When selecting roof assemblies containing foam plastic insulation, such as polyiso or polystyrene, roofing specifiers, roofing contractors, and consultants should confirm that all applicable specifications, building code, and insurance requirements of the job are met. It is important to note that substitution of other types of foam plastic for polyiso insulation in tested roof assemblies may result in violation of building codes and/or required insurance ratings.

**Understand the differences between a Class 1 and a Class A roof assembly containing foam plastic:**

- **A Class A rating is only for external fire performance** and is governed by compliance to either the UL 790 standard or ASTM E 108 standard. A Class A rating does not ensure building code compliance.

- **FM Class 1 requires that a roof deck assembly is subjected to a series of tests** – internal fire, external fire, wind uplift resistance, foot traffic, corrosion resistance, impact resistance, and susceptibility to heat damage – as described in FM 4470 Approval Standard for Class 1 Roof Covers. A roof assembly must pass all these tests in order to gain a Class 1 designation. For insulated steel roof deck assemblies, FM Class 1 includes FM 4470 and FM 4450 Approval Standard for Class 1 Insulated Steel Decks Roofs.

- **While a Class 1 assembly can be substituted for a Class A, B or C roof assembly, a Class A, B or C assembly cannot be substituted for a Class 1 roof assembly.**

- **Remember that in all cases, the roof assembly must be installed as tested.** Substitution of any component, such as insulation type and thickness, in tested roof assemblies can only be granted by FM or UL and may require additional testing. Failure to gain approval for the component substitution from FM or UL may impact insurance coverage and could result in violation of local building codes.

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**Polyiso Roof Insulation An Environmental Winner**

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

- Quality Mark™ Certified LTRR-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 system

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.”
Fire Testing of Roof Assemblies

There are two important fire assessments regarding steel deck roof assemblies: external spread of flame on the roof covering surface and below roof deck spread of flame.

External Spread of Flame

The exterior spread of flame fire test on a complete roof assembly is determined using either ASTM E 108 or UL 790. The result of this fire test is expressed as Class A, B, or C, with Class A described as “effective against severe fire exposure.”

ASTM E 108 and UL 790 include three test procedures: Spread of Flame, Intermittent Flame, and the Burning Brand. During all fire tests, there can be no flaming or glowing wood particles falling off the underside of the test deck; the roof deck cannot become exposed; and portions of the deck must not fall or break away in the form of glowing particles.

The spread of flame portion is the only test conducted on roof assemblies with non-combustible (concrete, steel, or gypsum) decks. Test conditions and pass criteria are shown in Table 1.

For roof assemblies with combustible decks (wood, plank, T&G), ASTM E 108 and UL 790 require two additional fire tests: 1) an intermittent flame test, in which the flame is turned on and off during the duration of the test, and 2) the “burning brand test,” which measures the ability of the roof assembly to resist fire from flaming embers.

Below Roof Deck Spread of Flame

FM 4450 and UL 1256 are used to judge the contribution of the roof assembly components to the spread of fire within a building. An examination of the scope of each test method shows that FM 4450 is a much more stringent and extensive test than UL 1256. See Table 2.

<table>
<thead>
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<th>Table 2: Comparison of FM 4450 and UL 1256</th>
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<td><strong>Roof Assembly Test</strong></td>
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**Elimination of Thermal Barrier**

According to building codes, roof assemblies incorporating foam plastic insulation installed on a steel deck must include a thermal barrier, typically 1/2 inch gypsum board or equivalent, between the deck and the foam plastic insulation. The thermal barrier may be eliminated if the complete roof assembly passes either FM 4450 or UL 1256. Note that although both FM

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4450 and UL 1256 are conducted on a specific roof assembly, passing either test without a thermal barrier in one tested roof 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. Those that have passed UL 1256 may be found in the UL Roofing Materials & Systems Directory.

For More Information
Class 1 and Class A roof assemblies are not the same. For additional details, please see the PIMA Web site (www.pima.org) or contact a polyiso insulation manufacturer.

Glossary
FM – Factory Mutual Global; www.fmglobal.com
FM 4450 Approval Standard for Class 1 Insulated Steel Decks Roofs
FM 4470 Approval Standard for Class 1 Roof Covers
UL – Underwriters Laboratories Inc.; www.ul.com
UL 1256 Fire Test of Roof Deck Constructions