



Zircar Zirconia, Inc.  
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## ZIRCONIA RIGIDIZER TYPE ZR-RIG



Zirconia Rigidizer Type ZR-RIG.

### FEATURES

- High Purity
- High Temperature Stability to 2200 °C
- Withstands Water and Steam after curing
- Safe to Use – Non-Flammable
- Available in Two Sizes; Pint or Quart
- Available 'Off the Shelf'

Zircar Zirconia Rigidizer Type **ZR-RIG** is formulated for the surface hardening of all Zircar zirconia fiber products and for use in the fabrication of zirconia composites from Zircar zirconia textiles. Such composites are comprised of a matrix of zirconia fibers reinforced with sub-micron zirconia particles. Type **ZR-RIG** has the same fired composition as Zircar zirconia fibers and forms a fully stabilized zirconia body upon curing.

**ZR-RIG** contains sub-micron particles of yttria-stabilized zirconia suspended in a zirconium acetate aqueous solution. The water based rigidizer, as supplied, has the consistency of a light house paint. Should the rigidizer become too thick during use for complete penetration into the surface of the zirconia fiber product, the rigidizer can be thinned by small additions of de-ionized or distilled water.

### APPLICATION INFORMATION

- **ZR-RIG** is used for surface hardening and as a strengthening agent for low density zirconia ceramic fiber insulation.
- **ZR-RIG** is used as a bonding agent in the manufacture of composite structures made from Zircar zirconia textiles.

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### DIRECTIONS FOR USE

#### Bonding Layers of Zirconia Cloth into a Composite

1. Thoroughly mix **ZR-RIG** before using. It is normal for the sub-micron yttria-stabilized zirconia particles to settle during storage.
2. Using a sponge, brush or simply by pouring on, saturate both sides of the cloth using a liberal amount of **ZR-RIG** to assure uniform penetration. The rate of application of **ZR-RIG** for use with Zircar Zirconia Cloth Type ZYW-30A in the production of Zirconia Composites is about 2.5 fluid ounces per square foot of cloth.
3. Remove excess **ZR-RIG** from the textile with a rubber squeegee or roller. Partially dry the saturated textile with a stream of dry air or in an oven at low temperature until the **ZR-RIG** becomes tacky (essentially a "B-staging" operation). A heat gun has been successfully used when the textile is turned several times during heating.
4. Laminate the pieces together or form to shape while the **ZR-RIG** is tacky. Roll or press the layers together to make good contact.
5. Dry the body slowly, starting at 100-200°F for several hours, increasing the temperature to 240-300°F over a period of 3-4 hours. The maximum rate of drying depends on the thickness of the lay-up. Two layers can normally be dried in 1-2 hours at 240°F, whereas, 10 layers or more require 24 hours at 300°F to dry thoroughly.
6. Cure the rigidizer by heating at 800-1000°F for 1 hour. Ramping up to these temperatures over a period of several hours is recommended. In some applications, it may be desirable to cure the body above 2000°F for increased strength.

#### Surface Hardening Zirconia Fiber Products

1. Thoroughly mix **ZR-RIG** before using. Using a sponge, brush, or by dipping, apply several light coats of **ZR-RIG** to the fiber surface. The rigidizer should soak into the fiber surface completely. When it cures up on the surface the pores are full.
2. Allow the treated parts to air dry overnight. Curing at 800-1000°F is then recommended.

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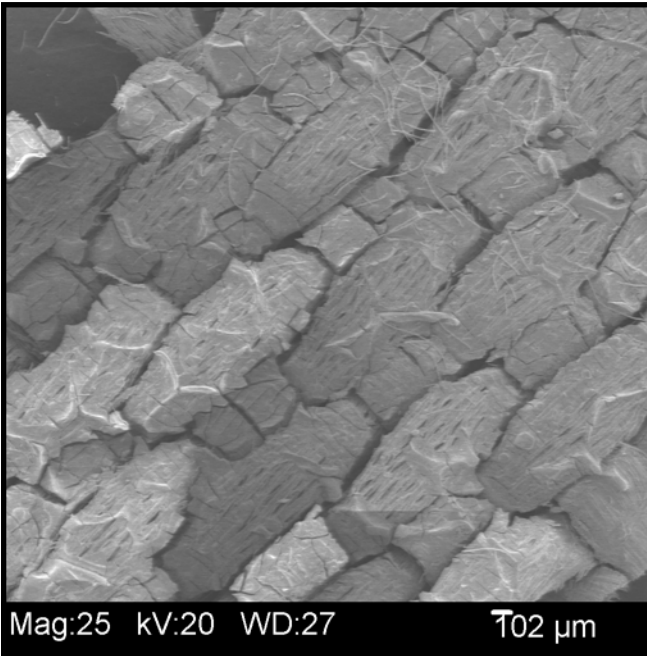


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## ZIRCONIA RIGIDIZER TYPE ZR-RIG

### PROPERTIES & CHARACTERISTICS

Fired Composition Wt%	
ZrO <sub>2</sub> (including 1-2 wt% naturally occurring HfO <sub>2</sub> )	90
Y <sub>2</sub> O <sub>3</sub>	10
Trace Inorganics	<0.3
Melting Point °C (°F)	2590 (4694)
Specific Gravity	1.87
Solids Content, %	53
Weight Per Pint, grams (lbs)	885 (1.95)



SEM photomicrograph of satin weave zirconia cloth, type ZYW-30A, rigidized three successive times with zirconia rigidizer type ZR-RIG and high fired. The resulting composite body still shows the original satin weave structure of the zirconia cloth. The raised ridges which approximate a honeycomb pattern are from contact with open cell urethane foam which was used as the contact surface in a fixture to restrain the rigidized cloth in a flat sheet during drying.

### ORDERING INFORMATION

Standard Item Description	Item Number
ZR-RIG, 1 pint	BB001
ZR-RIG, 1 quart	BB002

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