

SECTION 09960

COATING SYSTEMS FOR WATER STORAGE TANKS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Coating systems for concrete water storage tanks including interior concrete repair.

1.02 RELATED SECTIONS

- A. None.

1.03 REFERENCES

- A. ANSI/NSF 61 - Drinking Water System Components - Health Effects.
- B. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- C. ASTM D 4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.
- D. ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- E. International Concrete Repair Institute (ICRI) Guideline No. 03732 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
- F. SSPC-SP 13/NACE 6 - Surface Preparation of Concrete.

1.04 DEFINITIONS

- A. Definitions of Painting Terms: ASTM D 16, unless otherwise specified.
- B. Dry Film Thickness (DFT): Thickness of a coat of paint, or any coating film that is liquid based, in fully cured state measured in mils (1/1000 inch).
- C. Dry: for purposes of the Work, substrate is dry if a relative humidity of 80% or lower exists.
- D. Wet Film Thickness (WFT): Wet film thickness is the thickness of a single application or wet paint or any coating film that is liquid based measured in mils (1/1000 inch)

1.05 SUBMITTALS

- A. Comply with Section 01330 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data for each coating, including generic description, complete technical data, surface preparation, and application instructions.
- C. Color Samples: Submit manufacturer's color samples showing full range of standard colors.
- D. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.
- E. Applicator's Minimum Qualifications: Submit list of a minimum of five (5) completed projects of similar size and complexity to this Work. Include for each project:
 - 1. Project name and location.
 - 2. Name of owner.

3. Name of contractor.
4. Name of engineer.
5. Name of coating manufacturer.
6. Approximate area of coatings applied.
7. Date of completion.

F. Warranty: Submit manufacturer's standard product warranty and an installation warranty for five (5) years.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
1. Specialize in manufacture of coatings with a minimum of 10 years experience.
 2. Demonstrated successful performance on three (3) comparable projects.
 3. Single Source Responsibility: Coatings and coating application accessories shall be products of a single manufacturer.
- B. Applicator's Personnel Qualifications:
persons trained for application of specified coatings.
- C. Pre-application Meeting: Convene a pre-application meeting 2 weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Engineer, applicator, and manufacturer's representative. Review the following:
1. Environmental requirements.
 2. Protection of surfaces not scheduled to be coated.
 3. Surface preparation
 4. Repair
 5. Application.
 6. Field quality control.
 7. Cleaning.
 8. Protection of coating systems.
 9. Leakage Testing
 10. One-year inspection.
 11. Coordination with other work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:
1. Coating or material name.
 2. Manufacturer.
 3. Color name and number.
 4. Batch or lot number.
 5. Date of manufacture.
 6. Mixing and thinning instructions.
- B. Storage:
1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.
 2. Keep containers sealed until ready for use.
 3. Do not use materials beyond manufacturer's shelf life limits.
- C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Weather:
 - 1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer's instructions.
 - 2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.
 - 3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.
- B. Ventilation: Provide ventilation during substrate preparation and coating application and curing stages in confined or enclosed areas in accordance with AWWA D 102 requirements for work in Steel Water Tanks.
- C. Dust and Contaminants:
 - 1. Schedule coating work to avoid excessive dust and airborne contaminants.
 - 2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

PART 2 -PRODUCTS

2.01 MANUFACTURER

- A. Tnemec Company Incorporated; Web Site www.tnemec.com.
- B. Deneef Consturction Chemicals, Inc; Web Site www.deneef.com. (or Engineer approved equal)

2.02 SURFACE PREPARATION AND COATING SYSTEMS FOR CONCRETE

- A. Interior Concrete (for submerged applications), as indicated in drawings and schedules.
 - 1. Surface Preparation: SSPC-SP 13/NACE 6. Abrasive blast with clean/dry properly sized aggregate to achieve ICRI-CSP5 condition.
 - 2. Crack Filler : Deneef Denepox I-40, or Engineer approved equal.
 - 3. Spot Filler/Surfacer: Spot fill bug-holes and voids (1/4" - 1/2") with Tnemec Series 218 MortarClad applied at 1/4"-1/2" thickness.
 - 4. Larger Void Filler (1/2"- 4"): Tnemec Series 217.
 - 5. Primer: One complete prime coat of Tnemec Series FC20-1255 Pota-Pox to achieve DFT 3.0-5.0 mils. **ANSI/NSF 61 Certified: For use inside potable water storage tanks.**
 - 6. Finish Coat: One complete coat Tnemec Series 141EpoXoline to achieve DFT of 12.0-18.0 mils. **ANSI/NSF 61 Certified: For use inside potable water storage tanks.**
 - 7. Total Coating DFT: 15.0 to 21.0 mils minimum.
 - 8. Finish Color: WHO3 Off-white.

PART 3-EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which coating systems are to be applied. Notify Engineer of areas or conditions that do not meet the coating manufacturer requirements for an acceptable substrate. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected and the Engineer has observed the pre-application condition of the substrate.

3.02 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

- A. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.
- B. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

3.03 SURFACE PREPARATION OF CONCRETE

- A. Interior, For Submerged Applications:
 - 1. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6 and ICRI 03732.
 - 2. Test concrete for moisture in accordance with ASTM F 2170-02 and F 1869. Drying of the tank interior will be the responsibility of the Owner.
 - 3. Abrasive blast surface to remove laitance and solid contaminants and to provide clean, sound substrate (to achieve ICRI-CSP5 condition).
 - 4. Contact Engineer in the event excessive spalling, exposed rebar or voids larger than 2" in any dimension are uncovered.
 - 5. Prior to installation of coating system, inspect entire tank to ensure surfaces are clean, dry, and free of existing coating systems, oil, grease, chalk, form release agents, and other contaminants.
 - 6. Fill cracks with Deneef Denepox I-40, per manufacturer's recommendations.
 - 7. Spot fill bug-holes and voids (1/4" - 1/2" in any dimension) with Tnemec Series 218 MortarClad applied per manufacturers recommendations.
 - 8. Fill larger voids (1/2" to 4" in any dimension) with Tnemec Series 217, applied per manufacture's recommendations.

3.04 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's instructions, after repairs and dryness testing.
- B. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
- C. Keep containers closed when not in use to avoid contamination.
- D. Do not use mixed coatings beyond pot-life limits.
- E. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.
- F. Uniformly apply coatings at spreading rate required to achieve specified DFT.
- G. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.

- H. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer.

3.05 COATING REPAIR

- A. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.
- B. 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.

3.06 FIELD QUALITY CONTROL

- A. Contractor's Inspection Services:
 - 1. Verify coatings and other materials are as specified.
 - 2. Verify surface preparation and application are as specified.
 - 3. Verify WFT of each coat is as specified using wet film gauges.
 - 4. Coating Defects: Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.
 - a. Check for holidays on interior steel immersion surfaces using holiday detector.
 - 5. Report:
 - a. Submit written reports describing inspections made and actions taken to correct nonconforming work.
 - b. Report nonconforming work not corrected at the time of the inspection.
 - c. Submit copies of report to Engineer and Contractor.
- B. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems and inspect dryness test results and substrate prior to application of primer coat.
- C. Upon completion, the tank shall be tested to determine water tightness. The tank shall be filled to the overflow level.

The test shall consist of measuring the liquid level over the next 24 hours to determine if any change has occurred. If a change is observed and exceeds the maximum allowance, the test shall be extended to a total of five days. If at the end of five days the average daily change has not exceeded the maximum allowance, the test shall be considered satisfactory.

Per AWWA, the allowable leakage rate is one-tenth of one percent (0.1%) of the water volume in any 24-hour period. If the liquid volume loss exceeds this amount, it shall be considered excessive, and the tank shall be repaired and retested.

Owner to provide water for required rinsing and filling at no cost. If repeat tests are necessary, any cost associated with refilling shall be the responsibility of the Contractor.

Draining of the tank following the leakage testing will not be required.

3.07 CLEANING AND DISPOSAL

- A. Remove temporary coverings and protection of surrounding areas and surfaces.
- B. Disposal - Contractor to properly remove and dispose of any debris resulting from the surface preparation and coating process. Any and all landfill fees are the responsibility of the Contractor.

3.08 PROTECTION OF COATING SYSTEMS

- A. Protect surfaces of coating systems from damage during construction.

3.09 WARRANTY INSPECTIONS

- A. Owner will set date for one-year and 5-year warranty inspection of coating systems.
- B. Inspection shall be attended by Owner, Contractor, Engineer, and manufacturer's representative.
- C. Repair deficiencies in coating systems as determined by Engineer in accordance with manufacturer's instructions.

END OF SECTION