

Roofing Regulations in Canada: Class 1 and Class A Roof Assemblies are Not the Same

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."



Building owners, specifiers, roof contractors and designers have many factors to consider when selecting a roof system: climate, building location and size, single ply or built-up or modified bitumen, mechanically attached or fully adhered, cap sheets or not, expected roof lifetime, and desired warranties. While the list can go on and on, there is one important factor that cannot be ignored – **the fire performance of the roof system.**

An often confusing issue is whether a "Class 1 roof" is the same as a "Class A roof". The distinction between these types of roof classifications becomes even more critical when the roof system contains foam plastic insulation, such as polyiso. One of the most important aspects to remember is this: not all Class A roof systems meet Class 1. For example, while roof assemblies containing polystyrene insulation can meet Class A, there are no roof assemblies with polystyrene insulation applied direct to a steel deck that qualify as a Class 1.

What is "Class A"?

Class A, B or C is a measure of the external spread of flame on a roof surface. A number of fire test laboratories including Underwriters Laboratories Canada (ULC), FM Global (FM) and Underwriters Laboratories Inc. (UL), conduct the same test using CAN/ULC S107M, ASTM E 108, or UL 790. The best rating achieved is Class A, which may be described as effective against severe fire exposure.

What is "Class 1"?

The designation of "Class 1" can be granted only by FM and reflects the successful testing of the **whole** roof assembly using FM 4470. According to the scope of FM 4470, "the fire performance of a roof cover depends in part upon the substrate materials to which it is applied, it is therefore necessary to evaluate the roof assembly as a whole, including the cover and auxiliary items necessary to build-up a roof assembly." The FM 4470 standard is comprehensive and is actually a series of tests that include "fire from above and below the structural deck, simulated wind uplift, corrosion of metal parts, susceptibility from hail storm damage and leakage." 1 A Class 1 rating, then, includes a test for external spread of flame as described by the Class A rating and all the other performance tests.

A Class A roof is not the same as a Class 1 roof!

A Class A roof is the result of one test, the external spread of flame test. An FM Class 1 roof has been tested for a series of tests including the external spread of flame described under the Class A rating, and flame spread on

the underside of the roof deck, plus wind, hail, corrosion and leakage. The test standard to achieve a Class 1 rating is much more comprehensive than the standard used to gain a Class A rating.

What does this have to do with polyiso roof insulation?

Class 1 roof assemblies that contain polyiso roof insulation have been approved by FM because the entire assembly has met the performance criteria of the FM 4470 Standard. This means that substitution of *any component* (such as polyiso insulation) of this Class 1 assembly may cause an adverse fire or wind performance.

Are substitutions of components of a Class 1 roof assembly possible?

In the case of a Class 1 roof, substitution of any component, such as insulation type and thickness, in tested roof assemblies may be granted only by FM. Testing of the proposed substitution in the roof assembly may be required. In the case of Class A roof assemblies, failure to gain approval for the substitution from ULC, FM or UL may impact insurance coverage, as well as violate local building codes.

Is there a list of Class 1 roofs?

Class 1 roof assemblies may be found in the *FM Approval Guide* or the web-based FM RoofNav search tool. Since FM tests specific roof assemblies, there are literally thousands of approved roof systems.

Are there specific building code requirements for roof assemblies containing foam plastic insulation?

Yes. According to building codes, roof assemblies incorporating foam plastic insulation installed on a steel deck must contain a thermal barrier, typically ½" gypsum board or equivalent, between the deck and the foam plastic insulation. The thermal barrier may be eliminated if the *complete roof assembly* passes CAN/ULC S126, FM 4450 Calorimeter or UL 1256. All of these tests measure the performance of the roof assembly to an internal fire.

Is the FM 4450 Calorimeter a part of the FM Class 1 series of tests?

The test for determining a Class 1 roof assembly, FM 4470, includes the FM 4450 Calorimeter when the roof assembly contains foam insulation and a steel deck.

If one roof assembly containing a certain type of foam insulation passes CAN/ULC S126, FM 4450 or UL 1256, can the thermal barrier be eliminated in all other roof assemblies containing that particular type of foam insulation?

No. These tests are specific to the roof assembly, i.e., passing any of these tests without a thermal barrier in a given assembly does not mean the thermal barrier may be eliminated in all roof assemblies. Specific roof assemblies that have passed FM 4450 may be found in the *FM Approval Guide* or the web-based *FM RoofNav* roof assembly search tool. Roof assemblies that have met the criteria for CAN/ULC S126 are found in the Building Material and Equipment Directories. Those that have passed UL 1256 may be found in the *UL Roofing Materials & Systems Directory*.

Do substitutions of any of the components in roof assemblies that pass CAN/ULC S126, UL 1256 or FM 4450 require approval?

Yes. Failure to gain approval for the substitution may cause violation of local building codes, as well as impact insurance coverage or rates for the building.

Are there any Class 1 roof assemblies with foam insulation that meet building code requirements for direct-to-deck application?

Polyiso roof insulation is the only foam plastic roof insulation board product that meets the strict FM 4450, CAN/ULC S126, and UL 1256 standards without the use of an additional thermal barrier layer between the insulation and the supporting steel roof deck. Currently, all FM Class 1 Approvals using polystyrene roof insulation on a steel deck require a thermal barrier under the foam.

For More Information

Class 1 and Class A roof assemblies are not the same. For more information, please visit the PIMA web site, www.pima.org, or contact a polyiso insulation manufacturer.

Glossary

ASTM E108 *Standard Test Methods for Fire Tests of Roof Coverings*

CAN/ULC S107 *Standard Methods of Fire Tests of Roof Coverings*

CAN/ULC S126M *Standard Method of Test for Fire Spread Under Roof-Deck Assemblies*

FM – Factory Mutual Global; www.fmglobal.com

FM 4450 *Approval Standard for Class 1 Insulated Steel Deck Roofs*

FM 4470 *Approval Standard for Class 1 Roof Covers*

UL – Underwriters Laboratories Inc.; www.ul.co

UL 1256 *Fire Test of Roof Deck Constructions*

UL 790 *Standard Test Methods for Fire Tests of Roof Coverings*

ULC – Underwriters' Laboratories of Canada; www.ulc.ca

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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