



GUIDELINE FOR ROOF ASSEMBLY EVALUATION FOR SPRAY POLYURETHANE FOAM (SPF) ROOF SYSTEM

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AND
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DESIGN CONSIDERATIONS

Purpose

The purpose of this guideline is to assist the owner, architect, designer or consultant in evaluating existing roof surfaces and assemblies to determine suitable re-roofing options using spray polyurethane foam (SPF).

General Considerations

All the component parts of a roof structure can affect the performance of a spray polyurethane foam roofing system.

Suitable structure design, specification review, contractor and material selection, coupled with the compatibility and positioning of the various components of a roof structure, are a necessity to produce a successful roofing system.

Consult with the respective material suppliers and the successful contractor to receive written conformation of their acceptance to all details of the roofing system, including, but not limited to, material selection, drainage, expansion joints, load design, flashing details, deck preparation, etc.

Roof Surface/Assembly Considerations

The following general considerations should be observed for all surfaces, which are to receive SPF (Refer to SPFA Document AY104 “Spray Polyurethane Foam Systems for New and Remedial Roofing” and ASTM D 5469 - 00 “Standard Guide for Application of New Spray Applied Polyurethane Foam and Coated Roofing Systems”).

- Securely fasten the roof system and roof deck to the building structure where required and conform to load limits required by building code, insurance requirements and good engineering practice.
- Designer should abide by applicable buildings codes.
- Moisture saturated substrate materials should be identified and removed
- Surface contaminates that would affect adhesion should be removed.
- Acceptable substrates for SPF include, but are not limited to, wood, metal, concrete, BUR, tile, and composite shingles when suitably prepared.
- Some single-ply / modified bitumen roofing systems and insulation materials are not considered acceptable substrates by some manufacturers. Consult with the specified system manufacturer for acceptable substrates.
- SPF should not be applied directly to a lightweight insulating concrete or poured gypsum decks.

CRITERIA FOR RECOVER

SPF may be used to recover existing roof surfaces provided the following criteria are met.

1. Surface to which SPF is to be applied is:
 - a. Dry (as defined by ASTM D-5469);
 - b. Free of loose gravel, dirt and other debris; and
 - c. Free of contaminants (such as oils and grease) which would affect adhesion.
2. Substrate to which SPF is to be applied is:
 - a. Secured to the structural deck;
 - b. Removed where saturated with water; and
 - c. Acceptable by building code and/or insurance criteria as to:
 - 1) Number of roof systems/membranes, and
 - 2) Wind uplift resistance.
 - 3) Other criteria determined by building codes or insurance requirements
3. Structural components meet building code and/or insurance wind uplift and structural support requirements.

CRITERIA FOR RE-ROOFING WITH TEAR-OFF

SPF may be applied to an existing roof deck following a tear-off provided the following criteria are met.

1. Deck surface to which SPF is to be applied is:
 - a. Dry (as defined by ASTM D-5469);
 - b. Free of loose gravel, dirt and other debris; and
 - c. Free of contaminants (such as oils and grease) which would affect adhesion.
2. Deck is not lightweight concrete or poured gypsum.
3. Deck and structural components meet building code and/or insurance wind uplift, structural support and other requirements.

ROOF EVALUATIONS

The following section describes various inspection procedures and techniques that can assist in the evaluation of existing roof assemblies in order to determine if the various recover and re-roofing criteria above can be satisfied.

(Note: This is not intended to be a complete list of procedures and techniques for every project. The persons conducting an evaluation should determine the most appropriate inspection procedures or techniques for each specific project.)

Preliminary

Obtain the following information prior to the site evaluation:

- Roof leakage history
- Height of the building
- Wind loads (Refer to applicable building codes and Factory Mutual Loss Prevention Data Sheet I-28).
- Age and history of the building
- Age, history and description of the roof system(s)
- Occupancy and vapor drive conditions of the building (e.g.: Hospital, warehouse, manufacturing, cold storage, swimming pool, process lines, etc)
- Insulation requirements
- Roof system warranty status

Exterior Inspection

Walk around the exterior of the building noting the following:

- Wall construction
- Wall conditions and cracks
- Indication of building settlement
- Conditions of the gutters and downspouts
- Fascia conditions
- Moisture stains on the walls
- Plant growth on or near the building
- Indication of insect and/or animal damage

Interior Inspection

Conduct a walk through inspection of the building with the owner's representative noting the following:

- Roof structure and deck type
- Indication of roof leaks (stained ceilings, floor stains, stained or corroded decking, etc.), noting the locations and documenting with photographs.
- Severity and patterns of leaks, quantity, duration and frequency of occurrences

- Conditions of the underside of the deck (rusted, deteriorated, deformation, etc.) and the proximity of electrical conduits and other miscellaneous items attached to the underside of the roof deck.
- Condition of roof deck support structure
- If fasteners penetrate the deck (frequency and type)
- Location and condition of plumbing, internal and overflow drains
- Interior environmental conditions (temperature and humidity)
- Asbestos or other regulated material

Roof Surface Inspection

Develop or obtain a roof sketch. Indicate the location of expansion joints, penetrations, drains, etc. Inspect the roof surface noting the locations and size of defects and deficiencies on the roof sketch. Attempt to correlate the observed apparent defects in the roof membrane or flashing with the previously noted leaks inside the building. Inspect the roof systematically, starting with the perimeter. Include the following in the visual inspection:

- Identify roof system
- Condition of the roof system and flashings
- Condition of perimeters
- Type and condition of drainage system
- Evidence of ponding
- Evidence of maintenance and repairs
- Evidence of structural movement
- Condition and height of penetrations, flashings and curbs
- Debris or vegetation
- Evidence of insect or animal damage
- Evidence of deteriorated decking
- Contaminates which could affect SPF adhesion or longevity

Roof Assembly Inspection

It is important to determine the construction and condition of the roof assembly. On many roof systems, this can be done by performing roof test cuts or obtaining roof cores.

Prior to performing destructive tests such as roof test cuts, determine if a roof warranty is currently in force. If a test cut or core has the potential to void a warranty, the roof composition can be determined by reviewing construction records, examining the actual warranty agreement, or engaging the manufacturer's approved applicator to perform the test cut and repair.

One test cut may serve the purpose if a single homogenous roof area is being evaluated. Multiple roof sections, differing compositions, differing conditions or roofs applied in different years require additional test cuts.

The purpose of the test cut(s) or core(s) is to determine the composition and conditions of the roof system and the number of roofs that have been installed. Test cut(s) or core(s) may also indicate deck type and conditions. From the test cut, remove and examine each component of the roof and note the following:

- Type of surfacing
- Weight per unit area of roofing system
- Total thickness of the substrate components
- Number of layers and adhesion between layers
- Type of adhesion or fastening system
- Type of roofing system
- Insulation type, thickness and attachment
- Moisture condition of the insulation
- Deck type and condition
- Presence of a vapor retarder (indicate type and how it was adhered)
- Presence of asbestos or other regulated material

Moisture Survey

A valuable tool in determining the roof assembly condition is the moisture survey. There are four primary moisture survey devices.

- Infrared scanner
- Capacitance
- Conductive
- Nuclear moisture

Although most of these techniques are considered non-destructive, the surveyor will typically secure cuts to confirm the findings as indicated by the survey. **NOTE: Test cuts may void an existing warranty.**

Outline wet anomalies on the roof surface and indicate on the roof sketch.

Evaluation of the Deck

Where there is concern for the structural integrity of the existing roof deck and support system or where it is anticipated that additional loads will be imposed with the application of the re-roofing or recovery system, then it is recommended that a professional structural engineer perform a structural evaluation. The structural evaluation may include but not be limited to performing larger test cuts and securing samples of the deck in order to determine the physical properties and load carrying capacity.

Evaluation of Wind Up-lift

Wind uplift resistance of an existing substrate should be determined by an engineering evaluation which may include on-site uplift resistance testing.

SUMMARY

Seeking outside expertise (e.g., structural evaluation, moisture survey, wind up-lift testing, mechanical fastener pull-out testing, etc.) may be needed to supplement the information obtained during the field evaluation of the roof. The final analysis should include a scaled roof plan (including roof penetrations, roof drains and scuppers) with all of the observed defects, deviations and wet anomalies noted with the approximate size and location. The plan shall include identification of the various roof areas, roof age, roof system composition, and roof size.

The information obtained during the field evaluation (including professional expertise when required) along with economic and environmental considerations will provide the basis for a decision to re-roof using Spray Polyurethane Foam.

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