

SECTION 1070—PAINTING EXISTING STRUCTURAL STEEL

1070.1 DESCRIPTION—This work is the cleaning and painting of existing bridges using a three-coat system, including an organic zinc-rich primer. This work includes abrasive blasting/paint removal, waste disposal, soluble salt/chloride remediation, and application of the three-coat paint system.

1070.2 MATERIAL—

(a) Coating System. Obtain material from a paint system listed in [Bulletin 15](#), listed under “Approved Three-Coat Organic Zinc-Rich Systems.” Use a system conforming to the following requirements:

- **Prime Coat**—Organic zinc primer (epoxy or urethane), with pigment primarily consisting of zinc dust.
- **Intermediate Coat**—Epoxy or urethane, formulated without using any heavy metal materials listed in the Resource Conservation and Recovery Act (RCRA) regulations for toxic characteristics.
- **Finish Coat**—Aliphatic urethane, formulated without using any heavy metal materials listed in the RCRA regulations for toxic characteristics.

Obtain the three parts of the three-coat system from one manufacturer. Do not mix components or coats from different systems of the same manufacturer or other manufacturers.

(b) Submittal Requirements. Provide submittals to the District Executive a minimum of 20 calendar days before beginning the painting. Do not begin painting until submittals have been accepted. Include the following:

1. Finish Coat Color Chips. Provide color chips of the indicated color.

2. Coating Certifications. Provide the brand names of the products selected for the system in use. For each batch delivered, provide the production lot number of the batch on the certification specified in [Section 1070.2\(d\)](#). Copies of the certification will be provided to the Representative and Chief Chemist of BOCM.

3. Manufacturers’ Data Sheets and Instructions. Provide current technical data sheets and MSDS for each coat. Provide specific application instructions for all coats including thinning; coating repair procedures, as specified in [Section 1070.3\(d\)6](#); and recoat times at various temperatures.

In the event of a conflict between the data/instruction sheets or procedures and the specifications, the specifications will govern unless directed otherwise.

4. DEP Notification. Provide written acknowledgement that the regional office of the DEP was notified of the painting and that it is aware of the controls that will be exercised.

5. Soluble Salt Remediation. Provide a written procedure for the removal of chloride and other soluble salts and the steps that will be taken to properly clean the steel before painting if wet methods are employed.

6. QC Plan. Submit a QC Plan, as specified in [Section 106.03\(a\)2](#). Include written procedures for review and acceptance of the quality of surface preparation, cleaning, and the application of the paint coats. Include the procedure and inspection points for each inspection specified in [Section 1070.3\(d\)8](#).

7. Concrete Rust Remover. Provide the name of the product that will be used to remove rust stains from concrete and the procedures that will be followed to use and remove the product, including containment and disposal of the waste.

(c) Technical Representation. Furnish the services of a technical representative from the paint manufacturer at the beginning of operations and when required during operations.

(d) Certification. [Section 106.03\(b\)3](#) modified as follows:

- Submit a dated certification, Form CS-4171, from the manufacturer, that each batch of the coating system meets specifications. Include in the certification the product name for each coat of the system being supplied and the production lot number of the batch being certified.

1070.3 CONSTRUCTION—

(a) General.

1. Protection of Structure, Persons, and Property. Conduct activities associated with the coating work according to applicable Federal (OSHA), EPA, State and local (based on bridge location) safety regulations and SSPC-PA Guide 3, “A Guide to Safety in Paint Application.”

Use scaffolding and rigging conforming to OSHA regulations and providing safe and ready access to work areas for inspection purposes.

Protect pedestrian, vehicular, and other traffic upon or under bridges, bridge superstructures and substructures, surrounding property, surfaces, and buildings against damage or disfigurement from surface preparation media, spatters, splashes, overspray, and smirches of paint or material. Furnish canvas or other suitable containment materials, for protection, as necessary.

Remove paint dropped on surfaces not designated to receive coatings, debris from the cleaning operations, empty paint containers, and other refuse. Correct damage resulting from the painting operations.

2. Pollution Controls. Prevent environmental pollution including stream and air pollution caused by surface preparation media, paint spills or overspray, paint chips, dust, or other harmful materials.

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

Do not begin work until the Department receives written acknowledgement that the regional DEP office was contacted and is aware of the controls to be exercised to complete the work in compliance with DEP regulations. The Department will not extend the contract time for delays caused by a failure to make a timely submission of this acknowledgement.

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

(b) Surfaces to be Painted. Unless otherwise specified, paint all surfaces previously painted and all surfaces of new metal. Do not paint aluminum and galvanized metal surfaces, unless otherwise specified. Do not apply intermediate and finish coats to surfaces that will be in contact with concrete. Coat those surfaces with a single coat of organic zinc primer only. If new pre-galvanized bolts are used, proceed as specified in [Section 1070.3\(d\)4](#) for galvanized surfaces.

(c) Surface Preparation.

1. Solvent Cleaning. Remove oil and grease present on bare steel according to SSPC Surface Preparation Specification No. 1, “Solvent Cleaning” (SSPC-SP1) before blasting. If contamination remains after blasting, re-clean with solvent before painting. If grease, oil, or similar contaminants become deposited on any coat that will receive another coat, remove according to SSPC-SP1 before the application of the subsequent coat.

2. Other Surface Cleaning. Remove soil, concrete spatter, drawing compounds, salts, and 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.

3. Weld Spatter, Sharp Edges, Flame-Cut Steel, and Holes. Remove slag, flux deposits, and weld spatter from newly installed steel. Grind any resulting burrs smooth, including burrs around holes.

4. Pack Rust and Rust Scale. Remove heavy corrosion (rust scale) and loose pack rust (e.g., as found in crevice areas) by hand and power tool cleaning before abrasive blast cleaning. Exercise extreme care to avoid nicking or gouging the steel during removal. If nicks or gouges occur, the Representative may suspend activities until appropriate adjustments are made to prevent a recurrence.

Caulk areas as directed.

5. Test Areas. Before proceeding with the production blast cleaning operation, prepare test sections on each structure of at least 1 m² (9 square feet), in locations considered by the Inspector to be representative of existing surface conditions and structural characteristics.

Blast clean test section areas using the same equipment, materials, and procedures that will be used for the production blast cleaning. Provide safe access for close visual inspection and testing. Do not proceed with the production blast cleaning operation until the Inspector agrees that the surface of each test section is acceptable.

6. Blast Cleaning and Abrasives. Blast clean all steel to a near-white condition, as defined in SSPC-SP10, except that a slight residue of paint or rust in seams between plates and around rivet heads is acceptable.

Determine the near-white blast condition by use of SSPC-VIS 1-89. In the event of a conflict between the pictorial standard and the written SSPC definition, follow the written definition.

Utilize clean, dry compressed air for abrasive blast cleaning. Conduct blotter test(s) according to [ASTM D 4285](#) a minimum of one time each shift for each compressor system in use to verify that the air supply is free of moisture and oil contamination. Conduct the tests in the presence of the Inspector.

Select abrasive size and type based on the type, grade, and surface condition of the steel to be cleaned and based on the finished surface condition to be attained for the paint that is to be applied. Select abrasives that are sized to create a surface profile from 40 µm to 90 µm (1 1/2 mils to 3 1/2 mils) deep in a dense, uniform pattern of depressions and ridges. Determine the surface profile depth by the Keane-Tator Surface Profile Comparator (G/S or SH disc as appropriate), or Testex Replica Tape according to [ASTM D 4417](#). If the profile is outside of the specified range, obtain different abrasives and reclean the steel.

Use abrasives that are clean and dry. Use recyclable abrasives to create the least amount of waste that is practicable. Acceptable recyclable abrasives are aluminum oxide, silicon carbide, zirconium aluminum oxide, steel grit, and steel shot. Use non-recyclable abrasives only if allowed. When the use of non-recyclable abrasives is allowed, use low dust abrasives such as coal slag (e.g., Black Beauty) or Staurolite (e.g., Star Blast) and use the abrasive only once. Do not use silica sand. Select the non-recyclable abrasives according to SSPC-AB1.

Use a reclamation system to clean the recyclable abrasive and return it for reuse. Confirm the cleanliness of the recycled abrasive during use according to SSPC-AB2. Equip the reclamation system with dust collectors to ensure that the discharge meets air quality requirements.

Grind laminations raised by the blasting operation to a flush surface and reclean the ground area to obtain the specified anchor pattern. Upon approval, restore the profile in limited areas according to SSPC-SP11.

7. Chloride/Ferrous (Soluble) Salt Removal. In the presence of the Inspector, remove chloride and other water-soluble salts to level SC-2 of SSPC-SP12. These thresholds are:

Chloride	< 7µg/cm ²
Ferrous Ion	< 10µg/cm ²
Sulfate	< 17µg/cm ²

Conduct tests across the structure with special attention to pitted areas. Use the cell method of SSPC-TU4 to collect the samples. Conduct this testing after abrasive blasting.

Provide the proposed method of chloride removal (e.g., fine abrasive mix of grit/shot, low- or high-pressure water cleaning according to SSPC-SP12) in the QC Plan specified in [Section 1070.2\(b\)6](#). Include the process that will be used for recleaning the steel.

If the chloride/ferrous salts are removed using wet methods after blast cleaning is performed, remove the resulting flash rust before applying the coating.

8. Cleanliness Before Painting. Before painting, remove abrasive residue and dust from the surface. Pay specific attention to pockets and corners. Unless directed otherwise (e.g., in the case of lead-containing paint), conduct the cleaning using clean bristle, fiber, or hair brushes; vacuuming; blowing with clean, dry, compressed air; or a combination thereof.

Apply primer within 10 hours after the metal is cleaned. If the metal is blast-cleaned and remains unpainted for longer than 10 hours, or if cleaned steel exhibits evidence of rust back, analyze for chloride contamination as specified in Section 1070.3(c)7. If chloride is present, remediate as specified in 1070.3(c)7. If chloride is not present, blast clean it again before priming. Apply primer only after the Inspector has accepted the prepared surface.

9. Cleaning Concrete. After completing the superstructure work, provide a concrete rust removal method. This can be by abrasive blasting to obtain a condition conforming to SSPC-SP-7. Brush, blast, or use an acceptable concrete rust remover, in the manner recommended by the manufacturer of the rust remover, to remove rust stains from the substructure concrete. Flush with water after application of rust remover. Provide for the Representative's review and acceptance, the name of the product proposed for use and the procedures that will be followed to apply, remove, contain, and dispose of the waste.

(d) Painting.

1. Storage and Mixing of Paints. Store all paints under cover, out of direct sunlight and between 4 °C and 38 °C (40F and 100F). If the storage requirements of the manufacturer are more restrictive, comply with the more restrictive requirements. Mix the coatings as follows:

1.a Prime Coat. Mix primer according to the requirements of the coating manufacturer. Unless prohibited by the manufacturer, mix the coating with a high shear mixer (e.g., a jiffy mixer). When the manufacturer prohibits the use of a high-speed mixture (e.g., in the case of moisture-cured urethanes), comply with the manufacturer's instructions. Mix the coating to achieve a smooth, lump-free consistency. 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 Intermediate and Finish Coats. Mix each coat according to the manufacturer's instructions to achieve and maintain a homogeneous mixture.

1.c Thinning Paint. Thin paint using thinners provided by the manufacturer, and in proportions as recommended by the manufacturer. Do not exceed local VOC regulations for any coat at the time of application.

1.d Straining. Strain the mixture through a 500 µm to 250 µm (30 mesh to 60 mesh) screen to remove large particles.

2. Weather Conditions for Painting. Apply coating to clean and dry surfaces during periods of favorable weather. Do not apply coating if any of the conditions specified in [Sections 1070.3\(d\)2.a-e](#) are present. If the requirements of the coating manufacturer, are more stringent, comply with those requirements.

2.a. Calendar. Do not apply coating in the field between October 31 and April 1 unless otherwise allowed in writing by the District Executive.

2.b Temperature. Do not apply coatings if the temperature of the air, paint, or metal is below 4 °C (40F) or greater than 43 °C (110F) or is forecasted to drop below 4 °C (40F) before the coating dries according to the times specified in the manufacturers' technical data sheet.

2.c Dew Point. Do not apply coatings if the temperature of the surface is less than 2.8 °C (5F) greater than the dew point.

2.d Relative Humidity. Do not apply coatings if the relative humidity is below or above the thresholds established in the manufacturer's written product data sheets.

2.e Dampness. Do not apply coatings if the air is misty, the surfaces are damp or frosted, or if weather conditions are otherwise unsatisfactory.

In damp or cold weather, keep the coating work protected until thoroughly dry according to the manufacturer's instructions, before exposing the steel to the elements.

3. Methods of Application. Apply all coats using equipment that is acceptable to the manufacturer, that is consistent with environmental constraints, and that provides a finish that is acceptable to the Department. Use brushes, rollers, spray equipment, or any combination of equipment that gives satisfactory results.

3.a Spray Painting. If air spray is used, provide suitable traps or separators to exclude oil and water from the air. Conduct blotter test(s) according to [ASTM D 4285](#) a minimum of one time each shift for each compressor system in use to verify that the air supply is clean and dry. Conduct tests in the presence of the Inspector. Unless prohibited by the manufacturer, equip paint containers with a mechanical agitator so the mixture is in motion throughout the application period.

3.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. Do not use rollers if prohibited by the manufacturer.

3.c Brush Painting. 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. Do not use brushes if prohibited by the manufacturer.

3.d Painting Inaccessible Areas. Use sheepskin daubers, spray, or other means to thoroughly paint surfaces inaccessible to normal painting methods. Do not use daubers if prohibited by the manufacturer.

4. Application and Recoating Requirements.

4.a Removal of Contaminants. If concrete, salts, grease, oil, diesel smoke, or other surface contamination are present on prime, intermediate, or finish coats, clean the surface as specified in [Sections 1070.3\(c\)1, 2, and 7](#), and the manufacturer's recommendations. Clean the bare steel, prime, and intermediate coats before the application of subsequent coats. Clean the finish coat as directed.

4.b Stripe Coats Before application of the prime coat, apply a wet stripe coat to all edges, bolts, welds, rivets, corners, crevices, and other irregularities. Apply the wet stripe coat by brush and/or spray. The purpose of the stripe coat is to increase the build of the film on projecting surfaces, such as edges, and to ensure that the coating is thoroughly worked into and covers all irregular surfaces, such as crevices.

Extend the stripe coat approximately 25 mm (1 inch) from edges, corners, rivets, and other irregularities that are stripe-coated.

Allow a minimum of 15 minutes for inspection of each stripe coat before applying each full coat. Do not apply the full coat until the inspector accepts the respective stripe coat.

Before the application of the intermediate coat, apply a wet stripe coat of the intermediate coating, using the same procedure as for the prime coat. Do not apply the intermediate stripe coat until the prime coat has dried according to the manufacturer's instructions.

A stripe coat is not required for the finish coat, but pay particular attention to providing complete coverage of all surfaces including edges, bolts, welds, rivets, corners, crevices, and other irregularities.

4.c Galvanized Bolts and Nuts. Remove grease, oil, dirt, dust, and similar interference material from the surfaces of galvanized bolts and nuts according to SSPC-SP1 and SSPC-SP2. Provide SP-2 to an overall wire-brushed condition. Use bolts and nuts that are prime-coated before delivery. Apply only intermediate and finish coats to the bolts and nuts.

5. Coating Thickness and Continuity. Apply the three-coat system to the dry film thicknesses specified in Sections 1070.3(d)5a to c. Achieve a surface that is free of shadow-through, runs, sags, overspray, dryspray, pinholes, skips, misses, and other film discontinuities.

Determine the cumulative dry film thickness of each coat using a Magnetic Dry Film Thickness Gage according to SSPC-PA2, except measure each 9 m² (100-square foot) increment of the surface. Determine the thickness of each coat by subtracting the thickness of the underlying coats from the cumulative readings. If questions are raised regarding the thickness of an individual coat, use the Tooke Gage, or equal. Repair damage created by the Tooke Gage.

If the thickness of any coat is less than specified, unless otherwise allowed, apply additional coating according to the manufacturer's instructions and as specified before applying the next coat. Provide inspection access so that the work can be corrected and inspected before the expiration of recoat times

If the thickness of any coat exceeds the specified maximum, or the surface exhibits runs, sags, dry spray, overspray, or other discontinuities, remove the excessive thickness or discontinuity by power tool cleaning or abrasive blast cleaning. If the thickness is reduced to below the specified minimum, recoat the area. If the excessive thickness or discontinuity being removed is in the finish coat, apply a thin coat of finish material to seal the surface and to smooth out any surface irregularities resulting from the removal process.

5.a Prime Coat. Apply the primer coating to a total dry film thickness (above the surface profile) in a single application, employing multiple spray passes, of 75 µm to 130 µm (3 mils to 5 mils) above the anchor pattern. The Inspector will determine thickness with a Magnetic Dry Film Thickness Gage, and measure thickness according to SSPC-PA2-73T.

Obtain a dense and uniform appearance of the cured coating. The Inspector will assess cure by coin rub or Methyl Ketone (MeK) wipe testing. For areas deficient in coating thickness and areas exhibiting mudcracking, repair, according to the manufacturer's recommendations.

5.b Intermediate Coat. Apply intermediate coating to a dry film thickness (above the primer) of 75 µm to 130 µm (3 mils to 5 mils), or a manufacturer's specified dry film thickness, if greater than 75 µm to 130 µm (3 mils to 5 mils).

Use an intermediate coat color that contrasts with the colors of the prime and finish coats.

5.c Finish Coat. Apply the finish coat (above the intermediate) to a dry film thickness of 50 µm to 100 µm (2 mils to 4 mils) or a manufacturer's specified dry film thickness, if greater than 50 µm to 100 µm (2 mils to 4 mils).

6. Removal/Repair of Defective Paint. A paint coat is defective if: it is damaged; it lifts, blisters, or wrinkles; it has excessive runs or sags; it shows evidence of application under unfavorable conditions; it does not meet the coating thickness and continuity requirements specified in Section 1070.3(d)5; rusting occurs; the workmanship is poor; or impure or unauthorized paint has been used.

Remove defective paint and repair and recoat damaged or defective areas. When the defective paint or damage extends to bare steel or bare steel is exposed, clean the surface by SSPC-SP10 or SSPC-SP11 as approved.

When the damage or defective paint does not expose the underlying steel, clean the surface according to SP3 to remove the defective material and loose coating, and re-apply the affected coats. If, in the opinion of the Representative, the damage is too extensive for localized power tool cleaning, clean the surface according to SSPC-SP7 to remove all loose and defective material, and reapply the effected coats.

For all repairs, roughen the coating in overcoat areas to ensure good adhesion of the repair material to the underlying coating. Feather the surrounding coating to expose a minimum of 12 mm (1/2 inch) of each coat and to provide a smooth transition into intact, adherent material, for all coats.

7. Stenciling of Final Product. After the final coat of paint has dried, stencil the following information on the inside face of the fascia member at the near and far abutment ends, unless directed otherwise:

- The bridge identification number,
- The month and year of completion,
- The specification identification of the cleaning method, and
- Identification of the paint system ([Bulletin 15](#) PEQ #).

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

8. Contractor Inspection and QC Program. Perform inspections and tests as described in the QC Plan specified in [Section 1070.2\(b\)6](#). Document inspections and provide a copy to the Representative.

Before beginning surface preparation work, perform inspections as a record of initial conditions. During work, perform the QC inspections necessary to ensure that work is performed in strict compliance with the specifications and the manufacturer's instructions.

At a minimum, inspect the following:

- Ambient conditions/compressed air cleanliness;
- Suitability of protective coverings;
- Surface cleanliness and profile;
- Chloride removal;
- Coating storage, mixing, and application;
- Dry film thickness and continuity of each coat;
- Dry time, curing, and cleanliness of each coat; and
- Touch up and repair of damaged or defective coats.

9. Access for Representative Inspection. Provide safe access and allow time for Department inspections, as requested by the Representative, for all phases of the work, including surface preparation; the application of each coat, including stripe coats; and inspection of the completed system.

1070.4 MEASUREMENT AND PAYMENT—Lump Sum.

The price includes abrasive blasting/paint removal, waste disposal, soluble salt/chloride remediation, and application of the three-coat paint system. The price also includes removal of coatings from surfaces not designated to be painted; repair of any damage resulting from the painting operation; removal of coating that does not meet specifications and recoating of the surfaces; and controls necessary to comply with the requirements of regulatory agencies.

The price does not include caulking.