Fiberfrax®
Blanket Products

Introduction

The Fiberfrax® blanket product family is a group of lightweight, thermally efficient ceramic fiber insulating materials that combine the advantages of dimensional stability at high temperatures with complete resistance to thermal shock. Featuring a broad range of thermal capabilities and physical characteristics, this product family provides proven and effective solutions to a variety of heat processing applications.

Durablanket® ceramic fiber products are high strength, needled insulating blankets that are made from spun Fiberfrax® ceramic fibers. The extra-long spun fibers, cross-locked through a unique forming process, produce a blanket with exceptional handling strength. The Durablanket® product family is completely inorganic and available in a variety of temperature grades, densities, and sizes.

PH blanket, and Moist Pak-D® insulation provide additional options for specific application requirements ranging from high-temperature filtration to hot gas velocity resistance.

Having excellent chemical stability, Fiberfrax® blanket products are unaffected by most chemicals except hydrofluoric and phosphoric acids and concentrated alkalies. If wet by water or steam, thermal and physical properties remain unaffected after drying.

Durablanket® K

Fiberfrax® Durablanket® K insulation is a strong, lightweight, flexible needled blanket. Available in a wide variety of thicknesses, widths and densities, Durablanket® K insulation provides an array of proven solutions for a broad spectrum of application problems.

Durablanket® S

Fiberfrax® Durablanket® S insulation is a needled blanket made from spun Fiberfrax ceramic fibers. Durablanket® S combines all of the physical characteristics offered by Durablanket® K insulation in a product with high-purity chemistry. The chemistry of Durablanket® S provides improved performance and service life in applications where fluxing or chemical attack occurs.

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

Durablanket® Z

Fiberfrax® Durablanket® Z insulation extends the high-temperature performance of the Durablanket® product line. The product is made from high-purity alumina, zirconia, and silica spun ceramic fibers. This chemical composition, manufactured in a unique fiber-making process, imparts Durablanket® Z insulation with extremely low shrinkage characteristics at elevated temperatures.

PH Blanket

Fiberfrax® PH blanket is a unique product that has been specifically designed to provide excellent filtration capabilities in addition to the high chemical stability and low thermal conductivity that is possessed by all Fiberfrax products.

PH blanket is made from Fiberfrax® bulk ceramic fibers in a unique wet felting process which removes unfiberized particles. In addition to the strength and resiliency afforded by the interlocking of fibers during the manufacturing process, handling strength is further enhanced by the addition of a small amount of organic binder.

A typical filtration application would involve utilizing PH blanket as a platinum catalyst recovery filter in nitric acid production. In this application, PH blanket offers numerous advantages over glass wool products including longer life, 50-60% improved filter efficiency, reduced chance of blowouts, and better temperature resistance.

Moist Pak-D®

Fiberfrax® Moist Pak-D® insulation is made from high-strength spinning ceramic fiber blankets impregnated with inorganic bonding agents. This processing results in a flexible insulation that air dries to form a hard, rigid structure. Moist Pak-D® is ideal for insulation of complex shapes and for service under conditions of high hot gas velocities.

The material is packaged in a clear polyethylene bag to retain the wet binder during shipment and storage. Since damage will occur, care should be taken to prevent freezing of the product.

Curing of product can be accomplished by air drying for several days or by immediate exposure to temperature in the application. Curing is merely a function of removing the water from the inorganic binder.

Product Family Characteristics

- Excellent handling strength
- Excellent hot strength
- Low thermal conductivity
- Low heat storage
- Light weight
- Resiliency
- Thermal shock resistance
- High heat reflectance
- Excellent corrosion resistance
- Excellent thermal stability
- Excellent sound absorption
- Excellent fire protection

Specific Product Characteristics

- Low shrinkage: Durablanket® Z insulation
- Exceptional handling strength: Durablanket® K insulation, Durablanket® S insulation, Durablanket® Z insulation
- Exceptional hot strength: Durablanket® Z insulation
- Exceptional velocity resistance: Moist Pak-D® insulation
- Exceptional sound absorption: PH blanket
- Excellent filtration capabilities: PH blanket

Typical Applications

Durablanket® K and Durablanket® S

- Furnace, kiln, reformer and boiler linings
- Investment casting mold wrappings
- Removable insulating blankets for stress relieving welds
- Reusable insulation for steam and gas turbines
- Flexible high-temperature pipe insulation
- Pressure and cryogenic vessel fire protection
- High-temperature kiln and furnace insulation
- Furnace door linings and seals
- Soaking pit seals
- Furnace repairs
- Thermal reactor insulation
- Expansion joint seals
- Primary reformer header insulation
- High-temperature gasketing
- Glass furnace crown insulation
- Incineration equipment and stack linings
- Annealing cover seals
- High-temperature filtration
- Nuclear insulation applications
- Atmosphere furnace lining
- Field steam generator lining

Durablanket® Z

- Ceramic kilns (abrasives, sanitary ware, electrical insulators, etc.)
- Billet/slab reheat furnaces
- Seals, gaskets, batten strips
- Forge furnaces
- Refractory kilns
- BOF door/shields
- Soaking pit seals
- High-temperature kilns and furnaces
- Boiler linings
- Furnace door linings and seals
- Glass furnace crown insulation
- Incineration equipment
- Skid pipe insulation

Flberfrax Durablanket

PH Blanket

- Catalyst recovery filter in nitric acid production
- Diffusion medium for fluidized beds
- Filtration and catalyst carrier medium for radioactive particles and hot exhaust gases

Moist Pak-D®

- Hot face layer for Fiberfrax® heater, furnace and kiln linings where hot gas velocities exceed 12.2 m/sec (40 ft/sec)
- Hot gas duct, flue and stack linings
- Recuperator linings
- Blow pipe linings
- External and internal pipe insulation
- Reformer header insulation
- Process furnace tube weld protection
- Thermal and corrosion protection of process heater tube supports

Typical Product Properties

Product	Durablanket® K	Durablanket® S	Durablanket® Z
Color	White	White	White
Temperature Grade	1260℃(2300°F)	1260℃(2300°F)	1430℃(2600°F)
*Recommended Operating Temperature	1100℃(2012°F)	1176℃(2150°F)	1343℃(2450°F)
Melting Point	1760℃(3200°F)	1760℃(3200°F)	1760℃(3200°F)
*Fiber Diameter	2.5-3.5 microns (mean)	2.5-3.5 microns (mean)	3.5 microns (mean)
Specific Heat Capacity @ 1093℃(2000°F)	1130 J/Kg℃ (0.27Btu/lb°F)	1130 J/Kg℃ (0.27Btu/lb°F)	1130 J/Kg℃ (0.27Btu/lb°F)
Specific Gravity	2.73g/cm^3	2.73g/cm^3	2.73g/cm^3
*Average Tensile Strength (ASTM 686-76)	28 ~ 35KPa@64kg/m^3 41 ~ 50KPa@96kg/m^3 55 ~ 75KPa@128kg/m^3	28 ~ 35KPa@64kg/m^3 41 ~ 50KPa@96kg/m^3 55 ~ 75KPa@128kg/m^3	28 ~ 35KPa@64kg/m^3 41 ~ 50KPa@96kg/m^3 55 ~ 75KPa@128kg/m^3
*Thermal Conductivity (W/m • k)			
Average Temperature	128kg/m^3	160kg/m^3	
600℃	0.12	0.11	
800℃	0.19	0.18	
1000℃	0.27	0.21	
1200℃	0.36*	0.33*	
Linear Shrinkage	≤3(1100℃@24hr)	≤3(1200℃@24hr)	≤3(1400℃@24hr)

*is only for Durablanket® Z product, other specifications are used for the other three products
*The recommended operating temperature applies only in oxidizing atmosphere, for the operating temperature in reducing atmosphere, please contact Unifrax Engineer Department

Product	PH Blanket	Moist Pak-D®
Color	Tan	
Temperature Grade	1260℃(2300°F)	1093℃(2000°F)
Recommended Operating Temperature	1176℃(2150°F)	1010℃(1850°F)
Melting Point	1790℃(3260°F)	1790℃(3260°F)
Fiber Diameter	4-8 microns (mean)	2-3 microns (mean)
Specific Heat Capacity @ 1093℃(2000°F)	—	1130 J/Kg℃(0.27Btu/lb°F)
Tensile Strength -6.4mm (1/4"): (ASTM 686-76)	—	Wet=1.2×10^{5}N/m^2(17psi) Dry=3.5×10^{5}N/m^2(50psi)
Hot Gas Erosion Resistance:	N/A	Test procedure based on British Gas Council Research Comm. GC173=over 30.5m/sec (100ft/sec)

*The temperature grade of Fiberfrax® insulation is determined by irreversible linear change criteria, not product melting point.
Test data shown are average results of tests conducted under standard procedures and are subject to variation.

Product	Durablanket® K	Durablanket® S	Durablanket® Z
Available Density kg/m3	64,96,128,160	64,96,128,160	96,128,160
(lb/ft^3)	(4,6,8,10)	(4,6,8,10)	(6,8,10)
Chemical Composition			
Al_2O_3	43-47%	43-47%	29-31%
SiO_2	53-57%	53-57%	53-55%
Al_2O_3 +SiO_2	98	99	
ZrO_2	—	—	15-17%
Fe_2O_3	<0.5%	—	—
K_2O+Na_2O	<0.2%	—	—
Leachable Chlorides	<10ppm	<10ppm	<10ppm

Product	PH Blanket	Moist Pak-D®
Available Density		(Typical Dry)
kg/m^3	96	190-290
(lb/ft^3)	(6)	(12-18)
Binder Content	3-5%	
Chemical Composition		
Al_2O_3	43-47%	23-32%
SiO_2	53-55%	68-77%
ZrO_2	—	—
Fe_2O_3	Trace	—
TiO_2	Trace	—
MgO	—	—
CaO	—	—
Na_2O	<0.5%	<0.5%
Alkali	—	—
Leachable Chlorides	<10ppm	—
Other Inorganics	—	—

Standard Product Specifications:

Thickness	Density KG/M³				Length	Width
mm	64	96	128	160	mm	mm
6	–	–	○	○	14640	610
13	–	○	▲	○	14640	
19	–	▲	▲	○	9760	
25	○	▲	▲	▲	7320	
38	○	▲	▲	○	4880	
50	○	▲	▲	–	3660	

Note: (○) and 1220mm wide blanket will be manufactured on customer needs (not less than minimum production amount)
(▲) is regular products

Typical Durablanket Heatflow Calculations

		Lining Cross-Section			
		1" Durablanket S,8PCF $1\frac{1}{2}$" Durablanket S,6PCF $1\frac{1}{2}$" Duraback,4PCF	2" Durablanket S,8PCF 2" Durablanket S,6PCF 2" Duraback,4PCF	2" Durablanket S,8PCF 2" Durablanket S,6PCF 4" Duraback,4PCF	2" Durablanket S,8PCF 2" Durablanket S,6PCF 6" Duraback,4PCF
Hot Face ℃(°F)	Insulation Thickness -mm(in) Cold Face Temperature-	102(4) ℃(°F)	152(6) ℃(°F)	203(8) ℃(°F)	254(10) ℃(°F)
649(1200)		80(176)	65(149)	57(135)	53(127)
871(1600)		115(238)	91(196)	80(175)	72(161)
1093(2000)		158(317)	125(257)	109(228)	98(205)
		Lining Cross-Section			
		2" Durablanket Z,8PCF 2" Durablanket S,6PCF 2" Duraback,4PCF	2" Durablanket Z,8PCF 4" Durablanket S,6PCF 2" Duraback,4PCF	2" Durablanket Z,8PCF 4" Durablanket S,6PCF 4" Duraback,4PCF	2" Durablanket Z,8PCF 4" Durablanket S,6PCF 6" Duraback,4PCF
Hot Face ℃(°F)	Insulation Thickness -mm(in) Cold Face Temperature-	152(6) ℃(°F)	203(8) ℃(°F)	254(10) ℃(°F)	305(12) ℃(°F)
1149(2100)		134(274)	114(238)	103(218)	94(202)
1260(2300)		154(310)	132(269)	118(245)	109(228)
1316(2400)		165(329)	141(285)	127(260)	116(241)