

# Thermafiber Mineral Wool Insulation

**Thermafiber Mineral Wool Insulation vs.  
Spray Polyurethane Foam Insulation in  
Pre-Cast Perimeter Fire Barrier Conditions**

**Check it out for yourself...  
Spray Foam Insulation is  
not all its blown up to be!**

**Factors to consider:**

- **Combustibility**
- **Toxicity**
- **Environmental Impact  
and Sustainability**
- **Ambient Temperature**
- **Ease of installation**
- **Durability**
- **Cost effectiveness**







# Thermafiber Mineral Wool vs. spray foam insulation (closed cell): a head-to-head comparison







Compare Thermafiber Mineral Wool to Spray Foam Insulation (Closed Cell).  
Compare the efficiency. Compare fire protection.  
Compare aesthetics. Compare prices, too. Whatever your criteria,  
the more you compare, the more benefits you'll find with Thermafiber.

Fire Performance Characteristics		
Thermafiber Mineral Wool	Characteristic	Spray Foam Insulation (Closed Cell)
 <p>Thermafiber mineral wool insulation resists temperatures in excess of 2,000°F per ASTM E 119.<sup>1</sup></p>	Fire Resistivity	 <p>The flash point of Spray Polyurethane Foam (SPF) is approximately 392°F.<sup>2</sup> Some SPFs can be treated with halogenated fire retardants, however, the additives only delay the time to flash and ultimately increase the toxicity of smoke when subjected to high heat.<sup>3</sup> Also fire retardant properties deteriorate with age.<sup>4</sup></p>
 <p>Thermafiber is made from inorganic materials (rock and blast furnace slag), therefore it is naturally noncombustible. Thermafiber products are classified as non-combustible per ASTM E 136.</p>	Non-Combustibility	 <p>Spray Polyurethane Foams (SPF) are highly combustible and present dangers during building renovation. Renovation can leave SPF exposed to fire sources such as wires, torch flames, welding arcs, trash fires, and other potential fire hazards. There have been several fires where combustible construction components contributed to fire spread and loss of life in buildings.<sup>5</sup> Selecting non-combustible materials reduces ignition risks.</p>
 <p>Mineral Wool is naturally fire retardant and does not require a thermal barrier.</p>	Thermal Barrier Protection	 <p>Because of its high combustibility characteristics, the codes require that SPF be separated from the building interior by a 15-minute thermal barrier.<sup>6</sup> SPF insulation manufacturers are specific about which type of thermal barrier is acceptable for their individual products. This requires additional research and sourcing of material in choosing the appropriate thermal barrier, and additional labor cost to install.</p>
 <p>Thermafiber unfaced insulation has Flame Spread and Smoke Developed ratings of 0. Foil-faced mineral wool products have a Flame Spread of 25 and Smoke Developed of 0. These ratings are classified per ASTM E 84.</p>	Surface Burning Characteristics per ASTM E 84	 <p>SPF manufacturers report surface burning characteristics as high as Flame Spread of 25 and Smoke Developed ≤ 450 (4" thick).<sup>7</sup> When ignited, SPF releases large quantities of intense, thick and highly toxic smoke<sup>3</sup> such as hydrogen cyanide, carbon monoxide, amines and isocyanates.<sup>8</sup></p>
 <p>Thermafiber mineral wool insulation has been tested as a proven firestopping material in numerous perimeter fire containment designs including the precast exterior wall condition. UL Design CW-D-2005 provides a 2 hour rating with mineral wool Safing Insulation in the safe-off void. Along with the mineral wool insulation in the safe-off area, the precast panel joints are also required to be firestopped with an approved system such as WW-S-0038 to prevent flame spread through small joints in precast panels at the safing line.<sup>9</sup></p>	Perimeter Fire Barrier Systems	 <p>SPF has not been tested in perimeter fire barrier systems and is not an approved material in these designs. Applications of SPF to the precast wall typically does not include the protection of the precast panel joints. Systems such as WW-S-0038 are required to keep fire from spreading vertically through the joints. Not only does the SPF product add a significant fuel source to fire, excluding the protection of the precast joints will allow fire to spread vertically through the safe-off area, negating the hourly rating of the assembly.</p>












## Thermal Performance Characteristics

Thermafiber Mineral Wool	Characteristic	Spray Foam Insulation (Closed Cell)
	R-Value	
<p>Thermafiber mineral wool insulation has consistent R-values per thickness regardless of installation temperatures. R-values of mineral wool insulation are also not affected by aging. Although Thermafiber products do have a lower R-value per inch versus aged R-values of SPF, this can be offset with increased thickness and still be more cost effective than foam insulation.</p>		<p>There's much ambiguity surrounding published R-values for SPF. Some SPF insulation manufacturers publish aged R-values from 6.7 to 6.9 per inch. However, there are many factors that can degrade the R-value such as installation temperature, temperature of substrate, and inconsistencies in applied thickness. Also variables such as humidity levels can affect the quality of the foam and cause reductions in R-values.<sup>14</sup></p>
	Continuity of Vapor Barrier	
<p>Thermafiber foil faced curtain wall insulation offers a permeability rating of 0.02 perms (grains/hr/ft<sup>2</sup>/in Hg) regardless of the thickness of material.</p> <p>Underwriter Laboratories perimeter fire containment system, CW-D-2006, does not compromise the continuity of the vapor barrier since Safing Insulation is installed between the slab edge and a foil faced Firespan® 90 Insulation.</p>		<p>SPF insulations offer permeability ratings of less than 1. However, the rating is dependent on the applied thickness. The perm rating thickness requirement varies from one manufacturer to another. Therefore, if required thickness is not correctly applied, the perm rating would be compromised.</p> <p>In perimeter wall conditions where Safing Insulation is installed as a perimeter fire barrier system, SPF insulation sprayed above and below the Safing Insulation (if applied in correct thickness) will provide a vapor barrier. However, the portion of the exterior wall assembly behind Safing Insulation, where foam is not applied, does not have a vapor barrier. Therefore the continuity of the vapor barrier is compromised in assemblies using SPF insulation at the exterior precast wall.</p>



## Installation Considerations

	Installer Safety	
<p>Thermafiber mineral wool insulation requires only minimal PPE (Personal Protection Equipment). PPE such as safety glasses, gloves, long sleeves and dust mask are worn to avoid temporary skin and eye irritation which generally diminishes quickly after ceasing installation. Mineral wool insulation has been extensively researched for many years by leading laboratories and universities in the U.S. and abroad. Scientific research shows no association between exposure to rock/slag fibers and respiratory disease or cancer in humans.<sup>10</sup> Information on the health and safety of the product can be found in the MSDS, or by viewing the Health and Safety of Mineral Wool Fibers at <a href="http://www.naima.org">www.naima.org</a>.</p>		<p>SPF insulation is a hazardous product and when not handled properly, according to the EPA and OSHA, is a leading attributable cause of occupational asthma.<sup>11</sup> Methylene Diphenyl Diisocyanate (MDI) in vapors, aerosols, and dust can trigger severe or fatal asthma attacks in sensitized persons at very low levels. According to the EPA, amine catalysts and other SPF ingredients or reaction products may also cause health effects such as chemical bronchitis, pulmonary edema and pneumonitis. Installation requires special respirator equipment and application training to keep the installer and other trades on the job site safe<sup>11</sup>. The EPA has had concerns regarding MSDSs amongst SPF manufacturers not consistently providing accurate health and safety information regarding installation and product handling.<sup>12</sup></p>
	Installation Scheduling	
<p>Thermafiber mineral wool insulation is stable and does not require certified installers.</p>		<p>Accumulated SPF dust during installation, if ignited, can explode<sup>13</sup>, thus the requirement for only a certified, experienced installer.</p>
	Installation Scheduling	
<p>Thermafiber mineral wool insulation can be installed at any temperature and does not require isolation of the work area during or after installation. Therefore special scheduling considerations are not necessary.</p>		<p>There are temperature limitations for SPF applications. Degradation in R-values can occur when indoor and substrate temperatures are too low or when humidity is too high.<sup>14</sup> Some grades of SPF can not be applied below 60°F.<sup>14</sup> Spraying on lower temperature surfaces may result in poor adhesion between the foam and the substrate.<sup>16</sup> In cold weather, heat shrouds must be installed and air needs to be conditioned to the recommended temperature during application.</p> <p>SPFs also require scheduling considerations for time and proximity of other trade workers during and after foam installation. Isolating the area during installation is required to keep other trades safe from exposure to harmful chemical vapors.<sup>17</sup> Also there are a number of variables that can affect the waiting time before re-occupancy. These include the product's chemical components, type of foam, thickness of finished product, applicator's technique, humidity level and ambient temperature. Generally manufacturers recommend waiting 24-72 hours after installing a 2-part, high pressure foam product.<sup>18</sup> Unfortunately SPF manufacturers do not provide consistent information regarding re-occupancy.</p>









## Installation Considerations (Continued)

Thermafiber Mineral Wool	Characteristic	Spray Foam Insulation (Closed Cell)
 <p>Thermafiber mineral wool insulation is manufactured in a preformed thickness, eliminating variable thickness problems and inconsistencies in R-value.</p>	Applied Thickness	 <p>R-value is dependent upon the thickness of the insulation. SPF applications are difficult when trying to get a consistent thickness. Variable thickness and unevenness are common installation problems. Spray path thickness is critical and the manufacturer's recommendations should be followed closely. There are multiple reasons to adhere to these guidelines, the first being quality. If lift thickness exceeds that which is recommended, negative results can occur including lower density, poor cell structure, cracking, splitting, or poor dimensional stability (possible shrinkage).<sup>19</sup></p> <p>Achieving the desired thickness with SPF can be difficult as the installer can only spray the material up to 2" thick/ spray path. If required to apply the SPF thicker, the installer has to wait for full cure (15-30 minutes)<sup>15</sup> before applying additional coats. This slows productivity and increases installation costs.</p>
 <p>Thermafiber mineral wool insulation is an inert product and is compatible with other building materials.</p>	Reactivity With Other Building Components	 <p>If applied too thick, SPF insulations go through a chemical reaction, causing the material to heat up while being installed which can result in charring, smoldering or fire.<sup>20</sup> When this occurs, membrane and transition flashings (made of rubber) can melt causing major installation issues.</p>
 <p>Mineral wool insulation does not involve any overspray cleaning.</p>	Installation Overspray	 <p>Overspray cleanup is an issue with SPF foam insulation and increases installation costs and complicates project scheduling.</p>
 <p>Mineral wool insulation has little odor.</p>	Material Odor	 <p>If not properly installed, SPF foam installations can give off an odor for a period of time.<sup>21</sup></p>
 <p>Mineral wool provides thermal, acoustical and fire resistive properties– all in one single product.</p>	Product Selection	 <p>The lack of standardization and large number of manufacturers of foam materials has caused much confusion as to the proper material selection for a given application. For example there's closed cell, open cell, SPF, rigid, flexible, boards, sprays, regular sprays, seasonal sprays, etc.</p>
 <p>Buildings are subject to movement caused by changes in temperature, relative humidity, wind, load deflection and seismic activity. Building materials must be able to handle such movement. Thermafiber mineral wool insulation allows for vertical and horizontal expansion and contraction within the assembly.</p>	Movement	 <p>What happens to the spray foam insulation system when the building moves? Will it crack and create voids? Will the adhesion fail? These considerations should be taken into account when selecting materials for the project.</p>

## Acoustical Performance

 <p>Mineral wool insulation provides superior NRC values (NRC of 1.00 for 2" Firespan 90 Insulation), helping to keep unwanted noise out of the building.</p>	Sound Control and Noise Absorption	 <p>Most SPF insulation manufacturers do not publish NRC or sound absorption data.</p>
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## Environmental Impacts

Thermafiber Mineral Wool	Characteristic	Spray Foam Insulation (Closed Cell)
		
Thermafiber mineral wool insulation offers up to 90% recycled content. Standard mineral wool products offer a 70% recycled content.	Recycled Content	SPF manufacturers do not publish values for recycled content.
		
Thermafiber mineral wool insulation contributes up to 33 credits across 4 categories.	LEED Green Building Credits	One manufacturer publishes their SPF insulations as contributing up to 26 credits across 4 categories. <sup>22</sup>
		
Thermafiber mineral wool insulation contains no CFC or HCFC blowing agents.	Global Warming Potential	Some SPF manufacturers still use HCFC's for blowing agents.
		
Thermafiber follows the strict "Guides for the Use of Environmental Marketing Claims, commonly known as the "Green Guides", per section 5 of the Federal Trade Commission Act.	Green Marketing Claims	The EPA has brought to the public's attention its concerns regarding unsubstantiated claims from some of the SPF Manufacturers such as "No Off-Gassing," "Non-Toxic-Safe," "Completely Green," "Completely Plant-Based," "Made from Soybeans," which misleads users into thinking the product is completely safe and contains no hazardous materials. <sup>23</sup>

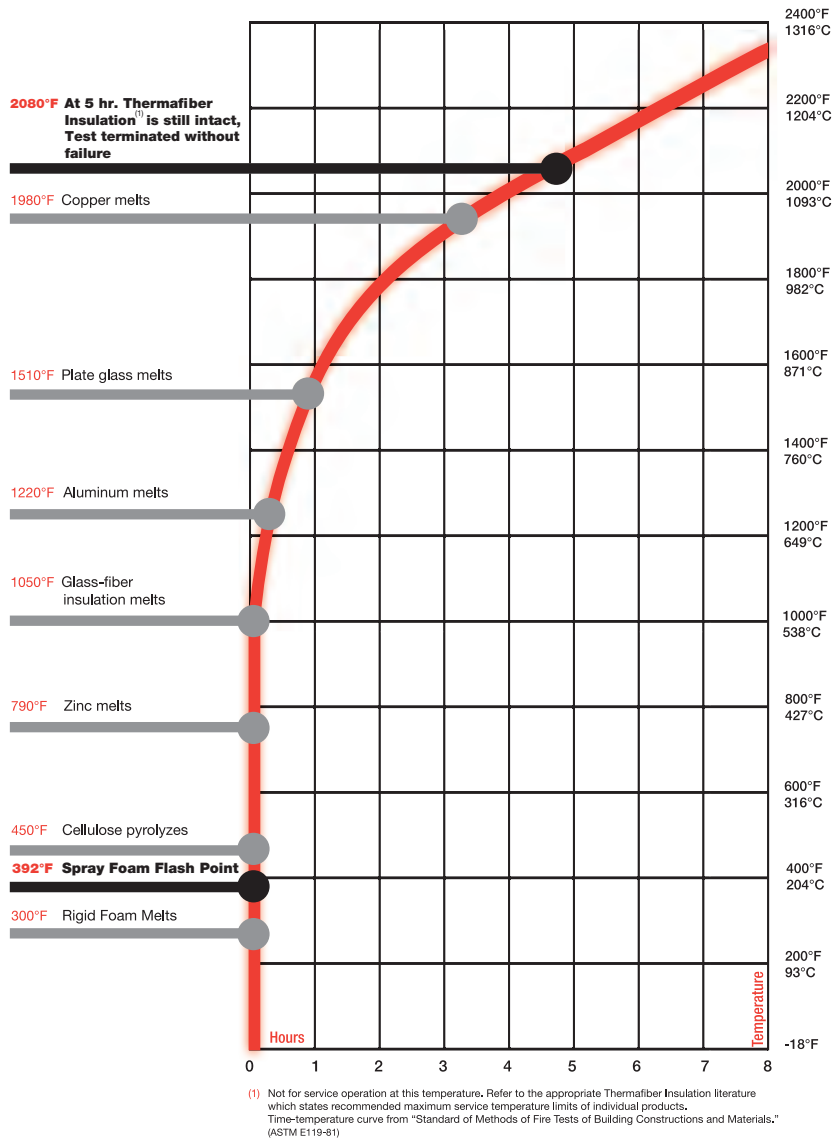
## Costs

		
Mineral wool insulation costs less and the installation coordination with other trades in minimal. Mineral wool does not require special, expensive equipment, special PPE, or special partitions/shrouding.	Material and Installation Costs	SPF materials, labor, spray equipment, PPE, and set up costs are all higher versus mineral wool insulation. The addition of a thermal barrier adds further cost.

## References

- <sup>1</sup> The Consulting Engineers Group, Inc., Mar. 29, 1974. Test of 1/4" aluminum curtain wall spandrel panel with insulation exposed to fire. No melting or disintegration after 5 hr. 5 min. When temperatures reached 2,080° F, the aluminum panel, protected with Thermafiber mineral wool insulation, was still intact.
- <sup>2</sup> "Raising Performance to New Heights". Walltite® Insulation/Air Barrier System by BASF.
- <sup>3</sup> Polyurethane Foam Association, Technical Bulletin dated January 15, 2009, "Flexible Polyurethane Foam Flammability".
- <sup>4</sup> Federal Register/Vol. 73, No. 16/ Thursday, January 24, 2008/Rules and Regulations/DOE-Federal Aviation Administration 14 CFR Part 39–Airworthiness Directives; Boeing Airplanes. Aging and deterioration of fire retardant additive in polyurethane foam insulation used to insulate duct assemblies in Boeing aircraft.
- <sup>5</sup> New York Times, Asia Pacific, www.nytimes.com, November 15, 2010. Fire in high-rise Shanghai apartment building.
- <sup>6</sup> International Code Council - International Building Code 2012, Chapter 26 Plastic, Section 2603.4- Thermal Barrier. And "Thermal Barrier For The Spray Polyurethane Foam Industry", Spray Polyurethane Foam Alliance (The American Plastics Council), Copyright 1995, Revised May 2000.
- <sup>7</sup> BASF Corporation, ICC-ES Evaluation Report ESR-2642, Reissued Feb. 1, 2010.
- <sup>8</sup> US Environmental Protection Agency, www.epa.gov, Design for the Environment, "SPF Exposure Potential".
- <sup>9</sup> Underwriters Laboratories, Fire Resistance Directory, Volume 2A, Design CW-D-2005, copyright 2012.
- <sup>10</sup> North American Insulation Manufacturers Association (NAIMA), "Health and Safety Facts for Rock and Slag Wool", Publication No. N041, April 2002. Highlights the International Agency for Research on Cancer Monograph in regards to the declassification of mineral wool insulation as not classifiable as to the carcinogenicity in humans.
- <sup>11</sup> US Environmental Protection Agency, www.epa.gov, Design for the Environment, "Health Concerns of SPF Insulation".
- <sup>12</sup> US Environmental Protection Agency, www.epa.gov, Health & Safety Considerations with Spray Polyurethane Foam (SPF) Application Presentation, Feb. 9, 2011.
- <sup>13</sup> Foamex MSDS on Polyurethane Foam, dated March 2, 2004.
- <sup>14</sup> Foam It Green, www.sprayfoamdirect.com, "Temperature and Spray Foam Insulation", October 11, 2011.
- <sup>15</sup> Bayer Material Science, Bayseal™ CC product data sheet dated 10/11.
- <sup>16</sup> www.foam-tech.com, technical data sheet on BASF– Walltite.
- <sup>17</sup> www.spraypolyurethane.org- "Spray Polyurethane Foam Health and Safety– Site Preparation".
- <sup>18</sup> Connecticut Department of Health, Environmental Health Technical Brief, "Spray Polyurethane Foam Insulation", Issue 4, 12/10.
- <sup>19</sup> www.sprayfoam.com, article titled: "How Thick Should Spray Foam Be Applied In Each Pass?", dated 8/11/08 by Spray Foam Staff.
- <sup>20</sup> Energy Design Update, Vol. 28. No. 4, April 2008- "Maximum Thickness Restrictions For Spray Foam".
- <sup>21</sup> www.greenbuildingadvisor.com, "Spray Foam Jobs with Lingering Odor Problems", Sept. 2, 2011.
- <sup>22</sup> NCFI Polyurethanes, Division of BMC, Inc., "Contributions to LEED™ Green Building Rating System".
- <sup>23</sup> North American Insulation Manufacturers Association (NAIMA), Insulation Facts #83, "Spray Foam Insulation Industry and Federal Agencies Agree on Product Stewardship Measures", Pub. No. N066, Sept. 2010.

This graph demonstrates the superiority of Thermafiber Insulation.



## Thermafiber Insolutions®

Thermafiber also supports all of its mineral wool products with Thermafiber Insolutions, a customized five-pronged approach that helps you easily and successfully plan, order and install insulation. Insolutions includes:



**All-phase consultation**



**High-performance products**



**Time-saving insulation hanger systems**



**Labor-saving customization and packaging**



**Safe & Sustainable Insulation**

You need to make your building more energy efficient. Why not optimize that protection with excellent sound control and fire resistance? Add in the water repellency and other advantages of Mineral Wool, and you'll not only make your building more energy efficient, but also safer.

## It's easy to specify Thermafiber

To specify Mineral Wool, just:

1. Go to [www.thermafiber.com](http://www.thermafiber.com) or log on to your favorite spec service website: [www.arcata.com](http://www.arcata.com), [www.4specs.com](http://www.4specs.com), [www.sweets.com](http://www.sweets.com)
2. Type "Thermafiber" in the search box
3. Click on "Specs" or follow the link to [Thermafiber.com](http://Thermafiber.com) and click on "Architectural Specs"
4. That's it. Questions? Call 1-888-834-2371.

**For more information about Mineral Wool Insulation or other Thermafiber products, contact your field representative. Call 1-888-834-2371 or visit [www.thermafiber.com](http://www.thermafiber.com).**

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