Section 075713 Fluid-Applied Roofing

Silicone/SPF Insulated Roof System for New Construction or Retrofit Applications

Master Guide Specification

1 *PART 1 – GENERAL*

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Rough Carpentry: Section 06100

B. Board-Stock Roof Insulation: Section 07220

C. Flashing & Sheet Metal: Section 07620

D. Roof Accessories: Section 07800

E. Prefabricated Expansion Joints: Section 07860

F. Painting: Section 09900

1.2 QUALITY ASSURANCE

A. Qualifications of Contractor

(1) The Contractor shall be acceptable to the Primary Coating Materials Manufacturer for application of its roof coatings products, and shall have a minimum of five (5) years of experience in the application of spray polyurethane foam and elastomeric roof coatings. The roofing applicator must present documentation that he/she has successfully completed the SPF Chemical Health & Safety Training Program as provided by The American Chemistry Council.

(2) The Contractor shall provide a list of project references similar in nature to the one proposed, including contact names and telephone numbers.

B. Qualifications of Manufacturer

(1) Manufacturer of the fluid applied elastomeric coating system shall have a proven track record of successful installations of elastomeric technology.

(2) Other Manufacturer's products shall be accepted for use on this project only after submittal of product data files to the Architect or Owner supporting quality, equality and full compliance with specifications herein. The Architect or Owner reserves the right to reject the substitution proposals should it be determined the submittals do not provide all functions required for application.

(3) Manufacturer to be certified ISO 9001:2008

C. Testing and Labeling

(1) The coating system to be U.L. Classified tested in compliance to UL790 for Class A, B or C roofing constructions. Products to be subject to Underwriters Laboratory Follow-up Services.

(2) Individual container labels must include the following information or they will be rejected at the jobsite: Manufacturer's name, product name, type and class of material, all

applicable Code and Testing approval logos, batch or lot number, mixing and application instructions, and precautions.

1.3 SUBMITTALS

A. Submit Manufacturer's literature, certificates and samples in a single package to the Architect or Owner in accordance with requirements specified in General Conditions.

B. Manufacturer's Literature: Literature on the SPF, protective coating, as well as related primers, sealants, reinforcement, etc., shall be submitted for review before work is started. Literature shall show material specifications, physical properties (including ASTM test methods utilized), and manufacturer's estimated application rate for required dry mil thickness per warranty requirements, current application instructions and SDS.

C. Applicator's Qualifications: Submit a copy of manufacturer's registration or certification as issued by the Manufacturer.

D. Warranty: Submit a copy of Primary Coating Materials Manufacturer's warranty to comply with project requirements.

1.4 PRODUCT DELIVERY, STORAGE & HANDLING

A. Delivery of Materials: Materials shall be delivered to the jobsite in Manufacturer's original, sealed containers with labels legible and intact.

B. Storage of Materials: Materials shall be stored in an area specifically designated for that purpose, in accordance with Manufacturer's recommendations, where temperatures are within the limits specified by the manufacturer.

C. Material Handling: Materials shall be handled, stored and installed per Manufacturer's instructions and all applicable safety regulatory agencies.

D. Damaged Materials: Contaminated, damaged or unsealed materials or materials not conforming to the specified requirements shall not be used in the installation. Rejected containers shall be immediately removed from the jobsite and replaced at no additional cost to the Owner.

1.5 ENVIRONMENTAL CONDITIONS

A. Install all materials in strict accordance with Manufacturer's published safety, weather and temperature precautions.

B. Do not apply polyurethane foam or elastomeric coating system components when the ambient and/or surface temperature is below 50°F (10°C) or above 110°F (43°C), if surface moisture is present, when the dew point is within 5°F (3°C) of the surface temperature or when there is a possibility of temperatures falling below 32°F (0°C) within a 24 hour period. Do not apply if weather conditions will not permit complete cure before rain, dew, fog or freezing temperatures occur. Do not spray apply if the wind velocity exceeds 10 mph (16 kph) without taking precautions to eliminate overspray.

C. Take all measures necessary to protect unrelated work and other adjacent surfaces from coating overspray or spillage.

1.6 SEQUENCING AND SCHEDULING

A. 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 silicone coating are being installed.

1.7 FIELD QUALITY CONTROL

A. The overall weather conditions, including surface temperature, surface moisture, ambient temperature, relative humidity and wind velocity shall be recorded by the Contractor, at designated time intervals, on the Daily Quality Control Report form if so requested by the Architect or Owner.

B. Verification of Protective Coating Thickness: During application of the elastomeric coating, the wet film thickness shall be measured and recorded daily, along with the quantity and batch numbers of the material applied and total square feet coated, on the Daily Quality Control form.

1.8 WARRANTY

A. 10-Year System Warranty

B. 15-Year System Warranty

C. 20-Year System Warranty

2 *PART 2 – PRODUCTS*

2.1 DESCRIPTION: A seamless, fluid applied membrane system designed for application over Spray Polyurethane Foam roof substrates. Approved system shall be KM Coatings SPF Silicone Coating System. The coating material and the spray polyurethane foam (SPF) insulation must be supplied by KM Coatings.

2.2 MATERIALS

A. Construction Grade Sealant: single package polyurethane sealant as approved by Coating Manufacturer for use on termination bars and counterflashing.

B. Substrate Primer: KM Primeseal 1, one part water-based epoxy primer designed to maximize adhesion to a variety of substrates including, built-up roof, modified bitumen, wood, concrete, fiberglass, and metal.

or

Substrate Primer: KM Min Prime, a low VOC, acrylic primer suitable over substrates such as built-up roofing, modified bitumen, masonry, wood, concrete or previously coated surfaces.

or

Substrate Cleaner/Primer: KM EPDM Primer, applied to single-ply membranes prior to powerwashing to enhance cleaning the cleaning process and promote adhesion. May be used as a stand alone product over EPDM roof membrane. Thermoplastic membranes may require additional primers. Contact KM Technical Services for additional information.

or

Substrate Primer: KM SP 1000, a specially formulated primer for thermoplastic roof membranes such as thermoplastic olefin (TPO).

C. Polyurethane Foam Insulation: KM-214, with Zero-Ozone Depleting Potential

Test Property	Test Value	Test Procedure
Density, Sprayed-in-Place, pcf, min.	2.5 – 3.0	ASTM D 1622
Compressive Strength, psi, min.	50	ASTM D 1621
Closed-cell Content, Percent, min.	>90	ASTM D 2856

K-factor, aged, max.	0.158	ASTM C 518
Dimensional Stability, 28 days, % vol. change, max.	+0.69	ASTM D 2126
Flame Spread, max.	<75	ASTM E 84

D. Viscosity Modifying Reinforcement Material: 40/40 Fibers, a high-tensile polyethylene fiber for use in the field by the applicator to modify thickness, enhance sag resistance and for use in high build application when utilized with KM silicone roof coatings. 40/40 Fibers by KM Coatings.

E. Reinforcement Fabric: Stitch bonded polyester fabric, Titex Reinforcing Polyester by KM Coatings for reinforcing seams, flashing, and large detail areas.

Test Property	Test Value	Test Procedure
Thickness (in.)	0.018	ASTM D 1777
Tensile Strength	MD: 67 lbs. CD: 59 lbs.	ASTM D5034
Trapezoid Tear	MD: 22 lbs. CD: 21 lbs.	ASTM D 5587

F. Fluid Applied Elastomeric Products:

(1) Silicone Roof Coating: KM PS #220 single component, solvent borne, moisture cure silicone roof coating:

Test Property	Test Value	Test Procedure
Accelerated Weathering @ 8760 hr.	Pass	ASTM G53
Permeance (perms)	5.9	ASTM E 96 (procedure B)
Elongation (%)	250 $\pm$ 25	ASTM D 2370
Tensile Strength (psi)	475 $\pm$ 25	ASTM D 2370
Hardness (Shore A)	50 $\pm$ 5	ASTM D 2240
Viscosity – spray grade / bulk (cP)	5,000 – 8,000	Brookfield© 4d/5 rpm @ 77ºF
Viscosity – roller grade / pail (cP)	8,000 – 12,000	Brookfield© 4d/5 rpm @ 77ºF
Weight per gallon (lb)	10.2	ASTM D 2939
Solids Weight (%)	80 $\pm$ 2	ASTM D 1644
Solids Volume (%)	69 $\pm$ 2	ASTM D 2697
Solar Reflective Index – initial (white)	106	
Reflectivity – initial (white)	85	ASTM C 1549
Emissivity – initial (white)	85	ASTM C 1371
Temperature Stability Range (ºF)	-80 to 350	
Tack-free time (hrs. subject to temp./humidity)	1-4	ASTM D 3960
VOC (gm/l)	< 250	Std. Method

Flash Point (ºF)	105	PMCC

(2) Silicone Roof Coating: KM PS #250 is a premium grade, high solids, single component, moisture cure silicone roof coating:

Test Property	Test Value	Test Procedure
Accelerated Weathering @ 5,000 hr.	Pass	ASTM 6694
Permeance (perms)	5.9	ASTM E 96 (procedure B)
Elongation (%)	250 ± 25	ASTM D 2370
Tensile Strength (psi)	375 ± 25	ASTM D 2370
Hardness (Shore A)	50 ± 5	ASTM D 2240
Viscosity – spray grade / bulk (cP)	5,000 – 8,000	Brookfield© 4d/5 rpm @ 77ºF
Viscosity – roller grade / pail (cP)	8,000 – 12,000	Brookfield© 4d/5 rpm @ 77ºF
Weight per gallon (lb)	10.8	ASTM D 2939
Solids Weight (%)	96 ± 2	ASTM D 1644
Solids Volume (%)	96 ± 2	ASTM D 2697
Solar Reflective Index – initial (white)	110	
Reflectivity – initial (white)	87	ASTM C 1549
Emissivity – initial (white)	89	ASTM C 1371
Temperature Stability Range (ºF)	-80 to 350	
Tack-free time (hrs. subject to temp./humidity)	1-4	ASTM D 3960
VOC (gm/l)	< 50	Std. Method
Flash Point (ºF)	290	PMCC

G. Granules: KM Granules , ceramic-coated roofing granules as

H. Protective Covering / Walkways: 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 KM Coatings.

3 *PART 3 – EXECUTION*

3.1 SURFACE INSPECTION: Inspect all roof surfaces to receive work specified under this section to ensure that the following conditions exist:

A. Roof surfaces shall be clean, dry, and structurally sound, stable and well secured.

B. Metal roof decks 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 the substrate and environmental conditions are satisfactory.

D. KM silicone coatings are not affected by ponding water. However, the NRCA (National Roofing Contractors Association.) considers ponding water undesirable and recommends that all roof assemblies have positive drainage. KM Coatings recommends adherence to the NRCA guidelines.

E. Inspect condition of flashing details adjacent to protrusions, penetrations, roof mounted equipment, curbs, walls, parapets, drains and roof edge to ensure that details are acceptable and will maintain a weather-tight installation after being properly detailed and coated.

F. **Recommended Option:** Determine moisture content of existing substrate, insulation and deck. If excessive moisture is found, work shall not proceed until the cause of the moisture is verified and the condition is corrected.

3.2 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 Primeseal 1, Black primer at the rate of ½ gallons per 100 square feet.

(6) Lightweight Insulating Concrete - If present in the existing roof assembly, recommendations will be made on a per job basis, please contact KM Technical

Services.

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 Primeseal 1, 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. EPDM & Thermoplastic Roof Membranes (except TPO) – fully adhered systems only

(1) Clean membrane by pressure washing with clean tap water to remove all dirt, duct, oils and other contaminants.

(2) Remove all wet insulation under existing roof membrane. Clean and dry the area and install new similar compatible insulation to the level of the adjacent existing membrane.

(3) Remove or fasten adhere all loose or damaged roof membrane, properly adhering to form a solid substrate Cutback products shall not be used. Make sure the adjoining roof materials around these defects are dry.

(4) Cut membrane around details, projections and edge terminations or any areas where the membrane is stretched tight.

(5) Primer - Install KM EPDM Primer. Make sure all surfaces are clean and dry prior to primer and/or polyurethane foam application.

E. EPDM & Thermoplastic Roof membranes – fastened

(1) Cut membrane at all details, protrusions and edge terminations after preparation.

(2) Remove any ballast.

(3) Fasten per appropriate wind uplift criteria to meet building code, a wood fiber recover

board, DensDeck, or Securerock recover board and ensure the surface is clean and free or other contaminants.

F. Other Surfaces

(1) Contact KM Technical Services for recommendations on surface preparations on other surfaces to receive a KM Silicone Roof System.

3.3 POLYURETHANE FOAM APPLICATION

A. Inspection

(1) Prior to polyurethane foam application, inspect the substrate surface to ensure substrate preparations have been met.

(2) Polyurethane foam shall not be applied unless the environmental requirements have been 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 to a maximum of 1.5" thick passes at one time. The cool down time of 20 minutes before adding another pass or lift is required and repeated until the overall desired thickness is achieved. The total thickness of the polyurethane foam shall be a minimum of **1.5** inches (or more for additional insulation value) (standing seam metal decks will require minimum **2** inches) 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 which holds water 48 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.

3.4 ELASTOMERIC COATING APPLICATION

A. Inspection

(1) Prior to the application of silicone coating, inspect the polyurethane foam surface to ensure the conditions of Section 3.3 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 silicone coating.

(3) If more than 24 hours have elapsed between the polyurethane foam application and the start of the silicone coating application, thoroughly inspect the polyurethane foam surface for UV degradation and oxidation. Call KM Technical Services for procedures to proceed, if UV degradation has affected the SPF.

(4) Make sure all environmental conditions are met prior to silicone coating application.

B. Application

10-year Warranty Installations:

(1) Apply base coat of KM PS #220 at a minimum rate of 1 gallon per 100 sq. ft., 16 wet mils (0.6 l/m²), 11 mils dry film thickness (DFT).

(2) After allowing the base coat to dry, apply one (1) or more coats of PS #220 at a minimum rate of 1 gallon per 100 sq. ft., 16 wet mils (0.6 l/m²), 11 mils dry film thickness (DFT) per coat. Apply consecutive coats in a perpendicular direction to the previous coat.

(3) Minimum system thickness: 22 dry mils

or

(4) Apply one (1) coat KM PS #250 at a minimum rate of 1.5 gallons per 100 sq. ft., 24 wet mils (0.9 l/m²) for a 22 mil dry film thickness (DFT). If applied in multiple coats, consecutive coats should be applied in a perpendicular direction to the previous coat of silicone and must be done within 24 hours of said application.

(5) Minimum system thickness: 22 dry mils

15-year Warranty Installations:

(1) Apply base coat of KM PS #220 at a minimum rate of 1.25 gallons per 100 sq. ft., 20 wet mils (0.75 l/m²), 14 mil dry film thickness (DFT).

(2) After allowing the base coat to dry, apply one (1) or more coats of PS #220 at a minimum rate of 1.25 gallon per 100 sq. ft., 20 wet mils (0.75 l/m²), 14 dry film thickness (DFT) per coat. Apply consecutive coats in a perpendicular direction to the previous coat.

Minimum system thickness: 27 dry mils

or

(3) Apply one coat KM PS #250 at a minimum rate of 2.0 gallons per 100 sq. ft., 32 wet mils (1.2 l/m²), for a 30 mil dry film thickness (DFT). If applied in multiple coats, consecutive coats should be applied in a perpendicular direction to the previous coat of silicone and must be done within 24 hours of said application.

(4) Minimum system thickness: 30 dry mils

20-year Warranty Installations:

(1) Apply base coat of KM PS #220 at a minimum rate of 1.5 gallons per 100 sq. ft., 24 wet mils (0.96 l/m²), 16.5 mil dry film thickness (DFT).

(2) After allowing the base coat to dry, apply one (1) or more coats of PS #220 at a minimum rate of 1.5 gallons per 100 sq. ft., 24 wet mils (0.96 l/m²), 16.5 mil dry film thickness (DFT) per coat. Apply consecutive coats in a perpendicular direction to the previous coat.

(3) Minimum system thickness: 33 dry mils

or

(4) Apply one coat KM PS #250 at a minimum rate of 2.5 gallons per 100 sq. ft., 40 wet mils (1.5 l/m²), for a 38 mil dry film thickness (DFT). If applied in multiple coats, consecutive coats should be applied in a perpendicular direction to the previous coat of silicone and must be done within 24 hours of said application.

(5) Minimum system thickness: 38 dry mils

3.5 GRANULE APPLICATION (Optional)

A. Application

(1) Apply roofing granules in a topcoat of silicone coating. A minimum of 10 dry mils of silicone coating is required to hold the granules.

(2) Apply the roofing granules, using suitable compressed air equipment, uniformly at a rate of approximately 35- 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.

3.6 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 silicone sealant. These shall be applied where instructed by owner's representative.

B. Walkways may also be constructed by marking out the walk path, adding 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.

3.7 CLEANUP

A. Maintain work and work areas in a clean, safe condition at all times during reroofing installation. Remove excess materials, trash and debris from the jobsite daily.

B. At the completion of the project, clean area of any spills and containers, and clean up all roofing debris, leaving jobsite in a clean and orderly condition.

3.8 WARRANTY

A. Upon completion of the roof coating system, the Coating Manufacturer's Representative, Owner's Representative, Architect and Applicator shall make a final roof observation to determine the dry film thickness of the fluid applied membrane and to verify that the system meets the Manufacturer's requirements for warranty. The Contractor shall notify all interested parties in advance of said roof observation.

B. As a condition of the project's completion and acceptance, deliver to the Owner a copy of the fully executed, specified warranty from the Coating Manufacturer, following individual warranty guidelines.