



SPFA-139

Repair of Spray Polyurethane Roof Systems Due to Hail and Wind-Driven Damage

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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	Cover and Header	New SPFA Logo

ROOFING COMMITTEE

Mission Statement

The mission of the Roofing 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 roofing system products and services to the SPF industry;
- (2) Review, research, develop, and issue documents concerning new products, systems and services for SPF roofing applications; and

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

Participating Members	
Roger Morrison, Chairman North Carolina Foam Industries	Bruce Schenke BASF
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OBJECTIVE

Research has indicated that the damage caused by wind-driven missiles typically does not cause an SPF (spray polyurethane foam) roof to leak. This damage can usually be repaired economically and does not require the roof to be replaced. This document provides a means both to evaluate information collected from the investigation of an SPF roof system after damage has occurred and to make recommendations for the rehabilitation and repair of the damaged areas.

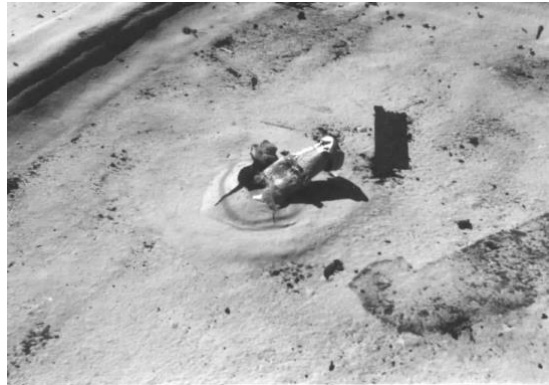
Ascertain the degree of the damage through a detailed on-site inspection (visual assessment, physical analysis, drawings, reports) and determine which category of damage has occurred.

CAUSE OF DAMAGE

This section describes the typical causes of damage and detailed descriptions of types of damage.

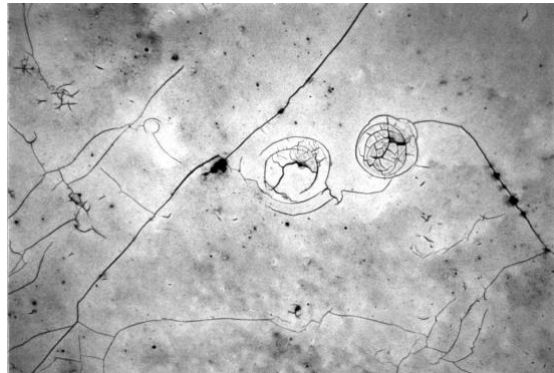
(1) Mechanical damage due to wind driven missiles

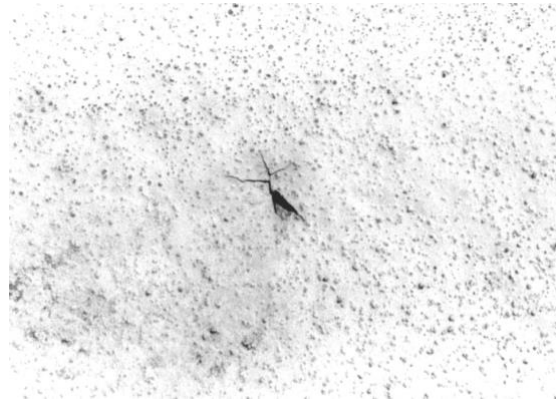
During high-wind events, a wide variety of objects can potentially impact a roof and produce damage to the protective coating and SPF. This damage may be isolated to small areas of the roof or cover large areas. Substrate and structural damage may or may not have occurred and should be thoroughly investigated. The type of repairs required will depend on the size and severity of the damage, and should be consistent with SPFA Guideline SPFA-122, "The Renewal of Spray Polyurethane Foam and Coating Roof Systems."



(2) Hail

Hail can damage both the surface coating and the underlying foam in an SPF roof system.





Coating damage can appear as gouges, cracks, and punctures. Hail-induced coating cracks often form patterns shaped like “crow’s feet” or semicircles.

Depending on the hailstone size, shape, and hardness, the underlying foam may be dented, cracked, or gouged. Depressions in SPF dented by hailstones may be 1/8 inch to 3/4 inch deep. Hail damage can be isolated to small areas or can cover the entire roof surface.

The repair technique is determined from the severity (size and depth of damage) and extent (number of hail hits per unit area) of the hail damage. For example, fifteen 3-inch diameter hail dents on a 1,000 square foot roof may be easier to repair than hundreds of 3/4-inch-diameter dents.

Occasionally, hail damage may not be discovered for months or years after a hail event. In these circumstances, the repairs may be more extensive because of UV degradation or moisture intrusion due to breached coatings and damaged foam cell structure.

(3) Foam and coating abrasion

Abrasion occurs when the wind blows sand or debris at a velocity sufficient to erode the protective coating over the SPF. Abraded SPF-coated roofs are repaired by recoating the affected areas and should be consistent with SPFA Guideline SPFA-122.

INSPECTION PROCEDURES

The first step in making an evaluation and repair recommendation for a damaged SPF roof is a thorough inspection. Follow SPFA Guideline SPFA-122, “The Renewal of Spray Polyurethane Foam and Coating Roof Systems.” Wind driven damage may not be readily visible from all directions. Check for the following items:

- Damage causing roof leaks
- Flashing and termination point damage
- Splits and other impact damage
- Abraded coating
- Substrate or structural damage
- Moisture intrusion in the SPF

Determine the severity and extent of hail damage by using a grid method (see Table 1, page 8).

DEGREES OF HAIL OR MISSILE DAMAGE AND REPAIR RECOMMENDATIONS

After information has been obtained from the roof inspection, repair recommendations can be developed specific to the damage sustained, based on Table 1. The degree of damage may vary in different areas of the roof. Repair procedures shall vary accordingly. Consult the manufacturer for specific recommendations before commencing repairs.

Table 1: The following table can help classify the mechanical damage and provide repair recommendations. Damage extent in this chart is categorized as fewer than 10 or more than 20 defects per 100 ft². Recommended repairs for damage extents between 10 and 20 defects per 100 ft² will require judgment based on the manufacturer's recommendations.

Degree of Damage	Size and Severity	Extent per 100 ft ²	Recommended Repair
Light	1/2 inch diameter, or less than 1/8 inch deep	Fewer than 10 cracks, cuts, or dents	Caulk and coat dents, cuts, and cracks. <i>Note: Recoat should be considered based on remaining service life of coating.</i>
		More than 20 cracks, cuts, or dents	Recoat as required to fill in cracks <i>Note: Some caulking may be required to seal deeper cracks.</i>
Moderate	1/2 inch to 3/4 inch diameter, or less than 1/4 inch deep	Fewer than 10 cracks or dents	Coat or caulk cracks
		More than 20 cracks, cuts, or dents	Recoat as required to seal cracks. <i>Note: Some caulking may be required to seal deeper cracks.</i>
Heavy	3/4 inch to 1-1/2 inch diameter, or 1/4 inch to 1/2 inch deep	Fewer than 10 cracks or dents	Remove damaged SPF. Caulk holes and recoat as required.
		More than 20 cracks or dents	Scarify 1/2 inch of roof surface. Refoam and coat.
Severe	1-1/2 inch diameter or larger, or 1/2 inch or deeper	Fewer than 10 crack or dents	Remove damaged SPF. Caulk holes. Recoat as required.
		More than 20 cracks or dents	Scarify 3/4 inch of roof surface. Refoam and coat.

DEGREES OF COATING ABRASION AND REPAIR RECOMMENDATIONS

Wind driven sand, dirt, and other small particles can abrade and scour the coating and SPF systems. The degree of damage will vary in different areas of the roof. Repair procedures will vary accordingly. Different coatings will have different resistance to abrasion and thicker coating layers will provide protection for longer periods of time.

Light and moderate abrasion will remove and roughen the coating surface, exposing small areas of SPF. This type of damage can be repaired by renewing the coating system with additional compatible coating. Consult the coating manufacturer for specific recommendations.

Heavy and severe abrasion will remove much of the coating system, expose the SPF, and possibly erode the SPF as well. This will leave depressions and pits in the surface. Severe abrasion can be repaired by scarifying or removing the damaged foam and coating surface, reapplying SPF, and applying the coating system in the area affected. Repairs for this type of damage can sometimes be made by applying a mixture of fillers and coating to cover the rough SPF and coating surface, followed by a finish coat. Consult the manufacturer for specific recommendations.