

## SECTION 1060—SHOP PAINTING STRUCTURAL STEEL

**1060.1 DESCRIPTION**—This work is the cleaning and priming of structural steel in the shop, using a self-curing, inorganic, zinc-rich primer, and the application of intermediate and finish coats in the shop in the field.

**(a) Prequalification.** When shop painting structural steel, use only [Bulletin 15](#) approved paint shops that are certified by the AISC under its Sophisticated Paint Endorsement (SPE) quality program or by the Society for Protective Coatings (SSPC) under its QP3 quality program. Use Shops certified to the “enclosed shop” category. Use shops that are fully certified for the duration of time they are performing surface preparation and coating application. Apply complete coating system in an “enclosed shop” except for touch up painting.

For shop removal and disposal of hazardous coating, including but not limited to lead based paint, use only shops certified to SSPC-QP3 and listed in [Bulletin 15](#) as approved paint shops.

### 1060.2 MATERIAL—

**(a) Coating System for Plain Carbon Steel.** Use an approved, proprietary, self-curing, inorganic, zinc system, from a manufacturer listed in [Bulletin 15](#), consisting of a self-curing, inorganic zinc primer, an epoxy or urethane intermediate coat, and an aliphatic urethane finish coat. Do not mix components or coats from different systems. Use the products of one manufacturer for the entire system.

**1. Submittal Requirements.** Submit the following information to the District Executive:

- Infrared curves (2.5  $\mu\text{m}$  to 15  $\mu\text{m}$  (2.5 microns to 15 microns)) for the zinc primer, intermediate coat, and finish coat including curves for the vehicle (binder) of each component and for the mixed paint;
- Mass per liter (weight per gallon), at 25 °C (77F), for zinc primer vehicle and the intermediate and finish coat paints;
- Viscosity in Krebs Units, at 25 °C (77F), for the zinc primer vehicle and the intermediate and finish coat paints;
- Percent solids by mass (weight) of the zinc primer vehicle and the intermediate and finish coat paints;
- Percent of metallic zinc by mass (weight) in the cured zinc primer coat, dry film;
- Percent of metallic zinc by mass (weight) in the zinc pigment component;
- Finish coat color chips for selection of color by the District Bridge Engineer; and
- Technical data sheets, safety data, and specific application instructions for all coats. In the event of a conflict between the data/instruction sheets and these Specifications, the Specification requirements will govern. Work will not be allowed to proceed until this information is received.

**2. Technical Representation.** Furnish the services of a paint or a painting technical representative from the paint manufacturer at the beginning of operations and when required.

**3. Damage Prevention and Repair Procedures.** Furnish a damage prevention plan with the structural steel shop drawings that describes the procedures and protective materials to be used to prevent damage to paint coats. Have the plan cover the period of time from when paint coats are applied in the shop until erection is completed in the field.

Furnish the manufacturer's recommended surface preparation, coating application, and coating repair procedures. Include the manufacturer's recommended surface preparation methods, coating material, application methods, and application conditions. Include the manufacturer's recommended methods for correction of damage to one or more coats, including correction of damage caused in handling, shipping, and erection; correction of deficient or excessive coating thickness; correction of runs, sags, peeling, and poorly adhered coating; and removal of zinc salts and other contaminants that would be detrimental to succeeding coats.

**(b) Coating System for Galvanized Steel.** Use an approved two-coat paint system, from a manufacturer listed in Bulletin 15, consisting of an epoxy polyamide as an intermediate coat and an aliphatic urethane as a finish coat. Select colors for the intermediate and finish coat before fabrication. Do not use the system prime coat. Do not mix components from different systems. If a wash primer is used, provide the manufacturer's certification of compatibility with the selected paint system.

- Furnish submittals as specified in [Section 1060.2\(a\)1](#) for intermediate and finish coats. Furnish technical representation as specified in [Section 1060.2\(a\)2](#). Furnish damage prevention and repair procedures as specified in [Section 1060.2\(a\)3](#).

### 1060.3 CONSTRUCTION—

#### (a) General.

**1. Protection of Structure, Persons, and Property.** When applying the full intermediate and finish coats in the field or when repairing coating damage in the field, protect pedestrians, vehicles, and other traffic, upon or under the bridges; the bridge superstructure and substructure; and surrounding property surfaces, buildings, and grounds. Protect against damage or disfigurement from surface preparation media and spatters, splashes, overspray, and smirches of paint or material. As necessary, furnish adequate canvas or other suitable containment materials, for protection.

For field coating work, remove paint dropped on surfaces not designated to be coated. Remove debris from cleaning operations, empty paint containers, and other refuse.

**2. Pollution Controls.** Prevent environmental pollution including stream and air pollution caused by paint, paint sprays, paint chips, dust, or other harmful materials.

Comply with the regulations of the DEP and the State Fish Commission.

Do not proceed with work until the Department receives written acknowledgement that the regional office of the DEP was contacted and is aware of the controls to be exercised to complete the work in compliance with its regulations. No extension of contract time will be allowed for delays caused by failure to make a timely submission for this acknowledgement. Do not claim for costs to comply with requirements of regulatory agencies.

Conviction of a criminal summary complaint issued by the DEP may be cause for suspension of prequalification.

#### (b) Surface Preparation.

**1. Solvent Cleaning.** Where oil and grease are present remove according to the SSPC Surface Preparation Specification using No. 1 Solvent Cleaning (SSPC-SP1). Perform cleaning before blasting. If contamination remains after blasting, reclean with solvent.

**2. Other Cleaning.** Remove soil, concrete spatter, drawing compounds, salts, or other foreign matter by brushing with stiff fiber or wire brushes; by scraping; by cleaning with solutions of biodegradable cleaners, provided such cleaners are followed by a fresh water rinse or by a combination of these methods. Satisfactorily remove detrimental deposits from new weld areas. When directed remove water soluble salts, by high pressure water blast cleaning (gauge pressure of 6 MPa (800 psig), minimum).

**3. Blast Cleaning.** Blast clean all steel to a near-white condition, as defined in SSPC-SP 1085. Determine the near-white blast condition by use of a Maryland Pictorial Standard, if shot blast is used; or SSPC-VIS 1-89, if sand or grit is used. Blast clean to leave an anchor pattern, from 40  $\mu\text{m}$  to 90  $\mu\text{m}$  (1 1/2 mils to 3 1/2 mils) deep, in a dense, uniform pattern of depressions and ridges. Determine pattern depth by the Keane-Tator Surface Profile Comparator, or Testex Replica Tape. Grind laminations raised by the blasting operation to a flush surface and reblast the ground area to obtain the specified anchor pattern.

**4. Preparing Galvanized Surfaces for Painting.** Prepare entire surface according to SSPC-SP1. Remove unsightly areas including rough and/or heavy galvanizing as directed according to SSPC-SP2 and SSPC-SP3. Apply wash primer, compatible with galvanizing and selected paint system, or brush-off blast the entire surface as indicated on the approved drawings. Do not use steel shot for brush-off blast. Use a blast media with a low level of aggressiveness, such as crushed walnut shells, corn cobs or bi-carbonate of soda for example, but not inclusive.

**5. Cleaning Concrete.** After completing the superstructure work, remove rust stains on the substructure concrete, using an acceptable concrete rust remover, in the manner recommended by the manufacturer of the rust remover. Flush with water after application of rust remover.

### (c) Painting.

#### 1. Mixing Paints.

**1.a Primer.** Mix the primer with a high shear mixer (such as a jiffy mixer), according to the manufacturer's recommendations to a smooth, lump free consistency. Do not use paddle mixers or paint shakers. Mix in the original containers. Continue mixing until all of the metallic powder or pigment is in suspension. Ensure that all of the coating solids that might have settled to the bottom of the container are thoroughly dispersed.

**1.b Subsequent Coats.** Mix each subsequent coat to achieve and to maintain a homogeneous mixture.

**1.c** Strain the mixture through 500  $\mu\text{m}$  to 250  $\mu\text{m}$  (30 mesh to 60 mesh) screen openings to remove large particles. Equip paint containers with a mechanical agitator so the mixture is in motion throughout the application period.

**2. Thinning Paint.** Thin the paint, only as recommended by the manufacturer.

**3. Conditions for Painting.** Apply paint only on clean and dry surfaces and only during periods of favorable weather. Do not paint when the temperature of the air, paint, or metal is below 5 °C (40F), and at no time below that described in the technical data sheet; when the air is misty; or when conditions are otherwise unsatisfactory. Do not paint damp or frosted surfaces or surfaces hot enough to cause the paint to blister, to produce a porous paint film, or to cause the vehicle to separate from the pigment. Paint only when the surface temperature is at least 3 °C (5F) above the dewpoint. Determine the dewpoint with the use of a psychrometer and psychrometric tables.

Allow each coat of paint to dry before applying the succeeding coat. Follow the manufacturer's recommendations for drying time, unless a longer drying time is required.

In damp or cold weather, keep the shop work under cover until thoroughly dry, or until weather conditions allow exposure.

**4. Application.** Apply primer and subsequent coats immediately after inspection and acceptance of the surface. Apply primer the same day the metal is cleaned. If the metal is blast cleaned and remains unpainted overnight, blast clean it again before priming.

Spray apply inorganic zinc-rich primer according to the manufacturer's recommendations. Striping of the inorganic zinc-rich primer is not required.

For application of the intermediate and finish coats, wet stripe all edges, bolts, welds, rivets, corners, crevices, and other irregularities either by brush or by a separate and distinct spray operation, before the application of the full coat. Provide safe access for inspection, as requested by the Representative, before application of the full coat over the striped areas. Do not apply the full coat until approval of the striping is provided.

Apply intermediate and final coats to areas of steel that will be inaccessible before the stage of construction that prevents access.

Apply the complete project site. Other types of prime coats may be substituted for the galvanized coating only if prior approval is received from the Department. Submit the written approval request at the preconstruction conference. Follow the paint manufacturer's recommendations to ensure compatibility between the prime coat and the intermediate coat and to ensure adhesion when the surface of the prime coat has been contaminated, for example, by bolt/nut lubrication.

**5. Shop Painting.** Apply the primer after shop fabrication, inspection and acceptance, but before shipment. Do not apply primer to galvanized surfaces.

Paint field contact surfaces and surfaces to be in contact with concrete with primer only. Do not paint within 50 mm (2 inches) of location of design field welds.

Coat machine-finished metal surfaces, subjected to movement, with either corrosion-preventive compound, conforming to the requirements of Military Specification MIL-C-16173D, Grade 2, or other acceptable material, as soon as possible after acceptance and before removal from the shop. Paint other surfaces of metal, either milled or finished, with primer. Certify the coating material as specified in [Section 106.03\(b\)3](#).

Paint or stencil the required dates, weight markings, and erection markings only on previously primed or painted surfaces. Use a suitable paint that does not react with other primer or paint coats, and one that is not visible after the final field paint coat.

Allow the paint to dry completely before loading and shipping.

Protect the paint from damage and from contamination. Use coverings and proper storage, handling, shipping and erection techniques.

Repair damaged and contaminated coatings according to the manufacturer's recommendations.

**6. Field Painting.** Before paint is applied, clean dust and dirt and other contamination from the freshly painted surfaces.

If concreting or other operations have damaged the coatings, reclean and, if directed, repaint the damaged areas.

Clean unpainted surfaces, including bolts and field welded areas, as specified in [Section 1060.3\(b\)](#) and prime according to the recommendations of the manufacturer of the self-curing, inorganic zinc-rich system.

Painting of shear connectors is not required.

Do not apply field coats between October 31 and April 1 unless otherwise permitted in writing by the District Executive.

Apply intermediate and final coats according to the manufacturer's recommendations consistent with environmental constraints. Use acceptable brushes, rollers, spray equipment, or any combination of equipment that gives satisfactory results.

**6.a Spray Painting.** If air spray is used, provide suitable traps or separators to exclude oil and water from the air. Keep the paint thoroughly mixed by continuous mechanical agitation.

**6.b Roller Painting.** Use rollers that do not leave a stippled texture in the paint film. Use rollers only on flat, even surfaces to produce a paint film of even thickness with no skips, runs, sags, or thin areas.

**6.c Brush Painting.** Use flat brushes, not wider than 110 mm (4 1/2 inches), or round or oval brushes.

Manipulate the paint under the brush to produce a uniform, even coat. Work the paint into corners and crevices. Move the brush in a series of small circles to thoroughly fill irregularities in the surface, then brush out and smooth by a series of parallel strokes until the paint film has an even thickness.

**6.d Painting Inaccessible Areas.** Thoroughly cover surfaces inaccessible to normal painting methods by use of sheepskin daubers, spray, or other means to ensure thorough coverage.

**6.e Stenciling.** After the final coat of paint has dried, stencil the following information on the inside face of the right fascia member at the near abutment ends unless directed otherwise:

- The bridge identification number,
- The month and year of completion,
- The specification identification of the cleaning method, and
- The list identification of the paint system.

Stencil using suitable black paint to provide uniform block lettering 50 mm to 75 mm (2 inches to 3 inches) high.

**7. Thickness of Coats.** The cumulative dry film thickness will be determined by use of a Magnetic Dry Film Thickness Gage, or the thickness of each coat will be determined by the use of a Tooke gage, or equal. Increase the thickness of coating, if directed by the Inspector-in-Charge, to ensure a finish that is uniform in color and appearance.

Apply the three-coat system as follows:

**7.a Primer.** Spray apply, as recommended by the manufacturer, in a single application, employing multiple spray passes, to a dry film thickness of 75  $\mu\text{m}$  to 130  $\mu\text{m}$  (3 mils to 5 mils) above the anchor pattern. The thickness will be determined with a Magnetic Dry Film Thickness Gage, and measured according to SSPC-PA2-73T. A dense and uniform appearance is required after the applied coating has cured. For areas deficient in coating thickness and areas exhibiting mudcracking, repair, as recommended by the manufacturer.

**7.b Intermediate Coat.** For an epoxy/urethane system apply the intermediate coat to a minimum dry film thickness of 100  $\mu\text{m}$  (4 mils).

For all other systems apply the intermediate coat to a minimum dry film thickness of 25  $\mu\text{m}$  (1 mil).  
Use a color that contrasts with the colors of the zinc and finish coats.

**7.c Finish Coat.** For an epoxy/urethane system apply the finish coat to a minimum dry film thickness of 50  $\mu\text{m}$  (2 mils).

For all other systems apply the finish coat to a minimum dry film thickness of 75  $\mu\text{m}$  (3 mils).

**8. Removal of Unsatisfactory Paint.** The painting is unsatisfactory if rusting occurs; the paint coat lifts, blisters, wrinkles, has excessive runs or sags, or shows evidence of application under unfavorable conditions; the workmanship is poor; impure or unauthorized paint has been used; or for other reasons determined by the Representative. Remove unsatisfactory paint, clean the metal, and repaint, as specified.

**1060.4 MEASUREMENT AND PAYMENT**—Painting structural steel is incidental to the items of work painted.