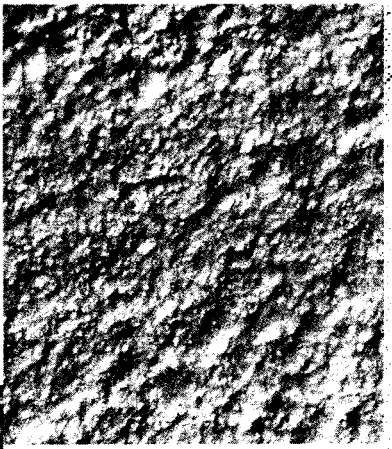
Quality Control Guidelines





for the Application of



Sprayed Polyurethane Foam Roofing

NATIONAL ROOFING CONTRACTORS ASSOCIATION

SPRAY POLYURETHANE FOAM DIVISION
SPFD
The Society of the Plastics Industry, Inc.

This document is not a specification. It does not supersede the project specification prepared by the designer (specifier) and/or the recommendation of the material manufacturer/supplier. It provides general guidelines for following accepted sprayed polyurethane foam roofing construction practices.

© 1997 National Roofing Contractors Association (NRCA)/The Society of the Plastics Industry, Inc., Sprayed Polyurethane Foam Division (SPI/SPFD)

All rights reserved. No part of this publication may be copied or reproduced without the express prior written permission of NRCA and SPI/SPFD.

TABLE OF CONTENTS

Statement of Purpose 1
Introduction 1
Terminology 2
System Description 2
Quality Control/Assurance 2
Visual Examination 3
Decks—New Construction/Tear-Off Projects 4
Existing Roof Substrates 4
Primers 5
Vapor Retarders 6
Separation Layer 7
- General Criteria 8
- Insulation Boards 8
- Base Sheet 10

Application of SPF 10
Application of Coating 13
Application of Aggregate Surfacing Cover ..15
Metal Flashings 15

APPENDICES

1. Sprayed Polyurethane Foam Roofing Quality Control Application Checklist ...17
2. Slit Samples/Core Samples 18
3. SPF Surface Texture Photographs 19
4. Terminology 21

Statement of Purpose

This document provides guidelines for on-site evaluation of sprayed polyurethane foam (SPF) roofing during the application process.

Introduction

This document addresses on-site evaluation guidelines during the application of SPF roofing. It stresses thorough, continuous inspections during construction to recognize and correct variances as they are detected. It provides guidelines to appraise the quality of application. This document gives information about the installation of specific components above the structural deck. Where appropriate, the guidelines describe variations in the application of primers, vapor retarders, cover board insulation and base sheets, fasteners, sprayed polyurethane foams, surfacings, and metal flashings.

The application of an SPF roof system involves the skillful arrangement of multiple components in a specified process. The quality of the workmanship during the application process is measured by application criteria and inspection procedures and is a critical element to roof performance. Roof performance is also determined by other factors, including building design, project specifications and details, material quality and suitability for the specific application, and roof maintenance.

The application of SPF roofs, like other types of roofs, is not an exact science. It is a craft involving people who deal with a broad range of materials, designs, practices and techniques, climates, and changing weather conditions. Both the National Roofing Contractors Association (NRCA) and the Society of the Plastics Industry, Inc./Sprayed Polyurethane Foam Division (SPI/SPFD) recognize the importance of these critical factors as they impact quality SPF roofing.

The guidelines presented in this document are based on the technical knowledge and experience of practicing and knowledgeable roofing professionals, including contractors, manufacturers, and roofing technologists. Their collective experience resulted in a consensus as expressed in this document.

The "Sprayed Polyurethane Foam Roofing Quality Control Application Checklist" has been developed to assist quality control and quality assurance personnel who are performing inspections while SPF roofing application is in progress. This checklist is located in Appendix 1 of this document.

Terminology

Terminology used in this document can be found in Appendix 4.

System Description

SPF roofs consist of a fully adhered base layer of closed-cell polyurethane foam covered with a protective surfacing.

The polyurethane foam is spray-applied by mixing two chemically reactive liquid components through a high-pressure mixing gun. As the liquid mixture is applied to the roof substrate, the chemical components react immediately, expanding 20 to 30 times their original volume, and set to a rigid foam layer. The foam formed is closed-cell, providing thermal insulation and water resistance.

The surfacing of an elastomeric coating and/or aggregate protects the foam from ultraviolet light and mechanical damage.

Quality Control/Assurance

Quality control and quality assurance are essential elements of SPF roof construction.

Quality control is performed by the SPF roofing contractor. The roofing contractor designates an individual to be on-site during the entire roof application process; that individual may be a working member of the crew. This person understands the system being installed and has authority to correct noncompliant work.

Quality assurance, when performed, is the responsibility of the building owner's representative (e.g., architect, engineer, roof consultant) or a representative of the material manufacturer/supplier. The person performing quality assurance must, likewise, understand the system being installed and its methods of application. The quality assurance person must notify the roofing contractor immediately if noncompliant work is observed so necessary corrective action can be taken.

Visual Examination

The most effective means to evaluate the quality of an SPF roof installation is by thorough, continuous visual inspection and evaluation at the time of application by a person who is knowledgeable of SPF roofing technology and good workmanship practices.

The list below will assist quality assurance inspectors during roof inspections of an in-progress roofing application. Many of the items referred to on this list are discussed in further detail in the following sections of this document. A detailed checklist is found in Appendix 1. If deficiencies are found during the inspection of the roofing application, corrective action must be taken.

Inspectors should visually ensure the following prior to and during application.

Prior to Application:

- Specifications and drawings are available for review.
- All certifications or approvals have been received for decking and roofing materials where applicable.
- Material manufacturers'/suppliers' literature and application specifications and recommendations are available for information and review.
- Safety precautions and material safety data sheets (MSDSs) have been reviewed and are present during the application.
- Specified materials and specified quantities, as verified by on-site inspection of product labels, are at the project site and are suitable for application (e.g., packaging not damaged, labels intact).
- Materials are stored according to the manufacturers'/suppliers' recommendations (e.g., proper temperature, covered, off ground, on pallets).
- Equipment is in good working order and functioning properly.
- Edge nailers, curbs, drains and penetrations have been installed in the areas to receive SPF.
- Drainage patterns for proper SPF roof system installation have been identified.
- When fastener pull-out tests are specified, tests have been conducted and the results have been approved by the specifier.

During Application:

- Weather and project conditions are suitable for application.
- Substrate is sufficiently dry and suitably prepared to receive the SPF roof system.
- Insulation cover boards are butted together with joints staggered and offset.
- Separation layer (e.g., cover board, base sheet) is firmly attached to the substrate with the specified type and number of fasteners or is embedded in the specified adhesive.
- Temporary water cut-offs are installed at the end of each day's work as required.
- Surfacing is applied as specified.
- Materials and applied roofing are not abused by other trades.

Decks—New Construction/Tear-Off Projects

The quality assurance and control of roof decks is beyond the scope of this document, and therefore, this document does not consider the roof deck as part of the SPF roof system. However, there are important roof deck factors that affect final SPF roof performance. These factors include structural load capabilities, slope and drainage, expansion joints, and flashing details.

The building owner, designer, and deck manufacturer/installer are responsible for providing for the support, attachment, fastener pull-out testing (when specified), proper deck alignment, structural integrity, construction details, and expansion and contraction of the structural roof deck in a manner that will provide a stable base for the SPF roof system.

Roofing contractors inspect and accept roof deck surfaces in order to schedule the roofing application. Attention to deck surface dryness and cleanliness is also essential.

Existing Roof Substrates

When re-covering an existing roof system, the designer is responsible for performing an analysis of the structural roof deck (described under the section "Decks—New Construction/Tear-Off Projects"), including deck integrity, system compatibility, load capacity, damage, moisture condition, wind uplift and building code requirements.

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating the substrate to which an SPF roof system is being applied. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ The substrate surface is sufficiently dry, clean and prepared to receive the new SPF roof system.

▲ Delay the installation until the substrate conditions have been corrected.

■ The substrate surface is suitably prepared for a re-cover application. The surface should be secure and clear of loose material. Aggregate embedded in bitumen is considered acceptable.

▲ As appropriate, cut, remove, or repair blisters, ridges, splits and other defects that appear likely to affect the security and adhesion of the new SPF roof system.

■ Areas of the existing roof system that are too wet, as determined by the designer, have been removed.

▲ Delay installation of new roofing until the designated areas have been removed and replaced.

Primers

SPF adheres well to most construction materials. Primers are often used to enhance the adhesion and/or increase the surface temperature of the substrate. Primers are not intended as a substitute for a properly prepared, clean, dry, oil-/grease-free surface.

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating primer application. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ The substrate surface is sufficiently dry, clean and prepared to receive the primer.

▲ Delay the installation until the substrate conditions have been corrected.

■ Primer is applied at the specified rate.

▲ Adjust application to comply with the specified rate.

Vapor Retarders

The entry of water vapor and its subsequent condensation can be detrimental to a roof's performance. Vapor retarders can be used to control migration of water vapor into the roof system. Determining the need for a vapor retarder, its compatibility with other materials, and the details of its construction is the responsibility of the designer.

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating vapor retarder application. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ The substrate surface is sufficiently dry, reasonably smooth, and clear of potentially damaging objects.

▲ Delay installation of the vapor retarder until substrate conditions are corrected.

■ Materials are protected from inclement weather and abuse from other trades.

▲ Cover materials and remove damaged materials from project site.

■ The location of the vapor retarder is as specified.

▲ Remove vapor retarder from incorrect area and install in specified location.

■ Number of plies of a membrane vapor retarder are as specified.

▲ Should examination reveal missing plies, install additional plies to comply with the specification.

■ Adhesive for a membrane vapor retarder is applied as specified.

▲ Remove the membrane vapor retarder from the deficient area and install new membrane vapor retarder to meet the specification.

■ Liquid-applied vapor retarder is applied continuously and at the specified rate.

▲ Adjust application to comply with the specified rate.

■ The vapor retarder extends continuously across the plane of the deck.

▲ Install specified vapor retarder to incomplete or non-continuous areas.

■ End laps, side laps, openings, and penetrations are sealed as specified.

▲ Add additional plies or sealant to ensure adequate seals.

■ The vapor retarder is sealed at the perimeter as specified.

▲ Modify the work to ensure that the perimeter detail and sealing complies with the specification.

■ The vapor retarder is tied into any other air or vapor retarders as specified.

▲ Add additional plies or sealant to ensure adequate tie-in and correct the work to comply with the specification.

Separation Layer

A separation layer, typically either an insulation cover board or asphalt base sheet, is often installed over certain structural roof decks or other substrates to provide a physical separation between the SPF roof system and the substrate. An example is an insulation cover board installed over irregular or uneven substrates, such as a metal roof deck, to provide a smooth surface to which the SPF roof system can be applied.

Separation Layer: General Criteria

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating the application of a separation layer. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ Separation layer materials are as specified.

▲ Remove noncompliant materials from the job site.

■ Separation layer materials are protected from inclement weather before, during, and after installation.

▲ Protect the material. Do not use damaged or wet material.

■ At the end of each day's work, water cut-offs are applied to seal the separation layer at the edge of the SPF.

▲ Install water cut-offs at the end of each day's work. Replace damaged materials.

Separation Layer: Insulation Boards

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating the application of insulation boards as a separation layer. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ Insulation boards are butted together. Due to manufacturing tolerances, dimensional stability, variances during installation, and the nature of insulation boards, some variance in joint spacing can be expected.

Occasional gaps between boards not exceeding ¼ inch (6 mm) are acceptable as long as the gaps are not continuous for more than the length of one insulation board.

▲ Insulation gaps in excess of ¼ inch (6 mm) should be filled with appropriate insulation board, SPF, or compatible material.

■ Stagger insulation end joints unless otherwise specified.

▲ Remove nonstaggered insulation boards. Adjust boards to appropriate stagger.

■ Finished surface of adjacent insulation boards is not vertically offset more than ¼ inch (6 mm).

▲ Correct vertical offset of insulation boards by shaving the insulation board, filling or leveling the gap with compatible material, or adding tapered insulation as applicable.

■ When the insulation board is mechanically attached, the type, size, and length of fasteners and plates or washers are as specified.

▲ Immediately adjust to the proper fastener. Remove improper fasteners, if necessary, and add specified fasteners to meet attachment objectives.

■ When the insulation board is mechanically attached, at least the minimum number of fasteners specified are installed.

▲ Fastener deficiencies are corrected by installing additional fasteners as needed and by spacing all fasteners appropriately.

■ When insulation board is mechanically attached, fasteners are properly driven.

▲ Immediately adjust operations. Remove improperly driven fasteners, if necessary, and add fasteners to maintain the minimum number of fasteners with appropriate spacing.

■ When insulation board is applied in hot asphalt, the asphalt is applied at a rate sufficient to visually cover the surface area being bonded. The insulation board is embedded in the asphalt while the asphalt is still hot and fluid.

▲ Replace unadhered insulation boards with properly embedded insulation boards.

■ When insulation board is applied in adhesive, the adhesive is applied at the specified rate.

▲ Adjust work practices. Replace unadhered insulation boards with properly adhered insulation boards.

Separation Layer: Base Sheet

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating the application of a base sheet as a separation layer. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ Base sheet laps:
- Head lap: as specified, less 1 inch (25 mm), but with a 1-inch (25-mm) minimum. No maximum limit.
- End lap: as specified, less 2 inches (50 mm), but with a 2-inch (50-mm) minimum. No maximum limit.
- Side lap: as specified, less 2 inches (50 mm), but with a 2-inch (50-mm) minimum. No maximum limit.

▲ Should examination reveal less than the minimum width head laps, side laps or end laps, install an additional layer of the base sheet over the deficient area.

■ When base sheet is applied in adhesive, the adhesive is applied at a rate sufficient to visually cover the surface area being bonded.

▲ Replace unadhered base sheet with properly adhered base sheet.

Application of SPF

SPF can be applied in various densities, each exhibiting different physical properties. The thickness of the SPF applied, number of passes, temperature of the substrate, and the ambient temperature and humidity all have an effect on the in-place physical properties of the SPF.

Most SPF manufacturers offer various seasonal grades of the chemicals used for SPF roofs. Grades are formulated according to the anticipated weather conditions for the project, and the ambient and surface temperatures that are anticipated during the time of application.

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating SPF application. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ○ - Evaluation ▲ - Corrective Action

■ Materials are as specified.

○ Visual: verify labeling on packaging or bills of lading.

▲ Remove noncompliant materials from the job site.

■ Temperature, humidity and ambient conditions are as specified.

○ Measurement: temperature and humidity.

▲ Discontinue SPF application until conditions are within specification.

■ Wind conditions are acceptable for proper application and protection against overspray.

○ Visual: observe the surface texture of the installed SPF and monitor for any overspray onto adjacent surfaces.

▲ Discontinue SPF application until wind conditions subside or utilize wind screens as necessary.

■ Equipment is operating at the proper pressure and temperature.

○ Visual: monitor equipment gauges for pressure and temperature.

▲ Adjust or repair equipment as necessary to provide proper pressure and temperature.

■ SPF is rising properly.

○ Visual: monitor SPF rise during application. Check foam thickness regularly with a probe. Fill probe openings.

▲ Remove defective SPF. Adjust work practices.

■ Minimum pass thickness is ½ inch (12 mm), or as specified, except where a feathered edge is necessary to complete a pass.

○ Visual: check foam pass thickness regularly with a probe and/or a slit sample. Fill probe and/or slit sample openings.

▲ Adjust work practices.

■ Minimum overall SPF thickness should be 1 inch (25 mm), or as specified, for coated systems and 1½ inch (38 mm), or as specified, for aggregate covered systems.

○ Visual: check foam pass thickness regularly with a probe. Fill probe openings.

▲ Adjust work practices. Apply additional SPF over the thin area.

■ SPF is applied uniformly over the entire surface with a tolerance of plus ¼ inch per inch (25%) of specified thickness, minus zero except where variations are required to provide for proper drainage or to complete a feathered edge.

○ Visual: check foam thickness regularly with a probe. Fill probe openings.

▲ Adjust work practices. Remove any excess SPF that will impede proper drainage. Apply additional SPF over any thin areas.

■ Surface texture is as specified.

○ Visual: monitor application. Refer to Appendix 3, "SPF Surface Texture Photographs."

▲ Adjust work practices. Consult with SPF and coating manufacturers regarding affected area.

■ SPF should be terminated neatly above the roof line at all penetrations and building junctions as specified.

○ Visual: monitor application.

▲ Adjust work practices. Remove excess SPF and overspray.

■ Sprayed-in-place cants and crickets should be relatively smooth and uniform to allow for proper drainage.

○ Visual: monitor application.

▲ Adjust work practices. Remove any excess SPF that will impede proper drainage. Apply additional SPF if necessary.

■ SPF is applied in the full thickness in the same day.

○ Visual: monitor application sequence.

▲ If SPF is exposed for more than 24 hours, consult the manufacturer for specific surface preparation instructions.

Application of Coating

An elastomeric coating is applied to an SPF roof system to protect the SPF from ultraviolet rays and mechanical damage. An elastomeric coating can also be specified to provide for other performance criteria (e.g., chemical resistance, vapor permeability).

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating coating application. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ○ - Evaluation ▲ - Corrective Action

■ Coating materials are as specified.

○ Visual: verify labeling on packaging or bills of lading.

▲ Remove noncompliant materials from the job site.

■ Coating materials are mixed as specified.

○ Visual: verify mixing is in compliance with the coating manufacturer's instructions.

▲ Consult coating manufacturer for appropriate remedial action.

■ Temperature, humidity and ambient conditions are as specified.

○ Measurement: temperature and humidity.

▲ Discontinue coating application until conditions are within specification.

■ Wind conditions are acceptable for proper application and protection against overspray.

○ Visual: monitor for any coating overspray onto adjacent surfaces.

▲ Discontinue coating application until wind conditions subside or utilize wind screens as necessary.

■ Equipment is operating at the proper pressure and temperature.

○ Visual: monitor equipment gauges for pressure and temperature.

▲ Adjust or repair equipment as necessary to provide proper pressure and temperature.

■ Unless otherwise specified, base coat is applied the same day as SPF.

○ Visual: monitor application.

▲ Consult coating manufacturer.

■ Coating is applied at the specified rate.

○ Visual: monitor application rate.

▲ Adjust application to comply with the specified rate. In the deficient area, apply additional coating material to achieve the minimum coverage rate.

■ Overall coating dry film thickness is as specified.

○ Measurement: measure overall dry film coating thickness.

▲ Adjust application to comply with the specified film thickness. In the deficient area, apply additional coating material to achieve the specified dry film coating thickness.

■ Layers of coating are applied within the manufacturer's specified time periods.

○ Visual: monitor application.

▲ Consult coating manufacturer for appropriate remedial action.

■ For granule-surfaced or aggregate-surfaced coatings, surfacing is applied in a continuous uncured coating at the specified coverage rate to achieve a continuous embedded surfacing.

○ Visual: monitor application.

▲ Immediately adjust operations to ensure embedment of the specified amount. Whenever visual observation indicates an inadequate amount of adhered granules, loose granules are to be removed, then coating and granules are to be reapplied.

Application of Aggregate Surfacing Cover

Aggregate can be applied to low-slope SPF roof surfaces to protect the SPF from ultraviolet rays and mechanical damage.

Quality control and assurance guidelines are provided here for aggregate-surfaced SPF roof systems even though NRCA in The NRCA Sprayed Polyurethane Foam-Based Roofing Manual *does not recognize the use of an aggregate surfacing without the use of a water-resistant elastomeric coating over the SPF. Guidelines for design and application of aggregate-surfaced SPF are included in SPI/SPFD Document AY-110,* Sprayed Polyurethane Foam Aggregate Systems for New and Remedial Roofing.

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating aggregate coating application. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ Aggregate type and size is as specified.

▲ Remove noncompliant materials from the job site.

■ Aggregate application rate is as specified.

▲ Adjust work practices. Add additional aggregate in the deficient area.

■ Aggregate is distributed evenly over the roof surface without bare spots.

▲ Redistribute aggregate over the deficient area.

Metal Flashings

For SPF roof systems, the use of metal flashings can be divided into three general categories:

- Water conveyance flashings include exterior water collector boxes (e.g., conductor heads), gutters, and downspouts.
- Independent water shedding flashings are attached, sealed and mounted above the top edge of the roof covering and penetration flashings. These flashings prevent moisture penetration into wall cavities, behind

base flashings, through curb-mounted equipment, or into or behind penetration flashings. Metal coping or cap flashings, surface-mounted counterflashing, curb caps, rain collars, and through-wall flashings are all examples of independent water shedding flashings. Independent water shedding flashings are independent from the roof system. Metal flashing flanges typically provide a minimum of 3½ inches (90 mm) of sealing surface.

- Integral component and edge flashings include metal roof jacks, pipe flashings, through-wall scuppers, electrical utility line penetration flashings, and light-gauge (i.e., 22-, 24- or 26-gauge [0.76-, 0.61-, or 0.45-mm]) low-profile metal edge flashings (e.g., gravel stops). These types of flashings differ from the other categories in one primary characteristic—they require integration or sealing of their metal flanges directly into the roof system.

Evaluation of Criteria

Visual examination at the time of application is the most effective means of evaluating metal flashing application. Visual examination may include routine measurements where applicable. Common sense must be used in the evaluation of the application, and reasonable variances from specified amounts are to be expected. Significant deviation from any particular criteria should be corrected as soon as possible.

■ - Criterion ▲ - Corrective Action

■ Metal sealing flanges are primed.

▲ Prime metal flanges and allow to dry prior to sealing in.

■ Metal flanges are set in a bed of sealant and secured as specified.

▲ Remove flashing and reinstall as specified or add fasteners as required to meet specified spacing.

■ Metal edging laps are sealed as detailed with specified sealant.

▲ Remove flashings sufficiently to install inter-lap sealant.

■ Metal flanges are set to be covered with an SPF roof system as specified.

▲ Remove defective or noncompliant work and replace as specified.

■ Edge metal is supported by continuous wood blocking or decking, and flanges are not extended over insulation cover board surfaces without wood blocking support.

▲ Install wood blocking prior to membrane and metal edge flashing to support metal flanges adequately.

Appendix 1 Sprayed Polyurethane Foam Roofing Quality Control Application Checklist

The following checklist is offered to assist quality control inspectors during roof inspection while the roofing application is in progress. It is not a specification, and it does not cover every detail of roofing application inspection procedures.

The intent of this checklist is to guide the quality inspector by highlighting the key application areas affecting successful SPF roof performance.

Prior to Application

- ❑ Specifications and drawings are available for review.
- ❑ All certifications or approvals have been received for decking and roofing materials where applicable.
- ❑ Material manufacturers'/suppliers' literature and application specifications and recommendations are available for information and review.
- ❑ Safety precautions and material safety data sheets (MSDSs) have been reviewed and are present during the application.
- ❑ Specified materials and specified quantities, as verified by on-site inspection of product labels, are at the project site and are suitable for application (e.g., packaging not damaged, labels intact).
- ❑ Materials are stored according to the manufacturers'/suppliers' recommendations (e.g., proper temperature, covered, off ground, on pallets).
- ❑ Equipment is in good working order and functioning properly.
- ❑ Edge nailers, curbs, drains and penetrations have been installed in the area to receive SPF.
- ❑ Drainage patterns for proper SPF roof system installation have been identified.
- ❑ When fastener pull-out tests are specified, tests have been conducted and the results have been approved by the specifier.

Prior to Application *continued*

- ❑ Weather and project conditions are suitable for application.
- ❑ Substrate is sufficiently dry and suitably prepared to receive SPF roof system.
- ❑ Insulation cover boards are butted together with joints staggered and offset.
- ❑ Separation layer (e.g., cover board, base sheet) is firmly attached to the substrate with the specified type and number of fasteners or is embedded in the specified adhesive.
- ❑ Temporary water cut-offs are installed at the end of each day's work as required.
- ❑ Surfacing is applied as specified.
- ❑ Materials and applied roofing are not abused by other trades.

Appendix 2 Slit Samples/Core Samples

Taking slit samples and core samples during the application of SPF and coatings is important for routine quality control and assurance for SPF roof systems. The taking of slit samples and core samples at the completion of an SPF roofing project should not be substituted for quality control and assurance provided by continuous visual inspection during application.

Final slit samples and core samples of a completed SPF roof are taken at the discretion of the manufacturer/supplier warranting the roof system.

Appendix 3 SPF Surface Texture Photographs

The following photographs show various SPF surface textures that have been established as industry reference standards.

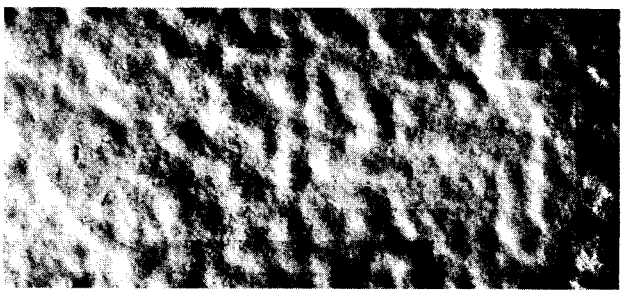


Photo 1: Smooth surface texture
Description: The surface shows spray undulation and is acceptable for receiving a protective coating. Even though the surface texture is classified as smooth, the theoretical coverage rate cannot be used without adding additional material to adequately cover the smooth surface texture to achieve the specified dry film thickness.

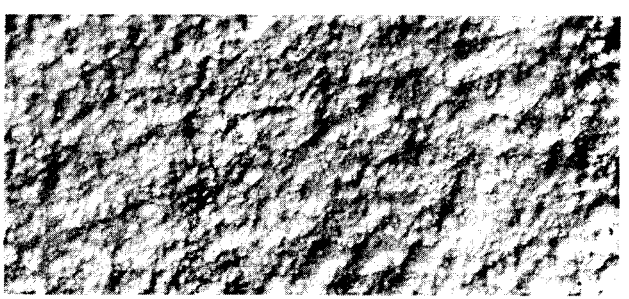


Photo 2: Orange peel surface texture
Description: The surface shows a fine texture and is compared to the exterior skin of an orange. This surface is considered acceptable for receiving a protective coating. The theoretical coverage rate cannot be used without adding additional material to adequately cover the orange peel texture to achieve the specified dry film thickness.

Appendix 4 Terminology

For the purpose of this document:

Dry film thickness: the thickness, expressed in "mils," of an applied and cured coating material.

Mil: a unit of measure (1 mil is equal to 0.001 inches or 25.400 microns) often used to indicate the thickness of a coating.

Slit sample: a small cut about 1 inch by ½ inch by ½ inch (25 mm by 13 mm by 13 mm), in a half-moon shape, used to measure foam pass thickness and/or coating film thickness.

Sprayed polyurethane foam (SPF): a material, formed by spraying two components, polymeric methylene diphenyl diisocyanate [(A) component] and resin [(B) component] to form a rigid, fully adhered and water-resistant foamed plastic.