

09 90 00 Painting and Coating

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030



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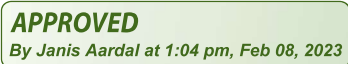
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09 90 00-PAINTING AND COATING

PART 1 GENERAL

1.01 SCOPE

- A. This section specifies requirements for painting and coating systems to be incorporated into the Work. Manufacturer shall apply shop coatings and construction contractor shall perform field work.

1.02 REFERENCES

- A. The following specification sections are referenced in this section:
 - 1. SGW-63706 01 43 33, Manufacturer's Field Services.
 - 2. Section 01 81 13, Sustainability Project Procedures.
- B. The following is a list of standards which may be referenced in this section:
 - 1. American Water Works Association (AWWA):
 - a. C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines—Enamel and Tape—Hot-Applied.
 - b. C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - c. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
 - d. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
 - 2. Environmental Protection Agency (EPA).
 - 3. NACE International (NACE): RP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
 - 4. NSF International (NSF): 61, Drinking Water System Components - Health Effects.
 - 5. Occupational Safety and Health Act (OSHA).
 - 6. The Society for Protective Coatings (SSPC):
 - a. PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
 - b. PA 3, Guide to Safety in Paint Applications.
 - c. SP 1, Solvent Cleaning.
 - d. SP 2, Hand Tool Cleaning.
 - e. SP 3, Power Tool Cleaning.
 - f. SP 5, White Metal Blast Cleaning.
 - g. SP6, Commercial Blast Cleaning
 - h. SP 7, Joint Surface Preparation Standard Brush-Off Blast Cleaning.
 - i. SP 10, Near-White Blast Cleaning.

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- j. SP 11, Power Tool Cleaning to Bare Metal.
- k. SP 13, Surface Preparation of Concrete.
- l. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

1.03 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.
- 13. Tie-coat: A paint specifically formulated to be compatible with generically different primer and finish coats.

1.04 SUBMITTALS

A. All submittal information shall be provided in English.

B. Approval Required Prior to Work Submittals:

- 1. Shop Drawings:
 - a. Data Sheets:
 - 1) For each product, furnish a Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PDS form is appended to the end of this section.
 - 2) For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.
 - 3) Technical and performance information that demonstrates compliance with Specification.
 - 4) Furnish copies of paint system submittals to the coating applicator.
 - 5) Indiscriminate submittal of only manufacturer's literature is not acceptable.
 - b. Detailed chemical and gradation analysis for each proposed abrasive material.

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2. Samples:
 - a. Provide unless waived by Buyer's Technical Representative (BTR).
 - b. Proposed Abrasive Materials: Minimum 5-pound sample for each type, only for field work.
 - c. Reference Panel:
 - 1) Surface Preparation:
 - a) Prior to start of surface preparation, furnish a 4-inch by 4-inch steel panel for each grade of sandblast specified herein, prepared to specified requirements.
 - b) Provide panel representative of the steel used; prevent deterioration of surface quality.
 - c) Panel to be reference source for inspection upon approval by BTR.
 - 2) Paint:
 - a) Unless otherwise specified, before painting work is started, prepare minimum 8-inch by 10-inch sample with type of paint and application specified on similar substrate to which paint is to be applied.
 - b) Furnish additional samples as required until colors, finishes, and textures are approved.
 - c) Approved samples to be the quality standard for final finishes.

C. For Information Only Submittals:

1. Applicator's Qualification: List of references substantiating experience.
2. Coating manufacturer's Certificate of Compliance, in accordance with SGW-63706 01 43 33, Manufacturers' Field Services.
3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
4. Manufacturer's written verification that submitted material is suitable for the intended use.
5. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.
6. Manufacturer's written instructions and special details for applying each type of paint.

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D. LEED® Submittals:

1. Refer to Section 01 81 13, Sustainability Project Procedures, for information regarding LEED® submission requirements.
2. The Contractor and/or Subcontractor shall submit the following costs for all Work associated with this Contract.
 - a. Labor costs.
 - b. Material cost.
 - c. Equipment costs.
 - d. The sum of labor, equipment, and material cost shall equal the total cost of construction.
 - e. Location of final fabrication of materials.
3. Product Data for Credit EQ 4.2: For paints, including printed statement of VOC content and chemical components.

1.05 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.

1.06 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.

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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.

1.07 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

2.01 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.

2.02 ABRASIVE MATERIALS

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

2.03 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.

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

- B. LEED® Requirements: All paints and coatings for interior applications must comply with the VOC and chemical component limits identified in Section 01 81 13, Sustainability Project Procedures.

- C. Products:

Product	Definition
Acrylic Latex	Single-component, finish as required
Acrylic Latex (Flat)	Flat latex
Acrylic Sealer	Clear acrylic
Alkyd (Semigloss)	Semigloss alkyd
Alkyd Enamel	Optimum quality, gloss or semigloss finish as required, medium long oil
Bituminous Paint	Single-component, coal-tar pitch based
Coal-Tar Epoxy	Amine, polyamide, or phenolic epoxy type 70% volume solids minimum, suitable for immersion service
Epoxy Nonskid (Aggregated)	Polyamidoamine or amine converted epoxies aggregated; aggregate may be packaged separately
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surfacer, nonshrinking, suitable for application to concrete and masonry. Approved for potable water contact and conforming to NSF 61, where required
Epoxy Primer— Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments
Epoxy Primer— Other	Epoxy primer, high-build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated
Fusion Bonded Coating	100% solids, thermosetting fusion bonded, dry powder epoxy, suitable for the intended service

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Product	Definition
Fusion Bonded, TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating, or open gear grease as supplied by McMaster-Carr Supply Corporation., Elmhurst, IL; RL 736 manufactured by Amrep, Inc., Marietta, GA
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat
Inorganic Zinc Primer	Solvent or water based, having 85% metallic zinc content in the dry film; follow manufacturer's recommendation for topcoating
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
Epoxy, High Solids	Polyamidoamine epoxy, 80% volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish
Chemical Resistant Vinyl Ester Coating	High performance vinyl ester coating suitable for exposure to intermittent exposure to the following chemicals: Anti-Scalant (NALCO CL-50) 50% Citric Acid 40% Ferric Chloride Micronutrients 75% Phosphoric Acid Cationic Polymer 38% Sodium Bisulfite 25% Sodium Hydroxide 12.5% Sodium Hypochlorite 50% Sodium Nitrate International/Ceilcote 242, or approved equal.
Silicone/Silicone Acrylic	Elevated temperature silicone or silicone/acrylic based
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required

D. Penetrating Sealer:

1. Silicate based densifier that penetrates and chemically reacts with the concrete substrate.

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2. Manufacturers and Products:
 - a. NOX-CRETE; STIFEL GC

2.04 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.

2.05 SHOP FINISHES

- A. Shop Blast Cleaning: SSPC SP10 for all surfaces unless on interior, immersed surfaces, which require SSPC SP5.
- B. Surface Preparation: Provide BTR 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, BTR 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.

PART 3 EXECUTION

3.01 GENERAL

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

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- B. Perform the Work only in presence of BTR, unless BTR grants prior approval to perform the Work in BTR's absence.
- C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with BTR.

3.02 EXAMINATION

- A. Factory Finished Items:
 - 1. Schedule inspection with BTR before packaging and shipping factory finished items.
 - 2. Schedule inspection with BTR before repairing damaged factory-finished items delivered to Site.
 - 3. 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.

3.03 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.

3.04 SURFACE PREPARATION

- A. 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.

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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.

B. 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. SP6, 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 shadow, slight streaks, or minor discoloration 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 a suitable surface profile of 25 micrometer (1.0 mil) minimum. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.
2. The words "solvent cleaning", "hand tool cleaning", "wire brushing", and "blast cleaning", or similar words of equal intent in these

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- 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. Hand tool clean areas that cannot be cleaned by power tool cleaning.
 5. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
 6. 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.
 7. 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.
 8. 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.
 9. 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.

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- b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.
- C. 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.
- D. 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 BTR, 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.
- E. 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.
- F. 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:

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- 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.
- G. Gypsum Board Surface Preparation: Typically, new gypsum board surfaces need no special preparation before painting.
1. Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.
- H. 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 BTR.
 9. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of SSPC.

3.05 SURFACE CLEANING

A. Brush-off Blast Cleaning:

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.

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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. BTR 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.

B. 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.

3.06 APPLICATION

A. General:

1. The intention of these Specifications is for new, interior and exterior masonry, concrete, metal, and submerged metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated.
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.

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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.

B. 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.

C. 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.

D. 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 BTR 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.

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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.

3.07 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

- A. 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 BTR before starting work in question.
- B. System No. 3 Submerged Metal—Other:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 5, White Metal Blast Cleaning	Prime in accordance with manufacturer's recommendations	
	High Build Epoxy	2 coats, 16 MDFT

1. Use on the following items or areas:
 - a. Metal surfaces new below top of the side walls, metal surfaces above maximum liquid surface which are a part of immersed equipment.

- C. System No. 5 Exposed Metal—Mildly Corrosive:

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

1. Use on the following items or areas:
 - a. Exposed metal surfaces, new located inside or outside of structures and exposed to weather or in a highly humid atmosphere, and the following specific surfaces:
 - 1) Building structural steel (exception: structural steel to receive applied fireproofing in Chemical Storage Room).
 - 2) Metal doors and frames.
 - 3) Metallic pipe, fittings, and valves.
 - 4) Pumps.
 - 5) Exterior of steel vessels, tanks, and towers.

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2. At Contractor’s option, the following procedure may be used for touch-up areas not exceeding 200-square inches unless specifically approved in writing by the Engineer, providing the work is performed as no-cost change to the contract:
 - a. Mechanical tool clean bare metal in accordance with SSPC-SP11.
 - b. Feather edges of existing paint and abrade existing intact paint 1 to 2 inches from the edge of bare metal to provide a mechanical bond for the epoxy primer.
 - c. Apply one coat of epoxy primer to specified thickness, overlapping roughened surface of existing paint.
 - d. Apply one coat of polyurethane enamel to specified thickness.
 - e. Primer and top coat shall be applied in accordance with specifications herein and with manufacturer recommendations including environmental conditions, application and curing temperatures, and dry times between coats.

D. System No. 8 Buried Metal - General:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Standard Hot Coal-Tar Enamel -OR- Coal-Tar Epoxy	AWWA C203 2 coats, 16 MDFT
	For Highly Abrasive Soil, Brackish Water: Tape Coat System	AWWA C214 with Double Outer Wrap

1. For steel pipe and fittings, follow AWWA C209 and AWWA C214
2. Use on the following items or areas:
 - a. Buried, belowgrade portions of steel items, except buried stainless steel or ductile iron.
3. Contractor to submit for approval items not covered in this section.

E. System No. 9 Special Coatings—Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Primer in Accordance with Manufacturer’s Directions	
	Chemical Resistant Vinyl Ester Coating	2 coats, 30 to 40 MDFT

1. Use on the following items or areas:

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- a. All exposed surfaces of the chemical tote tables.
- b. Shop apply and touch up in the field after assembly.

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

Surface Prep.	Paint Material	Min. Coats, Cover
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

- 1. 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.

G. System No. 22 Chemical-Resistant Wall, Heavy-Duty - Masonry:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Epoxy Filler/Surfacers	1 coat, as required to fill voids
	High Build Epoxy	1 coat, 160 SFPG
	High Build Epoxy, Gloss	1 coat, 160 SFPG

- 1. Use on the following items or areas:
 - a. Masonry walls within the chemical storage room.

H. System No. 25 Exposed FRP, PVC:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Plastic and FRP Surface Preparation	Acrylic Latex Gloss	2 coats, 320 SFPGPC

- 1. 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.

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I. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Bituminous Paint	1 coat, 10 MDFT

1. Use on aluminum surfaces embedded or in contact with concrete

J. System No. 29 Fusion Bonded Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Fusion Bonded Coating 100% Solids Epoxy	1 or 2 coats, 7 MDFT

1. For steel pipe and fittings, meet all requirements of AWWA C213.
2. Use on the following items:
 - a. Stainless anchor bolts.

K. System No. 29A Fusion Bonded, Steel Dowel Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Fusion Bonded Coating 100% Solids Epoxy	1 or 2 coats, 7 MDFT
TFE Lube, Shop Applied; Grease Lube Alternative, Field Applied Just Prior to Installation	TFE Lube or Grease Lube	1 coat, as required

1. Use on steel expansion joint dowels as specified in Section 03 15 00, Concrete Joints and Accessories.

3.08 ARCHITECTURAL PAINT SYSTEMS AND APPLICATION SCHEDULE

A. 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 BTR before starting work in question.

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B. System No. 110 Clear Waterproofing Sealer:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Acrylic sealer	2 coats, 100 SFPGPC

1. Use only at locations noted on drawings; excludes Bio Building Exterior CMU Wall Exterior Surface.

C. System No. 115 Gypsum Board and Plaster, Semigloss:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Gypsum Board Surface Preparation	Latex Primer/Sealer	1 coat, 350 SFPG
	Acrylic Latex (Semigloss) or Alkyd (Semigloss)	2 coats, 400 SFPGPC

1. Use on the following items or areas:
 - a. Interior gypsum walls and ceilings in control room, lab and restrooms.

D. System No. 117 Concrete Masonry, Gloss Epoxy:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Water Base Epoxy (Gloss)	2 coats, 300 SFPGPC

1. Use on the following items or areas:
 - a. Interior exposed masonry walls, other than in the chemical storage room.

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E. System No. 121 Concrete, Skid-Resistant:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Epoxy Nonskid (Aggregated)	1 coat, 160 SFPG

1. Use on all exposed concrete surfaces not receiving chemical resistant coatings located within Extraction Transfer Buildings No. 1, 2, and 3 and Injection Transfer Building No. 1 and 2 as follows:
 - a. Concrete slabs-on-grade, trench walls and base slabs, sump walls and base slabs, curbs, equipment pads, and column pedestals.
 - b. Treatment of surfaces not exposed to foot traffic including trench and sump walls, column pedestals, and portions of equipment pads may be applied without aggregate.
 - c. Treatment of exposed concrete equipment pad surfaces may be applied after installation of equipment including FRP tanks.
 - d. As directed by BTR.

F. System No. 122 Penetrating Sealer:

Surface Prep.	Paint Material	Min. Coats, Cover
As Specified Herein	Penetrating sealer (Silane)	Applied to Point of Rejection

1. Application. Use on the following items or areas:
 - a. As shown on drawings and noted herein.
 - b. Unless otherwise noted, use on all exposed concrete surfaces not receiving chemical resistant coatings including concrete slabs-on-grade, trench walls, and base slabs, curbs, equipment pads, and column pedestals located within process areas including Bio-Process building, Bio-Process equipment pad area, RAD building, RAD changing room, and lime stabilization area.
 - c. Treatment of exposed concrete equipment pad and trench wall surfaces may be applied after installation of equipment including FRP tanks.
 - d. Lime Stabilization Area: Apply to containment slab at truck loading bays.
 - e. As directed by BTR.
2. Applicator Qualifications. In accordance with manufacturer recommendations; minimum 5 years experience in application of specified or similar type of products unless specifically otherwise approved by the manufacturer.
3. Surface Preparation. Shall be in accordance with manufacturer recommendations except as follows:

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- a. Remove grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
- b. Brush-off blast clean to remove loose concrete and laitance as required without damage to broom finish slab surface.\
- c. In the event that brush blasting is too disruptive to broom finished concrete surfaces, high-pressure water cleaning may be acceptable, subject to the results of a mockup and penetrating sealer manufacturer's written approval.
 - i. Prepare surfaces with proposed cleaning methods and apply penetrating sealer to serve as a mockup of the work.
 - ii. Mockup shall consist of cleaning and application of penetrating sealer to a 5-foot by 5-foot area, minimum.
 - iii. Penetrating sealer manufacturer or NACE inspector shall observe surface preparation method and submit a letter stating that the method is approved for the application of the product.
 - iv. Mockup may be incorporated into the work.
4. Product Requirements. In accordance with manufacturer recommendations except as follows:
 - a. Do not apply until 28 days minimum after placement of concrete.
 - b. Surface and ambient temperature at time of application and for 48 hours minimum after application shall be at or above 40-degree.
 - c. Treated surfaces may be subjected to work activities after 24 hour minimum period.
 - d. Product may be applied to completed concrete wall finish treatment after 48 hour minimum period.
 - e. Minimum cure time required prior to application of product to concrete patches/repairs to concrete defects exceeding 3/4-inches in thickness shall be determined by the structural engineer.
5. Field Inspection and Testing. Shall be limited to visual observation at time of placement.

3.09 COLORS

- A. Provide as shown in SGW-6477 09 06 00, Schedules for Finishes
- B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.
- C. Equipment Colors:
 1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
 2. Paint equipment and piping one color as selected from color samples submitted to the BTR. Preference for equipment color is gray or blue.

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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.

3.10 FIELD QUALITY CONTROL

A. 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, or equivalent.
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 Rasor, San Gabriel, CA, Model M-1, or equivalent.
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.

B. 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 BTR.

- C. Inspection: Leave staging and lighting in place until BTR has inspected surface or coating. Replace staging removed prior to approval by BTR. Provide additional staging and lighting as requested by BTR.

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D. 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.

E. 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

A. In accordance with SGW-63706 01 43 33, Manufacturers' Field Services, coating 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 (FIELD PAINTING)

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.
- C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.13 SUPPLEMENTS

- A. 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).

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

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PAINT PRODUCT DATA SHEET

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

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

MSDS Number: _____

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.: _____