

SECTION 07 21 63 – FLUID-APPLIED INSULATIVE COATING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Section includes a spray-applied insulative coating including primer, insulative coating and topcoat for the following applications:
 - 1. Applied to ferrous and non-ferrous metal fabrications, pipe, and fittings

1.2 REFERENCES

- A. American Society of Testing and Materials (ASTM)
 - 1. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus
 - 2. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 3. ASTM C1057 – Standard Practice for Determination of Skin Contact Temperature from Heated Surfaces Using a Mathematical Model and Thermesthesiometer.
 - 4. ASTM D870 – Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.
 - 5. ASTM D4060 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - 6. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - 7. ASTM D4585 – Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
 - 8. ASTM D4587 – Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
 - 9. ASTM D4624/ISO 4624 – Standard Test Method for Bond Strength
 - 10. ASTM D5894 – Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet).
 - 11. ASTM D638 – Standard Test Method for Tensile Strength
 - 12. ASTM D695 – Standard Test Method for Compressive Strength
 - 13. ASTM D790 – Standard Test Method for Flexural Strength
 - 14. ASTM D2240 – Standard Test Method for Determining Durometer Hardness
 - 15. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 16. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. Association of the American Walls and Ceilings Industries (AWCI)
- C. Underwriters Laboratory (UL):
 - 1. UL 263: Standard for Fire Tests of Building Construction and Materials.

D. The Society of Protective Coatings (SSPC)

1. SSPC-SP6: Commercial Blast Cleaning Standard
2. SSPC-PA1: Shop, Field, and Maintenance Painting of Steel.
3. SSPC-PA2: Procedure for Determining Conformance to Dry Coating Thickness Requirements.

1.3 SYSTEM DESCRIPTION

- A. The liquid applied thermal break acrylic material shall be applied at the required thickness specified by the manufacturer in order to mitigate thermal bridging. In no case shall the K-value of the liquid applied thermal break be more than 0.040 W/mK.

1.4 SUBMITTALS

- A. Product Data: Submit product data including manufacturers technical data indicating product performance characteristics, performance and limitation criteria.
- B. Manufacturer's Instructions: Submit manufacturer written installation instructions.
- C. Applicator Qualifications: Submit applicators current certification as a manufacturer trained applicator.

1.5 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 trained by the manufacturer.
 3. Fluid Applied Insulative Acrylic Coating system shall be the complete system from a sole source consisting of primer, acrylic insulative coating material and topcoat. All materials shall be LEED 2009 compliant.
- B. Mock-up:
1. Minimum thirty days prior to application in any area, provide mock-up Samples of acrylic insulative coating materials in accordance with the following requirements:
 - a. Provide minimum two square feet on representative substrate, where directed by the Engineer, for each different thickness 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, finish, and color requirements.
 - e. Continue to provide mock-up areas until acceptable areas are produced.

- f. Acceptable areas shall constitute standard of acceptance for method of application, thickness, finish texture, and color requirements, for fluid applied insulative coating material applications.

1.6 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.

1.7 PROJECT/SITE CONDITIONS

- A. Project Environmental Requirements: Substrate and air temperature shall be in accordance with the manufacturers' requirements.
 - 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 Fluid Applied Acrylic Insulative Coating when temperature of substrate and/or surrounding ambient air temperature is below 45° 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° F (3° C) above the dew point of the surrounding air for a period of 24 hours prior, during the application of the material and 24 hour cure period.
 - 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% 24 hours prior, during and 24 hours after the application of the material. The relative humidity shall not exceed 75% throughout the application and curing of the decorative top coat finish.

PART 2 - PRODUCTS

2.0 FLUID APPLIED INSULATION COATING GENERAL

- A. Materials Compatibility:

1. Provide shop and field primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
2. Provide products of same manufacturer for each coat in a coating system.

2.1 MANUFACTURERS

A. Product Manufacturer:

1. Tnemec Company Incorporated, 6800 Corporate Drive, Kansas City, Missouri 64120-1372

B. Product Distribution and Technical Consultant:

1. Redox Coating Consultants, LLC, 6065 Frantz Road Suite 204, Dublin, OH 43017, 800.890.7580, redox@tnemec.com

C. Materials specified herein shall not preclude consideration of equivalent or superior materials. Suggested equivalent materials or other substitutions shall be submitted to SPECIFIER for consideration in compliance with substitution procedures in Section 01 25 00 of this Project Manual and include the following:

1. Submittals shall be provided no later than (10) days after Owner/Owner's Agent letter of Notice to Proceed.
2. Requests for substitution shall include evidence of satisfactory past performance in similar environment.
3. Substitutions will not be considered that change the number of coats or do not meet specified dry film thicknesses.
4. Manufacturer's certified test reports showing the substitute product(s) performance as outlined in Paragraph 2.15 shall be submitted.
5. After second submittal, Architect/Engineer/ Owner or Owner's Agent hourly rates will be charged to review further submittals.

D. Bidders desiring to use coatings other than those specified shall submit those with their proposal based on the specified materials, together with the information required in Paragraph 1.5 above, and indicate the sum which will be added to or deducted from the base bid should alternate materials be accepted.

2.2 PRIMERS

A. Organic Zinc-Rich Moisture Cured Urethane:

1. Tnemec Series 94-H2O Hydro-Zinc

2.3 THERMAL INSULATING COATING

A. Fluid Applied Acrylic Insulative Coating

1. Tnemec Series 971 Aerolon Acrylic

- a. VOC Content: 1.9 grams/liter
- b. Solids by Volume: 76 percent.
- c. Colors: 1278 Insulation Yellow
- d. Requirements:
 - 1) Abrasion (ASTM D4060): No more than 50.2 mg loss after 1,000 cycles.
 - 2) Cyclic Salt Fog/UV Exposure (ASTM D5894): No blistering, cracking, rusting or delamination of film after 5,000 hours.
 - 3) Humidity Resistance (ASTM D4585): No blistering, cracking, rusting, or delamination after 2,000 hours.
 - 4) Immersion (ASTM D870): No blistering, cracking, rusting, or delamination after six months continuous tap water immersion.
 - 5) Surface Burning Characteristics (ASTM E84): Class A
 - 6) Thermal Conductivity (ASTM C518): No greater than 0.0356 W/m-°K or 0.2468 BTU-in/ft²-hr-°F.
 - 7) NORSOK M-501 ISO 20340: Passed 25 cycles.
 - 8) CDPH Compliant: Passes the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1-2010 (also known as Section 01350).

2.4 TOPCOAT

A. Waterbased, High Dispersion Pure Acrylic Polymer

1. Tnemec Series 1028T Enduratone®

- a. VOC Content: 94 grams/liter.
- b. Colors: As selected by Architect.
- c. Requirements:
 - 1) Adhesion (ASTM D4541): No less than 2,363 psi.
 - 2) Abrasion (ASTM D4060): No more than 102 mg loss after 1,000 cycles.
 - 3) Impact (ASTM D2794): No visible cracking or delamination of film after 93 inch-pounds or less direct impact.
 - 4) QUV (ASTM D4587): No blistering, cracking or delamination of film. No less than 72% gloss retention, no more than 0.69 DE00 color change and no more than 22 units gloss loss after 3,000 hours.
 - 5) Salt Spray (Fog) (ASTM B117): No blistering, cracking, rusting or delamination of film. No more than 3/16" (5 mm) rust creepage at scribe after 5,000 hours exposure.
 - 6) CDPH Compliant: Passes the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1-2010 (also known as Section 01350).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. All surfaces to receive the specified Tnemec Series 971 Aerolon[®] shall follow the manufacturer's printed instructions and be 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.
- D. Other corrections of the surfaces to receive the Fluid Applied Insulation Coating material shall be the responsibility of the Contractor, at no additional cost to the Owner.
- E. Application of the primer, Series 971 Aerolon[®], and topcoat shall not commence until the contractor, applicator and inspector have examined the surfaces to receive the primer and determined the surfaces are acceptable to receive the primer and Aerolon[®]. Commencement of application means acceptance of substrate.
- F. Verify that substrate and workspace temperature and humidity conditions are in accordance with manufacturers recommendations.

3.2 SURFACE PREPARATION

- A. Prepare surfaces in accordance with manufacturer's instructions.
- B. Provide masking, drop cloths or other suitable coverings to prevent overspray onto surfaces not intended to be coated with insulative coating.
- C. Weld spatter and defects shall be ground smooth prior to commencement of primer and fluid applied insulative coating material.
- D. 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.
- E. Steel Substrates: Remove rust and loose mill scale.
 - 1. Fabrication defects:
 - a. Correct steel and fabrication defects revealed by surface preparation.
 - b. Remove weld spatter and slag.
 - c. Round sharp edges and corners of welds to a smooth contour.
 - d. Smooth weld undercuts and recesses.
 - e. Grind down porous welds to pinhole-free metal.
 - f. Remove weld flux from surface.
 - 2. Ensure surfaces are dry.

3. Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 6/NACE 3, unless otherwise specified.
- F. Abrasive Blast-Cleaned Surfaces: Coat abrasive blast-cleaned surfaces with primer before visible rust forms on surface. Do not leave blast-cleaned surfaces uncoated for more than 8 hours.
1. Shop Primer: Prepare shop primer to receive field coat in accordance with manufacturer's instructions.

3.3 APPLICATION

- A. Apply coatings in accordance with manufacturer's instructions.
1. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
 2. Keep containers closed when not in use to avoid contamination.
 3. Do not use mixed coatings beyond pot life limits.
 4. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.
- B. Uniformly apply coatings at spreading rate required to achieve specified DFT.
- C. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.
- D. Apply primer at thickness recommended by manufacturer.
- E. Apply Series 971 Aerolon[®] Thermal Insulative Coating as specified in Section 3.8 Coating Schedule.
- F. Apply topcoat at thickness recommended by the manufacturer.
- G. Final Dry Film Thickness (DFT) shall be measured with a dry film thickness gauge.
- H. The steel deck is not to be sprayed unless otherwise indicated.

3.4 REPAIR

- A. Materials and Surfaces Not Scheduled to Be Coated: Repair or replace damaged materials and surfaces not scheduled to be coated.
- B. Damaged Coatings: All 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.
- C. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

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 the specified thickness 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.
- C. Manufacturer's Technical Services: Coordinate with coating manufacturer's technical service department or independent sales representative for current technical data and instructions.

3.6 CLEANING AND PROTECTION

- A. Remove overspray materials from surfaces not required to be thermally protected.
- B. Protect surfaces of coating systems from damage during construction.
- C. Touch-up, or repair damaged products before Substantial Completion.

3.7 ONE-YEAR INSPECTION

- A. Owner will set date for one-year inspection of coating systems.
- B. Inspection shall be attended by Owner, Contractor, Architect, and manufacturer's representative.
- C. Repair deficiencies in coating systems as determined by Architect in accordance with manufacturer's instructions.

3.8 FLUID APPLIED INSULATIVE COATING SCHEDULE

- A. Non-Ferrous Metals, Condensation Control:
 - 1. Fluid Applied Insulative Coating System, Water-Based:
 - a. Surface Preparation: SSPC-SP 6
 - b. Prime Coat (Shop or Field): Series 94-H2O Hydro-Zinc, DFT of 2.5 to 3.5 mils per coat.
 - c. Intermediate Coat (Shop or Field) – Two Coats: Series 971 Aerolon Acrylic, DFT of 40.0 to 50.0 mils per coat. Total thickness of Series 971: 80 to 100 mils.
 - d. Finish Coat (Optional): Series 1028T Enduratone, DFT of 2.0 to 3.0 mils per coat.

END OF SECTION 07 21 63