SPRAY POLYURETHANE FOAM ALLIANCE

SPFA-143

Primers for Spray Polyurethane Foam Insulation and Roofing Systems

Spray Polyurethane Foam Alliance
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ABOUT SPRAY POLYURETHANE FOAM ALLIANCE (SPFA)

Founded in 1987, the Spray Polyurethane Foam Alliance (SPFA) is the voice, and educational and technical resource, for the spray polyurethane foam industry. A 501(c)6 trade association, the alliance is composed of contractors, manufacturers, and distributors of polyurethane foam, related equipment, and protective coatings; and who provide inspections, surface preparations, and other services. The organization supports the best practices and the growth of the industry through a number of core initiatives, which include educational programs and events, the SPFA Professional Installer Certification Program, technical literature and guidelines, legislative advocacy, research, and networking opportunities. For more information, please use the contact information and links provided in this document.

DISCLAIMER

This document was developed to aid building construction and design professionals in choosing 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 to the best of SPFA's knowledge and belief.

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DOCUMENT HISTORY

Date	Sections Modified	Description of Changes
August 2015	All	Administrative changes
January 2021	Front Cover and Header	New SPFA Logo

TECHNICAL OVERSIGHT COMMITTEE

Mission Statement

The mission of the Technical Committee is to provide a wide range of technical service to the SPF (spray polyurethane foam) industry such as, but not limited to:

(1) Review existing documents and serve as a clearing house to ensure 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 to the SPF industry.

Participating Members	
Roger Morrison, Chairman North Carolina Foam Industries	Bruce Schenke BASF
Mary Bogdan Honeywell	Irene Schwechler Gaco Western, Inc.
Bob Braun Dow Chemical	Chuck Skalski Gaco Western, Inc.
John Courier Equipment & Coatings Technology	Larry Smiley Poly-Tek.
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Tim Leonard ERSystems	Jay Zhang Convenience Products
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Primers are an initial layer of coating or paint applied to a surface to improve the adhesion of subsequently applied materials or to inhibit corrosion or degradation. The specifier and applicator must know why, when, and how to use a primer.

WHY DO WE USE PRIMERS?

In many cases, a primer is not used in SPF (spray polyurethane foam) and coating system applications because of confusion regarding what primer to use where.

Proper priming procedures can:

- Greatly enhance adhesion between a substrate and SPF or coating.
- Enhance adhesion between layers of SPF or coating.
- Enhance adhesion to aged SPF and coatings.
- Help seal porous substrates.
- Darken a substrate to increase solar gain to increase the performance of the SPF or coatings.
- Inhibit corrosion of metal substrates.
- Darken substrates to reduce residual moisture.
- Darken substrates to allow application in less than optimum ambient temperatures.

WHERE AND WHEN TO USE PRIMERS

It is easier to discuss the application of primers by the purpose and type of substrate. It is also very important to consider what material is to be applied over the primer, the cure time of the primer, weather conditions, the method of application, and cost. It may be necessary to test the primer over the substrate, either in the field or in a lab, to confirm performance.

METAL SURFACES

Primers are nearly always required for metal surfaces. Proper surface preparation of metal is very important, and descriptions of these procedures can be found in the resources listed below. Ferrous metal, such as mild steel, can rust or corrode. Without priming, the application of polyurethane foam can accelerate this corrosion in the presence of moisture. Ferrous metal surfaces usually require grit blasting, application of a primer, and/or a corrosion control coating system before the application of SPF. Primers for ferrous metals are often epoxy coatings with rust inhibitors.

Some metals, such as stainless steel, aluminum, galvanized metal, copper, and others, can have slick surfaces that reduce the adhesion of many coatings and SPF. These non-ferrous types of metal surfaces require an etching primer or other primer formulated to enhance adhesion. Vinyl wash primers are common for this type of substrate and are applied thinly at 1/2 to 1 dry mil.

Metal surfaces are common substrates in all roofing and insulation markets. These include tanks, metal flashings, metal roofing systems, metal framing and studs, and piping.

EXISTING ROOF SYSTEMS

The majority of SPF roofing systems are applied over existing roofs. Since existing roofs vary in type, substrate preparation varies as well. Asphalt built-up roofs, for example, typically do not require a primer to gain sufficient adhesion of SPF. Primers used over built-up and modified bitumen systems will bind residual loose dirt and debris and enhance adhesion of the polyurethane foam. Primers used over these roofing substrates are typically acrylic, polyurethanes, neoprene, and epoxy. Single component primers are preferred due to the ease of application. These primers are usually black to aid in increasing the surface temperature to improve the yield and performance of the SPF.

Clay, shingles, concrete tile, and transite can also be primed to enhance adhesion and darken these substrates.

Single-ply roofs are trickier. Primers have been used effectively to promote good adhesion of SPF and coating systems to most single-ply membranes. These roofing systems are comprised of rubbers and other flexible polymers. Each membrane is different and requires a specific primer. The primer or SPF manufacturer may want to test the primer onsite or with a piece of the membrane.

POROUS SUBSTRATES

The presence of moisture negatively impacts the application of SPF and coating systems on any surface. Porous substrates are especially vulnerable to surface moisture retention. Polyurethane foam, or coatings sprayed over wood or masonry, may require a primer designed to minimize the transfer of substrate moisture to the SPF or coating as it is applied. Surface moisture will cause poor adhesion due to inferior physical properties at the interface between the substrate and the material being applied. The primer also seals the porous surface to minimize any problems due to entrapped air or moisture. Primers can be used over other porous substrate materials, such as board stock, gypsum board, and Dens-deck®.

When deteriorated SPF systems are renewed, the coating and top polyurethane foam surface are often removed or scarified. This process leaves an SPF surface of open cellularity. Scarified SPF surfaces should be primed with an appropriate black primer.

AGED OR DEGRADED POLYURETHANE FOAM OR COATINGS

Normally, SPF is sprayed to full thickness and base-coated the same day of application to protect from sunlight (UV degradation). If circumstances, such as weather, preclude this practice, special surface preparation techniques or primers may be required to promote satisfactory adhesion between new and old SPF or between coatings and SPF. If such surfaces are not primed and properly prepared, blistering and delamination can result. This is also an excellent procedure for day-to-day tie-ins.

Polyurethane elastomers and other coatings have a “window” or period after their initial application in which a good bond between coats will form. After this period of time, interlaminar

adhesion between coats will be fair to poor. A suitable primer should be used to ensure that delamination is prevented between coats.

Advantages of Using Dark Colored Primers

When applying SPF and coating systems outdoors on a sunny but cool day, many contractors use primers to increase their window of time for the application. A dark colored primer can raise the substrate temperature 20–40 °F. The darker surface of the cured primer can also increase the yield and performance of the SPF. The darker colored primers applied over porous substrate help to dry the substrate. Darker primed surfaces can also dry faster after a rain or dew, especially in cooler weather. Conversely, in extremely hot weather, reflective primers can create a cooler surface.

How you apply primers makes a big difference in the success of your project. SPF applicators are accustomed to spraying protective coatings at a rate of 1–2 gallons per square for a 10–15 mil dry film thickness. Primers used to enhance adhesion or to darken surfaces are usually applied in much thinner films. These primers are typically applied at 1/4 to 3/4 gallons per square to form a 0.5–5 mil dry film thickness. Continuous coverage is not always required. Heavier applications can cause the primer to cure more slowly, which can cause blistering problems when the polyurethane foam or coating is applied over the uncured primer. Most primers will cure in 2-4 hours at 75°F.

Primers used for corrosion protection require very precise application techniques with no holidays.

The best way to apply primer effectively is to use the right equipment. Primers are generally thinner and less viscous than most coatings used over SPF. A smaller pump, and definitely a smaller spray tip, should be used. Some primers have a limited time window for application of subsequent SPF or coatings. If subsequent SPF or coatings are applied too soon, the primer does not cure properly. If the time window is too long, chemical adhesion will suffer, causing delamination problems.

Adhesion and Bond Strength Test Methods

- ASTM C 794
- ASTM D 429
- ASTM D 1623
- ASTM D 4541 Elcometer

Other Sources of Information

So how do you know what to use and how? Your first source of information comes from the material manufacturer. The manufacturer should have a list of acceptable primers to go with the type of application and substrate, and instructions about how to use them.

Other sources of information include the following:

(1) Spray Polyurethane Foam Alliance
3927 Old Lee Highway, Suite 101B
Fairfax, VA 22030
Tel 800-523-6154
www.sprayfoam.org

(2) The Society for Protective Coatings (SSPC)
40 24th Street 6th Floor
Pittsburgh, PA 15222-4656
Tel 877-281-7772
Fax 412-281-9992
www.sspc.org

(3) National Association of Corrosion Engineers (NACE)
P.O. Box 201009
Houston, TX 77216-1009
Tel 281-228-6200
Fax 281-228-6300
www.nace.org

(4) ASTM
100 Barr Harbor Drive
PO Box C700
West Conshohocken, PA 19428-2959
Tel 610-832-9677
www.astm.org