

DIVISION 9 – PAINTING

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SECTION 09900
PAINTING & COATING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Work of this Section consists of the provision of all labor, materials, services, equipment and incidental items required to complete the masonry work shown on the Drawings and specified herein, including but not limited to:
1. Field painting of exposed interior items and surfaces.
 2. Surface preparation for painting.

1.2 DEFINITIONS AND EXTENT

- A. General: Standard coating items defined in ASTM D 16 apply.
1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 2. Eggshell refers to a low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 3. Semigloss refers to a medium-sheen finish with a gloss range below 35 and 70 when measured at a 60-degree meter.
 4. Full gloss refers to a high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.
- B. This Section includes surface preparation and field painting of exposed interior and exterior items and surfaces.
1. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface preparation specified in other Sections.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or it to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Engineer will select from standard colors and finishes available.
- D. Painting includes field painting of exposed bare and covered pipes (including color

coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not a factory-applied final finish.

- E. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts and labels.

1.3 REFERENCES:

- A. The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO) Recommended Specifications for Sewer Collection System Rehabilitation (Current Edition).

ASTM C94	Ready-Mix Concrete
ASTM C109	Comprehensive Strength
ASTM C267	Chemical Resistance
ASTM C596	Shrinkage
ASTM C666, Method A	Freeze/Thaw Resistance
ASTM D4414	Standard Practice for Measurement of Wet Film Thickness for Organic Coatings
ASTM 543	Resistance of Plastics to Chemical Reagents
ASTM 638	Tensile Properties of Plastic
ASTM 695	Comprehensive Properties of Rigid Plastics
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics

1.4 SUBMITTALS

- A. Product Data: For each paint system indicates, including block filler and primers.
 - 1. Material List: Inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing and applying each coating material.
 - 3. Material Safety Data Sheets
- B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions on representative Samples of the actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color and texture are achieved.

2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
3. Submit two 8 in. x 12 in. Samples for each type of finish coating for Engineer's review of color and texture only.

C. Qualification Data: For Applicator.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in apply paints and coating materials similar in material, design and extent to those indicated, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain block filler and primes for each coating system from same manufacturer as finish coats.
- C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information.
 1. Product name or title of material.
 2. Product description (generic classification or type.)
 3. Manufacturer's stock number and date of manufacturer.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg. F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 1. Protect from freezing.
 2. Keep storage area neat and orderly.
 3. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperature of surfaces to be painted and surrounding air are between 50 and 90 deg. F.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air are between 45 and 95 deg. F.
- C. Do not apply in snow, rain, fog or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg. F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRAMATERIALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: Furnish four (4) unopened gallons of each type of paint and coating work, in color and gloss as used for the Project.

1.9 WARRANTY:

- A. The work performed shall be warrantied against infiltration and faulty workmanship and materials for a period of one (1) year after the project is accepted by the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, acceptable products are listed in the Finish Schedule at the end of this Section.

2.2 PAINTMATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, finish coat materials and other painting and coating materials that are compatible with one another and with the substrates indicated, under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory-formulated and recommended by manufacturer for application indicated. Paint material containers not displaying manufacturer's product identification will not be acceptable.

2.3 PATCHING MIX:

A quick-setting cementitious material shall be used as a patching mix to fill voids greater than ¼” deep, and is to be mixed and applied according to the manufacturer’s recommendation and shall have the following minimum requirements.

Compressive Strength	ASTM C-109	6 hr 1,400 psi
Shrinkage	ASTM C-596	0% AT 90% Relative Humidity

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for paint application.
 - 1. Proceed with paint application only after unsatisfactory condition have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total painting and coating system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Engineer about anticipated problems when using the painting or coating materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning:
 - 1. Before applying paint or other surface treatments, clean substrates of substances that could impair bond the various coatings. remove oil and grease before cleaning.

2. Schedule cleaning and painting so dust and other contaminants from cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions and technical bulletins for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Materials: Prepare concrete, concrete unit masonry (CMU), cement plaster and cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils and release agents. roughen as required to remove glaze.
 3. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation:
 - a. Use abrasive blast-cleaning if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surface by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the follow with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop-coated; remove oil, grease, dirt, loos mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Blast steel surfaces clean, as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 5. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's

written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and technique best suited for substrate and type of material being applied.
1. Paint surface treatments and finishes are indicated in the Paint Schedule and Painting & Coating Schedule.
 2. Where applicable, paint colors are to comply with regulator requirements; all other paint colors are to be selected by the Engineer.
 3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions detrimental to formation of a durable paint film.
 4. Exposed surfaces includes areas visible when permanent fixtures, equipment and similar components are in place. Extend painting and coating in these areas, as required to maintain painting system integrity and provide desired protection.
 5. Before final installation of equipment, paint surfaces behind permanently fixed equipment with prime coat only.
 6. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until pervious coat has cured, as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color and appearance. Give special attention to ensure that edges, corners, crevices, welds and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Applications Procedures: Apply paints and coatings by brush, roller, spray or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back or hi-pile sheep's wool, as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical items to be painted include, but are not limited to, the following:
1. Uninsulated metal piping.
 2. Pipe hangers and supports.
 3. Mechanical equipment indicated to have a factory-primed finish for field painting.
- F. Electrical items to be painted include, but are not limited to, electrical equipment indicated to have factory-prime finish for field painting.
- G. Block Fillers: Apply block fillers to concrete masonry block (CMU) at a rated to ensure complete coverage with pores filled.

- H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed area in first coat appears to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth opaque surface of uniform finish, color, appearance and coverage. Surface imperfections, including cloudiness, spotting, holidays, brush marks, runs, ropiness, laps or other surface imperfections will not be acceptable.
- J. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes or other surface imperfections.
- K. Complete Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

- A. Engineer may have a qualified Testing Agency sample painting materials, when the materials are being used on site. Samples will be taken, identified, sealed and certified in the presence of the Painting Contractor.
- B. Testing Agency will perform appropriate tests on the samples and provide test results to the Engineer and Painting Contractor.
- C. If test results show material being used does not comply with specified requirements, Painting Contractor shall remove noncomplying paint materials from the site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Painting Contractor may be required to remove noncomplying paint materials from previously painted surfaces if, on repainting with specified paint, the coatings are incompatible.

3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish and other discarded paint materials from the site.
- B. After completing painting, clean of paint spatter, removing spattered paint by washing and scraping without scratching or damaging the spattered surface or adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correction damage cleaning, repairing or replacing, and repainting as

approved by Engineer.

- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
- C. After work of other trades is complete, touchup and restore damaged or defaced painted surfaces. Comply with procedures specified in DPCA P1.

3.7 PAINT SCHEDULE

- A. Schedule: Provide products and number of coats specified. Use of manufacturer's proprietary product names to designate colors, materials, generic class, standard of quality and performance criteria and is not intended to imply that products named are required to be used to the exclusion of equivalent performing products of other manufacturers.
- B. Concrete and CMU Floors and Walls:
 - 1. Surface Preparation: Shot-blast or mechanically abrade the concrete/CMU to remove all coatings, laitance, curing compounds, hardeners, sealers, and other contaminants and to provide surface profile; Reference: ICRI CSP3-5. Verify dryness by testing for Moisture Vapor Transmission Rate via an Anhydrous Calcium Chloride Test; Reference: ASTM F 1869. Test pH levels via litmus paper testing to assure pH levels have been neutralized. Concrete and CMU shall have been cured for 28 days minimum before application of materials.
 - 2. Coating Schedule:
 - a. Primer / Sealer: Apply one full coat of Loxon concrete and masonry primer and sealer at 2.1 – 3.2 mils DFT.
 - b. Final Coat: Apply two full coats of Pro Industrial DTM Acrylic at 2.5 - 4.0 mils DFT per each coat.

3.8 FIELD TESTING/INSPECTION:

- A. Material Testing: One 2 x 2 inch sample cube shall be taken for every 50 bags of cementitious lining material used. Samples shall be sprayed from the nozzle of the application equipment, identified and sent to an independent test laboratory for compression strength testing as described in ASTM C109.
- B. Thickness Testing: During application of the corrosion protective coating a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.
- C. Holiday Testing: After the protective coating has set hard to the touch it shall be inspected with high-voltage holiday detection equipment. Surfaces shall first be

dried, an induced holiday shall then be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99). All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the protective coating manufacturer's recommendations.

- D. Bond Strength: Measurement of bond strength of the protective coating to the substrate shall be made at regular intervals and along different sections of the structure. Bond strength shall be measured in accordance with ASTM D4541. Any areas detected to have inadequate bond strength shall be evaluated by the Project Engineer. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs shall be made by Applicator in strict accordance with manufacturer's recommendations.
- E. All inspecting, testing, and reworking within the warranty period shall be provided at no additional cost to the Owner.

END OF SECTION 09900

SECTION 09901

SHOP PRIMERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

- A. The work covered under this Section of the specifications includes furnishing all plant, labor, equipment, appliances and materials, and performing all operations in connection with applying shop primers on ferrous metals, excluding stainless steel, complete in place in accordance with the Drawings and Specifications.
- B. Related Sections include the following:
 - 1. Field painting is included under Section 09900.
 - 2. Division 1 - General Requirements
 - 3. Division 11 – Equipment
 - 4. Division 16 – Electrical

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 – Submittal Procedures.

1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.

PART 2 - PRODUCTS

2.1 SURFACE PREPARATION

- 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.

2.2 SHOP COATING REQUIREMENTS

- A. 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.
- B. 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.

2.3 NON-PRIMED SURFACES

- A. Gears, bearing surfaces and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease. Grease coating shall be maintained as necessary to prevent corrosion during storage and erection up to the time of application of a field coating of grease.

2.4 COMPATIBILITY WITH FIELD PAINTS

- A. The primers and paints used in the field shall be products of the same manufacturer and recommended for use together, and shall meet the requirements of Section 09900 – Painting and Coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Factory Finished Items:

1. Provide Engineer minimum 7 days' advance notice to schedule inspection of factory-finished items delivered to Site to review factory priming and factory finish.
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. Repair shall be the responsibility of the General Contractor.
3. Full repair to damaged areas of factory-finished items, as determined by the Engineer, is to be done at no cost to the Owner. Full repair shall be responsibility of the General Contractor.

- 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.

3.2 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.

3.3 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 – Contract Closeout.

END OF SECTION 09901