Zircar Zirconia, Inc.
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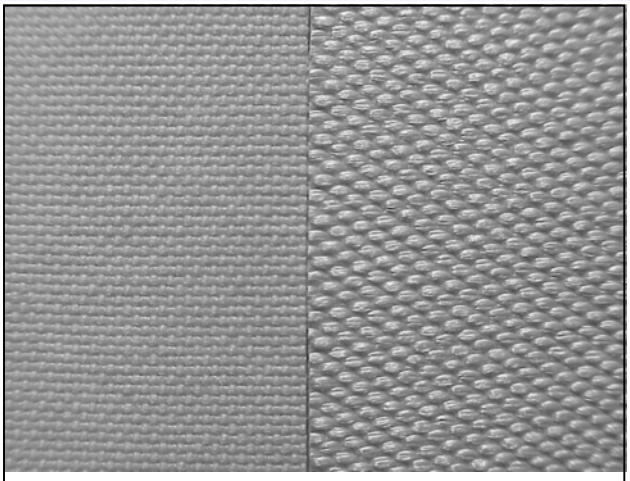
ZIRCONIA CLOTH
TYPE ZYW



ZYW-15 (left, square weave) and ZYW-30A (right, satin weave) are both available in 18" x 24" sheets.

FEATURES

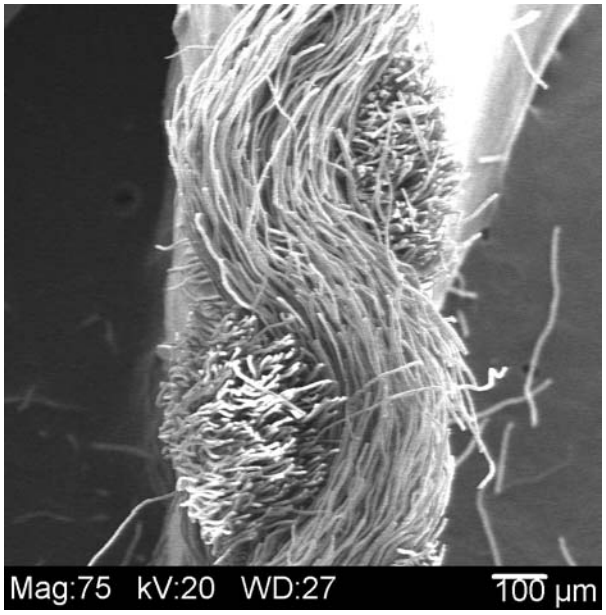
- **Low Thermal Conductivity**
- **High Porosity**
- **Offered in Two Constructions: Square Weave and Satin Weave**
- **Extreme High Temperature Stability**
- **Fibers Stabilized with ~10 wt% Yttria**
- **Can be Cemented with Zircar Zirconia Cement Type ZR-CEM**
- **Can be Rigidized with Zircar Zirconia Rigidizer Type ZR-RIG**
- **Easily Cut to Size**
- **Available 'off the shelf'**

Zirconia Cloths Type **ZYW** are flexible textiles composed of yttria stabilized zirconia fibers that offer extreme temperature and chemical resistance in a flexible form. Type **ZYW** cloths provide the lowest thermal conductivity of any commercially available refractory material in their class. Type **ZYW** cloths are true textiles, manufactured using the Zircar process where an organic cloth is converted into an inorganic replica. The fabrics are constructed of continuous individual filaments mechanically interlocked in a woven structure.

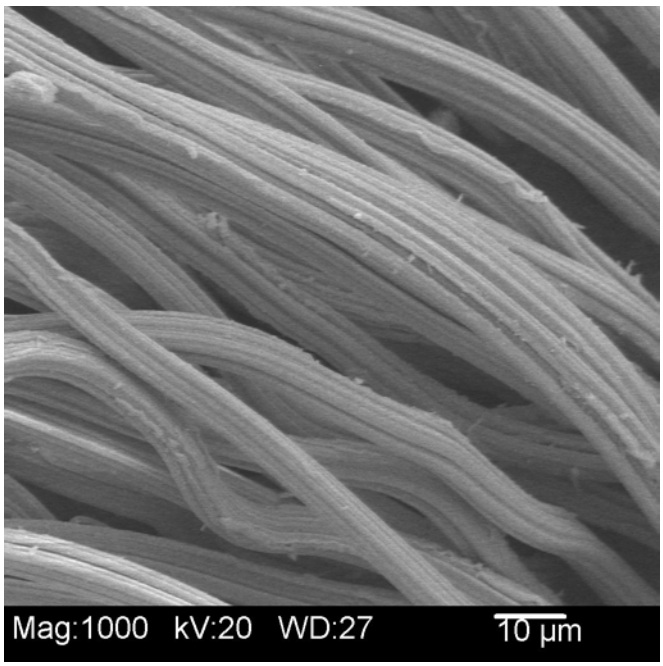
ZYW ceramic textiles are ideal for temperatures up to 2200°C and are suitable for applications such as high energy battery separators, thermal insulation in crystal growing furnaces, and hot gas filtration. The fine capillary and pore structure of **ZYW**, in combination with the hydrophilic nature of zirconia, impart excellent wetting, solution retention, and wicking characteristics, to these materials. The cloths require neither binders nor supporting wires to maintain their construction and will comply somewhat to both tensile and compressive forces due to the mechanical interlocking of the fibers. Elongation of 4 to 8% before breaking allows **ZYW** to conform to irregular surfaces. **ZYW** can be compressed up to two-thirds of its normal thickness and still recover a major fraction of its original dimension with little fiber damage.

Zirconia Cloth Type **ZYW** is available in two formats; Type **ZYW-15** and Type **ZYW-30A.** Type **ZYW-15** is a square weave cloth nominally 0.015" thick composed of yttria-stabilized zirconia fibers. Type **ZYW-30A** is a satin weave cloth nominally 0.025" thick.

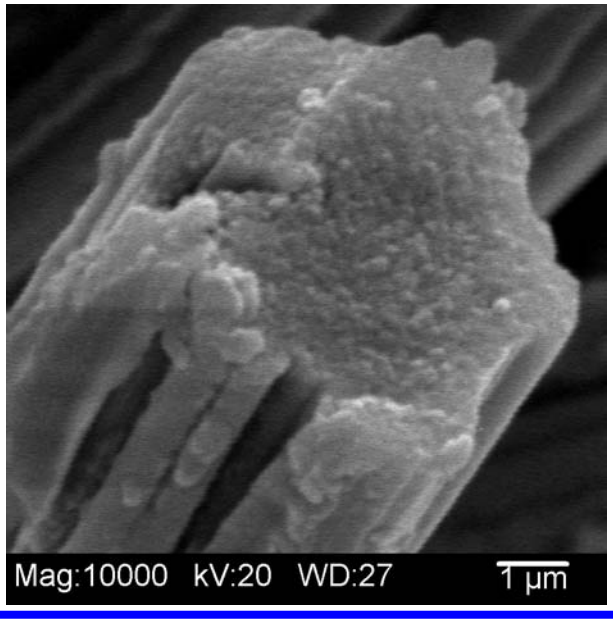
ZIRCONIA CLOTH
TYPE ZYW



The SEM photomicrograph on the left shows a view of the edge of Type **ZYW-15**, square weave zirconia cloth. Also known as a 'plain weave' the square weave results from a simple, over one - under one, weaving pattern. Type **ZYW-30A** (not shown) is a satin weave produced from an over four - under one weaving pattern similar to a twill.



The high porosity of Type **ZYW-15** is illustrated in the SEM photomicrograph shown above.



The SEM photomicrograph on the left shows a high magnification end view of an individual fiber from Type **ZYW-15**. The serrated shape which is common to all Zircar zirconia fibers can be seen in this image. The fiber is comprised of sub-micron crystallites and is of nearly theoretical density.

ZIRCONIA CLOTH
TYPE ZYW

APPLICATION INFORMATION

- **ZYW** is an effective high temperature insulation for use in applications where space is at a premium. Its relative high strength allows repeated flexing at temperatures below 2500°F.

- **ZYW** has found use as a high temperature heat shielding material. Its use can significantly reduce the number of conventional refractory metal shields needed in many applications and is not restricted to vacuum and inert or reducing environments.

- **ZYW** can be coated with Zirconia Rigidizer Type **ZR-RIG** to create thin walled, rigid fibrous zirconia tubes, and other shapes. **ZYW** can also be wrapped around dense zirconia oxygen sensor tubes, held in place with **ZR-RIG**, for use as standoffs.

- **ZYW** is an effective separator for high temperature fuel cells and high energy batteries.

- **ZYW** is an effective reinforcement for ablative materials used in nozzles, nose tips and heat shields.

- Other applications for Zircar Zirconia Cloth Type **ZYW** include filter media for hot gases, catalyst supports, and flexible setter cloths at elevated temperatures.

CHEMICAL RESISTANCE

Zircar Zirconia Cloths Type **ZYW** have exceptional resistance to molten alkali metal chlorides and carbonates at temperatures as high as 1300°F and to aqueous solutions of alkali metal hydroxides at temperatures as high as 450°F. These materials will tolerate exposure to a mineral acid at its boiling point for short lengths of time. Extensive contact with hot phosphoric acid, however, causes embrittlement and stiffening due to the formation of zirconium phosphate.

Molten metals such as copper, aluminum, iron steel, etc., do not wet and therefore cause little change in either the chemical or the physical nature of these products in spite of many hours of exposure.

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ZIRCONIA CLOTH
TYPE ZYW

PROPERTIES & CHARACTERISTICS

	ZYW-15	ZYW-30A
Nominal Composition Wt%		
ZrO_2 *	90	90
Y_2O_3	10	10
Trace Impurities	<0.25	<0.25
Nominal Thickness, mils	15	25
Bulk Porosity, %	87	83
Bulk Density, g/cc (pcf)	1.02 (64)	0.94 (59)
Tensile Strength, g/cm width (lb / inch width)	154 (0.9)	872 (5)
Nominal Weight / Area, grams/meter^2 (oz/yd^2)	291 (8.6)	772 (22)
Melting Point, °C (°F)	2590 (4694)	2590 (4694)
Continuous Maximum Use Limit**, °C (°F)	2200 (3992)	2200 (3992)
Specific Heat J/kgK @ 93°C (BTU / lb-°F @ 200°F)	544 (0.13)	544 (0.13)
Specific Heat J/kgK @ 2370°C (BTU / lb-°F @ 4298°F)	754 (0.18)	754 (0.18)
Vapor Pressure @ 1370°C (2498°F), Torr	8×10^{-12}	8×10^{-12}
% Shrinkage after 1 hr.@ 1650°C (3002°F) isothermal soak	5.5	3.9

* 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

Type **ZYW** is offered in standard size sheets listed below along with the ordering item number. Our process only allows **ZYW** to be made in sheets. We cannot make 'rolls'. Non-standard sheet sizes and die - cut parts are quoted on an individual basis - please inquire.

Standard Sizes	Item Number
ZYW-15, Square Weave, 18" x 24"	CD001
ZYW-30A, Satin Weave, 18" x 24"	CE001

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