



Zircar Zirconia, Inc.
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ZIRCONIA FELT TYPE ZYF



Flexible Zirconia Felt Types ZYF-50 and ZYF-100 are stocked in 18" x 24" sheets.

FEATURES

- Low Thermal Conductivity
- High Porosity
- High Purity
- Extreme High Temperature Stability
- Fibers Stabilized with ~10 wt% Yttria
- Custom Fillers and Coatings Available
- Can be Cemented with Zircar Zirconia Cement Type ZR-CEM
- Can be Rigidized with Zircar Zirconia Rigidizer Type ZIR-RIG
- Easily Cut to Size
- Available "Off the Shelf"

Zirconia Felt is a true ceramic textile formed by the unique ZIRCAR process for replicating organic structures in inorganic materials. The zirconia felt structure is a 'needled felt' which retains its fibrous nature to 2480°C. The stabilized zirconia composition permits the advantages of fibrous insulations to be extended into temperature regions well above the melting temperatures of siliceous and alumina insulation materials.

Zirconia Felt Types **ZYF-50**, **ZYF-100**, and **ZYF-150** are composed of 100%, 4-6 micron diameter, yttria-stabilized zirconia fibers which are mechanically interlocked. Designed for use in extremely corrosive environments and high temperatures, these felts are 100% inorganic fibers and contain no binders. They undergo no phase transitions on temperature cycling and are very effective thermal insulators, capable of use at temperatures in excess of 1930°C. These materials are equally useful in strong oxidizing and reducing environments, are not reactive to alkali vapors, salts or strong hot solutions. The felts are not wet by most molten metals and have low adsorption surface area and vapor pressure, resulting in low outgassing and contamination in ultra high temperature uses. Zirconia felts are light weight and very porous. They can be surface coated with polymers, filled with inorganic powders or treated with inorganic colloids to achieve special properties.

Zirconia Felt Type **ZYF-A2.13** is a rigidized version of **ZYF-150** in which the zirconia fibers have been surface treated with colloidal alumina, refired, and face milled to provide a very uniform thickness. This post processing results in a stiff sheet of **ZYF-A2.13**.

Zirconia Felt Type **ZYF-S.75G** is a powder loaded version of **ZYF-100** which has been physically filled with 0.75 grams silica per gram ZYF. This filled product retains some flexibility.

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ZIRCONIA FELT TYPE ZYF

APPLICATION INFORMATION

ZYF-50, ZYF-100, and ZYF-150:

- Zirconia Felt Type **ZYF** is widely used in crystal growing applications. In the Czochralski method of oxide crystal growing, an iridium crucible is often used to contain the melt. Iridium, a precious metal in the platinum group, vaporizes at high temperature. **ZYF** acts as thermal insulation and a cushioning barrier as well as a platform for iridium recovery. A layer of **ZYF** wrapped around the iridium crucible creates a physical barrier between the fragile crucible and the back up insulation. The steep thermal gradient across the **ZYF** causes condensation of the iridium into the felt from which it can then be easily segregated and recovered.
- Zirconia Felt Type **ZYF** is used as an electrolytic cell separator in batteries and fuel cells using alkali electrolytes. Type **ZYF** is unaffected by long term exposure to KOH.
- **ZYF** Felts are used as setter material for powder metal sintering in both vacuum and hydrogen atmospheres.
- **ZYF** Felts are used as setter material in contact with quartz glass in melting and hot-working operations.
- Vacuum furnace and hot isostatic press makers have used **ZYF-50** and **ZYF-100** as insulation between layers of refractory metal heat shields to improve their insulation package performance.

ZYF-A2.13

- This thicker, rigidized felt was developed for use as a diffusion burner membrane for fuel fired heaters installed in long-haul trucks and high end passenger cars. In this application the liquid fuel, gasoline or diesel, is pumped onto one surface of a disk of felt. The fuel then wicks through to the opposite surface which is located in a combustion chamber and evaporates. The evaporated fuel is mixed with air and ignited providing an 'instant-on' heat in the vehicle which is independent of the engine heat.
- **ZYF-A2.13** is also used as a setter plate for vacuum sintering flat sheets of powdered metal materials. The felt remains flat during sintering because of its rigid structure.

ZYF-S.75G

- This heavy, silica loaded felt is used as a gasket material in fuel cells. When compressed between the sealing surfaces of the fuel cell container **ZYF-S.75G** forms a barrier that resists attack from the highly corrosive electrolyte.

ZYF can be treated with other coatings and fillers to meet your needs. Please inquire.



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PROPERTIES & CHARACTERISTICS

	ZYF-50	ZYF-100	ZYF-150	ZYF-A2.13	ZYF-S.75G
Thickness, inch	0.05 +/- 0.015	0.10 +/- 0.03	0.15 +/- 0.03	0.128 +/- 0.01	0.10 +/- 0.03
Bulk Porosity	96%	95%	94%	94%	88%
Bulk Density Lb / Cubic Foot	15	15	20	20	30
Tensile Strength Lb / inch width	0.6	1.6	2.0	7.0	1.7
Weight / Area Lb / SQFT	0.07	0.13	0.23	0.21	0.22
Melting Point °F	4700	4700	4700		
Compressive Strength PSI @ 10% Compression	3	3	5	13	13
Composition					
Wt% ZrO ₂ *+Y ₂ O ₃	99+	99+	99+	97+	56+
Wt% Al ₂ O ₃	<0.01	<0.01	<0.01	2 +/- 1	<0/01
Wt% SiO ₂	<0.02	<0.02	<0.02	<0.02	43
Minimum wrapping diameter before breaking	0.25 Inch	0.75 Inch	3 Inches	3 Feet	2 Inches
Specific Heat BTU / LB-°F					
@ 200 °F	0.13	0.13	0.13		
@ 4300 °F	0.18	0.18	0.18		
Vapor Pressure @ 2500 °F	8 x 10 ⁻¹² Torr	8 x 10 ⁻¹² Torr	8 x 10 ⁻¹² Torr		
%Shrinkage after 1 hr. @ 3000°F isothermal soak	5	4	4	1.5	5

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

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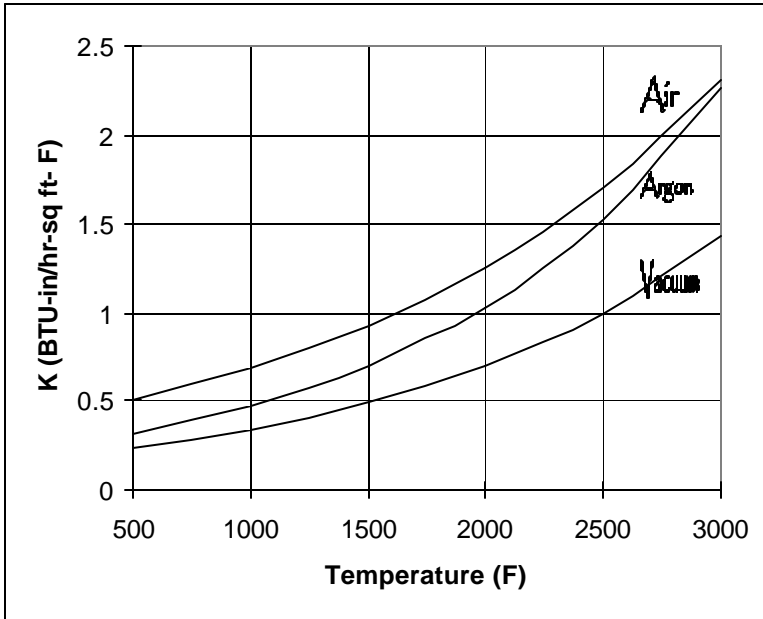
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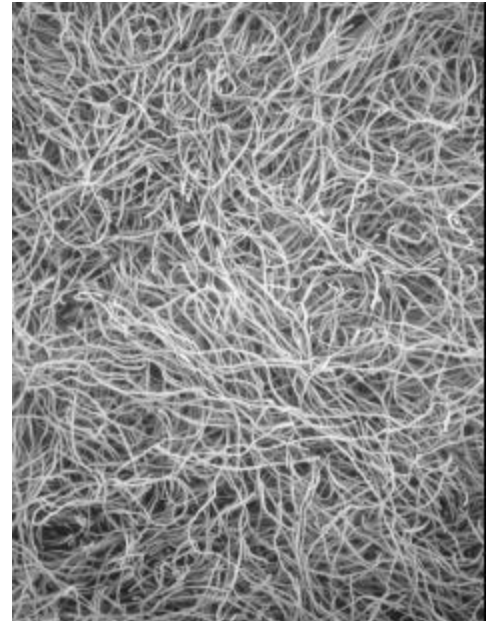


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ZIRCONIA FELT TYPE ZYF



Thermal Conductivity in Various Atmospheres
 ZYF-50, ZYF-100, and ZYF-150



Micrograph showing the mechanically interlocked structure of ZYF-50, ZYF-100 and ZYF-150

ORDERING INFORMATION

Zirconia felt is available in standard size sheets as shown in the table below. Please contact our Sales Department for Pricing and Availability.

- To order specify Quantity, Material Type and Item Number which is listed below.
 For example: 50 each, ZYF-100, Item # CB001

Standard Sizes	Item Number
ZYF-50, 18" x 24"	CA001
ZYF-100, 18" x 24"	CB001
ZYF-150, 12" x 18"	CBA01
ZYF-A2.13, 9" x 12"	CB006
ZYF-S.75G, 18" x 24"	CB008

Important Note:

Zirconia Felt Type ZYF is manufactured in sheet form only and is not available as a continuous roll.

- Custom sheet sizes and die - cut parts are available. Please contact us with your requirements for a quotation.

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