Section 07560 Fluid-Applied Roofing

Metal Roof Preservation System with Silicone 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 approved by the Coatings Manufacturer for application of its roof coatings products, and shall have a minimum of three (3) years experience in the application of elastomeric roof coatings.

(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 must be certified ISO 9001:2008 Quality

C. Testing and Labeling

(1) The coating system must be U.L. 790 classified as a Class A fluid-applied system for maintenance and repair of existing Class A, B or C roofing construction, and be subject to Underwriters Laboratory follow-up service.

(2) The silicone coating shall also be approved and listed by Factory Mutual as an acceptable recoating system over existing roof substrates, and approved by Miami-Dade County

(3) The Manufacturer shall also provide recognized, third party independent test results confirming the coating system's conformance to ASTM D6694.

(4) 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, U.L.

sticker with classification issue number, Factory Mutual logo, 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 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 Registration of Applicator letter and/or certificate as issued by the Manufacturer of the elastomeric coating system

D. Warranty: Submit a copy of Coating Manufacturer's warranty to meet project specifications.

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 will not be less than 50°F (10°C) or higher than 100°F (38°C).

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 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 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.

1.7 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 metal roof substrates.

2.2 MATERIALS

A. Construction Grade Caulk: one-part polyurethane sealant as approved by Coating Manufacturer for use on termination bars and counterflashing. Caulk must comply with ASTM C920.

B. Primer: KM Epoxy Primer, a two component, 1 to 1 ratio, water-based epoxy primer

Test Property	Test Value	Test Procedure
Weight/gal. (As mixed A+B) (lb.)	11.7	ASTM D 2939
Solids Weight (%)	60% $\pm$ 2	ASTM D 1644
Solids Volume (%)	42.5% $\pm$ 2	ASTM D 2697
Temperature Limit for normal Service (^{o}F)	-40 to 180	
VOC	<55 g/l	Std. method
Flash Point ^{o}F	212	PMCC

C. Viscosity Modifying Reinforcement Material: KM 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.

D. Reinforcement Fabric: Stitch bonded polyester fabric, KM Reinforcing Polyester 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

A. Fluid Applied Elastomeric Products:

(1) Silicone Roof Coating: 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 ± 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)	10.2	ASTM D 2939
Solids Weight (%)	80 ± 2	ASTM D 1644
Solids Volume (%)	69 ± 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: 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

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. 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.

C. 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.

3.2 SURFACE PREPARATION

A. All surfaces shall be clean and dry, and free of any dirt, dust, gravel, oil, surface chemicals or other contaminants that may interfere with optimum adhesion.

B. All mechanical fasteners shall be checked for integrity. Retighten or replace as necessary. "Stripped out" fasteners shall be replaced using a larger diameter fastener.

C. Unsound rust shall be wire brushed, sandblasted or mechanically abraded to remove all loose rust. Metal panels deteriorated to the point that their structural integrity is compromised shall be replaced.

D. Remove excessive amounts of asphaltic-based or other deteriorated patching/flashing materials if present.

E. Check all seams to ensure that they are tight and flush. Excessive gaps or deflections between panels shall be eliminated by installing additional screws or rivets as necessary to restrict deflection to ¼" (6 mm) or less.

F. All metal surfaces, whether new or existing, shall be cleaned using under high pressure (minimum 2,500 psi) to remove contaminants, along with any existing loose paint or coating. Heavy deposits of dirt or contamination may require agitation with a stiff-bristle broom or other mechanical scrubber. Allow the roof to dry thoroughly.

G. All existing "sound" rusted areas can be coated with PS #220 directly.

H. If utilizing PS #250 High Solids Silicone, apply KM Epoxy Primer at a minimum rate of 300 square feet per gallon. Color: Gray. If primer is left exposed for over 36 hours, re-prime the roof's surface.

I. KM Coatings recommends: Adhesion Test, one (1) test every 10,000 sq. ft.

(1) Procedure: In accordance with ASTM D 903

(a) Clean area at least 12 inches by 12 inches

(b) Prime area and permit to cure

(c) Coat area at specified rate

(d) While coating is still wet, embed 2-inch wide polyester fabric across test patch leaving 6-inch long dry section outside of test patch.

(e) Apply second coat to totally encapsulate flashing fabric and allow to cure for 14 days minimum.

(f) Pull dry end of flashing fabric with calibrated scale to failure of adhesion.

(2) Passing criteria: four (4) pounds minimum resistance prior to failure.

(a) If adhesion test fails, additional cleaning and/or priming may be required.

J. Fill gaps between ¼" and ½" at panel seams, joints and protrusion with KM Silicone modified with KM 40/40 Fibers to form an elastomeric mastic. Fill gaps larger that ½" using polyethylene backer rod or spray applied polyurethane foam.

K. All horizontal (end-lap) seams and vertical (side-lap) seams that have not been factory crimped or pre-sealed, roof terminations and flashings, around drains, scuppers and skylights, and base of all vents, conduits, HVAC equipment and other protrusions shall be reinforced using one or more of the following methods;

(1) Apply base coat of silicone elastomer liberally, using brush or roller, along the area to be detailed. While elastomer is still wet, embed a strip of 6" or 12" polyester mesh as per detail requirements, centered over the seam, joint or interface. Work the mesh into the elastomer applying additional material as necessary to totally encapsulate the reinforcing fabric.

(2) Apply KM Silicone modified with KM 40/40 Fibers at a thickness of 60 to 80 dry mils over the detail area. Extend the sealant a minimum of 2" on either side of seams, joints and interfaces. Sealant must be applied in 2 coats.

L. At the interface of any metal with a dissimilar material, detail the joint using one of the following methods:

(1) Apply 6" Polyester Mesh embedded into the base coat of silicone as described in the previous section.

(2) Apply KM Silicone as previously described.

M. All mechanical fastener heads shall be treated using one of the following methods:

(1) Apply KM Silicone modified with KM 40/40 Fibers to completely encapsulate the screw head and seal the base of the fastener to the metal deck.

3.3 ELASTOMERIC COATING APPLICATION

A. All roof preparation materials shall be allowed to fully dry prior to full roof surface application of the elastomeric coating system.

B. Immediately prior to application of the coating system, all dust, dirt and other contaminants shall be blown off the roof surfaces to be coated using high pressure compressed air.

C. It is often easier to visually see splits, tears or other damage in the roof surface after application of the first coat**.** For this reason the roof surface should be inspected after application of the first coat for any damage that was not detailed previously.

D. The entire roof substrate shall receive elastomer coating applied as follows:
Note: Airless spray is the preferred method of application. A medium to heavy nap roller may be used for application over flat substrates. Brush or roller may be used for touch-up or detail work or for small areas that are not practical for spray application.

10-year Warranty Installations:

(1) Apply base coat 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).

(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) Once the KM Epoxy Primer is dry, apply one (1) coat 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:

(6) Apply base coat of 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).

(7) 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.

(8) Minimum system thickness: 27 dry mils

or

(9) Once the KM Epoxy Primer is dry, apply one coat 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.

(10) Minimum system thickness: 30 dry mils

20-year Warranty Installations:

(11) Apply base coat 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).

(12) 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.

(13) Minimum system thickness: 33 dry mils.

or

(14) Once the KM Epoxy Primer is dry, apply one coat 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.

(15) Minimum system thickness: 38 dry mils.

3.2 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.

3.3 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.