

DIVISION 9

FINISHES

<u>Section</u>	<u>Title</u>
09250	GYPSUM BOARD ASSEMBLIES
09881	PLASTIC LINING FOR STRUCTURES
09900	COATING SYSTEMS

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section Includes:

1. Metal wall framing.
2. Metal ceiling furring.
3. Gypsum wallboard.
4. Rigid Insulation
5. Joint treatment and accessories.

1.02 REFERENCE

A. ASTM International – www.astm.org:

1. ASTM C 475/C 475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002 (Reapproved 2007).
2. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 2007.
3. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.
4. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2007.
5. ASTM C 840- Standard Specification for Application and Finishing of Gypsum Board; 2007.
6. ASTM C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2007.
7. ASTM C 1396/C 1396M - Standard Specification for Gypsum Board; 2006a.
8. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 2005.

B. Gypsum Association – www.gypsum.org

1. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2007.

1.03 SUBMITTALS

- ###### A. See Section 01300 - Administrative Requirements, for submittal procedures.

- B. Test Reports: For all stud framing products that do not comply with ASTM C 645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.04 DELIVERY AND STORAGE

- A. All materials shall be delivered in unbroken packages bearing the manufacturer's brand and designation. Store materials off of ground surface and cover against weather.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.
- B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.06 BUILDING INTERIOR CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.
- B. Building to be completely enclosed and weather-tight prior to start of gypsum board finishing.
- C. Room Temperatures:
 - 1. For non-adhesive attachment of gypsum board to framing, maintain not less than 40 deg F.
 - 2. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry.
 - 3. Do not exceed 95 deg F when using temporary heat sources.
- D. Ventilation: Ventilate building spaces as required to dry joint treatment materials.
 - 1. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C 840 and GA-216.
 - 1. See PART 3 for finishing requirements.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Scafco Steel Stud Mfg. Co.; 6200 E. Main Avenue, Spokane, WA 99211; Ph. (509) 535-5637.

2. Steeler Inc; 10023 Martin Luther King Jr. Way South, Seattle, WA 98178; Ph. (206) 725-2500.
 3. Substitutions: See Section 01600 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
1. Wall and Ceiling Furring: "Z" shaped, size as indicated on the drawings.
 2. Runners: U shaped, sized to match furring.
 3. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum: www.americangypsum.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. Georgia-Pacific Gypsum LLC: www.gp.com/gypsum.
 4. National Gypsum Company: www.nationalgypsum.com.
 5. USG Corporation: www.usg.com.
 6. Substitutions: See Section 01600 - Product Requirements.
- B. Wallboard: Paper-faced gypsum wallboard as defined in ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.

2.04 ACCESSORIES

- A. Rigid Insulation for Walls & Ceiling:
1. Owens Corning – ‘Foamular 250’.
 2. Dow – ‘Styrofoam Square Edge’.
 3. Insulfoam – ‘Insulfoam II-40’.
 4. Or Approved Equal.
- B. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners.
 2. Ready-mixed vinyl-based joint compound.

- C. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.
- D. Anchorage to Substrate: Screws and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- E. Miscellaneous: Provide miscellaneous and accessory materials, methods, tools, and equipment required for completion of insulation work.
 - 1. Sealing tape as recommended by the insulation manufacturer.
 - 2. Fasteners, plates, and adhesives as recommended by the manufacturer and as required for completion of insulation work.
 - 3. Vapor barrier: Vapor barrier retarder shall be Cross-Tuff cross-laminated polyethylene sheet conforming to ASTM D4397, 4 mil clear or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C 754 and manufacturer's instructions.
- B. Ceilings: Install underside of mechanical platform deck where scheduled to receive gypsum board. Secure in place on channel flanges at maximum 24 inches on center.
 - 1. Orientation: Horizontal.
 - 2. Spacing: At 24 inches on center.
- C. Wall Furring: Install at masonry walls scheduled to receive gypsum board. Secure in place on channel flanges at maximum 24 inches on center.
 - 1. Orientation: Vertical.
 - 2. Spacing: At 24 inches on center.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

1. Exception: Tapered edges to receive joint treatment at right angles to framing.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Corner Beads: Install at external corners, using longest practical lengths.

B. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C 840, as follows:

1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

****END OF SECTION****

SECTION 09881

PLASTIC LINING FOR STRUCTURES

PART 1--GENERAL

1.01 DESCRIPTION

A. SCOPE:

This section specifies material, design criteria, and labor required to furnish and install polyvinylchloride (PVC) liner for reinforced concrete structures and pipes.

B. APPLICATION:

Where indicated on the drawings, the interior surfaces of the structures shall be lined with cast-in-place PVC lining conforming to the requirements of this section.

1.02 RELATED WORK

A. Section 03100 - CONCRETE FORMWORK

B. Section 03300 - CAST-IN-PLACE CONCRETE

1.03 QUALITY ASSURANCE

A. REFERENCES:

This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization, or if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued, or replaced.

Reference	Title
ASTM D412	Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension
ASTM D638	Test Method for Tensile Properties of Plastics
ASTM C1147	Practice for Determining the Short Term Tensile Weld Strength of Chemical-Resistant Thermoplastics

B. QUALIFICATIONS:

1. **Lining System Manufacturer:** The minimum requirements for qualification shall be 5 years of experience in manufacturing of PVC lining and evidence of satisfactory completion of 5 projects comparable in scope to the work specified herein. Submit qualifications and experience with bid. After award, the supplier shall not substitute a different manufacturer.
2. **Lining System Installer:** The installer shall be familiar with Manufacturer's standard and shall be required to perform all work in a manner that will best incorporate modern materials and methods. Installer shall be certified by Manufacturer to do the installation.
3. **Qualifications of Workman:** The Erector shall provide at least one person who shall be present at all times during execution of work and who shall be thoroughly familiar with PVC liner installation and the requirements thereof, and who shall direct all work performed. All workers employed by the Installer shall be skilled in performing tasks related to liner installation. Provide certification from the liner manufacturer indicating all welders have passed qualification tests.
4. **Qualifications of Welders:** All welders shall be trained by the lining manufacturer. Each welder shall pass a qualification welding test before doing any welding. If a semi-automatic welder is used the operator and the machine must pre-qualify. All test welds shall be made in the presence of the Representative of the lining manufacturer, and shall consist of the following:
 - Two pieces of liner, at least 15 inch long and 4 inch, wide shall be lapped a minimum 1/2 inch and heat-sealed together.
 - A welding strip shall be positioned over the edge of the lap and welded to both pieces of liner. Each end of the welding strip shall extend at least 2 inch beyond the liner to provide tabs.
 - Welds shall be tested, by the manufactures quality control laboratory, for tensile strength in accordance with ASTM D412 using Die B. Tensile strength measured across the welded joint shall be at least 2000 PSI.

- Each welding strip tab, tested separately by the manufacturer's quality control laboratory, shall be subjected to a 10-pound pull normal to the face of the liner with the liner secured firmly in place. There shall be no separation between the welding strip and liner.
- Three test specimens shall be cut from the welding sample and tested in tension across the welds. If one specimen fails to pass the tension test, a retest will be permitted. The retest shall consist of testing three additional specimens cut from the original welded sample. If all three of the retest specimens pass the test, the weld will be considered satisfactory. If two of three specimens fail, the welder will be considered to be an unqualified welder and shall be disqualified.
- Provide certification from the liner manufacturer indicating that all welders on the project have passed the qualification test.

1.03 SUBMITTALS

The following information shall be submitted for review in accordance with Section 01300:

1. Complete liner layout drawings and information for each structure including details of, field welds, liner details at openings, terminations and repairs. Liner installation and testing requirements. This plan shall be approved prior to starting work in this section.
2. Certified test results on physical property, chemical resistance, and quality control test data.
3. Welder certifications for each welder.
4. A copy of this specification section with addenda updates, with each paragraph check marked to show specification compliance or marked to show deviations.

PART 2--PRODUCTS

2.01 PERFORMANCE AND DESIGN REQUIREMENTS:

A. GENERAL:

Materials furnished under this section shall be suitable for exposure to wastewater containing some industrial wastes, and hydrogen sulfide. The wastewater may be expected to contain gross waste solids, vegetable parts, small sections of lumber, rocks, sand, silt, petroleum products, industrial solvents, and animal fats and oils. The wastewater will have a temperature of 50 degrees F to 80 degrees F and will have pH which may range from 5 to 8. All lining shall be

impermeable to sewage gases, sewage liquids, sewage treatment chemicals and shall be nonconductive to bacterial or fungus growth.

All material, adhesives and incidentals necessary for proper application of plastic lining shall be furnished by the same manufacturer and shall be compatible with each other and with the adhesives employed.

B. DESIGN REQUIREMENTS:

1. **GENERAL:** The lining shall withstand a 40 psig back pressure applied to the under surface of the lining without losing anchorage or without rupture.

All plastic liner sheets, joint, corner and welding strips shall have the following physical properties when tested at 77 ± 5 degrees F:

Property	Test Method	Initial	After 112 days
Tensile strength	D638	2200 psi min	2100 psi min
Elongation at breadth	D638	200 percent min	200 percent min

2. **TESTING:** All lining shall be factory checked electrically to ensure freedom from porosity and imperfections.

3. **FABRICATION:** Fabricate in accordance with ASTM C1147.

2.02 MATERIALS

Plastic lining shall be T-lock Amerplate as manufactured by Ameron Corporation, Brea, California, or equal. The lining material shall be PVC, white in color, compounded of inert synthetic resins, pigments and plasticizers to make permanently flexible sheets. The sheets shall be formed with T-rib extensions on one face for casting into concrete and shall not rely upon an adhesive bond for adherence to the concrete surface.

Liner sheets shall be a nominal 0.065 inch in thickness. Locking extensions of the same material as that of the liner shall be integrally extruded with the sheet. Locking extensions shall be approximately 2.5 inches apart and shall be at least 0.375 inch high. Joint strips and welding strips shall have the same corrosion resistance as the sheet lining material but shall not have locking extensions. Liner sheets, including locking extensions, all joint, corner, and welding strips, shall be free of cracks, cleavages, or other defects adversely affecting the protective characteristics of the material. All lining shall have good impact resistance and shall have an elongation sufficient to bridge up to 1/4-inch settling cracks which may occur after installation without damage to the lining sheets.

PART 3--EXECUTION

3.01 LOCATION

Plastic lining shall be provided for all interior concrete surfaces as shown on the drawings and as shown in the schedule at the end of this section.

3.02 INSTALLATION

A. **Positioning Liner:** Plastic lining sheets shall be closely fitted and properly secured to the inner forms prior to any concreting operation. On vertical surfaces, liner sheets shall be placed so that locking ribs run vertically. All joints shall be protected and made mortar tight. All liner installed in pipe and manhole sections shall be positioned so that the locking extensions are parallel to the axis of the pipe. Liner shall be set flush with the inner edge of the socket end of a pipe section and shall extend either to the spigot end or beyond the spigot end, as required for the type of liner joint to be made with the adjoining pipe or manhole section

B. **Positioning Liner in Pipe or Manhole Sections:** All liner installed in pipe and manhole sections shall be positioned so that the locking extensions are parallel to the axis of the pipe. Liner shall be set flush with the inner edge of the socket end of a pipe section and shall extend either to the spigot end or beyond the spigot end, as required for the type of liner joint to be made with the adjoining pipe or manhole section. For pipes and similar circular sections, light steel banding straps, prefabricated tubes, or other approved means shall be used. If used, banding straps shall be placed in strap channels. Any method of banding other than in strap channels shall require prior approval of the Engineer.

C. **Concrete Placement:** During concrete placement, the concrete shall be carefully, thoroughly, and continuously vibrated to avoid damage to the liner and produce dense concrete securely anchoring the locking extensions into the concrete.

D. **Removing Forms:** When removing forms, care shall be taken to protect liner from damage. Sharp instruments shall not be used to pry forms from lined surfaces. After all forms have been removed, nails, form ties and protruding wire or metal objects shall be cut back from the surface and holes filled with grout and finished flush, then weld strips applied. All work shall be done in strict conformance with the specifications, instructions and recommendations of the lining manufacturer.

E. **Liner Penetrations:** All pipes, conduits and sleeves passing through the lining shall be installed as shown or as recommended by the manufacturer. All defective joints, wrinkles and areas which do not bond to concrete shall be repaired as directed by the Owner's Representative.

3.03 PROTECTION AND REPAIR OF LINER

A. All necessary measures and precautions shall be taken to prevent damage to liner from equipment and materials. Any damage to installed liner shall be repaired by the Contractor at no additional cost to the Owner.

B. All nail and tie rod holes, and all cut, torn, and seriously abraded areas in the liner plate shall be patched. Patches made entirely with welding strip shall be fused to the liner over the entire patch. The use of this method is limited to patches, which can be made with a single welding strip. The use of parallel, overlapping, or adjoining welding strips will not be permitted. Large patches may consist of smooth liner over the damaged area, with edges covered with welding strips fused to the patch and to the liner adjoining the damaged area, and may require mechanical fasteners as directed by the Owner's Representative. Patching at liner plate holes shall be made with a patch which overlaps the edge of the hole a minimum of 1/4 inch.

C. Whenever liner is not properly anchored to concrete, or whenever patches larger than those permitted above are necessary, the repair of liner and the restoration of anchorage shall be as directed by the Owner.

3.04 TESTING

Upon completion of the installation, the Contractor shall clean the surface of the liner and shall perform visual inspection and spark testing in the presence of the Owner's Representative. In addition, all weld joints shall be probed with a trowel, putty knife, or similar tool approved by the Owner's Representative. The spark-type detector shall be supplied by the Contractor. The voltage used for testing shall be 20,000 volts. All areas of liner failing to meet the field test shall be properly repaired and retested by the Contractor.

LINER LOCATION SCHEDULE

Location Description	Surface
Headworks	Provide lining on all vertical surfaces from bottom to top of walls. Install lining per design drawings around 30-inch diameter inlet pipes. Omit lining behind Parshall Flume insert.
Distribution Channel from Headworks to Grit chambers	Provide lining on all walls from elevation 153.35' to top of walls.
Aerated Grit tanks	Provide lining on all walls from elevation 153.35' to top of walls. Install lining on top of weir walls and all around inlet scum channel slot. Install lining on top of walls at cover joints.
Distribution Channels from Grit Chambers to outlet.	Provide lining on all walls from elevation 151.58' to top of walls. Install lining on bottom and sides of all beams. Install lining around 36-inch diameter outlet pipe.
Odor Control Biofilter Pump Station	Provide lining on manhole walls and underside of cover slab.

****END OF SECTION****

SECTION 09900

COATING SYSTEMS

PART 1--GENERAL

1.01 DESCRIPTION

A. SCOPE:

This Section 09900 specifies coating systems, surface preparations, and application requirements for coating systems.

B. DEFINITIONS:

Specific coating terminology used in this Section 09900 is in accordance with definitions contained in ASTM D16, ASTM D3960, and the following definitions:

1. Coating System Applicator (CSA): A generic reference to the specialty subcontractor or subcontractors retained by the Contractor to install the coating systems specified in this Section 09900.
2. Coating System Manufacturer (CSM): Refers to the acceptable coating system manufacturer, abbreviated as the CSM.
3. Coating System Manufacturer's Technical Representative(s) (CTR): Refers to the technical representative(s) of the acceptable Coating System Manufacturer and is abbreviated as CTR.
4. Dry Film Thickness (DFT): The primer or coating film's thickness following curing and drying. Dry film thickness is measured in mils or thousandths of an inch (0.001 inch) and is abbreviated DFT.
5. Field Coat: The application or the completion of application of the coating system after installation of the surface at the site of the work.
6. Hold Point: A defined point, specified in this Section 09900, at which work shall be halted for inspection.
7. Photochemically Reactive Organic Material: Organic material that will react with oxygen, excited oxygen, ozone or other free radicals generated by the action of sunlight on components in the atmosphere giving rise to secondary contaminants and reaction intermediates in the atmosphere.

8. Shop Coat: One or more coats applied in a shop or plant prior to shipment to the site of the work, where the field or finishing coat is applied.
9. Tie Coat: An intermediate coat used to bond different types of paint coats. Coatings used to improve the adhesion of a succeeding coat.
10. Touch-Up Painting: The application of paint on areas of painted surfaces to repair marks, scratches, and areas where the coating has deteriorated to restore the coating film to an unbroken condition.
11. Volatile Organic Compound (VOC) Content: The portion of the coating that is a compound of carbon, is photochemically reactive, and evaporates during drying or curing, expressed in grams per liter (g/l) or pounds per gallon (lb/gal).
12. Wet Film Thickness (WFT): The primer or coating film's thickness immediately following application. Wet film thickness is measured in mils or thousandths of an inch (0.001 inch) and is abbreviated WFT.

1.02 QUALITY ASSURANCE

A. REFERENCES:

This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued, or replaced.

Reference	Title
ANSI/NSF 61	Drinking Water System Components Health Effects
ANSI B74.18	Grading of Certain Abrasive Grain on Coated Abrasive Material
ASTM D16	Standard Terminology for Paint, Related Coatings, Materials, and Applications

Reference	Title
ASTM D2200 (SSPC-V1)	Pictorial Surface Preparation Standards for Painting Steel Surfaces
ASTM D4787	Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates
ASTM D5162	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
ASTM E337	Standard Test Method for Measuring Humidity With a Psychrometer
ASTM D3359 A	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D4262	Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces
ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4414	Standard Practice for Measurement of Wet Film Thickness by Notch Gages
ASTM D4417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM D4541	Standard Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM F1869	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
FS 595b	Federal Standard Colors
ICRI 03732	Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays
NAPF 500-03	Surface Preparation Standard for Ductile Iron Pipe and Fittings In Exposed Locations Receiving Special External Coatings And/Or Special Internal Linings
NAPF 500-03-04	Abrasive Blast Cleaning for Ductile Iron Pipe
NAPF 500-03-05	Abrasive Blast Cleaning for Cast Ductile Iron Fittings
SSPC	Paint Application Specification No. 1.
SSPC-PA Guide 3	A Guide to Safety in Paint Application
SSPC SP1	Solvent Cleaning
SSPC SP2	Hand Tool Cleaning

Reference	Title
SSPC SP3	Power Tool Cleaning
SSPC SP5	White Metal Blast Cleaning
SSPC SP6	Commercial Blast Cleaning
SSPC SP7	Brush-off Blast Cleaning
SSPC SP10	Near-White Blast Cleaning
SSPC SP11	Power Tool Cleaning to Bare Metal
SSPC SP12	Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC SP13	Surface Preparation of Concrete
SSPC-PA-2	Measurement of Dry Coating Thickness with Magnetic Gages
SSPC-TR2/NACE 6G198	Wet Abrasive Blast Cleaning
SSPC-TU-3	Overcoating
SSPC-TU-4	Field Methods for Retrieval and Analysis of Soluble Salts on Substrates.
SSPC V2	Systems and Specifications: Steel Structures Painting Manual, Volume 2
SSPC-Guide 11	Guide for Coating Concrete

B. STANDARDIZATION:

Materials and supplies provided shall be the standard products of CSMs. Materials in each coating system shall be the products of a single CSM.

The standard products of CSMs other than those specified may be acceptable when it is demonstrated to the Construction Manager that they are equal in composition, durability, usefulness, and convenience for the purpose intended. Requests for consideration of CSMs other than those specified in this Section 09900 will be considered, provided the following minimum conditions are met. Such requests are not a substitution for submittals after the alternative CSMs have been considered and accepted.

1. The proposed coating system shall use an equal or greater number of separate coats to achieve the required total dry film thickness.
2. The proposed coating system shall use coatings of the same generic type as that specified including curing agent type.

3. Requests for consideration of products from CSMs other than those specified in this Section 09900 shall include information listed in paragraph 09900-1.04, Items 1, 2, and 3, demonstrating that the proposed CSM's product is equal to the specified coating system.
4. The Contractor and the proposed alternative CSM shall provide a list of references for the proposed product where the coating of the same generic type has been applied. The reference list shall include the project name, city, state, owner, phone number of owner; coating system reference and number from this Section 09900; type of facility in which it was used, generic type, and year coating was applied.

C. QUALITY CONTROL REQUIREMENTS:

1. The Contractor is responsible for the workmanship and quality of the coating system installation. Inspections by the Construction Manager will not relieve or limit the Contractor's responsibilities.
2. The Contractor's methods shall conform to requirements of this specification and the standards referenced in this Section 09900. Changes in the coating system installation requirements will be allowed only with the written acceptance of the Construction Manager before work commences.
3. Only personnel who are trained by the CTR specifically for this contract or who are approved by the CSM specifically for this contract shall be allowed to perform the coating system installation specified in this Section 09900.
4. Contaminated, outdated, diluted materials, and/or materials from previously opened containers shall not be used.
5. For repairs, the Contractor shall provide the same products, or products recommended by the CSM, as used for the original coating.
6. The Contractor shall identify the points of access for inspection by the Owner or the Construction Manager. The Contractor shall provide ventilation, ingress and egress, and other means necessary for the Construction Manager's personnel to safely access the work areas.
7. The Contractor shall conduct the work so that the coating system is installed as specified and shall inspect the work continually to ensure that the coating system is installed as specified. Coating system work that does not conform to the specifications or is otherwise not acceptable shall be corrected as specified.

8. The Contractor shall complete the Coating System Inspection Checklist, Form 09900-A, included in Section 01999, for coating system installations. Follow the sequential steps required for proper coating system installation as specified and as listed in the Coating System Inspection Checklist. For each portion of the work, install the coating system and complete sign-offs as specified prior to proceeding with the next step. After completing each step as indicated on the Coating System Inspection Checklist, the Contractor shall sign the checklist indicating that the work has been installed and inspected as specified.
9. The Contractor shall provide written daily reports that present, in summary form, test data, work progress, surfaces covered, ambient conditions, quality control inspection test findings, and other information pertinent to the coating system installation.

D. INSPECTION AT HOLD POINTS

The Contractor shall conduct inspections at Hold Points during the coating system installation. The Contractor shall coordinate such Hold Points with the Construction Manager such that the Construction Manager may observe Contractor's inspections on a scheduled basis. The Contractor shall provide the Construction Manager a minimum of two (2) hours of notice prior to conducting Hold Point Inspections. The Hold Points shall be as follows:

1. Environment and Site Conditions. Prior to commencing an activity associated with coating system installation, the Contractor shall measure, record, and confirm acceptability of ambient air temperature and humidity as well as other conditions such as proper protective measures for surfaces not to be coated and safety requirements for personnel. The acceptability of the weather and/or environmental conditions within the structure shall be determined by the requirements of the coating system being used.
2. Conditions Prior to Surface Preparation. Prior to commencing surface preparation, the Contractor shall observe, record, and confirm that oil, grease, and/or soluble salts have been eliminated from the surface.
3. Monitoring of Surface Preparation. Spot checking of degree of cleanliness, surface profile, and surface pH testing, where applicable. In addition, the compressed air shall be checked to confirm it is free from oil and moisture.
4. Post Surface Preparation – Upon completion of the surface preparation, the Contractor shall measure and inspect for proper degree of cleanliness and surface profile as specified in this Section 09900 and in the CSM's written instructions.

5. Monitoring of Coatings Application – The Contractor shall inspect, measure, and record the wet film thickness and general film quality (visual inspection) for lack of runs, sags, pinholes, holidays, etc. as the application work proceeds.
6. Post Application Inspection – The Contractor shall identify defects in application work including pinholes, holidays, excessive runs or sags, inadequate or excessive film thickness and other problems as may be observed.
7. Post Cure Evaluation – The Contractor shall measure and inspect the overall dry film thickness. The Contractor shall conduct a DFT survey, as well as perform adhesion testing, holiday detection, or cure testing as required based on the type of project and the specific requirements in this Section 09900 and/or in the CSM's written instructions.
8. Follow-up to Corrective Actions and Final Inspection. The Contractor shall measure and reinspect corrective coating work performed to repair defects identified at prior Hold Points. This activity also includes final visual inspection along with follow-up tests such as holiday detection, adhesion tests, and DFT surveys.

1.03 DELIVERY AND STORAGE

Materials shall be delivered to the job site in their original, unopened containers. Each container shall bear the CSM's name, coating type, batch number, date of manufacture, shelf life, and written special instructions

Materials shall be handled and stored to prevent damage to or loss of label.

Labels on material containers shall show the following information:

1. Name or title of product.
2. CSM's batch number.
3. CSM's name.
4. Generic type of material.
5. Application and mixing instructions.
6. Hazardous material identification label.
7. Shelf life expiration date.

Materials shall be stored in enclosed structures and shall be protected from weather and excessive heat or cold in accordance with the CSM's recommendations. Flammable materials shall be stored in accordance with state and local requirements.

Containers shall be clearly marked indicating personnel safety hazards associated with the use of or exposure to the materials.

Material Safety Data Sheets (MSDS) for each material shall be provided to the Construction Manager.

The Contractor shall store and dispose of hazardous waste according to federal, state and local requirements. This requirement specifically addresses waste solvents and coatings.

1.04 SUBMITTALS:

Provide in accordance with Section 01300:

1. A copy of this specification section, with addendum updates included, and referenced and applicable sections, with addendum updates included, with each paragraph check-marked (✓) to indicate specification compliance or marked to indicate requested deviations from specification requirements or those parts which are to be provided by the Contractor or others. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for requested deviations to the specification requirements shall be cause for rejection of the entire submittal and no further submittal material will be reviewed.
2. CSM's current printed recommendations and product data sheets for coating systems including:
 - a. Volatile organic compound (VOC) data
 - b. Surface preparation recommendations.
 - c. Primer type, where required.
 - d. Maximum dry and wet mil thickness per coat.
 - e. Minimum and maximum curing time between coats, including atmospheric conditions for each.
 - f. Curing time before submergence in liquid.
 - g. Thinner to be used with each paint.
 - h. Ventilation requirements.
 - i. Minimum atmospheric conditions during which the paint shall be applied.

- j. Allowable application methods.
 - k. Maximum allowable moisture content.
 - l. Maximum shelf life.
3. Affidavits signed and sealed by an officer of the CSM's corporation, attesting to full compliance of each coating system component with current and promulgated federal, state, and local air pollution control regulations and requirements.
 4. Material Safety Data Sheets (MSDS) for materials to be delivered to the job site, including coating system materials, solvents, and abrasive blast media.
 5. List of cleaning and thinner solutions allowed by the CSMs.
 6. Storage requirements including temperature, humidity, and ventilation for Coating System Materials as recommended by the CSMs.
 7. CSM's detailed, written instructions for coating system treatment and graphic details for coating system terminations in the structures to be coated including pipe penetrations, metal embedments, gate frames, and other terminations to be determined from the contract drawings. This information shall also include detail treatment for coating system at joints in concrete.
 8. The Contractor and CSA shall provide a minimum of five project references each including contact name, address, and telephone number where similar coating work has been performed by their companies in the past five years.

1.05 RESPONSIBILITIES OF THE CTR

The Contractor shall retain or obtain the services of the CTR to be on site to perform the Contractor and/or CSA application training and to periodically inspect and verify that the application personnel have successfully performed surface preparation, filler/surface application, coating system application, and Quality Control Inspection in accordance with this Section 09900. This inspection is in addition to the inspection performed by the Contractor in accordance with this Section 09900.

A. COATING SYSTEM INSTALLATION TRAINING:

1. Provide a minimum of 8 hours of classroom and off site training for application and supervisory personnel (both the Contractor's and CSA's). Provide training to a minimum of two supervisory personnel from the CSA and one supervisor from the Contractor. Alternatively, the CTR

shall provide a written letter from the CSM stating that the application personnel (listed by name) who shall perform coating work are approved by the CSM without further or additional training.

2. One CTR can provide training for up to fourteen application personnel and three supervisory personnel at one time. The training shall include the following as a minimum:
 - a. A detailed explanation of mixing, application, curing, and termination details.
 - b. Hands-on demonstration of how to mix and apply the coating systems.
 - c. A detailed explanation of the ambient condition requirements (temperature and humidity) and surface preparation requirements for application of the coating system as well as a detailed explanation of re-coat times, cure times, and related ambient condition requirements.
 - d. When training is performed, the CTR shall provide a written letter stating that training was satisfactorily completed by the personnel listed by name in the letter.

B. COATING SYSTEM INSPECTION:

While on site to periodically inspect and verify, the CTR shall perform the following activities as and when they are applicable at the time of the CTR's site visits to confirm acceptability and conformance with the specifications:

1. Inspect ambient conditions during various coating system installation at hold points for conformance with the specified requirements.
2. Inspect the surface preparation of the substrates where the coating system will terminate or will be applied for conformance to the specified application criteria.
3. Inspect preparation and application of coating detail treatment.
4. Inspect application of the filler/surface materials for concrete and masonry substrates.
5. Inspect application of the primers and finish coats.
6. Inspect coating systems for cure.

7. Review adhesion testing of the cured coating systems for conformance to specified criteria.
8. Review coating system continuity testing for conformance to specified criteria.
9. Inspect and record representative localized repairs made to discontinuities identified via continuity testing.
10. Conduct a final review of completed coating system installation for conformance to the specifications.
11. Prepare and submit a site visit report following each site visit.

C. FINAL REPORT

Upon completion of coating work for the project, the CTR shall prepare a final report. That report shall summarize daily test data, observations, drawings, and photographs in a report to be submitted in accordance with paragraph 09900-2.02. Include substrate conditions, ambient conditions, and application procedures, observed during the CTR's site visits. Include a statement that the completed work was performed in accordance with the requirements of this Section 09900.

PART 2--PRODUCTS

2.01 MATERIALS

Notwithstanding the listing of product names in this Section 09900, the Contractor shall provide affidavits, signed and sealed by an officer of the CSM's corporation, attesting to full compliance of each coating system component with current and promulgated federal, state, and local air pollution control regulations and requirements. No coatings shall be applied to a surface until such time as the specified affidavits have been submitted and have been reviewed and accepted. Failure to comply with this requirement shall be cause for rejection and removal of such materials from the site.

The following list specifies the material requirements for coating systems. Coating systems are categorized by generic name followed by an identifying abbreviation. If an abbreviation has a suffix number, it is for the purpose of identifying subgroups within the coating system.

Coating System	CSM	Primer Coat(s)	Finish Coat(s)
Epoxy Coatings			
E-1	PPG PMC Carboline ICI Paints Sherwin Williams Tnemec	Amerlock 2/400 Series Carboguard 890 Devran 224 Macropoxy 646 Series V69	Amerlock 2/400 Series Carboguard 890 Devran 224 Macropoxy 646 Series V69
E-2	PPG PMC Carboline ICI Paints Sherwin Williams Tnemec	Amerlock 2/400 Series Carboguard 890 Bar-Rust 236 Macropoxy 646 Series V27 or V69	Amerlock 2/400 Series Carboguard 890 Bar-Rust 236 Macropoxy 646 Series V69
E-4	PPG PMC Carboline ICI Paints Sherwin Williams Tnemec	Amerlock 2/400 Series Carboguard 890 Bar-Rust 236 Macropoxy 646 Series V69	Amerlock 2/400 Series Carboguard 890 Bar-Rust 236 Macropoxy 646 Series V69
Specialty Epoxy Linings			
EA-1	Carboline Sauereisen Tnemec	Plasite 4500S Sewergard 210S Series 435	Plasite 4500S Sewergard 210S Series 435
EA-2	Carboline Sauereisen Tnemec	Plasite 4500S Sewergard 210S Series 435	Plasite 4500S Sewergard 210S Series 435
Epoxy Polyurethane			
		Primer Coat(s)	Intermediate Coat(s)
EU-1	PPG PMC	Amercoat	Amercoat 450H
	Carboline	68HS	Amercoat 385 Carboguard 890
	ICI Paints	Carbozinc 859	Carbothane 133 HB or Carbothane 133 LH
	Sherwin Williams	Devran 233 or 224HS	Devthane 379
	Tnemec	Zinc Clad IV	Macropoxy 646
		Series 90-97	Hi Solids Polyurethane Series 1075
EU-1-FRP	PPG PMC Carboline ICI Paints Sherwin Williams Tnemec	Amerlock 2/400 Series Carbocrylic 120 Devran 223/224 Macropoxy 646 Series V27	Amershield VOC Carbothane 133 HB Devthane 389 High Solids Polyurethane Series 1075

Coating System	CSM	Primer Coat(s)	Finish Coat(s)
High Heat			
HH-1	High Temperature Coatings, Inc.	Hi Temp 1027	1000 VS (any color)
Latex Acrylic			
L-2	PPG PMC Carboline ICI Paints Sherwin Williams Tnemec	Amercoat 220 Sanitile 120 UH Gripper 3210 Sher Cryl HPA Series 1028 or 1029	Amercoat 220 Carbocrylic 3359 DTM Dulux Pro 4206 Sher Cryl HPA Series 1028 or 1029
Miscellaneous			
M-1	Carboline Denso Trenton	Carbowrap Priming Paste Denso Paste Waxtape Primer	Tape A, B, or C (temp. dependent) Densyl Tape #1 Wax Tape
Urethane			
U	Ameron	Amercoat 385	Amercoat 450HS
	Carboline	Carboguard 893	Carbothane 134HS
	ICI Devoe	Bar Rust 235	Devthane 379
	International Paint	Intergard 750HS	Interthane 990HS
	Sherwin-Williams	920V137	975 Series
	Tnemec	Series 69	Series 75 Color

2.02 PRODUCT DATA

1. Prior to application of coatings, submit letter(s) from the CTR(s) identifying the application personnel who have satisfactorily completed training as specified in paragraph 09900-1.05 or a letter from the CSM stating that personnel who shall perform the work are approved by the CSM without need for further or additional training.
2. Submit reports specified in paragraph 09900-1.02 C.10 and 09900-1.05 B.11 when the work is underway.
3. Submit the Coating System Inspection Checklists, using Form 09900-A, included in Section 01999, for the coating work.
4. CTR final report in accordance with paragraph 09900-1.05 C.

PART 3--EXECUTION

3.01 COATINGS

A. GENERAL:

Coating products shall not be used until the Construction Manager has accepted the affidavits specified in paragraph 09900-1.04 and 2.01, the Construction Manager has inspected the materials, and the CTR has trained the Contractor and CSA in the surface preparation, mixing and application of each coating system.

B. SHOP AND FIELD COATS:

1. **SHOP APPLIED PRIME COAT:** Except as otherwise specified, prime coats may be shop-applied or field-applied. Shop-applied primer shall be compatible with the specified coating system and shall be applied at the minimum dry film thickness recommended by the CSM. Data sheets identifying the shop primer used shall be provided to the on-site coating application personnel. Adhesion tests shall be performed on the shop primer as specified in paragraph 09900-3.01B.3. Damaged, deteriorated and poorly applied shop coatings that do not meet the requirements of this Section 09900 shall be removed and the surfaces recoated. If the shop primer coat meets the requirements of this Section 09900, the field coating may consist of touching up the shop prime coat and then applying the finish coats to achieve the specified film thickness and continuity.
2. **FIELD COATS:** Field coats shall consist of one or more prime coats and one or more finish coats to build up the coating to the specified dry film thickness. Unless otherwise specified, finish coats shall not be applied until other work in the area is complete and until previous coats have been inspected.
3. **ADHESION CONFIRMATION:** The Contractor shall perform an adhesion test after proper cure in accordance with ASTM D3359 to demonstrate that (1) the shop applied prime coat adheres to the substrate, and (2) the specified field coatings adhere to the shop coat. Test results showing an adhesion rating of 5A on immersed surfaces and 4A or better on other surfaces shall be considered acceptable.

C. APPLICATION LOCATION REQUIREMENTS:

1. **EQUIPMENT, NONIMMERSED:** Items of equipment, or parts of equipment which are not immersed in service, shall be shop primed and then finish coated in the field after installation with the specified or acceptable color. If the shop primer requires topcoating within a specified period of

time, the equipment shall be finish coated in the shop and then touch-up painted after installation.

2. EQUIPMENT, IMMERSED: Items of equipment, or parts and surfaces of equipment which are immersed when in service, with the exception of pumps and valves, shall have surface preparation and coating work performed in the field. Coating systems applied to immersed equipment shall be pinhole free.

3.02 PREPARATION

A. GENERAL:

Surface preparations for each type of surface shall be in accordance with the specific requirements of each coating specification sheet (COATSPEC) and the following. In the event of a conflict the COATSPEC sheets shall take precedence.

Surfaces to be coated shall be clean and dry. Before applying coating or surface treatments, oil, grease, dirt, rust, loose mill scale, old weathered coatings, and other foreign substances shall be removed. Oil and grease shall be removed before mechanical cleaning is started. Where mechanical cleaning is accomplished by blast cleaning, the abrasive used shall be washed, graded and free of contaminants which might interfere with the adhesion of the coatings. The air used for blast cleaning shall be sufficiently free of oil and moisture to not cause detrimental contamination of the surfaces to be coated.

Where deemed necessary, a NACE International certified coatings inspector, provided by the Owner, will inspect and approve surfaces to be coated before application of a coating. Surface defects identified by the inspector shall be corrected by the Contractor.

Cleaning and painting shall be scheduled so that dust and spray from the cleaning process shall not fall on wet, newly painted surfaces. Hardware, hardware accessories, nameplates, data tags, machined surfaces, sprinkler heads, electrical fixtures, and similar uncoated items which are in contact with coated surfaces shall be removed or masked prior to surface preparation and painting operations. Following completion of coating, removed items shall be reinstalled. Equipment adjacent to walls shall be disconnected and moved to permit cleaning and painting of equipment and walls and, following painting, shall be replaced and reconnected.

B. BLAST CLEANING:

When blast cleaning is required to achieve the specified surface preparation the following requirements for blast cleaning materials and equipment shall be met:

1. Used or spent blast abrasive shall not be reused on this project.

2. The compressed air used for blast cleaning shall be filtered and shall contain no condensed water and no oil. Moisture traps shall be cleaned at least once every four hours or more frequently as required to prevent moisture from entering the supply air to the abrasive blasting equipment.
3. Oil separators shall be installed just downstream of compressor discharge valves and at the discharge of the blast pot discharges. These shall be checked on the same frequency as the moisture traps as defined in item 2 above.
4. Regulators, gauges, filters, and separators shall be in use on compressor air lines to blasting nozzles at all times during this work.
5. An air dryer or desiccant filter drying unit shall be installed which dries the compressed air prior to blast pot connections. This dryer shall be used and maintained for the duration of surface preparation work.
6. The abrasive blast nozzles used shall be of the venturi or other high velocity type supplied with a minimum of 100 psig air pressure and sufficient volume to obtain the blast cleaning production rates and cleanliness/specified.
7. The Contractor shall provide ventilation for airborne particulate evacuation (meeting pertinent safety standards) to optimize visibility for both blast cleaning and inspection for the substrate during surface preparation work.
8. If, between final surface preparation work and coating system application, contamination of prepared and cleaned metallic substrates occurs, or if the prepared substrates' appearance darkens or changes color, recleaning by water blasting, reblasting and abrasive blast cleaning shall be required until the specified degree of cleanliness is reclaimed.
9. The Contractor is responsible for dust control and for protection of mechanical, electrical, and other equipment adjacent to and surrounding the work area.

C. SOLVENT CLEANING:

Any solvent wash, solvent wipe, or cleaner used, including but not limited to those used for surface preparation in accordance with referenced Society for Protective Coatings (SSPC) specifications, shall be of the emulsifying type which emits no more than 2.8 lb/gal (340 g/L) VOCs, contains no phosphates, is biodegradable, removes no zinc, and is compatible with the specified primer.

Clean cloths and clean fluids shall be used in solvent cleaning.

D. METALLIC SURFACES:

Metallic surfaces shall be prepared in accordance with applicable portions of surface preparation specifications of the Society for Protective Coatings (SSPC) specified in each coating system. The profile depth of the surface to be coated shall be 20 to 25 percent of the coating dry film thickness as measured by Method C of ASTM D4417. Blast particle size shall be selected by the Contractor to produce the specified surface profile. The solvent in solvent cleaning operations shall be as recommended by the CSM.

Preparation of metallic surfaces shall be based upon comparison with SSPC-VIS1-89 (ASTM D2200), and as described. If dry abrasive blast cleaning is selected and to facilitate inspection, the Contractor shall, on the first day of cleaning operations, prepare abrasive blast metal panels to the standards specified. Plates shall measure a minimum of 8-1/2 inches by 11 inches. Panels meeting the requirements of the specifications shall be initialed by the Contractor and the Construction Manager and coated with a clear non-yellowing finish. One of these panels shall be prepared for each type of abrasive blasting and shall be used as the comparison standard throughout the project.

Blast cleaning requirements for steel, ductile iron, and stainless steel substrates are as follows:

1. Steel piping shall be prepared in accordance with SSPC SP-6 (Commercial Blast Cleaning) and primed before installation. Ductile iron piping surfaces including fittings shall be prepared in accordance with NAPF 500-03, NAPF 500-03-04, and NAPF 500-03-05.
2. Unless otherwise specified, stainless steel surfaces shall be abrasive blast cleaned to leave a clean uniform appearance with a minimum surface profile of 1.5 to 2.5 mils which is uniform.
3. Remove traces of grit, dust, dirt, rust scale, friable material, loose corrosion products or embedded abrasive from substrate by vacuum cleaning prior to coating application.
4. Care must be taken to prevent contamination of the surface after blasting from worker's fingerprints, deleterious substances on workers' clothing, or from atmospheric conditions.
5. Ambient environmental conditions in the enclosure must be constantly monitored and maintained to ensure the degree of cleanliness is held and no "rust back" occurs.

E. CONCRETE SURFACES:

1. Inspection of concrete surfaces prior to surface preparation and surface preparation of concrete surfaces other than concrete floors shall be performed in accordance with SSPC-SP13 (also called NACE 6).
2. The surface profile for prepared concrete surfaces to be coated shall be evaluated by comparing the profile of the prepared concrete with the profile of graded abrasive paper, as described in ANSI B74.18 or by comparing the profile with the ICRI 03732 (surface profile chips). Surface profile requirements shall be in accordance with the CSM's recommendations.
3. Surface cleanliness of prepared concrete substrates shall be inspected after cleaning, preparation, and/or drying, but prior to making repairs or applying a coat in the coating system. If concrete surfaces are repaired, they shall be reinspected for surface cleanliness prior to application of the coating system.
4. Surface preparation of concrete substrates shall be accomplished using methods such as dry abrasive blast cleaning, high, or ultra high pressure water blast cleaning in accordance with SSPC-SP-13. The selected cleaning method shall produce the requirements set forth below.
 - a. A clean substrate that is free of calcium sulfate, loose coarse or fine aggregate, laitance, loose hydrated cement paste, and otherwise deleterious substances shall be achieved. Blast cleaning and other means necessary shall be used to open up air voids or "bug holes" to expose their complete perimeter. Leaving shelled over, hidden air voids beneath the exposed concrete surface is not acceptable. Concrete substrate must be dry prior to the application of filler/surface or coating system materials.

Acceptable surface preparation must produce a concrete surface pH of 8.0 to 11.0 to be confirmed by surface pH testing. If after surface preparation, the surface pH remains below 8.0, perform additional water blasting, cleaning, or abrasive blast cleaning until additional pH testing indicates an acceptable pH level.

- b. Following inspection by the Contractor of the concrete surface preparation, thoroughly vacuum clean concrete surfaces to be coated to remove loose dirt and spent abrasive (if dry blast cleaning is used) leaving a dust free, sound concrete substrate. Debris produced by blast cleaning shall be removed from the structures to be coated and disposed of legally off site by the Contractor.

5. Should abrasive blast cleaning or high or ultrahigh pressure water blasting not remove degraded concrete, chipping or other abrading tools shall be used to remove the deteriorated concrete until a sound, clean substrate is achieved which is free of calcium sulfate, loose coarse or fine aggregate, laitance, loose hydrated cement paste, and otherwise deleterious substances. Concrete substrates must be dry prior to the application of filler/surfacers or coating system materials.
6. Surface cleanliness of prepared concrete substrates shall be inspected after cleaning, preparation, and/or drying, but prior to application of coating materials. If concrete surfaces are repaired, they shall be reinspected for surface cleanliness prior to application of the coating system.
7. Moisture content of concrete to be coated shall be tested in accordance with ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method and ASTM F 1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride. The ASTM D4263 plastic sheet test shall be conducted at least once for every 500 sq. ft. of surface area to be coated. For concrete surfaces to be coated which are on the negative or back side of concrete walls or structures exposed to soils (back filled) or immersed and waterproofed in accordance with Section 07100, perform calcium chloride tests in accordance with ASTM F-1869 once for each 500 sq. ft. of surface area to be coated.

F. MASONRY SURFACES:

1. Prepare masonry surfaces such as Concrete Masonry Units (CMU) to remove chalk, loose dirt, dried mortar splatter, dust, peeling or loose existing coatings, or otherwise deleterious substances to leave a clean, sound substrate.
2. Be certain masonry surfaces are dry prior to coating application. If pressure washing or low pressure water blast cleaning are used for preparation, allow the masonry to dry for at least 5 days under dry weather conditions or when the minimum ambient temperature is 70°F prior to coating application work.

G. FIBERGLASS REINFORCED PLASTIC (FRP) SURFACES:

Prepare FRP surfaces by sanding to establish uniform surface roughness and to remove gloss from the resin in the FRP. Next, vacuum clean to remove loose FRP dust, dirt, and other materials. Next, solvent clean using clean white rags and allow solvent to completely evaporate before application of coating materials.

H. EXISTING FACILITIES:

Unless otherwise specified, existing coating systems damaged by new construction shall be repaired and coated in accordance with the appropriate system specified for new work.

Contractor shall demonstrate that the existing coating is compatible with field coating by performing the adhesion test specified in paragraph 09900 – 3.01 B.3. Where unacceptable test results are obtained, the Contractor shall follow manufacturer's written instructions as to the necessity of existing coating removal or the need for a tie coat to provide a satisfactory bond between the existing coating and the specified field coating.

3.03 APPLICATION

A. WORKMANSHIP:

1. Coated surfaces shall be free from runs, drips, ridges, waves, laps, and brush marks. Coats shall be applied to produce an even film of uniform thickness completely coating corners and crevices. Coatings shall be applied in accordance with the requirements of SSPC Paint Application Specification No. 1.
2. The Contractor's equipment shall be designed for application of the materials specified. Compressors shall have suitable traps and filters to remove water and oils from the air. A paper blotter test shall be performed by the Contractor when requested by the Construction Manager to determine if the air is sufficiently free of oil and moisture to not produce deteriorating effects on the coating system. The amount of oil and moisture in spray air shall be less than the amount recommended by the CSM. Spray equipment shall be equipped with mechanical agitators, pressure gages, and pressure regulators, and spray nozzles of the proper sizes.
3. Each coat of paint shall be applied evenly and sharply cut to line. Care shall be exercised to avoid overspraying or spattering paint on surfaces not to be coated. Glass, hardware, floors, roofs, and other adjacent areas and installations shall be protected by taping, drop cloths, or other suitable measures.
4. Coating applications method shall be conventional or airless spray, brush or roller, or trowel as recommended by CSM.
5. Allow each coat to cure or dry thoroughly, according to CSM's printed instructions, prior to recoating.
6. Vary color for each successive coat for coating systems when possible.

7. When coating complex steel shapes, prior to overall coating system application, stripe coat welds, edges of structural steel shapes, metal cut-outs, pits in steel surfaces, or rough surfaces with the primer coat. This involves applying a separate coat using brushes or rollers to ensure proper coverage. Stripe coat via spray application is not permitted.

B. COATING PROPERTIES, MIXING AND THINNING:

Coatings, when applied, shall provide a satisfactory film and smooth even surface. Glossy undercoats shall be lightly sanded to provide a surface suitable for the proper application and adhesion of subsequent coats. Coating materials shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings consisting of two or more components shall be mixed in accordance with the CSM's instructions. Where necessary to suit the conditions of the surface, temperature, weather and method of application, the coating may be thinned as recommended by the CSM immediately prior to use. The volatile organic content (VOC) of the coating as applied shall comply with prevailing air pollution control regulations. Unless otherwise specified, coatings shall not be reduced more than necessary to obtain the proper application characteristics. Thinner shall be as recommended by the CSM.

C. ATMOSPHERIC CONDITIONS:

Coatings shall be applied only to surfaces that are dry, and only under conditions of evaporation rather than condensation. Coatings systems shall not be applied during rainy, misty weather, or to surfaces upon which there is frost or moisture condensation. During damp weather, when the temperature of the surface to be coated is within 10°F of the dew point, forced dehumidification equipment may be used to maintain a temperature of minimum 40°F and 10°F above the dew point for the surfaces to be coated, the coated surface, and the atmosphere in contact with the surface. These conditions shall be maintained for a period of at least 8 hours or as recommended by the CSM. Where conditions causing condensation are severe, dehumidification equipment, fans, and/or heaters shall be used inside enclosed areas to maintain the required atmospheric and surface temperature requirements for proper coating application and cure.

D. CONCRETE SUBSTRATE TEMPERATURES:

When the surface temperatures of the concrete substrates to be coated are rising or when these substrates are in direct sunlight, outgassing of air from the concrete may result in bubbling, pinhole formations, and/or blistering in the coating system. As such, the application of the coating system in such locations shall be postponed until the cooler evening hours or other measures shall be taken to prevent such rising substrate temperatures. Should bubbles, pinholes, or discontinuities form in the applied coating system material, they shall be repaired as recommended by the CSM.

E. PROTECTION OF COATED SURFACES:

Items which have been coated shall not be handled, worked on, or otherwise disturbed, until the coating is completely dry and hard. After delivery at the site, and upon permanent erection or

installation, shop-coated metalwork shall be recoated or retouched with specified coating when it is necessary to maintain the integrity of the film.

F. METHOD OF COATING APPLICATION:

1. Where two or more coats are required, alternate coats shall contain sufficient compatible color additive to act as indicator of coverage, or the alternate coats shall be of contrasting colors. Color additives shall not contain lead, or lead compounds, which may be destroyed or affected by hydrogen sulfide or other corrosive gas, and/or chromium.
2. Mechanical equipment, on which the equipment manufacturer's coating is acceptable, shall be touch-up primed and coated with two coats of the specified coating system to match the color scheduled. Electrical and instrumentation equipment specified in Divisions 16 and 17 shall be coated as specified in paragraph 09900-3.03 I.
3. Coatings shall not be applied to a surface until it has been prepared as specified. The primer or first coat shall be applied by brush to ferrous surfaces that are not blast-cleaned. Coats for blast-cleaned ferrous surfaces and subsequent coats for nonblast-cleaned ferrous surfaces may be either brush or spray applied. After the prime coat is dry, pinholes and holidays shall be marked, repaired in accordance with CSM's recommendations and retested before succeeding coats are applied. Unless otherwise specified, coats for concrete and masonry shall be brushed or rolled.

G. FILM THICKNESS AND CONTINUITY:

1. WFT of the first coat of the coating system and subsequent coats shall be verified by the Contractor, following application of each coat.
2. The surface area covered per gallon of coating for various types of surfaces shall not exceed those recommended by the CSM. The first coat, referred to as the prime coat, on metal surfaces refers to the first full paint coat and not to solvent wash, grease emulsifiers or other pretreatment applications. Coatings shall be applied to the thickness specified, and in accordance with these specifications. Unless otherwise specified, the average total thickness (dry) of a completed protective coating system on exposed metal surfaces shall be not less than 1.25 mils per coat. The minimum thickness at any point shall not deviate more than 25 percent from the required average. Unless otherwise specified, no less than two coats shall be applied.
3. In testing for continuity of coating about welds, projections (such as bolts and nuts), and crevices, the Construction Manager shall determine the minimum conductivity for smooth areas of like coating where the dry mil

thickness has been accepted. This conductivity shall be the minimum required for these rough or irregular areas. Pinholes and holidays shall be recoated to the required coverage.

4. The ability to obtain specified film thickness is generally compromised when brush or roller application methods are used and, therefore, more coats are needed to be applied to achieve the specified dry film thickness.
5. Contractor shall apply a complete skim coat of an appropriate filler/surfacer material over the entire substrate prior to application of the coating system if, after completion of surface preparation, the surface profile or roughness of concrete or masonry substrates cannot be hidden or covered by the coating system's film thickness and/or if there are frequent open air voids and "bug holes" in the concrete substrate that cannot be filled by the coating system. The Contractor shall consult with the CSM for the appropriate filler/surfacer material and application recommendations to ensure compatibility with the coating system.

H. SPECIAL REQUIREMENTS:

Before erection, the Contractor shall apply all but the final finish coat to interior surfaces of roof plates, roof rafters and supports, pipe hangers, piping in contact with hangers, and contact surfaces which are inaccessible after assembly. The final coat shall be applied after erection. Structural friction connections and high tensile bolts and nuts shall be coated after erection. Areas damaged during erection shall be hand-cleaned or power-tool cleaned and recoated with primer coat prior to the application of subsequent coats. Touch-up of surfaces shall be performed after installation. Surfaces to be coated shall be clean and dry at the time of application. Except for those to be filled with grout, the underside of equipment bases and supports that have not been galvanized shall be coated with at least two coats of primer specified for system E-2 prior to setting the equipment in place. Provide coating system terminations at leading edges and transitions to other substrates in accordance with the CSM's recommendations or detail drawings.

I. ELECTRICAL AND INSTRUMENTATION EQUIPMENT AND MATERIALS:

Electrical distribution equipment, Contractor and Manufacturer/Vendor control panels, and instrumentation equipment and materials shall be coated by the equipment manufacturer as specified below.

1. FINISH: Electrical equipment shall be treated with zinc phosphate, bonderized or otherwise given a rust-preventive treatment. Equipment shall be primed, coated with enamel, and baked. Minimum dry film thickness shall be 3 mils.

Unless otherwise specified, instrumentation panels shall be coated with system E-1 for indoor mounting and system EU-1 for outdoor mounting.

Before final acceptance, the Contractor shall touch up scratches on equipment with identical color coating. Finish shall be smooth, free of runs, and match existing finish. Prior to touching up scratches, Contractor shall fill them with an appropriate filler material approved by the CSM.

2. COLOR: Exterior color of electrical equipment shall be FS 26463 (ANSI 61) light gray. Interior shall be painted FS 27880 white. Nonmetallic electrical enclosures and equipment shall be the equipment manufacturer's standard grey color.

Exterior color of instrumentation panels and cabinets mounted indoors shall be FS 26463 light gray; unless otherwise specified, exterior color for cabinets mounted outdoors shall be FS 27722, white. Cabinet interiors shall be FS 27880, white.

J. SAFETY AND VENTILATION REQUIREMENTS:

Requirements for safety and ventilation shall be in accordance with SSPC Paint Application Guide No. 3.

3.04 CLEANUP

Upon completion of coating, the Contractor shall remove surplus materials, protective coverings, and accumulated rubbish, and thoroughly clean surfaces and repair overspray or other coating-related damage.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating systems for different types of surfaces and general service conditions for which these systems are normally applied are specified on the following COATSPEC sheets. Surfaces shall be coated in accordance with the COATSPEC to the system thickness specified. Coating systems shall be as specified in paragraph 09900-3.06, Coating System Schedule. In case of conflict between the schedule and the COATSPECS, the requirements of the schedule shall prevail.

Coating Specification Sheets included in Table 09900A are included in this paragraph 09900-3.05.

Table 09900A. Coating Specification Sheets

Coating System ID	Coating Material	Surface	Service Condition
E-1	Epoxy	Metal	Interior; exterior, covered, not exposed to direct sunlight, non-corrosive exposure
E-2	Epoxy	Metal	Immersed, nonpotable; non-immersed, moderately corrosive environment, color required.
E-4	Epoxy	Concrete, masonry, plaster, gypsum board	Interior
EA-1	Blended Amine Cured Epoxy	Metal	Immersed, nonpotable; non-immersed, corrosive environment, color not required especially for headspace environments that are corrosive due to biogenic sulfide corrosion.
EA-2	Blended Amine Cured Epoxy	Concrete or masonry	Immersed, nonpotable; non-immersed, corrosive environment, color not required, new construction especially for headspace environments that are corrosive due to biogenic sulfide corrosion.
HH-1	Proprietary Primer Plus Silicone Topcoat	Metal	Temperature to 750 degrees F.
L-2	Latex	PVC and CPVC pipe	Exterior, direct sunlight exposure.
M-1	Petrolatum based mastic or wax based wrapping tapes	Metal	Below grade (buried) or where little to no surface preparation can be performed on piping or structural steel.
EU-1	Zinc-epoxy-polyurethane system	Ferrous Metal	Exterior, exposed to direct sunlight, moderately corrosive non-immersed.
EU-1-FRP	Specialty Primer plus Polyurethane Finish Coat	Exterior of FRP pipe and tanks, etc	Exterior, exposed to direct sunlight, non-immersed.
U	Urethane	Galvanized structural steel	Exterior, exposure to direct sunlight.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: E-1
Coating Material: Epoxy
Surface: Metal
Service Condition: Interior; exterior, covered, not exposed to direct sunlight, non-corrosive exposure.

Surface Preparation:

General: Shop primed surfaces which are to be incorporated in the work shall be prepared in the field by cleaning surfaces in accordance with SSPC SP-2 (Hand Tool Cleaning). Damaged shop coated areas shall be cleaned in accordance with SSPC SP-5 (White Metal Blast Cleaning) and spot primed with the primer specified. Shop epoxy primed surfaces shall require light abrasive blasting prior to receiving finish coats.

Ferrous Metal: Bare ferrous metal surfaces shall be prepared in accordance with SSPC SP-6 (Commercial Blast Cleaning).

Ferrous metal with rust bleeding shall be cleaned in accordance with SSPC SP-1 (Solvent Cleaning). Areas of rust penetration shall be spot blasted to SSPC SP-10 (Near White Blast) and spot primed with the specified primer. For ductile iron surfaces, refer to the requirements in paragraph 09900-3.02 D.

Nonferrous and Galvanized Metal: Nonferrous and galvanized metal shall be prepared in accordance with SSPC SP-7 (Brush-off Blast Cleaning).

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: E-1 (continued)

Application: Field

General: Prime coat may be thinned and applied as recommended by the CSM, provided the coating as applied complies with prevailing air pollution control regulations.

Ferrous Metal: Prime coats shall be an epoxy primer compatible with the specified finish coats and applied in accordance with the written instructions of the CSM.

Nonferrous and Galvanized Metal: Nonferrous and galvanized metal shall be cleaned prior to the application of the prime coat in accordance with SSPC SP-1 (Solvent Cleaning).

System Thickness: 10 mils dry film.

Coatings:

Primer: One coat at CSM's recommended dry film thickness.

Finish: One or more coats at CSM's recommended dry film thickness per coat to the specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification:	E-2
Coating Material:	Epoxy
Surface:	Metal
Service Condition:	Immersed, nonpotable; non-immersed, moderately corrosive environment, color required.
Surface Preparation:	
Ferrous Metal:	<p>Ferrous metal surfaces shall be prepared in accordance with SSPC SP-5 (White Metal Blast Cleaning).</p> <p>Shop primed surfaces which are to be incorporated in the work shall be prepared in the field by cleaning surfaces in accordance with SSPC SP-2 (Hand Tool Cleaning) or SSPC-SP-3 (Power Tool Cleaning). Damaged shop coating shall be cleaned in accordance with SSPC SP-5 (White Metal Blast Cleaning) and spot primed with the primer specified. Shop epoxy primed surfaces shall require light abrasive blasting prior to receiving finish coats if the maximum recoat time for the primer has been exceeded. For ductile iron surfaces, refer to the requirements in paragraph 09900-3.02 D.</p>
Nonferrous and Galvanized Metal:	<p>Nonferrous and galvanized metal shall be prepared in accordance with SSPC SP-7 (Brush-off Blast Cleaning). Galvanized steel with this E-2 coating system shall not be used in immersion service in wastewater.</p>
Application:	Field
General:	<p>Prime coat may be thinned and applied as recommended by the CSM, provided the coating as applied complies with prevailing air pollution control regulations.</p>
Ferrous Metal:	<p>Prime coat shall be an epoxy primer compatible with the specified finish coats.</p>

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: E-2 (continued)

Nonferrous and
Galvanized Metal:

Nonferrous and galvanized metal, non-immersed, shall be coated prior to the application of the prime coat with a grease emulsifying agent in accordance with the CSM's written instructions. Nonferrous metal to be immersed shall not be painted. Galvanized metal shall not be immersed even if it is painted.

System Thickness: 16 mils dry film.

Coatings:

Primer: One coat at CSM's recommended dry film thickness.

Finish: Two or more coats at CSM's recommended dry film thickness per coat to the specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: E-4

Coating Material: Epoxy

Surfaces: Concrete, masonry, plaster, gypsum board.

Service Condition: Interior

Surface Preparation:

Concrete: Concrete surfaces shall be allowed to age for at least 28 days and allowed to dry to the moisture content recommended by the CSM. Moisture content may be tested by the Construction Manager with a Delmhorst Instrument Company moisture detector, or equal. Loose concrete, form oils, surface hardeners, curing compounds and laitance shall be removed from surfaces, and voids and cracks shall be repaired as specified in Section 03300. After cleaning, air voids or bug holes in the concrete shall be filled with a surfacer or block filler compatible with the specified primer and finish coats.

Masonry: Masonry surfaces shall be allowed to age for at least 28 days. Holes or other joint defects shall be filled with mortar and repointed. Loose or splattered mortar shall be removed by scrapping and chipping. Masonry surfaces shall be cleaned with clear water by washing and scrubbing to remove foreign and deleterious substances. Muriatic acid shall not be used. After cleaning, exterior masonry surfaces shall be sealed or filled with a sealer or block filler compatible with the specified primer.

Plaster: Plaster surfaces shall be dry and clean and free from grit, loose plaster, and surface irregularities. Cracks and holes shall be repaired with acceptable patching materials, keyed to existing surfaces, and sandpapered smooth. Surfaces shall be cleaned with clean water by washing and scrubbing to remove foreign and deleterious substances.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: E-4 (continued)

Application: Field

Block Filler shall be a multiple component epoxy block filler or an acrylic based or waterborne epoxy based block filler and shall dry a minimum of 48 hours prior to primer application or as required by the CSM.

Prime coat shall be thinned and applied as recommended by CSM, provided the coating as applied complies with prevailing air pollution control regulations.

Drying time between coats shall be as recommended by CSM.

System Thickness: 10 mils dry film, excluding block filler and sealer.

Coatings:

Primer: One coat at CSM's recommended dry film thickness.

Finish: One or more coats at CSM's recommended dry film thickness per coat to the specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification:	EA-1
Coating Material:	Blended Amine Cured Epoxy
Surface:	Metal
Service Condition:	Immersed, nonpotable; non-immersed, corrosive environment, color not required especially for headspace environments that are corrosive due to biogenic sulfide corrosion.
Surface Preparation:	
Ferrous Metal:	<p>Ferrous metal surfaces shall be prepared in accordance with SSPC SP-5 (White Metal Blast Cleaning).</p> <p>Shop primed surfaces which are to be incorporated in the work shall be prepared in the field by cleaning surfaces in accordance with SSPC SP-11 (Hand Tool Cleaning). Damaged shop coated areas shall be cleaned in accordance with SSPC SP-5 (White Metal Blast Cleaning) and spot primed with the primer specified. Shop epoxy primed surfaces shall require light abrasive blasting and blow down cleaning prior to receiving finish coats. Cast iron surfaces to be coated shall be abrasive blast cleaned to a clean, gray uniform metal appearance free of variations in color and loose materials. Ductile iron surfaces shall be prepared in accordance with paragraph 09900-3.02 D.</p>
Nonferrous and Galvanized Metal:	<p>Nonferrous and galvanized metal shall be prepared in accordance with SSPC SP-7 (Brush-off Blast Cleaning). Galvanized metal should generally not be used in these environments.</p>
Application:	Field
General:	Prime coat may be thinned and applied as recommended by the CSM, provided the coating as applied complies with prevailing air pollution control regulations.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: EA-1 (continued)

Drying time between coats shall be as specified by the CSM for the site conditions. If the maximum recoat time is exceeded, surface preparation shall require solvent washing, light abrasive blasting, or other procedures per CSM's instructions.

Ferrous Metal:

If shop priming is required or field priming is necessary, the prime coat shall be an epoxy primer compatible with the specified coating system. Generally, the EA-1 coating system is self-priming and does not require a primer unless there is a special reason to prime the steel to hold the blast cleaning from rusting back.

System Thickness: 25-30 mils dry film.

Coatings:

Primer: One coat at CSM's recommended dry film thickness only if required by special circumstances.

Finish: One or more coats at CSM's recommended dry film thickness per coat to the specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: EA-2

Coating Material: Blended Amine Cured Epoxy

Surface: Concrete or masonry

Service Condition¹: Immersed, nonpotable; non-immersed, corrosive environment, color not required, new construction especially for headspace environments that are corrosive due to biogenic sulfide corrosion.

Surface Preparation:

Concrete: Concrete surfaces shall be allowed to cure for at least 28 days and allowed to dry to the moisture content recommended by the CSM. Moisture content may be tested by the Construction Manager with a Delmhorst Instrument Company moisture detector, or equal. Except as otherwise specified, loose concrete, form oils, surface hardeners, curing compounds, and laitance shall be removed from surfaces by abrasive blasting and chipping, and voids and cracks shall be repaired as specified in Section 03300. After cleaning, air voids or bug holes in the concrete shall be filled with a surfacer or block filler compatible with the specified primer and finish coats. Concrete shall be abraded to achieve a concrete surface profile of CSP-3 in accordance with ICRI 03732.

Masonry: Masonry surfaces shall be allowed to cure for at least 28 days. Holes or other joint defects shall be filled with mortar and repointed and allowed to cure for 28 days or shall be filled with a repair material compatible with the coating system that does not require hydration cure time. Loose or splattered mortar shall be removed by scrapping and chipping.

Masonry surfaces shall be cleaned with clear water by washing and scrubbing to remove foreign and deleterious substances.

Muriatic acid shall not be used. After cleaning, masonry surfaces shall be skim coated with a surfacer or block filler compatible with the specified coating system.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: EA-2 (continued)

Application: Field

Surfacer or filler shall be applied per CSM's recommendations prior to application of coating system to fill bug holes and voids and create a coatable surface.

Drying time between coats shall be as specified by the CSM for the site conditions. If the maximum recoat time is exceeded, surface preparation shall require solvent washing, light abrasive blasting, or other procedures per CSM's instructions.

System Thickness: 25-30 mils dry film.

Coatings:

Finish: One or more coats at CSM's recommended dry film thickness per coat to the specified system thickness.

1. Service condition for concrete typically includes waterproofing as specified in Section 07100 for the exterior of the concrete exposed to soil(s). Be certain that the exterior of concrete structures to be buried to receive the EA-2 system have been waterproofed in accordance with Section 07100 prior to application of the EA-2 system.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: EU-1

Coating Material: Zinc-Epoxy-Polyurethane System

Surface: Ferrous Metal

Service Condition: Exterior, exposed to direct sunlight, moderately corrosive, non-immersed.

Surface Preparation:

General:

Shop primed surfaces which are to be incorporated in the work shall be prepared in the field by cleaning surfaces in accordance with SSPC SP-2 (Hand Tool Cleaning). Damaged shop coated areas shall be cleaned in accordance with SSPC SP-3 (Power Tool Cleaning) and recoated with the primer specified.

Ferrous Metal: Bare ferrous metal surfaces shall be prepared in accordance with SSPC SP-6 (Commercial Blast Cleaning). Ductile iron surfaces to be coated shall be abrasive blast cleaned in accordance with paragraph 09900-3.02 D.

Ferrous metal with rust bleeding shall be cleaned in accordance with SSPC-SP-11 (Power Tool Cleaning to Bare Metal). Areas of rust penetration shall be spot blasted to SSPC SP-10 (Near White Blast) and spot primed with the specified primer.

Application:

Field

General:

Prime coat may be thinned and applied as recommended by the CSM, provided the coating as applied complies with prevailing air pollution control regulations.

Ferrous Metal:

Prime coats shall be a zinc rich epoxy or polyurethane primer compatible for use with urethane finish coats and applied in accordance with written instructions of the CSM.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: EU-1 (continued)

System Thickness: 3 to 4 mils of zinc rich primer, one intermediate epoxy coat at 5 to 6 mils and one finish coat of polyurethane at 2 to 3 mils DFT.

Coatings:

Primer: One coat at CSM's recommended dry film thickness.

Intermediate: One coat at CSM's recommended dry film thickness.

Finish: One coat at CSM's recommended dry film thickness per coat to meet the specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: EU-1-FRP

Coating Material: Specialty Primer Plus Polyurethane Finish Coat

Surface: Exterior of FRP Pipe and Tanks, etc.

Service Condition: Exterior, exposed to direct sunlight, non-immersed.

Surface Preparation:

 General: Clean to remove loose dirt, dust, or other contaminants.

 Prepare surfaces by sanding to produce a uniform surface roughness.

 Solvent clean thoroughly using solvent as recommended by the CSM.

 Thoroughly clean to remove loose debris by vacuum cleaning.

 Application: Field

 General: Apply primer coat and thin as recommended by the CSM provided the coating applied complies with prevailing air pollution control regulations.

 Apply finish coat as recommended by the CSM.

System Thickness: Primer to 2 to 4 mils and finish coat is 2 to 3 mils DFT.

Coatings:

 Primer: One coat at CSM's recommended dry film thickness.

 Finish: One coat at CSM's recommended dry film thickness per coat to meet the specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: HH-1

Coating Material: Proprietary Primer Plus Silicone Topcoat

Surface: Metal

Service Condition: Temperature to 750 degrees F.

Surface Preparation: Metal surfaces shall be prepared in accordance with SSPC SP-10 (Near White Metal Blast Cleaning).

Application: Field

Curing as required by CSM.

System Thickness: 6.5 to 8.0 mils dry film

Coating: Primer at 5 to 6 mils DFT plus one topcoat at 1.5 to 2.0 mils DFT.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: L-2

Coating Material: Latex

Surface: PVC and CPVC pipe.

Service Condition: Exterior, direct sunlight exposure.

Surface Preparation: Plastic pipe shall be cleaned with solvent compatible with the specified primer and sanded to uniformly roughen surfaces.

Application: Field

System Thickness: 3 mils dry film.

Coatings:

 Primer: One coat at CSM's recommended dry film thickness.

 Finish: One or more coats at CSM's recommended dry film thickness per coat to the specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

- Coating System Identification: M-1
- Coating Material: Petrolatum based mastic or wax based wrapping tapes.
- Surfaces: Metal
- Service Condition: Below grade (buried) or where little to no surface preparation can be performed on piping or structural steel.
- Surface Preparation: Remove loose scale, rust, dirt, excessive moisture, or frost from the surface in accordance with SSPC SP-2 (Hand Tool Cleaning).
- Application: All surfaces shall be hand rubbed or brushed with a priming paste recommended by the CSM. Sharp projections such as threads, irregular contours, or badly pitted areas shall receive a liberal amount of priming paste to ensure maximum protection of metal throughout.
- On irregular shaped surfaces, i.e., nuts, bolts, flanges, valves, etc., the Contractor shall use either of the following systems recommended by the CSM.
- A. Apply recommended mastic by hand in sufficient quantity to build an even contour over entire surface. the Contractor shall pay particular attention to ensure that folds and air pockets within the mastic layer are thoroughly pressed out prior to subsequent application of tape.
- OR:
- B. An extra layer of tape shall be cut and carefully molded around sharp projections, nuts, bolts, etc., before final application of tape, in order to meet specified system thickness.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification: M-1 (Continued)

Tape shall be spirally wrapped with a 55 percent overlap and sufficient tension and pressure to provide continuous adhesion without stretching the tape. Edges of tape must be continuously smoothed and sealed by hand during wrapping. On vertical application, contractor shall begin at bottom and proceed upward creating a weather board overlap.

System Thickness: Smooth contours shall have a minimum thickness of 50 mils while nuts, bolts, and sharp projections shall be 100 mils.

Tape: Number and types of tape wraps shall be in accordance with the CSM's written instructions.

3.05 COATING SYSTEM SPECIFICATION SHEETS (COATSPEC)

Coating System Identification:	U
Coating Material:	Urethane
Surface:	Metal
Service Condition:	Exterior, exposed to direct sunlight.
Surface Preparation:	
General:	Shop primed surfaces which are to be incorporated in the work shall be prepared in the field by cleaning all surfaces in accordance with SSPC SP-2 (Hand Tool Cleaning). Damaged shop coated areas shall be cleaned in accordance with SSPC SP-3 (Power Tool Cleaning) and recoated with the primer specified.
Ferrous Metal:	Bare ferrous metal surfaces shall be prepared in accordance with SSPC SP-6 (Commercial Blast Cleaning). Ferrous metal with rust bleeding shall be cleaned in accordance with SSPC SP-1 (Solvent Cleaning). Areas of rust penetration shall be spot blasted to SSPC SP-10 (Near White Blast) and spot primed with the specified primer.
Nonferrous and Galvanized Metal:	Nonferrous and galvanized metal shall be prepared in accordance with SSPC SP-7 (Brush-off Blast Cleaning) to impart a 1 to 2 mil profile to the galvanized steel surfaces. Where this cannot be performed, prepare by abrading in accordance with SSPC-SP-3 (Power Tool Cleaning) to impart a 1 to 2 mil profile uniformly to the galvanized steel surfaces.
Application:	Field
General:	Prime coat may be thinned and applied as recommended by the manufacturer, provided the coating as applied complies with prevailing air pollution control regulations.
Ferrous Metal:	Prime coats shall be an epoxy primer compatible for use with urethane finish coats and applied in accordance with written instructions of the coating system manufacturer.

3.06 COATING SYSTEMS SCHEDULE (FINISH SCHEDULE)

Specific coating systems, colors, and finishes for rooms, galleries, piping, equipment, and other items which are coated or have other architectural finishes are specified in the following coating system schedule. Unless otherwise specified in the coating system schedule, the word "interior" shall mean the inside of a building or structure, and the word "exterior" shall mean outside exposure to weather elements.

Location description	Surface	Coating system identification	Color
General: All surfaces not specified by area or structure	1. Equipment and Metal Appurtenances		
	a. Equipment, non immersed, unless otherwise specified		
	1) Indoors	E-1	Note 1
	2) Outdoors	EU-1	Note 1
	b. Equipment, immersed, unless otherwise specified		
	E-2		
	Black		
	c. Existing equipment		
	1) Not damaged nor modified by work in this contract		
	Uncoated		
	--		
	2) Damaged or modified by work in this contract		
	a) Indoors	E-1	Match existing color
	b) Outdoors	EU-1 without primer	Match existing color
	d. Diffusers and grilles, unless otherwise specified		
	1) Indoors		
	E-1		
	Note 1		
	2) Outdoors		
	EU-1		
	Note 1		
	e. Existing diffusers and grilles		
	1) Not damaged not modified by work in this contract		
	Uncoated		
	--		
	2) Damaged or modified by work in this contract		
	a) Indoors	E-1	Match existing color
b) Outdoors	EU-1 without primer	Match existing color	
f. Electrical panels, power transformers and mini-power centers, and vendor panels; indoors and outdoors			
See paragraph 09900-3.03 I			
See paragraph 09900-3.03 I			
g. Instrumentation panels, including indicating and transmitting field panels			
1) Indoors			
See paragraph 09900-3.03 I			
See paragraph 09900-3.03 I			
2) Outdoors			
See paragraph 09900-3.03 I			
See paragraph 09900-3.03 I			
h. Existing electrical and instrumentation panels			
1) Not damaged by work in this contract			
Uncoated			
--			
2) Damages to outside surfaces by work in this contract			
a) Indoors	E-1	Match existing	
b) Outdoors	EU-1 without primer	Match existing	
2. Conduit, Piping and Ductwork			
a. Ferrous, non ferrous and galvanized piping, and appurtenant hangers and supports, non immersed, unless otherwise specified.			
1) Indoors – noncorrosive			
E-1			
Note 1			
2) Outdoors – noncorrosive			
EU-1			
Note 1			
3) Indoors – in corrosive environment			
EA-1			
Note 1			
4) Buried piping			
M-1			
Not required			
b. Ferrous piping, appurtenant and supports, immersed.			
E-2			
Note 1			

Location description	Surface	Coating system identification	Color
	c. Conduit, outlet and junction boxes, lighting transformers, lighting, communication panels, control stations, piping, lagged ductwork, appurtenant hangers, clamps and supports, other than SST and aluminum backplates and supports		
	1) Indoors	E-1	Note 1
	2) Outdoors	EU-1	Note 1
	d. Existing conduit, outlet and junction boxes, lighting transformers, lighting communication and small power panels, control stations, piping, lagged ductwork, appurtenant hangers, clamps, and supports, other than SST and aluminum backplates and supports.		
	1) Not damaged nor modified by work in this contract	Uncoated	--
	2) Damaged or modified by work in this contract		
	a) Indoors	E-1	Match existing color.
	b) Outdoors	EU-1 without primer	Match existing color.
	e. Racked conduits and cable trays	Uncoated	--
	f. Insulated pipe jacketing	Uncoated	--
	g. Plastic, fiberglass and flexible conduit and piping		
	1) Unless otherwise specified	Uncoated	--
	2) PVC and CPVC Piping		
	a) Outdoors	L-2	Note 1
	b) Indoors	Uncoated	--
	h. High temperature piping operable at		
	1) 200 to 750 degrees F	HH-1	Note 1
	i. Exposed ductwork, unless otherwise specified	Uncoated	--
	3. <u>Concrete, Grout, Masonry and Plaster</u>		
	a. Immersed tank and channel walls and bottoms unless otherwise specified	In accordance with Section 07100	--
	b. Outside concrete walls below grade common with dry area or room	In accordance with Section 07100	--
	c. Walls and ceilings		
	1) Precast concrete or colored masonry	Uncoated	--
	2) Outdoors, unless otherwise specified	Uncoated (See Section 07121)	--
	3) Indoors, unless otherwise specified	E-4	Note 1
	d. Concrete equipment bases unless otherwise specified	Uncoated	--
	e. Floors unless otherwise specified	Uncoated	--
	4. <u>Door and Door Frames</u>		
	a. Doors unless otherwise specified		
	1) Ferrous metal		
	a) Indoors	E-1	Note 1
	b) Outdoors	EU-1	Note 1
	2) Aluminum	Uncoated	--

Location description	Surface	Coating system identification	Color
	3) Existing		
	a) Not damaged by work in this contract	Uncoated	--
	b) Damaged by work in this contract		
	(1) Indoors	E-1	Match existing color
	(2) Outdoors	EU-1	Match existing color
	b. Door frames unless otherwise specified		
	1) Adjacent wall coated		
	a) Indoors	E-1	Note 1
	b) Outdoors	EU-1	Note 1
	2) Adjacent wall uncoated		
	a) Indoors	E-1	Note 1
	b) Outdoors	EU-1	Note 1
	3) Aluminum	Uncoated	--
	4) Existing		
	a) Not damaged by work in this contract	Uncoated	--
	b) Damaged by work in this contract		
	(1) Indoors	E-1	Match existing color
	(2) Outdoors	EU-1 without primer	Match existing color
	<u>5. Handrails, Gratings, Floor Plates, Manhole Covers, and Hatches</u>		
	a. Unless otherwise specified	Uncoated	--
	b. Existing		
	1) Not damaged by work in this contract	Uncoated	--
	2) Damaged by work in this contract		
	a) Indoors	E-1	Match existing color.
	b) Outdoors	EU-1 without primer	Match existing color
	<u>6. Metal Stairs, Ladders, Platforms, and Supports Except Tread and Grating</u>		
	a. Indoors	E-1	Note 1
	b. Outdoors	U	Note 1
	1) Galvanized supports	U	Note 1
	2) Other	EU-1	Note 1
	c. Existing		
	1) Not damaged nor modified by work in this contract	Uncoated	--
	2) Damaged or modified by work in this contract		
	a) Indoors	E-1	Match existing color
	b) Outdoors		Match existing color
	(1) Galvanized supports	U	Match existing color
	(2) Other	EU-1 without primer	Match existing color

Location description	Surface	Coating system identification	Color
	7. Aluminum Flashing, Light Standards, Supports, and Louvers		
	Indoors and outdoors, unless otherwise specified	Uncoated	--
	8. Galvanized structural steel		
	Indoors galvanized structural steel	U	Note 1
	Outdoors galvanized structural steel	U	Note 1
	9. Other		
	a. Fire hydrants	EU-1	Note 1
	c. Aluminum slide gates	Uncoated	--
	e. Tanks		
	1) Polyethylene tank	L-2 (See Section 13216)	Note 1
	f. Pipe, ductwork, equipment and appurtenances made from fiberglass, plastic, rubber, including flexible hose, conduit, and plastic coated tubing, in areas not exposed to view (indoors) (metal hangers and supports are coated with E-1)	Uncoated	--
	g. Buried, sleeve-type and flanged pipe, couplings, valves, mechanical and electrical penetrations	M-1	Manufacturer's color
Screen Channels	1. Screen channel wall and bottom not covered by PVC liner.	EA-2	Manufacturer's color
Distribution Channels	1. Distribution channel wall and bottom not covered by PVC liner.	EA-2	Manufacturer's color
Headworks Building Electrical Room	1. Walls and ceilings inside electrical room	E-4	Note 1

Notes:

1. To be determined by the Construction Manager.

3.07 INSPECTION AND TESTING BY OWNER

- A. Inspection by the Owner or others does not limit the Contractor's or CSA's responsibilities for quality workmanship or quality control as specified or as required by the CSM's instructions. Inspection by the Owner is in addition to any inspection required to be performed by the Contractor.

- B. The Owner may perform, or contract with an inspection agency to perform, quality control inspection and testing of the coating work covered by this Section 09900. These inspections may include the following:
 - 1. Inspect materials upon receipt to ensure that the materials are supplied by the CSM.
 - 2. Inspect to verify that specified storage conditions for the coating system materials, solvents and abrasives are provided.
 - 3. Inspect and record findings for the degree of cleanliness of substrates.
 - 4. Inspect and record the pH of concrete and metal substrates.
 - 5. Inspect and record substrate profile (anchor pattern).
 - 5. Measure and record ambient air and substrate temperature.
 - 6. Measure and record relative humidity.
 - 7. Check for the presence of substrate moisture in the concrete.
 - 8. Inspect to verify that correct mixing of coating system materials is performed in accordance with CSM's instructions.
 - 9. Inspect, confirm, and record that the "pot life" of coating system materials is not exceeded during installation. Inspect to verify that recoat limitations for coating materials are not exceeded.
 - 10. Perform adhesion testing.
 - 11. Measure and record the thickness of the coating system.
 - 12. Inspect to verify proper curing of the coating system in accordance with the CSM's instructions.
 - 13. Perform holiday or continuity testing for immersed coatings or coatings exposed to aggressively corrosive conditions.

3.08 FINAL INSPECTION

- A. Contractor shall conduct a final inspection to determine whether coating system work meets the requirements of the specifications.
- B. The Construction Manager will subsequently conduct a final inspection with the Contractor to determine the work is in conformance with requirements of the contract documents.
- C. Any rework required shall be marked. Such areas shall be recleaned and repaired as specified at no additional cost to the Owner.

****END OF SECTION****