THERMAL BARRIERS FOR THE

SPRAY POLYURETHANE FOAM INDUSTRY

Spray Polyurethane Foam Alliance

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MISSION STATEMENT

The mission of the Technical Committee is to provide a wide range of technical service to the Spray Polyurethane Foam Industry such as, but not limited to:

1. Review existing documents and serve as a clearing house to endure the "Continuity of Value of technical information published by SPFA and others concerning the products and services to the SPF industry;

2. Review, research, develop and issue documents concerning new products, systems and services and;

3. To identify, explore, develop and communicate an understanding of technical issues facing the SPF industry.

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POLICY STATEMENT

It is the policy and recommendation of the Spray Polyurethane Foam Alliance that all interior applied spray polyurethane foams receive a thermal barrier as soon as possible after the initial application, except when specifically approved by a building code authority based on fire tests specific to the application.

What Is A Thermal Barrier?

A thermal barrier is a material, applied between spray polyurethane foam (SPF) and interior spaces designed to slow the temperature rise of the SPF during a fire situation, and to delay the SPF's involvement in a fire. A building code definition of an approved thermal barrier is one which is equal in fire resistance to 12.7 mm (1/2 inch) gypsum board. Such thermal barriers limit the temperature rise of the underlying SPF to not more than 121^{o}C (250^{o}F) after 15 minutes of fire exposure complying with the standard time temperature curve of ASTM E 119 (Test Methods for Fire Tests of Building Construction Materials). Thermal barriers meeting this criterion are termed a “15-minute thermal barrier or classified as having an “index of 15.

Under specific conditions, the ASTM E 119 fifteen-minute requirement can be waived if approved by building code authorities on the basis of full scale, diversified fire testing representing actual end uses. Many materials which are not “15-minute thermal barriers per ASTM E 119 have earned various building code acceptances for use as thermal barriers over SPF based on diversified fire testing. Such test methods include:

UL 1715 Fire Test of Interior Finish Material

UL 1040 Insulated Wall Construction

FM 4880 Building Corner Fire Test

UBC 26-3 Room Fire Test Standard for Interior of Foam Plastic Systems

What is an Ignition Barrier?

Model building codes allow an exception to the thermal barrier requirement in attics and crawlspaces where entry is made only for the service of utilities. SPF in these spaces must be "protected against ignition by 38 mm (1.5 inch) mineral fiber insulation; 6.4 mm (0.25 inch) wood structural panel, particle board, or hardboard; 9.5 mm (0.375 inch) gypsum wallboard; corrosion resistant steel have a base metal thickness of 0.4 mm (0.016 inch); or other approved material installed in such a manner that the foam plastic insulation is not exposed. [2003 IBC, Section 2603.4.1.6]

Such materials are commonly called "ignition barriers. Ignition barriers do not afford as high a degree of protection from fire as thermal barriers but are considered acceptable for attic and crawlspaces where entry is limited. Building code authorities may accept alternative ignition barrier materials based on full scale, diversified tests such as SwRI® Test Procedure 99-02 Crawl Space Fire Test.

Where Is A Thermal Barrier Needed?

All model building codes require a building code approved thermal barrier on the habitable side of a structure between the interior of the structure and the polyurethane foam. SPF should not be applied to the interior of a building without an approved thermal barrier as defined by the applicable building code. A thermal barrier is not normally required for SPF applied on the exterior of the structure (i.e., roof insulation).

Building codes may exclude the installation of a thermal barrier over certain applications of SPF. Review the specific code requirements on a case-by-case basis.

Why Do Codes Require Thermal Barriers?

SPF, like most other organic materials, is combustible. SPFs are formulated with flame retardants to decrease the flame spread as measured by ASTM E 84 (Standard Test Method for Surface Burning Characteristics of Building Materials) and other tests. However, these flame spread indexes are used solely to measure and describe properties of products in response to heat and flame under controlled laboratory conditions. The numerical flame spread indexes are not intended to reflect hazards presented by SPFs or any other material under actual fire conditions.

When exposed to fire sources, such as trash fires, welding arcs, cutting torches, or red-hot metal, unprotected SPF in interior situations may ignite resulting in a flash fire. The burning will be brief, forming a layer of less flammable surface char. This initial burning produces combustible gases and black smoke. In confined interiors, combustible gases can accumulate and ignite resulting in flashover, a dangerous fire situation. Under these conditions, additional foam or other combustibles can become involved in the fire giving off additional combustible gases and feeding the fire. If the heat and gases are not dissipated and the temperature of the SPF rises above approximately 379^{o}C (700^{o}F), the surface char will no longer be able to protect the SPF and the SPF will fuel the fire as it degrades under these extreme temperatures. Most SPF fires will involve other flammable materials, however, in a limited number of situations, when other flammable materials are not involved, SPF fires tend to be flash fires of relatively short duration.

Codes require thermal barriers for interiors to reduce the risk of a flash fire and to extend the time at which the foam would reach its auto ignition temperature should a fire originate from other sources.

(**Note:** These fire scenarios depend on the accumulation of combustible gases. Exterior applications of SPF, such as roof systems, where combustible gases can dissipate, are less likely to become involved in flash fires and are treated differently under the building codes.)

Selection of Thermal Barriers

Many types of thermal barriers are available on the market today including but not limited to:

1. Gypsum wallboard
2. Spray applied cementitious materials
3. Spray applied cellulose materials
4. Portland cement plaster
5. Various proprietary materials

The thermal barrier should have a currently valid building code evaluation report that lists a report number and effective dates. In some cases, a local building code official will allow the use of a thermal barrier which has been tested to the satisfaction of the official but is not yet evaluated by a code evaluation service.

Generally accepted diversified fire tests for building assemblies include:

* UL 1715 Fire Test of Interior Finish Material
* UL 1040 Insulated Wall Construction
* FM 4880 Building Corner Fire Test
* U.B.C. Standard 26-3 Room Fire Test Standard for Interior of Foam Plastic Systems.

Caution: Just because a material is advertised as a “thermal barrier or and “ignition barrier does not mean that it has been approved by a code agency or a local code official. Ask for test data and code body approvals, listings, or other written indications of acceptability under the code to be sure that the product selected offers the fire protection that the code demands.

This brochure was developed to aid specifiers in choosing a thermal barrier over spray-applied polyurethane foam systems. The information provided herein, based on current customs and practices of the trade, is offered in good faith and believed to be true, but is made WITHOUT WARRANTY, EITHER EXPRESS OR IMPLIED, AS TO FITNESS, MERCHANTABILITY, OR ANY OTHER MATTER, SPI DISCLAIMS ALL LIABILITY FOR ANY LOSS OR DAMAGE ARISING OUT OF ITS USE. Individual manufacturers and contractors should be consulted for specific information. SPI does not endorse the proprietary products or processes of any individual manufacturer, or the services of any individual contractor.

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