



Zircar Zirconia, Inc.
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ZIRCONIA CEMENT TYPE ZR-CEM



Zirconia Cement Type ZR-CEM.

FEATURES

- High Temperature Stability to 2200°C
- Withstands Water and Steam after curing
- Safe to Use – Non-Flammable
- Excellent Thermal Shock Resistance
- Low Shrinkage, High Strength
- Available 'Off the Shelf'
- Single Part System

Zircar Zirconia 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 Zircar Zirconia Felts, Boards and Cylinders to themselves or to back-up thermal insulations such as porous firebrick, alumina fiber and alumino-silicate fiber boards. **ZR-CEM** is composed of yttria-stabilized zirconia milled fibers and sub-micron particles. Potassium silicate and zirconium acetate binders are added to enhance bonding characteristics. **ZR-CEM** will not bond to non-porous surfaces such as glass or steel. **ZR-CEM** is mildly acidic (pH 5.4) and forms a strong bond upon removal of the water solvent.

For most furnace applications, the articles bonded together are ready for placing in service once the cement has dried. Curing at 426°C (800°F) 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 material Types 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.

ZR-CEM has the consistency of a thick paint and should be mixed thoroughly before using. **ZR-CEM** may be applied by dipping, brushing, 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 0.01 inch thick bond, a pint of cement will cover about 7 square feet of joint surface.

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Product Data
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APPLICATION INFORMATION

- **ZR-CEM** is used for bonding zirconia fibrous ceramic materials together and to other porous surfaces.
- **ZR-CEM** is used for forming rigid tubes, setter trays and other shapes by bonding of fibrous ceramic materials.
- **ZR-CEM** is used for repairing cracks and openings in furnace walls composed of zirconia fibrous ceramic material.

DIRECTIONS FOR USE

Bonding Closely Mated Surfaces

1. Mix contents thoroughly before using.
2. Clean surfaces to be joined making certain they are free of oil, starch, etc.
3. Pre-moisten both surfaces with de-ionized water from a spray bottle (~1 cc/in²).
4. Thoroughly coat both cleaned 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.
5. Contact wet surfaces using slight pressure to assure match of parts.
6. 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 or oven drying at not greater than 90°C (200°F).
7. Complete the curing of the bond by firing to a minimum of 426°C (800°F). In most cases this curing can be accomplished in the initial heating cycle.

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

1. Make a thick paste by mixing one fluid ounce (about 30 cc) of **ZR-CEM** with 6 grams of lightly crushed zirconia board, felt or bulk fiber.
2. Spread the paste into the void using a spatula or trowel.
3. Dry and cure at a somewhat slower rate than outlined above.

Surface Coating or Hardening of Fibrous Zirconia Materials

1. Thin **ZR-CEM** slightly with water to allow deeper penetration of the surface.
2. Clean surfaces to be coated making certain they are free of oil, starch, etc.
3. Apply the thinned **ZR-CEM** onto the area to be coated using a brush or sponge. Do not apply thicker than 0.01 inch or the surface coating may crack.
4. Air or oven dry at not greater than 90°C (200°F) and cure at 426°C (800°F) as recommended above.

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PROPERTIES & CHARACTERISTICS

Fired Composition - Wt%	
ZrO ₂ *	85
Y ₂ O ₃	10
SiO ₂	3.6
K ₂ O	1.2
Trace Inorganics	<0.3
Melting Point, °C (°F)	2430 (4406)
Continuous Maximum Use Temperature**, °C (°F)	2200 (3992)
Bulk Density after drying, g/cc (pcf)	3.1 (195)
Bulk Density as supplied, g/cc (pcf)	2.0 (125)
Solids Content, Wt%	60
Weight Per Pint, grams (lbs)	953 (2.1)
Viscosity, centipoises at 25°C (77°F)	1200

* 1 - 2 wt% hafnia occurs naturally with zirconia and does not affect performance.

** Maximum use temperature is dependent on variables such as thermal and mechanical stresses, and the chemical environment that the material experiences.

ORDERING INFORMATION

Zirconia cement is available in a standard pint size. Please Contact our Sales Department for pricing and availability.

Standard Size	Item Number
ZR-CEM, 1 pint	BA001

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