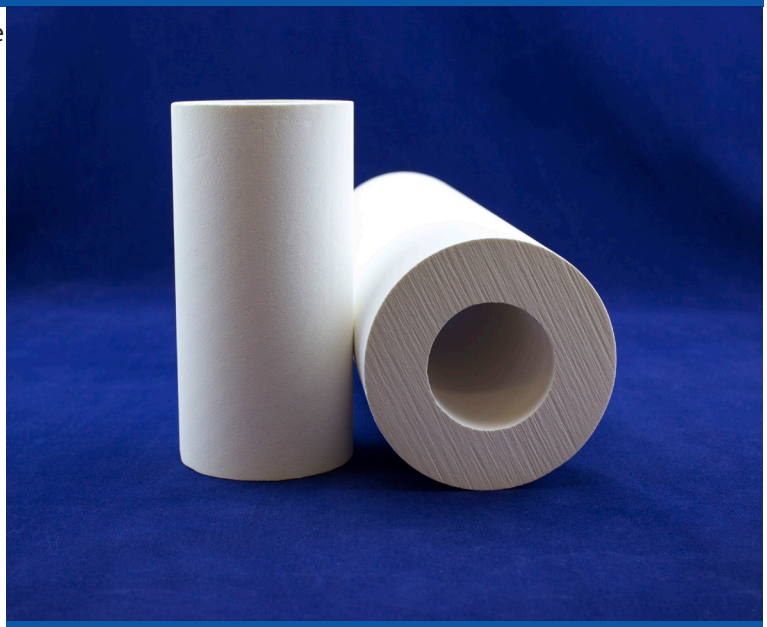
Advanced Fibrous Ceramics

ZYC

Silica Bonded Yttria Stabilized Zirconia Fiber Cylinder

Zircar Zirconium Oxide Cylinders Type ZYC are firm, rigid, free standing refractory structures composed of yttria stabilized zirconia fibers (YSZ) evenly bonded with amorphous silica, allowing cylinders to be machined to tight tolerances. ZYC cylinders possess low thermal conductivity and good resistance to thermal shock. The material is dimensionally stable to 1650 °C (3002 °F) although it can be used at higher temperatures as back-up insulation, or in areas where additional sintering can be tolerated. ZYC has good hot strength up to 1370 °C (2498 °F) and is self-supporting up to this temperature. The material is resistant to attack by most molten metals and has a high resistance to reaction with other oxide materials. At high temperatures, heat transfer by radiation dominates over conduction and convection. Our zirconia fibers are the best in the industry at reflecting and re-radiating heat while not storing it. They facilitate steep temperature gradients and outperform all others when challenged with extreme temperatures and severe environments.



Applications

RESISTANCE HEATED AND INDUCTION FURNACES

ZYC is used in both resistance heated and induction furnaces. It is particularly suited for insulation in hot pressing, crystal growing and annealing furnaces.

RADIATION SHIELDING

ZYC is used as radiation shielding in vacuum furnaces, replacing five or six metalshields without loss of insulation value. In processes where carbon contamination cannot be tolerated, Zircar's products are used instead of graphite felts and carbon black as insulation.

HIGH TEMPERATURE INSULATION

ZYC is excellent insulation for pipes or molten metal transporting and feed tubes. For cylindrical applications where silica is undesirable, our zirconia bonded fiber materials ZYFB and/or FBD are recommended.

ZYC Cylinders are phase stabilized with yttria and therefore do not undergo the usual phase transitions associated with zirconia. Electrical conductivity at elevated temperatures is also minimized with low density Zirconia fibers whereas dense Zirconia is an effective conductor at elevated temperatures. ZYC does not couple with radio frequency (RF) radiation used in induction heating, but does couple with microwave energy. ZYC has no organic binders and will produce no smoke or odor when heated.

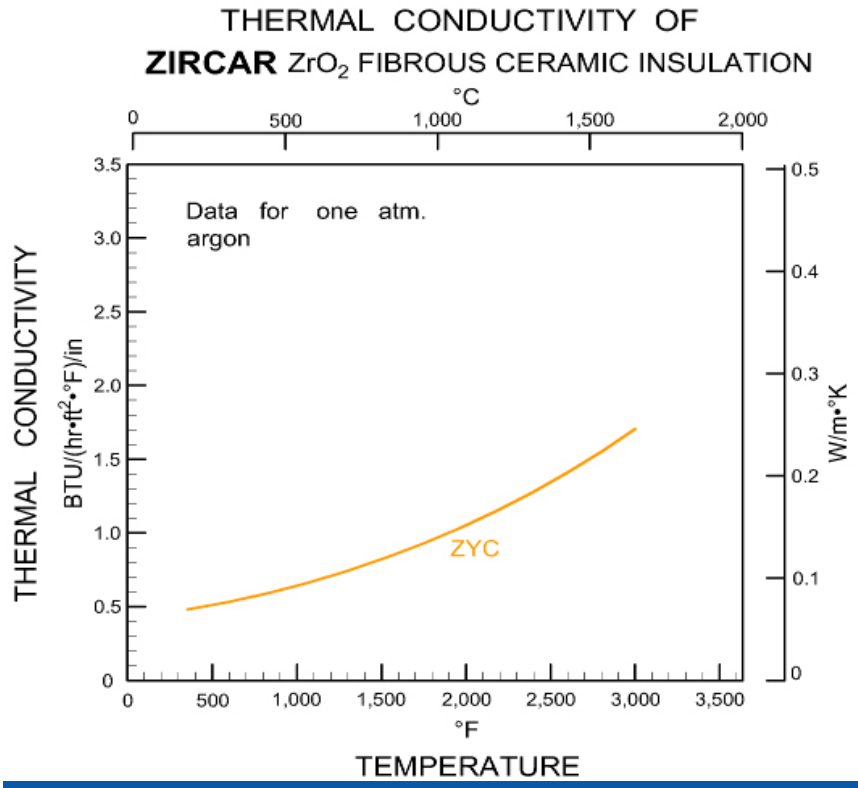
Properties & Characteristics

Properties (Nominal)	ZYC
Bulk Density, lb/ft³ (g/cm³)	30 (0.48)
Porosity, %	91
Melting Point, °C (°F)	2200 (3992)
Continuous Maximum Use Temperature, °C (°F) [1]	1650 (3002)
Intermittent Maximum Use Temperature, °C (°F) [1]	1700 (3092)
Flexural Strength, MPa (psi) - Normal to Fiber Plane	0.55 (81)
Compressive Strength, MPa (psi) @ 10% Compression - Normal to Fiber Plane	0.21 (31)
Dilatometric Softening Temperature at 10 psi,°C (°F)	950 (1740)
Thermal Expansion Coefficient RT-1425 °C (2600 °F)	$9x10^{-6}$/°C ($5x10^{-6}$/°F)
Linear Shrinkage, % (Perpendicular to Thickness)	
1 hour at 1650 °C (3002 °F)	2.5
24 hours at 1650 °C (3002 °F)	4

Chemical Composition (Nominal)	
Oxide	**Wt%**
ZrO_2 [2]	85
Y_2O_3	10
SiO_2	5

[1] Use temperature is dependent of variables such as chemical environment and stresses; both thermal and mechanical.

[2] 1-2% weight hafnia (HfO_2) occurs naturally with zirconia (ZrO_2) and does not affect performance.



Zirconia has the lowest thermal conductivity of any commercial refractory and is one of the most studied ceramic materials in the world.

The products we manfacture at Zircar Zirconia, Inc. are unique due to the open and closed porosity of our zirconium oxide fibers. This is a one-of-a-kind porosity and is exclusive to Zircar. Our products are the best performing ZrO_2 fibrous ceramics in the industry, outperforming all others when challenged with extreme temperatures and severe environments

Standard Sizes & Ordering

Please contact our Sales Department for pricing and availability for the standard sizes below as well as your custom needs.

To Place an Order

Call: 845-651-3040
email: sales@zircarzirconia.com

ZYC is manufactured using a proprietary vacuum forming technique which includes pre-treatment of the ZYBF fiber prior to establishment of the bonded finished product. Vacuum forming the ceramic fiber cylinders, with their fibers aligned perpendicular to the radius of the cylinder is then followed by a drying period on a mandrel. Final inside diameters are typically determined during the drying process. Outside diameters are machined to a tolerance within our standard +/- 0.060" on a precision tool post grinder. Tighter tolerances can be achieved and customers are welcomed to take advantage of our expertise for all your machining needs.

ZYC Cylinders

Size	Item Number
1" ID x 2" OD x 12"L	AG502
2" ID x 3" OD x 12"L	AG504
3" ID x 4" OD x 12"L	AG506
4" ID x 5" OD x 12"L	AG508
5" ID x 6" OD x 12"L	AG510
6" ID x 7" OD x 12"L	AG512
7" ID x 8" OD x 12"L	AG514
8" ID x 9" OD x 12"L	AG515
9" ID x 10" OD x 12"L	AG516
10" ID x 11" OD x 12"L	AG517
11" ID x 12" OD x 12"L	AG518

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