restored to its original look. See below:

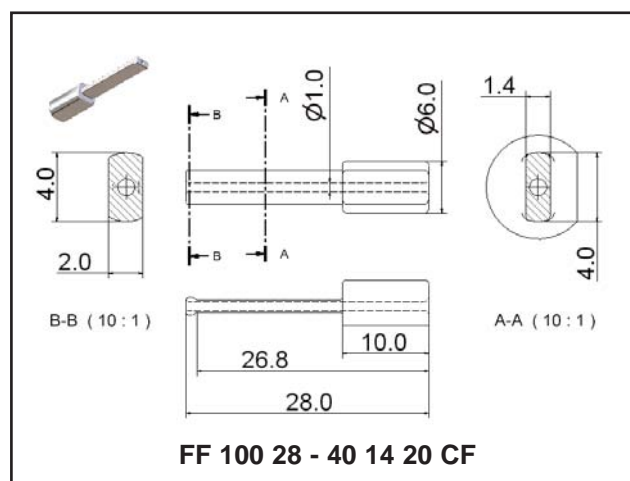
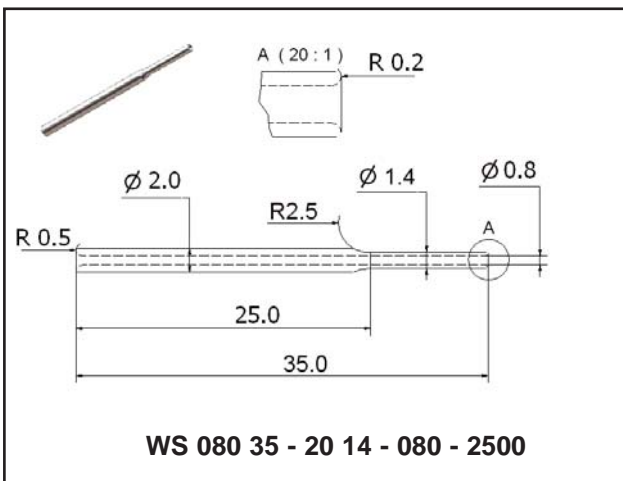
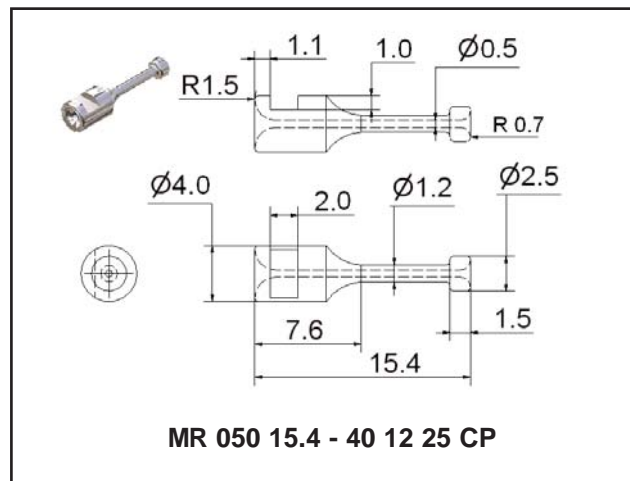
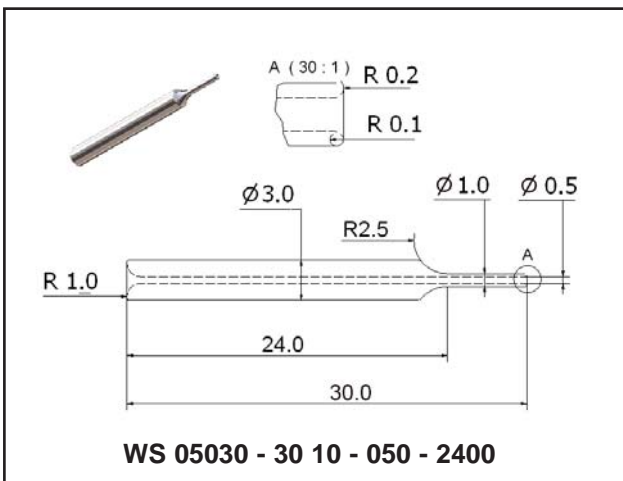
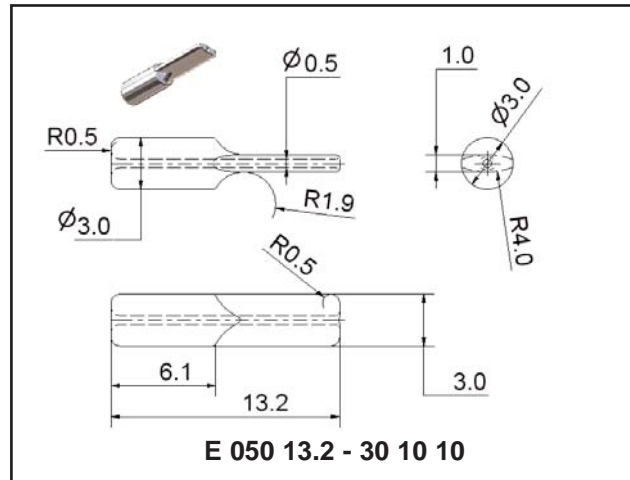
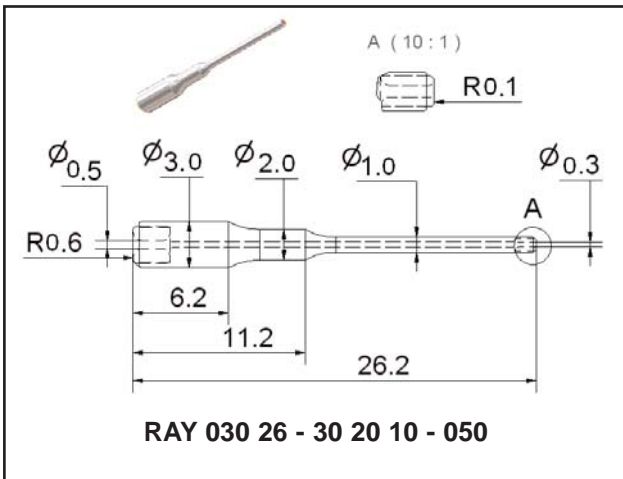


A stainless steel guide tube, bumped, bent, straightened then bisected. Arrow points to the deformation at the point of bending.

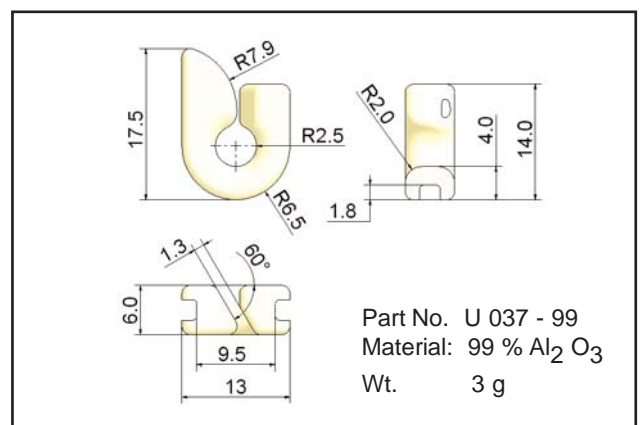
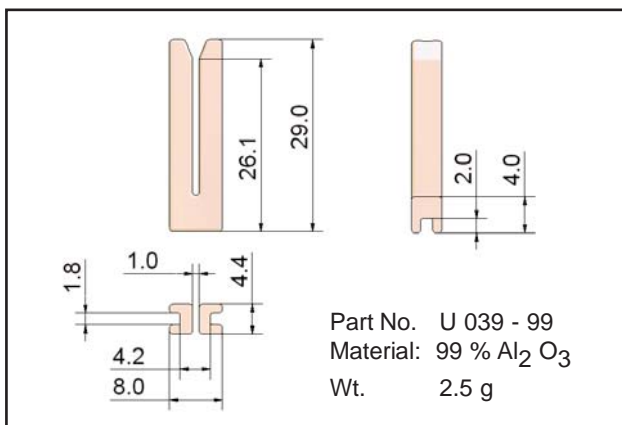
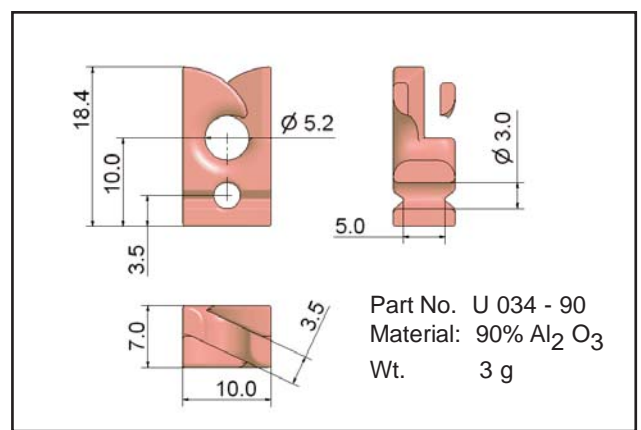
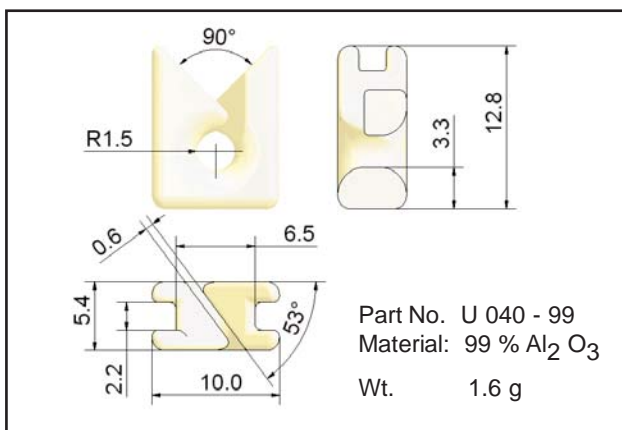
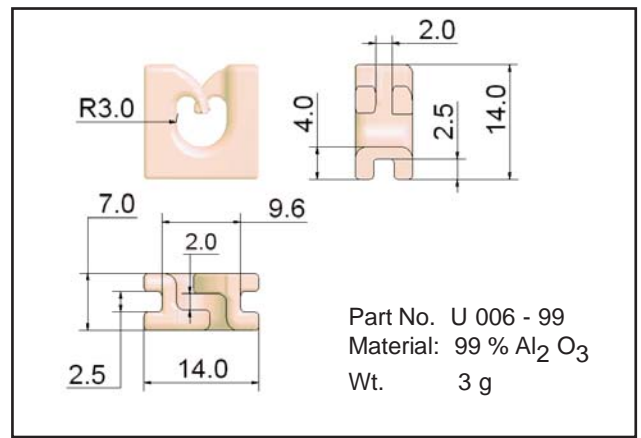
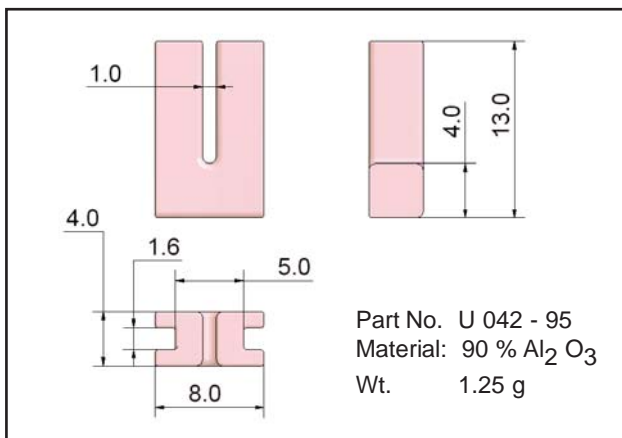
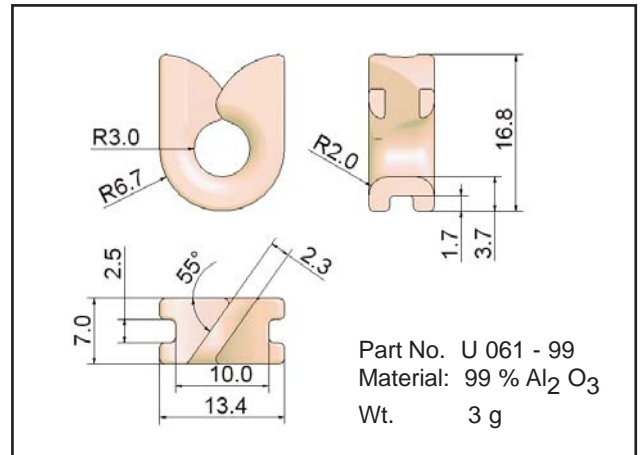
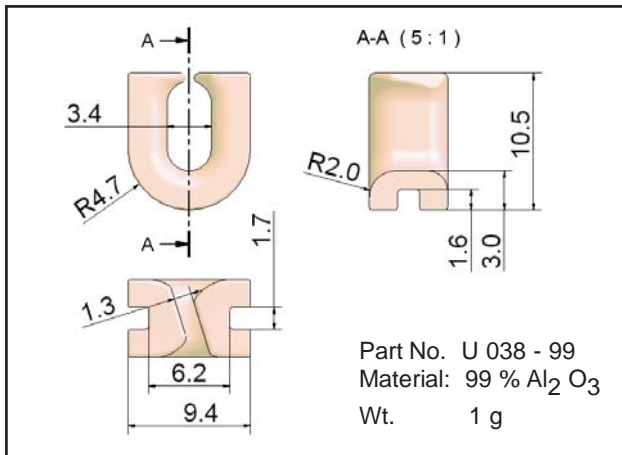
This deformation damages the wire. Therefore it is a good practice to discard all bumped needle guides, before thousands of defective coils are wound.

Note: The fact that renowned coil manufacturers request that we add to their guides a feature, which would break (the guide) at the slightest impact, substantiates our observation.

Dimensional drawings of the more popular needle guides (left column) and some of the motor winding guides (right column) are depicted.

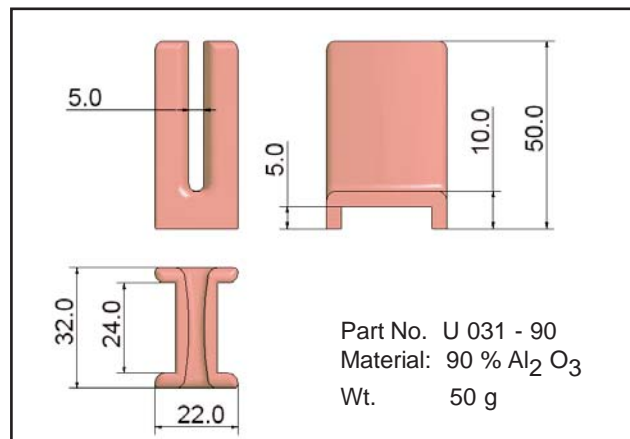
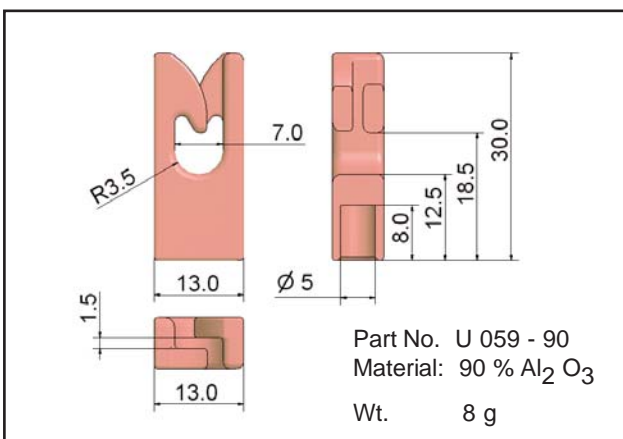
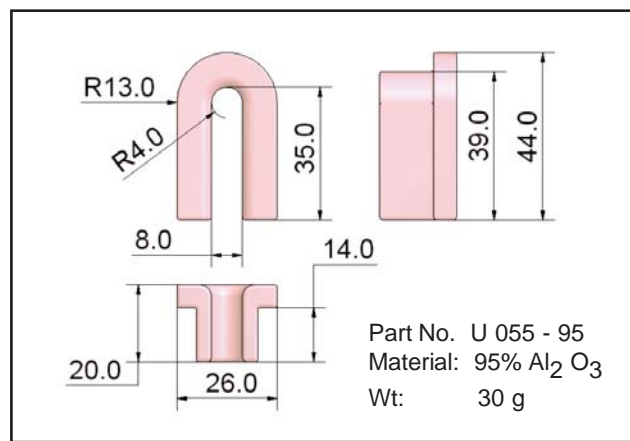
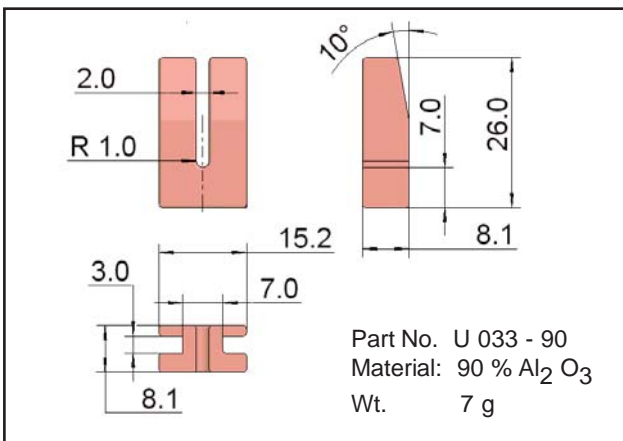
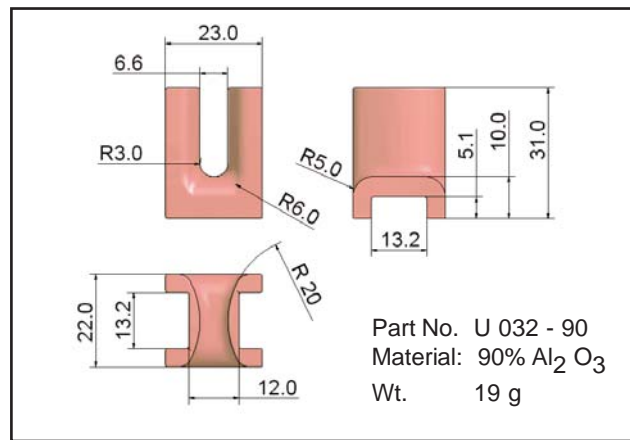
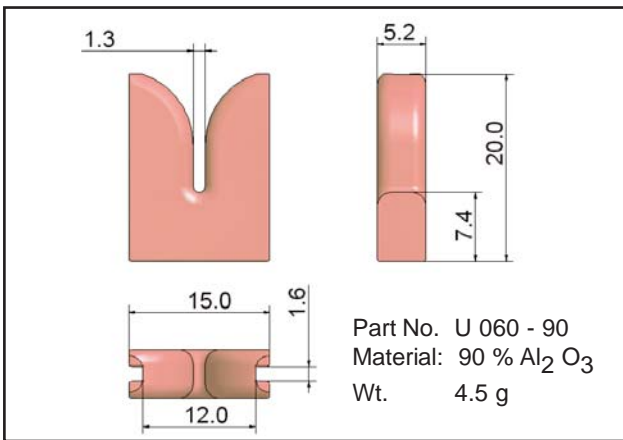
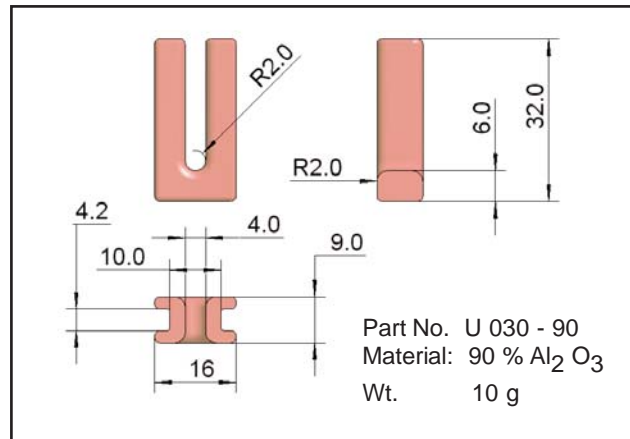
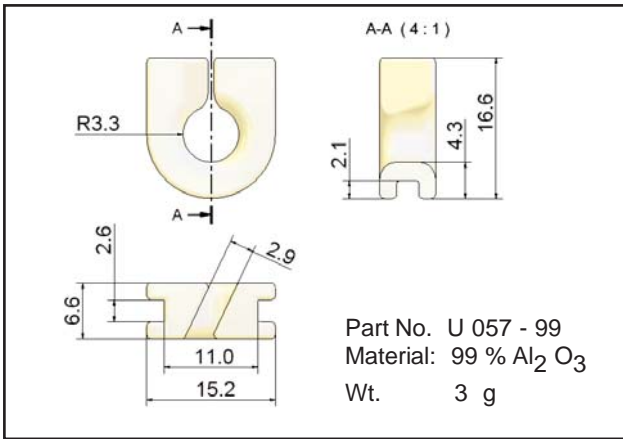


Please take note not all section symbols are shown in the drawings.



U - Guides

All U - Guide drawings are sectioned to reveal the details, but only one set of sectional symbol is shown.



Part No. E 050 - 99
 Material: 99% Al₂ O₃
 Wt. 2 g
 Application: Henrich

Part No. E 051 - 99
 Material: 99% Al₂ O₃
 Wt. 2 g
 Application: Henrich

Part No. E 055 - 90
 Material: 90 % Al₂ O₃
 Wt. 2.8 g

Part No. E 317 - 90
 Material: 90% Al₂ O₃
 Wt. 5 g

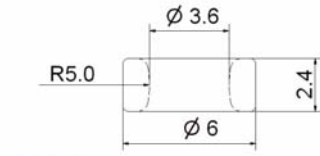
Part No. E 175 - 99
 Material: 99% Al₂ O₃
 Wt. 5 g

Part No. E 214 - 90
 Material: 90% Al₂ O₃
 Wt. 6 g

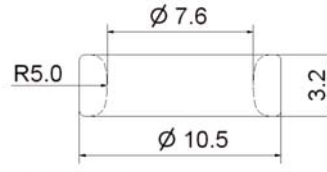
Part No. E 150 - 99
 Material: 99% Al₂ O₃
 Wt. 8.5 g

Part No. RG 012 - 95
 Material: 95 % Al₂ O₃
 Wt. 100 g

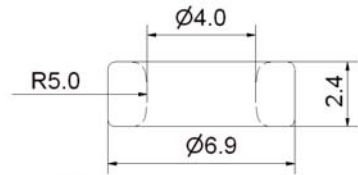
G Rings in Alumina are stocked for your convenience



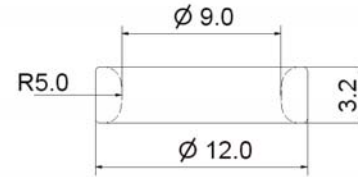
Part No. E 247 Wt. 0.13
Material: 99 % Al₂ O₃
Replaces: G 1



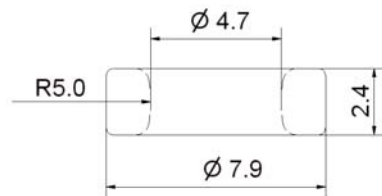
Part No. E 249 Wt. 1.0 g
Material: 99 % Al₂ O₃
Replaces: G 6



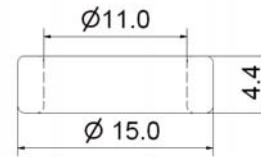
Part No. E 207 Wt. 0.2 g
Material: 99 % Al₂ O₃
Replaces: G 2
Application: Bartell B-62, B -64



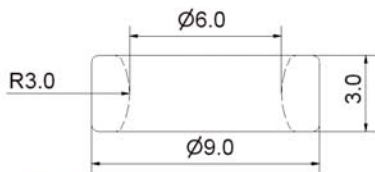
Part No. E 250 Wt. 1.2 g
Material: 99 % Al₂ O₃
Replaces: G 7



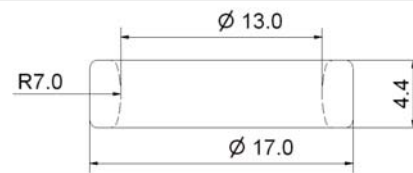
Part No. E 202 Wt. 0.22 g
Material: 99 % Al₂ O₃
Replaces: G 3



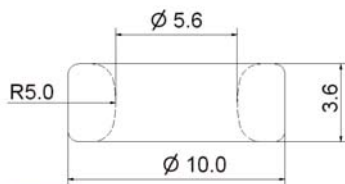
Part No. E 114 Wt. 1.4 g
Material: 99 % Al₂ O₃
Replaces: G 8



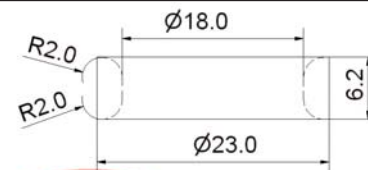
Part No. E 172 Wt. 0.47 g
Material: 99 % Al₂ O₃
Replaces: G 4



Part No. E 113 Wt. 2.5 g
Material: 99 % Al₂ O₃
Replaces: G 9



Part No. E 248 Wt. 0.55 g
Material: 99 % Al₂ O₃
Replaces: G 5

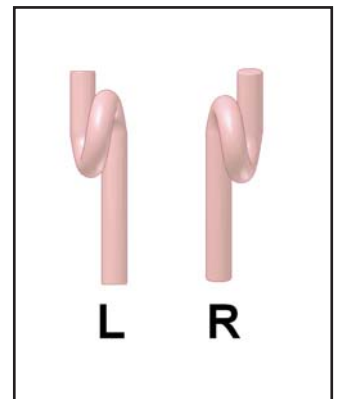


Part No. E 112 Wt. 3 g
Material: 90 % Al₂ O₃
Replaces: G 10

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% Al₂ O₃
Wt: 1.3 g

Part No. P 010 - L
Material: 99% Al₂ O₃
Wt. 1.0 g

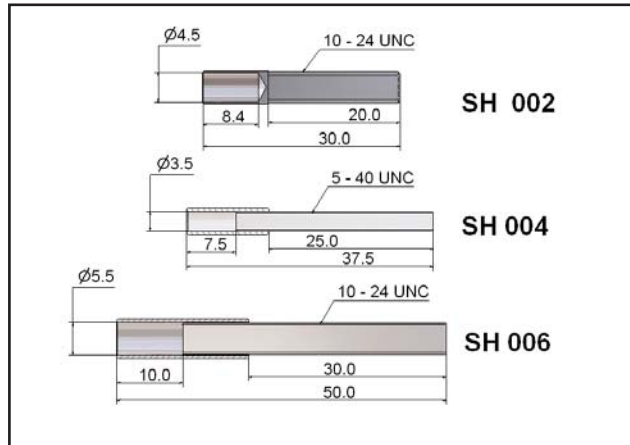
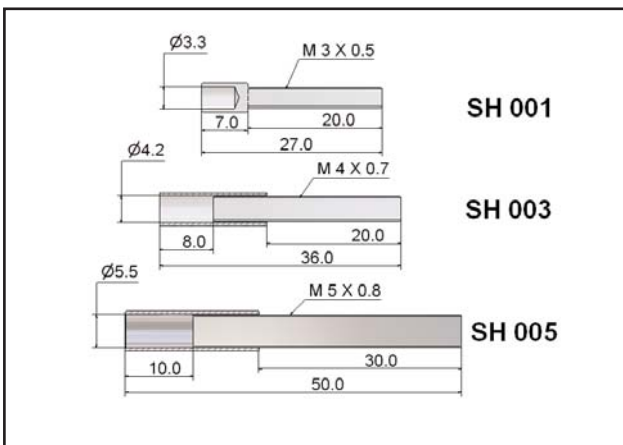
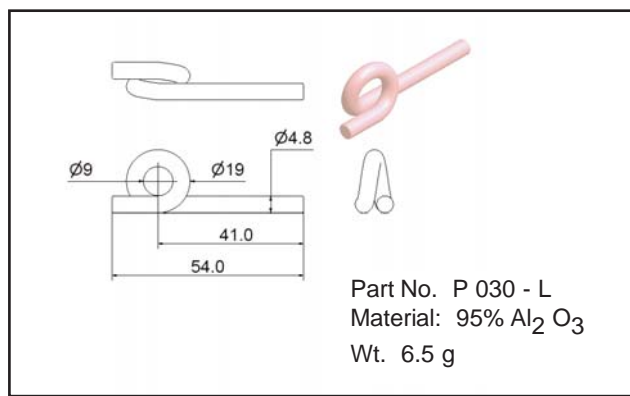
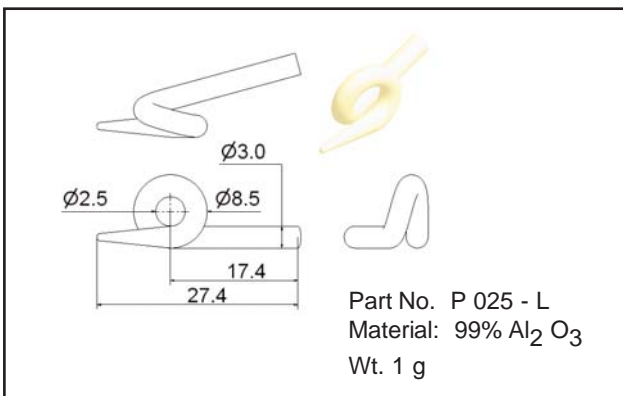
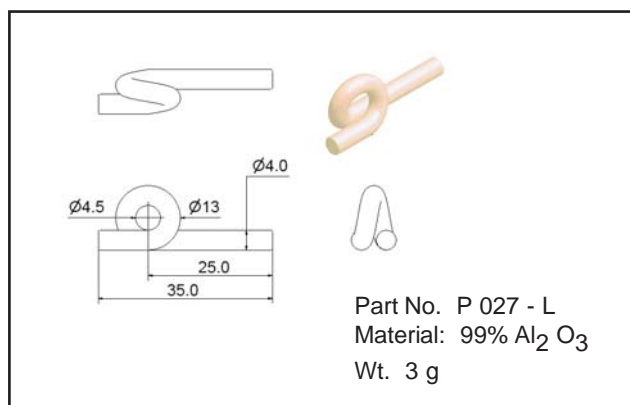
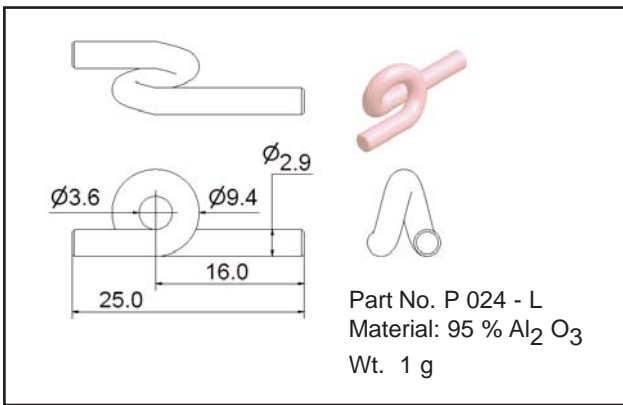
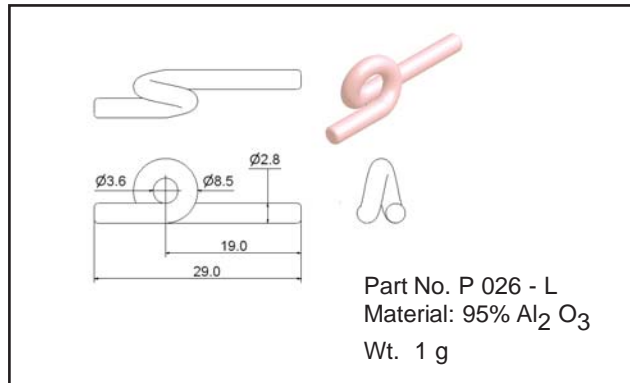
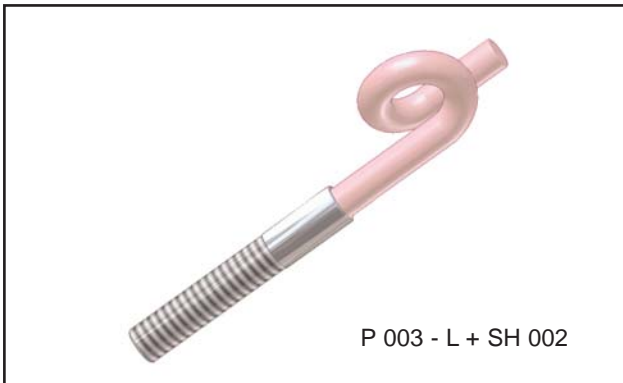
Part No. P 003 - L
Material: 95% Al₂ O₃
Wt. 2.9 g

Part No. P 021 - R
Material: 95% Al₂ O₃
Wt. 0.8 g

Part No. P 004 - L
Material: 95% Al₂ O₃
Wt. 5.1 g

Part No. P 023 - L
Material: 95% Al₂ O₃
Wt. 2.5 g

Pigtails can be delivered with stainless steel holder in metric or inch threads



Thermal Spray Coated Pulleys

COSMOS offers metal pulleys, capstans, thermal spray coated with:

Chromium oxide
Tungsten Carbide Cobalt (WC 12Co)

Representative samples are shown at right. The left and middle pulleys are made of 6061 T 6 aluminum alloy. The one capstan at right is made of steel.



The benefits:

- Light weight (aluminum), low starting torque
- Good concentricity
- Short lead-time, no need for molds
- A broad range of pulley diameters selection

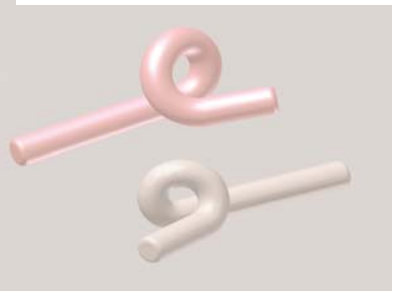
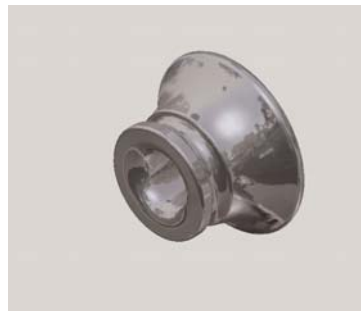
We list below the hardness values of the coatings offered, where the Vickers hardness governs, the HRC values are for reference only:

Chromium oxide	1,000 ~ 1,800 HV (HRC 70 ~ 80)
Tungsten Carbide Cobalt (WC 12Co)	750 ~ 1,450 HV (HRC 65 ~ 75)

Thermal spray coated pulleys are made to order items, which call for unambiguous dimensional drawings to fabricate from. The inquiry form we provide could be of use to you, yet it needs not cover, nor insure, the full range of intricate dimensions; some may call for dedicated instruments to ascertain. Consequently, when in doubt, please consider sending us one used pulley/capstan, which will be returned to you after measurements. The minimum order is 10 pieces each item.

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