Product Information Sheet

Fiberfrax® Ceramic Fiber Paper

Fiberfrax

INTRODUCTION

The Fiberfrax® ceramic fiber paper product line is a unique family of products which is manufactured by forming aluminosilicate fibers in a nonwoven matrix. The ceramic fibers are randomly orientated during manufacture, then held in place with a latex binder system. A specialized paper making process is statistically controlled to form uniform, lightweight, flexible sheets.

By blending different fibers, binders, and additives while varying the manufacturing process, Alkegen now produces a variety of Fiberfrax paper products for a wide range of applications.

Fiberfrax papers exhibit excellent chemical stability, resisting attack from most corrosive agents. Exceptions are hydrofluoric, phosphoric acids and concentrated alkalis. If Fiberfrax papers are wet by water or steam, all thermal and physical properties are completely restored upon drying. No water of hydration is present in most Fiberfrax paper grades. Fiberfrax papers have good dielectric strengths.

Fiberfrax papers, with the exception of the inorganic series, will generate small amounts of smoke and trace element out gassing during the initial exposure to temperatures above 450°F.

PRODUCT LINE ADVANTAGES

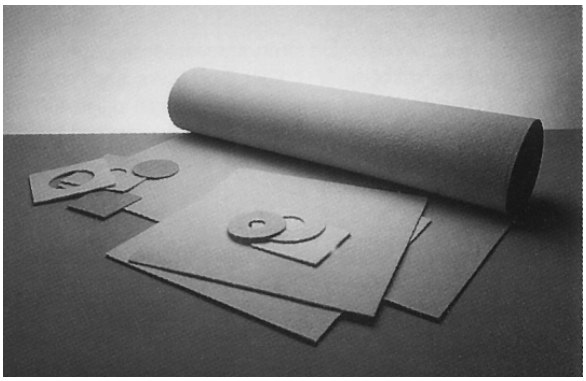
Fiberfrax ceramic fiber papers offer our customers many unique problem solving advantages which include:

- High temperature stability
- Low thermal conductivity
- Low heat storage
- Weight reduction
- Resiliency
- Thermal shock resistance
- High heat reflectance
- Good dielectric strength
- Excellent corrosion resistance
- Easy to wrap, shape, or cut
- Ease of fabrication

GENERAL USES OF FIBERFRAX PAPERS

Fiberfrax papers are used to solve a wide variety of heat related problems, and are used as:

- Highly efficient refractory backup
- Dependable fire protection
- Thermal insulation
- Hot gas filtration media
- Molten metal splash and spark protection
- High temperature gasket, separator, or parting agent



TYPICAL MARKETS/APPLICATIONS

Based on the uses listed in the preceding text, Fiberfrax papers solve a range of application problems in the industries listed below:

Aerospace
- Heat shields
- Nose cone ablative shields
- Igniter line protection
- Oxygen generators

Appliance
- Self cleaning ovens
- Woodburning stoves
- Electrical heaters
- Mobile home appliance insulation

Ceramic and Glass
- Ware separator
- Metal clad brick gaskets
- Glass tank refractory backup

Petrochemical
- Transfer line protection
- Welding
- Brazing protection

Automotive
- Muffler insulation
- Heat shielding

Steel and Nonferrous
- Investment casting mold wrapping
- Ladle refractory backup
- Thermocouple tube protection
- Heat treating parting agent
- Foundry gasketing
- Ladle shroud wrap

Refer to the product Material Safety Data Sheet (MSDS) for recommended work practices and other product safety information.

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PRODUCT RANGE

Product Segmentation

Fiberfrax ceramic fiber papers are differentiated by thickness, density, fiber index, and chemistry. They are often segmented into three groups:

- **Utility grade:** Rollboard paper, the most cost effective product in applications where continuous performance characteristics is less critical.
- **Standard grades:** 550 and 970 Papers are used where reliability and consistency are important.
- **Premium grades:** 880, HSA, 882-H, and 972-H Papers are used either when organic out gassing cannot be tolerated or when thermal performance is critical. "-H" designation references the heat treating process used to remove organics.

UTILITY GRADE

Rollboard

The lower density, binder chemistry, and bulk ceramic fiber grade used to manufacture Fiberfrax Rollboard paper result in a product with lower cost, higher flexibility, and reduced smoke and odor during burnout. Rollboard paper is best suited for wrapping intricate shapes or molds and as a standard grade single use product in disposable applications.

STANDARD GRADE

550 Paper

550 paper is made from unwashed high purity ceramic fiber. Its higher density and binders give performance properties ideal for most refractory applications.

970 Paper

970 paper is made from high purity Fiberfrax washed fiber. During the manufacture of this product, a large portion of the unfiberized particles in the bulk fiber are removed prior to paper layup. The washing of the fiber gives great uniformity to the papers structure while reducing weight and improving the thermal performance; in addition, this product is preferred in automatic die stamping operations where unfiberized particles in the paper can lead to excessive die wear.

PREMIUM GRADE

880 Paper

880 paper is made from a higher alumina content, shorter, smaller diameter fiber and laid up at higher densities. These product parameters lead to reduced shrinkage, higher strength, an increased operating temperature range and better chemical resistivity. This product is used in applications where the service life of standard ceramic fiber papers is reduced.

HSA Paper

HSA paper is made from high surface area (HSA) fibers that contain a low percentage of unfiberized material. Use of this fiber results in a paper with lighter weight and extremely low thermal conductivity, making it the choice of the aerospace industry. It is also used when uniform pore structure and a low content of unfiberized material are required in applications such as glass contact or gas filtration.

Inorganic Papers

Fiberfrax papers are available without the organic binder system. These products are completely free of organics and used when higher fired strength is required or in processes and applications where even small amounts of organic burnout is unacceptable. Two temperature grades and several thicknesses and widths are available.

- **972-H** is heat treated during the manufacturing process to remove organic binders. As manufactured, 972-H paper remains soft and flexible allowing it to conform to most shapes or contours.
- **882-H** has higher temperature stability and higher density than 972-H Paper. The fiber geometry and product density lead to the maximum burn strength of a binderless paper.

CERTIFICATIONS/APPROVALS

Fiberfrax papers have been independently tested for conformance to a wide variety of industry standards. For example, several Fiberfrax papers are listed as "Recognized Components" with Underwriters Laboratories, Inc.; conform to U.S. Coast Guard requirements for incombustible materials; and are tested in accordance with ASTM methods. For details of existing approvals and test procedures, contact the Alkegen Application Engineering Group at 716-768-6460.

ADDITIONAL CAPABILITIES

Alkegen has several manufacturing capabilities which can enhance the performance of Fiberfrax papers in a wide variety of applications. Utilizing precision high speed slitters, Alkegen can slit paper materials down to one inch (1") widths for installation speed and convenience. Material can be laminated, foil faced or adhesive backed to tailor the material form to specific application requirements

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TYPICAL PRODUCT PARAMETERS

Paper Grade	Roll Board	550	970	880	HSA	972-H	882-H	HSA (OF)
Physical Properties								
Color	Off-White	White	White	White	White	White	White	White
Classification Temperature* °F (°C)	2300 (1260)	2300 (1260)	2300 (1260)	2600 (1427)	2300 (1260)	2300 (1260)	2600 (1427)	2300 (1260)
Continuous Use Temperature** °F (°C)	2000 (1100)	2150 (1176)	2150 (1176)	2450 (1343)	2150 (1176)	2150 (1176)	2450 (1343)	2150 (1176)
Melting Point	3200 (1760)	3260 (1793)	3260 (1793)	3500 (1927)	3100 (1704)	3260 (1793)	3500 (1927)	3100 (1704)
Density, lb/ft³ (kg/m³)	10 (160)	12 (192)	10 (160)	18 (288)	10 (160)	9 (144)	16 (256)	7 (112)
Fiber Index (wt. %)	40%	50%	70%	55%	100%	70%	70%	100%
LOI (wt. %)	3.0%	6.5%	7.0%	8.0%	3.0%	0.1%	0.1%	0.1%

Typical Chemical Analysis (wt. %)								
Al_2O_3	47-52	47-52	47-52	58-60	47-52	47-52	58-60	47-52
SiO_2	48-53	48-53	48-53	40-42	47-52	48-53	40-42	47-52
NA_2O	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.3	<0.5
Fe_2O_3	<0.5	<0.5	<0.5	<0.1	<0.05	<0.5	<0.1	<0.05

Compression Properties								
Deformation (% compression)	Applied Pressure, psi (kPa)							
10%	1 (7)	1 (7)	1.3 (9)	3 (21)	–	–	–	–
25%	5 (35)	6 (41)	5.8 (40)	16 (110)	–	–	–	–
50%	32 (221)	35 (241)	22 (152)	44 (303)	–	–	–	–

Strength Properties								
Tensile Strength, psi (kPa)	58 (400)	102 (703)	94 (648)	136 (938)	55 (379)	–	–	–
Burst Strength, psi (kPa)	22 (152)	19 (131)	25 (172)	37 (255)	–	–	–	–

NOTES:

- The "OF" designation signifies materials manufactured without the use of any organic binders, produced "organic free" as is.
- The "H" designation signifies that binders (organics) have been removed via a heat treating process.

*The Classification Temperature is not a definition of the operational temperature use limit of these products, especially when long-term physical or dimensional stability is a factor. The classification temperature is the temperature at which irreversible linear shrinkage does not exceed a given value after a 24-hour heat soak test. For applications where long-term stability is not a requirement, products may be successfully used at temperatures well in excess of their Classification Temperature. For continuous use applications requiring long-term stability, routine practice is to utilize materials in respect to their continuous use temperature.

**The Continuous Use Temperature is a recommended maximum operating temperature for the material usage under clean, oxidizing atmosphere conditions. For certain application conditions (specific chemical contaminants, reducing atmospheres, etc.), the Continuous Use Temperature may be reduced.

Data are average results of tests conducted under standard procedures and are subject to variation. Results should not be used for specification purposes.
For assistance or further clarification, please contact your nearest Alkegen Application Engineering office.

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AVAILABILITY

Paper Grade	Roll Board	550	970	880	HSA	972-H	882-H	HSA (OF)
Thickness, in (mm)								
A = 1/32 (0.8)			X			X		
F = 1/16 (1.6)		X	X	X	X	X	X	
J = 1/8 (3.2)	X	X	X	X	X	X	X	X
K = 1/4 (6.35)		X	X					

NOTES:

- Contact customer service or your sales representative for information on standard roll sizes.
- Non-standard roll sizes (widths and lengths) available upon request, subject to minimum order requirements.

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