SECTION 072800

LIQUID-APPLIED INSULATIVE COATING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Spray-applied insulative coating including primer, insulative coating and topcoat. Applied to steel penetrating the exterior envelope, as indicated on the Drawings, and at a minimum 24 inches inboard and 24 inches outboard of the exterior envelope, including canopies, terraces and roof penetrations for dunnage and davits and similar items.
2. Aerogel filled thermal break tape including primer coating at locations where spray or roller applied coating is not practical (Contractor's option).

B. Sustainable Design Intent: Refer to Section 018110 - SUSTAINABLE DESIGN REQUIREMENTS for certification level and certification requirements.

C. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 051200 - STRUCTURAL STEEL FRAMING for steel substrates.
2. Section 055000 - METAL FABRICATION for steel substrates.
3. Section 099000 - PAINTING AND COATING.

1.3 SUBMITTALS

A. Product Data: Submit product data including manufacturers technical data indicating product performance characteristics, performance and limitation criteria.

B. Shop Drawings: Submit shop drawings with plans, elevations, and details showing all locations where this system will be applied.

1. Include details of interfaces with other materials that form part of air barrier.
2. Include details of mockups.
3. Include relationship with adjacent materials (roof membrane, air barrier flashing membranes, and similar items), indication of sequence of installation for coordination during construction, and materials and methods for sealing connections and penetrations.

C. Manufacturer’s Instructions: Submit manufacturer written installation instructions.

D. Applicator Qualifications: Submit applicators current certification as a manufacturer trained applicator.

E. Performance Documentation: Submit published design listings for insulation value ratings and product thickness. Include evidence that the liquid thermal break testing was sponsored by the manufacturer and that the material tested was produced at the manufacturers facility under the

supervision of technical personnel.

1.4 QUALITY ASSURANCE

A. Manufacturer:

1. Company specializing in manufacturing product in this section with a minimum of 2 years documented experience in manufacturing insulative technology.
2. Applicator: Company specializing in applying the work of this section with documented experience and certified / trained by the manufacturer.
3. Liquid applied thermal break acrylic system shall be the complete system from a sole source consisting of primer, acrylic thermal break material and topcoat.

B. Mock-up:

1. Minimum thirty days prior to application in any area, provide mock-up samples of coating materials in accordance with the following requirements:

a. Provide minimum two square feet on all representative substrates and conditions, where directed by the Engineer, for each different desired R Values and finish of required for the work.
b. Provide mock-up areas that comply with thickness, density application, finish texture, and color.
c. Inspect mock-up areas within one hour of application for variance due to shrinkage, temperature, and humidity.
d. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary to meet required installation, R Value, finish, and color requirements.
e. Continue to provide mock-up areas at the Contractor's expense until acceptable areas are produced.
f. Acceptable areas shall constitute standard of acceptance for method of application, thickness, finish texture, and color requirements, for Liquid applied thermal break material applications.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials in manufacturers’ original, sealed, undamaged container with identification label intact. Packaged materials shall bear the appropriate labels, seals.

B. Storage: Materials shall be stored in strict accordance with manufacturers documented instructions.

C. Documentation: All batch number, product identification and quantities shall be recorded on appropriate QC documents. A copy of the transport document and manufacturers conformance certificate shall be attached to the material delivery on site.

1.6 PROJECT/SITE CONDITIONS

A. Project Environmental Requirements: Substrate and air temperature shall be in accordance with the manufacturers’ requirements including the following:

1. Protect work area from windblown dust and rain. Protect adjacent areas from over spray of material.
2. Provide ventilation in areas to receive work of this section during application and minimum 24 hours after application.

B. Temperature and Humidity Requirements: Maintain air temperature and relative humidity in

areas where products will be applied for a time period before during and after application as recommended by manufacturer.

1. Do not apply coatings when temperature of substrate and/or surrounding ambient air temperature is below 45 degrees F. Temporary protection and heat shall be maintained at this minimum temperature for 24 hours before, during and 24 hours after material application.
2. Steel substrate temperature shall be a minimum of 5 degrees F (3 degrees C) above the dew point of the surrounding air for a period of 24 hours prior and during the application of the material.
3. If necessary for job schedule, the General Contractor shall provide enclosures and heat to maintain proper temperatures and humidity levels in the application areas.
4. The relative humidity of the application area shall not exceed a maximum of 85 percent 24 hours prior, during and 24 hours after the application of the material. The relative humidity shall not exceed 75 percent throughout the application and drying of the decorative top coat finish.

1.7 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard 5-year material warranty.

PART 2 - PRODUCTS

2.1 LIQUID-APPLIED INSULATIVE COATING

A. Basis-of-Design: Tnemec Aerolon Series 971 Coating System by Tnemec, Kansas City, MO, as represented by The Righter Group, ww.rightergroup.com, Tel. 800-533-3003.

1. Steel: Surface Preparation and Primer for Coating Steel, Shop or Site Applied:

   a. Preparation: Abrasive blast clean, SSPC SP-6 surface profile 2-3 mils. Remove weld splatter and grind defects smooth. Steel substrate temperature shall be a minimum of 5 degrees F above the dew point of the surrounding air for a period of 24 hours prior and during the application of the material.
   b. Primer: Tnemec Series 1224T with less than 11 grams VOC, surface tolerant inorganic epoxy coating, at 6-8 mils DFT.

2. Galvanized Steel: Surface Preparation and Primer for Coating Steel, Shop or Site Applied:

   a. Preparation: SSPC SP16.
   b. Primer: Tnemec 135 Chembuild at 5-7 mils DFT.

3. Concrete: Surface Preparation and Primer for Coating Concrete, Site Applied:

   a. Preparation: Grind all surfaces smooth.
   b. Primer: Tnemec Series 1224T with less than 11 grams VOC, surface tolerant inorganic epoxy coating, at 6-8 mils.

4. Aluminum: Surface Preparation and Primer for Coating Aluminum, Site Applied:

   a. Preparation: Clean surface of foreign material, grind defects smooth.
   b. Primer: Tnemec Series 1224T with less than 11 grams VOC, surface tolerant inorganic epoxy coating, at 6-8 mils.

5. Insulative Coating: Coating Tnemec Series 971 Aerolon liquid-applied thermal break coating.

a. Solids by Volume: 76 percent.
b. Coating Type: Water based thermal acrylic, spray applied.
c. Fire Performance: ASTM E 84, Class A.
d. VOC Content: 0.01 lbs./Gallon (1.0 grams /liter).
e. Thinned: 0.01 lbs./ gallon (1.0 grams /liter).
f. HAPS: 0 lbs. per gallon solids.
g. Curing Time: 75 degrees F, 4 hours to touch 16 hours to recoat.
h. Thermal Transmission: ASTM C 518, no more than 50 mW/ mK.
i. Net Weight per Gallon: 4.66 lbs. per gallon
j. Storage Temperature: 40-110 degrees F.
k. Number of Components: One component part powder not liquid
l. Pot Life: 2 hours.
m. Spray Life: 2 hours.
n. Prohesion: ASTM D 5894, 4,00 hours.
o. Salt Fog: ASTM B 117m 4,000 hours.
p. Immersion: ASTM D 870 – 4,000 hours.
q. Humidity: ASTM D 4585 – 4,000 hours
r. Water Immersion: ASTM D 870 Method B, 2,000 hours at 140 degrees.
s. Taber Abrasion Resistance: ASTM D 4060 (CS-17 Wheel, 1,000g load), no more than 50 mg loss after 1,000 cycles.
t. Required Thermal Resistance, W Sections, 60 mils (approx 1/8 inch): 0.25 R-value.
u. Required Thermal Resistance, HSS Sections, 120 mils (approx 1/16 inch): 0.50 R-value.

6. Topcoat: Tnemec Series 1028 Enduratone or Tnemec at 2-3 mils DFT for non-immersion services. Apply Tnemec Series 22 at 16-40 miles DFT depending on application for areas where immersion is required.

a. Color for Exposed Applications: As selected by Architect.

2.2 AEROGEL FILLED THERMAL BREAK TAPE

A. Basis-of-Design: Tnemec Aerolon Series 945 Peel & Stick by Tnemec, Kansas City, as represented by The Righter Group, ww.rightergroup.com, Tel. 800-533-3003.

1. Primer Coating For Steel or Concrete to Receive Thermal Break Tape: Tnemec Series 90-97, 394, 530V (Concrete) or 1224 VOC, surface tolerant inorganic epoxy conforming to the following requirements. Galvanized metal must be clean dry and abraded.

a. Bond Strength: ASTM D4541 1320 psi
b. Abrasion Resistance: ASTM 4060 181 mg
c. Cathodic Disbondment: ASTM D G8- No disbondment 3000 Hrs.
d. Water Vapor Transmission: ASTM D 1653 4.68 g/m2 /24hrs/<0.22 prms.

2. Tnemec Series 945 Aerogel Filled thermal break tape, 76% solids, conforming to the following requirements: Material may be shop or field applied.

a. Solids by Volume: 76% Water based thermal insulative acrylic tape.
b. Recommended Film Thickness: 60 mil thick Aerolon Tape applied in multiple applications to specified R Value.
c. VOC Content: 0.01 lbs./Gallon (1.0 grams /liter).
d. Thinned: 0.01 lbs./ gallon (1.0 grams /liter).
e. HAPS: 0 lbs. per gallon solids.
f. Curing Time at 75 degrees F: 4 hours to touch , 16 hours to recoat.
g. Thermal Transmission: Must meet ASTM C 518 - No more than 49.8mW/ mK.

h. Net Weight per Gallon: 4.66 lbs. per gallon.
i. Storage Temperature 40 degrees F Maximum 110 degrees F
j. Number of Components: ne component.
k. Primer Required: As recommended by manufacturer.
l. Topcoat Required: Refer to Section 2.0 and 3.0.
m. Pot Life: 2 hours.
n. Spray Life: 2 hours.

3. Thermal Resistance of Thermal Break Tape: Thermal Conductivity (ASTM C518 at 77°F): 0.0497 W/m-°K or 0.3446 BTU-in/ft²-hr-°F (R value at one inch equals 2.9) Tnemec 945 is to be applied in 60 mil (1.5mm) lifts to desired R value established by Architect. Performance Data:

a. ASTM E 84 – Class A.
b. ASTM D 5894 – 4,000 hrs Prohesion.
c. ASTM B 117 – 4,000 hrs Salt Fog.
d. ASTM D 870 – 4,000 hrs. Immersion.
e. ASTM D 4585 – 4,000 hrs. Humidity.
f. 18 Months Roof Exposure.
g. Compatible with DOW 790 Sealant.

4. Application Thickness:

a. W Sections: One 60 mils layer.
b. HSS Sections: Two 60 mils layers.
c. Concrete: Minimum two 60 mil layers; confirm with manufacturer based on site conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Application shall not commence until the Contractor, Installer and Architect/Engineer have examined the surfaces to receive the primer and determined the surfaces are acceptable to receive the coatings and that the interface to adjacent air barrier materials has been reviewed and approved by all manufacturers. Commencement of application means acceptance of substrate.

B. Verify that substrate and workspace temperature and humidity conditions are in accordance with manufacturers recommendations.

3.2 PREPARATION

A. Provide masking, drop cloths or other suitable coverings to prevent overspray onto surfaces not intended to be coated.

B. Clean, dry and free of oil, grease, loose mill scale, dirt, dust or other foreign substances which would impair bond of the material to the substrate.

C. Primer shall not be applied to prepared substrate until the area has been adequately vented to remove all airborne dust. Prior to the application of any coating material, the blast products, dust and debris, shall be removed by vacuuming.

3.3 APPLICATION OF INSULATIVE COATING

A. Equipment and application procedures shall conform to the manufacturer’s application instructions. Materials shall be applied at the required dry film thickness per the appropriate thicknesses specified.

B. Apply primer at thickness recommended by manufacturer. Apply insulative coating 60 mils for W Shapes, 120 mils for HSS sections per wet film thickness (DFT) per lift. Measure final DFT with a dry film thickness gauge. Apply topcoat at thickness recommended by the manufacturer.

C. Follow all manufacturer recommendations regarding adhesion and compatibility requirements for materials that come in contact with the liquid-applied insulative coating.

D. Do not apply coatings to steel deck unless otherwise indicated.

E. Follow all manufacturer recommendations regarding adhesion and compatibility requirements for materials that come in contact with the liquid-applied insulative coating.

3.4 APPLICATION OF THERMAL BREAK TAPE

A. Equipment and application procedures shall conform to the manufacturer's application instructions. When the use of Tnemec Series 971 or 961 Aerolon Acrylic are used in concert with Tnemec 945 , apply 945 First and spray 971 or 961 onto the Aerolon 945 Tape.

B. Apply Tnemec Series 945 Aerolon, Aerogel Filled Thermal Break Tape at thicknesses / layer noted above mils per layer. Subsequent layers may be applied immediately after each other, using heat gun to activate adhesive more quickly as required in low temperature applications until final DFT is achieved for required. Work bubbles out of film with wallpaper or other rollers making 945 intimately bonded to substrate with no air gaps.

3.5 FIELD QUALITY CONTROL

A. The Owner will engage an independent testing laboratory inspect and verify the application of material in accordance with the provisions Tnemec Company.

1. Material inspection and testing shall be performed 24 hours after completion of final application coat.
2. The results of the above tests shall be made available to all parties at the completion of each pre-designated area and approval.
3. In-place material not in compliance with desired R Values the specification requirements shall be corrected prior to final acceptance.

B. The dry film thickness (DFT) of the applied material shall be measured with a non¬destructive coating thickness gage after material has completely cured. All measurements shall be documented in writing and furnished to the Owner.

3.6 CLEAN UP AND REPAIR

A. Upon completion of installation, excess material, overspray and debris shall be cleared and removed from the job site. Remove overspray materials from surfaces not required to be thermally protected.

B. Patching and repair to material, due to damage by other trades, shall be performed under this Section and paid for by the trade responsible for the damage. Patching shall be performed by applicators certified by the manufacturer and applied in accordance with the manufacturer application instructions.

END OF SECTION