

Tnemec Fluid Applied Waterproofing for Detention and Potable Water Tanks Specification

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as specified, shown, and required to furnish, install, and place into satisfactory service the protective, reinforced epoxy, waterproof lining system for concrete surfaces of the water tank/tanks.
2. Where not otherwise shown, extent of the protective lining system shall be located in the interior surfaces of all tanks to include: storm water, potable water, chiller water, fire protection water, cooling tower liquids waste water and a variety of other fluids.
3. Types of protective lining for concrete Work required include, but are not necessarily limited to, the following:
 - a. 100% solids trowel applied epoxy base coat.
 - b. Fiberglass reinforcing mat and saturant coat.
 - c. 100% solids high build epoxy topcoat.
 - d. Cementitious mortar and 100% solids epoxy mortars for cant cove base, air hole filing, form tie hole filling and other miscellaneous filing at penetrations.
4. Cleaning, surface preparation, lining application, and thicknesses shall be as specified herein and shall meet or exceed the lining manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, Contractor shall comply with the Manufacturer's minimum recommendations.
5. Entire coating system must meet NSF/ANSI Standard 61 for potable water contact when used in potable water tanks.

B. Coordination:

1. Coordinate surface preparation of substrates to avoid later difficulty or delay in performing the Work of this Section.
2. Review installation procedures under other Sections and coordinate the installation of items that must be installed prior to application of the protective lining.
3. All substrate surface preparation and lining application, including concrete resurfacing, to be completed by manufacturer's approved Applicator.
4. The Contractor shall coordinate with Engineer regarding the availability of work areas, completion times, safety, access and other factors which can impact plant operations.

C. Related Sections:

1. Section 01300, Submittals
2. Section 03300, Cast-in-Place Concrete
3. Section 03400, Precast Concrete
4. Section 03640, Chemical Grouting
5. Section 07150, Sealants
6. Section 07160, Bituminous Damp proofing
7. Section 072616, Below-grade Vapor Retarders
5. Section 07160, Bituminous Damp proofing

1.2 REFERENCES

- A. This Section contains references to the governing standards and documents listed below. They are a part of this Section as specified and modified; the current version shall apply unless otherwise noted. In case of conflict between the requirements of this section and those of the listed documents, the more stringent of the requirements shall prevail.
1. American Concrete Institute, (ACI)
 - a. ACI 224.1R – Causes, Evaluation and Repair of Cracks in Concrete Structures
 - b. ACI 301 – Specifications for Structural Concrete
 - c. ACI 308R – Guide to Curing Concrete
 - d. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures and Commentary
 - e. ACI 515 – A Guide to the use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete
 - f. ACI 546.R – Concrete Repair Guide
 - g. ACI 546.3R – Guide for the Selection of Materials for the Repair of Concrete
 2. ASTM International, (ASTM)
 - a. ASTM C 868 – Standard Test Method for Chemical Resistance of Protective Linings
 - b. ASTM D 2794 – Standard Test Method for Resistance of Organic Linings to the Effects of Rapid Deformation (Impact)
 - c. ASTM D 4060 – Standard Test Method for Abrasion Resistance of Organic Linings by the Taber Abraser
 - d. ASTM D 4285 – Standard Test Method for Indicating Water or Oil in Compressed Air
 - e. ASTM D 4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
 - f. ASTM D 4414 – Standard Practice for Measurement of Wet Film Thickness by Notch Gages
 - g. ASTM D 6944 Standard Test Method for Measuring Humidity with a Psychrometer
 - h. ASTM D 7682 – Standard Test Method for Replication and Measurement of Concrete Surface Profiles Using Replica Putty
 3. International Concrete Repair Institute, (ICRI)
 - a. Guideline No. 310.1R – Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
 - b. Guideline No. 310.2 – Selecting and Specifying Concrete Surface Preparation for Sealer, Linings, and Polymer Overlays
 4. NACE International, (NACE)
 - a. NACE Publication 6D-173 – A Manual for Painter Safety
 - b. NACE SP0188 – Standard Practice for Discontinuity (Holiday) Testing of Protective Linings
 - c. NACE SP0892 – Standard Practice for Coatings and Linings over Concrete for Chemical Immersion and Containment Service
 - d. NACE No. 6/SSPC-SP13 – Surface Preparation of Concrete
 5. National Sanitation Foundation (NSF)
 - a. NSF/ANSI Standard 61 Drinking Water System Components
 6. Occupational Safety and health Administration, (OSHA)
 - a. Safety and Health Standards (29 CFR 1910/1926)
 7. SSPC: The Society for Protective Linings, (SSPC)
 - a. SSPC-SP13/NACE No. 6 – Surface Preparation of Concrete
 - b. SSPC-Guide 12 – Guide for Illumination of Industrial Painting Projects
- B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of receipt of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents, the last version of the document before it was discontinued.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications:

1. Contractor shall be a qualified Applicator by the protective reinforced epoxy, waterproof lining system manufacturer prior to bid date. Submit proof of acceptability of Applicator by manufacturer to Engineer.
2. Installation equipment shall be acceptable to the protective lining manufacturer.
3. Applicator to establish quality control procedures and practices to monitor phases of surface preparation, storage, mixing, application, and inspection throughout the duration of the project. Contractor to provide a fulltime, on-site person whose dedicated responsibilities will include quality control of the corrosion protection linings.
4. Applicator's quality control procedures and practices must include the following items:
 - a. Training of personnel in the proper surface preparation requirements.
 - b. Training of personnel in the proper storing, mixing, and application and quality control testing of the linings.

B. Mock-Ups:

1. Prior to the installation of the protective reinforced epoxy, waterproof lining system and auxiliary system components, but after Engineer's approval of the Samples and Shop Drawings, install 150 square foot (14 square meters) stepped-back mock-ups of the systems showing each system component in an area selected by Engineer to show representative installation of the Work.
2. Architect/Engineer shall approve the mock-up before the start of Work.
3. Retain and protect mock-ups during construction as one standard for judging completed corrosion protection lining Work. Do not alter mock-ups after approval by Engineer.
 - a. Finished Work, in compliance with visual qualities of mock-ups, that fails other on-Site quality control testing procedures shall be replaced by Contractor at no charge to the Owner.
4. Contractor shall build as many mock-ups as required to achieve Engineer's acceptance of the corrosion protection lining.
5. The approved mock-up shall be considered the acceptable minimum standard of quality.
6. Any corrosion protection lining Work that proceeds without approved mock-ups will not be accepted by the Engineer and removed at no cost to the Owner.

C. Pre-Installation Conference:

1. Before erecting mock-ups Contractor, Installer and technical representative of the protective reinforced epoxy waterproof lining manufacturer shall meet on-site with Engineer to discuss approved products and workmanship to ensure proper application of the corrosion protection lining components and substrate preparation requirements.
2. Review foreseeable methods and procedures related to the corrosion protection lining of coating Work including but not necessarily limited to the following:
 - a. Review Project requirements and the Contract Documents.
 - b. Review required submittals, both completed and yet to be completed.
 - c. Review status of substrate Work, including approval of surface preparations and similar considerations.
 - d. Review requirements of on-Site quality control testing and requirements for preparing Site Quality Control Report as specified herein.
 - e. Review availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.
 - f. Review required inspection and testing.
 - g. Review environmental conditions, other Project conditions, and procedures for coping with unfavorable conditions.
 - h. Review regulations concerning code compliance, environmental protection, health, safety, fire and similar considerations.
 - i. Review procedures required for the protection of the corrosion protection lining during the remainder of the construction period.

3. Record the discussions of the Pre-Installation Conference and the decisions and agreements or disagreements reached, and furnish a copy of the minutes to each party attending. Record any revision or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.
 4. Reconvene the conference at the earliest opportunity if additional information must be developed in order to conclude the subjects under consideration.
- D. Performance Criteria: The surfaces to receive the protective lining system shall be capable of withstanding immersion in potable water, storm water, cooling tower chemicals and wastewater.
- E. Source Quality Control: Provide each component of protective lining produced by a single manufacturer; including recommended repair mortar (if required), primer, base coat, fiberglass mat and topcoat materials.
- F. Reference Standards: Comply with applicable provisions and recommendations of all standards listed in Section 1.2 except as otherwise shown or specified.
- G. Protective reinforced epoxy waterproof lining system specified is as manufactured by Tnemec Company, Inc., Kansas City, MO (816) 483-3400. Specified system is the minimum standard of quality for this project. Request for material substitutions shall be in accordance with requirements of the project specifications.

1.4 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01200 entitled "Submittals", the Contractor shall submit all required information as specified herein.
- B. Shop Drawings: Submit for approval prior to commencing any Work:
1. Product Data Sheets: Copies of current technical data for each component specified and applied as outlined in this Section.
 2. Safety Data Sheets: Copies of current SDS for any materials brought on-site including all clean-up solvents, repair or resurfacing mortars and lining materials.
 3. Qualification: Installer Qualification statement from manufacturer.
 4. Performance Testing Reports: Copies of test data for the entire physical, chemical, and permeation properties listed herein and as outlined within this Section.
 5. Installation Instructions: Manufacturer's written installation instructions for the materials specified in this Section.
 6. Construction Details: Copies of manufacturer's standard lining details for specified materials.
 7. Product Substitution: The specified corrosion protection lining is the minimum standard of quality for this project. Equivalent materials of other manufacturers may be substituted only by approval of Engineer. Requests for material substitutions shall be in accordance with requirements of the project specification.
 - a. Manufacturers of "or equal" products shall provide direct property comparison with the materials specified in addition to complying with all other requirements of these Specifications. "Or equal" products shall employ the same generic materials and system components as the corrosion protection lining specified. "Or equal" products shall provide equivalent performance certifications as the specified protective lining system.
 - b. Bidders desiring to use lining system other than that specified shall submit proposed system with their proposal at the time of bid, together with the information required herein, and indicate the sum which will be deducted from the base bid should alternate materials be accepted.
- C. Jobsite Reports: Submit at the completion of Work
1. Daily Reports: Include surface preparation, substrate conditions, ambient conditions application procedures, lining materials applied, material quantities, material batch number(s), description of work completed and location thereof.
 2. Quality Control Reports: Include all quality control testing and physical specimens.
 3. Contractor shall maintain a copy of records until the expiration of the specified warranty period.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver material in manufacturer's original, unopened and undamaged packages.
2. Clearly identify manufacturer's, brand name, contents, color, batch number, and any personal safety hazards associated with the use of or exposure to the materials on each package.
3. Packages showing indications of damage that may affect condition of contents are not acceptable.

B. Storage of Materials:

1. Materials shall be stored in accordance with manufacturer's recommendations in enclosed structures and shall be protected from weather and adverse temperature conditions. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life as defined by the manufacturer shall be removed promptly from the site. Store all materials only in area or areas designated by the Engineer solely for this purpose. Temperature of storage area should be a minimum of 70°F
2. Store in original packaging under protective cover and protect from damage.
3. Stack containers in accordance with manufacturer's recommendations.

C. Handling of Materials: Handle materials in such a manner as to prevent damage to products or finishes.

1.6 JOB CONDITIONS

A. Environmental Requirements:

1. Proceed with lining Work only when temperature and moisture conditions of substrates, air temperature, relative humidity, dew point and other conditions comply with the corrosion protection lining manufacturer's written recommendations and when no damaging environmental conditions are forecasted for the time when the material will be vulnerable to such environmental damage. Record all such conditions and include in final Site Quality Control Report.
2. Maintain substrate temperature and ambient temperature before, during and after installation above 50°F (7°C) and rising in accordance with protective lining material manufacturer's instructions. 50°F is a minimum. Maintaining surface temperature in the 65-70°F range is ideal
3. Provide adequate ventilation during instillation and full curing periods of the protective lining.
4. Lining System shall not be applied when ambient air temperature is within 5°F (3°C) of the dew point and falling.
5. Lining System shall not be applied when relative humidity is outside of material manufacturer's recommendations. Do not prepare surfaces or apply materials in rain, snow, fog, mist, or otherwise inclement weather as per material manufacturer's instructions.

B. Dust and Contaminants: Protect work and adjacent areas from excessive dust and airborne contaminants during protective lining application and curing. Schedule Work to avoid excessive dust and airborne contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Protective Reinforced Epoxy, Waterproof Lining System shall be comprised of: 1) filling and patching, 2) epoxy bed coat, 3) fiberglass reinforcement mat, and 4) polyamine epoxy saturant and finish coat. The Protective Epoxy, Waterproof Lining System shall be NSF Std. 61 certified for potable water contact where applicable.
1. Filler/Patcher to repair spalls and honey combs, fill form tie holes, large air holes and provide cant strips at all inside corners: 215 Surfacing Epoxy with 301C filler or 217 Mortar Crete
 2. Bed Coat for Fiberglass Mat: Series 215 Surfacing Epoxy @ 25-30 mils Wet/DFT
 3. Fiberglass Reinforcement Mat: Series 273-0273 Fiberglass Reinforcing Mat, for flat surfaces of walls and floor, and 211-0216 fiberglass mat for inside corners at wall to floor and wall to wall intersections.
 4. Saturant Coat: Series 22/322 Pota-Pox Plus @ 20-25 mils wet/ DFT to saturate mesh
 5. Topcoat: Series 22 /322 Pota-Pox Plus @ 12-15 mils DFT.

B. Polyamine Epoxy Bedding Coat:

1. Properties: Tnemec Series 215 Surfacing Epoxy
- | | | |
|----|------------------------------------|-------------------------|
| a. | Solids by Volume: | 100% |
| b. | VOC | 10 g/l |
| c. | Pot Life at 75°F: | 1 hour |
| d. | Compressive Strength (ASTM C579): | 9,183 psi |
| e. | Flexural Strength (ASTM C580): | 4,330 psi |
| f. | Modulus of Elasticity (ASTM C580): | 32,877 psi |
| g. | Tensile Strength (ASTM C307): | 2,282 psi |
| h. | Tensile Strength (ASTM D2370): | 2011 psi |
| i. | Adhesion to concrete (ASTM D7234): | 400 psi |
| j. | Water Absorption (ASTM C413): | 0 |
| k. | Steam Resistance (ASTM D661/D714): | no blister, crack, peel |
| l. | Recoat Window at 75F | 21 days without sanding |
2. NSF Standard 61 approved for use on interior of potable water storage tanks and reservoirs of 5 gallons capacity or greater.

C. Modified Polyamine Epoxy Saturant/Finish Coat:

1. Properties: Tnemec Series 22 /322 Epoxoline
- | | | |
|----|--|------------------------------------|
| a. | Solids by Volume: | 100% |
| b. | VOC | 12 g/l |
| c. | Pot Life at 75°F: | 45 minutes |
| d. | Color: | Off-White |
| e. | Abrasion (ASTM D4060, CS-17 Wheel, 1,000 g load, 1,000 cycles) Loss: | 109 mg |
| f. | Shore D Hardness (ASTM D2240): | 95 |
| g. | Pencil Hardness (ASTM D3363): | 2H |
| h. | Humidity (ASTM D4585, 2,000 hours): | No effect |
| i. | Immersion (ASTM D870, 1 year exposure): | No effect |
| j. | Impact (ASTM D2794): | 16 inch-pounds, no effect |
| k. | Immersion in hot water, (ASTM D714/D661) @ 203F, 32 mils dft | no blister or crack after 6 months |
| l. | Water vapor transmission, (ASTM D1653) @21 mils dft | 0.04 metric perms/0.06 perms |
| m. | Recoat Window at 75F | 7 days without sanding |
2. NSF Standard 61 approved for use on interior of potable water storage tanks and reservoirs of 5 gallons capacity or greater for projects that include potable water use
3. All components of lining system shall meet LEEDv4

D. Product and Manufacturer:

1. Materials specified are those that have been evaluated for the specific service. Products of Tnemec Company, Inc. (816-483-3400), are listed to establish a standard of performance and quality. Equivalent materials of other manufacturers may be submitted on written approval of the Engineer. As part of the proof of equality, the Engineer will require at the cost of the Contractor, comparative laboratory tests as directed by the Engineer between the product specified and the requested substitution.
2. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, laboratory testing showing results to equal the performance criteria of the products specified herein. In addition, a list of ten projects shall be submitted in which each product has been used and rendered satisfactory service.
3. Requests for product substitution shall be made at least 10 days prior to the bid date.
4. Any material savings shall be passed to the owner in the form of a contract dollar reduction.

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractor shall provide, erect, and maintain all required hoists, scaffolding, staging and planking, and perform all access related hoisting work required to complete the Work of this Section as specified.
- B. Contractor shall cover or otherwise protect finish work or other surfaces not being coated within the scope of this Section. Contractor shall erect and maintain protective tarps, enclosures and/or masking to contain debris, including dust or other airborne particles from surface preparation or application activities. This may include the use of dust or debris collection apparatus as required at no additional cost to Owner.

3.2 INSPECTION

- A. Contractor shall examine the areas and conditions under which the protective coating Work is to be performed in accordance with NACE SP0892, Table 1 and SSPC-SP13/NACE No. 6, and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work.
- B. Contractor shall confirm the presence of a positive side waterproofing on the exterior of the concrete structure.
- C. Commencement of the Work of this Section shall indicate that the substrate and other conditions of installation are acceptable to the Contractor and his Applicator, and will produce a finished product meeting the requirements of the Specifications. All defects resulting from accepted conditions shall be corrected by Contractor at his own expense.
- D. Stopping Active Leaks: After surface cleaning, any visible leaks or other water ingress shall be reported to the Engineer. Any water infiltration through minor leaks must be stopped using a polyurethane grout manufactured by Avanti International, Webster, TX (281-486-5600), or approved equal, or other approved method in accordance with ACI 221.1R. Surface and grouting material may require additional surface preparation prior to application of protective coating.

3.3 PREPARATION

- A. Specifier Note: Confirm Section 03300 specifies “As-cast, Smooth Form Finish” as defined in ACI 301 for areas receiving Protective Lining System. The As-Cast, Smooth Form Finish requires the patching of tie holes and honeycombing, as well as the removal of form fins exceeding 1/8 inch in height. Reference to As-Cast, Smooth Form Finish ensures the surface does not receive an unspecified rubbed finish.
- B. Concrete surfaces to receive lining system shall be cast with a Smooth Form Finish in accordance with ACI 301. Surfaces shall not be rubbed, sacked, troweled or otherwise finished in any manner that will obscure or cover the parent concrete surface with materials other than materials as specified in this Section.
- C. Allow cast-in-place concrete to cure for a minimum of 28 days at 75°F (24°C) and with adequate air movement before installing the protective reinforced epoxy waterproof lining system. Regardless whether concrete has cured for at least 28 days or longer, check moisture levels of the concrete before applying the epoxy waterproof lining system. At a minimum, the Contractor shall conduct at least 3 moisture level tests according to ASTM D4263, Clear Plastic Sheet Test. There should be no condensation on the concrete or on the plastic. Concrete shall not show a darker color vs surrounding uncovered concrete.
- D. All surface washing, abrasive blasting, water jetting, grinding, patching, filling and preparation shall be completed by the Applicator in accordance with the Protective Coating Manufacturer’s recommendations.
- E. Substrate: Concrete surfaces to be coated shall be free of curing compounds and form release agents, laitance and foreign particles that may inhibit bonding. Prior to start of protective coating systems application, pre-clean as required, and inspect the substrate in accordance with SSPC-SP13/NACE No. 6, Severe Service. Surface preparation procedures shall be in accordance with NACE SP0892, SSPC-SP13/NACE No. 6 and ICRI Guideline No. 310.2. Surface preparation shall expose aggregate, open all air holes and obtain a uniform surface texture.
- F. Level or grind concrete substrates to produce a uniform and smooth surface, including removal of all sharp edges, ridges, form fins, and other concrete protrusions.

- G. New Concrete Application: All voids, air holes, form tie holes and other surface depressions shall be filled with the specified epoxy-modified or cementitious filler, re-establishing plane finished grades and concrete planes.
- H. Existing Concrete Application: Existing concrete structures to receive protective coating system must be capable of withstanding imposed loads. All oil, grease, waste and chemical contaminants must be removed from the surface of the concrete prior to preparation in accordance with NACE SP0892 and SSPC-SP13/NACE No. 6. Concrete surfaces must be sound and capable of supporting the Protective Lining system as determined by the engineer. Surface preparation requirement is to expose a sound, uniform surface texture confirming to the minimum recommended ICRI-CSP5. The appropriate cementitious repair mortar or epoxy cementitious resurfacer material shall be applied to the entire, prepared surface to level surface suitable for coating.

3.4 APPLICATION

- A. Lining system shall be installed when ambient air and surface temperature is above 50°F (7°C). The substrate temperature shall be at least 5°F above the dew point. Condition the material between 70-80°F (21-27°C) for 48 hours prior to use. Application when temperatures outside of this range will require written instruction from the Manufacturer and approval of the Engineer.
- B. Application in direct sunlight and/or with rising surface temperatures is not allowed, as this may result in blistering of the materials due to expansion of entrapped air or moisture in the concrete. In such cases, it will be necessary to postpone the application until later in the day when the temperature of the substrate is falling. Concrete surfaces that have been in direct sunlight should be shaded for at least 24 hours prior to application. Consult the Manufacturer for application schedule guidelines specific to temperature conditions and possible sealer application recommendations to reduce outgassing.
- C. Saw cuts: All areas where the installed lining does not transition into another surface of a different angle shall be saw cut. The saw cut shall be ¼" wide by a ¼" in depth.
- D. Control Joints: shall be filled with 215 Surface epoxy filled with 301C filler.
- E. Expansion Joints: shall be filled with flexible sealant such as BASF NP-1 and allowed to cure
- F. Cracks: visible cracks from hairline up to 1/16" side shall be filled at the same time the 215 Surfacing epoxy base coat is applied. Larger cracks shall be filled at the same time air holes, and form tie holes are filled with 215 Surfacing Epoxy with 301C sand
- G. Pipe Penetrations: All pipe penetrations that extend through the walls and/or floors of tanks where the reinforced epoxy waterproof lining system is applied shall be waterproofed using standard link seal apparatus. If additional protection (belt and suspenders waterproofing) is required, then the annular space between the OD of the pipe and the ID of the steel sleeve or plain concrete penetration, shall have non-shrink grout installed in the annular space and be flush with the tank wall or floor surface. Apply reinforced epoxy coating system over the grout and onto the pipe as recommended by the manufacturer. Typical non-shrink grout is Tnemec 217 Mortarcrete. Typical steel pipe primer is 22/322 Epoxoline.
- H. Ladders (normally stainless steel) should be removed during surface preparation and application of lining system. Threaded fasteners that attach ladder to wall should be installed prior to the work. Lining system shall be installed around fasteners. Fasteners should be grouted in place using waterproof epoxy grout. Ladder should not rest on the lining system after ladder is reinstalled so as not to damage lining system.
- I. Walls and Floors
- J. Filler/Patcher: Apply 215 Surfacing Epoxy with 301C filler to all voids, large air holes, form tie holes using trowels or taping knives. Apply cant strips using 2" margin trowel to all inside corners. Depending on conditions, 217 Mortarcrete can be used for above applications
- K. Epoxy Bed Coat (Basecoat):
 - 1. To all horizontal and vertical surfaces, trowel-apply, or spray transfer and trowel-finish full parge coat of Series 215 Surfacing Epoxy at a thickness of 25.0–30.0 mils WET/DFT.

L. Fiberglass Reinforcement Mat:

1. Embed Series 211-216 fiberglass mat into basecoat while still wet at inside corners, and smooth with ribbed roller to remove any voids or wrinkles. After corners are completed, embed 273-0273 fiberglass mat into wet 215 Surface on all walls and floors, overlapping 2" over adjacent mat. Use ribbed roller to smooth and remove wrinkles. Use 210C filler with 215 Surfacing Epoxy to allow for proper thickness.

M. Intermediate Epoxy Saturant:

1. Saturate top of fiberglass mat completely with Series 22/322 Epoxoline at approximately 60-70 sf/gal, 20.0–25.0 mils WET/DFT, until glass attains a uniform, wet-out appearance. Apply using ½" nap roller and thoroughly roll up and down and left and right to thoroughly saturate the mesh leaving no misses, skips or pinholes.
2. Once cured, sand to remove any imperfections or raised fibers that protrude through film. Grind if necessary.

N. Epoxy Topcoat:

1. To all horizontal and vertical surfaces, roller-apply topcoat of Series 22 /322 Epoxoline at 100-110 sf/gal, 12.0–15.0 mils WET/DFT. Finish shall be smooth to the touch with slight orange peel texture. Finish shall completely cover and hide the mat with no misses, skips or pinholes.

O. Ceilings

P. Prime Coat: 1 coat 22/322 Epoxoline at 10-12 mils dft, applied by 3/8" nap roller

1. Touch-up: After cure of the prime coat of 22/322, inspect surface of the 22 for any discontinuities. Fill any minor pits or holes with 215 Surfacing Epoxy.

Q. Finish Coat: 1 coat 22/322 Epoxoline at 10-12 mils dft applied by 3/8" roller

3.5 FIELD QUALITY CONTROL, INSPECTION AND TESTING

A. Contractor to perform the quality control procedures listed below in conjunction with the requirements of this Section.

B. Inspect all materials upon receipt to ensure that all are supplied by the approved Manufacturer.

C. Surface pH Testing: The pH of the concrete substrate will be measured using pH indicating papers. The pH testing is to be performed once every 50 square feet (5 square meters). Acceptable pH values shall be a minimum 9.0 as measured using color indicating pH paper with readable color calibrations and a scale at whole numbers (minimum). Use Hydrion Insta-Check Jumbo 1-12, or equal. The paper shall be touched to the surface once using moderate gloved finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH. Spot check any questionable areas with a 1% phenolphthalein solution. The phenolphthalein solution shall turn bright pink on concrete.

D. Surface Profile: Inspect and record substrate profile (anchor pattern). Surfaces shall be profiled, at a minimum, equal to the CSP5 roughness or as recommended by the coating manufacturer in accordance with ICRI Guideline 310.2 and SSPC-SP13/NACE No. 6.

1. Perform replication of the concrete surface profile every 500 square feet (46 square meters) using replica putty in accordance with ASTM D7682. Submit replications to the Engineer as part of the Jobsite Reports.

E. Measure and record ambient air temperature once every two hours of each work shift using a thermometer and measure and record substrate temperature once every two hours using an infrared or other surface thermometer.

F. Measure and record relative humidity and dew point temperature every two hours of each work shift using a sling psychrometer in accordance with ASTM E 337.

G. Provide verification of correct mixing of coating materials in accordance with the Manufacturer's instructions.

H. Inspect and record that the "pot life" of coating materials is not exceeded during installation.

I. Verify curing of the coating materials in accordance with the Manufacturer's instructions.

- J. Dry-Film Thickness:
 1. Wet-Film Thickness shall be taken every 100 square feet (9 square meters) in accordance with ASTM D 4414 and recorded.
 2. The Dry-Film Thickness can be determined using a surface area calculation for material consumption.
- K. High-Voltage Holiday (Spark) Testing: Upon full cure, the installed lining system shall be checked by high voltage spark detection in accordance with NACE SP0188 and the Manufacturer's printed application guide to verify a pinhole-free surface. Areas which do not pass the spark detection test shall be corrected at no cost to the Owner.
- L. Contractor is responsible for keeping the Engineer informed of all progress so that Engineer may provide additional quality control at his discretion.
- M. Inspection by the Engineer or others does not absolve the Contractor from his responsibilities for quality control inspection and testing as specified herein or as required by the Manufacturer's instructions.

3.6 ACCEPTANCE CRITERIA

- A. All surfaces shall be prepared, applied, and tested in accordance with the specification and referenced standards herein.

3.7 ADJUSTMENTS AND CLEANING

- A. At the completion of the Work, Contractor shall remove all materials and debris associated with the Work of this Section.
- B. Clean all surfaces not designated to receive lining system. Restore all other work in a manner acceptable to Engineer.
- C. All finished lining system shall be protected from damage until Final Acceptance of the Work. Protective coating damaged in any manner shall be repaired or replaced at the discretion of Engineer, at no additional cost to Owner.

END OF SECTION

Specifier Notes: This product selection guide is written according to the Construction Specifications Institute (CSI) Format, including *Master Format*, *Section Format*, and *Page Format*, contained in the *CSI Manual of Practice*.

The section must be carefully reviewed and edited by the Architect to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the drawings.

Delete all "Specifier Notes" when editing this section.

Specifier Notes: This section covers Tnemec high-performance coating systems for commercial facilities.

This specification is only a guide listing various coating system options for various environments and should not be used as a final specification. Additional coating systems not listed in this specification are available and may be more appropriate for your coating application. To finalize this specification, please contact www.rightergroup.com

Many coatings contain organic solvents. Consult Righter Group for compliance to local VOC regulations.

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