

SECTION 09 97 00

WATER STORAGE TANK PAINTING

PART 1: GENERAL

1.01 SCOPE

- A. Section includes surface preparation, priming, and field coating for interior wet, interior dry, and exterior surfaces of steel water storage tanks.

1.02 SUBMITTALS

- A. Conform to requirements of Specification Section 01 33 00 – Submittals.
- B. Contractor shall submit a color exhibit depicting the tank with proposed color and/or any proposed logos required on the tank. All logos shall be approved by AW and DPW prior to painting.
- C. See below for a complete list of Contractor submittals.

PART 2: PRODUCTS

2.01 PAINT MATERIALS

- A. Coatings shall comply with ANSI/NSF Standard 61. The approval of interior coatings and sealers shall be based on written certification of compliance. Manufacturer's published data shall be submitted concerning transportation, storage, mixing, thinning, pot life, application, curing etc.
- B. Contractor shall furnish one of the proprietary systems specified herein. All coatings shall be supplied by one coating manufacturer. Approved coating manufacturers are listed as follows:
 - 1. Tnemec Co., Inc., 6800 Corporate Drive, Kansas City, MO 64120.
 - 2. Sherwin-Williams Corporation, 101 Prospect Avenue, N.W., Cleveland, Ohio, 44115.

2.02 PAINT SYSTEMS

- A. The roof vent, safety climbing devices, and any other non-painted items shall be removed prior to cleaning and painting.
- B. The coating systems listed below are proprietary to TNEMEC Company, Inc and Sherwin-Williams Corporation. All coatings and thinners must be supplied by one manufacturer, including shop coating. All paint must be new and purchased for each project.

C. **INTERIOR WET AREAS:** Interior wet surfaces are any surfaces exposed to stored water or its vapor. Interior wet areas shall be coated with a three-coat high-build zinc-epoxy-epoxy system, NSF Standard 61 approved for use in potable water. The minimum dry film thickness of the interior coating system shall be 10.5 Mils. Manufacturers' recommended curing times and recoat windows between each coat must be strictly adhered to.

1. Three-coat high-build zinc-epoxy-epoxy system manufactured by Tnemec Company, Inc.

a. (full) Primer Coat – Tnemec Series 91-H₂O or 94-H₂O Hydro-Zinc applied at 2.5 – 3.5 Mils DFT.

Pit Filler – All designated pits shall be filled with Tnemec Pit Filler. Follow Tnemec recommendations for application methods/procedures. Payment for this item shall be based on unit pricing provided by the Contractor in the bid.

b. Stripe Coat – All vertical/horizontal seams, ceiling overlapping plate edge, ceiling support beams, support columns, ceiling to shall joint, nuts, bolts, ladders, pits, and all other irregular surfaces shall receive one (1) coat of Tnemec Series N140-1255 (Beige) applied to a dry film thickness of 2.0 – 3.0 Mils DFT. Application shall be spray and back brush and/or rolled. Applied coating shall not be recoated until minimum recoating time has been satisfied as per manufacturer's recommendations.

c. (full) Intermediate Coat – Tnemec Series N140-1255 (Beige) Pota-Pox applied at 4.0 – 6.0 Mils DFT.

d. (full) Finish Coat – Tnemec Series N140-15BL (Tank White) applied at 4.0 – 6.0 Mils DFT.

Total DFT = 10.5 – 15.5 Mils

2. Three-coat high-build zinc-epoxy-epoxy system manufactured by Sherwin Williams Corporation.

a. (full) Primer Coat – Corothane I Galvapac Two-Pack Zinc-rich Primer B65 Series applied at 2.5 – 3.5 Mils DFT.

Pit Filler – All designated pits shall be filled with Sherwin Williams Steel Seam FT-910. Follow Sherwin-Williams's recommendations for application methods/procedures. Payment for this item shall be based on unit pricing provided by the Contractor in the bid.

b. Stripe Coat – All vertical/horizontal seams, ceiling overlapping plate edge, ceiling support beams, support columns, ceiling to shall joint, nuts,

bolts, ladders, pits, and all other irregular surfaces shall receive one (1) coat of Macropoxy 646 PW, B58 Series (Light Blue/Mill White) applied to a dry film thickness of 2.0 – 3.0 Mils DFT. Application shall be spray and back brush and/or rolled. Applied coating shall not be recoated until minimum recoating time has been satisfied as per manufacturer's recommendations.

- c. (full) Intermediate Coat – Macropoxy 646 PW, B58 Series (Light Blue/Mill White) applied at of 4.0 – 6.0 Mils DFT.
- d. (full) Finish Coat – Macropoxy 646 PW, B58 Series (Mill White) applied to a dry film thickness of 4.0 – 6.0 Mils DFT.

Total DFT = 10.5 – 15.5 Mils

D. **EXTERIOR SURFACES:** Exterior surfaces are all surfaces exposed to the weather. Exterior surfaces shall be coated with a three coat high-build zinc-epoxy-polyurethane system. The minimum dry film thickness of the exterior coating system shall be 7.0 Mils. Manufacturers' recommended curing times and recoat windows between each coat shall be strictly adhered to.

1. Three-coat high-build zinc-epoxy-polyurethane system manufactured by Tnemec Company, Inc.:
 - a. (full) Primer Coat – Tnemec Series 90-97 Tnemec-Zinc applied at 2.5 – 3.5 Mils DFT.
 - b. (full) Intermediate Coat – Tnemec Series N69 Epoxyline II applied at 2.5 – 3.5 Mils DFT. Color shall contrast with Primer and Finish Coat colors. The color of this coat of paint shall closely match that of the one (1) finish coat, but be a little darker.
 - c. (full) Finish Coat – Tnemec Series 1074 (U) Endura Shield (high gloss) applied at 2.0 – 3.0 Mils DFT (Color to be selected by the AW).

Total DFT = 7.0 – 10.0 Mils

2. Three-coat high-build zinc-epoxy-polyurethane system manufactured by Sherwin-Williams Corporation.
 - a. (full) Primer Coat – Corothane I Galvapac Two-Pack Zinc-rich Primer B65 Series applied at 2.5 – 3.5 Mils DFT.
 - b. (full) Intermediate Coat – Macropoxy 646, B58 Series applied at 2.5 – 3.5 Mils DFT. Color shall contrast with primer and finish coat colors. The color of this coat of paint shall closely match that of the one (1) finish coat, but a little darker.

- c. (full) Finish Coat – Hi-Solids Polyurethane B65 Series applied at 2.0 – 3.0 Mils DFT (Color to be selected by the AW).

Total DFT = 7.0 – 10.0 Mils

- E. **TOP COATING:** This coating requirement is for an alternate exterior cleaning and top coating in lieu of the complete blast cleaning and coating. Top coating only covers existing tank surfaces.

This coating system should only be considered in rare cases. If this system is under consideration, the Contractor shall review the existing coating condition of the tank exterior coatings and confirm that this particular coating system is an appropriate action. Otherwise, the Contractor shall recommend a suitable alternative.

Manufacturers' recommended curing times and recoat windows between each coat must be strictly adhered to.

- 1. Tnemec Company, Inc.:
 - a. (spot) Primer Coat – Tnemec Series 135-1243 Chembuild Metallic Aluminum applied at 3.0 – 5.0 Mils DFT.
 - b. (full) Intermediate Coat – Tnemec Series 27 Typoxy applied at 2.0 – 3.0 Mils DFT. Color of this coat of paint shall be slightly darker than the finish coat.
 - c. (full) Finish Coat – Tnemec Series 1075 Endura Shield II (semi gloss) applied at 2.0 – 3.0 Mils DFT. (Color to be selected by AW).

Total DFT = 7.0 – 11.0 Mils

- 2. Sherwin Williams Corporation.
 - a. (spot) Primer Coat – Macropoxy 646, B58 Series, applied at 3.0-5.0 Mils DFT.
 - b. (full) Intermediate Coat – Macropoxy 646, B58 Series, applied at 2.0-3.0 Mils DFT. Color of this coat of paint shall be slightly darker than the finish coat.
 - c. (full) Finish Coat – HiSolids Polyurethane SG, B65 Series, applied at 2.0-3.0 Mils DFT. (Color to be selected by AW).

Total DFT = 7.0 – 11.0 Mils

2.03 FLEXIBLE SEALANT

- A. Flexible sealant shall be Sikaflex-1A or approved equal. Sealant color shall be white for all interior applications.

2.04 ABRASIVES

- A. Abrasives used for blast cleaning shall be those mentioned in the specifications of the SSPC. Particular attention shall be given to the maximum particle size requirements. Abrasives must be selected to provide the recommended surface profile and degree of cleanliness required.

2.05 SAFETY REQUIREMENTS

- A. The Contractor shall comply with all health and safety regulations and requirements of OSHA (or State Health and Safety Regulatory Agency), SSPC - PA Guide 3, and the paint and abrasive manufacturers. Should vents, holes, rigging attachments, or any other modification, cutting, or welding be required to meet safety standards, they may be accomplished at the expense of the Contractor upon submitting of details in writing to, and with subsequent approval by AW.

PART 3: EXECUTION

3.01 EQUIPMENT

- A. All equipment, (compressor, sand pots and paint pumps, etc.) shall be in good operating condition and of sufficient capacity to provide satisfactory results for cleaning and painting.
- B. Spray equipment and tip size shall be used as recommended in the paint manufacturer's instructions.
- C. Compressed air for blasting and painting shall be free from detrimental amounts of water or oil. Adequate traps and/or dryers shall be provided.
- D. Adequate lighting shall be provided inside the tank to properly allow for safety, workmanship and inspection. Lighting requirements shall meet the minimum requirements of SSPC Guide No. 12 "Guide for Illumination of Industrial Painting Projects"
- E. Air hoods, respirators and proper and sufficient ventilation shall be provided during blasting, painting and curing.
- F. Contractor must have sufficient explosion proof ventilation equipment to properly and efficiently expel dust and paint fumes out of unit to prevent injury to workmen or the accumulation of volatile gases.

- G. Contractor shall have available at the site, all inspection and measuring equipment such as wet and dry film thickness gages, wet-bulb, dry-bulb measuring equipment, steel temperature measuring equipment, holiday detector equipment, etc., as required by this Specification.

3.02 SURFACE PREPARATION

- A. All removable and non-painted appurtenances such as roof vents, safe climbing devices, antennas, markers, etc, shall be removed by the Contractor prior to any exterior coating work. These items shall be cleaned, protected, and stored during coating work, and re-installed following completion of all work. Modification/calibration required to make appurtenances operable, such as screen repair, straightening of safe climb bars, calibration of antenna, etc shall be included in the Contractors' scope of work.
- B. All interior steel surfaces shall be prepared in the shop in accordance with SSPC-SP10 "Near White Blast Cleaning". Steel shall be thoroughly cleaned of rust, mill scale, dirt and all other foreign substances.
- C. All exterior steel surfaces shall be prepared in accordance with SSPC-SP6 "Commercial Blast Cleaning".
- D. Shop primed surfaces shall be inspected in the field by the AW Project Engineer after tank erection. Failure of the shop primer to meet manufacturer's requirements shall be sufficient cause for removal of the shop primer, re-cleaning and application of a field prime coat at no additional expense to AW. Recoat windows shall be adhered to and/or proper procedures followed if maximum recoat time frames are exceeded.
- E. Field:
1. Prior to any field coating application, all unused brackets shall be removed from the interior and exterior surfaces. All underlying areas shall be ground smooth. All weld burrs, weld spatter, scars and rough edges shall be ground smooth. Sealed welded containment lugs shall be left in place.
 2. All weld seams and any rusted or abraded areas, including rust bloom shall be ground smooth and properly cleaned.
 3. Where necessary, steel surfaces shall be prepared in the field in accordance with SSPC-SP10 "Near White Blast Cleaning".
 4. All areas of seam deterioration, weld undercut and pitting deeper than 1/8" shall be clearly marked for repair.

Repair shall be done by arc-gouging and welding. All welding shall be done in accordance with AWWA D100 Standard for Welded Steel Tanks for Water Storage.

5. Contractor shall conduct field measurement of the surface profile of blasted cleaned steel in accordance with ASTM D4417.
- F. Contractor shall be responsible for any dust, debris and/or paint droplets which leave AW's property and/or cause damage to neighboring property. Insufficient containment of abrasive debris and/or generation of nuisance dust beyond AW's property limits is just cause for shut-down of the job until proper protective measures are in place and violations have been remedied.
- G. After any and all surface preparation, shop and field, all surfaces shall be thoroughly washed and completely cleaned of any residue or dust before applying sealer or primer, shop or field coatings.

3.03 SHOP PRIMING

- A. Fabricated steel plates may be shop primed, subject to all of the requirements of this Specification. Contractor is required to notify AW at least two weeks in advance of any shop coating. AW reserves the right to inspect, or have an authorized representative present to inspect all shop coating operations. Failure to provide proper notification in advance of shop coating is cause for rejection of the primer coat and grounds for complete removal and repainting in the field, at no additional cost to AW.
- B. Primer used on internal surfaces, shall be tested and certified for potable water contact in accordance with NSF Standard 61. Priming shall occur before the formation of rust and after observation of the surface by the AW Project Manager.
- C. If applicable, Contractor shall apply the specified primer in the shop, in accordance with manufacturer's recommendations. Steel plates shall be primed leaving a four inch margin along all edges that are to be welded. ANY PRIMER APPLIED TO AREAS THAT ARE TO BE WELDED **MUST** BE REMOVED IN THE FIELD PRIOR TO WELDING. WELDING OF PAINTED SURFACES WILL **NOT** BE PERMITTED.

3.04 STRIPE COAT

- A. Special attention shall be given to welds, lap joints, bolt heads and nuts, threads, corners, member intersections, and other deviations from smooth surfaces. These areas shall be primed by brush after complete priming. Inaccessible areas shall be primed with the Aluminum platelet material.

3.05 INTERMEDIATE COAT

- A. After curing of the prime coat and stripe coat, the primed interior and exterior surfaces shall be cleaned of all dust, overspray, abrasive, and other contaminants which may cause premature coating failure and given one immediate coat paint.

3.06 FINISH COAT

- A. After curing of intermediate coat, the interior/exterior surfaces shall be cleaned of all dust, overspray, abrasive, and other contaminants which may cause premature coating failure and given one finish coat.

If the finish coat is not applied before the recoat window expires, then the intermediate coat surfaces shall be scarified by abrasive blasting or other method recommended by the manufacturer in order for the finish coat to properly bond to the intermediate coat.

3.07 SEALER APPLICATION

- A. After cleaning, rough weld areas, areas where sealing is required or depressions where paint will not properly fill voids, these areas shall be sealed with an epoxy seam sealer recommended by the respective paint manufacturer as listed below. The seam sealer shall be applied to designated locations after the prime coat and prior to the intermediate coat.

1. Tnemec Company, Inc. – Surfacing Epoxy Series 215.
2. Sherwin-Williams - Steel Seam FT910.

- B. Seam sealer shall be applied as per the recommendations of the respective paint manufacturer to the roof and shell manholes, vent to shell intersection and all piping connections, unless seal welding of the area has been performed.

3.08 WATER TANKS OBSTRUCTING AIR NAVIGATION

- A. Painting of elevated steel water storage tanks obstructing air navigation shall conform to the requirements set forth in the Utility Facility Code (UFC) 3-260-05A Chapter 7, and the latest edition of the FAA Advisory Circular (AC) No. 70/7460 Obstruction Marking & Lighting. Obstruction marking shall be made with a solid pattern of aviation surface orange (FS 12197), or a checkerboard pattern of aviation surface orange (FS 12197) and aviation surface white (FS 17875). Where marking by surface color is impractical as defined by the AW Project Engineer, the general definition and location of the tank will be indicated by using suitable markers.

3.09 FLEXIBLE SEALANT

- A. After final curing of the finish interior coat, a flexible polyurethane sealant shall be applied to the roof stiffener-to-roof interfaces, if any, the circumferential stiffener angle-to-roof plate intersection, the unwelded roof lap seams and at the center hub connections or any other areas which are difficult to paint and subject to corrosion and movement. Sealant shall be applied in accordance with all manufacturers' recommendations and in a neat and workmanlike manner. Sealant shall be approved for use in potable water and shall be certified by EPA, ANSI/NSF and any applicable local health regulatory agencies.

3.10 INSPECTION

- A. All cleaning and painting shall be subject to inspection by a designated representative of AW and/or the paint manufacturer.
- B. The Contractor shall make all work accessible to AW's representative by having available the appropriate rigging and equipment. Any rigging removed prior to proper inspection and approval shall be reinstalled at the Contractor's expense. This shall also apply at the one year anniversary inspection.
- C. The Contractor shall have available at the site a calibrated Elcometer or MikroTest gauge for measuring dry film thickness and uniformity of the paint coating. AW may elect to use a low voltage holiday detector to check the finished paint film integrity.

3.11 CURING

- A. The water tank shall remain empty with all hatches and vents open for a minimum of seven days following the last coating operations. Forced air ventilation shall be provided, if deemed necessary by AW, to facilitate complete and timely curing.
- B. Following the recommended curing time, AW's representative, along with a representative of the paint manufacturer will perform testing to ensure that the coatings have properly cured. At a minimum, MEK rub tests shall be conducted. The Contractor is required to obtain from the paint manufacturer certification that the coatings have been applied in accordance with all recommendations and in a proper state of cure prior to disinfection and filling of the tank.
- C. Disinfection of the tank will be performed in accordance with Specification Section 33 16 13.11 Water Storage Tank Disinfection.
- D. The Contractor shall be responsible for tank disinfection upon completion of repair/rehabilitation work.

3.12 LOGO PAINTING

- A. Tank painting applications that require the painting of a logo on a tank shall be stenciled on to the tank prior to painting. The location of the logo shall be reviewed in the field by AW and local DPW. Both AW and DPW shall approve location of logo in writing prior to painting.

3.13 CONSTRUCTION SIGN – **ONLY REQUIRED FOR FT HOOD PROJECTS**

- A. Contractor shall provide and install a construction site sign prior to blasting/painting of water storage tanks. Signage shall meet the following standards:
 - 1. Sign size: 4' x 8'.
 - 2. Single sided face.
 - 3. Black letters on a white background (reflecting sheet diamond grade)

4. Letter type: Helvetica, sizes 4" and 3".
- B. Letters and words shall not be spaced too closely. In general letters shall not occupy more than 75% of the sign panel area when external or no lighting is used.

Letter types shall be no more than three to increase legibility, and the signs shall conform to a simple color and graphic palette in order to minimize confusion and reduce clutter of sign. In general, sign shall be no more than three colors or shades of the same color.
- C. Contractor shall place one construction sign at each work location. Construction sign shall be placed next to an access gate (attached to fence if possible) allowing adequate time for site personnel's to read and react to the message. The area around the sign shall be free of visual clutter and landscape or construction materials. Signage shall be placed approximately 4 feet above ground level to within 10 degrees of on-coming driver's line of vision.

3.14 TEMPORARY FENCING

- A. Contractor shall install a chain-link fence along the perimeter of the site. Contractor shall submit a sketch of their fencing for AW approval. Contractor shall coordinate with AW if temporary fencing and construction activities would affect parking area or other common areas adjacent to the site. Vehicular access and exit gates shall be clearly marked.
- B. Contractor shall provide adequate areas for pedestrians and clearly restrict areas that would represent a hazard due to construction activities.
- C. Contractor shall use a standard galvanized chain-link with a minimum fence height of 6 feet. The fencing hardware shall be galvanized steel to prevent rust. Chain-link fence fabric shall be a minimum of 9 gauge, and shall be tied on the side of the fence with a minimum 9 gauge wire ties not clips. Bottom of fence fabric must be within two inches of grade level.

3.15 ANNIVERSARY INSPECTION

- A. Contractor shall inspect the interior surfaces and exterior surfaces of the tank within one year after coating work has been completed to determine whether any repair work is necessary.
- B. It shall be the Contractor's responsibility to contact AW and arrange a suitable date for inspection work.
- C. The method of inspection shall be specified and agreed with AW. Contractor shall confirm the date of inspection and notify AW 30 days in advance.
- D. Contractor shall provide AW with an inspection report covering the one year anniversary inspection, stating the number and type of failures observed, if any, the percentage of the surface area where failure has occurred, the names of the

persons responsible for making the inspection, and the type and location of coatings repairs shall be prepared. Color photographs illustrating each type of failure shall be included in the report.

- E. Any location where layers of coating have been peeled off, bubbled, cracked, and location where rusting is evident, shall be considered to be a failure of the coating system. Rust stains emanating from inaccessible areas, such as unwelded roof plate lap joints, and areas where roof plates cross supporting members will be considered acceptable as the rust does not affect the integrity of the coating surface.
- F. Contractor shall repair points where failures are observed by removing the deteriorated coating, cleaning the surface, and recoating with the same coating system. Manufacturer's cure time requirement for coating repair shall be observed.

CONTRACTOR SUBMITTAL CHECKLIST

Project Name: _____

Locatio: _____, _____

Submittal Number	Close d √	Submittal Name	Submit By Date	Date Received	Date Reviewed	Status	Notes
1		Bid	-				
2		Insurance Certificate (if not already on file)	w/ Bid				
3		Bid Bond (if applicable)	w/ Bid				
4		Project Execution Plan (PEP)	NTP+7				Executed PEP
5		Payment Bond	NTP+7				
6		Performance Bond	NTP+7				
7		Maintenance Bond	Completion				
8		QA/QC Inspection Report	-				To be submitted biweekly
9		Abrasive Blasting Containment Details	W/Bid				Details to be included in PEP.
10		Abrasives Technical Details	W/Bid				
11		Project Schedule	W/Bid				
12		Pre-Soil Sample Form	NTP+7				Form to be completed by Contractor
13		Post-Soil Sample Form	Completion				Form to be completed by Contractor
14		Surface Profile test Results	-				To be submittal after surface preparation
15		Dry Film Thickness Test Results	-				To be submitted after coating tank
16		MEK Rub Test / Holiday Test Results	-				To be submitted after curing
17		Certification of Coating Compliance	Completion				Certified copy from paint manufacturer
18		Pre-construction Video (as required)	-	-	-	-	1 wk prior to commencement of work
20		Crack Filler (as required)	-				
21		Patching Material (as required)					
22		Concrete Coating (as required)	-				
23		Permits	-				Prior to commencement of work
24		Shop Drawings, Site Plan, Logo Plan	NTP+14				For Review
25		Work Safety Plan (Medical surveillance plan, employee training program, medical removal protection program)	NTP+14				Reviewed only for content

Status Abbreviations: A = Approved, AAN = Approved As Noted, RAR = Revise And Resubmit, NA = Not Approved, NAR = No Action Required by AW Project Engineer or AW

RRC = Resubmit Record Copy

Others: CD = Contract Date, NTP = Notice To Proceed

CONTRACTOR SUBMITTAL CHECKLIST

Project Name: _____

Location: _____, _____

Submittal Number	Close d √	Submittal Name	Submit By Date	Date Received	Date Reviewed	Status	Notes
26		Waste Collection and Storage Plan	NTP+14				Reviewed only for content
27		Coatings Specifications					
28		Coatings MSDS Sheets					
29		Sealer Specification					
30		Flexible Sealant Specification					
31		Decontamination Shower (as required)		-	-	-	Not applicable
32		Disinfection Procedure		-	-	-	2 wks prior to commencement of disinfection
33		Coatings Lead & NSF Certification					
34		Welder Certifications					
35		Waste Disposal Manifests					
36		Grouting Details					
37		As Built Details	Completion				
38		Competent Person	NTP+20				Reviewed only for content
39		Spill Prevention Control and Countermeasure (SPCC) Plan	NTP+20				
40		List All Other Items Below (if applicable)					
41		Structural Submittals (if different than supplied drawings)					
42		Company Safety Plan					Reviewed only for content
43		Site Specific Safety Plan					Reviewed only for content
44		Job Safety Analysis (JSA)					Reviewed only for content
45		Public Safety Plan					

46		Logo					
47		Sign					
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END OF SECTION 09 97 00