

## SECTION 560 COATING NEW STRUCTURAL STEEL

### 560-1 Description

Coat new structural steel in accordance with the requirements of this Section. Apply the coating system designated in the Contract Documents.

### 560-2 Materials.

**560-2.1 Coating System:** Use only coating products and systems meeting the requirements of Section 975 and listed on the Department's Approved Product List (APL).

Use Type M coal tar epoxy coatings meeting the requirements of Section 926 and listed on the Department's APL for coating of permanent bulkhead sheet piles and H piles.

**560-2.2 Thinners, Solvents and Cleaners:** Use thinners, solvents and cleaners listed on the coating manufacturer's product data sheet.

**560-2.3 Caulking:** Use caulks that are paintable, compatible with the coating system and recommended by the coating manufacturer as part of the coating system.

**560-2.4 Soluble Salts Test Kit:** Use a soluble salts test kit in accordance with SSPC-Guide 15 utilizing a Table 1 retrieval method. Ensure the test sleeve or cell creates a sealed, encapsulated environment during ion extraction and is suitable for testing all structural steel surfaces. As an alternative, electronic conductivity meters approved for use by the Engineer may be used.

**560-2.5 Abrasives:** Use properly sized abrasives to achieve the required cleanliness and anchor profile. Use abrasives meeting the requirements of SSPC-AB 1, Mineral and Slag Abrasives, SSPC-AB 2, Cleanliness of Recycled Ferrous Metallic Abrasives, or SSPC-AB 3, Newly Manufactured or Re-Manufactured Steel Abrasive and do not introduce any contamination that interferes with the coating application and performance.

Submit certification to the Engineer that the abrasives used meet the requirements of this Section and do not contain any chlorides and other salts.

For non-metallic abrasives, verify compliance with the conductivity and cleanliness requirements of SSPC-AB1. For recycled abrasives, verify compliance with the conductivity and cleanliness requirements of SSPC-AB 2 after each recycling or more frequently if required by the Engineer. Select a sample from each recycling machine in use and conduct the water-soluble contaminant and oil content tests outlined in SSPC-AB 2 at least one time each week or more frequently if directed by the Engineer. Conduct the non-abrasive residue and lead content tests as directed by the Engineer. If test results do not meet requirements, notify the Engineer immediately, remove and replace the abrasive, clean the recycling equipment, and conduct tests each day to confirm the equipment is functioning properly. Return to the weekly testing interval as directed by the Engineer.

**560-2.6 Rust Preventative Compound:** Use a Class 3 rust preventative compound meeting the requirements of Military Specification MIL-C-11796C, Corrosion Preventative Compound, Petrolatum, Hot Applied.

**560-2.7 Storage:** Store materials in conformance with the manufacturer's recommendations.

### **560-3 Equipment.**

**560-3.1 Compressed Air:** Use a compressed air system capable of delivering clean, dry, continuous nozzle pressure to achieve the required surface cleanliness and profile or spray pattern. The system must comply with the instructions and recommendations of the manufacturer of the abrasive blasting system or coating application system.

**560-3.2 Abrasive Blasting System:** Design the blasting system to produce the specified cleanliness and profile.

**560-3.3 Coating Application System:** Use the coating application equipment approved by and in accordance with the coating manufacturer's technical data requirements.

### **560-4 Environmental, Health and Safety Requirements.**

Isolate the work areas with containment devices, canvasses, tarpaulins or screens during all surface preparation and coating application operations. Dispose of all debris and waste products generated in accordance with all Federal, State and Local regulations.

### **560-5 Quality Control (QC).**

**560-5.1 Shop Preparation and Application:** Prior to applying coatings, submit a current Corporate Quality Control Plan approved by the American Institute of Steel Construction (AISC) under the Sophisticated Paint Endorsement Program or SSPC under the SSPC-QP3 certification to the State Materials Office for approval.

**560-5.2 Field Preparation and Application:** Submit a current Corporate QC Plan approved by SSPC under the SSPC-QP1 and/or SSPC-QP2 certifications as appropriate and a site specific Coating Plan to the Engineer at least 14 calendar days prior to beginning coatings work. Do not begin coatings work until the site specific Coating Plan has been approved by the Engineer.

**560-5.3 Inspection:** Ensure that all inspection equipment is maintained in accordance with the manufacturer's instructions, calibrated, and in good working condition. Ensure that all activities are observed and approved by a quality control coatings inspector meeting the requirements of this Section. Maintain daily inspection reports at the job site for review by the Engineer. Submit all daily inspection reports upon completion of the project to the Engineer or more frequently as requested by the Engineer.

### **560-6 Qualifications.**

**560-6.1 Shop:** Submit documentation to the Engineer at least 14 days prior to beginning work that the shop performing any work in accordance with this Section is certified by AISC Sophisticated Paint Endorsement or by SSPC to the requirements of SSPC-QP3.

**560-6.2 Field Contractor:** Submit documentation to the Engineer at least 14 days prior to beginning work that the field contractor performing any work in accordance with this Section is certified by SSPC to the requirements of SSPC-QP1 and/or SSPC-QP2 as appropriate.

**560-6.3 Quality Control (QC) Inspectors in the Shop and Field:** All personnel performing coating QC activities must be employed by the coating contractor. Submit documentation to the Engineer that all personnel performing QC inspections are certified, at a minimum, as a National Association of Corrosion Engineers (NACE) Coating Inspector Level I or a SSPC Level 1 Bridge Coating Inspector and that they report directly to a QC Supervisor who is certified either as a NACE Coating Inspector Level 3 or a SSPC Level 2 Bridge Coating Inspector.

**560-6.4 Certifications:** Maintain certifications for the duration of the Contract. If the certifications expire, do not perform any work until certifications are reissued.

Notify the Engineer of any change in certification status.

### **560-7 Surface Preparation.**

**560-7.1 General:** Ensure all surfaces to be coated are clean, dry, and free from oil, grease, dirt, dust, soluble salts, corrosion, peeling coating, caulking, weld spatter, mill scale and any other surface contaminants. Prepare all surfaces that will become inaccessible after fabrication, erection, or installation while accessible. Sequence the surface preparations and coating operations so that freshly applied coatings will not be contaminated by dust or foreign matter. Protect all equipment and adjacent surfaces not to be coated from surface preparation operations. Protect working mechanisms against intrusion of abrasive. In the event that any rusting or contamination occurs after the completion of the surface preparation, prepare the surfaces again to the initial requirements. Perform surface preparation work only when the temperature of the steel surface is at least 5°F above the dew point temperature.

**560-7.2 Mechanical Removal of Surface Defects:** Break all corners resulting from sawing, burning, or shearing. In areas where burning has been used, remove the flame hardened surface of the steel to the extent necessary to achieve the required surface profile after abrasive blast cleaning. Remove all weld slag and weld spatter. Conduct all of this work in accordance with AASHTO/NSBA Steel Bridge Collaboration S 8.1.

**560-7.3 Cleaning:** Clean all steel surfaces in accordance with the requirements of SSPC-SP 1.

**560-7.4 Washing:** Clean all steel surfaces in accordance with the requirements of SSPC-SP 12 LPWC WJ4.

**560-7.5 Soluble Salts Detection and Removal:** When using SSPC Guide 15, Table 1 retrieval methods, determine the chloride, sulfate and nitrate concentrations on all steel surfaces using soluble salts test kits meeting the requirements of 560-2.4. Measure the concentration levels using the method described in SSPC-TU 4. Perform the tests after washing and after each applied coat of the coating system. Ensure the non-visible surface contaminant concentrations on blast-cleaned surfaces do not exceed 7  $\mu\text{g}/\text{cm}^2$  for chlorides, 10  $\mu\text{g}/\text{cm}^2$  for soluble ferrous iron, 17  $\mu\text{g}/\text{cm}^2$  for sulfates and 10  $\mu\text{g}/\text{cm}^2$  for nitrates. When using electronic conductivity meters, use meters meeting the requirements of 560-2.4 and measure the surface conductivity as prescribed by the manufacturer. The instrument shall be properly calibrated and maintained according to the manufacturer's recommendations. Ensure the surface conductivity does not exceed 70 micro-Siemens per centimeter squared. For either contaminant assessment method (salt test kits or conductivity meter) test three random locations in the first 1000 square feet and one random location for each subsequent 1000 square feet. When quality control documentation at a fixed location indicates 36 months of historical sequential soluble salt/conductivity levels below those specified above, soluble salt/conductivity testing frequency may be reduced to one test per day. When any concentration or conductivity measurement exceeds the levels given above, rewash the entire surface area and retest all potentially contaminated steel to the satisfaction of the Engineer. If additional washing does not reduce the concentration to the acceptable level, a surface treatment or water additive may be used. Use a surface treatment or water additive that is approved by the coating system supplier and the Engineer.

**560-7.6 Abrasive Blast Cleaning:** Prepare steel by abrasive blast cleaning to "near-white" metal condition as defined in SSPC-SP 10. Use SSPC VIS 1 as an aid in establishing

cleanliness. After abrasive blast cleaning, ensure the surface profile meets the requirements of the coating manufacturer's product data sheet. Determine the surface profile in accordance with ASTM D4417, Method B or C.

Perform all abrasive blast cleaning within a containment system to ensure confinement of all particulates. Design the containment system to comply with all applicable Federal, State, and Local regulations. Ensure the abrasive blast cleaning does not produce holes, cause distortion, remove metal, or cause thinning of the substrate.

**560-7.7 Hand and Power Tool Cleaning:** Prepare steel by power and hand tool cleaning as defined in SSPC-SP 11, SSPC-SP 15, SSPC-SP 3, and SSPC-SP 2 for touch up and repair when approved by the Engineer. Use SSPC-VIS 3 as an aid in establishing cleanliness.

## **560-8 Surfaces Not to be Coated.**

**560-8.1 Galvanized Surfaces:** Do not coat galvanized surfaces unless specified in the Contract Documents.

**560-8.2 Surfaces to be in contact with Concrete:** Do not coat the areas of contact surfaces of steel to be encased or embedded in concrete, or coated with concrete unless specified in the Contract Documents. When specified, prepare the contact surfaces and apply primer.

**560-8.3 Faying Surfaces:** After application of the primer, protect the contact surfaces of members to be joined by high-strength bolts in friction type joints from all other coatings and foreign material.

**560-8.4 Machine Finished Surfaces:** Apply a coating of rust preventative compound to all machine finished or similar surfaces that are not to be coated, or will not be coated immediately.

**560-8.5 Surfaces to be Welded:** Mask off surfaces within 1 inch of field welded connections before the application of any shop coating. Apply a mist coat of primer that is less than 1 mil dry film thickness to surfaces where shear studs will be welded.

## **560-9 Application.**

**560-9.1 General:** Apply a complete coating system to all structural steel surfaces except surfaces indicated in 560-8. Apply a complete coating system to all surfaces that will become inaccessible after fabrication, erection, or installation.

Apply the prime coat in the shop. Apply the intermediate coat in the shop or field. Only apply the finish coat after erection and after concrete work is complete.

Prior to the application of any coating, inspect the substrate for contamination and defects, and prepare the surface in accordance with 560-7 before application of the next coat.

Apply each coat including a stripe coat in a color that contrasts with the substrate or preceding coat. For exterior surfaces, apply a finish coat color meeting FED-STD-595, Shade 36622, unless otherwise specified in the Contract Documents.

**560-9.2 Weather and Temperature Limitations:** Do not spray coating when the measured wind speed in the immediate coating area is above 15 miles per hour. Do not apply coatings when contamination from rainfall is imminent or when the ambient air temperature, relative humidity, dew point temperature, or temperature of the steel is outside limits of the coating manufacturer's product data sheet.

**560-9.3 Sealing Using Caulk:** Apply caulk after the intermediate coat has cured to a condition suitable for recoating in accordance with the manufacturer's product data sheet, and before application of the finish coat. Completely seal the perimeter of all cracks and crevices, joints open less than 1/2 inch, and skip-welded joints using caulk. Apply the caulk to the joint

following the caulk manufacturer's recommendations. Ensure the caulk bead has a smooth and uniform finish and is cured according to the caulk manufacturer's curing schedule prior to the application of the finish coat. It is unnecessary to caulk the perimeter of bolted friction splice plates unless otherwise directed by the Engineer. In addition, it is unnecessary to caulk cracks or crevices less than 0.003 inches in width located on the interior surface area of box girders.

**560-9.4 Protection of Adjacent Surfaces:** Protect all surfaces and working mechanisms not intended to be coated during the application of coatings. Clean surfaces that have been contaminated with coatings until all traces of the coating have been removed. Do not allow material from cleaning and coating operations to be dispersed outside the work site.

**560-9.5 Mixing and Thinning:** Mix all coatings in accordance with the manufacturer's product data sheet. Only mix complete kits. Use thinners and solvents in accordance with the requirements of the coating manufacturer's product data sheet and confirm that the amount of thinner added does not result in the coating exceeding VOC regulations stated in Section 975.

Perform all mixing operations over an impervious surface with provisions to prevent runoff to grade of any spilled material.

**560-9.6 Application Methods:** Use coating application equipment and apply coatings per the coating manufacturer's product data sheet. Application with brushes may be permitted for minor touchup of spray applications, stripe coats, or when otherwise approved by the Engineer. Adjust spray equipment to produce an even, wet coat with minimum overspray. Apply coatings in even, parallel passes, overlapping 50 percent. Agitate coatings during application as required by the coating manufacturer's product data sheet.

**560-9.7 Stripe Coating:** Use an aluminum epoxy mastic that is at least 80% solids by volume. Apply a stripe coat after the prime coat, but prior to applying the intermediate coat. Also, apply a stripe coat after the intermediate coat but prior to the finish coat. Apply the stripe coat per the manufacturer's published product data sheet but no less than 3 mils dry film thickness. Apply both stripe coats to achieve complete coverage on welds, corners, crevices, sharp edges, bolts, nuts, rivets, and rough or pitted surfaces. A stripe coat of translucent coatings is not required. Do not apply subsequent coats until the previous stripe coat has cured per the manufacturer's product data sheet for recoating. Stripe coating is not required for the inside surface area of all steel box girders.

**560-9.8 Thickness of Coats:** Apply coatings to the thickness as identified in the manufacturer's product data sheet. After application of each coat, thoroughly inspect the surfaces and measure the dry film thickness (DFT) in accordance with SSPC-PA 2. As an exception to SSPC-PA2, the DFT of the prime coat shall not be less than the minimum specified by the manufacturer's product data sheet. When the DFT is deficient or excessive, correct in accordance with the coating manufacturer's recommendations and retest the area.

**560-9.9 Coating Drying, and Curing:** Apply coatings within the time specified by the coating manufacturer's product data sheet for drying and recoating. Test the coating for proper cure before handling and shipping. Test for cure in accordance with the manufacturer's recommended method. Meet the requirements of ASTM D4752 for inorganic zinc primers or ASTM D5402 for organic zinc primers when the manufacturer's technical data sheet does not state a specified cure test. Obtain the acceptance criteria from the coating manufacturer and report the results to the Engineer.

Prior to assembling bolted connections, test and verify that the primer coating on the faying surfaces has cured to a resistance rating of 5 in accordance with ASTM D4752, ASTM D5402, or the coating manufacturer's requirements. If cure testing is performed per the

coating manufacturer's requirements, submit the test results to the Engineer for approval prior to assembling the bolted connection.

**560-9.10 Coating Finish:** Apply each coat free of runs, sags, blisters, bubbles, and mud cracking; variations in color, gloss, or texture; holidays; excessive film buildup; foreign contaminants; orange peeling; and overspray.

#### **560-10 Touchup and Repair.**

Clean and coat all welds, rivets, bolts, and all damaged or defective coating and rusted areas in accordance with 560-7 and 560-9. Upon approval by the Engineer, aluminum mastic may be used in accordance with the manufacturer's recommendations. Aluminum mastic must contain aluminum pigment and minimum 80% volume solids.

#### **560-11 Coating of Permanent Sheet, Pipe and H Piles.**

**560-11.1 Surface Preparation:** Prepare the substrate in accordance with 560-7. Provide a depth of anchor profile in accordance with the manufacturer's product data sheet, but in no case less than 2.5 mils. Re-blast piles not coated during the same shift or if the surface to be coated no longer meets the requirements SSPC-SP 10.

**560-11.2 Application of Coating:** Unless otherwise shown in the Contract Documents, apply the inorganic zinc primer to all surfaces of H and sheet piles and the exterior surface of pipe piles. Unless otherwise shown in the Contract Documents, apply coal tar-epoxy coatings to the exposed side of sheet piles from the top of the piles to a depth of five feet below the lower of the design ground surface or the design scour depth. Apply the inorganic zinc primer in accordance with this Section. Apply the coal tar-epoxy in accordance with the following specific requirements:

1. Apply the coal tar-epoxy system in two coats. The time interval between the first coat and the second coat will be in strict accordance with the coating manufacturer's published specifications. Apply the first coat to yield a dry film thickness of 8 to 10 mils. Apply the second coat to attain a total dry film thickness of the two coats between 16 and 20 mils.
2. Ensure that no portion of the coating is less than the specified minimum film thicknesses. The total minimum film thickness for any combination of coats will be the sum total of the averages of the specified thickness range of the individual coats.
3. After applying the coating on the steel piles, the Engineer will thoroughly inspect the surfaces and make film thickness measurements at the approximate rate of one for each 25 square feet of area unless deficient thickness is found. In this case, the rate of sub-measurements will be increased as required to determine the extent of the deficient area.

#### **560-12 Basis of Payment.**

No separate payment will be made for coating new structural steel. Include the cost in the cost of the structural steel.