

STANDARD SPECIFICATION  
SECTION 09900 PAINTING AND COATING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section includes materials and application of painting and coating systems for the following surfaces:
  - 1. Submerged Metal
  - 2. Exposed Metal
  - 3. PVC, CPVC and FRP
  - 4. Metal in Contact with Concrete
  - 5. Plaster, Wood, Masonry and Drywall
- B. This section does not include coating steel tanks and reservoirs.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.

1.03 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit coating manufacturer's data sheets for the products to be applied. Data sheets shall show the following information:
  - 1. Percent solids by volume.
  - 2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
  - 3. Recommended surface preparation.
  - 4. Recommended thinners.
  - 5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.
  - 6. Application instructions including recommended equipment and temperature limitations.
  - 7. Curing requirements and instructions.

- C. Submit color swatches.
- D. Submit certificate identifying the type and gradation of abrasives used for surface preparation.
- E. Submit material safety data sheets for each coating.

PART 2 - MATERIALS

2.01 PAINTING AND COATING SYSTEMS

- A. Coating products shall conform to San Diego Air Pollution Control District Rule 67.0, where products cannot contain more than 250 grams per liter of volatile organic compound (VOC) per gallon of coating product as applied. The following index lists the various painting and coating systems by service and generic type.

PAINT COATINGS SYSTEM INDEX

No.	Title	Generic Coating
<u>Submerged Metal Coating System</u>		
5.	Submerged or Intermittently Submerged Metal, Potable or Recycled Water	Epoxy
<u>Exposed Metal Coating Systems</u>		
10.	Exposed Metal, Corrosive Environment	High Build Epoxy (2 Coat System) with Polyurethane Topcoat
15.	Exposed Metal, Atmospheric Weathering Environment	Acrylic
20.	Exposed Metal, Exterior	Epoxy with Urethane Topcoat
<u>PVC, CPVC and FRP Coating System</u>		
41.	PVC, CPVC and FRP, Ultraviolet Exposure	Polyurethane
<u>Metal in Contact with Concrete Coating System</u>		
51.	Aluminum and Concrete	Epoxy
<u>Plaster, Wood, Masonry and Drywall Coating System</u>		
60.	Plaster, Wood, Masonry and Drywall	Acrylic Latex

- B. These systems are specified in detail in the following paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

## 2.02 SUBMERGED METAL COATING SYSTEM

System No. 5 -- Submerged Metal, Potable or Recycled Water:

Type: Epoxy

Service Conditions: For use with steel structures, piping, valves, or equipment in potable or recycled water.

Surface Preparation: SSPC SP-10.

Coating System: Apply the manufacturer's recommended number of coats to attain the specified minimum coating thickness. Products: Devoe Bar-Rust 233H, Tnemec N140 or 100, Sherwin-Williams Tank Clad HS B62-80, PPG AQUAPON® LT NSF Low Temperature Epoxy Coatings 95-172, or District approved equal; 12 mils total. Color of topcoat: white. Each coat shall be different color than the one preceding it.

## 2.03 EXPOSED METAL COATING SYSTEMS

- A. System No. 10 -- Exposed Metal, Corrosive Environment:

Type: High-build epoxy finish coat having a minimum volume solids of 60%, with an inorganic zinc prime coat and a pigmented polyurethane finish coat having a minimum volume solids of 52%.

Service Conditions: For use with metal structures, pipes, or valves subjected to water condensation; chemical fumes; and chemical contact.

Surface Preparation: SSPC SP-10.

Prime Coat: Self-curing, two-component inorganic zinc-rich coating recommended by the manufacturer for overcoating with a high-build epoxy finish coat. Minimum zinc content shall be 12 pounds per gallon. Apply to a thickness of 3 mils. Products: Tnemec 90E-92, Devoe Catha-Coat 304 or 304V, International Interzinc 22HS, Ameron 9HS, Sherwin-Williams Zinc-Clad II Plus, PPG METALHIDE® 28 Inorganic Zinc-Rich Primer 97-672, or District approved equal.

Intermediate Coat: Tnemec 104, ICI Devoe Devran 224HS or 231, International Interseal 670HS, Ameron 385, Sherwin-Williams Macropoxy 646 B58-600, PPG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 series, or District approved equal; 5 mils.

Finish Coat: Two-component pigmented acrylic or aliphatic polyurethane recommended by the manufacturer for overcoating a high-build epoxy coating. Apply to a thickness of at least 2 mils. Products: Tnemec Series 1075, ICI Devoe Devthane 379, International Interline 990HS, Ameron 450HS, Sherwin-Williams Hi-Solids Polyurethane B65-300, PPG PITTHANE® Ultra Gloss Urethane Enamel 95-812 series, or District approved equal.

B. System No. 15 -- Exposed Metal, Atmospheric Weathering Environment:

Type: One component acrylic enamel having a minimum volume solids content of 35% with an acrylic inorganic zinc primer.

Service Conditions: For use on interior and exterior metal and piping subject to sunlight, weathering, and water condensation.

Surface Preparation: SSPC SP-10.

Prime Coat: Sherwin-Williams Zinc Clad II Plus primer, ICI Devoe Inorganic Zinc 304V, Tnemec 90E-92, or District approved equal applied to a minimum dry-film thickness of 3 mils.

Finish Coats: Two or more coats of Sherwin-Williams Sher-Cryl B66-300, ICI Devoe Devflex 659, Tnemec Series 28 or 29, or District approved equal. Apply sufficient coats to provide a total minimum dry-film thickness of 8 mils. Thickness of any individual coat shall not exceed 4 mils.

C. System No. 20 -- Exposed Metal, Exterior:

Type: High-build epoxy prime coat with a pigmented high-build aliphatic or acrylic polyurethane finish coat.

Service Conditions: For use on exterior metal piping appurtenances, such as valve box lids, hydrant heads, and guard posts.

Surface Preparation: SSPC SP-10.

Prime Coat: Two-component high-build epoxy. Apply to a thickness of 8 mils. Products: Ameron 400, ICI Devoe 235, Tnemec 104, International Interseal 670HS, Sherwin-Williams Macropoxy 646 B58-600, PPG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 series, or District approved equal.

Finish Coat: Two-component pigmented high-build polyurethane. Apply one or more coats to a total thickness of 5 mils. Products: Ameron "Amershield," ICI Devoe Devthane 359, Tnemec Series 1075, International Interthane 990HS, Sherwin-Williams Hi-Solids Polyurethane B65-300 series, PPG PITTHANE® Ultra Gloss Urethane Enamel 95-812 series, or District approved equal.

2.04 PVC, CPVC AND FRP COATING SYSTEM

System No. 41 -- PVC, CPVC and FRP, Ultraviolet Exposure:

Type: Epoxy primer with a minimum volume solids of 54% and a pigmented Polyurethane enamel having a minimum volume solids of 52%.

Service Conditions: PVC or CPVC piping and FRP exposed to sunlight.

Surface Preparation: SSPC SP-1. Then lightly abrade the surface with medium-grain garnet paper.

Prime Coat: One coat of Tnemec Series N69 Epoxoline, International 7510, Ameron 385, ICI Devoe Devran 224HS, Sherwin-Williams Macropoxy 646 B58 series, PG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 series, or District approved equal. Apply to a minimum dry-film thickness of 4 mils.

Finish Coat: One coat of Tnemec Series 1075, International Interthane 990HS, Ameron 450HS, ICI Devoe Devran 379, Sherwin-Williams Hi-Solids Polyurethane B65-300 series, PPG PITTHANE® Ultra Gloss Urethane Enamel 95-812 series, or District approved equal. Apply to a minimum dry-film thickness of 3 mils

## 2.05 METAL IN CONTACT WITH CONCRETE, COATING SYSTEM

System No. 51 -- Aluminum insulation from Concrete and Carbon Steel:

Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D2697).

Service Conditions: Coat areas of aluminum grating, stairs, framing, structural members, or aluminum fabrications in contact with concrete or carbon steel with this system.

Surface Preparation: Preparation: Solvent or steam cleaning per SSPC SP-1; do not use alkali cleaning. Then dust blast.

Coating System: Apply three or more coats of Ameron 400, Tnemec Series 135, ICI Devoe Bar-Rust 233H, Sherwin-Williams Macropoxy B58-600, PPG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 series, or District approved equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer's recommendation.

## 2.06 PLASTER, WOOD, MASONRY AND DRYWALL COATING SYSTEM

System No. 60 -- Plaster, Wood, Masonry and Drywall, Normal Exposure:

Type: Acrylic latex coating having a minimum volume solids of 40%.

Service Conditions: For use in coating weather-exposed or enclosed concrete masonry, drywall, wood, and plaster.

Surface Preparation: Surfaces shall be dry, clean, and free of contaminants.

Prime Coat: Self-priming.

Finish Coats: Two coats of Tnemec Series 6, Tneme-cryl, 2 mils each; two coats of ICI Dulux Professional, 2 mils each; two coats of Sherwin-Williams Metalatex B42 series, 2 mils each; two coats of PPG PITT-TECH® Int/Ext Satin DTM Industrial Enamel 90-474 series, 2 to 3 mils each, or District approved equal.

## 2.07 ABRASIVES FOR SURFACE PREPARATION

A. Abrasives used for preparation of iron and steel surfaces shall be one of the following:

1. 16 to 30 or 16 to 40 mesh silica sand or mineral grit.

2. 20 to 40 mesh garnet.
  3. Crushed iron slag, 100% retained on No. 80 mesh.
  4. SAE Grade G-40 or G-50 iron or steel grit.
- B. Abrasives used for preparation of copper and aluminum surfaces shall be one of the following:
1. Crushed slag, 80 to 100 mesh.
  2. Very fine silica sand, 80 to 100 mesh.
- C. In the above gradations, 100% of the material shall pass through the first stated sieve size and 100% shall be retained on the second stated sieve size.

### PART 3 - EXECUTION

#### 3.01 WEATHER CONDITIONS

- A. Do not paint in the rain, wind, snow, mist, and fog or when steel or metal surface temperatures are less than 5 degrees F above the dew point.
- B. Do not apply paint when the relative humidity is above 85% or the temperature is above 90 degrees F.
- C. Do not paint when temperature of metal to be painted is above 120 degrees F.
- D. Do not apply paints if air or surface temperature is below 40 degrees F or expected to be below 40 degrees F within 24 hours.
- E. Do not apply epoxy, acrylic latex, and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60 degrees F or expected to drop below 60 degrees F in 24 hours.

#### 3.02 SURFACE PREPARATION

- A. Remove oil and grease from metal surfaces in accordance with SSPC-SP 1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before sandblasting.
- B. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges in accordance with SSPC SP-2 and SSPC SP- 3. Grind 0.02 inch (minimum) off the weld caps on pipe weld seams. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of ¼ inch.
- C. Neutralize welds with a chemical solvent that is compatible with the specified coating materials. Use clean cloths and chemical solvent. Wipe dry with clean cloths. Do not leave a residue on the cleaned surfaces.

D. Do not abrasive blast or prepare more surface area than can be coated in one day. Remove all sharp edges, burrs, and weld spatter. Do not abrasive blast PVC, CPVC, or FRP piping or equipment. Do not abrasive blast epoxy, enamel coated, or fusion-bonded epoxy pipe that has already been factory coated, except to repair scratched or damaged coatings.

E. Surface preparation shall conform with the SSPC specifications as follows:

Solvent Cleaning	SP-1
Hand Tool Cleaning	SP-2
Power Tool Cleaning	SP-3
White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off-Blast Cleaning	SP-7
Pickling	SP-8
Near-White Blast Cleaning	SP-10

F. Wherever the words "solvent cleaning," "hand tool cleaning," "wire brushing," or "blast cleaning" or similar words are used in these specifications or in paint manufacturer's specifications, they shall be understood to refer to the applicable SSPC (Society for Protective Coatings), surface preparation specifications listed above.

G. Dust blasting is defined as cleaning the surface through the use of very fine abrasives, such as siliceous or mineral abrasives, 80 to 100 mesh. Apply a fine etch to the metal surface to clean the surface of any contamination or oxide and to provide a surface profile for the coating.

### 3.03 ABRASIVE BLAST CLEANING

A. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.

B. After abrasive blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within the period of an eight-hour working day. Do not apply coating over damp or moist surfaces. Reclean prior to application of primer or touch-up coating any blast cleaned surface not coated within said eight-hour period.

C. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.

D. During abrasive blast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

### 3.04 PROCEDURES FOR ITEMS HAVING SHOP-APPLIED PRIME COATS

Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of

other work unless ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

### 3.05 FIELD TOUCH-UP OF SHOP-APPLIED PRIME COATS

- A. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.
- B. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Before applying intermediate or finish coats to inorganic zinc primers, remove any soluble zinc salts that have formed by means of scrubbing with a stiff bristle brush. Rinse scrubbed surfaces with clean water.
- C. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.
- D. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.
- E. Use repair procedures on damaged primer which protects adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.
- F. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.
- G. Surfaces that are shop primed with inorganic zinc primers shall receive a field touch-up of organic zinc primer to cover all scratches or abraded areas.
- H. Other surfaces that are shop primed shall receive a field touch-up of the same primer used in the original prime coat.

### 3.06 PAINTING SYSTEMS

- A. All materials of a specified painting system, including primer, intermediate, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.
- B. Deliver paints to the jobsite in the original, unopened containers.



### 3.07 PAINT MIXING

Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touchup painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

### 3.08 PROCEDURES FOR THE APPLICATION OF COATINGS

- A. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.
- B. Stir, strain, and keep coating materials at a uniform consistency during application. Apply each coating evenly, free of brush marks, sags, runs, holidays, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.
- C. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.
- D. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility of working area prior to coating applications. Remove dust from coated surfaces by dusting, sweeping, and vacuuming prior to applying succeeding coats.
- E. Apply coating systems to the specified minimum dry-film thicknesses as measured from above the peaks of the surface profile.
- F. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Reclean surfaces by blast cleaning that have surface colored or become moist prior to coating application.
- G. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. The brush coat shall be done prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

### 3.09 SURFACES NOT TO BE COATED

Do not paint the following surfaces unless otherwise noted on the Drawings or in other Standard Specification sections. Protect during the painting of adjacent areas:

- A. Cement mortar coated pipe and fittings.

- B. Stainless steel.
- C. Metal plates/nameplates or letters.
- D. Concrete surfaces.
- E. Fencing.
- F. Copper tubing, red brass piping and PVC piping except where such piping occurs in rooms where the walls are painted, or required for color coding.
- G. Electrical fixtures except for factory coatings.
- H. Grease fittings.
- I. Buried pipe unless specifically required in the piping specifications.
- J. Fiberglass items.
- K. Aluminum handrails, stairs and grating, unless in contact with concrete.

### 3.10 PROTECTION OF SURFACES NOT TO BE PAINTED

Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

### 3.11 SURFACES TO BE COATED

Coat surfaces as described below:

- A. Coat mechanical equipment as described in the various mechanical equipment specifications. Color shall match the color of the connecting piping.
- B. Coat aboveground and exposed piping or piping in vaults and structures as described in the various piping specifications. Color shall be as indicated or as selected by the District's Representative.
- C. Coat valves as described in the various valve specifications. Aboveground valves or valves in vaults and structures shall match the color of the connecting piping.
- D. Coat aluminum surfaces in contact with concrete per System No. 51.
- E. Coat exposed surfaces of enclosures, guard posts, marker posts, fire hydrants, valve boxes, and test boxes as described in the particular specifications for the above items.

### 3.12 DRY FILM THICKNESS TESTING

- A. Measure coating thickness specified for metal surfaces with a magnetic-type dry-film thickness gage. Test the finish coat (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide detector as manufactured by Tinker and Razor or K-D Bird Dog. Provide dry-film thickness gage as manufactured by Mikrotest or Elcometer. Check each coat for the correct dry-film thickness. Do not measure within eight hours after application of the coating.
- B. If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Hand or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps or other imperfections.

END OF SECTION