SPECIFICATIONS

COATING & PAINTING FOR STEEL WATER STORAGE TANKS

PART 1 - GENERAL

1.01 SCOPE

A. The work of this section includes the coating of all interior surfaces, and the painting of all exterior surfaces.

1.02 RELATED WORK SPECIFIED ELSEWHERE (If Applicable)

Specifier Notes: Reference other sections of the specification which relate to or affect this section, such as piping, pump houses, etc.

Specifier Note: When new steel work is scheduled, such as new roof rafters, review 3.04, Paragraph C. This Paragraph calls for the application of the full coating system prior to the erection or installation of areas rendered inaccessible after erection. This requirement should also be so noted in any tank fabrication and/or structural sections of the specification.

1.03 REFERENCE SPECIFICATIONS AND STANDARDS

A. Without limiting the general aspects of other requirements of these specifications, all surface preparation, coating and painting of interior and exterior surfaces and inspection shall conform to the applicable requirements of the Society for Protective Coatings, NACE International, ASTM (American Society for Testing and Materials), AWWA and the manufacturer's printed instructions.

1. **ASTM** (American Society for Testing and Materials)

ASTM D 520	Standard Specification for Zinc Dust Pigment
ASTM D 4417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM E 337	Standard Practice Test Method for Measuring Humidity with a Psychrometer
ASTM D2200	Standard Methods of Evaluating Degree of Rusting on Painted Surfaces

2. **ANSI** (American National Standards Institute)

ANSI/ASC 29.4 Exhaust Systems	Abrasive Blasting Operations – Ventilation and Safe Practice
ANSI/NSF Standard 61	Drinking Water Components

3. **AWWA** (American Water Works Association)

AWWA D 102	Coating Steel Water Storage Tanks

4. **Consumer Product Safety Act, Part 1303**

5. **NACE International**

NACE Publication TPC2	Coatings and Linings for Immersion Service: Chapter 1 Safety, Chapter Surface Preparation, Chapter 3 Curing, and Chapter 4 Inspection
NACE Standard SP0178-2007	Standard Recommended Practice – Fabrication Details, Surface Finish Requirements and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service
NACE Standard SP0188-2018	Standard Recommended Practice – Discontinuity (Holiday) Testing of Protective Coatings
NACE Standard SP0287-2016	Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape
NACE Standard RP0288-2004	Standard Recommended Practice, Inspection of Linings on Steel and Concrete

6. **OSHA** (Occupational Safety & Health Administration)
1915.35 Standards – 29 CFR – Painting

7. **SSPC** (Society for Protective Coatings)

SSPC-SP1	Solvent Cleaning
SSPC-SP2	Hand Tool Cleaning
SSPC-SP3	Power Tool Cleaning
SSPC-SP11	Power Tool Cleaning to Bare Metal
SSPC-PA 1	Shop, Field and Maintenance Painting
SSPC-PA 2	Measurement of Dry Film Thickness with Magnetic Gages
SSPC-PA 3	Guide to Safety in Paint Application
SSPC-PA 11	Protecting Edges, Crevices, and Irregular Steel Surfaces by Stripe Coating
SSPC-Guide 12	Guide for Illumination of Industrial Painting Project
SSPC-VIS 1-89	Pictorial Surface Preparation Standards for Painting Steel Surfaces
SSPC Paint Spec 36	Two Component Weatherable Aliphatic Polyurethane Topcoat, Performance-Based

8. **SSPC/NACE Joint Standards**

SSPC-SP5/NACE 1	White Metal Blast Cleaning
SSPC-SP6/NACE 3	Commercial Blast Cleaning
SSPC-SP7/NACE 4	Brush-Off Blast Cleaning
SSPC-SP10/NACE 2	Near-White Metal Blast Cleaning
SSPC-WJ-4/NACE WJ-4	Waterjet Cleaning of Metals

B. The Engineer's decision shall be final as the interpretation and/or conflict between any of the referenced specifications and standards contained herein.

1.04 CONTRACTOR

A. The Contractor shall have three years practical experience and successful history in the application of specified product to surfaces of steel water tanks. Upon request, he shall substantiate this requirement by furnishing a list of references and job completions.

B. The Contractor shall submit with his bid a written statement by the coatings manufacturer stating that the Contractor is familiar with the materials specified and has workers capable of performing the work specified herein.

C. The personnel performing the work shall be knowledgeable and have the required experience and skill to adequately perform the work for this project, in accordance with SSPC-PA1, "Shop, Field and Maintenance Painting".

1.05 QUALITY ASSURANCE

A. **General:** Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the Engineer.

B. **Surface Preparation:** Surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces: SSPC-VIS 1-89", ASTM D2200-95, "Standard Methods of Evaluating Degree of Rusting on Painted Surfaces".

Surface profile shall be measured in accordance with ASTM D 4417-21, Method B and/or Method C or NACE Standard RP0287-2002. The number of surface profile readings to be taken shall be as proscribed in SSPC-PA 2, Section 8 regarding the number of dry film readings. In all cases the written standard shall take precedence over the visual standard.

NACE Standard SP0178-2007, along with the Visual Comparator, shall be used to verify the surface preparation of welds.

Specifier Note: The above paragraph contains weld treatment requirements which should also be called out in any tank fabrication and/or structural specifications. See also 3.02, B of this specification.

Prior to undertaking full-scale abrasive blasting operations, the contractor shall perform a test blast on both the exterior and the interior of the tank in the presence

of the Engineer or his representative. The test section shall be a minimum of five (5) feet high by five (5) feet wide. The Engineer or his representative shall verify that the surface cleanliness and profile meet the requirements of this specification before work is allowed to proceed. In the event the test section fails to comply with the requirements of this specification, the contractor shall be required to make suitable changes to the equipment and/or abrasive material and perform an additional test sections until compliance with the specification is demonstrated.

C. **Application:** No coating or paint shall be applied when: 1) the surrounding air temperature or the temperature of the surface to be coated or painted is below the minimum surface temperature for the products specified herein, 2) rain, snow, fog or mist is present, 3) the surface temperature is less than 5°F above the dew point, 4) the air temperature is expected to drop below the minimum temperature for the products specified within six hours after application of coating. Dewpoint shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychometric Tables. If any of the above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.

D. **Coating Thickness:** Thickness of coatings and paint shall be measured checked according to the procedures outlined in SSPC-PA 2 "Measurement of Dry Film Thickness with Magnetic Gages", November 2018 Edition. Dry film thickness shall be a Level 3. Areas that fail to meet these criteria shall be corrected at no expense to the Owner. Use of an instrument such as a Tooke Gauge, precision groove grinder, etc. is permitted if a destructive test is deemed necessary by the Engineer and the total DFT is less than 50 mils.

Specifier Notes: The below paragraph calls for all interior surfaces to be checked for holidays. We recommend this include the interior roof as well. Inaccessible areas such as the space between rafters and roof plates and lapped roof plates are exempted from this requirement.

E. **Holiday (Pinhole) Testing:** The integrity of interior coated surfaces shall be tested for holidays in accordance with NACE Standard SP0188-2006. For dry films less than 20 mils, a non-destructive holiday detector shall not exceed 67.5 volts, nor shall destructive holiday detector exceed the voltage recommended by the manufacturer of the coating system. A solution of 1 ounce non-sudsing type wetting agent, such as Kodak Photo-Flo, and 1 gallon of tap water shall be used to perform the holiday testing. For coating thickness at 20 mils and greater, a high voltage Tinker & Rasor AP/W holiday tester shall be used. Contact coating manufacturer for voltage recommendations and curing parameters.

All pinholes and/or holidays shall be marked and repaired in accordance with the manufacturer's printed recommendations and retested. No pinholes or other irregularities will be permitted in the final coating.

F. **Inspection Devices:** The contractor shall furnish, until final acceptance of coating and painting is accepted, inspection devices in good working condition for detection of holidays and measurement of dry film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates and/or plastic shims, depending upon the thickness gauge used, to test the accuracy of dry film thickness gauges and certified instrumentation to test the accuracy of holiday detectors. Dry film gauges and holiday detectors shall be made available for the Engineer's use at all times until final acceptance of application. Holiday detection devices shall be operated in the presence of the Engineer.

G. **Inspection:** Inspection for this project shall consist of 'hold point' inspections. The Engineer or his representative shall inspect the surface prior to abrasive blasting, after abrasive blasting but prior to application of coating materials, and between subsequent coats of material. Final inspection shall take place after all coatings are applied, but prior to placing the tank in service. Contractor will ensure that sufficient rigging is in place so that the Engineer or his representative shall be able to conduct the required inspections.

H. **Warranty Inspection:** Warranty inspection shall be conducted during the eleventh month following acceptance of all coating and painting work. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Engineer and/or Owner.

Specifier Note: The warranty inspection must be scheduled and coordinated by the Engineer or the Owner.

1.06 SAFETY AND HEALTH REQUIREMENTS

A. **General:** In accordance with requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of personal protective lifesaving equipment for persons working on or about the project site. The Contractor's work forces should comply with the provisions outlined in SSPC-PA-3 "A Guide to Safety in Paint Application".

B. **Head and Face Protection and Respiratory Devices:** Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying half-mask or mouthpiece respirators with appropriate filters. Barrier creams shall be used on any exposed areas of skin.

C. **Ventilation:** Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminants to a degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.

D. **Sound Levels:** Whenever the occupational noise exposure exceeds maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protection devices.

E. **Illumination:** Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Engineer.

F. **Temporary Ladders and Scaffolding:** All temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer.

1.07 PRODUCT DELIVERY, STORAGE & HANDLING

A. All materials shall be brought to the jobsite in original sealed containers. They shall not be used until the Engineer has inspected the contents and obtained data from information on containers or label. Materials exceeding storage life recommended by the manufacturer shall be rejected.

B. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings and paints must be stored to conform with City, County, State and Federal safety codes for flammable coating or paint materials. At all times coatings and paints shall be protected from freezing.

1.08 JOB CONDITIONS

Specifier Notes: Include specific project site conditions that will affect scheduling or access. Delete if not required.

PART 2 - MATERIALS

2.01 ACCEPTABLE MANUFACTURERS

A. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Company, Inc. are listed to establish a standard of 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, certified test reports from a nationally known, reputable and independent testing laboratory conducting comparative tests as directed by the Engineer between the product specified and the requested substitution.

B. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified lab test reports showing results to equal the performance criteria of the products specified herein. In addition, a list of five projects shall be submitted in which each product has been used and rendered satisfactory service.

C. All requests for product substitution shall be made at least 14 days prior to the bid date.

D. Any material savings shall be passed to the owner in the form of a contract dollar reduction.

E. Manufacturer's color charts shall be submitted to the Engineer at least 30 days prior to coating and/or paint application. General Contractor and Painting Contractor shall coordinate work so as to allow sufficient time (normally seven to ten days) for paint to be delivered to the job site.

2.02 GENERAL REQUIREMENTS

A. All materials shall be lead-free as defined by the Consumer Product Safety Act, Part 1303.

B. All zinc dust pigment contained in any zinc-rich material shall meet the requirements of ASTM D 520 Type III with regard to zinc content and purity.

C. All materials for the interior wetted portion of the tank shall meet the requirements of ANSI/NSF Standard 61 for potable water contact.

D. All catalyzed polyurethane products shall meet the minimum requirements of SSPC Paint Specification Number 36, Level 3 Performance Level.

E. No products containing MOCHA shall be allowed.

F. No inorganic zinc-rich primers shall be permitted on the tank interior surfaces.

2.03 MATERIAL PREPARATION

A. Mix and thin materials according to manufacturer's latest printed instructions.

B. Do not use materials beyond manufacturer's recommended shelf life.

C. Do not use mixed materials beyond manufacturer's recommended pot life.

D. Do not split kits of multi-component products.

2.04 TANK INTERIOR COATING SYSTEM – WETTED AREAS

A. **Weld Preparation**: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard SP0178, Designation D.

B. **Surface Preparation:** SSPC-SP10/NACE 2 Near-White Metal Blast Cleaning. An angular profile of 2.0 to 3.0 mils as per ASTM D 4417, Method C or NACE Standard RP0287 is required.

C. **Coating System:**

First Coat: Tnemec Series 94-H2O Hydro-Zinc applied at 2.5 to 3.5 dry mils.

Stripe Coat: Tnemec Series 21-1255 Beige Epoxoline applied by brush to all weld seams, edges, corners, bolts, nuts and other difficult to coat areas.

Second Coat: Tnemec Series 21-WH16 Epoxoline applied at 17.0 to 20.0 dry mils.

Total dry film thickness shall be a minimum of 21.0 mils.

Series 44-710 Accelerator must be used with Series 94 if the surface temperature is 35°F to 60°F and 20% to 40% relative humidity.

2.05 TANK INTERIOR COATING SYSTEM - DRY AREAS

A. **Weld Preparation**: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard SP0178, Designation D.

B. **Surface Preparation:** SSPC-SP10/NACE 2 Near-White Metal Blast Cleaning. An angular profile of 2.0 to 3.0 mils as per ASTM D 4417, Method C or NACE Standard RP0287 is required.

C. **Coating System:**

1st Coat: Tnemec Series 94-H_2O Hydro-Zinc applied at 2.5 to 3.5 dry mils.

Stripe Coat: Tnemec Series L140-1255 Pota-Pox Plus applied by brush and scrubbed into all weld seams. In addition to weld seams, all edges, corners, bolts, rivets, pits shall receive a stripe coat.

2nd Coat: Tnemec Series L140-15BL Pota-Pox Plus applied at 6.0 to 8.0 dry mils.

Total dry film thickness shall be a minimum of 8.5 mils.

Series 44-710 Accelerator must be used with Series 94 if the surface temperature is 35°F to 60°F and 20% to 40% relative humidity.

For cold weather applications, use Series L140F in lieu of Series L140.

2.06 TANK EXTERIOR COATING SYSTEM

A. **Weld Preparation**: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard SP0178, Designation D.

B. **Surface Preparation:** SSPC-SP6/NACE 3 Commercial Blast Cleaning. An angular profile of 1.5 to 2.5 mils as per ASTM D 4417, Method C or NACE Standard RP0287 is required.

C. **Coating System:**

1st Coat: Tnemec Series 94-H2O Hydro-Zinc applied at 2.5 to 3.5 dry mils.

2nd Coat: Tnemec Series 66 Hi-Build Epoxoline applied at 2.0 to 4.0 dry mils.

3rd Coat: Tnemec Series 73 Endura-Shield applied at 2.0 to 3.0 dry mils.

4th Coat: Tnemec Series 700 HydroFlon applied at 2.0 to 3.0 dry mils.

Logo: Tnemec Series 700 HydroFlon applied at 2.0 to 3.0 dry mils.

Total dry film thickness shall be a minimum of 10.0 mils.

For cold weather applications, Series 44-710 Urethane Accelerator may be added to Series 73 and Series 700 at the rate specified on the Series 44-710 product data sheet.

For cold weather applications, Series 161 may be used in lieu of Series 66.

Series 44-710 Accelerator must be used with Series 94 if the surface temperature is 35°F to 60°F and 20% to 40% relative humidity.

PART 3 - EXECUTION

3.01 GENERAL

A. All surface preparation, coating and painting shall conform to applicable standards of the Society for Protective Coatings, NACE International and the manufacturer's printed instructions. Materials applied to the surface prior to the approval of the Engineer shall be removed and re-applied to the satisfaction of the Engineer at the expense of the contractor.

B. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be coordinated with the Engineer.

C. The Contractor shall provide a supervisor at the work site during cleaning and application operations. The supervisor shall have the authority to sign change orders, coordinate work and make decisions pertaining to the fulfillment of the contract.

D. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the coating or paint must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags.

E. Coating and painting systems include surface preparation, prime coating and finish coatings. Unless otherwise approved in writing by the Engineer, prime coating shall be field applied. Where prime coatings are shop applied, the Contractor shall instruct suppliers to provide the prime coat compatible with the specified finish coat. Any off-site work which does not conform to this specification, is subjected to damage during transportation, construction or installation shall be thoroughly cleaned and touched-up in the field as directed by the Engineer. The Contractor shall use repair procedures which insure the complete protection of all adjacent primer. The specified repair method and equipment may include wire-brushing, hand or power tool cleaning, or dry air blast cleaning. In order to prevent injury to surrounding painted surfaces, blast cleaning may require use of lower air pressure, smaller nozzle and/or abrasive blast particles, or shorter blast nozzle distances from surface shielding and masking. If damage is too extensive or uneconomical to touch-up, the entire item shall be blasted and then coated or painted as directed by the Engineer.

F. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval of the Engineer.

G. Application of the first coat shall follow immediately after surface preparation and cleaning and stripe coat, if applicable, before rust bloom occurs or the same day, whichever is less. Any cleaned areas not receiving first coat within this period shall be recleaned prior to application of first coat. Use of dehumidification equipment shall be first reviewed by the Engineer and coatings manufacturer prior to deviating from this provision.

H. Prior to assembly, all surfaces made inaccessible after assembly shall be prepared as specified herein and shall receive the coating or paint system specified.

3.02 SURFACE PREPARATION

A. The latest revision of the following surface preparation specifications of the Society for Protective Coatings (SSPC) shall form a part of this specification. The summaries listed below are for informational purposes; consult the actual SSPC specification for full detail.

1. **Solvent Cleaning (SSPC-SP1):** Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.

2. **Hand Tool Cleaning (SSPC-SP2):** Removal of loose rust, loose mil scale and other detrimental foreign matter to a degree specified by hand chipping, scraping, sanding and wire-brushing

3. **Power Tool Cleaning (SSPC-SP3):** Removal of loose rust, loose mil scale and other detrimental foreign matter by power wire-brushing, power impact tools or power sanders.

4. **White Metal Blast Cleaning (SSPC-SP5/NACE No. 1):** Air blast cleaning to a gray-white uniform metallic color until each element of surface area is free of all visible residues.

5. **Commercial Blast Cleaning (SSPC-SP6 NACE No. 3):** Air blast cleaning until at least two-thirds of each element of surface area is free of all visible residues.

6. **Brush-Off Blast Cleaning (SSPC-SP7 NACE No. 4):** Air blast cleaning to remove loose rust, loose mil scale and other detrimental foreign matter to a degree specified.

7. **Near-White Metal Blast Cleaning (SSPC-SP10 NACE No. 2):** Air blast cleaning until at least 95% of each element of surface area is free of all visible residues.

8. **Power Tool Cleaning to Bare Metal (SSPC-SP11):** Differs from SSPC-SP3 in that it requires more thorough cleaning and a surface profile not less than 1 mil.

9. **Waterjet Cleaning of Metals (SSPC-WJ-4/NACE WJ-4):** Waterjet (pressure washing) of coated and uncoated metal surfaces.

B. Slag, weld metal accumulation and spatters not removed by the Fabricator, Erector or Installer shall be removed by chipping and/or grinding. All sharp edges shall be peened, ground or otherwise blunted as required by the Engineer. All grinding and finishing of welds, edges, etc. shall be performed prior to solvent cleaning and abrasive blasting. Welds shall be prepared as per NACE Standard SP0178 for all interior and exterior surfaces:

1. **Butt Welds:** Shall be ground smooth and free of all defects, designation "D".

2. **Lap Welds:** Shall be ground smooth and blended., designation "D".

3. **Fillet Welded Tee Joint**: Shall be ground smooth and blended, designation "D".

Specifier Note: The above paragraph contains weld treatment requirements, which should also be called out in any tank fabrication and/or structural specifications. See also 1.05, B of this specification.

C. Field blast cleaning for all surfaces shall be by dry method unless otherwise directed. Blast nozzles shall be venturi-type nozzles with a minimum pressure at the nozzle of 90 psi.

D. Particle size of abrasives used in blast cleaning shall be that which will produce the specified surface profile or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.

If the profile of the blasted steel exceeds the profile specified above, the Contractor shall be required to do one or both of the following:

1. Reblast the surface using a finer aggregate in order to produce the required profile.

2. Apply a thicker prime coat, if possible given the limitations of the products being applied, in order to adequately cover the blast profile

E. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused unless specifically approved in writing by the Engineer.

F. During blast cleaning operations, caution shall be exercised to insure that existing coatings or paint are not exposed to abrasion from blast cleaning.

G. The Contractor shall keep the area of his work and the surrounding environment in a clean condition. He shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the accomplishment of the work, the operation of the existing facilities or to the surrounding environment.

H. Blast cleaned surfaces shall be cleaned prior to application of specified coatings or paint. All surfaces shall be free of dust, dirt, and other residue resulting from the abrasive blasting operation. No coatings or paint shall be applied over damp or moist surfaces.

I. All welds not scheduled to be abrasive blasted or finished by grinding or sanding with power tools as per SSPC-SP3 or SP11 shall be neutralized with a suitable chemical compatible with the specified coating or paint.

J. Pitted areas on the tank interior shall be repaired by either filling with Tnemec Series 215 Surfacing Epoxy or Tnemec Series FC22 Epoxoline (floor) or by welding. Epoxy filler shall be feathered smooth. Filler shall be applied between the prime coat and the succeeding coat. No protrusions or spatter will be allowed. Pits deeper than 1/8" shall be filled by welding.

K. **Specific Surface Preparation:** Surface preparation for the specific system shall be as noted in Sections 2.04, 2.05 and 2.06.

3.03 NON-VISIBLE CONTAMINANTS

A. Surface shall be checked in three locations for the presence of chlorides, free iron and sulfates. New tanks shall be tested prior to abrasive blasting, tanks being rehabilitated shall be tested prior to blasting. If blisters are present in existing tank, testing shall also be performed after abrasive blasting. These tests are an Iron Test (Fe^{2+}), Chloride Test and Sulfate Test. Testing shall be carried out as per SSPC Technology Guide 15 "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates". The maximum limits for these contaminants shall be:

1. The maximum level of chlorides is 30 milligrams per square meter or 3 micrograms per square centimeter.

2. The maximum level of sulfates is 100 milligrams per square meter or 10 micrograms per square centimeter.

3. The maximum level of ferrous ions (Fe^{2+}) is 50 milligrams per square meter or 5 micrograms per square centimeter.

4. Contamination levels above these limits will require washing and retesting in accordance with Item 2 (below) until the surface is under the allowable limits.

B. If testing shows amounts present in the test solution to be greater than the limits listed herein, the Contractor shall clean the surface of the entire tank interior with a 5,000 psi water blast with fine entrained abrasive until the levels in the test solutions are below the maximum acceptable level. Alternate cleaning methods may be allowed with prior approval of the Engineer. Surface shall be reblasted as specified in 2.04 at no additional cost to the Owner.

C. Contractor shall provide a written statement from paint manufacturer stating that the maximum acceptable levels are not less than those listed herein. Results of the testing shall be provided to the Owner before any coatings are applied.

D. The following test kits are approved for use on this project:

a. Chlor*Rid Chlor*Test Kit

b. KTA SCAT Test Kit

c. Test kits from other vendors shall be submitted to the Engineer for prior approval before use.

Specifier Note: The below paragraph should be included when painting is near the coast when salt contamination is possible, or when the tank is next to an industrial facility where the possibility of atmospheric fallout is possible.

E. When exterior coats are to be applied on subsequent days, or if a containment shroud is dropped between coats, areas scheduled to be coated shall be thoroughly pressure-washed immediately prior to applying coatings to remove any pollen, dust, other atmospheric fallout and/or salts that may have settled on the surface.

3.04 APPLICATION, GENERAL

A. Coating and paint application shall conform to the requirements of the Society for Protective Coatings Paint Application Specification SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting".

B. Thinning shall be permitted only as recommended by the manufacturer and approved by the Engineer, and utilizing the thinners stated in Sections 2.04, 2.05 and 2.06.

C. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.

D. Protective coverings or drop cloths shall be used to protect floors, fixtures and equipment. Care shall be exercised to prevent coatings or paints from being spattered onto surfaces which are not to be coated or painted. Report to the Engineer surfaces from which materials cannot be satisfactorily removed.

E. When two coats of coating or paint are specified, where possible, the first coat shall contain sufficient approved color additive to act as an indicator of coverage or the two coats must be of contrasting color.

F. Film thickness per coat as specified in Sections 2.04, 2.05 and 2.06 are the minimum required. If roller application is deemed necessary, the Contractor shall apply additional coats as to achieve the specified thickness.

G. Apply stripe coat in accordance with manufacturer's recommendations and in accordance with SSPC-PA 11.

H. All material shall be as specified.

3.05 COATING SYSTEMS APPLICATION

A. After completion of surface preparation as specified for the specific system, materials shall be applied as noted in Sections 2.04, 2.05 and 2.06.

B. Care shall be taken so as to eliminate overspray and dry spray on the tank interior. Where such conditions are encountered, the surface shall be cleaned of all over spray and dry spray prior to the application of the succeeding coat.

C. Areas rendered inaccessible after tank erection such as the spaces between roof plates and rafters shall receive the full coating system prior to erection and/or assembly.

D. Exterior surfaces that have been coated on a previous day shall be rinsed with clean potable water and allowed to dry before applying subsequent coat(s). Cleaned surfaces, which are not coated the day of cleaning shall be re-cleaned prior to applying coatings.

3.06 REPAIRS

A. After the interior coating system has been installed and holiday tested, repair pinholes and voids as follows:

1. Abrasive blasting shall be in accordance with SSPC-SP10/NACE No.2 Near White Blast Cleaning obtaining a minimal surface profile as specified herein.

2. Power tool cleaning shall be in accordance with SSPC-SP11 Power Tool Cleaning to Bare Metal and limited to not more than a thirty (30) square inches. Surface profile shall be angular and not less than the surface profile as specified herein.

3. All edges of remaining sound, tightly adhering coating shall be feathered back (beveled) to create a smooth transition from the substrate to the coatings surface. The coating may be considered tightly adhering if an edge cannot be lifted with a dull putty knife.

4. Install the coating system as specified herein to provide a complete and monolithic system, free of voids and pinholes. Alternatively, Tnemec Series FC22 Epoxoline may be used as a repair material when approved by the Engineer or his representative in consideration of the area(s) to be repaired.

B. For exterior surfaces, repair as follows:

1. Hand or Power Tool Clean as per SSPC-SP2 or SP3 to remove defects in the intermediate and/or topcoat. In cases where the defect extends to the substrate, prepare the surface as per SSPC-SP11 Power Tool Cleaning to Bare Metal, obtaining a minimum anchor profile as specified herein.

2. All edges of remaining sound, tightly adhering coating shall be feathered back (beveled) to create a smooth transition from the substrate to the coatings surface. The coating may be considered tightly adhering if an edge cannot be lifted with a dull putty knife.

3. Install the coating system as specified herein to provide a complete and monolithic system, free of voids and pinholes.

3.07 SOLVENT VAPOR REMOVAL

A. All solvent vapors shall be completely removed by suction-type exhaust fans and blowers before placing tank in operating service. Vapors shall be exhausted as near ground level as possible with fresh air supplied from the roof.

B. All solvent vapors will be exhausted both during and after coating application as per AWWA D 102 to allow the proper curing of the coating material.

C. Ventilation shall be continued until such time as the coating has reached "full cure" as specified by the coating manufacturer.

3.08 DISINFECTION

Specifier Notes: Amend as needed.

A. Disinfection of interior surfaces shall be performed in the presence of the Engineer in accordance with all the requirements of ANSI/AWWA C652 and regulatory agencies. Contractor shall submit his preferred method of disinfection to the Engineer for approval prior to disinfection.

B. Disinfection shall be performed after protective coatings have been applied to the interior surfaces and allowed to thoroughly cure.

C. Prior to disinfecting, the complete interior shall be washed down with clean water and thoroughly flushed out.

3.09 CLEAN UP

A. Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Coating or paint spots or oil stains upon adjacent surfaces shall be removed and

the jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired or refinished to the satisfaction of the Engineer at no cost to the Owner.

END OF SPECIFICATION