

# DID YOU KNOW?

## COMMONLY ASKED QUESTIONS ABOUT CLASS 1 AND CLASS A ROOF ASSEMBLIES

### **Class 1 and Class A Roof Assemblies Are Not the Same**

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. The list can go on and on, however, 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, polystyrene or polyurethane. Note, 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 direct-to-deck polystyrene insulation 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 (UL) and FM Global (FM), conduct this test using either the ASTM E 108 or UL 790 Standard. The best rating achieved is Class A, which is described by UL as “effective against severe fire exposure.”<sup>1</sup>

#### **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, “because 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.”<sup>2</sup> A Class 1 rating, then, contains 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. A 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,

<sup>1</sup> Sloan, D. E. (2005, May). The UL story: part 1. *Professional Roofing*. Retrieved on July 25, 2005, from the World Wide Web: ([http://www.professionalroofing.net/article.aspx?A\\_ID=641](http://www.professionalroofing.net/article.aspx?A_ID=641))

<sup>2</sup> FM 4470 Approval Standard for Class 1 Roof Covers

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. Another way to put it is that all Class 1 roof assemblies are Class A roofs, but not all Class A roof systems meet Class 1.

### ***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. Failure to gain approval for the substitution from FM or UL may impact insurance coverage, as well as cause violation of 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 thousand 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  $\frac{1}{2}$ " 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. Both FM 4450 and UL 1256 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 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 FM 4450 or UL 1256, can the thermal barrier be eliminated in all other roof assemblies containing that particular type of foam insulation?***

No. Both tests are specific to the roof assembly, i.e., passing either test 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. 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 UL 1256 or FM 4450 require approval?***

Yes. Failure to gain approval for the substitution from FM or UL may cause violation of local building codes, as well as possibly 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 standards of both FM Approvals Class 1 and UL 1256 without the use of an additional thermal barrier layer between the insulation and the supporting steel roof deck. Currently, all FM 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 additional details, please see Technical Bulletin 111 at the PIMA Web site ([www.pima.org](http://www.pima.org)) or contact the polyiso insulation manufacturer.

### **Glossary**

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

FM – Factory Mutual Global; [www.fmglobal.com](http://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](http://www.ul.com)

UL 1256 *Fire Test of Roof Deck Constructions*

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

PIMA is the national trade organization that advances the use of polyiso insulation, one of the nation's most widely used and cost-effective insulation products. PIMA's membership consists of manufacturers and marketers of polyiso insulation, as well as suppliers to the industry.



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