

CeramAlox *Alumina (Aluminum Oxide)*

Alumina is the more common name of Aluminum 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 works 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 metalizing and brazing techniques.

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



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Advanced Technical Ceramic Solutions

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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		96%	99.7%	>99.95% (Ultra Pure)
General Application		High Strength, Wear Resistant, Electronic, Insulating, Mechanical, Structural & Metalizing	High Purity, Temperature & Strength; Excellent Corrosion & Wear Resistance	Very high purity, excellent high temperature strength, very high hardness and abrasion resistance, excellent electrical properties
Color (Sintered)		White	Off White	White
Porosity	%	Nil	Nil	Nil
Density	gm/cm^3	3.55-3.75	3.75-3.95	3.98
Flexural Strength	MPa	275-350	350-400	550-650
Comprehensive Strength	MPa	>2000	>2000	>3500
Tensile Strength	MPa	140	150	200
Linear Coefficient of Thermal Expansion	10^{-6}/°C 25-300°C 25-700°C	 $6.3x10^{-6}$ $7.0x10^{-6}$	 $6.5x10^{-6}$ $7.5x10^{-6}$	 $7.5x10^{-6}$ $8.0x10^{-6}$
Dielectric Constant at 25°C	1 MH 10 MH	9.2-9.8 9.0-9.6	9.5-9.9 9.3-9.7	
Dielectric Strength	Volt/mil	225	285	>400
Te Value	°C	>1000	>1000	>1000
Thermal Conductivity range at 25°C	W/mK	16-25	29-33	37-45
Thermal Shock		Good	Good	Good
Safe Use Temperature Under No Load	°C	1400	1400	1550

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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