

COATING OF STEEL WATER STORAGE TANK

PART 1 - GENERAL

1.1 SUMMARY

- A. Work included:
 - 1. Coat the interior carbon steel surfaces of the reservoirs (new and existing) in their entirety, including braces, new weld construction, new pipes, and appurtenances.
 - 2. Coat the exterior carbon steel surfaces of the reservoirs (new and existing) in their entirety, including new weld construction, new pipe connections, and new steel appurtenances, as indicated on the Contract Drawings.

- B. Related Sections:
 - 1. Section 13210 – Steel Water Storage Tank Leakage and Water Quality Testing.

1.2 REFERENCES

- A. SSPC Vol. 1, Steel Structures Painting Manual, Volume 1, Good Painting Practice.

- B. SSPC Vol. 2, Steel Structures Painting Manual, Volume 2, Systems and Specifications.
 - 1. SSPC-SP 1 -- Solvent Cleaning
 - 2. SSPC-SP 5 -- White Metal Blast Cleaning
 - 3. SSPC-SP 6 -- Commercial Blast Cleaning
 - 4. SSPC-SP 7 -- Brush-off Blast Cleaning
 - 5. SSPC-SP 10 -- Near White Blast Cleaning
 - 6. SSPC-SP 11 -- Power Tool Cleaning to Bare Metal
 - 7. SSPC-SP WJ-1 -- Low Pressure Water Cleaning
 - 8. SSPC-AB 1 -- Mineral and Slag Abrasives
 - 9. SSPC-PA 1 -- Shop, Field, & Maintenance Painting
 - 10. SSPC-PA 2 -- Measurement of Dry Paint Thickness with Magnetic Gages
 - 11. SSPC-PA Guide 3 -- A Guide to Safety in Paint Application
 - 12. SSPC-Guide to VIS 1-89 -- Visual Standard for Abrasive Blast Cleaned Steel

- C. AWWA D-102, AWWA Standard for Painting Steel Water-Storage Tanks.

- D. AWWA D-100, AWWA Standard for Welded Carbon Steel Tanks for Water Storage

- E. Exterior coatings (and possibly interior coatings) may contain, Heavy Metals, in the dried film; the following regulatory requirements shall be applicable at a minimum:
 - 1. 29 CFR 1910 "OSHA General Industry Standards"
 - 2. 29 CFR 1910.134, "Respiratory Protection"
 - 3. 29 CFR 1910.1000, "Air Contaminants - Permissible Exposure Limits"
 - 4. 29 CFR 1910.1020, "Employee Access to Exposure and Medical Records"
 - 5. 20 CFR 1926, OSHA Construction Industry Standards"
 - 6. 29 CFR 1926.59, "Hazard Communication"
 - 7. 29 CFR 1926.62, "Lead Exposure in Construction; Interim Final Rule"
 - 8. 40 CFR 261, "Identification and Listing of Hazardous Waste"
 - 9. 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste"
 - 10. 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste"
 - 11. 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, & Disposal Facilities"

1.3 SUBMITTALS

A. Product data:

1. Submit list of materials to be provided. Include thinner, bond solvent, and abrasive grit material.
2. Submit manufacturer's current specifications or technical information.
3. Submit certification from manufacturer that coating system materials provided comply with this specification.
4. Submit manufacturer's batch numbers and dates of manufacture for coating system materials to be provided under this contract.
5. Submit manufacturer's documented results for the following data for coating system materials to be provided under this contract determined in accordance with the listed ASTM standard.
 - a. Weight in pounds/gallon – ASTM D 2196.
 - b. Specific gravity – ASTM D 1475.
 - c. Percent solids by volume – ASTM D 2369.
 - d. Percent solids by weight – ASTM D 2369.
 - e. Air cure dry to recoat time – ASTM D 1640.
 - f. Adhesion to steel substrate – ASTM D 4541.
 - g. Adhesion between coats – ASTM D 4541.

B. Manufacturer's instructions:

1. Submit coating manufacturer's latest written instructions for:
 - a. Coating system materials storage,
 - b. Surface preparation, coating repair,
 - c. Application equipment,
 - d. Mixing and application of coating system,
 - e. Ventilation and curing of coating system.
2. Include:
 - a. Maximum and minimum storage temperatures,
 - b. Maximum surface application temperature,
 - c. Maximum temperature coating can be heated prior to application,
 - d. Special preparation of paint surface when maximum recoat time has been exceeded, and
 - e. Curing required prior to holiday detector test.
3. Submit coating manufacturer's chart showing recoat times for application temperatures from 50 °F to 160 °F.

C. Dehumidification and ventilation operation:

1. Submit details of dehumidification and ventilation operation showing all equipment and materials to be used.
2. Submittal shall clearly show compliance with all requirements specifies.

D. Equipment:

1. Submit plural component pump type and equipment with name of individual who will operate the plural component pump for the duration for the job.

E. Reports:

1. CONTRACTOR shall keep a daily log which includes at a minimum:
 - a. Actual weight of blast cleaning abrasive used for field abrasive blast cleaning each day.
 - b. Quantity of coating material used for each coat each day.
 - c. Daily Ambient weather conditions.

- d. Steel temperatures on days coating occurs.
 - e. Due point on days coating occurs.
- F. Samples:
- 1. Submit with the bid a specimen of the approved interior coating.
 - 2. Submit with the bid color samples for the interior finish and the exterior finish.
- G. ADDITIONAL SUBMITTALS AND QUALIFICATIONS:
- 1. Proof of Arizona "A License" in good standing
 - 2. Attachment A - Firm Informational Form
 - 3. Attachment B - Notarized Affidavit
 - 4. Attachment C - Reference List
 - 5. Site Specific Safety Plan (not an IIPP)
 - 6. Project Schedule
 - 7. Disinfection Plan
 - 8. Scaffolding Plan
 - 9. Past Experience on City of Globe Projects
 - 10. Sample Insurance Certificate
 - 11. Coating Crew:
 - a. Submit 5 water tanks of equal or greater size to the largest tank under this bid where the plural component pump operator has successfully utilized the specified coatings.
 - b. Submit 5 water tanks of equal or greater size to the largest tank under this bid where the plural component applicator has successfully utilized the specified coatings.
 - c. Safety certifications held by the crew

1.4 QUALITY ASSURANCE

- A. Qualifications:
- 1. Applicator: Regularly engaged in application of similar coatings on potable water tanks, having a capacity of at least 1,000,000,000 gallons, for at least two years immediately prior to this work.
 - 2. Workers: Experienced and knowledgeable in preparation for and applications of high performance industrial coatings.
 - 3. The Plural component pump and equipment will have a dedicated operator that will monitor the operation of the pump for the duration of the coating process. The operator shall submit evidence of experience and have used this equipment for a minimum of 2 years.
- B. Workmanship: Conform to standards and recommendations of SSPC Vol. 1, especially Chapters 5.1 and 6.
- C. Job-site conference:
- 1. Arrange a job-site conference prior to work under this Section with the coating applicator, coating supplier, dehumidification supplier, and the ENGINEER to review specification requirements and job-site conditions.
 - 2. Give the ENGINEER two work days minimum notification of the meeting.
- D. Abrasive blast cleaning standard:
- 1. Prepare an abrasive blast cleaning standard to SSPC-SP 10 prior to any field abrasive blast cleaning.
 - a. Prepare in field at jobsite, using equipment that will be used on the job.
 - b. Prepare in presence of ENGINEER.
 - 2. Abrasive blast clean two (2) 8" x 11" steel plate panels to the standard specified. Steel shall be same type used in the reservoir.

3. Review:
 - a. ENGINEER and CONTRACTOR shall examine panels.
 - b. When ENGINEER and CONTRACTOR agree that the panels meet the specified standard, they shall initial and date the accepted panels.
 - c. Accepted panels shall be marked to indicate the job and the specified standard.
 - d. The ENGINEER will coat the accepted panels with a clear non-yellowing lacquer to prevent degradation.
 4. The accepted panels shall be the visual standard for evaluating abrasive blast cleaning to the specified standards.
- E. Testing:
1. Magnification: ENGINEER may use magnification in the inspection of surface preparation and coatings.
 2. Ultraviolet light: ENGINEER may use ultraviolet (black) light in the inspection of surface preparation.
 3. Testing of coating: ENGINEER may, in the event of disagreement with the CONTRACTOR over coating failures, use destructive test instruments to analyze coating failures.
- F. Materials handling and use:
1. Coating materials shall be labeled and used in accordance with SSPC-PA 1, Paragraphs 5.1.1. through 5.1.5.
 - a. Except: All coating system materials shall be delivered and used within six months of the date of manufacture.
 - b. Except: Certification, from any source, that coating system materials are still suitable for use beyond the stated shelf life or beyond the stated shelf life or beyond the six month period specified in 1.a above will not be accepted.
- G. Manufacturer's Representative:
1. A qualified technical representative of the coating system manufacturer shall be made available at the jobsite as required by the ENGINEER to resolve problems related to the coating system or the application of the system.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
1. Deliver abrasive grit in moisture-proof bags or airtight bulk containers.
 2. Deliver coating system materials in original, unopened containers with seals unbroken and labels intact. Labels shall identify type of material, color, and batch number.
- B. Storage:
1. Store material in a single, approved location.
 2. Store coating system materials in enclosed and ventilated structures.
 3. Maintain temperature inside the structure within the temperature range recommended by the manufacturer, but not lower than 70 °F.
 4. Keep storage locations clean, neat, and free of fire hazards.
 5. Keep abrasive grit dry and clean.
- C. Handling:
1. Do not introduce into the reservoir any thinners, solvents, paint products or other materials that contain toxic substances not specifically approved for use that will result in exceeding the maximum contaminant limit (MCL) for regulated VOC's or the detection limit for unregulated VOC's, as identified in Attachment 09871-1.

2. Do not spill thinners, solvents, and paint products or other materials that contain toxic substances.
3. Remove discarded thinners, solvents, and paint products from the job site daily.
4. During painting, the CONTRACTOR shall provide a debris box on site for empty paint buckets. Place discarded buckets in the debris box and remove the debris box when it is full and replace.

1.6 JOB CONDITIONS

A. Environmental conditions:

1. Do not abrasive blast or apply coatings when surface or ambient temperature is less than 5 °F above dew point.
2. Apply coatings only when conditions are within the limits prescribed by the manufacturer but, in any case, do not apply coatings when:
 - a. Surface temperature is less than 40 °F.
 - b. Relative humidity is greater than 85 percent.
 - c. Surface temperature is greater than 120 °F.
3. If environmental conditions within the tank are not within the limits prescribed by the manufacturer, or the limits described above, CONTRACTOR shall provide appropriate equipment and techniques to modify the environmental conditions to be within those limits. If dehumidification is required, CONTRACTOR shall provide dehumidification per the requirements of Paragraph 3.2 of this Specification. If other equipment or techniques are required to modify the environmental conditions within the tank, those equipment and techniques shall be approved by the ENGINEER and the coatings manufacturer prior to their use.
4. Provide an air monitor at the reservoir roof vent and test the exhaust air for compliance with local Air Quality Management District standards. Exhaust air shall be tested continuously during interior abrasive blasting and coating operations.

B. Safety:

1. Comply with the applicable safety recommendations of SSPC-PA-Guide 3 and Good Painting Practice, Chapters 2.4 and 5.3.

C. Breathing air:

1. Upon request, the CONTRACTOR shall provide breathing air for two OWNER employees to enter the reservoirs. Breathing air shall meet all Federal, State, and County safety regulations.
2. CONTRACTOR shall provide compatible fittings for OWNER'S field safety equipment.

D. Testing for hazardous substances:

1. Test the interior and exterior coatings for the presence of lead.
2. Test spent abrasive for hazardous substances prior to disposal.

1.7 WARRANTY

A. The guarantee period shall be two years for defects of material and workmanship for the work of this Section.

B. Warranty Inspection:

1. A first anniversary warranty inspection will be conducted by the OWNER approximately one year after coating of the reservoir under this contract is completed.
2. Reservoir may be drained or may contain water for warranty inspection of interior coating.

3. OWNER will establish date of inspection and will notify CONTRACTOR at least 30 days in advance of inspection.
 4. CONTRACTOR may, at his option, be present during inspection.
- C. Inspection Report:
1. ENGINEER will prepare and deliver to the CONTRACTOR a report of the warranty inspection.
 2. The report will set forth the number and type of failures observed, the percentage of the surface area where failure has occurred, and the names of persons making the inspection.
 3. Underwater photographs or reports of interior coating imperfections or failures shall be considered acceptable evidence of failure.
- D. Failure: Any location where coating has delaminated, peeled, blistered, or cracked; and any location where rusting is evident will be considered a failure of the coating system.
- E. Remedial Work:
1. Repair all failures by removing the deteriorated coating, cleaning the surface, and recoating with the same system in accordance with this Section, except dehumidification.
 2. With approval of the ENGINEER, surface preparation of small failures (area less than 10 sq. ft.) may be by cleaning to near white metal in accordance with SSPC-SP 11.
- F. Extensive Failure:
1. If the area of failure exceeds 25 percent of the area of a portion of the reservoir surface, then that portion shall be recoated in accordance with this Section, including dehumidification/ventilation for failed interior surfaces.
 2. For determining the need for complete recoating, the following shall each be considered a separate portion:
 - a. Exterior roof to bottom of the knuckle,
 - b. Exterior Shell
 - c. Inside roof,
 - d. Inside Shell (including columns and appurtenances),
 - e. Floor
- G. Schedule of Remedial Work:
1. The ENGINEER will establish a starting date and a reasonable time of completion for remedial work.
 2. The starting date will be not less than 30 days after delivery of the first anniversary warranty inspection report to the CONTRACTOR.
 3. Should the CONTRACTOR fail to start the remedial work within ten days after the starting date established by the ENGINEER, the OWNER may at its option perform the remedial work, and the CONTRACTOR shall pay to the OWNER the actual cost of such work plus 20 percent.
- H. Extended warranty:
1. All remedial work performed shall be guaranteed under the terms of the General Conditions for defects of material and workmanship for two years from completion of the remedial work
 2. The OWNER may conduct a first anniversary warranty inspection of remedial work and require repair of failures under the terms of this Article.
- I. Cost of Inspection:
1. The first anniversary warranty inspection will be at the expense of the OWNER.

2. Warranty inspections of remedial work shall be at the expense of the CONTRACTOR.

PART 2 - PRODUCTS

2.1 COATING SYSTEM MATERIALS

- A. General:
 1. Coating system materials shall conform to the latest applicable requirements of the local Air Quality Management District.
- B. Reservoir interior coating systems:
 1. Minimum 98% solids epoxy, National Sanitation Foundation (NSF) 61 approved for use in potable water reservoirs.
 2. Acceptable Interior Coating Systems:
 - a. Sherwin Williams Sherplate PW
 3. Coating system shall be restricted to a single manufacturer.
 4. Finish coat shall be white.
 5. Vapor areas in the interior roof shall be caulked prior to coating application.
 - a. Sikaflex-1A
- C. Reservoir Exterior Coating systems:
 1. Acceptable Coating Systems
 - a. Sherwin Williams
 - 1) Primer: Macropoxy 646
 - 2) Finish: Hi-Solids Polyurethane (semi-gloss)
 - b. Or equal.
 2. Coating system shall be restricted to a single manufacturer.
 3. Color of the exterior coating system shall be approved by the Owner prior to application.

2.2 ACCESSORIES

- A. Abrasive grit for field abrasive blast cleaning:
 1. Conform to SSPC-AB 1. Type I or Type II, Class A.
 2. Angular and properly graded to produce the specified profile.
 3. New, clean and free of contaminants, and containing no hazardous materials.
 4. Conform to all applicable requirements of the local Air Quality Management District.
 5. Except: Do not use silica sand or nickel slag.
- B. Steel shot shall not be used as an abrasive or as part of a mixture for abrasive blasting.
- C. Thinners and solvents:
 1. As specified in the coating system manufacturer's technical data. No substitutions.
 2. Thinners and solvents shall be used for cleaning only.

PART 3 - EXECUTION

3.1 GENERAL

- A. Prevent blast media, paint, or any other foreign material from entering open piping.

1. For openings greater than 2" diameter use an expandable seal placed inside the pipe. Protect seal from damage.
 2. All exterior roof vents shall be sealed from the outside prior to abrasive blasting and remain sealed through the entire coating operation.
- B. Welding Repairs:
1. Defects in welds and steel:
 - a. Repair defects in welds and steel exposed during blast cleaning or coating.
 - b. Repair defects in welds and steel exposed during blast cleaning prior to application of first coat. Repair defects exposed during coating prior to application of subsequent coat.
 - c. Repair weld defects such as slag inclusions, undercuts, craters, and pinholes by welding and /or grinding as directed by the ENGINEER.
 - d. Remove defects in steel having a depth less than or equal to 12.5% of nominal thickness of steel by grinding to a smooth contour.
 - e. Repair defects in steel deeper than 12.5% of nominal thickness of steel by repair welding and grinding smooth.
 2. All interior roof plates, roof beams, roof support columns and ring girders exhibiting corrosion degradation must be ultrasonically inspected upon completion of the inspection blast to quantify the extent of metal loss. In cases where the metal loss exceeds 25 % or the original thickness of the plate, beam or appurtenance, an Arizona Registered Engineer shall approve the need for repair and the type of repair intended for use. In the event that the plate, beam or appurtenance is replaced with a component of equal size and configuration, Structural Engineering approval is not required.
 3. All interior floor surfaces shall be ultrasonically inspected upon completion of the inspection blast. Since the below grade portion of the reverse side of the steel plates are not accessible, this inspection is intended to quantify the extent of corrosion degradation on both sides of the steel plates. All areas exceeding 50% metal loss shall be more closely inspected to determine and map the size of the deficiency. The installation of seal welded, ¼" steel plates shall be installed over the areas of corrosion degradation.
 - 4.
- C. Mix and apply all coatings in accordance with the manufacturer's instructions, the applicable requirements of SSPC-PA 1, and as specified herein.
- D. Interior Coating Equipment Limitations:
1. No diesel, gasoline, or propane-operated equipment shall be allowed into the reservoir at any time.
 2. Propane-powered equipment may be used subject to the ENGINEER's approval of a plan identifying how contaminants can be contained.
 3. At a minimum, this plan will specify containment measures, such as drip pans for equipment lubricants, and specify cleaning procedures in the event that oil or hydraulic fluid is spilled on the reservoir floor.
 4. Any chemical cleaning agent included in the plan will be restricted to bio-degradable detergents.

3.2 DEHUMIDIFICATION AND VENTILATION (INTERIOR COATING ONLY)

- A. Provide dehumidification and ventilation to establish and maintain the specified temperature, relative humidity, and dew point in the tank, and to provide the specified ventilation and dust control. Provide dehumidification and ventilation for entire tank interior. Tank shall not be partitioned for dehumidification purposes.
- B. Provide dehumidification and ventilation continuously.

1. For 24 hour prior to start of near white metal abrasive blasting and continuously throughout the white metal abrasive blasting and coating applications.
 2. For 96 hours after final coat and all repairs are completed.
- C. Dehumidification equipment shall be a solid desiccant (not liquid, granular, or loose lithium chloride) design having a single rotary desiccant bed capable of continuous operation, fully automatic with drip-proof electrical controller. Direct air heaters are not acceptable as dehumidification units. Heated air shall be dehumidified prior to introduction into the reservoir.
- D. Relative humidity of processed air from dehumidification unit shall not exceed eleven percent.
- E. Dehumidification equipment shall provide two complete air changes inside the reservoir every sixty minutes.
- F. Areas adjacent to the surface that is to be blasted and coated shall not be exposed to a relative humidity greater than thirty-five percent at any time during blasting, cleaning, coating, or curing.
- G. During the dehumidification process, and for 96 hours after final coat and all repairs are completed, an air temperature of 60 °F minimum shall be maintained inside the reservoir. Heating equipment shall be furnished on site and operational during dehumidification process.
- H. Provide exhaust air dust collector to prevent discharge of dust to outside air.
1. Volume of discharged air shall be equal to the air being introduced into the tank by the dehumidification and heating requirements. During coating application, ventilated air shall be discharged at not less than one air change per hour.
 2. Dust collector filters shall be high-efficiency particulate air (HEPA) filters.
- I. Place dehumidification equipment as close to reservoir manhole as possible.
- J. Clean dehumidification filters prior to start of dehumidification and clean weekly thereafter.
- K. Dehumidification tubing:
1. Mechanically connected and sealed with duct tape at joints.
 2. Extend to the center of the reservoir and attach to a diffuser that will distribute air equally throughout reservoir.
 3. Have no dust or other foreign matter inside tubing.
- L. Provide and maintain 24-hour recorded humidity and temperature measurements. Place humidity and temperature measuring devices/probes inside reservoir.

3.3 EXAMINATION

- A. Verify that all required seal welding has been performed.
- B. Verify that all defects in steel have been removed or repaired.
- C. Verify that all welds and sharp edges have been ground off and that all surface imperfections have been removed.

3.4 PREPARATION

- A. Cleaning.
 - 1. Remove all visible oil, grease, dirt, welding residue, and other contaminants from areas that were coated prior to erection.
 - 2. Remove prior to any field application of coating, using a method that does not damage the coating that is being cleaned.
- B. Interior Blast Cleaning: Prepare by abrasive blast cleaning to SSPC-SP 10 with a surface profile of 3.0 to 5.0 mils.
- C. Exterior Blast Cleaning: Prepare all newly installed exterior steel by abrasive blast cleaning to SSPC-SP 6 with a surface profile of 1.5 to 3.0 mils.
- D. Exterior Spot Preparation: Spot prepare all exterior areas of rusting or coating failure per SSPC-SP 2 or SSPC-SP 3.
- E. Do not reuse abrasive blast media.
- F. Abrasive blasting equipment:
 - 1. Install an oil and moisture separator in air line between compressor and blast machine. Use Clemco Triplex filter or approved equal.
 - 2. Install an air cooler in air line between compressor and the oil and moisture separator. Use Clemco Air-to-Air After-Cooler, or approved equal.
 - 3. Use venturi nozzle.
 - 4. Place air compressor at least 25 ft. from reservoir.
 - 5. Change compressor air filters at least as often as required by compressor manufacturer's written instructions.
- G. All surfaces to be blast cleaned shall be electrically grounded during blast cleaning.
- H. Abrasive blasting, cleaning, and coating operations shall not be permitted in the same area at the same time prior to drying of coating material.
- I. Mask-off and protect all exposed machined metal surfaces, plastic, and other surfaces not to be painted or that may be damaged by abrasive blasting.
- J. Remove all dust and abrasive from all blasted surfaces.
 - 1. For interior surfaces, use approved vacuum system or other approved system.
 - 2. For exterior surfaces, remove dust and abrasive by brushing, blowing with clean air, or vacuuming. If not vacuuming, collect used abrasive blast media on plastic sheeting, or use other means of collection acceptable to the ENGINEER.
- K. Vacuum cleaner requirements:
 - 1. Vacuum cleaning shall be proven to remove dust with a minimum of 140 CFM and compliant dust filtration.
- L. Sample, test, and dispose of abrasive blast media and other waste material off-site and in accordance with material disposal plan.
 - 1. Discard directly from reservoir to a portable containment container or box and remove containment tank or box from site.
 - 2. Do not place media on ground or other intermediate location.

3.5 APPLICATION

- A. General:

1. Mix and apply all coating in accordance with the manufacturer's recommendations and instructions, the applicable requirements of SSPC-PA 1, and as specified herein.
2. Plural component spray systems will be required for interior coating, but not permitted for exterior coating.
 - a. The CONTRACTOR shall certify that the pumps meet the manufacturer's original operational specifications, and are only operated by skilled and trained craftsmen who have been certified by the coating manufacturer.
 - b. The spray painter shall at all times monitor his material application using a wet film gauge as recommended by the manufacturer.
 - c. The CONTRACTOR shall at all times have a quality control operator managing the plural component equipment maintaining the proper mixing ratio, operation temperatures and pressures according to the Manufacturer's application technical data. The operator shall be trained and certified by the coating and equipment manufacturer to the satisfaction of the ENGINEER.
 - d. The CONTRACTOR shall monitor the accuracy of the pump flow controls by performing a ratio proportioning test using the coating components. A minimum of one gallon of each component shall be pumped through the spray lines into separate containers to verify proper proportioning. The permissible variation in component ratios shall be as stated in the manufacturer's printed technical literature. Two successful, successive ratio proportioning tests shall be performed prior to the start of daily painting operations and every four hours thereafter in the presence of the ENGINEER. If coating equipment problems develop, the ENGINEER shall have the right to direct the CONTRACTOR to perform the proportioning test immediately
 - e. At the ENGINEER'S request the CONTRACTOR shall obtain a sample of the coating and have it tested by an approved independent coating laboratory for fingerprinting to match the manufacturer's specimen that has been determined to be a representative sample of the coating material. The manufacturer shall have submitted a quality control specimen prior to starting the job for approval by the ENGINEER.
 - f. The field sample shall be obtained after the equipment is deemed to be calibrated and performing properly. At the ENGINEER'S request the CONTRACTOR shall provide 10 steel plates 1/8 x 6 x 6 inches per reservoir, for the Inspector to obtain a sample at his discretion any time during production. As a minimum one sample shall be taken for each 10,000 square feet of coated area, or a minimum of two (2) samples per tank. This sample will be personally delivered or shipped overnight for testing the next day. The costs of delivery and testing shall be borne by the CONTRACTOR. The laboratory shall be contracted to perform the tests and report the results to the ENGINEER the same day for his evaluation and approval or rejection of the previous day's work.
 - g. Should any laboratory test sample from the previous day's production not meet the manufacturer's quality control specimen, the CONTRACTOR shall be financially responsible for removing the deficient coating and performing the work according to the specification.
3. Obtain ENGINEER's evaluation and approval of steel surface preparation immediately prior to application of first coating.
4. Obtain ENGINEER's evaluation and approval of cleanliness of previous coat immediately prior to application of a subsequent coat.
5. For exterior coating, complete all priming before any portion of second coat is applied.
6. Stripe all welds, nuts, bolts, and edges by brush only, prior to applying first full coat. Do not thin.
7. Coat all steel surfaces of reservoir interior and exterior except underside of floor plates (if any).

8. Complete coating all surfaces above floor prior to coating floor.
 9. Apply all interior coatings by plural component airless spray except:
 - a. Areas of less than 36 square inches may be brushed.
 - b. Required brush striping of welds, nuts, bolts, and edges. Do not thin for interior coating.
 10. Additional Interior Coating Requirements:
 - a. Apply coatings at a temperature of 85 °F to 130 °F at gun tip. Use explosion-proof in-line heaters. Binks Model #2-6401, or approved equal.
 - b. Coating materials temperature shall be as recommended by manufacturer, but not less than 70 °F, immediately prior to mixing.
 11. After each coat and immediately prior to application of a subsequent coat, clean surface as required to remove dirt, dust, overspray, and other contaminants that may affect adhesion of the subsequent coat.
 12. Discard all catalyzed coatings at the end of each working day or at end of manufacturer's recommended pot life, whichever is first.
 13. Scaffolding or other support system shall be free of abrasive blast media, dirt, and other foreign matter.
 14. All empty paint buckets shall be removed daily from the jobsite or placed in the debris box.
 15. Coating shall be uniform in color and gloss over the entire surface. Coating shall be smooth to touch with no sags, runs, overspray, cracks, pinholes, pores, or other surface defects.
- B. Dry Film Thickness (DFT) of coating systems:
1. Reservoir Interior:
 - a. Finish: 25.0 to 35.0 mils
 - b. Total DFT: 20.0 to 35.0 mils
 2. Reservoir Exterior:
 - a. Primer: 4.0 to 6.0 mils
 - b. Finish: 3.0 to 5.0 mils
 - c. Total DFT: 7.0 to 11.0 mils
- C. Application equipment:
1. Exterior Airless Spray Systems:
 - a. Use airless spray pump with a minimum 45:1 pressure ratio. Pump shall have moisture trap, anti-freeze device, and fluid filter.
 - b. Use fluid tip size recommended by manufacturer.
 - c. Use 3/8" minimum interior diameter fluid hose.
 - d. Use clean fluid lines not previously used to apply zinc-rich or water-based coating materials.
 - e. Clean equipment using only products recommended by the coating manufacturer.
 - f. Blow lines with compressed air to completely remove all thinners prior to painting.
 2. Interior Plural Component Systems:
 - a. Pump shall be WIWA DURO-MIX 1:1, Graco Extreme mix or Graco XP 70 or equal.
 - b. All fluid lines shall be insulated or maintained as recommended by the coating manufacturer.
 - c. Pressure shall be 4,000 psi.
 - d. Hose shall be 3/8" ID.
 - e. Tip shall be 0.021"-0.025".
 - f. Lines shall be flushed between each application.
 - g. Equipment shall only have been used for 1:1 epoxy coatings in the past.
- D. Coating repairs:

1. Touch up or refinish all chipped, abraded, or otherwise unsatisfactory portions of the work in accordance with the manufacturer's recommendations, except that in no case shall thinner be used for interior coatings.
 - a. Any coatings found to be sticky, partially cured, or not fully cured after the manufacturer's recommended cure time shall be removed.
2. Recoating or touch-up of areas that have cured beyond the maximum time recommended by the manufacturer require special preparation.
 - a. Sweep blast area and 3" into surrounding area. Sweep blast under low pressure to uniformly abrade surface and feather edges. Feather edges by sanding or other means acceptable to the ENGINEER.
 - b. Remove abrasive blast residue from blasted area with special attention to marginal areas of intact coating.

3.6 QUALITY CONTROL

- A. Provide adequate lighting, without shadows, during all phases of work to ensure that work is performed as specified. Illuminate entire area of work.
- B. Provide adequate ground supported scaffolding and lighting, as determined by the ENGINEER, to facilitate visual and instrument inspection by the ENGINEER of each phase of the work and of the completed work.
 1. Place as directed by the ENGINEER to minimize glare and shadows.
- C. Provide personnel to move scaffolding and furnish other assistance that the ENGINEER may require.
- D. ENGINEER will inspect surfaces prior to blast cleaning to verify that heavy deposits of contaminants have been removed.
- E. Verify that air supply is free of oil and moisture contamination.
- F. Measure air temperature, humidity, relative humidity, and metal surface temperature, and determine dew point prior to blasting or painting each day. Repeat measurements and determination of dew point as often as the ENGINEER deems necessary but not less often than every four hours.
 1. Maintain a written record of measurements and dew points, and time that measurements were taken. Make record available to ENGINEER immediately on request.
 2. ENGINEER will also measure air temperature, humidity, relative humidity, and metal surface temperature, and determine dew point at least once each day that blasting or painting is performed.
 3. Temperature and humidity measuring shall be accomplished with capacitance based electronic meters such as Vaisala Model HM 34 and magnetic surface thermometers. Determining dew point from these measurements shall be accomplished with the use of a psychrometric chart of US Department of Commerce Weather Bureau Psychrometric Tables.
- G. ENGINEER will evaluate surface preparation using the accepted field abrasive blasting standard and replica tapes. Evaluation will include inspection of blasted surface for dust and abrasive residue, using adhesive coated tape. Evaluation will be made immediately prior to coating application.
- H. Verify cleanliness of all spray application equipment prior to, or no later than, time of mixing coating material.

- I. Measure wet film coating thickness during application of coating to ensure adequate coating thickness. Take at least one measurement every 100 square feet.
- J. Measure dry film coating thickness after each coat using non-destructive magnetic dry film gauges.
 - 1. Measure in accordance with SSPC-PA 2 except: Delete Paragraph 3.1.1 through 3.1.3 and replace with: for each 1,000 square feet area, three 100 square feet areas shall be randomly selected and measured.
 - 2. ENGINEER will also measure coating thickness, at random locations, after each coat.
- K. ENGINEER will evaluate cleanliness of coated surface immediately prior to application of a repair coat.
- L. CONTRACTOR shall test all coated surfaces for pinholes and holidays.
 - 1. Perform test in presence of ENGINEER.
 - 2. Perform test after coating has cured as recommended by the manufacturer.
 - 3. As directed by the ENGINEER, use either a low voltage wet sponge holiday detector or a high voltage holiday detector.
 - a. Low voltage wet sponge holiday detector, for coatings to 20 mils dry film thickness, shall be equal to K-D Bird Dog or Tinker-Razor M-1. Add a non-sudsing wetting agent, such as Eastman Kodak Photo-Flow to the water used to saturate the sponge.
 - b. High voltage holiday detector, for coatings more than 20 mils dry film thickness, shall be equal to Tinker-Razor AP-W or D. E. Stearns Model 14/20. Use in accordance with coating manufacturers recommendations except use voltage of 125 volts per mil of coating.
 - 4. Retest after coating repairs.

3.7 INTERIOR CURING AND CLEANING

- A. Provide ventilation at a rate of at least one complete air change every four hours.
- B. Roof vent covers shall be removed during forced air ventilation if possible.
- C. Interior Reservoir Flushing/Cleaning
 - 1. Prior to blasting and coating the tank must be cleaned to remove all foreign deposits on the tank floor and oil accumulation inside the tank.
 - a. Cleaning to remove oil shall be performed with 3,000 psi or greater hot water blasters (200-350 degrees Fahrenheit) and biodegradable degreasing agents.
 - b. Storage and Disposal of Flushing Water:
 - 1) All flushing water shall be discharged into a temporary holding tank or basin or to an approved drainage discharge point.
 - 2) Costs for removal and disposal of flushing water and sediment shall be included under the Lump Sum bid.
 - 2. After reservoir interior coating is applied and cured by forced air ventilation in accordance with the manufacturer's instructions and all interior reservoir appurtenances are installed, the inlet/outlet lines and all interior reservoir surfaces are to be cleaned according to the following procedure:
 - a. Blow Down:
 - 1) Contractor shall blow down all interior areas to remove dust and debris.
 - b. Water Blast:
 - 1) CONTRACTOR shall water blast as required all interior reservoir surfaces including the reservoir ceiling, rafters, walls, floor, and all other interior metal attachments in accordance with SSPC-SP WJ-1 to remove all

- adhered dust, overspray, and contaminants and remove all rinse water from the reservoir.
- 2) This operation is to continue until the rinse water contains no visible turbidity.
 - 3) In the event that the surface contaminants cannot be removed by water blast, the CONTRACTOR shall mechanically clean the surfaces.
- c. Flushing of Inlet and Outlet Lines:
- 1) CONTRACTOR shall clean the portion of the inlet and outlet lines from the reservoir floor to the first valve outside of the reservoir.
 - 2) This cleaning operation will be performed using a low pressure jet (up to 5,000 psi) and vacuum line, and will be continued until rinse water vacuumed from the inlet and outlet lines contains no visible turbidity, spent media or other contaminants.
- d. Following flushing of the inlet and outlet lines, the ENGINEER shall have the system source water sampled at a location to be determined by the ENGINEER to verify that the source water meets all water quality standards prior to commencement of filling of the reservoir.
- e. Storage and Disposal of Flushing Water:
- 1) All flushing water shall be discharged into a temporary holding tank or basin or to an approved drainage discharge point.
 - 2) Costs for removal and disposal of flushing water and sediment shall be included under the Lump Sum bid.

3.8 CLEAN UP

- A. Clean dust and abrasive-blasting residue from the roof ventilation screens.
- B. Remove all spattering, spits, and blemishes caused by work under this Section.
- C. Remove from the premises all surplus paint materials, equipment, rubbish, and debris resulting from work under this section.

3.9 DISINFECTION

- A. Upon completion of the interior coating's cure period and cleaning to remove all residual dirt and debris from the tank.
- B. Disinfection shall be performed in accordance with AWWA C.652 "Spray Method #2" recommendations.

+ + END OF SECTION + +

FRIM INFORMATIONAL FROM

ATTACHMENT A

RESPONDING FRIM INFORMATION

Firm's Name	
Firm's Corporate Location	
Firm's Phone Number	
Firm's Crew Location	
CR-34 License #	

PROJECT MANAGER INFORMATION

Project Manager Name	
Project Title/Positing with Responding Firm	
Project Manager Phone Number	
Project Manager E-Mail	

PROJECT INFORMATION

Project Safety Manager Name	
Firm's AZ Registered In-House Engineer	
AZ Registered Engineer's License #	

**AFFIDAVIT BY FIRM
REGARDING RESPONSIBILTY AND COMPLIANCE**

ATTACHMENT B

All Firms must complete the following questions and have the document notarized. Failure to complete and return this document will result in disqualification. In the event you require more space an additional sheet maybe used to complete the questions.

1. List your Firm's Arizona "A" Firms License number.

2. List which of the following your Firm qualifies for: MBE, SMBE or Small Business.

3. State the location of your corporate office.

4. List any documented, sited, or under investigation violations of federal or state labor laws, regulations, or standards, OSHA rules.

5. List any current lawsuits your company is involved in.

6. List any contracts that were cancelled by the customer is the last 3 years.

7. List any penalties imposed for time delays and/or quality of materials and workmanship.

8. By signing this affidavit the Firm acknowledges that this spec and RFP are meant to represent a guideline or minimum required to perform the proposal tank renovation

services. Should the Firm feel that more a stringent scope of work is necessary to complete the project correctly and safety they are encouraged to include this in their bid. The entity issuing this document bares no liability from incidents resulting during the referenced project.

9. In accordance with State Laws the Firm will provide an 11 month warranty inspection to correct any failures and defects in the work performed under this contract.

I, _____, as _____
Name of individual Title & Authority

of _____, declare under oath that
Firm Name

the above statements, including any supplemental responses attached hereto, are true.

Signature

State of _____ County of _____

Subscribed and sworn to before me on this _____ day of _____

20__ by _____ representing him/herself to be
_____ of the Firm named herein.

Notary public

My Commission expires:

REFERENCE LIST

ATTACHMENT C

List at least 6 References for tank rehabilitation work completed in the last 3 years in the Arizona and California.

REFERENCES MUST include tanks where 100% solids plural component epoxy was applied.

A separate sheet may be used if it is typed and includes the specified information. If a separate sheet is utilized indicate below that a separate sheet is attached containing references.

Include:

- Tank Owner’s Name
- Contact Name and Phone Number
- Brief Description of Work Performed

REFERENCES:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

