

Guide Specification

SECTION 07541

BASF Corporation

Seamless Acrylic Coating/Polyurethane Insulated Roof System for Renewing Existing Coated/Polyurethane Roofs

PART 1 - GENERAL

1.01 Work Included

- A. Preparation of Substrate, Inspections
- B. BASF Elastospray[®] Sprayed-in-place Polyurethane Foam (SPF) Insulation
- C. BASF FE 1000 Series Acrylic Roof Coating Application
- D. Roofing Granules or aggregate
- 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 Scope

Contractor shall perform rehabilitation of existing coated SPF Roofing System. Using good roofing practice, some areas may require removal of the coating and/or the insulation; other areas shall require surface preparation and recoating with acrylic coatings and granules. Areas shall be as described by the specifier and/or the contractor.

1.04 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 122 – Renewal of SPF and Coating Roof Systems

1.05 Inspection of Existing Roof System

In all cases, an inspection of the existing polyurethane foam roof system must be completed by an Approved Applicator and submitted to BASF's Technical Department, detailing any deficiencies in the current system. An infrared or other moisture survey is required to determine if there is any moisture in the existing system. If extensive deficiencies are found in the existing polyurethane foam roof system or the existing roof is coated with a silicone coating, recoating with BASF FE 1000 Series Acrylic Roof Coating would not be recommended and full or partial removal of the existing roof system would be suggested.

1.06 Quality Assurance

- A. Contractor Qualifications: Must be a current BASF Team Q Approved Applicator or current applicator of the approved roof system manufacturer.
- B. Roofing contractor 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 approximately one week before bid date. Its purpose shall be: To discuss any details of the project not adequately covered within the specification; to allow bidding contractors 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 contractors must attend this Pre-Bid Conference. A list of those companies present will be recorded.

- D. The BASF Team Q approved roofing applicator shall perform the work of this section. Subcontracting installation of the acrylic/ spray polyurethane foam is not allowed.
- E. Final Quality Control: Completed roofing application will be inspected by an independent inspection firm designated by the warranty provider and inspected on a periodic basis during the term of the warranty.

1.07 Submittals

- A. The owner/specifier shall supply to BASF's representative, before the project goes to bid:
 - 1. A draft copy of the project specification, including: the roofing section, roof warranty requirements and roofing drawings.
 - 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 contractor.
 - 2. Provide specimen copy of warranty.
 - 3. Submit Underwriters Laboratory 790 Class A listings, Factory Mutual listings, current ICC-ES report and/or local building code approvals as required.

1.08 Delivery, Storage, and Handling

- 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. Contractor shall provide secure site storage trailers.

1.09 Environmental Conditions

- A. Neither the acrylic coating nor the polyurethane foam shall 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 50°F unless specifically approved in writing by the polyurethane foam manufacturer.
- C. Do not apply acrylic coatings when temperature is below 50°F.
- D. When wind speeds exceed 10 miles per hour at the job site, 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 20 miles per hour.

1.10 Warranty

- A. The manufacturer's **10**-year Full System Recoat Warranty shall be issued upon completion, inspection and acceptance of the project. This warranty shall cover repair of leaks. 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. Physical property requirements are as follows for acceptable insulation products with Zero-Ozone Depleting Potential, such as BASF Elastospray 81285 or 81305.

Property	Value	Test Method
Density, sprayed-in-place, pcf, min.	2.7-3.2	ASTM D-1622
Compressive strength, psi	50	ASTM D-1621
Closed-cell content, percent, min.	>90	ASTM D-2856
K-factor	0.158	ASTM C-518
Dimensional Stability, 28 days, 158°F, 100% R.H., percent volume change, max.	0.69%	ASTM D-2126
Flame spread, max.	<75	ASTM E-84

2.02 Acrylic Coatings

- 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 **30** dry mils on newly applied polyurethane foam and **20** dry mils on existing coating.

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 coating as supplied by BASF is FE 1000 and has the following minimum properties:

Property	Value	Test Method
<i><u>As Supplied:</u></i>		
Solids Content		
by weight, percent	66	ASTM D 4209
by volume, percent	55	ASTM D 5201
Weight (lbs) per gallon closed cup, °F, min	11.7-11.9	ASTM D 1475
Volatile Organic Content (VOC), (g/l)	0	EPAMethod 24
<i><u>As Cured:</u></i>		
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
Weathering, QUV, 3,000 hours	No observable degradation	ASTM G 53

2.03 Sealants

- A. Sealant shall be a urethane sealant such as BASF NP1 Urethane Sealant. The color of this sealant, if exposed, shall closely match that of the topcoat. Non-pigmented or clear acrylic sealants shall not be used.

2.04 Substrate Primer

- A. Freshly scarified/planed SPF will require a primer, it must not be left exposed longer than the manufacturer's recommendations. For concrete, wood, brick, metal (ferrous, not rusted) - the primer must be approved by BASF, such as FE Coat 1601 primer
- B. For non-ferrous metals (cleaned aluminum, galvanized copper, etc) - a primer shall be required, which is approved by BASF. Such a primer is Jones-Blair Mist Coat II Primer or ITW ConBond 2725.
- C. Cut-back asphalt primers are not to be used.

2.05 Granules or Aggregate

- A. Granules shall be number 11 screen size; ceramic-coated roofing granules as manufactured by the Industrial Products Division of 3M Company, color to best match topcoat or other approved aggregate.

2.06 Protective Covering / Walkways

- A. As required, a weather-resistant, breathable, resilient pad composed of synthetic rubber 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.

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.
- C. Do not begin applying polyurethane foam insulation until substrate and environmental conditions are satisfactory.

3.02 Surface Preparation

- A. Existing Coated Polyurethane Foam Roofing System – Areas to be scarified
 - 1. Existing roof shall be inspected for any areas of wet insulation and areas of poor drainage; they shall be plotted on a roof diagram for later inspection and remediation.
 - 2. In any wet or loose areas identified in 3.02.A.1, the entire existing coating surface and approximately ½" of polyurethane foam insulation shall be removed by a roof scarfer. This machine shall be designed to plane polyurethane foam /coating systems to a level and renewable condition. Areas coated with silicone coating shall be scarified. All waste created in the planning process shall be contained, gathered, and properly disposed of.
 - 3. Any wet insulation, including that within an underlying roof system, shall be removed. Clean and dry the area and install new similar compatible insulation, and/or apply polyurethane to the level of adjacent surfaces.
 - 4. Primer - install primer such as Elastocoat 1601 as required by the warrantor's recommendation.
 - 5. Continue with the application of SPF Insulation and Coating System.

B. Recoat

For existing polyurethane foam roof systems that are deemed "acceptable for recoating", the following surface preparation guidelines shall be followed:

1. Clean existing coated surface with a high-pressure power wash using only clean water. During the power wash operation, the water pressure should be sufficient to remove dirt and debris without damaging the existing coating and polyurethane foam. Power washing with a detergent solution and water is only permitted when power washing with water alone does not sufficiently remove dirt and other contaminants.
 2. Scour any areas of accumulated dirt, fungus, mold, grease, oil, etc. with a detergent solution and water. Solvents should not be used for these cleaning purposes.
 3. In areas where a detergent solution has been used in the cleaning process, additional power washing with clean water is required to remove all residual detergent.
 4. The following minimum work shall be completed:
 - a. All wet or otherwise substandard polyurethane insulation shall be removed and replaced. 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.
 - b. Any deteriorated components of the substrate shall be replaced or brought up to acceptable standards of the warranty provider or good roofing practice.
 - c. The existing coating shall be properly adhered, if not, all loose coating shall be removed. Cracks, flashing details, slope-to-drain, metal edging, penetrations, roof drains, and all other components of the roofing system shall be functional and in accordance with manufacturer's application instructions.
 5. Deficiencies outlined in the Approved Applicator Inspection or infrared moisture survey shall be properly repaired prior to the recoat operations. Should any questions exist regarding the proper repair procedures, please contact the BASF Technical Department.
 6. Continue with coating application, as follows.
- C. Contact BASF Technical Department for recommendations on surface preparations on other surfaces to receive a BASF Acrylic/ Spray Polyurethane Foam Roof System.

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 1.09 are met.

B. Application

1. All objects that require protection from overspray shall be protected; all movable 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 polyurethane foam manufacturer. The field of the roof shall be applied, as practical, by a digitally controlled 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 new polyurethane foam shall be a minimum of 1.0 inches, except where tapering is required to facilitate drainage or areas removed are brought to the existing roof level.
4. Apply the full thickness of polyurethane foam in any area on the same day.
5. Polyurethane foam shall be applied to ensure proper 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. Foamed-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 foam textures shall be removed and refoamed prior to coating application.

3.04 BASF FE 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's Technical Department, for procedures to proceed, if UV damage has affected the foam.

4. Make sure all environmental conditions of Section 1.09 are met prior to acrylic coating application.

B. Application

1. FE 1000 Series Acrylic Roof Coating gray should be used as the basecoat on the polyurethane foam.
2. The acrylic basecoat 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.
3. Apply the basecoat in a uniform application to achieve a finished dry film thickness of approximately ½ the total millage required for the roof.
4. The basecoat shall not be subjected to foot traffic or otherwise disturbed until it is tack-free.
5. After it has cured, inspect the coating for pinholes, cracks, thin areas or other defects. All defects observed shall be caulked with sealant and/or roller coated with additional basecoat prior to applying subsequent coats of acrylic.
6. The basecoat must be cured, clean and free of all moisture prior to application of topcoat.
7. Apply the topcoat in a contrasting color to the basecoat within 72 hours of the basecoat application. The topcoat application shall be made at right angles to the basecoat application. Surface texture and conditions may require additional quantities of acrylic to insure proper millage. It is the contractor's responsibility to properly coat the insulation regardless of the quantity of acrylic coating required.
8. Apply the topcoat in a uniform application to achieve a minimum total finished dry film thickness of the basecoat and topcoat of **20** dry mils minimum over existing coated roof surfaces and **30** dry mils minimum over new SPF surfaces.
9. The 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.
10. Allow the topcoat to cure and inspect the finished coating surface for pinholes, cracks, thin areas, or other defects. Repair any defects observed with acrylic sealant and/or additional acrylic coating material.
11. 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 liquid acrylic coating required.

3.05 Granule/Aggregate Application

A. Application

1. Apply roofing granules in a finish coat of acrylic coating. 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 30-40 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 imbedment.
4. After the coating has fully cured, all loose granules shall be removed using a soft-bristled broom to prevent blocking drains and scuppers.
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 roof-top equipment to provide a working surface. Spot adhere the pads or rolls to the finished roof surface with generous buttons of urethane sealant.
- B. Walkways may also be constructed by marking out the walk path, adding an additional 10-15 mils seeded with additional granules or aggregate. This coating shall be in light but contrasting color as well as granules to match.

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 SPF/acrylic coating roof system will be secured at project completion by an independent inspection firm at a rate of one core per 10,000 square feet, with a minimum of 2 cores per roof, to test for foam thickness, compressive strength, density and adhesion. Additionally, slit samples will be taken at a rate of 6 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 foam cores.
- C. Contractor'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. Thickness and adhesion of the insulation shall be examined by removing cores at a rate of 1 every 10,000 feet.
 4. After and during coating application, the contractor shall remove slits to examine adhesion of the coating to the insulation and the dry millage of applied acrylic coating.

3.08 Safety Requirements

- A. Proper safety precautions shall be followed throughout the entire roofing operation. OSHA and local regulations shall be strictly followed. Refer to the roofing product's Material Safety Data Sheets, on site, for specific safety information on handling and working with all materials. 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.

3.09 Follow-Up Inspections

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

FOR TECHNICAL ASSISTANCE PLEASE CALL:

BASF Corporation
13630 Watertower Circle
Minneapolis, MN 55441
1-800-888-3342

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 contractor 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 suspects 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 contractor's bid or it shall state that this information will be provided to the contractor 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.