



EPS VS XPS

Insulfoam Product Overview

Insulfoam is one of the nation's largest manufacturer of block-molded expanded polystyrene (EPS). For over 50 years, Insulfoam has enabled building professionals to construct high-quality, cost-effective insulation systems. With the widest range of faced, laminated, and standard high-performance EPS insulation products, Insulfoam has the right products for any application while providing the highest R-Value per dollar of any rigid insulation.

Insulfoam's Core Business Definition

Questions	Parameters	Divisional Core Attributes
What are the division's strongest (and most differential) assets and capabilities?	Physical assets	<ul style="list-style-type: none"> Eight state-of-the-art manufacturing facilities strategically located throughout the U.S. Technical/R&D/Training Center based in Savage, MN Sales offices located within each of our manufacturing facilities Access to CCM training facilities and personnel in Carlisle, PA
	Intangible capabilities and assets	<ul style="list-style-type: none"> Presence & power of the Carlisle brand name Customer-centric culture of engaged & empowered employees focused on innovation and industry-leading service and support ("The Carlisle Experience") Industry experience, technical knowledge, excellent brand name and reputation Tapered Design and take-off services for roofing, waterproofing and Geofoam projects
Where does the division generate the most profit?	Products and services	<ul style="list-style-type: none"> Plain Expanded Polystyrene (EPS) or with assorted facers, laminates and cover boards Best-in-Class customer service/support & technical expertise.
	Value chain activities	<ul style="list-style-type: none"> Converting raw materials and specialized, proprietary laminates into high-performance construction and OEM systems. Product development and innovation targeted to higher performance materials aimed at enhancing margin growth.
Where does the division enjoy competitive outperformance?	"Carlisle Experience"	<ul style="list-style-type: none"> Customer service and technical support expertise, problem-solving capabilities. Just-in-time (JIT) capabilities to provide job-lot quantities. Best in class supplier to jobsites for roofing and new-construction projects. Stand behind our products. Quickly correct our errors.

Manufacturing

EPS

Expanded Polystyrene insulation (EPS) is produced through expansion using heat via steam and pentane in a large mold to expand and fuse the resin together. This process produces a closed-cell structure that contains air. Expanded polystyrene is very versatile because it can be molded and cut into different shapes and can be produced with additives such as pest deterrents.

XPS

Extruded polystyrene insulation (XPS) is manufactured using a process of extrusion from polystyrene resin and blowing agents which are extruded into boards. This continuous process results in a closed-cell structure XPS which contains gases other than air within the closed cells. XPS insulation is typically available in standard-dimension square or rectangular boards. Brands of XPS are generally recognizable by the color of the insulation: green, blue, pink, etc.

ASTM C578 Standard Compliance

EPS

InsulFoam EPS insulations are manufactured to meet and exceed the physical property requirements of ASTM C578, "Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation".

XPS

XPS is manufactured under the same specification and has separate designations under ASTM C578, "Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation".

R-Value

EPS

InsulFoam EPS insulation is stable and its thermal properties will remain the same throughout its entire service life.

XPS

XPS is subject to thermal degradation over time as the cell gas makeup changes. This is known as thermal drift and results in a lower R-value.

When it comes to water, you have two variables: absorption and retention. It is important to evaluate material performance when exposed to long-term environmental conditions. Insulation materials need to resist moisture intrusion, but just as importantly, they need to exhibit drying potential to maintain long-term thermal integrity.

R-Value: Water Absorption

EPS

InsulFoam EPS insulation is a closed-cell polystyrene foam which is naturally water resistant. Some comparisons are misleading because they use short-term laboratory tests which are conducted for only 24 hours. However, EPS has demonstrated lower water absorption than XPS in several long-term exterior exposure studies. A real-life study which compared the two types of insulation was made by installing them in the foundation of a commercial building in St. Paul, MN. After being in place for 15 years, researchers extracted the insulation and began testing them for their moisture content.

The EPS insulation was found to have a 4.8 percent moisture content by volume compared to 18.9 percent found in the XPS portion. That equated to a massive four-fold difference in moisture content.

XPS

XPS is a closed-cell polystyrene foam which is naturally water resistant. XPS insulation is tested by performing controlled, underwater tests that submerge the insulation material for 24 hours at a time. When tested through this method, XPS is seen as the more resistant option because it resists water absorption more than EPS, although in-situ applications indicate that XPS can have much higher water absorption characteristics.

R-Value: Water Retention

EPS

When exposed to the extreme conditions of the ASTM C1512 Test, “Standard Test Method for Characterizing the Effect of Exposure to Environmental Cycling on Thermal Performance of Insulation Products”, EPS insulation exhibited drying potential under severe exposure conditions, while extruded polystyrene did not exhibit drying potential when exposed to the same conditions.

XPS

Insulations lose R-value when exposed to moisture. Long-term in-situ testing has shown XPS to trap water, which lowers its R-value. After 30 days of being left to dry, these XPS samples retained moisture levels of around 15.7% and had R-values of 52% of claimed value.

Vapor permeability is a standard measurement of water in the material. The higher the number, the more easily gaseous water can diffuse through the material. A material with a lower perm rating is better at retarding movement of water vapor. If the perm rating is low, the material is considered a “vapor retarder”. If it has a very low perm rating, it is labeled a “vapor barrier”. A perm rating of less than 0.1 is considered a Class I impermeable vapor retarder and is classified as a ‘vapor barrier.’ A rating between 0.1 and 1 is a Class II semi-permeable vapor retarder, and a perm rating between 1 and 10 is a Class III permeable vapor retarder. Any product with a perm rating greater than 10 is highly permeable and is not considered a vapor retarder. Applications will determine what perm rating is desirable.

Vapor Permeance

EPS

The vapor permeability of EPS insulation ranges from 2.5 to 5.0 perms for a 1-inch-thick material depending on density. EPS is available with facers that can lower the perm rating.

XPS

Unfaced 25-mm (1-inch) -thick XPS has a perm rating around 1 and is measured as semipermeable. XPS is available with facers that can reduce the perm rating.

The “Green” Factor

EPS

InsulFoam EPS insulation is produced with pentane, which has a very low global warming potential (GWP). The pentane used in the manufacture of EPS is mostly consumed in the manufacturing process, and the cell gasses that create the insulating characteristics of the material are air, which does not change with age. EPS can be considered a suitable choice for green building designs because it offers the environmental advantages of energy efficiency, recyclable content, resistance to mold, and indoor environmental quality.

XPS

XPS uses a combination of blowing agents, including HFCs in many states in the U.S. Products using HFC blowing agents have a high GWP. These blowing agents are also diluted over time, which results in a lower R-value over the life of the insulation. Several states are now requiring that XPS no longer use HFCs. These new blowing agent combinations are still subject to long-term R-value loss and add to the cost of the finished product. The 20-year R-value of XPS is expected to be near 4.3 per inch.