

Moisture Control with the WarmWall^{cm} System

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 MarkTM 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."



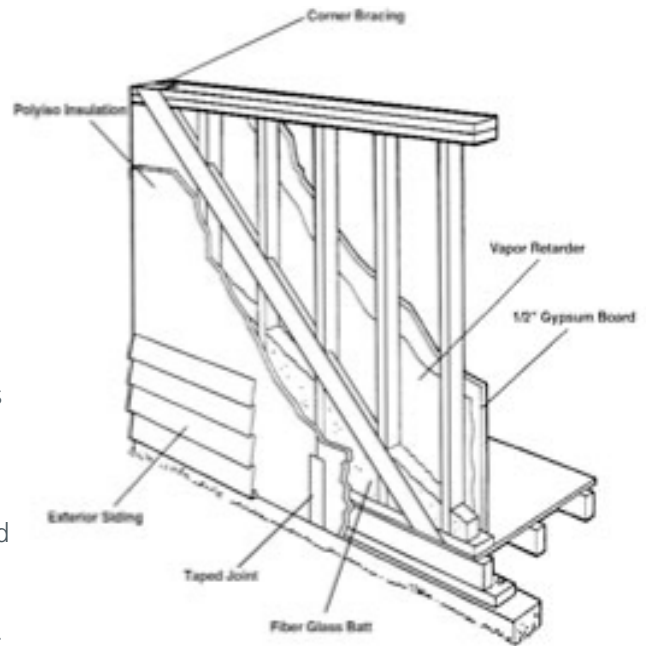
The Superior Sheathing System.

The Polyisocyanurate Insulation Manufacturers Association (PIMA) features WarmWall^{cm} - the Superior Sheathing System. WarmWall^{cm}

is an innovative building concept utilizing foil faced polyiso insulation sheathing to provide a complete envelope of insulation on the exterior of a home. The WarmWall^{cm} concept is extremely beneficial to both wood and steel framed construction, providing insulation over 100% of the exterior walls and increasing the overall thermal performance of a home.

What is the WarmWall^{cm} System?

- Proper corner bracing of framing;
- Insulates 100% of the exterior framed walls with foil faced polyiso insulation keeping energy loss to a minimum;¹
- The exterior joints of the polyiso insulation sheathing are taped to prevent air infiltration;
- Conventional glass fiber batt insulation is placed between the wood or steel framing;
- In heating or mixed climates, a continuous vapor retarder is applied on the interior side of the studs;
- Gypsum board, minimum 1/2" thick, is applied to the interior; and
- Exterior finish is applied in accordance with the manufacturer's recommended application instructions, over the polyiso insulation sheathing.



The WarmWall^{cm} System

¹ Savings can vary. Find out why in the insulation sellers fact sheet on R-value. Higher R-values mean greater insulating power.

Moisture Problems in Walls

If moisture accumulates in the exterior walls of a home either by liquid water intrusion from the exterior or water vapor condensation from the interior, serious problems can occur. These include mold, mildew, wet cavity insulation, wet framing members, peeling paint or wall paper and significant energy loss. If the exterior wall becomes wet, the wood framing members may rot or steel framing may corrode, significantly impacting the structural integrity of the home. This can mean costly call backs for the builder. Wet walls are also thought to be associated with insect infestations, such as termites.

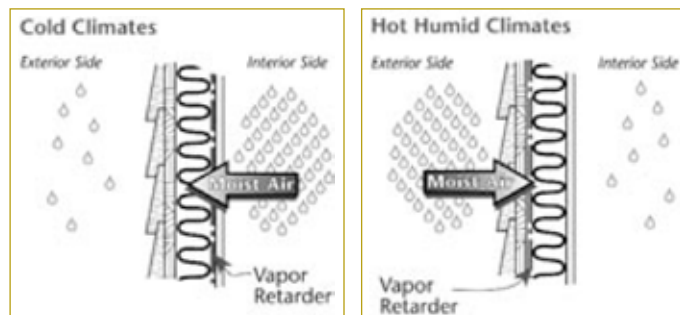
Home owners should also be aware of the health problems associated with wet walls - the sick home syndrome. This problem is well documented by studies at a number of universities. For example, according to a recent Duke University study, mold growth appears to be linked to dewpoint conditions rather than the relative humidity. Researchers found that in certain HVAC systems, sustained mold growth could occur when wet conditions were produced through condensation, as the air is cooled past its dew point.

How Does Water Enter the Stud Cavity?

Liquid water can enter a home through the walls as a result of wind-driven rain or rain splashing on the exterior side of the wall. In the living space of a home, water vapor is generated by normal occupancy —showers, kitchen appliances, plumbing equipment, and occupants themselves all generate moisture. (See drawing to the right.)

In cold climates, water vapor can migrate from the interior into the exterior walls through breaks in the vapor retarder and condense on a cooler surface, usually on the inside surface of the wood sheathing. This liquid water then accumulates, causing mold, mildew and even wood rot.

In hot humid climates where the moisture content of the outside air is high, water vapor can enter through the exterior wall, condensing on the cooler interior surface, usually the stud cavity side of the interior wall. The liquid water, once again, can create the perfect environment for wood rot and mold or mildew growth.



Drawing reprinted with permission from the North American Insulation Manufacturers Association (NAIMA)

Insulation Facts #11: Facts About Ventilation and Moisture Control

Minimize Moisture Problems

In general, moisture problems may be minimized through proper ventilation of the home, the use of vapor retarders to inhibit water vapor transmission into wall cavities, and by keeping the wall cavity warm to prevent condensation. Be sure to consult local building codes for ventilation and/or vapor retarder requirements.

The WarmWall System Solution

The WarmWall system, while increasing the energy efficiency of your home, provides an additional important benefit - moisture control. It helps increase the temperature of the wall cavity thereby avoiding condensation. It can also help prevent both liquid and vapor moisture from entering the home's exterior walls.

By placing a "security blanket" of highly energy efficient polyiso insulation sheathing around the

walls of a home, a more consistent wall temperature is maintained, and the temperature inside the cavity is warmer, reducing the threat of condensation. For example, consider a home with R-13 batt as cavity insulation, where the outside temperature is 30°F and the inside condition is 70°F with a relative humidity of 30%. The calculated dewpoint will be 38°F. If wood sheathing is used, condensation in the cavity will likely occur since the cavity side surface of the wood sheathing is about 34°F. With one inch polyiso as the sheathing, the cavity side surface of the polyiso sheathing is about 45°F, reducing the risk of condensation in the cavity.

Taping the joints of the polyiso insulation sheathing will reduce air infiltration and may eliminate the need for house wraps or other similar material along with the cost of labor to install these materials. The water resistive facers of the polyiso sheathing provide a barrier to liquid water entry into the walls. Of course, proper caulking and sealing of windows, doors and penetrations (all good construction practices) are required. Proper installation of the exterior finish will ensure a quality home.

A vapor retarder, generally 4 or mil polyethylene rated at 1.0 perm or less, should be applied to the warm side of the wall. This will help prevent moisture from entering the cavity. (Consult the map and note below for proper placement of the vapor retarder.)

In heating and mixed climates, the vapor retarder should be stapled to the interior face of the framing, at top, bottom and the side. Joints should be overlapped at least 16 inches and stapled at the stud. Be careful to avoid electrical wiring when stapling vapor retarders. Sealing the vapor retarder at the top and bottom plates with either silicone caulking or tape is also a component of good construction practice. Seal penetrations at electrical outlets with silicone caulking or polyurethane foam sealant. Any tears or rips in the vapor retarder should be repaired with polypropylene tape having an acrylic adhesive prior to installing the gypsum board interior finish.

For cooling climates (those where the primary energy use is air conditioning), a vapor retarder should be installed on the outside or exterior of the walls. In this case, tape the joints of the foil faced polyiso sheathing and caulk or seal around all openings and penetrations. Use a high quality foil tape with an acrylic adhesive. Do not use “duct tape” because the adhesive can degrade with time, especially at high temperatures.

The WarmWall^{cm} System Provides:

- **A wall system with a high R-value** - increasing the energy efficiency of the home and significantly reducing heat loss;
- **A reduction in air infiltration and exfiltration** - increasing the overall performance of the wall and reducing heat loss;



Note: Climate conditions can be classified as heating, cooling or mixed. For more details, consult the ASHRAE Handbook of Fundamentals, Chapter 23, Thermal and Moisture Control in Insulated Assembly Application or the Moisture Control Handbook (Lstiburek and Carmody, 1991 published by Oak Ridge National Laboratory.)

- **A reduction in the risk of water condensation/intrusion** - increasing thermal and structural performance and reducing builder call backs;
- **Insulation over the entire framing members** - reducing the loss of energy from the home;
- **Increased home builder confidence** - assurance that the builder is providing a quality product;
- **Increased home buyer/owner confidence** - assurance of a quality home with state-of-the-art energy efficient construction techniques.

Remember, normal good construction practices are essential in any building system. Always follow the manufacturers recommended application instructions.

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



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