

# FyreWrap® LiB Boards, Blankets and Felts

## Introduction

FyreWrap® LiB (Lithium-ion Battery) Boards, Blankets and Felts are a family of high-temperature, lightweight insulating materials that are designed to help prevent thermal runaway propagation in lithium-ion battery applications. Unifrax combines material science with industry knowledge to tackle one of the most important safety issues in today's large format lithium-ion battery applications. From cell-to-cell isolating thermal barriers to whole pack solutions, Unifrax delivers an engineered platform with unparalleled designs to offer the ultimate fire protection in lithium-ion battery containment.

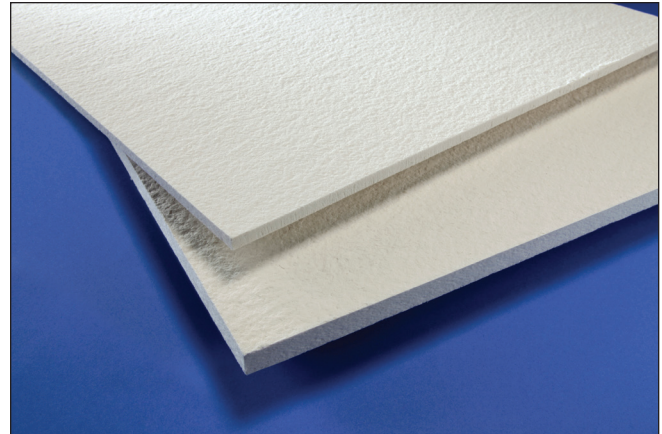
Building on Unifrax's thermal management expertise and manufacturing excellence, combined with extensive experience in aerospace, automotive, and fire protection applications, Unifrax offers customized solutions for lithium-ion thermal runaway propagation prevention. The base of its technology starts with its fiber manufacturing techniques. Unifrax produces multiple fiber chemistries such as alkaline earth silicate fibers, refractory ceramic fibers, micro-fine glass fibers and polycrystalline fibers. Dependent upon the desired characteristics of the finished product, Unifrax converts the fibers into different product forms with varying options for additional enhancements.

## Common Properties

- Fire resistant, flame barrier
- Electrically insulating
- Low thermal conductivity/thermal insulating
- Suitable for temperatures up to 1200°C
- Excellent chemical stability
- Exceptionally resistant to thermal shock

## Markets

- E-Mobility
- Grid Storage
- Energy Storage Systems (ESS)
- Military
- Aerospace
- Consumer Electronics
- Medical
- Transportation packaging



FyreWrap LiB Boards

## Board Properties

- Easy to cut with standard tools
- Uniform, lightweight option available
- Non-woven compressible fiber matrix forms available

## Felt Properties

- Easy to wrap, shape, or cut
- Uniform, lightweight, easy-to-cut sheets
- Non-woven compressible fiber matrix

## Blanket Properties

- Flexible, strong, and lightweight
- Low thermal conductivity
- Excellent thermal shock resistance

## Applications

- Cells (external to cell)
- Battery modules
- Battery packs
- Packaging for transportation

## Capabilities

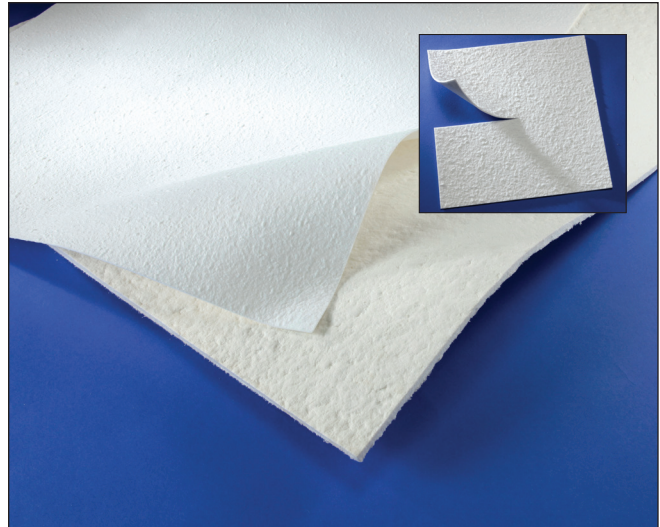
- Thermal runaway propagation prevention
- Short circuit prevention and electrical protection
- Cascading fire prevention
- Thermal isolation and containment

## Additional Capabilities

Customer requirements are unique and Unifrax offers solutions that cater to each application's performance criteria, cost structure, and product handling needs. The information presented refers to our core products and their typical characteristics. Unifrax offers application support for many specifications and/or enhancements, such as:

- Adhesive and foil backings
- Encapsulation and lamination
- Hybrid fiber systems
- Rigidization of components

Please contact the LiB team to discuss additional enhancement requirements at +01-716-768-6472.



FyreWrap LiB Felt

## FyreWrap LiB Boards, Blankets and Felts Typical Product Properties

Product Grade	Physical Properties						
	Color	Temperature Grade		Melting Point		Density	
		°F	°C	°F	°C	lb/ft <sup>3</sup>	kg/m <sup>3</sup>
<b>IN70 Blanket</b>	White	2300	1260	2390	1310	4 - 8	64 - 128
<b>IN70 Felt</b>	White	2300	1260	2390	1310	10 - 17	160 - 275
<b>IN70 Board</b>	White	2300	1260	2390	1310	17	275
<b>IN70 XT-Board</b>	White	2300	1260	2390	1310	22	360
	LOI <sup>2</sup>	Modulus of Rupture		Thermal Conductivity (W/mK)			
	Including Binder, % Wt	PSI	kPa	400°C	600°C	800°C	1000°C
<b>IN70 Blanket</b>	0	—	—	0.08	0.12	0.18	0.25
<b>IN70 Felt</b>	7	—	—	0.08	0.1	0.15	0.2
<b>IN70 Board</b>	<9	>100	>700	0.07	0.1	0.14	—
<b>IN70 XT-Board</b>	<7	>100	>700	0.1	0.12	0.15	—
Available Thickness, mm (other material sizes available upon request)							
	3	5	6	9	10	12	15
<b>IN70 Blanket</b>			Available in 13mm and 25mm Thicknesses				
<b>IN70 Felt</b>			X	X		X	
<b>IN70 Board</b>	X	X	X		X	X	X
<b>IN70 XT-Board</b>		X	X		X	X	X

# FyreWrap®

The following is a registered trademark of Unifrax: FyreWrap.

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

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