



[www.precision-ceramics.co.uk](http://www.precision-ceramics.co.uk)

Advanced Technical Ceramic Solutions

# Advanced Ceramic Tubes & Insulators

**A new range of alumina-based components  
for thermocouple protection**



---

**PRECISION CERAMICS**

86 Lower Tower Street, Birmingham B19 3PA, England

Tel: +44 (0) 121 687 5858 Fax: +44 (0) 121 687 5857

Email: [info@precision-ceramics.co.uk](mailto:info@precision-ceramics.co.uk)

[www.precision-ceramics.co.uk](http://www.precision-ceramics.co.uk)

# Advanced Ceramic Tubes & Insulators

## A new range of alumina-based components for thermocouple protection...

Precision Ceramics has introduced a new and exciting range of advanced ceramic tubes and insulators ideally suitable for thermocouple protection in high temperature measurement applications.

The alumina-based tubes are used throughout many industries to aid monitoring the stability and performance of production processes especially those within hostile and aggressive chemical environments at temperatures up to 1,700°C. They are manufactured to DIN V ENV 12212 and are very strong, organically inert and well proven in a wide field of applications.

A comprehensive range of closed one end tubes and open both end tubes in various diameters and stock sizes is available for immediate despatch. All can be cut to length as required and both single and multi-bore tubes are available.

### Protection Tubes

Alumina tubes are used as outer protection sheaths. For closed-one-end tubes they are specially produced as a one-piece unit rather than fusing an end piece on making them much stronger and more reliable in operation. The end seal guarantees complete resistance to penetration from the outer atmosphere and coupled with excellent thermal shock resistance, the tubes provide a safe, secure and completely accurate environment for temperature measurement and process monitoring.

### Aluminium Oxide (Alumina)

Aluminium oxide ( $Al_2O_3$ ), more commonly known as alumina, is a hard wearing material and used throughout many industries. Once fired and sintered, it can only be machined using diamond-grinding methods. Alumina is the most commonly used type of ceramic and is available in purities

up to 99.9%. Its combination of hardness, high temperature operation (up to 1,700°C) and good electrical insulation makes it useful for a wide range of applications.

Almost pure alumina (99.7%) provides the highest temperature operation for protection tubes.

### Comprehensive Range

Precision Ceramics offers a comprehensive range of both closed one end tubes and open both end tubes. Both ranges are held in stock and are available for immediate despatch.

We currently offer 15 Rubalit C 799 closed one end tubes with internal diameters ranging from 4mm to 18mm (external diameters ranging from 6mm to 24mm) and in lengths from 530mm to 1,525mm. These are complemented by 34 open both end tubes with internal diameters ranging from 0.2mm to 25mm (external diameters from 0.7mm to 31mm) and in lengths from 174mm to 1,060mm.

Standard items can be cut to a specific length if required.



## Material Data

Material			Aluminium Oxide Content	Operating Temperature
<b>RUBALIT® C799</b>	Aluminum Oxide	Impervious	99.7% Al <sub>2</sub> O <sub>3</sub>	Max. 1700°C

### Rubalit C799

- Manufactured in accordance with DIN VE 0335
- Suitable for operating temperatures up to 1,700°C
- Very high temperature stability and chemical resistance
- High mechanical strength
- High electrical resistivity

### Rubalit C799 Protection Tubes - Closed One End

Catalogue Reference	OD	ID	Length
<b>Rubalit C799 COE Tube - ODxIDxLength</b>	6	4	530
	6	4	1,065
	6	4	1,550
	8	5	530
	8	5	1,030
	8	5	1,500
	10	6	1,030
	12	8	1,030
	12	8	1,525
	17	13	600
	17	13	1,030
	17	13	1,525
	20	15	1,100
	24	18	750
24	18	1,100	

All dimensions in mm

All protection tubes are supplied with a certificate of compliance



### Rubalit C799 Protection Tubes - Open Both Ends

Catalogue Reference	OD	ID	Length
<b>Rubalit C799 OBE Tube - ODxIDxLength</b>	0.7	0.2	300
	1.0	0.5	300
	1.5	0.8	250
	1.5	0.8	400
	2.0	1.0	300
	2.0	1.2	400
	2.1	1.5	400
	2.5	1.5	1,000
	2.7	1.7	300
	2.7	1.7	500
	3.0	2.1	1,000
	4.0	2.0	1,000
	5.0	3.0	1,000
	6.0	4.0	1,000
	7.0	4.0	600
	7.0	2.0	1,000
	8.0	5.0	1,000
	10.0	2.0	350
	10.0	2.0	350
	10.0	3.7	350
	10.0	6.0	1,000
	12.0	8.0	1,000
	13.0	3.0	350
	13.0	9.0	420
	13.0	6.0	1,050
	15.0	6.0	300
	16.0	10.0	1,000
	16.0	12.0	1,000
17.0	8.0	300	
20.0	9.0	300	
20.0	15.0	1,000	
24.0	18.0	1,000	
25.4	17.5	174	
26.0	20.0	1,060	
31.0	25.0	1,000	



### Manufacturing Tolerances Data

Length mm	Deflection Tolerances [Fa] in mm
up to 30	+/- 0.15
over 30 to 40	+/- 0.20
over 40 to 50	+/- 0.25
over 50 to 60	+/- 0.30
over 60 to 70	+/- 0.35
over 70 to 80	+/- 0.40
over 80 to 90	+/- 0.45
over 90 to 100	+/- 0.50
over 100 to 110	+/- 0.55
over 110 to 125	+/- 0.60
over 125 to 140	+/- 0.70
over 140 to 155	+/- 0.80
over 155 to 170	+/- 0.85
over 170 to 185	+/- 0.90
over 185 to 200	+/- 1.00
over 200 to 250	+/- 1.25
over 250 to 300	+/- 1.50
over 300 to 350	+/- 1.75
over 350 to 400	+/- 2.00
over 400 to 450	+/- 2.25
over 450 to 500	+/- 2.50
over 500 to 600	+/- 3.00
over 600 to 700	+/- 3.50
over 700 to 800	+/- 4.00
over 800 to 900	+/- 4.50
over 900 to 1000	+/- 5.00
over 1000	+/- 0.5% x length

### Material Characteristics - Typical Data

Properties	Units	Test	RUBALIT®
DIN VDE 0335 / IEC 672	-	-	C 799
Colour	-	-	white
Specific gravity	kg/dm <sup>3</sup>	ASTM C 20	3.85
Water absorption	%	ASTM C 373	0
Hardness rockwell	R 45 N	ASTM E 18	80
Flexural strength	N/mm <sup>2</sup>	ASTM F 417	360
Max. Temp. use	°C	-	1700
Thermal conductivity	W/mK	ASTM V 408	28
Thermal expansion/Linear coefficient			
20 – 100°C	x 10 <sup>-6</sup> /°C	ASTM 372	5.4
20 – 300°C	-	-	6.5
20 – 1000°C	-	-	8.5
Dielectric constant	-	ASTM D 150	10
Dielectric strength	KV/mm	ASTM D 116	>10
Dielectric factor	x 10 <sup>-3</sup>	ASTM D 150	> 0.2
Volume resistivity			
200°C	Ohm x cm	ASTM D 257	10 <sup>15</sup>
400°C	-	-	10 <sup>12</sup>
600°C	-	-	10 <sup>11</sup>

### Material Compound - Typical Data

The grade of aluminium oxide used in all our materials is Alpha:  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>

Properties	Unit	RUBALIT®
Aluminium oxide	Al <sub>2</sub> O <sub>3</sub>	> 99.7%
Silicon oxide	SiO <sub>2</sub>	0.05%
Ferric oxide	Fe <sub>2</sub> O <sub>3</sub>	0.06%
Magnesium oxide	MgO	0.15%
Calcium oxide	CaO	0.025%

Diameter mm	Diameter Tolerances in mm
up to 4.0	+/- 0.15
over 4 to 6	+/- 0.20
over 6 to 8	+/- 0.25
over 8 to 10	+/- 0.30
over 10 to 13	+/- 0.35
over 13 to 16	+/- 0.40
over 16 to 20	+/- 0.45
over 20 to 25	+/- 0.55
over 25 to 30	+/- 0.55
over 30 to 35	+/- 1.30
over 35 to 40	+/- 1.33
over 40 to 45	+/- 1.35
over 45 to 50	+/- 1.65