

Section 716. SHOP CLEANING AND COATING STRUCTURAL STEEL

716.01 Description. This specification covers shop cleaning and application of a complete coating system on new structural steel. This work is included in the work of furnishing and fabricating structural steel. This section also covers the field cleaning and repair of surfaces damaged in shipping, handling, and erecting the structural steel, and the repair of damaged galvanized surfaces.

Cleaning criteria and other coating terms are defined in the Society for Protective Coatings (SSPC) *Steel Structures Painting Manual*, Volumes 1 and 2.

716.02 Materials. Materials shall meet the following requirements.

Bridge Coating System 915

All blast cleaning shall be done using an approved low dusting abrasive, steel grit or shot, or a combination of these and shall have a gradation such that the abrasive will produce a uniform profile of 1 mil to 2.8 mils using extra coarse Testex Replica Tape. Abrasives will be selected from the Qualified Products List.

The coating for faying surfaces of slip critical connections shall be an organic zinc-rich primer. The primer shall meet Class B (0.5 or greater) slip coefficient requirements of the Research Council on Structural Connections' Specification for Structural Joints Using ASTM A325 or A490 Bolts. The slip coefficient shall be verified by testing according to the Testing Method to Determine the Slip Coefficient of Coatings Used in Bolted Connections' Specification for Structural Joints Using ASTM A325 or A490 Bolts, Appendix A. Testing shall be conducted by an independent laboratory. Before coating, the fabricator shall furnish the Engineer with the certification of testing showing that the primer meets Class B slip coefficient. This coating shall be from the same manufacturer as selected for coating the remainder of the structure.

The sealant for perimeter of beam plates shall be selected from the Qualified Products List. It shall be supplied in caulking tubes.

Zinc-rich paint for the repair of damaged galvanized surfaces shall be selected from the Qualified Products List. The zinc-rich paint used shall be a closely matching gray color.

716.03 Construction.

- A. **Cleaning Structural Steel.** Before cleaning remove all oil or grease deposits as per SSPC SP1. Clean all surfaces to SSPC-SP 10 (near-white). Grind any fins, tears, slivers, and burred or sharp edges on steel members to SSPC-SP 11 bare metal finish. The visual standard from SSPC-VIS 1, SSPC-SP 10 that corresponds to the initial rust condition will be used to check for acceptable steel cleanliness.

All surfaces to be coated must have a uniform profile of 1 mil to 2.8 mils measured using extra coarse Testex Replica Tape.

All abrasive shall be removed from steel surfaces with a commercial grade vacuum cleaner equipped with a brush-type cleaning tool, or by double blowing with partial vacuuming. If the double blowing method is used, the top surfaces of all structural steel, including flanges, longitudinal stiffeners, splice plates, hangers, etc., shall be vacuumed after the double blowing operations are completed. The air line used for blowing the steel clean shall have an in-line water trap and the air shall be free of oil and water as it leaves the air line. Keep the steel dust-free and prime within eight hours of cleaning.

All areas where field welding is required, except the areas where the stud-shear connectors will be welded to the top flange, shall be masked prior to shop coating. Areas where stud-shear connectors will be welded to the top flange shall be masked after the primer coat has been applied, but before the intermediate coat is applied. The primer dry film thickness for the top flange shall range from 1 mil to 2.5 mils.

- B. **Coating Structural Steel.** Material shall not be loaded for shipment until the shop coating has adequately cured and been inspected. The components shall be stamped "Recommended for Use" only after the loading has been completed and approved.
1. **Applying the Coating.** Apply the coating according to subsections 715.03.D.1 and 715.03.D.3.
 2. **Coating Faying Surfaces and Connections.** Faying surfaces are defined as all surfaces internal to a connection that bear on an adjacent surface including the contact surface of bolts, nuts, and washers. Bolted connections that have been fit up shall be disassembled prior to cleaning and coating. The components shall be blast cleaned separately, primed, and properly cured prior to reassembly. The connection shall be vacuumed again just prior to reassembly. If the Engineer decides the surface is not clean enough for bolting, the surface shall be scrubbed with a commercial detergent and thoroughly rinsed with water before the connection is assembled. Reassemble the connection by fully tightening the bolts using the turn-of-nut method described in subsection 707.03.D.7.c.
 - a. **Slip Critical Connections.** The primer shall be applied to all surfaces internal to the connection and all surfaces of filler plates at a minimum dry film thickness of 1 mil and a maximum dry film thickness as determined by the slip coefficient test results. The primer shall be applied to the external surfaces of splice plates with a minimum dry film thickness of 4 mils and a maximum dry film thickness of 10 mils. All other variables required for the primer to meet the requirements of Class B shall be adhered to. The faying surface shall be masked during subsequent coating operations.
 - b. **Other Connections.** All faying surfaces, other than slip critical, shall be prime coated according to subsection 715.03.D.1. The faying surface shall be masked during subsequent shop coating operations. After assembly in the field, exposed, primed only splice and other bolted connections locations shall be solvent cleaned as per SSPC-SP 1 and coated with the intermediate coat and top coat used on the remainder of the structure. Exposed surfaces of the bolts, nuts, and washers shall be coated according to subsection 715.03.D.1.

- c. **Contact Surfaces without Prime Coat.** After painting with epoxy intermediate coat, surfaces in contact that have not been prime coated shall be edge sealed with a sealant from the Qualified Products List under approved Sealant for Perimeter of Beam Repairs.
3. **Stenciling.** Stenciling shall be according to subsection 715.03.D.5 except the coating type shall be designated 4S.
- C. **Handling Coated Steel.** Extreme care shall be exercised in handling coated steel in the shop, during shipping, erecting, and constructing the bridge. Coated steel shall not be moved or handled until sufficient cure time has elapsed to ensure no damage is done to the fresh coating. The steel shall be insulated from the binding chains by softeners approved by the Engineer. Hooks and slings used to hoist steel shall be padded. Diaphragms and similar pieces shall be spaced in such a way that no rubbing that may damage the coatings will occur during shipment. The steel shall be stored on pallets at the project site, or by other means approved by the Engineer, so that it does not rest on the ground or so that components do not fall or rest on each other. All shipping and project site storage details shall be presented to the Engineer at the prefabrication meeting and they must be approved prior to shipping the steel.
- D. **Shop and Field Repair.** Shop and field repairs to the coating shall be made according to the coating supplier's recommendations except where the requirements listed in this specification are more stringent. All written procedures for shop and field repairs shall be submitted for approval by the Engineer prior to coating. Surfaces which will be inaccessible for coating after erection shall be repaired or recoated prior to erection. When the erection work has been completed, including all connections and the straightening of all bent metal, the steel shall be prepared for repairs.
1. **Cleaning.** Shop cleaning shall be done according to subsection 716.03.A. Field cleaning shall be done according to subsection 715.03.C.
 2. **Coating.** Shop coating shall be done according to subsection 716.03.B. Field coatings shall be done according to subsection 715.03.D.
- E. **Repair of Damaged Galvanized Surfaces.** Surfaces on which the zinc coating has been damaged in transporting, handling, or installing shall be repaired by the Contractor. The repair is required on all areas where the underlying steel has been exposed or the coating thickness is less than 50 percent of the specified thickness or thickness equivalent.
- The thickness of the repair coating shall be 1-½ times the thickness or thickness equivalent specified for galvanizing on the item but not less than 5 mils. Thickness equivalent: 1 ounce of zinc per square foot equals 1.7 mils.
- The repair material used may be either zinc-based solder, zinc-rich paint, or sprayed zinc as described in ASTM A 780.
- The metal shall be cleaned and the coating applied according to Annex A1, A2, or A3 of ASTM A 780, except as modified in these specifications.

If zinc-based solder is used for repair, temperature sensitive crayons shall be used to verify the preheat temperature requirements of metal prior to depositing the zinc alloy.

If zinc-rich paint is used for repair, the damaged surface shall be cleaned to near-white metal prior to application of paint. Apply the paint according to the manufacturer's recommendations for temperature and dryness.

716.04 Measurement and Payment.

Contract Item (Pay Item)	Pay Unit
Field Repair of Damaged Coating, <u>(Structure Number)</u>	Lump Sum

Field Repair of Damaged Coating will be measured as a unit for each structure. It includes making all the field repairs of the shop applied coating system including the repair of the stenciling and the coating of galvanized components that are not shop coated.

Application and shop repair of the complete coating system, including stenciling and approved sealant, will be included in the pay item **Structural Steel, Furn and Fab** (of the type specified).

Repair of damaged galvanized surfaces will be included in pay item for furnishing the galvanized component.