

# Single-Ply Roof Systems Applied Directly to Polyiso Roof Insulation with Adhesives

## About Polyiso Insulation

Polyiso is a rigid foam insulation used in over 70% of commercial roof construction, in commercial sidewall construction and in residential construction.

The Benefits of using Polyiso include:

- Quality Mark™ certified LTTR-values for permeable faced products
- Highest R-value per inch of thickness
- Excellent fire test performance
- Moisture resistant
- Dimensional stability
- Superior compressive strength
- Extensive building code approvals
- Cost effective
- Recycled content
- Zero ozone depletion potential
- Virtually no global warming potential
- Preferred insurance ratings
- Nationwide availability
- Thinner walls and roofs with shorter fasteners
- Compatible with most roofing systems

PIMA and polyiso products have received many environmental awards. These include an honorable mention in the Sustainable Buildings Industry Council's (SBIC) 2003 "Best Practice" Sustainability Awards Program and the U.S. EPA's Climate Protection Award for the association's leadership in promoting energy efficiency and climate protection. The EPA also awarded PIMA and its members the Stratospheric Ozone Protection Award for "leadership in CFC phase-out in polyiso insulation and in recognition of exceptional contributions to global environmental protection."



## Single-Ply Roof Systems and Polyiso

Polyiso is used in built-up (BUR), modified bitumen, metal, ballasted single-ply, mechanically attached single-ply, and adhered single-ply roofing systems. Although all these roofing systems commonly incorporate polyiso and depend on its proper installation for successful performance, this technical bulletin will focus on single-ply systems applied directly to polyiso roof insulation with adhesives.

Adhered single-ply membranes (thermoplastic or thermoset) are bonded to polyiso roof insulation with adhesives, some of which are proprietary. These adhesives are usually solvent based, but water-based or low-rise foams can also be used. Adhesives are generally applied to the underside of the membrane and the top facer of the insulation. After a drying time specified by the adhesive manufacturer, the membrane is placed over the insulation and broomed or rolled to ensure full adhesive contact between the membrane and the insulation. Specific methods to achieve optimum adhesion are provided by the membrane and adhesive manufacturers.

Although adhered single-ply roofing systems are commonly specified, familiar to many contractors, and successfully installed under a variety of conditions, special care is required for proper adhesive application. This is essential to successful performance of this type of roof system. During cold weather, proper adhesive application is especially critical.

The factors listed below are generally considered good roofing practices that will help promote successful bonding of the membrane to the polyiso insulation substrate, improving the likelihood of satisfactory long-term performance.

### 1. Follow recommendations for adhesive storage

Proper storage of adhesives is critical to adhered single-ply roof system performance. Adhesive manufacturers typically recommend that adhesives be stored at temperatures between 60°F (15C) and 80°F (27C).

### 2. Apply the adhesive at the proper coverage rate

The adhesive must be applied evenly at the proper coverage rate on both the membrane and the insulation surface. In colder weather, the adhesive can become thicker or more viscous and difficult to spread causing heavier than recommended coverage rates.

Never thin adhesives with additional solvents. Adding solvent to adhesives is typically against manufacturer's recommendations. In addition, thinning of adhesives can extend the solvent evaporation time and may cause delamination.

### **3. Allow the solvent in the solvent-based adhesive to “flash off” before placing the glued membrane on the glued insulation**

It is essential that the adhesive have sufficient time to reach the “tacky” stage before mating the membrane to the insulation. When the adhesive has dried sufficiently, the adhesive will feel tacky and solid to the touch of the finger, not wet or spongy. If the adhesive has merely “skinned over,” liquid adhesive will be present just below the surface and will “string” when a finger or knuckle is pushed across it. If this occurs, further drying is necessary.

When the membrane is placed over insufficiently dried adhesive, the remaining solvent is retained between the membrane and the surface of the insulation and cannot readily evaporate to the atmosphere. This concentration of solvent may affect the adhesion of the membrane to the insulation facer. Bubbles or blisters may appear when the trapped solvents attempt to escape through the membrane, resulting in less than 100% adhesion of the membrane to the insulation. In extreme circumstances trapped solvents may affect the dimensional stability of the polyiso foam.

Some important weather and job conditions that may affect the drying time of adhesives include:

- Some adhesive manufacturers recommend “40°F (4C) and rising” as the minimum application temperature. With falling temperatures, even within the temperature ranges provided by membrane manufacturers, the solvents in the adhesive will evaporate or flash off more slowly.
- Windy conditions can accelerate surface drying of the adhesive, causing the adhesive to “skin” over, trapping solvents within the adhesive layer. If the adhesive “skins over,” more time must be allowed for solvents to flash off.
- As solvents flash off, the surface of the adhesive can drop below ambient temperature because of evaporative cooling. When quickly falling temperatures are accompanied by high relative humidity, the temperature of the adhesive surface may then reach the dew point temperature, causing condensation to occur. Moisture accumulation due to condensation must be allowed to dry before proceeding.
- Temperature differences between shaded and sunlit areas of the same roof require special attention because the adhesive will dry at different rates in those different areas.

### **4. Provide Protective Work Surfaces and Minimize Rooftop Traffic**

Avoid excessive traffic during roof construction or on a completed roof surface. Although polyiso has been designed to withstand normal foot traffic, protection from damage by construction traffic and/or abuse is extremely important. Roof surface protection such as plywood shall be used in areas where storage and staging are planned and heavy or repeated traffic is anticipated during or after installation.

Some designers and membrane manufacturers specify the use of cover boards as a means of protecting the insulation. If specified, installers should insure that the cover board used is compatible with all components of the roofing system, is acceptable to the membrane manufacturer, and meets specified fire, wind, and code requirements.

### **5. Follow Manufacturer's Recommendations**

Always consult the membrane and adhesive manufacturers for recommendations on proper installation, adhesive compatibility and safety practices required for adhered single-ply membranes over polyiso roof insulation. If there are questions concerning the single-ply membrane or the adhesive, contact the respective manufacturer immediately.

Consult the polyiso roof insulation manufacturer for their recommended application instructions. If there are any questions about the quality of the polyiso roof insulation delivered to the job site, contact the manufacturer of the insulation immediately. Together, polyiso roof insulation

and single-ply membranes have a long history of successful thermal and roofing/waterproofing performance. In combination with membrane manufacturers' installation instructions, these recommendations should further the continued success and trouble-free application of adhered single-ply membranes to polyiso roof insulation.

## PIMA

For over 20 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 produces technical bulletins in an effort to address frequently asked questions about polyiso insulation. PIMA's technical bulletins are published to help expand the knowledge of specifiers and contractors and to build consensus on the performance characteristics of polyiso. Individual companies should be consulted for specifics about their respective products.

PIMA's membership consists of manufacturers of polyiso insulation and suppliers to the industry. Our members account for a majority of all of the polyiso produced in North America.

## SAFETY

Polyiso insulation, like wood and other organic building materials is combustible. Therefore, it should not be exposed to an ignition source of sufficient heat and intensity (e.g., flames, fire, sparks, etc.) during transit, storage or product application. Consult the product label and/or the PIMA members' Material Safety Data Sheets (MSDS) for specific safety instructions. In the United States, follow all regulations from OSHA, NFPA and local fire authorities; in Canada, follow all regulations from Health Canada Occupational Health and Safety Act (WHMIS) and local fire authorities.

**For more information on polyisocyanurate insulation, visit [www.polyiso.org](http://www.polyiso.org)**



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