

## Insulfrax® Paper

### Introduction

Insulfrax® Paper is an evolutionary product which is manufactured by forming Insulfrax Fiber in a nonwoven matrix. These fibers are randomly oriented during manufacturing and then held in place with a latex binder system. A specialized paper-making process is utilized to form uniform lightweight, flexible materials, including Insulfrax Paper.

Insulfrax Fiber, utilized in Insulfrax Paper, is based upon a calcium, magnesium, silicate (CMS) chemistry. This CMS fiber chemistry has been successfully used to solve a variety of application problems from 800°F (427°C) up to 2012°F (1100°C). In addition to high temperature resistance, Insulfrax Fiber meets European regulatory requirements (Directive 97/69/EC).

The calcium, magnesium, silicate chemistry of Insulfrax Fiber provides superior wetting resistance to molten aluminum alloys. Testing with corrosive aluminum alloys at elevated temperatures has proven that Insulfrax is superior to traditional alumina/silica refractory ceramic fibers.

Insulfrax Paper will generate small amounts of smoke and trace element outgassing during initial exposure to temperatures above 450°F (232°C).

### Insulfrax Paper Advantages

Insulfrax Paper offers many unique problem-solving advantages, which include:

- High-temperature stability up to 2012°F (1100°C)
- Meets European regulatory requirements
- Superior wetting resistance to molten aluminum
- Low thermal conductivity
- Flexibility
- Easy to wrap, shape, or cut

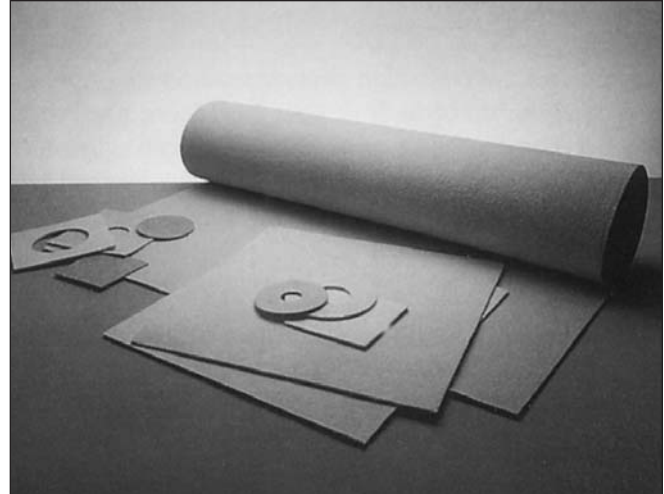
### Typical Product Properties

Color	White
Melting Point	2390°F (1310°C)
Temperature Grade <sup>(1)</sup>	2300°F (1260°C)
Recommended Operating Temperature <sup>(2)</sup>	2012°F (1100°C)
Average Tensile Strength	>36 psi (>250 kPa)
Thermal Shrinkage (24-hour soak) 2012°F (1100°C)	<4%

Note:

<sup>(1)</sup> Temperature Grade based on European Norm 1094 (EN1094).

<sup>(2)</sup> The recommended operating temperature is determined by irreversible linear change criteria, not melting point.



### Applications

Insulfrax Paper is used in many different applications, which include:

- Automotive and aerospace heat shields
- Gaskets for ovens, stoves, heaters, and other appliances
- Nonferrous ingot mold liners
- Refractory backup insulation in ladles, glass tanks, and other high-temperature furnaces
- Parting medium in brazing and soldering
- Molten aluminum transfer systems

### Typical Product Parameters

Density	9-10 pcf (144-160 kg/m <sup>3</sup> )
Fiber Index <sup>(3)</sup>	>50% Wt <sup>(2)</sup>
LOI (including binder)	<12% Wt
Thickness (mm)	1, 2, 3, 6 (0.04", 0.08", 0.12", 0.24")
Width	24", 48" (610mm, 1220mm)

Note:

<sup>(3)</sup> Fiber index is measured using the conical elutriation method.

For additional information about product performance or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-278-3888.

Data shown are average results of tests conducted under standard procedures and are subject to variation. Results should not be used for specification purposes.

## Insulating Value

The following table summarizes the insulating characteristics of Insulfrax Paper. All heat flow calculations are based on a surface emissivity factor of 0.90, an ambient temperature of 80°F and zero mph wind velocity, unless otherwise stated.

Insulation Thickness	3mm (0.12")	6mm (0.24")
Hot Face (°F/°C)	Cold Face (°F/°C)	Cold Face (°F/°C)
1000/538	512/261	394/201
1500/816	753/401	578/303
1800/982	910/488	704/373
2012/1100	1025/552	797/425

Insulfrax Paper can be used in conjunction with hard refractory materials to improve the insulating value and reduce heat loss of the lining system. The following table shows a typical application using 9" of Super Duty Firebrick as the hot face with Insulfrax Paper as backup insulation.

	9" Super Duty Firebrick Plus	9" Super Duty Firebrick Plus	9" Super Duty Firebrick
Insulation Thickness	3mm (0.12") Insulfrax Paper	6mm (0.24") Insulfrax Paper	
Hot Face (°F/°C)	Cold Face (°F/°C)	Cold Face (°F/°C)	Cold Face (°F/°C)
1000/538	285/141	259/126	322/161
1500/816	366/186	333/167	414/212
1800/982	409/209	374/190	462/239
2012/1100	439/226	403/206	494/257

## Health and Safety Information

Insulfrax Fiber from Unifrax, according to Directive 97/69/EC, possesses a fiber chemistry within the regulatory definition of a "man-made vitreous (silicate) fiber with random orientation with alkaline oxide and alkaline earth oxide content greater than 18% by weight." Insulfrax Fibers have been tested pursuant to EU protocol ECB/TM/26, Revision 7, Nota Q, Directive 97/69/EC, with results that are below regulatory thresholds. As a result, Insulfrax Fibers do not require additional labeling or further testing.

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

