



# Foil-Faced Polyiso and Mineral Wool Board in Wall Applications



Foil-faced Polyiso wall insulation, one of the most thermally efficient rigid board insulations, exceeds most functional performance criteria when compared to mineral wool board - also known as mineral fiber board, stone wool and rock wool.

		<b>Mineral Wool Board*</b>
Thermal Performance (R-value)	The R-value per inch of foil-faced Polyiso ranges from 6.0 to 6.8.	The R-value per inch of mineral wool board is 4.0
	<b>POLYISO BENEFIT: The R-value per inch of foil-faced Polyiso provides over 50% more R-value than mineral wool board, delivering a higher level of insulation in a thinner wall.</b>	
Fire Performance	★ Polyiso wall insulation is approved in hundreds of building code-compliant wall assemblies, meeting all necessary safety requirements.	★ Mineral wool board is approved in hundreds of building code-compliant wall assemblies, meeting all necessary safety requirements.
	<b>POLYISO BENEFIT: Foil-faced Polyiso meets life safety standards established by the National Fire Protection Agency (NFPA 285), while providing superior thermal insulation performance.</b>	
Resistance to Air	★ Foil-faced Polyiso is highly resistant to air flow under normal conditions.	Mineral wool board is inherently open and permeable to air (wind washing), reducing the effective R-value by nearly 80%.
	<b>POLYISO BENEFIT: Thermal performance of a Polyiso wall is more stable than that of mineral wool, for a better insulated wall.</b>	
Resistance to Water Vapor	★ Foil-faced Polyiso is classified as impermeable, or vapor proof, and has a maximum perm rating of 0.1 perms.	Mineral wool board is classified as permeable, or not resistant to vapor, with a perm rating of 35 perms.
	<b>POLYISO BENEFIT: Foil-faced Polyiso serves as a vapor retarder in walls, resisting the flow of water vapor and associated R-value loss.</b>	
Resistance to Water	★ Foil-faced Polyiso with properly taped joints is classified as a Water-Resistive Barrier.	Mineral wool board can absorb over 50% water by volume after a simple immersion and takes days to recover its insulation value.
	<b>POLYISO BENEFIT: Foil-faced Polyiso with properly taped joints resists the absorption of liquid water as well as associated R-value loss and internal moisture damage.</b>	

		<b>Mineral Wool*</b>
Compressive Strength	★ Foil-face Polyiso has a compressive strength of 20 psi.	The compressive strength of mineral wool board is only 8.5 psi, and reduced thickness, through compression, can significantly reduce its insulation effectiveness.
	<b>POLYISO BENEFIT: Foil-face Polyiso has a high compressive strength, that is more than two times stronger than mineral wool board, meaning it resists damage and deformation during installation, as well as associated R-value loss, internal moisture damage, and is more likely to meet design installation requirements.</b>	
Weight Per Installed R-value	★ R-10 foil-faced Polyiso is 1.5 inches thick, 4 ft. x 8 ft., and weighs 10.6 lbs.	R-10 mineral wool board is 2.5 inches thick, 4 ft. x 6 ft., and weighs 55 lbs.
	<b>POLYISO BENEFIT: When covering the same area with an equivalent R-value, mineral wool board is 7 times heavier and 2 1/2 times thicker than Polyiso, making it more difficult to handle and costly to install.</b>	
Binders and Glues	★ Polyiso’s foam core is formaldehyde free.	The mineral wool fibers are held together using a formaldehyde based binder. These binders are known to break down when exposed to moisture and damage the integrity and performance of the insulation.
	<b>POLYISO BENEFIT: Foil-faced Polyiso is not susceptible to moisture damage and will not deteriorate over the life of the building.</b>	
Value	★ Foil-face Polyiso offers a lighter weight, larger (4’x8’) insulation product that has a greater R-value per inch at nearly half the cost of mineral wool board.	Mineral wool board offers a heavier, smaller (4’x6’) insulation product that has a lower R-value per inch at nearly twice the cost of polyiso.
	<b>POLYISO BENEFIT: Foil-faced Polyiso is a higher performing insulation that reduces material and labor costs.</b>	

While foil-faced Polyiso and mineral wool board\* (also known as mineral fiber board and stone wool insulation) insulations are both used in a wide variety of commercial building wall systems, they do not perform in the same way.

Foil-faced Polyiso rigid foam insulation is an engineered composite specifically designed for each type of building envelope application. The versatility of the product is demonstrated by the many building envelope applications in which it is commonly used.

Mineral wool board insulation is made from molten glass, stone, or slag that is spun into a fiber-like structure, with an R-value of 4 per inch. Inorganic rock or slag is the main component, and the remaining organic content includes thermosetting resin urea-extended phenol formaldehyde binder (an adhesive) and other components.

## R-value

Foil-faced Polyiso provides the highest R-value per inch of any commonly used insulation in North America. Polyiso has an added benefit that the R-value per inch increases with the thickness of the foam, so three inches of foil-faced Polyiso has a higher R-value per inch than two inches. This increased efficiency can be useful when specifying insulation for high R-value wall sections. The R-value per inch of foil-faced Polyiso ranges from 6.0 to 6.8.

The R-value of mineral wool insulation is constant R-4 per inch and does not increase with thickness.

**POLYISO BENEFIT:** The R-value per inch of foil-faced Polyiso is over 50 percent higher than mineral wool. With Polyiso, you can use less material for a high-performing, thinner wall cavity.

## Fire Performance

Foil-faced Polyiso insulation meets the requirements of the stringent NFPA 285 fire tests required to demonstrate compliance with building codes for commercial buildings. As a result, there are hundreds of listed assemblies where it is used, providing many options of wall design for architects and specifiers.

Mineral wool insulation also meets the requirements of fire tests and is listed in many approved assemblies.

**POLYISO BENEFIT:** Polyiso insulation has successfully passed many stringent NFPA 285 fire tests as required by the International Building Code. It can be used in a wide variety of code-approved building assembly options for architects and specifiers.

## Resistance to Air, Water Vapor Transmission, and Liquid Water

Building science continues to evolve, and it is recognized that the design of wall sections and the location of various components may be different according to the location of the building and its intended service. The type of structure, the occupancy, and the need for or location of air, water and vapor barriers or retarders are all important factors and influence the specific details of the wall design. A competent building design professional should be consulted when final material decisions are made.

A fundamental requirement of the building envelope is to control the flow of air, heat, and moisture (liquid and vapor.) Polyiso foil-faced insulation allows no air or moisture movement through it because of the closed-cell composition and the use of impermeable foil-facing materials. The use of appropriate tapes for sealing joints, penetrations, and perimeters ensures long-term resistance to air, water and vapor transport in wall sections.

Fibrous insulations, such as mineral wool, are—by design—porous materials. This allows the movement of air and water vapor through the product as the external climate conditions affect air and moisture transport in the building envelope.

**Research has shown that either air movement or water exposure can decrease the R-value of insulation by up to 85 percent of the advertised value<sup>1,2</sup>.**

**POLYISO BENEFIT:** Given its resistance to air flow, water vapor transmission, and liquid water, the thermal insulation value of a Polyiso wall is more stable than that of mineral wool. Architects, specifiers, and builders can depend on the thermal value of Polyiso foil-faced insulation.

## Compressive Strength

The compressive strength of foil-faced Polyiso insulation at 20 psi, far exceeds that of mineral wool board, which is only 8.5 psi. The high compressive strength of foil-faced Polyiso reduces the risk of job site damage and makes mechanical attachment more reliable and more consistent.

In addition, recent research involving similar mineral wool board products in roofing applications suggests the compressive strength of mineral wool may be reduced by as much as 85% when exposed to moisture.<sup>3</sup>

Materials with low compressive strength, like compressible mineral wool insulation, limit the options for external cladding attachment because of this lack of compressive strength. This same weakness allows the deformation of the fibrous insulation around other penetrating wall components, increasing the risk of thermal shorts and reduced insulation performance.

**POLYISO BENEFIT:** Foil-faced Polyiso has a high compressive strength, meaning it resists damage during installation. Soft, deformed insulation, which can happen with mineral wool, potentially creates thermal shorts and reduced insulation effectiveness with complex cladding support systems.

## Weight Per Installed R-Value

Foil-faced Polyiso is strong but very light. For example, an R-10 foil-faced Polyiso board that is 1.5 inches thick and measures 4 ft. x 8 ft. weighs 10.6 lbs. By contrast, an R-10 mineral wool that is 2.5 inches thick and measures 4 ft. x 6 ft. weighs 55 lbs. [Note, mineral wool is not available in 4 ft. x 8 ft. sheets.]

**POLYISO BENEFIT:** For the same R-value, Polyiso is 40 percent thinner and over 80 percent lighter than mineral wool wall insulation. Compared with Polyiso, it takes 25 percent more mineral wools to cover the same wall area. With Polyiso, the result is easier handling and faster installation, reducing the installed cost.

## Binders and Glues

Polyiso wall insulation is a closed-cell, rigid foam board insulation consisting of a strong foam core sandwiched between two foil or foil-composite facers.

The fibers in mineral wools are glued together using a Urea Extended Phenolic Formaldehyde binder, that has been shown to break down when exposed to moisture.

**POLYISO BENEFIT:** Foil-faced Polyiso is not susceptible to moisture damage, so there is no concern about performance of cladding support.

Remember, when it comes to selecting the best overall insulation for walls, foil-faced Polyiso is the product of choice and outperforms mineral wool in environmental performance.

## Value

Foil-faced Polyiso, which has a higher R-value per inch, is lighter and thinner making it easier to install and offering a much greater value than mineral fiber board which has an R-value of 4.0, is heavier, thicker and can be more difficult to handle.

Polyiso:

- Holds the highest R-value per inch of any commonly used rigid foam insulation.
- Provides water resistance as well as superior vapor barrier control.
- Has high compressive strength and resists damage during installation.
- Offers superior performance in fire tests.
- Is lighter and easier to handle on the job site.
- Contains no formaldehyde binders.

\*Also known as mineral fiber board, stone wool or rock wool.

Notes:

<sup>1</sup> The Effect of Airflow on Measured Heat Transport Through Wall Cavity Insulation, STP 1495, ASTM International 2007.

<sup>2</sup> Water Resistance of Rain Screen Cavity Wall Insulation, The Dow Chemical Company, 2010.

<sup>3</sup> The Effect of Roof Traffic and Moisture on Thermal Roof Insulations, PIMA Research Report, 2015.

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## PIMA

For more than 30 years, PIMA (Polyisocyanurate Insulation Manufacturers Association) has served as the unified voice of the rigid polyiso industry proactively advocating for safe, cost-effective, sustainable and energy-efficient construction. PIMA's membership includes manufacturers of polyiso insulation and suppliers to the industry. The products of PIMA's members comprise the majority of the polyiso produced in North America.

PIMA produces technical bulletins to address frequently asked questions about polyiso insulation. These publications update and inform architects, specifiers, and contractors about and build consensus on the performance characteristics of polyiso insulation. Individual companies can provide specific information about their respective polyiso products.



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