

# Compressive Strength

## 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
- 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."



## Compressive Strength: An Important Physical Property

The ability of rigid foam board to resist deformation or maintain shape when a force or load is applied is due to the physical property known as compressive strength. Although the force may be applied in any direction, it is most often measured in the direction of insulation thickness. The value is defined as a unit of force applied over an area. In the customary U.S. measurement system, the value would be expressed in the units of pounds per square inch (psi) or pounds per square foot (psf). In the SI system, the units would be Newton per meter squared (N/m<sup>2</sup>) or kilo Pascal (Pa).

## Measuring the Compressive Strength

The compressive strength of polyiso foam insulation is determined by ASTM D 1621-Standard Test Method for Compressive Properties of Rigid Cellular Plastics. The following procedure is used:

From the center of randomly selected 4'x8' or 4'x4' (1220mm x 2440mm or 1220mm x 1220mm) insulation boards, a 4" (100mm) strip is cut across the width of the board at its center point; this strip is further cut into 4" (100mm) pieces. Each alternative piece is a test specimen for a total of at least five specimens. Sampling the entire width of the board ensures that the sample is representative and illustrates uniformity of the product. After preparation, each specimen is compressed in the testing machine and the force required to deform the piece 10 percent in thickness or until a yield point (which ever occurs first) is recorded. The compressive strength for a particular product is defined as the average of at least five test results. Polyiso products are commonly available in the range of 16-25 psi (110-172 kPa).

The published values are nominal or typical values due to the variation of manufacturing processes. Most samples should be within 10 percent of the nominal value. Individual companies should be consulted for specific variations. Manufacturers test production materials to ensure continuing quality and determine values for published specifications.

## Importance of Compressive Strength

Common construction applications of polyiso insulation require compressive strengths adequate for durability during installation and use.

Wall application requires the product to support flexible siding materials. In roofing, it must withstand limited installation traffic, support fastener loads, and sustain the total roofing system. The results of the tests provide information about the behavior of polyiso insulation under compressive loads and are important to ensure proper performance.

## Using Compressive Strength Values

The specific compression strength values needed must be determined by the architect, engineer, or designer of a building. The compressive strength value can be used to compare different products or between brands of the same type of product. Polyiso insulation boards are available in a range of compressive strengths. Material specifications for Polyiso Insulations (ASTM C 1289 in United States and CAN/ULC-S704 in Canada), indicate that all polyiso products should have a minimum stated compressive strength of 16 psi (110 kPa). Actual compressive strength may vary above the minimum depending on the manufacturer.

### 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)**



#### PIMA

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