JYOTI
CERAMIC

CERAMIC PYROMETRY TUBES
SINGLE - MULTIBORE INSULATORS & SOLID RODS

FROM THE CHAIRMAN'S DESK

For over 4 decades Jyoti has been manufacturing Technical Ceramics in a wide variety of composites such as Alumina, Zirconia, Zirconia Toughened Alumina, Mullites, Cordierites, Steatites, Forsterite, etc.

Jyoti's growth has been consistent with the needs of industry, offering world standard quality industrial ceramics. Today Jyoti is recognized world over as one of the dependable global source of supplies of ceramic micro-macro milling media, wear-resistant lining tiles, ball mill lining blocks, low tension electrical fuse-switch gear insulators, electrical heater parts, fluid handling pump parts, spark igniting electrodes, flame sensors and ceramic custom engineered parts.

Looking to the limited number of global manufacturers and growing international demand for high-temperature creep resistant ceramic pyrometry tubes, laboratoryware and custom parts, we welcomed the opportunity to manufacture high purity 99.7% re-crystallised alumina ceramics in India with advanced German technical know-how and suitably expanded manufacturing facilities by installing state-of-the-art German hat type micro-processor controlled (>1800°C) high temperature kilns, high pressure de-airing ram extruders, automatic dry/wet bag isostatic presses and other special purpose machines required for ceramic body preparation, product production and testings.

The new range of product includes Ceramic Pyrometry and radiant furnace tubes, single and multibore tubular insulators, capillaries, solid rods, tubes for high temperature roller-hearth kilns, heat exchangers, combustion analysis, molten metals, liquid glass contacts and protective atmosphere sintering furnaces, Re-crystallised alumina ceramic crucibles, dishes, boats for laboratory etc. use and custom engineered parts.

We ensure high quality standards of our product, competitive prices and timely deliveries.

Shyam Merani

DURALOX 997 CERAMIC PYROMETRY TUBES

Duralox stands for Durable Aluminium Oxide and is a registered trade name of Jyoti Ceramic Industries Pvt. Ltd. For Aluminim Oxide ceramic compositions containing 90 to 99.7% & above percentage Al_2O_3 in its residue.

Duralox 997 Re-crystallised Alumina Ceramic

Duralox 997 Re-crystallised Alumina Ceramic is fine grained, non porous, dense and impervious, and is of exceptionally high purity containing 99.7% Al_2O_3 and less than 0.05% SiO_2 in its residue.

1. Stability at high temperature and Chemical Inertness
   Duralox 997 is inert even at high temperatures in reducing atmosphere and flux attack due to low silica contentin its residue.

2. Physical Strength
   Duralox 997 alumina is extremely hard with high mechanical strength and resistance to abrasion and corrosion, good thermal conductor at high temperatures.

3. Imperviousness
   Duralox 997 alumina products are fired at extremely high temperature around 1800°C which ensures impermeability under severe & critical conditions.

4. Product Range
   Duralox 997 Recrystallised 99.7% alumina range includes solid rods Dia. 1mm and above, pyrometry tubes with one end closed, both ends open, tubes with single & multibores, capillary tubes, thin walled crucibles, dishes, plates, discs & boats for laboratory use, ballistic armor tiles, Pallets, profiles & custom designed parts.

5. Good Electrical Resistivity
   Duralox 997 alumina maintains good electrical resistivity at high temperatures.

6. High heat Conductivity
   Duralox 997 alumina products are considered as high-tech products and are manufactured with advanced technology, therefore maximum density is ensured with minimum wall thickness. This makes the highest possible heat transfer.

7. Amphoteric
   Duralox 997 alumina is highly resistant to acid slugs.

Pyrometry Sheaths

The main feature of Duralox 997 recrystallised alumina is its very high degree of chemical inertness. It offers a high degree of protection against reactive slags or furnace gasses and its low silica content ensures that there is no contamination of rare metals such as platinum by silicon - a frequent cause of loss of calibration in thermocouples.

Tubes

Duralox 997 Recrystallised Alumina tubes passes good electrical resistivity as well as high thermal conductivity at high temperatures. When adequately supported they can be used up to a temp. of 1800°C+ (3272°F+) and are suitable for molybdenum and tungsten wound tube furnaces, particularly for processes requiring a tube of an impervious nature.

Single and Multibore Insulators

Duralox 997 Recrystallised Alumina can be used up to a temperature of 1800°C and above. It is particularly suitable for use as an insulator for rare metal thermocouples, because of its low silica content ensures that there is no contamination of rare metals such as platinum with silicon. Duralox 997 alumina one end closed thermocouple protection tubes are fired vertically at around 1800°C temp. in oxygen atmosphere in micro processor controlled state-of-the-art kiln. After sintering, 100% thermocouple sheaths are tested under air pressure 4 bar to ensure gas tightness.

Advantages

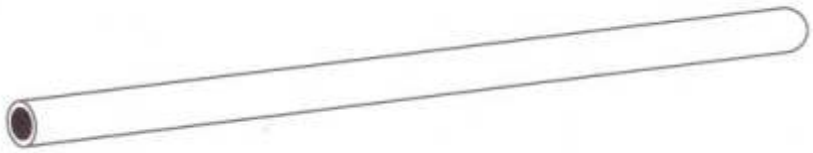
Duralox 997 Recrystallised Alumina Ceramic offers following advantages over the metals:

1. Continuous high temperature resistance > 1800°C.
2. Higher thermal stability.
3. Lower thermal expansion.
4. Higher electrical insulation.
5. Higher modules of elasticity, hence higher rigidity.
6. Greater hardness and wear resistance.
7. Higher abrasion corrosion and oxidation resistance
8. Higher compressive strength.
9. Inert to Hydrogen, Carbon and refractory metals under most severe conditions, non toxic, non radioactive, non magnetic and non-aging.

With above physical properties, Duralox 997 ceramic is most suitable for use for noble metal thermocouples, furnace tubes, high temperature vacuum furnaces etc.

DURALOX 997 (DIN VDE 0335)

RE-CRYSTALLISED ALUMINA CERAMIC PROTECTION SHEATHS FOR THERMOCOUPLES & SENSORS



Pat. Ref.	Outer Dia (OD)	Inner Dia (ID)	Length Upto (L)
RC PS 6-4	* 6	4	---
RC PS 7-5	* 7	5	---
RC PS 8-5	* 8	5	1030
RC PS 10-6	**10	6	1030
RC PS 12-8	**12	8	1500
RC PS 13-9	**13	9	1500
RC PS 15-6	**15	6	1500
RC PS 15-10	**15	10	1500
RC PS 17-13	**17	13	1500
RC PS 20-8	**20	8	1500
RC PS 20-10	**20	10	1000
RC PS 20-15	**20	15	1500
RC PS 24-18	**24	18	1500
RC PS 28-22	**28	22	1500

* Pyrometer protection sheaths (closed one end) are available from 100 to 1030mm long.

** Pyrometer protection sheaths (closed one end) are available from 100 to 1500mm long.

Only against specific enquiry, we can offer protection thermocouple sheaths and tubes open both ends with flange, price on request. Please do not fail to specify length of the sheath in your purchase enquiry.

Pyrometer Sheath sizes not shown in above table can be made on request, if found feasible. Workable dimensional tolerances are adhered to DIN standards 40680 medium class. Closer tolerances on enquiry.

Code RC PS corresponds to Re-crystallised Pyrometry Protection Sheath.

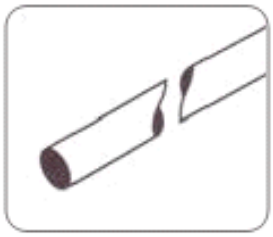
Sheath means closed one end Pyrometer tube.

DURALOX 997 (DIN VDE 0335)

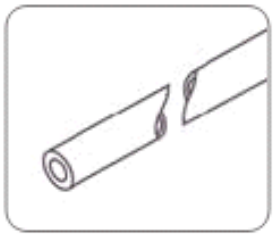
RE-CRYSTALLISED ALUMINA CERAMIC PROTECTION SHEATHS FOR THERMOCOUPLES & SENSORS

For improvement of product, quality, time to time changes are made in ceramic body formulations, temperatures and in manufacturing procedures.

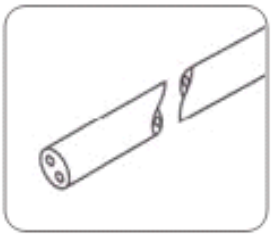
Duralox 997 recrystallised (din vde 0335) alumina ceramic, solid round rods, single & multibore tubes.



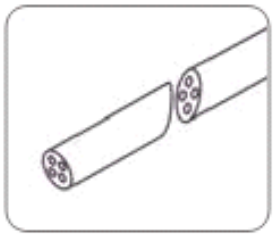
Solid Round Rod



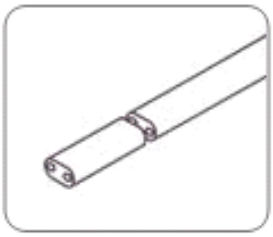
Single Bore Tube



2 Bore Tube



4 Bore Tube



Oval 2 Bore Tube

Ref. Code	Ref. Code OD/1B	Ref. Code OD/2B	Ref. Code OD/4B	Ref. Code LXW/2B
RC SR-2.0	RC SB-1.6 x 1.0	RC 2B-2.0 x 0.6	RC 4B-2.5 x 0.6	RC O-2B-2.3/1.4 x 0.7
RC SR-3.0	RC SB-1.8 x 1.2	RC 2B-2.5 x 0.6	RC 4B-3.0 x 0.8	RC O-2B-3.0/1.5 x 0.8
RC SR-4.0	RC SB-2.0 x 1.0	RC 2B-3.0 x 0.7	RC 4B-3.5 x 1.0	RC O-2B-4.2 x 2.2 x 1.2
RC SR-5.0	RC SB-2.7 x 1.7	RC 2B-3.0 x 1.0	RC 4B-4.0 x 1.0	
RC SR-6.0	RC SB-3.0 x 2.0	RC 2B-4.0 x 0.8	RC 4B-4.5 x 1.0	
RC SR-8.0	RC SB-4.0 x 2.0	RC 2B-4.0 x 1.0	RC 4B-4.5 x 1.3	
RC SR-10.0	RC SB-5.0 x 3.0	RC 2B-4.5 x 1.0	RC 4B-5.0 x 1.0	
RC SR-12.0	RC SB-6.0 x 3.0	RC 2B-4.5 x 1.5	RC 4B-5.0 x 1.3	
RC SR-12.5	RC SB-6.0 x 4.0	RC 2B-5.0 x 1.5	RC 4B-6.0 x 1.3	
RC SR-15.0	RC SB-8.0 x 5.0	RC 2B-5.0 x 1.8	RC 4B-6.0 x 1.5	
RC SR-18.0	RC SB-10.0 x 6.0	RC 2B-5.5 x 2.0	RC 4B-7.0 x 1.5	
RC SR-20.0	RC SB-12.0 x 8.0	RC 2B-6.0 x 1.8	RC 4B-8.0 x 2.3	
RC SR-22.0	RC SB-15.0 x 10.0	RC 2B-6.0 x 2.0	RC 4B-8.5 x 1.5	
RC SR-25.0	RC SB-20.0 x 15.0	RC 2B-6.5 x 1.8	RC 4B-8.5 x 2.5	
RC SR-30.0	RC SB-20.0 x 15.0	RC 2B-6.5 x 2.0	RC 4B-9.5 x 2.5	
	RC SB-28.0 x 22.0	RC 2B-7.0 x 2.0	RC 4B-10.0 x 1.8	
	RC SB-30.0 x 23.0	RC 2B-7.0 x 2.5	RC 4B-10.0 x 3.1	

Solid Round rods and tubes other than above sizes on request. All tubes are open at both ends. Solid Rod/Tube length 25 to 1500mm depending on outer Diameter. Specific length size on enquiry. Please do not fail to specify length of Solid Rod /Tube in purchase enquiry.

Duralox 997 single and multibore tube insulators are used for insulating thermocouple wires suitable for maximum temp>1800°C according to DIN43725 standards. Tube sizes other than as above shown in table can be made on request if found feasible. Dimensional tolerances are maintained to DIN 40680 medium class Standards.

Following ref. code numbers correspond to:
RC SR = Recrystallised Solid Rod | RC-SB = Recrystallised Single Bore Tube | RC-2B = Recrystallised 2 Bore Tube | RC-4B = Recrystallised 4 Bore Tube | RCO-2B = Recrystallised Oval 2 Bore Tube.

DURALOX 997 (DIN VDE 0335)

Material Property	Units	Duralox 997
Chemical Composition		Al2O3 : 99.7% Alkali : 0.05%
Colour		Off-white
Density	gm/cc	3.85-3.90
Porosity		Nil
Hardness (Vicker's)	HV10	1550-1600
Hardness (Moh's)		9+
Flexural Strength	Kg/cm2	3000
Young's Modulus	X 10-6 kg/cm2	3.5
Coefficient of linear thermal expansion (25-1000°C)	X 10-6 / °C	8
Thermal Conductivity (25°C)	W/m°K	26
Max. Working temp. in oxidizing atmosphere @ no load	°C	1800+
Dielectric strength (25°C) (1.5mm thick)	KV/mm	25
Volume Resistivity (25°C)	Ohm.cm	1014
Thermal shock resistance	°C	Good (170°C) 120-170°C

CHEMICAL CHARACTERISTICS OF DURALOX 997

IN VACUUM

Reacts with carbon at about 1650°C | Reacts with zirconia at about 1800°C | Reacts with magnesia at about 1900°C | Reacts with thoria at about 1990°C | Reacts with beryllia at about 1860°C

IN OXIDISING ATMOSPHERE

Reacts with magnesia at about 1600°C | Reacts with zirconia at about 1700°C | Reacts with thoria at about 1900°C

IN INERT ATMOSPHERE

No reaction with molybdenum at 1800°C | No reaction with nickel at 1800°C | Slight reaction with niobium at 1600°C | Violent reaction with niobium at 1800°C | Slight reaction with titanium at 1600°C | Violent reaction with titanium at 1800°C | Slight reaction with beryllium at 1800°C | Slow reaction with silicon at 1400°C | Violent reaction with silicon at 1600°C | Slow reaction with zirconium at 1600°C | Violent reaction with zirconium at 1800°C

DIMENSIONAL TOLERANCES AND ALLOWANCES ARE CONFORMING TO DIN STANDARD 40680 MEDIUM CLASS

DIN STANDARD 40680 MEDIUM CLASS
FOR (OD-ID) DIAMETERS-LENGTH-CAMBER-OVALITY AND ECCENTRICITY

On diameter	Tolerances
1 to 5mm	± 0.2mm or 4% whichever is greater
5.1 to 40mm	± 0.3mm or 2% whichever is greater
On length	
20 to 150mm	± 0.5mm or 2% whichever is greater
151 to 1500mm	± 2mm or 1 % whichever is greater
Allowance on Camber	0.5% of the length
Allowance on Ovality	0.1 mm or 0.5% of the diameter whichever is the greater

ALLOWANCE ON BORE ECCENTRICITY 0.05MM OR 0.5% OF THE DIAMETER

Tolerances closer than above on request

Duralox alumina ceramic pyrometry tubes and parts are formed by high pressure extrusion, dry-wet bag isostatic pressing, uniaxial pressing, injection moulding and slip casting process, depending upon the geometry and construction of the part. We are constantly working for improvement of the product quality, hence the data given in the brochure may change as and when found necessary.

Information contained herein is to our best of knowledge, true and accurate and is based upon measurements made in our R&D Laboratory. Recommendations, suggestions and data are practical guidelines and not guarantees. Actual results may vary with conditions of use and with variations in the methods of manufacture, size and shape of the ceramic part. We disclaim any liability that may be incurred in connection with use of suggestions or data. This publication is not to be taken as license to operate under or a recommendation to infringe any patents. Observation of all legal regulations and patents is the responsibility of the user.

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