

SECTION 16446

CLEANING AND PAINTING STEEL

PART 1 DESCRIPTION

- A. Prepare steel surfaces for painting and apply paint.

PART 2 MATERIALS

- A. Provide the paint system (surface preparation, primer, intermediate, and appearance coats as required) shown on the plans. Provide System II with #742 Gray Appearance Coat if no system is specified. Provide a concrete gray appearance coat (Federal Standard 595B color 35630) if appearance coat is required unless otherwise shown on the plans.
- B. If faying surfaces will be painted, provide a prime coat that is documented to have the required slip and creep characteristics (as determined by “Testing Method to Determine the Slip Coefficient for Coatings Used in Bolted Joints” in the Research Council on Structural Connections’ Specification for Structural Joints Using ASTM A325 or A490 Bolts) to meet the required mean slip coefficient shown on the plans. Perform all required testing at no expense to the City.

2.01 PAINT SYSTEMS

- A. Standard paint systems for painting new and existing steel include the following.
 - 1. System I (Overcoating)
 - a. Provide paint in accordance with the following requirements. Provide a penetrating sealer, intermediate prime coat on bare steel areas, and an appearance coat in accordance with manufacturer’s specifications. This system is used for repainting existing steel and used only when specified on the plans.
 - 2. System II
 - a. Provide #810 Prime Coat in accordance with the following requirements. For appearance coat, provide either #742 Gray Appearance Coat or acrylic latex in accordance with the following requirements. This system is used for painting new steel and repainting existing steel.
 - 3. System III
 - a. Provide paint in accordance with the following requirements. Provide inorganic zinc (IOZ) prime coat, epoxy intermediate coat, and

urethane appearance coat for all outer surfaces except those to be in contact with concrete. Provide epoxy zinc prime coat for areas to be in contact with concrete and for touchup of IOZ. This system is used for painting new steel.

4. System IV

- a. Provide paint in accordance with the following requirements. Provide IOZ prime coat and acrylic latex appearance coat for all outer surfaces except those to be in contact with concrete. Provide epoxy zinc prime coat for areas to be in contact with concrete and for touchup of IOZ. This system is used for painting new steel.

2.02 PAINT INSIDE TUB GIRDERS AND CLOSED BOXES

- A. Provide a white polyamide cured epoxy.

2.03 PAINT OVER GALVANIZING

- A. Provide epoxy intermediate coat and urethane appearance coat in accordance with the following requirements. Provide intermediate coating recommended by the manufacturer for use on galvanized steel.

2.04 SPECIAL PROTECTION SYSTEM

- A. Provide the type of paint shown on the plans or in special provisions to this Section.

PART 3 EQUIPMENT

- A. Ensure that spray equipment:
1. has adequate capacity and sufficient gauges, filters, agitators, regulators, and moisture separators to ensure delivery of clean dry air at the proper pressure and volume;
 2. is adequate for the type of paint being used;
 3. has spray heads that provide a smooth, uniform coat of paint;
 4. can separate moisture from air stream in contact with the paint; and
 5. has no dried coatings, solvents, or other foreign matter on surfaces that paint is likely to contact.
- B. Maintain all equipment and accessories in good working order.
- C. During painting operations, keep paint pots no more than 20 ft. above or below the level of spray application of paint. Do not allow fluid hoses to sag more than 10 ft. below the level of the bottom of the paint pot or actual spraying operations, whichever is the lowest point. Keep hoses serviceable with no cracks or deterioration. Equip paint pots (or other containers from which the paint is dispensed) with agitators that operate whenever paint is in the pot.

3.01 AIRLESS SPRAY EQUIPMENT

- A. Use regulator and air or fluid pressure gauges. Use fluid hoses with at least 1/4 in. I.D. and a maximum length of 75 ft.

3.02 CONVENTIONAL SPRAY EQUIPMENT

- A. Use independent fluid pressure and atomization pressure regulators and gauges. Use fluid and air hoses with at least 1/2 in. I.D. and a maximum length of 75 ft.

PART 4 CONSTRUCTION

4.01 QUALIFICATION

- A. Certification of the cleaning and painting contractor, subcontractor, or fabricator is required as follows.
 - 1. Shop Cleaning and Painting
 - a. Follow all applicable provisions for qualification specified in the AASHTO/NSBA Steel Bridge Collaboration S8.1.
 - 2. Field Cleaning and Painting
 - a. Maintain SSPC QP 1 (for paint application and removal of coatings not containing hazardous materials) and SSPC QP 2 (for removal of coatings containing hazardous materials) certification for the duration of the project when the following conditions exist:
 - (1). total steel surface area to be cleaned and painted exceeds 15,000 sq. ft.,
 - (2). existing coating to be removed from steel contains hazardous materials as specified on the plans, or
 - (3). certification is required on the plans.
 - b. Submit proof of certification before beginning work.

4.02 RESPONSIBILITY FOR HAZARDS

- A. Some paints and cleaning products are harmful to health. Handle all paints and cleaning products in accordance with the information on the manufacturer's safety data sheet and in accordance with all applicable federal and state regulations. Comply with all worker and public safety protection measures including 29 CFR 1926.62 when cleaning requires removing paint containing lead or chromium. Monitor permissible exposure limits (PEL) in accordance with OSHA requirements.

4.03 ACCESS

- A. Provide safe access to all parts of the work for proper inspection. Do not place rigging, scaffolds, etc., in contact with previously painted surfaces until the previously applied coating has had at least 48 hours of curing time. Protect previously painted and cured surfaces with an approved padding to minimize damage when

rigging, scaffolds, etc., will be placed on or hung from those surfaces. Repair all coating damaged as a result of rigging or scaffolding as directed.

- B. Remove tree limbs, bushes, grass, and other items that will interfere with the cleaning and painting operations as directed. Remove vertical clearance signs, and erect and maintain temporary ground-mounted signs matching the content and letter size on the existing sign unless otherwise directed. Re-attach permanent clearance signs as directed.

4.04 STEEL TO BE PAINTED

- A. Clean and paint all structural steel except weathering steel that is to remain unpainted, unless otherwise shown on the plans. Structural steel includes all main members, bearing apparatus, diaphragms, and lateral bracing where applicable. Unless otherwise shown on the plans or exempted in this Section, paint the rolling faces of rockers and base plates, all surfaces of bearing plates, and all surfaces of iron or steel castings, whether or not the surfaces are milled. Unless otherwise provided in the Contract or approved in writing, perform the initial cleaning and application of required prime and intermediate coatings on new steel before shipment of the steel to the job site.

4.05 PAINTING GALVANIZED SURFACES

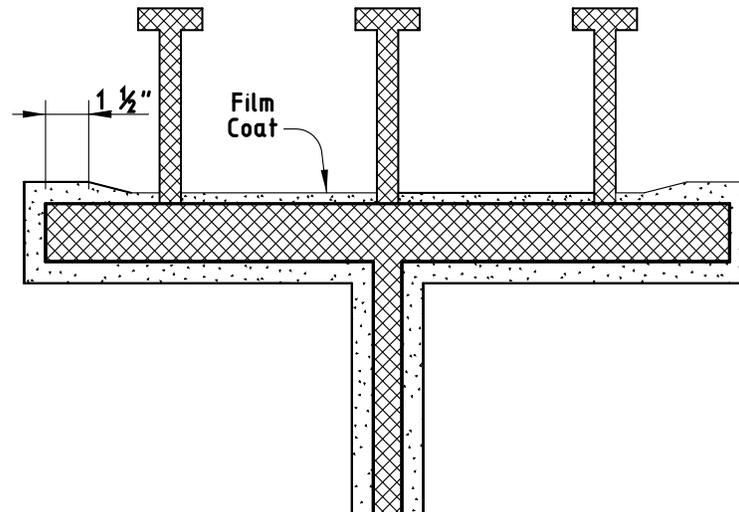
- A. Do not water-quench or chromate-quench galvanized surfaces to be painted. Wash the surface to be painted with a biodegradable alkaline detergent to remove oil, grease, flux, white rust, dirt, and any other contaminants. Thoroughly rinse the surface with potable water to remove remaining detergent. Remove remaining oily contamination with a clean solvent. Properly label and store then recycle or dispose of spent solvents.
- B. Lightly abrasive-blast the surface to be painted, or use another approved method to show an etched pattern on the entire surface without removing any of the zinc. Apply primer within 24 hours of cleaning. Reclean the surface if more than 24 hours elapse before painting.
- C. Apply at least 2.0 mils dry film thickness (DFT) of intermediate coating and at least 2.0 mils DFT of appearance coating.
- D. Ensure that the appearance coating dries to form a smooth, continuous, tightly adhering film of uniform thickness and appearance, free of sags, runs, pinholes, holidays, overspray, and any other discontinuities; and that it has a uniform appearance within all portions of the painted piece and all related pieces and components of a job.

4.06 SHOP CLEANING AND PAINTING

- A. Unless otherwise approved, do not apply coatings until all fabrication work is completed and has been tentatively accepted.
- B. Follow all applicable provisions of AASHTO/NSBA Steel Bridge Collaboration S8.1, for both organic and inorganic zinc-based primer systems, except as modified by this Section. Use the paint systems specified in this Section and on the plans and meet the dry film thickness (DFT) requirements of this Section instead of those of S8.1. The requirement to test for primer curing using ASTM D 4752 does not apply to organic zinc primer. Use Tex 728 I instead of SSPC PA2 for measuring DFT.
- C. Repair all runs, sags, and other defects in each coat before application of subsequent coats.
- D. Clean and paint surfaces that will be in contact with concrete, such as the top surfaces of top flanges, in accordance with the specified system except as modified in this Section or otherwise shown on the plans. Designate no-paint areas on the shop drawings.
- E. Paint erection marks for field identification of members upon previously painted surfaces. Do not load pieces for shipment until coatings are thoroughly dry. Except for small approved touchups, do not apply any paint after material is loaded for shipment.
 - 1. Faying Surfaces.
 - a. Painted
 - (1). When painting faying surfaces, ensure that the primer used is documented to have the required slip and creep characteristics. If no mean slip coefficient (or corresponding surface condition) is specified, do not paint faying surfaces without approval.
 - (2). Apply no more than the maximum average film thickness used in the qualifying test to the faying surfaces. Before bolting, ensure that paint on faying surfaces has cured for the minimum time used in the qualifying test. Perform all required testing of the paint at no additional expense to the City.
 - b. Unpainted
 - (1). If surfaces to be in contact after final bolting will be left unpainted, provide an SSPC SP 10 blast-cleaning, and ensure that these areas are free of paint and overspray to within 1 in. or 1 bolt diameter, whichever is less, from the outside edges of the bolt holes. Do not power wire-brush uncoated faying surfaces. Roughen galvanized faying surfaces by hand wire-brushing. Remove tape from masked areas as soon as practical.
 - (2). For unpainted top lateral bracing connections shown on the plans as designed to AASHTO Class A surface condition (slip coefficient of 0.33), an SSPC SP 10 blast-cleaning is not required. Remove grease and loose mill scale from nonweathering steel, and remove grease and all mill scale from weathering steel. If no slip coefficient or assumed surface

condition is shown on the plans or if the connection is shown as Class B (slip coefficient 0.50), provide an SSPC SP 10 blast.

2. No-Paint Areas at Field-Welded Connections
 - a. Do not paint surfaces within 4 in. of groove welds or within 2 in. of fillet welds. Do not apply intermediate coat within 4 in. of the edge of primer at these areas. Remove tape from masked areas as soon as practical after painting.
3. Paint Application for Specified Systems
 - a. System II
 - (1). Prime Coat
 - (a). Apply a total of 3.5 to 10.0 mils DFT of primer in at least 2 coats to outer surfaces that will not be in contact with concrete. Extend the primer at least 1 1/2 in. onto surfaces that will be in contact with concrete, such as top flanges (see Figure 1). Coat the remaining portion of the surfaces to be in contact with concrete with a film coat of tightly adhering primer.
 - (2). Appearance Coat
 - (a). If the appearance coat is shop-applied, apply at least 2.0 mils DFT of appearance coating to outer surfaces that will not be in contact with concrete. Do not extend the appearance coat onto surfaces that will be in contact with concrete.



-  System II Primer
-  Steel Girder and Shear Stud

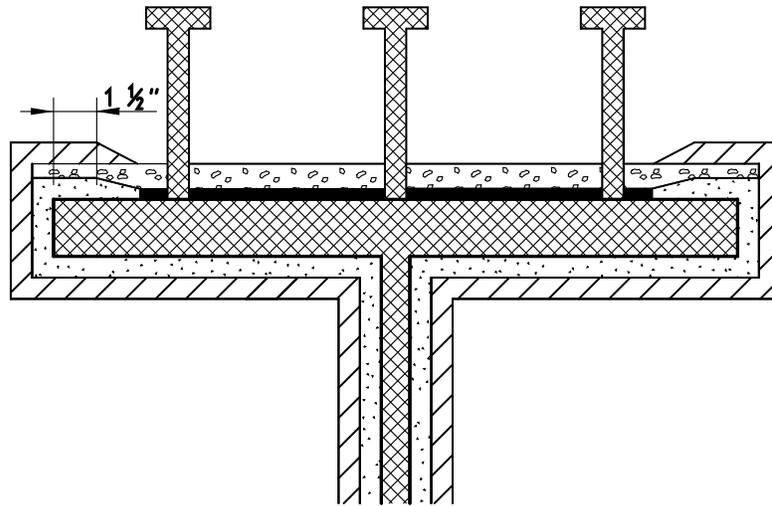
Figure 1

Application areas of System II paint (appearance coat not shown).

b. System III

(1). Outer Surfaces Not in Contact with Concrete

- (a). Extend primer and intermediate coatings at least 1 1/2 in. onto surfaces that will be in contact with concrete, such as top flanges (see Figure 2).

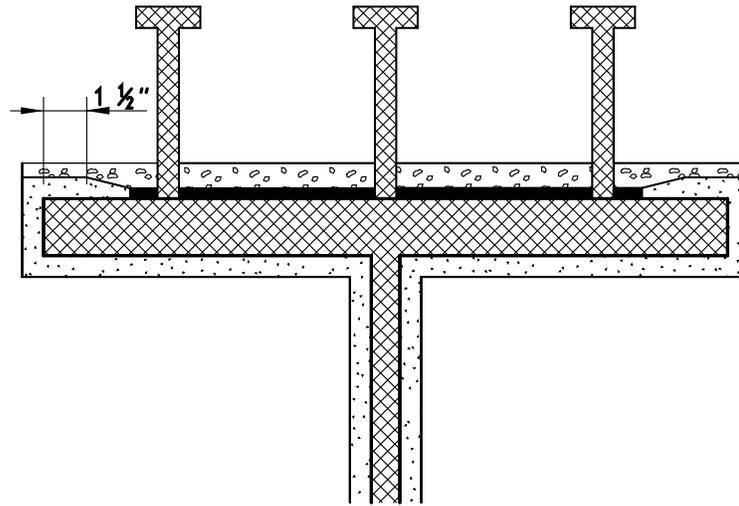


- System III IOZ Primer Film Coat (Optional)
- ▤ System III IOZ Primer
- ▥ System III Epoxy Zinc Primer
- ▧ System III Epoxy Intermediate
- ▨ Steel Girder and Shear Stud

Figure 2
Application areas of System III paints (appearance coat not shown).

- (b). Prime Coat
 - 1) Apply at least 3.0 mils DFT of IOZ primer. Surfaces to be in contact with concrete may be covered with a film coat of IOZ primer. Thoroughly wet coated surfaces with a fine mist of potable water after the primer has set. Test the IOZ primer for cure in accordance with ASTM D4752. If the IOZ primer meets a resistance rating of 4 or higher, apply the intermediate coat. If it does not meet this rating, reapply a fine mist of potable water until the coating is cured. Alternative cure tests may be used if recommended by the coating manufacturer.
- (c). Intermediate Coat
 - 1) Apply at least 2.0 mils DFT of epoxy intermediate coating after primer (including epoxy zinc on top flange; see Section 16446, Part 4, 4.06, E, 3, b, (2), "Surfaces to be in

- Contact with Concrete”) has met curing requirements.
- (d). Appearance Coat
 - 1) If appearance coat is shop-applied, apply at least 2.0 mils DFT of appearance coating.
 - (2). Surfaces to be in Contact with Concrete
 - (a). See Figure 2. Before coating surfaces to be in contact with concrete, ensure that the IOZ prime coat has met curing requirements. Allow the surface to dry before evaluating the condition of the IOZ primer. If the surface to be in contact with concrete shows metal oxidation or if IOZ primer present on that surface is mud-cracked, reclean the surface to specified requirements. Do not damage the IOZ primer on other surfaces during recleaning. Paint on shear studs is not required. Apply 2 coats of 3 to 5 mils wet film thickness (WFT) each of epoxy zinc primer to a clean, dry surface. Wait between 1 and 48 hours between coat applications.
- c. System IV
- (1). Outer Surfaces Not in Contact With Concrete
 - (a). Prime Coat
 - 1) Apply at least 3.0 mils DFT of IOZ primer. Extend primer at least 1 1/2 in. onto surfaces that will be in contact with concrete, such as top flanges (see Figure 3). Thoroughly wet all coated surfaces with a fine mist of potable water.



- System IV IOZ Primer Film Coat (Optional)
- ◻ System IV IOZ Primer
- ◻ System IV Epoxy Zinc Primer
- ◻ Steel Girder and Shear Stud

Figure 3
Application areas of System IV paints (appearance coat not shown).

(b). Appearance Coat

- 1) If appearance coat is shop-applied, test the IOZ primer for cure in accordance with ASTM D 4752. If the IOZ primer meets a resistance rating of 4 or higher, apply the appearance coat. If it does not meet this rating, reapply potable water with a fine mist until the coating is cured. Alternative cure tests may be used if recommended by the coating manufacturer. Apply at least 2.0 mils DFT of appearance coating.

(2). Surfaces to be in Contact with Concrete

- (a). Coat surfaces to be in contact with concrete in accordance with Section 16446, Part 4, 4.06, E, 3, b, (2), "Surfaces to be in Contact with Concrete."

d. Paint Inside Tub Girders and Closed Boxes

- (1). Provide an SSPC SP 7 blast-cleaning to unpainted surfaces. Apply 2 to 3 mils DFT of paint over all inside surfaces that will be visible after final bolting including exposed surfaces of interior splice plates.
- e. Special Protection System
 - (1). Apply paint as shown on the plans.
4. Repairs
 - a. If repairs must be made after the IOZ primer has cured, use epoxy zinc primer to repair the IOZ primer. Brush application for touchup is acceptable as long as the paint is mixed in the appropriate proportions by weight and is agitated continuously during the painting operation.

4.07 FIELD CLEANING AND PAINTING

- A. Clean and paint only after erection or maintenance work including bolting, welding, straightening of material, etc. is complete; slab concrete has been placed; and the Owner's Representative has examined and approved the work. Clean and paint unpainted areas including bolts, nuts, washers, and areas where the shop-applied paint has been damaged or fails to meet specification requirements, in accordance with the method required under the paint system specified. Prevent paint spatter and overspray from coming in contact with passing traffic, private and public property, and areas of the bridge not designated to be painted.
 1. Containment
 - a. Submit a plan that details the procedures and type and size of equipment proposed to keep public property, private property, and the environment from being adversely affected by the cleaning and painting operations. Approval of the plan is required before cleaning and painting operations begin.
 - b. When required on the plans, submit an analysis showing the loads, including wind loads, added to the existing structure by the containment system and waste materials. Verify that the forces and stresses induced in the members from these loads do not cause them to be overstressed. Have a licensed professional engineer sign, seal, and date the submittal.
 - c. When abrasive-blasting is used to remove the existing coating, provide a containment system capable of containing all blast refuse. Unless otherwise shown on the plans, construct and maintain a structure meeting the following minimum requirements:

- (1). rigid or flexible framing;
 - (2). ability to withstand winds up to 30 MPH;
 - (3). enclosure of all sides of area with air-penetrable or air-impenetrable walls;
 - (4). watertight floor;
 - (5). overlapping seams and entryways; and
 - (6). exhaust air filtration system capable of creating negative pressure inside the enclosure causing the sides of the containment to have a concave appearance.
- d. In place of a full containment structure, a modified containment system may be proposed when using abrasive-blasting equipment equipped with negative pressure that will contain all blast refuse. Demonstrate for approval the equipment's ability to contain all blast refuse.
- e. When using hand tools, provide a system that will contain all removed paint, rust, and other debris. Place an airtight membrane below the member being cleaned to collect all falling debris. When using power hand tools, equip them with high-efficiency particulate air (HEPA) filter vacuums or provide a full containment system as specified above.
- f. When using water-blasting (low-pressure or high-pressure), provide a system capable of collecting all falling paint chips and other debris. Store, characterize, and dispose of all recovered debris in accordance with 30 TAC 335, "Industrial Solid Waste and Municipal Hazardous Waste." Discharge liquids in accordance with the TCEQ Texas Pollution Discharge Elimination Program (30 TAC 305, "Effluent Guidelines and Standards for TPDES Permits") and Texas Surface Water Quality Standards (30 TAC 307). Alternatively, liquids may be captured, stored and characterized for disposal at an authorized facility in accordance with 30 TAC 315, "Pretreatment Regulation for Existing and New Sources of Pollution," or 30 TAC 335, "Industrial Solid Waste and Municipal Hazardous Waste."
- g. Remove all blast refuse from the floor and cleaned members before the Inspector enters the containment to inspect the cleaned surfaces. Remove all blast refuse from the containment before ending work for the day.
- h. Provide containment during the priming operation to provide a wind-free environment and to keep the primer from entering the environment. Obtain approval of the containment system prior to beginning work.

- i. Use a skimmer when cleaning and painting over bodies of water. If the skimmer collects any blast or paint material, remove the material the day the release occurs. Correct the containment problem that allowed the release before continuing work.
2. Cleaning and Preparation of Surfaces
 - a. Prepare surfaces prior to applying paint.
 - (1). General Preparation
 - (a). Clean far enough into the shop-applied paint to ensure removal of all contaminants. Feather edges of sound paint around cleaned areas.
 - (b). Ensure that surfaces to be painted are completely free of oil, grease, moisture, dirt, sand, overspray, welding contamination (slag or acid residue); loose or flaking mill scale, rust, or paint; weld spatter; and any other conditions that will prevent the paint from forming a continuous, uniform, tightly adhering film. Remove all steel splinters (hackles) raised or evident during cleaning. When abrasive blast-cleaning is required, reblast areas from which hackles are removed. Use the test described in Section 16446, Part 4, 4.07, A, 2, a, (3), "Tape Test," on all surfaces to be painted to determine if they are contaminated with loose particles.
 - (c). Before other cleaning operations, remove grease-like contaminants with clean petroleum solvents or other approved methods. Contain solvents and removed material as approved. Dispose of properly or reuse solvents as approved. This requirement applies to all coats.
 - (d). When abrasive blast-cleaning is required, blast all flame-cut edges to produce a visible anchor pattern over the entire flame-cut surface.
 - (e). Completely remove, as directed, the protective coating on machined surfaces and pins.
 - (2). Classes of Cleaning
 - (a). The requirements of Section 16446, Part 4, 4.07, A, 2, a, (1), "General Preparation," apply whether or not a

class of cleaning is specified. For blasting, use an approved abrasive as shown on the plans and potable water. Do not use steel shot. When abrasive blast-cleaning is used to remove existing paint containing lead or chromium, use an abrasive recycling system with an approved recyclable abrasive. Abrasive will be considered recyclable if it is separated from the dust and paint debris before being reused.

- 1) Class A Blast-Cleaning
 - a) Remove all visible rust, paint, mill scale, and other forms of contamination, so that the blasted surface appears near white when viewed with the unaided eye (corrected to 20/20 vision). Slight staining is allowed provided it does not exceed 5% in any 9 sq. in. area. Staining includes light shadows, slight streaks, or minor discoloration caused by stains from rust, mill scale, or previously applied paint. Meet the surface preparation requirements of SSPC SP 10 unless otherwise shown on the plans.
- 2) Class B Blast-Cleaning
 - a) Remove all dirt, rust scale, loose mill scale, loose rust, and loose paint. Tight mill scale and tightly adhered rust and paint are permitted. Expose each square inch of surface area to be cleaned to the abrasive-blast pattern long enough to expose several flecks of the underlying metal. Meet the surface preparation requirements of SSPC SP 7. Use the test described in Section 16446, Part 4, 4.07, A, 2, a, (3), "Tape Test," on the cleaned surface to determine if it is adequately cleaned.
- 3) Class C Cleaning
 - a) Remove all exposed loose rust, loose mill scale, peeling or flaking paint, and oxidized paint. Clean these areas by

hand-scraping, wire-brushing, or other approved method. Feather all sound, tightly adhered coating edges surrounding cleaned areas.

- 4) Class D Water-Blasting
 - a) Remove all dirt, loose rust, and loose paint using water-blasting equipment. Tight mill scale and tightly adhered rust and paint are permitted. Probe perimeter of peeled areas of paint with a putty knife to ensure remaining paint is tightly adhered.
 - b) System I requires Class D water-blasting to remove contaminants, followed by a Class C cleaning for defective areas. If prime coat is field-applied, System II requires Class A blast-cleaning. If prime coat is shop-applied, Systems II, III, and IV require Class A spot-cleaning of all damaged and unpainted areas.

(3). Tape Test

- (a). Perform the tape test as follows:
 - 1) Press a strip of filament tape onto the surface by rubbing with moderate thumb pressure 4 times, leaving approximately 2 in. of one end of the tape free from the surface.
 - 2) Grasp the free end and remove the tape from the surface with a sharp pull.
- (b). The surface will be considered to be contaminated and not adequately cleaned if visible particles cling to the tape.

3. Painting

a. Paint Condition

- (1). Thoroughly mix and strain paints to be applied. Mix by mechanical methods. Ensure that the paint is a completely homogeneous mixture free of lumps, skins, and agglomerates

and that it contains all pigments, vehicle solids, and thinners required in the original formulation. Keep paint containers tightly covered and protected from weather when not in use.

- b. Thinning
 - (1). Adjust paint to the correct application consistency by using suitable thinners or by using properly applied heat up to 150°F. Using heat to thin epoxy paints may decrease their useful pot life.

- c. Paint System Requirements
 - (1). Ensure that all coatings in the paint system, including shop-applied coats, are from the same manufacturer.
 - (a). System I (Overcoating)
 - 1) Penetrating Sealer
 - a) Apply at least 1.0 mil DFT of penetrating sealer to all surfaces to be painted.
 - 2) Prime Coat
 - a) Apply at least 4.0 mils DFT of primer to areas that have received a Class C cleaning and to other areas where there is no existing primer.
 - 3) Appearance Coat
 - a) Apply at least 2.0 mils DFT of appearance coat.
 - (b). System II
 - 1) Prime Coat
 - a) Apply 3.5 to 10.0 mils DFT of primer in at least 2 coats.
 - 2) Appearance Coat
 - a) Apply at least 2.0 mils DFT of appearance coat.
 - (c). System III
 - 1) Prime Coat
 - a) Spot-clean to Class A all damaged and unpainted areas. Apply at least 3.0 mils DFT of epoxy zinc primer to the cleaned areas.
 - 2) Intermediate Coat
 - a) If intermediate coat is not shop-applied, apply at least 2.0 mils DFT of epoxy intermediate coating.
 - 3) Appearance Coat

- a) Apply at least 2.0 mils DFT of appearance coat.
 - (d). System IV
 - 1) Prime Coat
 - a) Spot-clean to Class A all damaged and unpainted areas. Apply at least 3.0 mils DFT of epoxy zinc primer to the cleaned areas.
 - 2) Appearance Coat
 - a) Apply at least 2.0 mils DFT of appearance coat.
 - (e). Special Protection System
 - 1) Apply paint as shown on the plans.
- d. Temperature
- (1). Do not apply #810 Prime Coat when the steel or air temperature is below 50°F or when the steel or air temperature is expected to drop below 50°F within 2 hr. after application. Do not apply #742 Appearance Coat when the steel or air temperature is below 40°F or when the steel or air temperature is expected to drop below 40°F within 2 hours after application. Follow product data sheets for temperature requirements for all other paints.
- e. Application
- (1). Immediately before painting, clean steel surfaces or surfaces of previously applied coats of paint by blowing with clean compressed air, brushing, or both to remove traces of dust or other foreign particles. When directed, wash the surfaces of previously applied coatings either with clean, fresh water or with a mild detergent and water mixture followed by a complete and thorough rinse with clean, fresh water.
 - (2). Do not apply paint to any surface with discernible moisture. Do not apply paint to any surface when the relative humidity is greater than 85% as determined by a sling psychrometer in accordance with ASTM E 337. Do not apply any paint when impending weather conditions might result in injury to fresh paint.
 - (3). Do not apply paint to any surface when the relative humidity is greater than 85% as determined by a sling psychrometer in accordance with ASTM E 337.

- (4). Apply each coat of paint to clean, dry, firm surfaces complying with all specification requirements. Ensure that surfaces to be painted are free of all forms of contamination. Ensure that each coat dries to form a smooth, continuous, tightly adhering film of uniform thickness and appearance, free of sags, runs, pinholes, holidays, overspray, or other defects. Apply all coats by spray, except that any approved method of application may be used to paint inaccessible areas.
- (5). Repair all runs, sags, and other defects in each coat of paint before application of subsequent coats.
- (6). Measure the dry film thickness of coatings in accordance with Tex 728 I.
- (7). If, in the opinion of the Owner's Representative, there is an objectionable amount of dust in the atmosphere, discontinue painting or take necessary precautions to prevent dust and dirt from coming in contact with freshly painted surfaces or with surfaces before the paint is applied.
- (8). Where there is potential for paint to be sprayed on traffic, provide a shield that will protect the traffic from paint.
- (9). When painting steel that is in contact with concrete, provide full coverage of the steel with a minimal amount of paint on the concrete surface. Do not extend the paint more than 4 in. onto the concrete surfaces or as directed. Ensure that when painting is complete, the only visible paint on concrete surface is the finish coat. Remove excessive or objectionable paint on concrete surfaces in an approved manner.
 - (a). Prime Coat
 - 1) Paint cleaned areas with the specified prime coat. Overlap painting onto the surface of the shop-applied paint enough to form a sealed edge.
 - 2) When System III or IV is specified, paint spot-repair and unpainted areas with epoxy zinc primer. Cure the epoxy zinc primer in accordance with the manufacturer's product data sheet before applying appearance coat.

- 3) When System II is specified and the steel and the ambient temperature are both above 60°F, the second coat of primer may be applied before the first coat has cured but not within 2 hours after the application of the first coat. Cure the primer in accordance with Table 1 before applying appearance coat.

Table 1
System II Primer Cure Times

Temperature	Days Cure, Min.
77°F and above	2
65 to 77°F	3
55 to 65°F	4
40 to 55°F	5

(b). Appearance Coat

- 1) After field-painting of the prime coat in accordance with Section 16446, Part 4, 4.07, A, 3, e, (9), (a), "Prime Coat," is completed and approved, apply the specified appearance coat.
- 2) Clean prime coat and intermediate coat surfaces by an approved method which does not damage the paint to remove all dirt, grease, concrete, overspray, and any other substance that may impair adhesion before the application of the appearance coat.
- 3) Provide an even and uniform appearance throughout the painted portion of the structure.

f. Workmanship

- (1). Perform all painting with skilled painters who can adjust equipment and application techniques as dictated by the type of paint, weather conditions, environment, and size and shape of the surface being painted. Painters who, in the opinion of the Owner's Representative, do not adjust equipment to apply coatings in a uniform full wet coat free of runs, sags, holidays, and overspray will not be considered skilled painters.
- (2). Apply sprayed coatings essentially 90° to the surface and between 10 and 18 in. from the surface as necessary to apply a full wet coat of paint free of overspray, runs, sags, and holidays. Any spray painter who does not consistently spray in

this manner or extends the spraying stroke so that paint is applied to the surface at an angle of less than 80° will not be allowed to spray paint. Brush application for touchup is acceptable as long as the paint is mixed in the appropriate proportions by weight and is agitated continuously during the painting operation.

4. Handling and Shipping
 - a. Pad the blocks, chains, slings, braces, clamps, etc., used for handling, moving, storing, and shipping painted members so that the paint will not be damaged.
5. Cleaning and Painting Existing Structures
 - a. Unless otherwise shown on the plans, provide System II for existing steel structures to be cleaned and painted.

4.08 PAINT IMPROPERLY APPLIED

- A. To uncover evidence of improperly applied paint, the Owner's Representative may at any time during construction explore underneath the surface of any paint coats already applied. Repair these areas of investigation at no additional expense to the City. Whenever unsatisfactory conditions are found, the Owner's Representative may require remedial measures.
- B. Repair or completely remove and replace all paint that has been applied improperly, has been applied to improperly cleaned surfaces, fails to dry and harden properly, fails to adhere tightly to underlying metal or other paint film, or does not have a normal, workmanlike appearance in conformance with this Section. When the final field coat does not have a uniform color and appearance throughout the structure, correct it by the use of whatever additional coats or other corrective measures are required. Remove freshly applied paint that has not yet set with the use of suitable solvents. Remove dried paint films with blast-cleaning, scraping, or flame torches, as approved.

4.09 STORAGE AND DISPOSAL

- A. Collect all waste generated by cleaning and painting operations as necessary to prevent release into the environment. At a minimum, collect all waste before leaving the job site each day. Handle and store the waste as if it were hazardous until classification is made. Follow the requirements of 30 TAC 335 for on-site handling of the waste. Store waste collected in containers that comply with 49 CFR 178. Seal containers containing waste each day before leaving the job site.

- B. Test each container of waste using EPA Test Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP), to determine existing metal and organic content. If testing shows that the waste is not hazardous, handle and dispose of the waste as a "Special Waste" as defined in 30 TAC 330.2 or as directed. Provide documentation showing that disposal of the waste was done in a suitable landfill holding permits to handle this type of material. If testing shows that the waste is hazardous, dispose of the waste in compliance with applicable hazardous waste rules and regulations. Transport hazardous waste using a permitted transporter and dispose of in an authorized hazardous waste facility.
- C. When the plans specify that the existing coating to be removed contains hazardous materials and steel grit is used as the abrasive, the waste generated is classified as hazardous regardless of the results of the TCLP. Dispose of this waste in compliance with applicable hazardous waste rules and regulations as specified above and by the Contract.
- D. Provide copies of all test reports and transportation manifests to the Owner's Representative before shipping hazardous waste. Provide signed original manifests to the Owner's Representative verifying that all steps of the handling and disposal process were correctly handled.

4.10 MISCELLANEOUS

- A. Notify the Owner's Representative of any condition that may require the repair or replacement of any portion of the bridge.
- B. Upon completion of the painting operations for each structure, stencil on the exterior face of the outside beam the control, section, and structure number, as directed. Stencil on the interior face of the outside beam the completion date of the painting operation. Do this work at each end of the structure where painting is specified.

PART 5 MEASUREMENT

- A. When this Section is specified on the plans to be a pay item, it will be measured by the lump sum or by each structure, structure unit, or group of structures as shown on the plans.

PART 6 PAYMENT

- A. The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly, but will be subsidiary to bid items of the Contract, unless otherwise specified as a pay item in the Contract.
- B. When this Section is specified as a pay item, the work performed and materials furnished in accordance with this Section and measured as provided under "Measurement" will be paid for at the price bid for "Cleaning and Painting Existing

Structures,” “Cleaning and Painting Existing Railing,” or “Cleaning and Painting Existing Piling” for the system specified and, when paid by each, for the structure description by reference number. “Cleaning and Painting Existing Structures” includes painting of railing and piling unless otherwise shown on the plans. This price is full compensation for paint; cleaning, spot painting, and painting; removal of vegetative obstructions; containment systems; traffic protection and scaffolding; disposal of waste; and materials, equipment, labor, tools, and incidentals.

END OF SECTION