

Tapered Insulation Systems

About Polyiso Insulation

Polyiso is a rigid foam insulation used in more than 70% of commercial roof construction and offers a continuous insulation solution for commercial and residential wall assemblies. As one of North America's most widely used and readily available building products, Polyiso is a cost-effective insulation option for reducing building energy use and improving the overall service-life of roofs and walls.

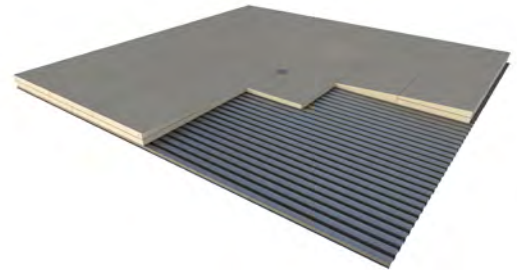
The benefits of using Polyiso include:

- High R-value per inch of thickness
- Excellent fire test performance
- Extensive building code approvals
- Cost-effective continuous insulation (ci) solution
- Compatible with most roof and wall systems
- Dimensional stability
- Compressive strength
- Moisture resistance
- Thinner walls and roofs with shorter fasteners
- Long service life
- Preferred insurance ratings
- Virtually no global warming potential
- Zero ozone depletion potential
- Recyclable through reuse
- Recycled content (amount varies by product)
- Regional materials (nationwide production network)

Shedding water is one of the primary functions of a well designed and constructed roof assembly. Unless a roof assembly is specifically designed to hold water (e.g., vegetative roofs), prolonged periods of standing or ponding water risk reducing the lifespan and long-term performance of low-slope roof assemblies. Tapered roof insulation and tapered insulation systems are an extremely effective tool available to roof designers and roofing contractors to help ensure positive drainage is possible for any design or in-field condition encountered.

What are Tapered Roof Insulation and Tapered Insulation Systems?

Tapered roof insulation is an insulation board where opposing edges are of different thicknesses producing an insulation board with a sloped face. Manufacturers of tapered roof insulation offer products of different slopes that may include both standard slopes as well as special-order custom slopes. Tapered insulation "crickets" are a commonly used device to direct water in tapered insulation systems. "Crickets" are typically diamond-shaped and assembled from pieces of tapered insulation.



A tapered insulation system combines tapered roof insulation with flat insulation boards and other devices (e.g., crickets) and accessories to create a roof assembly having a landscape of many slopes pointing in different directions. The ability to create slope in any direction allows designers and contractors to control the flow of water, directing it toward drainage devices and away from walls, parapets, rooftop equipment, and penetrating items. Beyond drainage, the thermal resistance and design flexibility of tapered insulation systems has the additional benefit of providing more opportunity to comply with energy code provisions when presented with challenging or limiting roof conditions.

Why Use Tapered Roof Insulation and Tapered Insulation Systems?

Ponding water is one of the greatest threats to a roof assembly. It shortens the service life of the roof assembly membrane and can also lead to serious problems such as leaks, increased structural loading and deflection of the roof deck, growth of bacteria or unwanted vegetation,



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and other consequences of stagnant water. Draining water in a timely and efficient manner minimizes these possible issues for roof assemblies not specifically designed to handle prolonged periods of ponding or standing water.

Many professional roofing industry organizations and building codes in the United States and Canada recommend or require a minimum roof slope for both new construction and re-roofing projects. Designers may achieve the required slope by sloping the structural roof deck, by using a tapered roof insulation system, or a combination of both. Tapered roof insulation systems provide solutions for overcoming insufficient roof slope, correcting slope in the wrong direction, and solving extremely complex or limiting roof conditions that appear technically infeasible for typical single-slope roof profiles.

Design Considerations

While tapered insulation systems have an important role in the successful performance of the roof assembly, proper design and installation are even more important. Every roofing project and its associated challenges are unique, so many polyiso manufacturers provide consultation, technical, and education services for contractors and architects in the design and specification of code-compliant tapered systems. Some key design considerations include:

SLOPE AND SYSTEM PROFILES:

Tapered insulation panels are available in standard slopes and thicknesses. Standard slopes include 1/8 in. per foot, 1/4 in. per foot, and 1/2 in. per foot. Other panel slopes and thicknesses may be available upon request. Tapered insulation system profiles generally consist of standard tapered insulation panels combined with flat insulation panels installed as a multi-layered system. Examples of typical systems with standard-slope profiles are included in Figure 1 (1/8 in. per foot profile), Figure 2 (1/4 in. per foot profile), and Figure 3 (1/2 in. per foot profile). Note that Figures 1, 2 and 3 also demonstrate the use of multiple tapered insulation panels of different thicknesses to provide a flat and consistent sloping surface across multiple insulation panels (left-to-right in each Figure). Consult with the insulation manufacturer for non-standard slope profiles and additional assistance with system design options and recommendations.

R-VALUE (U-FACTOR) AND FIRE PERFORMANCE:

A properly designed tapered insulation system must also meet stringent energy conservation code requirements for roof assembly R-value (or U-factor) and building code requirements for fire performance. Tapered insulation systems are particularly useful when upgrading existing roofs that present challenging or limiting conditions. Contact the manufacturer for more specific information regarding R-value (U-factor) and fire performance ratings as well as design suggestions for more complicated projects.

Finally...

Although design theory, job conditions and budget constraints may vary, a properly designed and installed tapered polyiso insulation system can add years to the performance life of any roof.

FIGURES

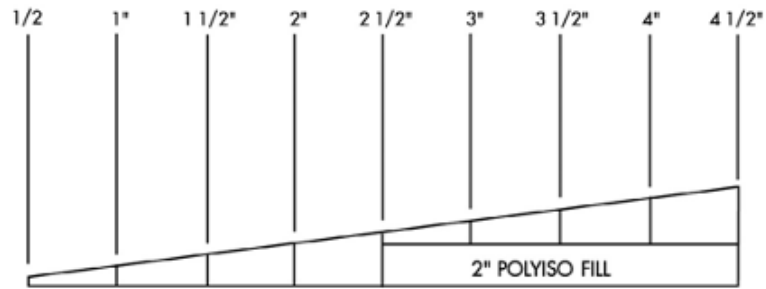


Figure 1 – Example of a tapered insulation system based on a 1/8 in. per foot slope using a single layer of flat insulation fill.

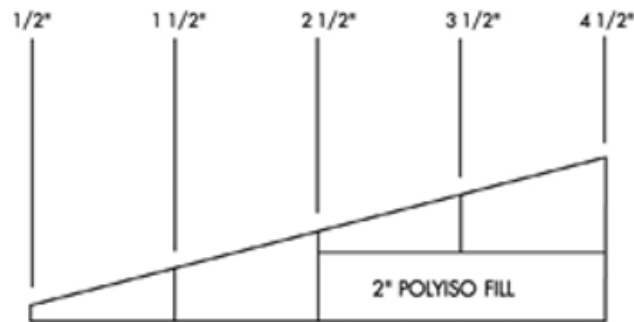


Figure 2 – Example of a tapered insulation system based on a 1/4 in. per foot slope using a single layer of flat insulation fill.

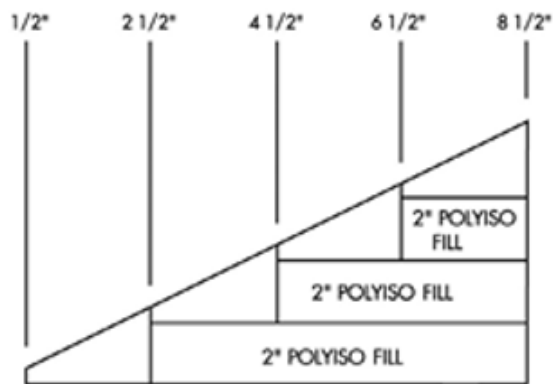


Figure 3 – Example of a tapered insulation system based on a 1/2-in. per foot slope using multiple layers of flat insulation fill.

ABOUT PIMA

Since 1987, PIMA has served as the voice of the North American rigid polyiso insulation industry. PIMA is a leading advocate for safe, cost-effective, sustainable, and energy-efficient construction. The Association is comprised of polyiso manufacturers and industry suppliers, and represents the public policy interests of its membership at the local, national, and international levels to advance high-performance building practices.

PIMA produces technical bulletins to address key topics related to polyiso insulation. These publications inform architects, specifiers, and contractors about the performance characteristics of polyiso insulation. Always consult individual manufacturers for product specific information, including product data sheets and installation instructions.

For more information on polyisocyanurate insulation, visit www.polyiso.org

