

Polyiso Nailable Roof Insulation

Introduction, Types, and Design Considerations

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)

Polyisocyanurate (polyiso) roof insulation is widely used in commercial and industrial low-slope roof systems. Polyiso roof insulation is also used in steep-slope roofs. This application has grown in popularity in the last decade and polyiso nailable¹ insulation provides a very useful insulation solution for steep-slope roof applications.

What is Polyiso Nailable Roof Insulation?

Polyiso nailable insulation combines a polyiso insulation board with a plywood or oriented strand board (OSB) panel into a single product. Polyiso nailable insulation products offer the benefits of continuous insulation with a substrate suitable for mechanical attachment of roof covering materials (e.g., clay/concrete/slate tiles, asphalt/metal shingles, or standing metal seam roofing).

Polyiso nailable insulation is available in two types: vented and non-vented. The non-vented type of polyiso nailable insulation is configured with the wood panel bonded directly to the polyiso insulation board (see Figure 1). By comparison, the vented type is configured with an integral gap or air space (typically 1.0-inch to 2.0-inch) created by bonding spacers between the polyiso insulation board and the plywood or OSB panel (see Figure 2). A solution incorporating polyiso nailable insulation is possible for almost any new or existing roof design condition or roof assembly that one might consider or encounter in today's roofing marketplace. Contact the polyiso insulation manufacturer for more information regarding specific products and design assistance.



Figure 1. Non-vented Polyiso Nailable Roof Insulation

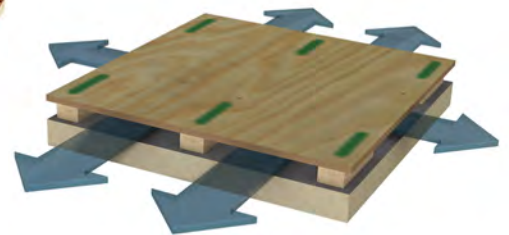


Figure 2. Vented Polyiso Nailable Roof Insulation



Surround yourself with the best.

1. Other names or references to polyiso nailable insulation include: nailbase, nail base, and various branded product names from manufacturers.

Benefits of Using Polyiso Nailable Roof Insulation?

The composition and configuration of polyiso nailable insulation provides designers the ability to combine multiple performance benefits that are typically not possible with traditional steep-slope roofing applications and roof coverings, including:

- High-performing polyiso insulation
 - High R-value and thermal performance
 - Excellent fire test performance
 - Excellent dimensional stability and compressive strength
- Continuous insulation
 - A continuous layer of insulation across the entire roof surface that significantly reduces thermal bridging in the roof system
 - Multiple continuous insulation layers with staggered joints also reduces moisture migration and potential moisture-related issues such as shingle buckling (see PIMA Technical Bulletin 113 for additional information)
 - The most effective insulation practice to limit heat transfer into (hot environments) and out of (cold environments) attics
- Design flexibility
 - Options appropriate for use with unvented attic and unvented enclosed rafter assemblies
 - Use for new and existing roof applications over combustible or noncombustible roof decks
 - Options for use with roof coverings that may require, or benefit from, venting the underside of the deck

Design Considerations

Vented or Unvented Attics and Roof Decks

Historically, natural or mechanical ventilation of attic spaces was required by the model building codes in both the United States and Canada. Ventilation of attics and enclosed rafter assemblies is a time-proven design practice with three primary purposes in terms of the attic space and the underside of the roof deck:

- Minimize / prevent condensation
- Prevent accumulation of moisture (vapor and liquid)
- Reduce heat buildup / retention in both hot and cold conditions

Advances in building science and greater understanding of air leakage, moisture transmission, and heat transfer in building enclosures, coupled with the use of air, vapor, weather-resistive barriers, and continuous insulation have led to design practices and code-recognition of attic assemblies that do not require natural or mechanical ventilation. Both the International Building Code (IBC)² and International Residential Code (IRC)³ contain prescriptive provisions for unvented attics and unvented enclosed rafter assemblies. In most instances, the use of air impermeable insulation, such as polyiso, is required for these types of assemblies.

By comparison, the current National Building Code of Canada (NBCC) also requires ventilation of attics and the underside of roof decks in buildings⁴ and homes⁵. The NBCC also permits unvented assemblies; however, it does not provide specific requirements and instead places the burden on the builder or designer to demonstrate to the building official's satisfaction that venting is not necessary.

2. International Building Code (IBC) – Section 1203.2 (2015 Ed.), Section 1202.2 (2018 & 2021 Eds.)

3. International Residential Code (IRC) – Provisions for “unvented” attics in Section R806 began in the 2006 Ed.

4. National Building Code of Canada (NBCC) 1995 through 2020, Volume1, Division B, Parts 5 & 6

5. National Building Code of Canada (NBCC) 1995 through 2020, Volume2, Division B, Part 9

Roof Coverings

In steep-slope roof applications, a number of roof covering materials (e.g., clay/concrete/slate tiles, asphalt/metal shingles, or standing metal seam roofing) perform best when the underside of the surface upon which they are installed is vented. Vented polyiso nailable insulation products allow designers to accommodate such a design condition over an unvented attic assembly providing a vented space above the structural roof deck and immediately below the roof covering. These polyiso products offer the benefit of a vented substrate, while still providing continuous insulation. Consult with the roof covering manufacturer for information regarding roof deck ventilation requirements.

Vapor Retarders

Vapor retarders are used in buildings to inhibit or reduce the migration of water vapor into the building envelope assemblies, such as roofs, where moisture vapor may accumulate or condense and ultimately damage or reduce the life of the roof assembly. The proper design, calculations, and location of vapor retarders within building envelope assemblies is complex and critical to ensure durable, long-term performance.

As with any roof assembly, the project location, building and energy code requirements, and many other details regarding the building's use and configuration will influence requirements for vapor retarders in attic and/or roof assemblies. PIMA recommends coordinating with design professionals, local building code officials and product manufacturers regarding the use and location of vapor retarders in roof assemblies and attics. PIMA also recommends following manufacturers' installation instructions.

Conclusion

In today's modern buildings and homes, roof assemblies can become just as complex as wall assemblies. Polyiso nailable insulation offers designers a flexible insulation option that is useful in vented and unvented roof designs with virtually any roof covering and in both low-slope and steep-slope applications. As with any roof assembly, there are important details to carefully consider when designing and installing an energy-efficient and durable roof system incorporating polyiso nailable insulation products. PIMA always recommends users consult product manufacturers for more detailed information and design assistance as well as the local code authority for the project location.

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

