

Study Highlights Dramatic Installed Cost Advantage of Polyiso Roof Insulation in San Francisco

Savings Between \$51,000 and \$101,000 Compared to Extruded and Expanded Roof Insulation Products

PIMA First Cost Study: San Francisco

Polyiso insulation presents many superior features that designers need when specifying insulation for use in roof systems:

- Quality MarkSM certified LTR-values
- Highest thermal performance available
- Excellent fire test performance
- Dimensional stability
- Superior compressive strength
- Moisture resistance
- Extensive building code approvals
- Zero ozone depletion potential
- Negligible global warming potential
- Cost effective
- Preferred insurance ratings
- Recycled content
- Compatible with most roofing systems

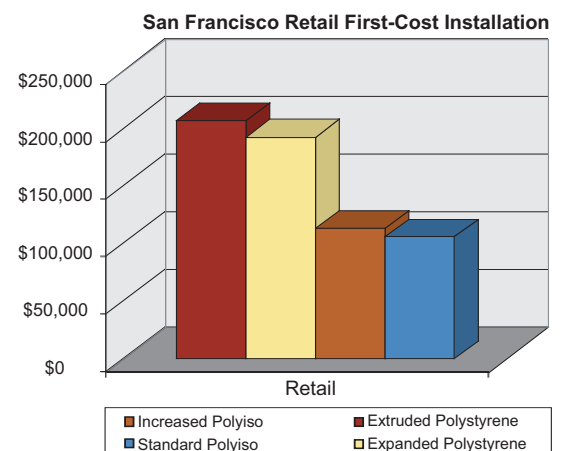
PIMA and polyiso products have received many environmental awards. These include an honorable mention in the Sustainable Buildings Industry Council's (SBIC) 2003 "Best Practice" Sustainability Awards Program and the U.S. EPA's Climate Protection Award for the association's leadership in promoting energy 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."



A study by the Energy Service Provider Group (ESPG) analyzing the cost to insulate the roofs of standard retail and elementary school buildings in San Francisco found that **polyiso insulation can save tens of thousands of dollars in installed costs** when compared to other roof insulation materials. The study additionally illustrates that a roof system using additional polyiso, **exceeding the standard ASHRAE R-value requirements, is still more affordable to install** than minimum levels of extruded and expanded polystyrene insulation products, while offering increased energy efficiency.

The San Francisco Retail Building Study with Minimum R-values Showed Cost Savings of:

- **\$101,011** when polyiso is used instead of extruded polystyrene
- **\$86,407** when polyiso is used instead of expanded polystyrene

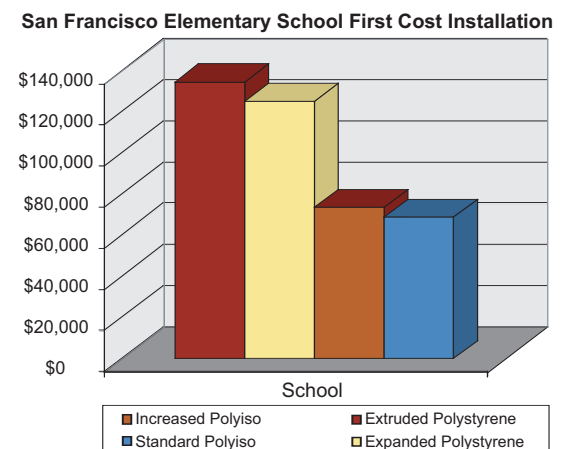


The San Francisco Retail Building Study with Increased Polyiso Showed Cost Savings of:

- **\$93,709** when higher levels of polyiso are used instead of standard levels of extruded polystyrene
- **\$79,105** when higher levels of polyiso are used instead of standard levels of expanded polystyrene

The San Francisco Elementary School Study Showed Cost Savings of:

- **\$65,657** when polyiso is used instead of extruded polystyrene
- **\$56,165** when polyiso is used instead of expanded polystyrene



This study illustrates how polyiso insulation can save tens of thousands of dollars in installed costs.

The San Francisco Elementary School Study with Increased Polyiso Showed Cost Savings of:

- **\$60,911** when increased levels of polyiso are used instead of minimum levels of extruded polystyrene
- **\$51,418** when increased levels of polyiso are used instead of minimum levels of expanded polystyrene

The Study

The Energy Services Provider Group (ESPG) in Baltimore, Maryland conducted energy simulations in six different U.S. cities to determine the comparable economic effects associated with replacing expanded and extruded polystyrene roof insulation with polyiso roof insulation.

A computer model compared the costs of insulating typical elementary schools and retail strip malls in six U.S. cities: Atlanta, Boston, Chicago, Dallas, Denver, and San Francisco. The study examined the costs of installing polyiso, extruded polystyrene, and expanded polystyrene to meet minimum ASHRAE 90.1 compliance standards. (The ASHRAE 90.1 R-value standard for Atlanta, Boston, Chicago, Dallas, and Denver is 15. The minimum R-value for San Francisco is 10.) The research also compared the cost to install an extra inch of polyiso – for an increased R-value – to the cost to install the minimum R-value of extruded and expanded polystyrene.

The study defined the retail building as a single story, strip shopping mall structure of 100,000 square feet with 30% glazing and a two to five length/width ratio. During occupied periods the structure was cooled to 78 °F (summer), 72 °F (winter) and 90 °F (summer), 55 °F (winter) during unoccupied periods. Lighting, including display lighting, was set to 1.9 watts per square foot, per ASHRAE 90.1 standards for retail spaces. The analysis contains two distinct comparisons, which are as follows:

1. Comparison of the minimum thicknesses of polyisocyanurate and extruded and expanded polystyrene insulation complying with the ASHRAE 90.1 standard (R-15 continuous insulation above the roof decking in Atlanta, Boston, Chicago, Dallas, and Denver. R-10 for San Francisco.)
2. Increased Polyisocyanurate insulation thickness (1" increase over the minimum required) compared to the minimum extruded and expanded polystyrene insulation.

For both comparisons, a 1/2" layer of gypsum board was added to the roof structure beneath the polystyrene products in order to attain FM-4450 compliance.

The study defined the typical elementary school as a single story 65,000 square foot structure with 30% glazing and a two to five length/width ratio. During occupied periods the structure was cooled to 75 °F (summer), 72 °F (winter) and 90 °F (summer), 60 °F (winter) during unoccupied periods. The analysis contains two distinct comparisons, which are as follows:

1. Comparison of the minimum thicknesses of polyisocyanurate and extruded and expanded polystyrene insulation complying with the ASHRAE 90.1 standard (R-15 continuous insulation above the roof decking in Atlanta, Boston, Chicago, Dallas, and Denver. R-10 for San Francisco.)

2. Increased polyisocyanurate insulation thickness (1" increase over the minimum required) compared to the minimum extruded and expanded polystyrene insulation.

For both comparisons, a 1/2" layer of gypsum board has been added to the roof structure beneath the polystyrene product in order to attain FM-4450 compliance.

This study illustrates why polyiso remains the leading insulation product on the market and the preferred choice for specifiers, architects and contractors.

PIMA

The Polyisocyanurate Insulation Manufacturers Association (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 is the North American trade association that advances the use of polyisocyanurate (polyiso) insulation. Polyiso is one of the nation's most widely used and cost-effective insulation products available.

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.

For more information visit www.polyiso.org



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