

## Guide Specification

### SECTION 075713

### BASF Seamless Acrylic/Polyurethane Insulated Roof System for New Construction

#### PART 1 - GENERAL

##### 1.01 Work Included

- A. Preparation of Substrate
- B. BASF Elastospray® Sprayed-in-place Polyurethane Foam (SPF) Insulation
- C. BASF FE 1000 Series Acrylic Roof Coating
- D. Roofing Granules
- E. Walkways

##### 1.02 Related Work

- A. Section 01410: Testing Laboratory Services
- B. Section 03300: Cast-in-Place Concrete
- C. Section 05300: Metal Decking
- D. Section 06100: Rough Carpentry
- E. Section 07600: Flashing and Sheet Metal
- F. Section 07700: Roof Specialties and Accessories
- G. Section 07800: Skylights

##### 1.03 Related Documents

The codes, standards and practices listed shall be the latest edition. ASTM refers to ASTM International.

ASTM C 518 – Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

ASTM D 471 – Standard Test Method for Rubber Property Effect of Liquids

ASTM D 1475 – Standard Test Method for Density of Liquid Coatings, Inks and Related Products

ASTM D 1621 – Standard Test Method of Compressive Properties of Rigid Cellular Plastics

ASTM D 1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics

ASTM D 2126 – Test Method for Response of Rigid Cellular Plastics to Thermal and Heat Aging

ASTM D 2240 – Standard Test Method for Rubber Property Durometer Hardness

ASTM D 2320 – Standard Test Method for Density (Relative Density) of Solid Pitch (Pycnometer Method)

ASTM D 2856 – Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer

ASTM D 4209 – Standard Practice for Determining Volatile and Non-Volatile Content of Cellulosics, Emulsions, Resin Solutions, Shellac and Varnishes

ASTM D 5201 – Standard Practice for Calculating Formulation Physical Constants of Paints and Coatings

ASTM D 5469 – Standard for SPF Roofing Systems

ASTM D 6083 - Liquid-Applied Acrylic Coating Used in Spray Roofing

ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM G 53 – Standard Practice for Operating QUV for Exposure of Non Metallic Materials

ASTM E 96 – Standard Test Method for Water Vapor Transmission of Materials

ASTM E 108 (UL 790) – Standard Test Method for Fire Tests of Roof Coverings

SPFA AY 104 – Spray Polyurethane Foam Systems for New and Remedial Roofing

#### 1.04 Quality Assurance

- A. Applicator Qualifications: Must be a current BASF Approved Team Q Applicator or current applicator of the approved roof system manufacturer.
- B. Roofing applicator must exhibit 5 years and a minimum of 500,000 sq. ft. experience with the selected roofing system, with projects of a similar scope and nature.
- C. A Pre-Bid Conference shall be conducted. Its purpose shall be: To discuss any details of the project not adequately covered within the specification; to allow bidding applicators a period of access to the roof areas; and to review the normal flow of activities at the facility. There will be no other access to the roof area without the consent of the owner's representative. All bidding applicators must attend this Pre-Bid Conference. A list of those companies present will be recorded.
- D. The roofing applicator shall perform the work of this section. Subcontracting installation of the acrylic coating/polyurethane foam is not allowed.
- E. Inspections: Completed roofing application will be inspected by an independent inspection firm designated by the warranty provider on a periodic basis.
- F. The roofing system manufacturer shall provide proof of SPFA accreditation. Roofing system manufacturer shall have a 5A D&B rating and be ISO 9002 certified or equal.

#### 1.05 Submittals

- A. Specification Development - The owner/specifier shall supply to BASF manufacturer's representative:
  - 1. A draft copy of the project specification, including: the roofing section, roofing warranty requirements, and roofing drawings. This shall be completed before project goes out to bid.
  - 2. This draft specification shall be reviewed for general technical acceptance and eligibility for issuance of a warranty. A letter confirming an appropriate application, drawings and specification, based on the current available information, will be delivered to the owner's representative at their request.
- B. Any alternate products shall be submitted to the owner and/or owner's representative 10 days before bid date to allow time for product review. Submittals shall include: all appropriate technical data sheets, manufacturer's references, warranty, follow-up inspection policy and outline, material safety data sheets, and a typical, physical sample (3' x 3') to be used as a standard of quality. Manufacturer shall supply list of geographically appropriate work and list of work of similar size and scope to substantiate their period of performance, see 2:02A.1.
- C. Applicator shall submit to owner's representative at or before time of bid:
  - 1. Reference projects with contacts, substantiating years of experience and completion of minimum prior work submitted by applicator.
  - 2. Provide specimen copy of warranty.
  - 3. Submit current ICC ES Report for the roofing system.
  - 4. Submit Underwriters Laboratory, UL 790 classification, or Factory Mutual, and local building code approvals as required/requested.

#### 1.06 Materials, Delivery and Storage

- A. Deliver materials to the site in their original, tightly sealed containers, all clearly labeled with manufacturer's name, product identification and lot number.
- B. Safely store materials in their original containers out of the weather and where the temperatures are within the limits specified by the manufacturer.
- C. All materials shall be stored in compliance with applicable fire and safety requirements.
- D. Protect materials from damage during transit, handling, storage and installation. Applicator shall provide secure site storage trailers.

1.07 Environmental Conditions

- A. The coating and the polyurethane foam shall not be applied during periods of inclement weather (rain, snow, fog, mist).
- B. Do not apply the polyurethane foam when substrate or ambient air temperatures are below 40°F (5°C) unless specifically approved in writing by the polyurethane foam manufacturer.
- C. Do not apply acrylic coatings when temperature is below 50°F (10°C).
- D. When wind speeds exceed 10 miles per hour or adversely affects the quality of the SPF, windscreens shall be used during the application of the polyurethane foam and coatings to prevent overspray onto surfaces not intended to receive foam and coating. Under no circumstances shall the polyurethane foam or acrylic coating be applied when wind speeds exceed 25 miles per hour.

1.08 Sequencing and Scheduling

The spray polyurethane foam is installed when the deck, parapet walls, rough openings, and curbs are completed. The type of skylights used will determine when skylights should be installed. Plumbing vents, drains, and electrical penetrations should all be in place. There should not be any tradespeople working on the roof when the spray polyurethane foam and acrylic coating are being installed.

1.09 Warranty

The roof system manufacturer's 15 Year Full System Warranty shall be issued upon completion, inspection and acceptance of the project. Any repairs covered by the warranty are without cost to the Owner throughout the term. The warranty shall be comprehensive with no proration and no cap for repairs.

**PART 2 - PRODUCTS**

2.01 Polyurethane Foam Insulation

- A. The coating material and the SPF insulation must be supplied by one manufacturer.
- B. Physical property requirements are as follows, for acceptable insulation products with Zero-Ozone Depleting Potential, such as BASF Elastospray 81285 and 81305.

Property	Value	Test Method
Density, sprayed-in-place, pcf, min.	2.7 - 3.2	ASTM D 1622
Compressive strength, psi, min.	50	ASTM D1621
Closed-cell content, percent, min.	>90	ASTM D 2856
K-factor, aged, max	0.158	ASTM C 518
Dimensional Stability, 28 days, Percent volume change, max.	+0.69	ASTM D 2126

Flame spread, max. <75 ASTM E 84

2.02 Acrylic Coating

- A. The acrylic roofing membrane shall consist of a minimum two coats of an elastomeric, liquid applied material, domestically engineered and produced. The two coats shall be of contrasting colors. The minimum two-coat thickness shall be **35** dry mils.
1. The acrylic coating will be a product proven through actual roof performance for a period of time equal to, or longer, than the term of the requested warranty.
  2. The manufacturer shall have an established program to rapidly respond to any required warranty repair, if the original applicator is unable to perform standard repairs.
  3. The BASF FE 1000 Series acrylic coating has the following minimum properties:

<u>Property</u>	<u>Value</u>	<u>Test Method</u>
As Supplied:		
Solids Content		
by weight, percent	66	ASTM D 4209
by volume, percent	55	ASTM D 5201
Weight (lbs) per gallon	11.7-11.9	ASTM D 1475
Volatile Organic Content (VOC), (g/l)	0	EPA Method 24
As Cured:		
Durometer Hardness, Shore A, points	55-60	ASTM D 2240
Tensile Strength, die C, psi	280 (+/-20)	ASTM D 2370
Elongation, percent	280 (+/-20)	ASTM D 2370
Permeability, perms	3.0	ASTM E 96
Water Absorption, %	1.5	ASTM D 471
Weathering,		
QUV, 3,000 hours	No checking or cracking	ASTM G 53

2.03 Sealant

- A. Sealant shall be a pigmented Urethane sealant such as BASF NP 1 Sealant. The color of this sealant, if exposed, shall closely match that of the topcoat.

2.04 Substrate Primer

- Securock® – if kept clean, with little dust, will not require a primer.
- A. For B.U.R., concrete, wood, brick, metal (ferrous, not rusted), and most 'painted' metal - the primer must be approved by BASF Corporation, such as a water-based epoxy primer, BASF FE 1601 Primer.

- B. For non-ferrous metals (cleaned aluminum, galvanized copper, etc) - a primer shall be required, which is approved by BASF Corporation. Such a primer is Mist Coat II Primer by Jones-Blair.
- C. Cut-back asphalt primers are not to be used.

2.05 Granules

- A. Granules shall be number 11 screen size, ceramic-coated roofing granules as manufactured by the Industrial Products Division of 3M Company or equal, color to best match topcoat.
- B. Quartz or silica aggregate such as U. S. Silica Company's #2 unground silica, this product will have natural color variations, color should be selected to match topcoat.

2.06 Protective Covering / Walkways

- A. As required a weather-resistant, breathable, resilient pad composed of synthetic rubber strands shall be installed to create additionally protected roof areas. This product shall be approved by BASF. Such a walkway is Yellow Spaghetti, as manufactured by Western Plastics, Inc.

2.07 Gypsum Board

- A. Shall be a ½" Securock® or a glass matt faced, moisture-resistant core gypsum board.

2.08 Polyiso Insulation Board

- A. Shall be a closed-cell polyisocyanurate foam core integrally laminated to inorganic coated glass fiber facers, such as Atlas AC III.

### **PART 3 – EXECUTION**

3.01 Inspection

- A. Verify that all surfaces to receive polyurethane foam insulation are clean, dry and free of dust, dirt, debris, oil, solvents and all materials that may adversely affect the adhesion of the polyurethane foam.
- B. Verify that all roof penetrations and flashings are properly installed and secured. The metal roof deck shall be securely fastened, the existing fasteners may need to be tightened and/or new fasteners shall be required.
- C. Do not begin applying polyurethane foam insulation until substrate and environmental conditions are satisfactory.

3.02 Surface Preparation

A. Metal Decks

1. The metal roof deck should be a minimum of 22-gauge and be securely installed to conform to local building code requirements. Deflections shall not exceed 1/240 of the span.
2. Remove any loose scale, rust and weathered or chalking paint using a wire brush, scraper, sand blasting or other suitable means. Prime if necessary and as recommended.
3. Remove all dust, dirt and debris using air, a hand or power broom and/or a power washer. Other contaminants such as oil and grease must be removed with appropriate cleaning solution, and rinsed with clean water. (New metal will have a thin

film of milling oil on it, which must be removed.)

4. Fluted metal roof decks should be covered with a polyester tape securely adhered to the metal deck over the flutes, or by mechanically fastened gypsum, urethane, and perlite or wood fiber board per Factory Mutual recommendations for local wind uplift resistance. The boards shall be firmly butted together along all edges. Any joints greater than ¼ inch shall be taped prior to the polyurethane foam application.
5. Factory painted metal surfaces will not normally require an additional application of primer.
6. Make sure all surfaces are clean and dry prior to foam application.

#### B. Concrete Surfaces

1. The concrete shall be cured a minimum of 28 days at temperatures above 50°F and must be free of any laitance.
2. Remove all loose dirt, dust and debris using air pressure, a hand or power broom and/or a vacuum. Oil, grease, release agents and other contaminants must be removed using the appropriate cleaning solution.
3. All joints or cracks greater than ¼ inch shall be caulked or grouted prior to polyurethane foam application.
4. Make sure all surfaces are clean and dry prior to application of an approved primer and polyurethane foam application.
5. Prime the clean, dry concrete surface with BASF FE 1601 Black primer at the rate of ½ gallons per 100 square feet.
6. Lightweight concrete insulating, fill material - If present in the existing roof assembly, recommendations will be made on a per job basis, please contact BASF's Technical Services (page 9).

#### C. Wood Surfaces

1. Plywood shall be exterior grade not less than ½ inch thick, fastened firmly in place. Attachment must meet building code requirements for resistance to wind uplift.
2. The plywood shall contain no more than 18 percent moisture by weight.
3. All untreated and unpainted surfaces shall be primed with an appropriate, approved primer to minimize moisture absorption and aid in the polyurethane foam adhesion.
4. Tongue-and-groove sheathing and planking decks shall be overlaid with a minimum of ¼-inch exterior grade plywood, insulation board or a base sheet securely attached to meet building code requirements.
5. Any joints greater than ¼ inch shall be caulked or taped prior to the polyurethane foam application.
6. Remove all loose dirt, dust and debris using air, a hand or power broom and/or a vacuum. Power washing is not recommended as it may introduce water into the substrate. Oil, grease and other contaminants must be removed using appropriate cleaning solution. Severely contaminated wood substrates shall be removed and

replaced.

7. Prime the clean, dry wood surfaces with BASF FE 1601 Black primer at the rate of ½ gallons per 100 square feet.
8. Ensure all surfaces are clean and dry prior to polyurethane foam application.

#### D. Other Surfaces

1. Contact BASF's Technical Services for recommendations on surface preparations on other surfaces to receive a BASF Acrylic Roof System. Contact BASF technical department for recommendations at (800) 706-0712, or [spfinfo@basf.com](mailto:spfinfo@basf.com).

### 3.03 Polyurethane Foam Application

#### A. Inspection

1. Prior to polyurethane foam application, inspect the substrate surface to ensure preparations required in Section 3.02 have been met.
2. Polyurethane foam shall not be applied unless the environmental requirements of Section 1.06 are met.

#### B. Application

1. All objects that require protection from overspray shall be protected; all mobile objects shall be moved to an acceptable area. All intake air vents shall be turned off and covered.
2. Apply the polyurethane foam in strict accordance with the polyurethane foam manufacturer's specifications and application instructions, using spray equipment recommended by the SPF manufacturer. The field of the roof shall be applied, as practical, by a robotic SPF application device. The robotic method shall improve consistency, slope-to-drain, and visual appearance.
3. Polyurethane foam shall be applied in a minimum of ½-inch thick passes. The total thickness of the polyurethane foam shall be a minimum of 1½ inches (or more for additional insulation value), except where tapering is required to facilitate drainage.
4. Apply the full thickness of polyurethane foam in any area on the same day.
5. Polyurethane foam shall be applied to ensure positive drainage, resulting in no ponding water. Ponding water is defined as "an area of 100 square feet or more which holds in excess of ½ inch of water as measured 24 hours after rainfall."
6. The polyurethane foam shall be terminated neatly a minimum of 4 inches above the finished roof surface at roof penetrations. Sprayed-in-place cants shall be applied to allow a smooth transition from the horizontal to vertical surface.
7. The finished polyurethane foam surface texture shall be "smooth to orange-peel", free of voids, pinholes and depressions. "Verge of popcorn" texture is acceptable if it can be thoroughly and completely coated. Popcorn and tree bark textures are not acceptable. Unacceptable SPF textures shall be removed and re-sprayed prior to the coating application.

### 3.04 BASF 1000 Series Acrylic Roof Coating Application

#### A. Inspection

1. Prior to the application of acrylic coating, inspect the polyurethane foam surface to ensure the conditions of Section 3.03 have been met.
2. The polyurethane foam surface shall be free of moisture, dust, dirt, debris and other contaminants that would impair the adhesion of the acrylic coating.

3. If more than 24 hours elapse between the polyurethane foam application and the start of the acrylic coating application, thoroughly inspect the polyurethane foam surface for UV degradation and oxidation. Call BASF technical department for procedures to proceed, if UV degradation has affected the SPF.
4. Make sure all environmental conditions of Section 1.06 are met prior to acrylic coating application.

#### B. Application

1. The acrylic base coat shall be applied on the same day as the polyurethane foam application, after the polyurethane foam has been allowed to cure a minimum of one hour. Apply the base coat in a uniform application to achieve a finished dry film thickness of approximately  $\frac{1}{2}$  the total thickness required for the roof.
2. The base coat shall not be subjected to foot traffic or otherwise disturbed until it is tack-free or cured. After it has cured, inspect the coating for pinholes, cracks, thin areas or other defects. All defects observed shall be caulked with acrylic sealant and/or roller coated with additional base coat prior to applying subsequent coats of acrylic.
3. The base coat and sealant must be cured, clean and free of all moisture prior to application of topcoat.
4. Apply the topcoat in a contrasting color to the base coat within 72 hours of the base coat application. The topcoat application shall be made at right angles to the base coat application. Surface texture and conditions may require additional quantities of acrylic coating to insure proper thickness. It is the applicator's responsibility to properly coat the insulation regardless of the quantity of acrylic coating necessary.
5. Apply the topcoat in a uniform application to achieve a minimum total finished dry film thickness of the base coat and topcoat of **35** mils. It is the applicator's responsibility to ensure the minimum total dry film thickness specified is achieved throughout the entire roof area regardless of the quantity of acrylic coating required.
6. The BASF FE 1000 Series Acrylic Roof Coating shall be applied a minimum of 2 inches beyond all the terminated edges of the polyurethane foam. These terminations should be masked to provide a straight edge, neat, finished appearance.
7. Allow the topcoat to cure and inspect the finished coating surface for pinholes, cracks, thin areas, or other defects. Repair any defects observed with Urethane sealant and/or additional acrylic coating material.

### 3.05 Granule Application

#### A. Application

1. Apply roofing granules in the second or finish coat of acrylic. A minimum of 10 dry mils of acrylic coating is required to hold the granules.
2. Apply the roofing granules, using suitable compressed air equipment, uniformly at a rate of approximately 40 pounds per 100 square feet of roof area.
3. Apply the roofing granules immediately after the additional coating application to obtain maximum wet-out and embedment.
4. After the coating has fully cured, excessive, loose granules shall be removed using a soft-bristled broom to prevent blocking drains, scuppers, or gutters.
5. Bare spots in the granulated surface shall be filled in by applying additional coating and granules in these areas.

### 3.06 Walkways

- A. Factory-formed walkway pads may be used at rooftop equipment to provide a working surface. Spot adhere the pads or rolls to the finished roof surface with generous buttons of sealant. These shall be applied where instructed by the owners representative.



### 3.07 Field Quality Control

- A. The independent inspector shall instruct the contractor to repair any deficient roof areas, such as: ponding, wet insulation, deck problems, required new drains, etc.
- B. Core samples of the acrylic roof system will be secured at completion by an independent licensed inspection firm at a rate of one core per 10,000 square feet, with a minimum of 2 cores per roof, to test for SPF thickness, compressive strength, density and adhesion. Additionally, slit samples will be taken at a rate of 3 per 10,000 square feet, with a minimum of 6 per roof, to test the coating thickness and coating adhesion. Sampled areas will be repaired using acrylic sealant and replacement SPF cores.
- C. Applicator's quality control during application shall consist of the following, as a minimum:
  - 1. If specified, the primer application rate shall be verified by a wet mil gauge test onto a metal test panel.
  - 2. Insulation thickness shall be verified with a probe at frequent and random locations.
  - 3. During and after the coating application process, the applicator shall remove slits to examine adhesion of the coating to the insulation and the dry film thickness of each coat.

### 3.08 Safety Requirements

- A. Proper safety precautions shall be followed throughout the entire roofing operation. OSHA and local regulations shall be strictly followed. Manufacturer's Material Safety Data Sheets must be available on site, for specific safety information on handling and working with all materials. Spray Polyurethane Foam Alliance and the American Chemistry Council's Recommendations for the Safe Handling and Use of Sprayed Urethane Foam and Coating Materials shall be strictly adhered to. Dispose of all trash, debris and empty containers in accordance with local regulations.
- B. On the roof and at all work sites, a properly maintained fire extinguisher will always be available.
- C. Dispose of trash, debris and empty containers in accordance with local regulations.

### 3.09 Follow-Up Inspections

- A. The system manufacturer shall have a standard warranty inspection program, employing an independent testing firm to perform periodic inspections throughout the term of the warranty.

**FOR TECHNICAL ASSISTANCE, PLEASE CALL: BASF at (800) 706-0712**

***PLEASE NOTE:***

Building owner is responsible to test for presence of asbestos or other hazardous substances that may be present within or near the work area. Such items, if found to be present, shall be communicated to the roofing applicator before any additional testing, removals or roof replacement is performed. On remedial work, the Owner's representative must conduct a full inspection to determine if there is any structural damage (rust, dry rot, etc.) or moisture within the existing roofing systems. If the Architect or Owner suspect that there is moisture within the existing roofing system, a non-destructive evaluation should be conducted. The major advantage to this type of inspection is that trouble spots are located, thus possibly preventing a complete tear-off of the existing roof. Likewise, this can also save many man-hours, which may be necessary to thoroughly inspect the roof using a moisture meter probe. The main point, which the Architect and Owner must take into consideration on remedial work, is that polyurethane foam must not be sprayed over any substrate that contains moisture.

If this type of inspection is required, the specifications must be modified to either include it as part of the applicator's bid or it shall state that this information will be provided to the applicator on a plotted roof plan at Owner's expense.

BASF Corporation does not provide structural, engineering or architectural services. BASF assumes no responsibility for the structural integrity of the building during the work described herein or after completion of the work. This guideline shall not be construed as contracting to provide engineering or architectural services of any kind.