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Advanced Technical Ceramic Solutions

## CeramAlox Alumina (Aluminium Oxide)

Alumina is the more common name of Aluminium Oxide. It is a hard-wearing technical ceramic offering an excellent combination of both mechanical and electrical properties and is ideally suited to a wide range of industrial applications.

Alumina features high hardness and wear resistance, low erosion levels, high temperature and corrosion resistance and bio-inertness. Its high temperature stability and thermal conductivity make it particularly suitable for high temperature applications such as thermocouple protection in high temperature measurement. A comprehensive range of advanced ceramic tubes and insulators is available from Precision Ceramics for this purpose.

### Key Properties

- Excellent electrical insulation properties
- High compressive and dielectric strength
- High hardness and mechanical strength
- High thermal conductivity and thermal shock resistance
- Low density
- Resistant to strong acid and alkali attack at high temperatures
- Transparent to microwave radio frequencies
- Very specific thermal conductive and thermal expansion rates
- Wear and abrasion resistant

Alumina can be produced in a wide range of purities with additives designed to enhance its properties. Typical purities range from 90 to 99.9% although Precision Ceramics generally work with 99.7% material.

It can be injection molded, die pressed, isostatically pressed, slip cast and extruded. Once fired and sintered, it can only be machined using diamond-grinding methods but prior to sintering advanced green and biscuit machining techniques developed by Precision Ceramics allow more complex components to be manufactured using traditional machining methods.

In addition Alumina can be readily joined to metals or other ceramics using metallising and brazing techniques.

Precision Ceramics specialises in tight tolerance, highly complex work and has extensive in-house machining facilities - including 4th & 5th axis machining centres, drilling, grinding, milling, polishing, sawing, tapping, threading and turning - to enable us to manufacture Alumina components to the highest specifications.



### 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)

### Applications

- Electronic components & substrates
- High temperature electrical insulators
- High voltage insulators
- Laser tubes
- Machine components
- Mechanical seals
- Precision shafts and axles in high wear environments
- Roller and ball bearings
- Seal rings
- Semiconductor parts
- Shot blast nozzles
- Thermocouple tubes
- Tap plates
- Valve seats
- Wear components
- Wire and thread guides
- Ballistic Armor



Alumina Engineering Properties				
Alumina Content		80-85%	90-96%	>99.5%
General Application		Lower Cost Electrical & Mechanical	High Strength, Wear Resistant, Electronic, Insulating, Mechanical, Structural & Metalizing	Extremely High Purity, Temperature & Strength; Excellent Corrosion & Wear Resistance
Color (Fired)		White	White	Off White
Porosity	%	0-.05	0-.05	0-.05
Density	gm/cm <sup>3</sup>	3.45-3.50	3.55-3.75	3.75-3.95
Flexural Strength	kpsi	35.0-40.0	40.0-50.0	50.0-55.0
Comprehensive Strength	kpsi	260.0	>300.0	>300.0
Tensile Strength	kpsi	15.0-20.0	20.0-28.0	20.0-28.0
Linear Coefficient of Thermal Expansion	(cm/cm/°C) 25-300°C 25-700°C	5.9X10 <sup>-6</sup> 6.5X10 <sup>-6</sup>	6.3X10 <sup>-6</sup> 7.0X10 <sup>-6</sup>	6.5X10 <sup>-6</sup> 7.5X10 <sup>-6</sup>
Dielectric Constant at 25°C	1 MH 10 MH	8.5-8.9 8.4-8.8	9.2-9.8 9.0-9.6	9.5-9.9 9.3-9.7
Dielectric Strength	Volt/mil	200	225	225
Te Value	°F °C	1472 800	>1832 >1000	>1832 >1000
Thermal Conductivity at 25°C	cal/sec/cm <sup>2</sup> /cm/°C	.03-.04	.04-.06	.07-.08
Thermal Shock		Good	Good	Good
Safe Use Temperature	°F °C	2550 1400	3000-3100 1650-1700	3275 1800

*The values presented are mean and typical of those resulted from test samples. They are provided as an indication only to serve as guidance in the design of ceramic components and are not guaranteed in any way. The actual values can vary according to the shape and size of the envisaged component.*



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