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INSULATION

Roof Assembly Insulation

By Ram Mayivahanan
Product Marketing Manager,
Insulfoam, a division of
Carlisle Construction Materials

Insulation Considerations: The Case for EPS

Design professionals typically want to use as much insulation as possible, not only to comply with building codes, but also to build to the highest standards. Building owners want enough insulation to keep heating and cooling costs down, without having to “pay through the roof” in upfront costs. Performance vs. cost: where is the middle ground that makes sense for both parties?

To answer that question, it is important to look at how insulation is designed. For many years, the use of rigid foam insulation was based on the R-value per inch—the higher the better. Today, well-informed design professionals are cognizant of the design optimum and the realization that insulation suffers from the law of diminishing returns. Any insulation installed beyond the design optimum provides little additional energy savings, but costs a lot of money. Efficient insulation design comes down to choosing the product that balances upfront costs with the energy savings offered over the life of the building.

So, which insulation gives the best “bang for the buck?” To understand performance vs. expenditure across different rigid insulations, it is important to consider the R-value per dollar spent on both materials and labor.

Because material and labor costs for insulation vary by market, specific R-value per dollar figures often shift, but EPS consistently rates highest when compared to other rigid foam insulations. Also, EPS comes in much higher thicknesses (up to 40 in.) in a single-layer than does XPS or polyisocyanurate, so higher R-values can be achieved with fewer layers, lowering on-job labor time and cost. Plus, EPS does not suffer any loss in R-value over the life of the building, so the design R-value for EPS is the long-term R-value.

With that in mind, here are some increasingly popular applications in which design professionals use EPS to comply with building codes while reducing material and labor costs for roof insulation.

Roof Recoveries Requiring a Separator Board
EPS is available in accordion-type folded bundles, where

numerous individual faced foam panels are joined together edge to edge. These EPS products are lightweight, easy to carry and unfold quickly to cover a large area. One such example is Insulfoam’s R-Tech Fanfold insulation, which weighs about 11 pounds, yet covers two roof squares (200 sq. ft.) and meets UL codes for roof recover. Compared to carrying numerous separate sheets of individual foam panels, these fanfold bundles require about 60% fewer hours to install, saving up to \$25 per square vs. using other cover boards. On a 1,000-sq.-ft. roof, fanfold bundles would save around \$25,000.

Metal Roof Recoveries

For recover jobs over metal roofs with standing seams, it can be cumbersome to create a stable, even surface for successive roof layers. EPS products are available as “flute-fill” segments, with standard and custom cuts that fit between the metal roofing’s raised seams. Because EPS can be custom-cut to completely fill the flute, it saves up to 25% in cost without sacrificing thermal performance or durability.

Built-Up Sloped Roofs

Creating a slope on roof decks typically requires stacking several layers of insulation on top of one another. The thicker the individual pieces, the less labor needed for handling and placing materials. Polyiso and XPS products are limited to sheets a few inches thick, whereas EPS insulation is available in blocks up to 40 in. thick. Properly equipped manufacturers can pre-cut such blocks into any tapered slope, and can produce custom shapes to accommodate roof crickets, saddles, valleys and ridges, along with all types of drainage systems and layouts. Tapered EPS can reduce roof insulation material and labor costs up to 30%.

High-Traffic Areas

For roofs subject to foot traffic or other abuse, such as severe weather, composite and high-density EPS insulation products are available that offer enhanced durability.



Composites include EPS bonded to high-density polyiso cover boards, gypsum or OSB coverboards for added protection in severe-weather or hail zones. High-density EPS products include 40 psi and 60 psi flat or tapered panels providing the compressive strengths needed in applications like plaza decks, garden and IRMA roofs, as well as roofs that have high foot-traffic. EPS-polyiso composites provide high-thermal efficiency and durability and are fully compatible with adhered roof systems. These composites typically weigh much less than gypsum or oriented strand board (OSB) coverboards, install more quickly and result in less fatigue for installers. They also deliver adhesive cost savings as they are bonded together at the factory.

Final Thoughts

When choosing any insulation, it is important to confirm that the specific product has been tested according to the appropriate standards. The two ASTM standards for rigid foam insulation are:

XPS and EPS: ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

Polyiso: ASTM C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

Many rigid-foam insulation products are offered that do not meet these standards, which can mean inferior performance in thermal and moisture resistance, durability and other criteria.

In the end, the right insulation product is the one that offers the optimum balance of performance and economy. Such a product satisfies both the design professional and the building owner, leading to a building that is code compliant, built to high performance standards and economical enough to deliver lifetime energy savings that justify the upfront costs. □

COMPARISON OF COMMON RIGID FOAM INSULATIONS:

To understand performance vs. expenditure, it is important to consider the R-value per dollar spent on both materials and labor.

Insulation type	R-value per Inch (at 40°F, varies by product)	R-value per dollar (Materials And Labor)	Design Optimum: Performance vs. Cost
EPS (Expanded polystyrene)	41-51 (lifetime)	Higher	Higher
XPS (Extruded polystyrene)	54 (at time of manufacture)	Lower	Lower
Polyisocyanurate	57-60	Lower	Lower