



**The Renewal of
Spray Polyurethane Foam and Coating
Roof Systems**

RECOMMENDED
DESIGN CONSIDERATIONS
AND GUIDE SPECIFICATIONS

Spray Polyurethane Foam Alliance

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The Renewal of Spray Polyurethane Foam and Coating Roof Systems

GENERAL CONSIDERATIONS

Sprayed in place polyurethane foam roof systems that have been applied and maintained according to industry standards can be prepared for re-coat and/or renewal.

The performance of a sprayed in place polyurethane foam roof system renewal can be affected by all the component parts of the roof structure, as well as the atmospheric conditions inside and outside the structure.

Structural design, code compliance, specification review, contractor and material selection, should be considered in the renewal of a polyurethane foam roofing system.

The specifier should consult with the contractor to receive written confirmation of their agreement to all facets of the sprayed in place polyurethane foam roof system. This should include, but not be limited to, material selection, expansion joints and flashing details.

ROOF PREPARATION, PROCEDURES AND CONSIDERATIONS

1. Inspection:

The preparation for the renewal of a sprayed in place polyurethane foam roof system will vary according to the condition of the roof and its component parts and the type of protective covering used over the polyurethane foam.

Conduct a roof inspection to determine the repairs to be performed and the type of materials to be used.

2. Visual Inspection:

- A. Look for blisters or delaminated areas in the original roof.
- B. Check the condition of the roofing system at all flashing and termination points.
- C. Look for splits or cracks in the polyurethane foam.
- D. Look for damage from impact such as foot traffic, hail, dropped tools, etc.
- E. Check for pinholes in the polyurethane foam and/or coating.
- F. Check for exposed polyurethane foam and areas of eroded (thin) coating.
- G. Check for areas of ponding water.

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3. Physical Inspection:

- A. Perform a non-destructive moisture survey. Follow-up suspected moisture laden areas with a moisture probe or core samples.
- B. Probe to determine polyurethane foam thickness.
- C. Take slit samples of the existing system as required by the manufacturer.
- D. Take polyurethane foam core samples as required.

4. Analyze Inspection:

- A. Core and slit samples should be examined for the following characteristics:
 - 1) Adhesion of polyurethane foam to the substrate.
 - 2) Inter-laminar adhesion of polyurethane foam.
 - 3) Presence of moisture.
 - 4) Adhesion of base coat to polyurethane foam.
 - 5) Adhesion of top coat to base coat.
 - 6) Type and condition of protective coating.
 - 7) Thickness of protective coating.
- 1. On a roof sketch indicate the following items and deficiencies:
 - 1) Location of core and slit samples.
 - 2) Areas of pinholes.
 - 3) Uncured coating.
 - 4) Polyurethane foam or coating blisters.
 - 5) Mechanical damage.

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- 6) Poor drainage.
- 7) Repairs required for foam stops, parapet walls, gutters, scuppers, edge terminations, expansion joints, counter-flashing, and other perimeter items.
- 8) Repairs required to soil and vent pipes, drains, roof hatches, equipment curbs or supports, guy wires, hot stacks, skylights, mechanical units, walkways, sleepers, pitch-pans and other penetration items.
- 9) Water saturated sub-roofs, insulation, or polyurethane foam.
- 10) Sub-roof damage or deterioration.
- 11) Areas of special consideration.

SELECTION OF A PROTECTIVE COATING

The following must be taken into consideration when choosing a recoating material.

- A. Perm rating required.
- B. Compatibility with the existing roof coating.
- C. Specifier and/or manufacturer's recommendations.
- D. Environmental conditions.
- E. Slope limitations.

SELECTION OF THE POLYURETHANE FOAM SYSTEM

A range of spray polyurethane foam systems are available in various physical properties, exhibiting different temperature limitations, combustibility characteristics. Most published data are run on laboratory samples. The thickness of polyurethane foam sprayed, number of passes, temperature of substrate, ambient temperature, etc. will have an effect on all polyurethane foam properties.

Newly applied spray polyurethane foam must be compatible with the existing system.

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MAINTENANCE PROCEDURES

It is good policy to periodically inspect any roof system for minor damage, on a regular basis. Roofs should be inspected twice a year (Spring and Fall) and any repairs should be made promptly.

CONTACT THE MANUFACTURER/SUPPLIER FOR RECOMMENDED MAINTENANCE PROCEDURES.

RECOMMENDED GUIDE SPECIFICATION FOR THE RENEWAL OF SPRAY POLYURETHANE FOAM AND COATING ROOF SYSTEMS

PART 1—GENERAL

This guideline discusses the renewal of a sprayed-in-place polyurethane foam roof that has been coated. Your contractor, systems manufacturer, and local code agencies can also be of assistance.

1.01 SCOPE OF WORK

Furnish all labor, materials, tools and equipment necessary for the application of a polyurethane foam roofing system, including accessory items, subject to the general provisions of the contract.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-In-Place Concrete	Section 03300
B. Metal Decking	Section 05300
C. Rough Carpentry	Section 06100
D. Insulation	Section 07200
E. Membrane Roofing	Section 07500
F. Flashing and Sheet Metal	Section 07600
G. Roof Specialties and Accessories	Section 07700
H. Skylights	Section 07800
I. Mechanical	Division 15
J. Electrical	Division 16

1.03 QUALITY ASSURANCE

- A. Contractor Qualifications: The proposed contractor should provide information concerning projects similar in nature to the one proposed including location and person to be contacted for references. Some manufacturers of sprayed polyurethane systems and/or protective coatings have approval programs and/or licensing methods that could be required. SPFA has a Contractor Accreditation Program.

- B. Manufacturer Qualifications: Polyurethane foam and protective coating manufacturers shall show evidence of sufficient financial resources and facilities to furnish materials on this project. References shall be required, sufficient project lists, warranties and code approvals shall be submitted for verification.

- C. Inspections: The polyurethane foam and protective coating manufacturers are to provide qualified representatives to monitor and inspect the installation of their products.

RECOMMENDED GUIDE SPECIFICATION FOR THE RENEWAL OF SPRAY POLYURETHANE FOAM AND COATING ROOF SYSTEMS

1.04 SUBMITTALS

- A. Manufacturers to provide published data sheets or letter of certification that their products comply with the materials specified. This is to include primers (if required), polyurethane foam and protective coatings.
- B. Shop drawings on sheet metal, accessories, or other fabricated items.
- C. Manufacturer's application or installation instructions.
- D. Contractor/Applicator certification from polyurethane foam supplier and/or protective coatings manufacturers and evidence of contractor/applicator qualification and experience. SEE SECTION 1.03A
- E. A specimen copy of the applicable warranty for the project. SEE SECTION 1.03B
- F. Approval and information guides for applicable local, or national codes and/or insurance acceptability.
- G. Safety and handling instructions for storage, handling and use of the materials to include appropriate Materials Safety Data Sheets (MSDS).
- H. Field quality control procedure to be utilized by the contractor/applicator to insure proper preparation and installation of polyurethane foam and protective coatings, detail work and follow-up inspection.
- I. Spray Polyurethane Foam Alliance sprayed polyurethane foam surface visual guide.

1.05 MATERIALS, DELIVERY AND STORAGE

- A. Materials shall be delivered in the manufacturer's original, tightly sealed containers or unopened packages, all clearly labeled with the manufacturer's name, product identification, safety information, and batch or lot numbers where appropriate. (Where materials are covered by a referenced specification, the labels shall bear the specification number, type and class, as applicable.)
- B. Containers shall be stored where the temperature and humidity are within the limits specified by the manufacturer.
- C. All materials shall be stored in compliance with local fire and safety requirements.

RECOMMENDED GUIDE SPECIFICATION FOR THE RENEWAL OF SPRAY POLYURETHANE FOAM AND COATING ROOF SYSTEMS

1.06 ENVIRONMENTAL CONDITIONS

- A. The polyurethane foam applications shall not proceed during periods of inclement weather. Do not apply the polyurethane foam below the temperature and/or above humidity specified by the manufacturer for ambient air and substrate.
- B. Do not apply protective coatings when there is ice, frost, surface moisture or visible dampness present on the surface to be coated. Prior to applying the coatings, check the polyurethane foam to insure that the surface is dry. Apply protective coatings in accordance with the coatings manufacturer's application instructions.
- C. Wind barriers may be used if wind conditions could affect the quality of the polyurethane foam or protective coatings installation.

1.07 SEQUENCING AND SCHEDULING

In Recoat and Renewal projects the spray polyurethane foam is installed when repairs to the deck, parapet walls, rough openings, and curbs are completed. Plumbing vents, drains, and electrical penetrations should all be in place. There should not be any other trades working on the roof when the spray polyurethane foam and protective coating is being installed.

1.08 WARRANTY

Warranty agreements vary in duration and content. If a warranty is desired, it is suggested that parameters be established as a prerequisite to the execution of a contract.

1.09 SAFETY REQUIREMENTS

- A. See API Bulletin AX-119, "*MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal.*"
- B. Refer to appropriate Materials Safety Data Sheets (MSDS) for additional safety information.
- C. Before applying spray polyurethane foam or coating, all HVAC equipment on the roof must be turned off. These units and any other potential sources of air entry into the building must be sealed.

PART 2—PRODUCTS

2.01 POLYURETHANE FOAM

A. The polyurethane foam to be applied shall be a two component system made by combining an isocyanate (A) component with a polyol (B) component and shall possess the following physical characteristics:

<u>PROPERTIES</u>	<u>ASTM TEST</u>	<u>METRIC (S.I.) UNITS</u>	<u>U.S. UNITS</u>
Density (sprayed-in-place)	D-1622	45–48 (Kg/m ³)	2.8 - 3.0 lbs/ft ³
Compressive Strength	D-1621	270 kPa	40 psi lbs/in ²
Closed Cell content	D-2856	90% (Minimum) % Value	90% (Minimum) % Value
R-Value	C-518, C-177, C-236	35 aged K•m ² /W	6.2 °F•hr•ft ² /Btu
Flammability**	E-84	75 FSI or less (flame spread index)	

**This standard is used solely to measure and describe properties of products in response to heat and flame under controlled laboratory conditions. This numerical flame spread rating is not intended to reflect hazards presented by this or any other material under actual fire conditions

- B. Polyurethane Foam Primers: Primers used shall be as recommended by the manufacturer of the spray polyurethane foam materials specified.
- C. Fire Safety Requirements: When tested as a composite system, the sprayed polyurethane foam, protective coating, and deck assembly shall meet all applicable code requirements for exterior and interior fire exposure. The composite system should be rated Class A by ASTM E-108 or an equivalent test method.

2.02 PROTECTIVE COATING

- A. Elastomeric Coating System: The elastomeric coating system may be one or more of the following types:
 - Acrylics
 - Butyls
 - Chlorinated Synthetic Rubbers*
 - Silicones
 - Polyurethanes
 - Modified Asphalts

* **Note:** These coatings are frequently referred to in the trade as “Hypalon” or “Neoprene” coatings. The terms “Hypalon” and “Neoprene” are registered trademarks of the E. I. DuPont de Nemours Co.

Within these generic coatings are both vapor retarder and non-vapor retarder systems. The specifier should choose among these based on the particular project requirements and circumstances. It is recommended that the coatings be elastomeric in nature (“100% minimum elongation”) and have excellent adhesion properties with the polyurethane foam and/or existing coating. The renewal coating shall be compatible with the existing coating and should be chosen with the following parameters in mind:

1. Environmental Factors: Temperature extremes, wind potential, hail, proximity to chemical emissions, etc.
2. Aesthetics: Color, surface profile, reflectivity, and visibility.
3. Traffic: Rooftop HVAC servicing, mechanical, and maintenance traffic.
4. Ease of Maintenance: Ability to effect repairs or modifications with in-house maintenance personnel, and the ability of the coating system to be completely rejuvenated by reapplication of the coating system.
5. Fire Resistance**: Should meet E-84 <75.

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B. Physical Properties: The Elastomeric Coating System shall possess the following physical characteristics (NOTE: Specifier shall list physical properties of chosen Elastomeric Coating System):

PROPERTIES	ASTM TEST	VALUE
Tensile Strength	D-412	_____
Elongation	D-412	_____
Hardness Shore “A”	D-2240	_____
Tear Resistance (lbs per lineal inch)	D-624	_____
Ultra Violet Exposure	D-822	_____
Atlas Carbon Arc		
Type F. weatherometer		
Moisture Vapor Transmission	E-96 Procedure E	

RECOMMENDED GUIDE SPECIFICATION FOR THE RENEWAL OF SPRAY POLYURETHANE FOAM AND COATING ROOF SYSTEMS

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C. For further information concerning protective coatings refer to “*A Guide for Selection of Protective Coatings Over Sprayed Polyurethane Foam Roofing Systems.*” [SPFA Stock Number AY-102]

PART 3—EXECUTION

3.01 SURFACE PREPARATION AND REPAIR

- A. From the inspection, determine items that need to be corrected.
- B. Replace or repair substrate that is unacceptable.
- C. Remove and replace blistered polyurethane foam, using the following guidelines:
 - 1. Take test cuts (core or slit samples) in areas of blistered foam to determine the cause and extent of the problem. It may be necessary to remove foam beyond the actual area of an individual blister in order to prevent reoccurrence. The surface area adjacent to the cut should be prepared and cleaned.
 - 2. If a number of blisters are found clustered in one area, it is recommended that you remove the top pass or top two passes in the area rather than attempting to repair individual blisters.
 - 3. It is not an acceptable procedure to cut out a blister and fill with coating. Such a procedure will result in either a depression in the surface which will hold water or an unacceptable thickness of coating which may itself blister or crack.
 - 4. The sprayed polyurethane foam replacement shall be installed so as to have the originally specified density and compressive strength. Many commercial “froth packs” and pour foams will not give satisfactory results.
 - 5. After opening a blister or removing a foam layer, the lower layer should be inspected for degradation or moisture. No repair procedure should be attempted to a degraded or moist surface. Dry the surface and remove degraded area before

proceeding to repair.

6. Remove unacceptable coating. Consult coating manufacturer for definition and methods.
 7. Apply coating to proper thickness to repaired areas. Two or more coats should be used. Final dry mil thickness of repaired areas should be as specified.
- D. Small (less than 3" in diameter) blisters, cracks, breaks in the foam or coating, bird pecks, or hail damage can be repaired with a compatible sealant using the following guidelines and procedures:
1. Install sealant to an area or thickness no greater than is recommended by the manufacturer for proper cure.
 2. Install sealant so that the final surface is higher than the surrounding area and water will not remain on the repair area.
 3. Use the type of sealant recommended by the coating manufacturer.
 4. Ensure the area to be repaired is clean, dry, and the edges beveled to assure proper adhesion.
 5. In some cases, foam core plugs can be used with sealant to make small repairs.
- E. If weathering has caused the surface of the coating and the foam to degrade (pitting), such surface may be ground off or scarified to expose clean, dry polyurethane foam.
- F. Provide positive drainage by using one or more of the following procedures that are most suitable for the project:
1. Install additional roof drains or scuppers.
 2. Build up low areas by applying polyurethane foam. (Follow manufacturers recommendation for surface preparation.)
- G. Repair or replace deteriorated flashings, roof jacks, metal work, curbs, supports, penetrations, drains, etc.
- H. Clean the existing coated roof surface of dust, dirt, oils, and other contaminants by power washing, brooming, and/or blowing as recommended by the coating manufacturer.

RECOMMENDED GUIDE SPECIFICATION FOR THE RENEWAL OF SPRAY POLYURETHANE FOAM AND COATING ROOF SYSTEMS

3.02 PROTECTIVE COATING APPLICATION

A. General Coating Requirements

1. The existing coating and repaired polyurethane foam shall be dry and free of contaminants and UV degradation.
2. The texture of the foam will influence the amount of coating material required. Coatings shall be applied at a uniform rate as to obtain the minimum dry film thickness specified by the coating manufacturer.

B. Inspection

1. The coating shall be allowed to cure and be inspected for pinholes, thinly coated areas, uncured areas or other defects. Any defects should be repaired prior to subsequent applications. The base coat shall be free of dirt, dust, water, or other contaminants before application of the top coat.
2. Subsequent coating, if required, should be applied in a timely manner to insure proper adhesion between coats.

3.03 GRANULE APPLICATION (Optional)

When used shall be of the size and type and applied in the top coat as recommended by the coating manufacturer.

3.04 WALKWAYS

Walkways may be installed for heavy traffic areas and around frequently serviced roof top units. Breathable walk pads should be as recommended by the coating manufacturer.

3.05 SAFETY REQUIREMENTS

- A. Refer to API Bulletin AX-119, "*MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal.*"
- B. Refer to appropriate Materials Safety Data Sheets (MSDS) for additional safety information.
- C. Before applying spray polyurethane foam or coating, all HVAC equipment on the roof must be turned off. These units and any other potential sources of air entry into the building must be sealed.

OTHER PROGRAMS AND SERVICES OFFERED BY SPFA

Professional Training

The Accreditation Program offers individual and company accreditation in five areas: Contractor, Distributor, Elastomeric Coating Supplier, Foam Supplier and Independent Inspector. The objectives of the program are to **PROVIDE** an established set of criteria; to **IDENTIFY AND RECOGNIZE** individuals and companies; and to **ENCOURAGE** responsibility for the quality of their work through self-education.

Association Newsletter published quarterly with a “Special Show Edition” for the annual conference offers articles, alerts, and technical information affecting the industry.

The SPFA Web Site is a direct communication to all member suppliers and contractors with web access. Up to date information is offered.... And as a member, you may link into the web site (www.sprayfoam.org)

A “**HOT-LINE**” **800 number** is available for your use to answer those technical questions (800-523-6154). The SPFA sponsors research and development and product testing that allows approval for generic types of spray foams, coverings, and related products.

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