

## SECTION 09 90 00.00 40

## PAINTING AND COATING

06/06

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

**SD-03 Product Data**

Manufacturer's catalog data shall be submitted for all specified products. Product data sheets shall include complete information regarding composition, application requirements, and intended service. Manufacturer's data for each paint system shall be submitted with a completed PAINT SYSTEM DATA SHEET using the form at the end of this section.

**Paint System Data Sheet****SD-04 Samples**

**Manufacturer's Standard Color Charts** shall be submitted in accordance with paragraph entitled, "Manufacturer's and Materials," of this section.

**SD-07 Certificates**

A **Safety Plan** shall be submitted in accordance with paragraph entitled, "General," of this section.

**SD-08 Manufacturer's Instructions**

Manufacturer's instructions shall be submitted for architectural coatings including details of thinning, mixing, handling, and application, in accordance with paragraph entitled, "General," of this section.

## 1.2 DEFINITIONS

## a. Terms used in this section:

1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
2. FRP: Fiberglass Reinforced Plastic.
3. HCl: Hydrochloric Acid.
4. MDFT: Minimum Dry Film Thickness, mils.

5. MDFTPC: Minimum Dry Film Thickness per Coat, mils.
6. Mil: Thousandth of an inch.
7. PDS: Product Data Sheet.
8. PSDS: Paint System Data Sheet.
9. PVC: Polyvinyl Chloride.
10. SFPG: Square Feet per Gallon.
11. SFPGPC: Square Feet per Gallon per Coat.
12. SP: Surface Preparation.

### 1.3 QUALITY ASSURANCE

- a. Applicator Qualifications: Minimum 5 years' experience in application of specified products.
- b. Regulatory Requirements:
  1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
  2. Perform surface preparation and painting in accordance with recommendations of the following:
    - a) Paint manufacturer's instructions.
    - b) SSPC PA 3, Guide to Safety in Paint Applications.
    - c) Federal, state, and local agencies having jurisdiction.
- c. Mockup:
  1. Before proceeding with Work under this section, finish one complete space or item of each color scheme required showing selected colors, finish texture, materials, quality of work, and special details.
  2. After Engineer approval, sample spaces or items shall serve as a standard for similar work throughout the Project.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- a. Shipping:
  1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
  2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.
- b. Storage:
  1. Store products in a protected area that is heated or cooled to maintain

temperatures within the range recommended by paint manufacturer.

2. Primed surfaces shall not be exposed to weather for more than 2 months before being topcoated, or less time if recommended by coating manufacturer.

#### 1.5 PROJECT CONDITIONS

##### a. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.

2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

a. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.

b. Minimum of 5 years' verifiable experience in manufacture of specified product.

c. Each of the following manufacturers is capable of supplying most of the products specified herein:

1. Carboline Coatings, St. Louis, MO.

2. ICI Devoe, Louisville, KY.

3. Sherwin-Williams, Cleveland, OH.

4. Tnemec Coatings, Kansas City, MO.

#### 2.2 ABRASIVE MATERIALS

Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

#### 2.3 PAINT MATERIALS

##### a. General:

1. Manufacturer's highest quality products suitable for intended service.

2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.

3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

## b. Products:

<u>PRODUCT</u>	<u>DEFINITION</u>
Acrylic Latex	Single-component, finish as required
Acrylic Sealer	Clear acrylic
Alkyd Enamel	Optimum quality, gloss or semigloss finish as required, medium long oil
Bituminous Paint	Single-component, coal-tar pitch based
Block Filler	Primer-sealer designed for rough masonry surfaces, 100% acrylic emulsion
Epoxy Primer-Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments
Epoxy Primer-Other	Epoxy primer, high-build, as recommended coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat
Latex Primer Sealer	Waterborne vinyl acrylic primer/sealer for interior gypsum board and plaster. Capable of providing uniform seal and suitable for use with specified finish coats
NSF Epoxy	Polyamidoamine epoxy, approved for potable water contact and conforming to NSF 61
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish
Rust-Inhibitive Primer	Single-package steel primers with anticorrosive pigment loading
Sanding Sealer	Co-polymer oil, clear, dull luster
Varnish	Nonpigmented vehicle based on a variety of resins (alkyd, phenolic, urethane) in gloss, semigloss, or flat finishes, as required
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required

## 2.4 MIXING

## a. Multiple-Component Coatings:

1. Prepare using each component as packaged by paint manufacturer.
2. No partial batches will be permitted.

3. Do not use multiple-component coatings that have been mixed beyond their pot life.
  4. Furnish small quantity kits for touchup painting and for painting other small areas.
  5. Mix only components specified and furnished by paint manufacturer.
  6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.
- b. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site. Submit [Manufacturer's Standard Color Charts](#). Custom colors may be required if standard colors are deemed unsuitable by the Engineer.

## 2.5 SHOP FINISHES

- a. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.
- b. Surface Preparation: Provide Engineer minimum 7 days' advance notice to start of shop surface preparation work and coating application work.
- c. Shop Coating Requirements:
  1. When required by equipment Specifications, such equipment shall be primed and finish coated in shop by manufacturer and touched up in field with identical material after installation.
  2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.
- d. Pipe:
  1. Ductile Iron Pipe and Cast Iron Pipe:
    - a) Use SSPC standards as a guide for desired prepared surface. Follow recommendations of pipe and coating manufacturers for means and methods to achieve SSPC-equivalent surface.
    - b) For ductile iron pipe only, the surface preparation and application of the primer shall be performed by pipe manufacturer.
    - c) For high performance (epoxy) coatings, follow additional recommendations of pipe and coating manufacturers.
    - d) Prior to blast cleaning, grind smooth surface imperfections, including, but not limited to delaminating metal or oxide layers.

## PART 3 EXECUTION

## 3.1 GENERAL

Provide Engineer minimum 7 days' advance notice to start of field surface preparation work and coating application work.

Perform the Work only in presence of Engineer, unless Engineer grants prior approval to perform the Work in Engineer's absence.

Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Engineer.

Submit [Safety Plan](#) for preparing and installing paints and protective coating specified in this section.

## 3.2 EXAMINATION

## a. Factory Finished Items:

1. Schedule inspection with Engineer before repairing damaged factory-finished items delivered to Site.
2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

## b. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

## 3.3 PROTECTION OF ITEMS NOT TO BE PAINTED

- a. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.
- b. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- c. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- d. Mask openings in motors to prevent paint and other materials from entering.
- e. Protect surfaces adjacent to or downwind of Work area from overspray.

## 3.4 SURFACE PREPARATION

## 3.4.1 Field Abrasive Blasting

1. Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed or coated.

2. Refer to coating systems for degree of abrasive blasting required.
3. Where the specified degree of surface preparation differs from manufacturer's recommendations, the more stringent shall apply.

#### 3.4.2 Metal Surface Preparation

1. Where indicated, meet requirements of SSPC Specifications summarized below:
  - a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.
  - b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.
  - c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.
  - d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.
  - e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
  - f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.
  - g. SP 10, Near-White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
  - h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.
  - i. SP 12, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating: Surface preparation using high-pressure and ultrahigh-pressure water jetting to achieve specified surface cleanliness condition. Surface cleanliness conditions are defined in SSPC SP 12 and are designated WJ 1 through WJ 4 for visual surface preparation definitions and SC 1 through SC 3 for nonvisual surface preparation definitions.
2. The words "solvent cleaning", "hand tool cleaning", "wire brushing",

and "blast cleaning", or similar words of equal intent in these Specifications or in paint manufacturer's specification refer to the applicable SSPC Specification.

3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.
4. Ductile Iron Pipe and Cast iron Soil Pipe supplied with Asphaltic Varnish Finish: Remove asphaltic varnish finish prior to performing specified surface preparation.
5. Hand tool clean areas that cannot be cleaned by power tool cleaning.
6. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
7. Welds and Adjacent Areas:
  - a. Prepare such that there is:
    - 1) No undercutting or reverse ridges on weld bead.
    - 2) No weld spatter on or adjacent to weld or any area to be painted.
    - 3) No sharp peaks or ridges along weld bead.
  - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
8. Preblast Cleaning Requirements:
  - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
  - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
  - c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.
9. Blast Cleaning Requirements:
  - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
  - b. Select type and size of abrasive to produce surface profile that meets coating manufacturer's recommendations for particular primer to be used.
  - c. Use only dry blast cleaning methods.
  - d. Do not reuse abrasive, except for designed recyclable systems.
  - e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space

entry (if required), and disposition of spent aggregate and debris.

10. Post-Blast Cleaning and Other Cleaning Requirements:

a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.

b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

3.4.3 Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation

1. Remove soil, cement spatter, and other surface dirt with appropriate hand or power tools.
2. Remove oil and grease by wiping or scrubbing surface with suitable solvent, rag, and brush. Use clean solvent and clean rag for final wiping to avoid contaminating surface.
3. Obtain and follow coating manufacturer's recommendations for additional preparation that may be required.

3.4.4 Concrete Surface Preparation

1. Do not begin until 30 days after concrete has been placed.
2. Meet requirements of SSPC SP 13.
3. Remove grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
4. Brush-off blast clean to remove loose concrete and laitance, and provide a tooth for binding. Upon approval by Engineer, surface may be cleaned by acid etching method. Approval is subject to producing desired profile equivalent to No. 80 grit flint sandpaper. Acid etching of vertical or overhead surfaces shall not be allowed.
5. Secure coating manufacturer's recommendations for additional preparation, if required, for excessive bug holes exposed after blasting.
6. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.

3.4.5 Plastic and FRP Surface Preparation

1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.
2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

## 3.4.6 Masonry Surface Preparation

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.
2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.
3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:
  - a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.
  - b. Brush-off blasting.
  - c. Water blasting.
4. Do not damage masonry mortar joints or adjacent surfaces.
5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.
6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.
7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.

## 3.4.7 Wood Surface Preparation

1. Replace damaged wood surfaces or repair in a manner acceptable to Engineer prior to start of surface preparation.
2. Solvent clean (mineral spirits) knots and other resinous areas and coat with shellac or other knot sealer, prior to painting. Remove pitch by scraping and wipe clean with mineral spirits or turpentine prior to applying knot sealer.
3. Round sharp edges by light sanding prior to priming.
4. Filler:
  - a. Synthetic-based wood putty approved by paint manufacturer for paint system.
  - b. For natural finishes, color of wood putty shall match color of finished wood.
  - c. Fill holes, cracks, and other surface irregularities flush with surrounding surface and sand smooth.
  - d. Apply putty before or after prime coat, depending on compatibility and putty manufacturer's recommendations.
  - e. Use cellulose type putty for stained wood surfaces.
5. Ensure surfaces are clean and dry prior to painting.

### 3.4.8 Gypsum Board Surface Preparation

Typically, new gypsum board surfaces need no special preparation before painting.

Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.

### 3.4.9 Existing Painted Surfaces to be Repainted Surface Preparation

1. Detergent wash and freshwater rinse.
2. Clean loose, abraded, or damaged coatings to substrate by hand or power tool, SP 2 or SP 3.
3. Feather surrounding intact coating.
4. Apply one spot coat of specified primer to bare areas, overlapping prepared existing coating.
5. Apply one full finish coat of specified primer to entire surface.
6. If an aged, plural-component material is to be topcoated, contact coating manufacturer for additional surface preparation requirements.
7. For ductile iron pipe with asphaltic varnish finish not specified to be abrasive blasted, apply coat of tar stop prior to application of cosmetic finish coat.
8. Application of Cosmetic Coat:
  - a. It is assumed that existing coatings have oxidized sufficiently to prevent lifting or peeling when overcoated with paints specified.
  - b. Check compatibility by application to a small area prior to starting painting.
  - c. If lifting or other problems occur, request disposition from Engineer.
9. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of SSPC.

## 3.5 SURFACE CLEANING

### 3.5.1 Brush-off Blast Cleaning

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.
2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.
3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.
4. Verify parameter selection by blast cleaning a trial area that will not

be exposed to view.

5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.
6. Repair or replace surface damaged by blast cleaning.

### 3.5.2 Acid Etching

1. After precleaning, spread the following solution by brush or plastic sprinkling can: One part commercial muriatic acid reduced by two parts water by volume. Adding acid to water in these proportions gives an approximate 10 percent solution of HCl.
2. Application:
  - a. Rate: Approximately 2 gallons per 100 square feet.
  - b. Work acid solution into surface by hard-bristled brushes or brooms until complete wetting and coverage is obtained.
  - c. Acid will react vigorously for a few minutes, during which time brushing shall be continued.
  - d. After bubbling subsides (10 minutes), hose down remaining slurry with high pressure clean water.
  - e. Rinse immediately to avoid formation on the surface of salts that are difficult to remove.
  - f. Thoroughly rinse to remove any residual acid surface condition that may impair adhesion.
3. Ensure surface is completely dry before application of coating.
4. Apply acid etching to obtain a "grit sandpaper" surface profile. If not, repeat treatment.

### 3.5.3 Solvent Cleaning

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.
2. Meet requirements of SSPC SP 1.

## 3.6 APPLICATION

### 3.6.1 General

1. The intention of these Specifications is for new, interior and exterior wood, masonry, concrete, and metal, and submerged metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise.
2. Extent of Coating (Immersion): Coatings shall be applied to internal vessel and pipe surfaces, nozzle bores, flange gasket sealing surfaces, carbon steel internals, and stainless steel internals, unless otherwise

specified.

3. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating until completion of curing cycle.
  4. Apply coatings in accordance with these Specifications and paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
  5. Sand wood lightly between coats to achieve required finish.
  6. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
  7. Fusion Bonded Coatings Method Application: Electrostatic, fluidized bed, or flocking.
  8. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
  9. Water-Resistant Gypsum Board: Use only solvent type paints and coatings.
  10. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.
  11. Keep paint materials sealed when not in use.
  12. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.
- 3.6.2 Galvanized Metal, Copper, and Nonferrous Metal Alloys
1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.
  2. Prepare surface and apply primer in accordance with System No. 10 specification.
  3. Apply intermediate and finish coats of the coating system appropriate for the exposure.
- 3.6.3 Porous Surfaces, Such As Concrete and Masonry
1. Filler/Surfacer: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects.
  2. Prime Coat: May be thinned to provide maximum penetration and adhesion.
    - a. Type and Amount of Thinning: Determined by paint manufacturer and dependent on surface density and type of coating.
  3. Surface Specified to Receive Water Base Coating: Damp, but free of running water, just prior to application of coating.

3.6.4 Film Thickness and Coverage

1. Number of Coats:
  - a. Minimum required without regard to coating thickness.
  - b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
2. Application Thickness:
  - a. Do not exceed coating manufacturer's recommendations.
  - b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.
3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
  - a. Perform with properly calibrated instruments.
  - b. Recoat and repair as necessary for compliance with Specification.
  - c. Coats are subject to inspection by Engineer and coating manufacturer's representative.
4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.7 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

As shown in Interior and Exterior Finish Schedule on Drawings. Additional requirements are included in the Piping Schedule.

3.7.1 System No. 1 Submerged Metal-Potable Water

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
SP 5, White Metal Blast Cleaning	NSF Epoxy	3 coats, 3 MDFTPC

Use on the following items or areas:

1. Metal surfaces below a plane 1 foot above the maximum liquid surface; metal surfaces above the maximum liquid surface that are a part of the

immersed equipment; surfaces of metallic items, such as wall pipes, pipes, pipe sleeves, access manholes, gate guides and thimbles, and structural steel that are embedded in concrete; and the following specific surfaces:

- a. Interior surfaces of steel piping noted in the Piping Schedule.
- b. Interior and exterior surfaces of valves and appurtenances for piping systems.

3.7.2 System No. 4 Exposed Metal-Highly Corrosive

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
SP 10, Near-White Blast Cleaning	Epoxy Primer- Ferrous Metal	1 coat, 2.5 MDFT
	High Build Epoxy	1 coat, 4 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

Use on the following items or areas:

- a. Exposed metal surfaces, located inside or outside of structures and exposed to weather.

3.7.3 System No. 5 Exposed Metal-Mildly Corrosive

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
SP 10, Near-White Blast Cleaning	Epoxy Primer- Ferrous Metal	1 coat, 2.5 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

Use on the following items or areas:

- a. Exposed metal surfaces, located inside or outside of structures and exposed to weather or in a highly humid atmosphere, such as pipe galleries and similar areas, and the following specific surfaces:
  - 1. Structural steel framing and metal deck.
  - 2. As indicated on Door and Hardware Schedule and Interior and Exterior Finish Schedule on Drawings.

3.7.4 System No. 7 Concrete Encased Metal

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
SP 6, Commercial Blast Cleaning	High Build Epoxy	1, 2 or 3 coats 16 MDFT

Use on the following items or areas:

- a. Use on concrete encased ferrous metals including wall pipes, pipe sleeves, access manholes, gate guides, and thimbles; and the following specific surfaces:

3.7.5 System No. 8 Buried Metal-General

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
SP 10, Near-White Blast Cleaning	For Highly Abrasive Soil, Brackish Water Tape Coat System	AWWA C214 with Double Outer Wrap

For steel pipe and fittings, follow AWWA C209 and AWWA C214 with double outer wrap.

Use on the following items or areas:

- a. Buried, belowgrade portions of steel items, except buried stainless steel or ductile iron.

3.7.6 System No. 10 Galvanized Metal, Copper, and Nonferrous Metal Alloy Conditioning

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Epoxy Primer-Other	As recommended by coating manufacturer Remaining coats as required for exposure

Use on the following items or areas:

- a. Galvanized surfaces requiring painting.
- b. After application of System No. 10, apply finish coats as required for exposure.

3.7.7 System No. 25 Exposed FRP, PVC

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Plastic and FRP Surface preparation	Acrylic Latex Semigloss	2 coats, 320 SFPGPC

Use on the following items or areas:

- a. All exposed-to-view PVC and CPVC surfaces, and FRP surfaces without integral UV-resistant gel coat. Secondary containment pipes require painting only where located outdoors.

3.7.8 System No. 27 Aluminum and Dissimilar Metal Insulation

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
Solvent Clean (SP1)	Prime in accordance with manufacturer's recommendation Bituminous Paint	1 coat, 10 MDFT

Use on aluminum surfaces embedded or in contact with concrete.

3.8 ARCHITECTURAL PAINT SYSTEMS AND APPLICATION SCHEDULE

Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

3.8.1 System No. 104 Wood, Natural (Interior or Exterior)

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Wood Surface Preparation	Sanding Sealer	1 coat, 450 SFPG
	Varnish (Satin or Gloss)	2 coats, 450 SFPG

Use on the following items or areas:

- a. As indicated on Door and Hardware Schedule and Interior Finish Schedule on Drawings.

3.8.2 System No. 107 Metal Trim and Structural Steel

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
SP 6 Commercial Blast Cleaning	Rust Inhibitor Primer	1 coat, 2 MDFT
	Alkyd Enamel (Semigloss)	2 coats, 4 MDFT

Use on the following items or areas:

- a. As indicated on Interior and Exterior Finish Schedule on Drawings.

3.8.3 System No. 109 Masonry, Semigloss

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Acrylic Latex (Semigloss)	2 coats, 240 SFPGPC

Use on the following items or areas:

- a. As indicated on Interior Finish Schedule on Drawings.

3.8.4 System No. 110 Masonry Sealer

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Masonry Surface Preparation	Acrylic Sealer	2 coats, 100 SFPGPC

Use on the following items or areas:

- a. As indicated on Interior Finish Schedule on Drawings.

3.8.5 System No. 115 Gypsum Board, Semigloss

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Gypsum Board Surface Preparation	Manufacturer's Recommended Primer	1 coat, 350 SFPG
	Water Base Epoxy (Semi Gloss)	1 coat, 250 SFPG

Use on the following items or areas:

- a. As indicated on Interior Finish Schedule on Drawings.

3.8.6 System No. 116 Gypsum Board, Gloss Epoxy

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Gypsum Board Surface Preparation	Manufacturer's Recommended Primer	1 coat, 350 SFPG
	Water Base Epoxy (Gloss)	1 coat, 250 SFPG

Use on the following items or areas:

- a. As indicated on Interior Finish Schedule on Drawings.

3.8.7 System No. 117 Concrete Masonry, Gloss Epoxy

<u>Surface Prep.</u>	<u>Paint Material</u>	<u>Min. Coats, Cover</u>
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Acrylic Latex (Semigloss)	2 coats, 240 SFPGPC

Use on the following items or areas:

- a. As indicated on Interior Finish Schedule on Drawings.

3.9 COLORS

Provide as shown on Drawings, shown for equipment and appurtenances and designated herein.

Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.

3.9.1 Equipment Colors

1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
2. Paint equipment as selected by District.
3. Paint nonsubmerged portions of equipment the same color as the piping

it serves, except as itemized below:

- a. Dangerous Parts of Equipment and Machinery: OSHA Orange.
- b. Fire Protection Equipment and Apparatus: OSHA Red.
- c. Radiation Hazards: OSHA Purple.
- d. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.

3.9.2 Pipe Identification Painting

- 1. Color code nonsubmerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.
- 2. Pipe Color Coding: As shown in table below.
- 3. On exposed stainless steel piping, apply color 24 inches in length along pipe axis at connections to equipment, valves, or branch fittings, at wall boundaries, and at intervals along piping not greater than 9 feet on center.
- 4. Pipe Supports: Painted light gray, as approved by District.
- 5. Fiberglass reinforced plastic (FRP) pipe, polyvinylidene fluoride (PVDF), and polyvinyl chloride (PVC) pipe located inside of buildings and enclosed structures will not require painting, except as noted or scheduled.

3.9.3 Pipe System Color Code

<u>PIPE SYSTEM</u>	<u>COLOR</u>
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Pipe colors shall be submitted for Owner's approval. Stainless steel pipes shall not be painted.

AQUEOUS AMMONIA	Federal Safety Orange
CITRIC ACID	
FLUORIDE (HYDROFLUOSILICIC ACID)	Safety Orange
SODIUM BISULFITE	Orangy-Brown
SODIUM HYPOCHLORITE	Safety Orange
SODIUM HYDROXIDE	Yellow
SULFURIC ACID	Safety Orange
THRESHOLD INHIBITOR	Safety Orange
CORROSION INHIBITOR	Safety Orange
BLENDED WATER	N/A
RO FEED	N/A
RO PERMEATE	N/A
RO CONCENTRATE	Brown
RO FLUSH	N/A
CLEANING CONCENTRATE RETURN	N/A
CLEANING PERMEATE RETURN	N/A
CLEANING FEED	N/A
CARTRIDGE FILTER INFLUENT	N/A
CARTRIDGE FILTER EFFLUENT	N/A

RAW WATER	Dark Gray
FILTER WATER SUPPLY	N/A
Reclaim Water	Medium Blue
Backwash Water Supply	N/A
Backwash Water Reclaim	N/A
Drain	Black
Finished Water	Light Blue
Permeate To Waste	Light Brown
Salt Solution	Brown
Tepid Water, Potable	Light Blue
Hot Water, Domestic	Blue
Hot Water, Recirculated, Domestic	Blue
Condensate Drain	Brown
Fire Protection	OSHA Red
Fire Sprinkler Service	OSHA Red
Roof Drain	Gray
Trap Primer	Gray
Plant Water, Potable	Light Blue
Plant Water, Process	Medium Blue
Sample	Medium Green
Storm Drain	Gray
Sanitary Vent	N/A
Sanitary Sewer	Dark Gray

### 3.10 FIELD QUALITY CONTROL

#### 3.10.1 Testing Equipment

1. Provide magnetic type dry film thickness gauge to test coating thickness specified in mils, as manufactured by Nordson Corp., Anaheim, CA, Mikrotest.
2. Provide low-voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Razor, San Gabriel, CA, Model M 1.
3. Provide high-voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

#### 3.10.2 Testing

1. Thickness and Continuity Testing:
  - a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC PA 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
  - b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE RP0188.
  - c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE RP0188.

d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

### 3.10.3 Inspection

Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.

### 3.10.4 Unsatisfactory Application

1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
3. Repair defects in accordance with written recommendations of coating manufacturer.

### 3.10.5 Damaged Coatings, Pinholes, and Holidays

1. Feather edges and repair in accordance with recommendations of paint manufacturer.
2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
3. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

### 3.11 MANUFACTURER'S SERVICES

To ensure proper use of paint and coating materials, manufacturer's representative shall be present at Site as follows:

1. On first day of application of any coating system.
2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
3. As required to resolve field problems attributable to or associated with manufacturer's product.
4. To verify full cure of coating prior to coated surfaces being placed into immersion service.

### 3.12 CLEANUP

Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.

Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.

Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

### 3.13 SUPPLEMENTS

The supplements listed below, following "End of Section," are a part of this Specification:

1. Paint System Data Sheet (PSDS)
2. Product Data Sheet (PDS).

**PAINT SYSTEM DATA SHEET**

Complete this PSDS for each coating system, include all components of the system (surface preparation, primer, intermediate coats, and finish coats). Include all components of a given coating system on a single PSDS.

Paint System Number (from Spec.):

Paint System Title (from Spec.):

Coating Supplier:

Representative:

Surface Preparation:

Paint Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**PAINT PRODUCT DATA SHEET**

Complete and attach manufacturer's Technical Data Sheet to this PDS for each product submitted. Provide manufacturer's recommendations for the following parameters at temperature (F)/relative humidity:

<b>Temperature/RH</b>	<b>50/50</b>	<b>70/30</b>	<b>90/25</b>
Induction Time	_____	_____	_____
Pot Life	_____	_____	_____
Shelf Life	_____	_____	_____
Drying Time	_____	_____	_____
Curing Time	_____	_____	_____
Min. Recoat Time	_____	_____	_____
Max. Recoat Time	_____	_____	_____

Provide manufacturer's recommendations for the following:

Mixing Ratio: \_\_\_\_\_

Maximum Permissible Thinning: \_\_\_\_\_

Ambient Temperature Limitations: min.: \_\_\_\_\_ max.: \_\_\_\_\_

Surface Temperature Limitations: min.: \_\_\_\_\_ max.: \_\_\_\_\_

Surface Profile Requirements: min.: \_\_\_\_\_ max.: \_\_\_\_\_

Attach additional sheets detailing manufacturer's recommended storage requirements and holiday testing procedures.

-- End of Section --