

ZR-CEM

Yttria Stabilized Zirconia Cement

The Unrivaled Industry Leader
of ZrO_2 Insulation

Available in Pints.

ZR-CEM Features

- Manufactured Using Our Own Unique **Zircar** ZYBF Bulk Fiber
- High Temperature Stability up to 2200 °C (3992 °F)
- Phase Stabilized with 10 wt% Yttria
- Usable in Multiple Atmospheres
- Withstands Water & Steam after Curing
- Low Shrinkage, High Strength
- Single Part Adhesive
- Safe to Use - Non-Flammable

The **Zircar** Fibrous Ceramics Advantage

Low Mass,
Low Heat Storage &
Low Thermoconductivity
means
High Thermal Shock Resistance,
High Insulation Performance,
Higher System Efficiency &
Lower Energy Costs



Low Shrinkage... High Strength... Cement Adhesive...

High temperature bonding for porous zirconia insulation. Bond ZYFB boards into larger assemblies, or ZYF or ZY textiles into any shape required.

Product Information

Zircar Zirconium Oxide Cement Type ZR-CEM is an off white single part yttria-stabilized zirconia adhesive with a useful temperature limit of 2200 °C. ZR-CEM is formulated specifically for bonding our ZrO_2 fibrous ceramic felts, boards and cylinders to themselves or to porous back-up thermal insulations such as porous firebrick, alumina and alumino-silicate fiber boards. ZR-CEM is manufactured from **Zircar** ZYBF Bulk Fibers which are made using the original ZIRCAR process at our plant in Florida, NY, USA.

ZR-CEM is composed of ZYBF yttria-stabilized zirconia milled fibers and sub-micron particles. Potassium silicate and zirconium acetate binders are added to enhance bonding characteristics. ZR-CEM is mildly acidic (pH 5) and forms a strong bond upon drying and firing.

For more information,
phone: (845) 651-3040
email: sales@zircarzirconia.com
website: www.zircarzirconia.com

Directions For Use

Bonding Closely Mated Surfaces

Mix contents thoroughly before using. Clean surfaces to be joined making certain they are free of dust. Thoroughly coat both surfaces to be joined with ZR-CEM using a brush, spatula or trowel. Reapply ZR-CEM as required until both surfaces remain wet and fluid. Initially some wicking into porous materials will occur. Push the wet surfaces with enough pressure to force some cement to flow out. Use a knife or spatula to clean the excess cement away from the bond. Dry the joined pieces thoroughly before moving or placing into service. The time required to dry varies from a few minutes to a day or more, depending on the size of the part and humidity. Drying may be accelerated by heating, do not exceed 200 °F (90 °C). Complete the curing of the bond by firing to a minimum of 800 °F (426 °C). In most cases this curing can be accomplished in the initial heating cycle. For the best bond, do not pre moisten the surfaces to be joined.

Filling Holes or Bonding Mismatched Surfaces Greater than 1/16 Inch

Make a thick paste by mixing one fluid ounce (about 30 cc) of ZR-CEM with 6 grams of lightly crushed ZYFB, ZYF or ZYBF. Spread the paste into the void using a spatula or trowel. Dry and cure at a somewhat slower rate than outlined above.

Surface Coating or Hardening of Fibrous Zirconia Materials

Thin ZR-CEM slightly with water to allow deeper penetration of the surface. Clean surfaces to be coated making certain they are free of dust. Apply the thinned ZR-CEM onto the area to be coated using a brush or sponge. Do not apply thicker than 0.03 inch or the surface coating may crack. Air or oven dry at not greater than 200 °F (80 °C) and cure at 800 °C (426 °C) as recommended above. If the texture is unacceptable, consider using ZR-RIG.

Properties & Characteristics

ZR-CEM Properties	
Bulk Density after drying, pcf (g/cc)	195 (3.1)
Bulk Density as supplied, pcf (g/cc)	125 (2.0)
Melting Point, °C (°F)	2430 (4406)
Continuous Maximum Use Temperature, °C (°F)*	2200 (3992)
Solids Content, Wt%	50
Cured Chemical Composition (Nominal)	
Oxide	Wt%
ZrO ₂ *	85
Y ₂ O ₃	10
SiO ₂	3.6
K ₂ O	1.2
Trace Inorganics	<0.3

*1-2% weight hafnia (HfO₂) occurs naturally with zirconia (ZrO₂) and does not affect performance. Only the highest purity starting materials are used to make Type ZR-CEM, minimizing trace oxides.

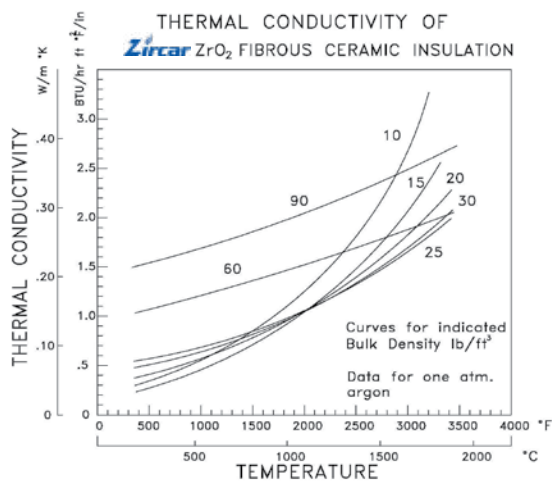


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Facts About Our Zirconium Oxide

- **Zircar** ZrO₂ fibrous ceramics are manufactured using the original ZIRCAR Process which was developed by Bernie H. Hamling (BHH) while at Union Carbide Corp. in Sterling Forest, NY. In 1974 BHH purchased the patents for the process and began ZIRCAR Products, Inc. Over the years the name ZIRCAR became synonymous with high quality advanced fibrous ceramics. In July 2000 Zircar Zirconia, Inc. purchased Bernie's zirconia business and to this day still uses his original process. Although Bernie is no longer with us, we think of him often and are grateful for the opportunity to continue his legacy in the ceramics industry. Thank you BHH.
- At very high temperatures in vacuum and inert or reducing atmospheres, zirconia loses a small amount of oxygen. The reaction results in a color change from white to gray but most other properties remain essentially unchanged and insulation effectiveness is not impaired.
- 1 to 2% hafnium oxide, HfO₂, occurs naturally with zirconium oxide. Hafnia is sometimes referred to as zirconia's twin because of structural similarities.
- Zirconia has the lowest thermal conductivity of any commercial refractory and is one of the most studied ceramic materials in the world.



- Upon heating unstabilized zirconia undergoes disruptive phase changes. At room temperature unstabilized ZrO₂ adopts a monoclinic crystal structure and transitions to tetragonal and cubic at higher temperatures. The volume expansion caused by the cubic to tetragonal to monoclinic transformation induces large stresses which cause cracking on cooling. The addition of yttria eliminates the phase transitions by stabilizing the tetragonal and cubic phases. **Zircar** ZrO₂ is phase stabilized with 10 wt% Y₂O₃.

Applications

BONDING ZIRCONIA FIBROUS CERAMICS

ZR-CEM is used for bonding zirconia fibrous ceramic materials together and to other porous surfaces.

REPAIRING CRACKS AND OPENINGS

ZR-CEM is used for repairing cracks and openings in furnace walls composed of zirconia fibrous ceramic material. For most furnace applications, the articles bonded together are ready for placing in service once the cement has dried. Curing at 800 °F (426 °C) or more may be desirable to eliminate the acetate prior to use. The cured bond joint is stronger than the tensile strength of 30 pound per cubic foot density **Zircar** zirconia insulation materials ZYFB-3, ZYZ-3 and ZYC. Pull out or de-lamination due to excessive mechanical or thermal stresses will usually first occur in the insulation material itself.

FORMING RIGID TUBES, SETTER TRAYS AND OTHER SHAPES

ZR-CEM can be used for forming rigid tubes, setter trays and other shapes by bonding together fibrous ceramic materials such as ZYF, ZYK or ZYW and drying them on a form.

ZR-CEM has the consistency of a thick paint and should be mixed thoroughly before using. ZR-CEM may be applied by dipping, brushing, troweling or rolling. If ZR-CEM becomes thickened by evaporation, de-ionized or distilled water can be used to bring the cement back to its original consistency. ZR-CEM is non-flammable and is not affected by freezing. For a 0.03 inch thick bond, a pint of cement will cover about 7 square feet of joint surface.

Standard Product Sizes & Ordering

Please contact our Sales Department for pricing and availability.

To Place an Order

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

ZR-CEM

Size	Item Number
1 Pint	BA001



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Product Samples

FREE SAMPLES

Call: 845-651-3040

email: sales@zircarzirconia.com

Product Type	Item #
ZR-CEM	SAMPLE-BA

Samples are 1oz



Other Products & Capabilities

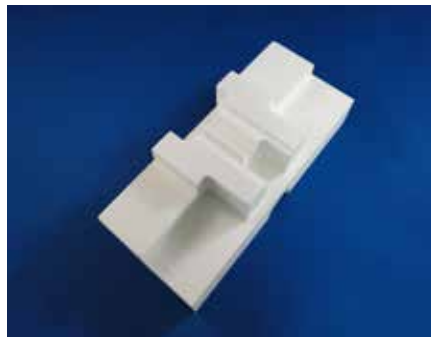
Customers who order ZR-CEM also order:

- ZYBF
- ZYFB-3, ZYFB-6 & FBD
- ZYF
- ZYK
- ZYW

Zircar machines custom shapes to your design specifications.

Our capabilities include:

- 3D CNC Machining
- Layered Configurations
- Lap Joined Boards and Cylinders
- Diamond Wire Splitting of Cylinders



Zircar welcomes our customers to take advantage of our machining department's expertise for all your custom machining needs.



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