ITEM 10570.8614 M - FIELD CLEANING AND EPOXY PAINTING OF STRUCTURAL STEEL (SPRAY PROHIBITED)

DESCRIPTION

This work shall consist of pressure washing, abrasive blast cleaning and painting structural steel surfaces with an epoxy primer, epoxy intermediate and aliphatic urethane topcoat paint system where indicated by the Contract Documents.

MATERIALS

1. **Paint and Thinner.** All paint and thinner shall be from the Department's Approved List, "Paints For Structural Steel". No substitutions will be allowed.

   All paint (primer, intermediate, and finish coats) used on any one structure shall be produced by the same manufacturer.

   Each single coat of paint shall be a color different from the others. The color of the primer and the intermediate paints shall be at the contractor's option and shall provide contrast with the underlying substrate. The color of the finish paint shall be as specified in the Contract Documents, or as ordered by the Engineer.

   Containers of paint shall be labeled with the manufacturer's name, product name, component part, batch number, date of manufacture and shelf life date. Paint in containers having expired shelf life dates shall be immediately removed from the work site and not used.

   Containers of thinner shall be labeled with the manufacturer's name and the product name. If an approved generic thinner is supplied it shall be clearly identified as a reagent grade.

2. **Water for Pressure Washing**. Water for pressure washing shall be clean, potable water.

3. **Abrasive for Blast Cleaning**. Abrasive material for blast cleaning may be selected by the contractor. The abrasive selected should be dry and free of oil, grease, and other contaminants as determined by test methods found in SSPC-AB 1, AB 2, or AB 3 (depending on type of abrasive selected). The abrasive selected shall be designed to establish an angular profile of approximately 50 to 75 µm (2-3 mils) in a dense, uniform pattern of depressions and ridges. Silica sand and other types of non-metallic abrasive containing more than 1.0% crystalline (free) silica, by weight, will not be allowed.

4. **Basis of Acceptance**. All primer, intermediate and finish paint, and thinner material,

shall be accepted on the basis of the manufacturer's name and the product name appearing on the Department's Approved List.

Water for washing and abrasive material for blast cleaning shall be approved by the Engineer.

Only paint and thinner arriving at the work site in new, unopened cans shall be used.

Containers of paint shall be labeled with the manufacturer's name, product name, batch number and date of manufacture. Paint that has not been used within 12 months from the date of manufacture shall be removed from the work site.

CONSTRUCTION DETAILS

1. Surface Preparation.

Surface preparation will involve a four step process: 1) a pressure wash, 2) abrasive blast to a surface cleanliness of SSPC SP-10, 3) allowing bare steel to flash rust and 4) Re-blast steel to re-establish SP-10 cleanliness.

1. Pressure Washing

All steel surfaces to be painted shall first be pressure washed using equipment operating at a minimum pressure of 20.7 MPa. The pressure washer shall be operated at a minimum distance of 100 mm to a maximum distance of 300 mm from the surface. Water is to be of potable quality and may be heated. After washing, the surface shall be allowed to dry before subsequent cleaning and painting work is done.

Pressure washing shall be performed to remove all dirt, dust, animal waste, and water soluble contaminants such as salt. Clean, fresh potable water shall be used with sufficient pressure to remove surface contaminants and loose material. Corroded and pitted areas of the steel shall receive special attention when pressure washing. Loose rust and corrosion products in these areas and other debris shall be removed by hand using a stiff bristled brush as necessary. When necessary, oil and grease shall be removed by hand-wiping, using solvents.

After pressure washing, the cleaned surfaces shall be visually free of dust, dirt, animal waste, oil and grease, salts and other debris.

Pressure washing will only be allowed when ambient air temperatures are greater than

4.5°C and rising. In no case shall pressure washing be performed when in the opinion of the Engineer spent wastewater will freeze on roadway or bridge surfaces, or in any other way create a hazardous situation.

During washing operations, containment shall be placed around and beneath the work area to contain all paint chips, corrosion residue, and other solid particles that become dislodged by pressure washing[1] (See Note1). All such solid residue shall be contained, collected, and allowed to air dry for treatment and disposal as hazardous paint removal waste under a separate pay item or as directed by the Engineer. The containment provided shall also prevent all spray and residue from falling on or interfering with traffic, pedestrians, or surrounding property, above or below the structure. Extreme care shall be exercised to ensure that vehicles, pedestrians and property are not exposed to the cleaning process.

All structures over water courses shall be washed during the seasonal periods indicated in the Contract Documents. If no schedule is provided, washing shall occur only when adequate flow in the stream exists to dilute possible contaminants. Operations shall be sequenced so that structures over small bodies of water or small streams are cleaned in the spring of the year, or in a period when flows are greatest. Streams categorized by the Department of Environmental Conservation (DEC) as "CT(s)", i.e. trout spawning, shall be washed prior to July 1 and bridges located at DEC yearling trout stocking sites shall not be washed during April. When washing operations are performed on bridges over a public water supply, e.g. reservoir or on bridges in the watershed area of the New York City water supply, the spent washwater shall be diverted, or collected, and disposed of on the adjoining land mass, at a location away from the waters edge.

2 . Abrasive Blast Cleaning

The abrasive blast cleaning will be accomplished in two stages with a flash rust stage in-between as described below:

A. First Blast

[1]Note 1: The containment for pressure washing is intended to capture solid paint chips and other solid debris that may become dislodged from washing operations. The containment may be constructed of water permeable or water impermeable materials. Spent washwater will not require collection and will be allowed to fall to the underlying road, ground, or waterway, providing the other requirements of this specification are met. The exception for the collection of spent washwater will be for structures over a public water supply. When a bridge crosses a water supply the spent washwater must be diverted, or collected and disposed of on the adjoining land mass, at a location away from the waters edge.

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All structural steel members (and other steel if indicated on the Contract Documents) shall receive an initial blast to remove all paint, rust and rust scale, millscale and other corrosion producing contaminants and shall be cleaned to SSPC SP-10 Near White Metal.

B. Flash Rust Stage

The blast cleaned steel shall be allowed to flash rust completely prior to the final blast cleaning. The period of time required for complete rust over shall be determined by the Engineer and will be determined prior to blast work by establishing a test coupon on the structural steel and determining an approximate rust over period. The rust over period shall not be longer than one day (24 hours).

C. Final Blast

Once the steel has completely flash rusted or allowed to stand a maximum of one day, it shall be re-blasted and the SSPC SP-10 cleanliness level shall be reestablished. The purpose of the re-blast is to remove soluble contaminants. These contaminants, such as chloride, result in a blue or black flash rust. Though all flash rust is to be removed, areas exhibiting blue or black flash rust should receive special attention and thoroughly cleaned. The final blast shall establish the surface profile required by this specification.

All steel receiving a final blast shall be prime coated the same day. At no time shall paint be applied over flash rust.

All equipment and compressors used in the cleaning operation shall be equipped with all necessary filters and traps to prevent moisture, oil, and other contaminants from being deposited on clean surfaces.

Special attention shall be given to the edges of beam flanges, angles and plates, bearings, rivets, the heads of nuts and bolts, and similar surfaces that are marginally accessible and difficult to clean. These surfaces are often difficult to access, and are labor intensive and hard to clean. To remove heavy deposits of rust and scale, hand pounding using a hammer, or power tool cleaning using a needle gun or de-scaler may be necessary before abrasive blast cleaning work begins.

All fin, tears, slivers, burred and sharp edges that are present or occur during the blast operation shall be removed by grinding, and then the area shall be reblasted to provide

the required 50 µm to 75 µm deep anchor profile.

Throughout abrasive blast cleaning work, care shall be taken to protect newly painted surfaces from the cleaning operations. Tarps, covers, or other devices approved by the Engineer shall be used to protect new paint from damage. Damaged paint shall be thoroughly wire brushed or if visible damage occurs, reblasted to the required condition, and then repainted. All repair to damaged paint surfaces shall be approved by the Engineer.

After blast cleaning operations are completed, all residue generated by the cleaning work shall be removed by vacuuming using HEPA filtered vacuums. A HEPA filter shall be defined as a filter that is at least 99.97% efficient for particles that are 0.3 µm in diameter, or larger.

Steel surfaces that have been cleaned to bare metal shall be accepted by visual comparison to a project prepared standard(s) for each structure. The contractor shall prepare a project standard by abrasive blast cleaning a representative area on the structure that is being prepared for painting. The prepared standard shall generally conform to SSPC VIS 1-89, "Visual Standard For Abrasive Blast Cleaned Steel," Pictorial Standard A SP 10, B SP 10, C SP 10, and D SP 10, as applicable, and shall be approved by the Engineer before the start of general cleaning work. At least one standard shall be prepared for each structure that is being specified for cleaning. More than one standard may be necessary if the cleaned steel differs significantly from the photographic standards due to surface conditions or other factors. Each standard shall be at least 300 mm x 300 mm in size, and shall be located in an area of the structure that is accessible to, and approved by the Engineer. The contractor shall protect the work standard from corrosion and contamination throughout the duration of work by applying a clear coat of polyurethane. At the completion of cleaning work the project standard shall be recleaned and painted in accordance with this specification. If in the opinion of the Engineer the project standard becomes deteriorated, or otherwise ineffective, it shall be re-established in accordance with this specification at no additional cost.

To avoid re-contamination of the bare steel in coastal areas, the cleaned surfaces should be coated as soon as possible. At a minimum, they should remain protected within a containment until the primer coat is applied. The primer and intermediate coats should be protected in a similar fashion to prevent chloride contamination of these coats by ocean salt spray. Osmotic blistering can result between layers of paint if the primer and intermediate coats are chloride contaminated.

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2. Painting.

Painting shall consist of striping, and then applying three full coats of new paint to all surfaces cleaned to bare metal. The first full coat shall be primer, followed by the application of a full coat of intermediate paint, and a full coat of finish paint, to all steel surfaces designated to be painted.

a. Material Storage. Paint in storage shall be protected from damage and maintained between 4.5°C and 29.5°C.

b. Specifications and Inspection Equipment. Prior to the start of and throughout the duration of work the contractor shall supply the Engineer with the following specifications and equipment.. *No work shall begin until these materials have been delivered to, and accepted by the Engineer.*

1. One bound copy of the Steel Structures Painting Council surface preparation specification, SSPC-SP 10 - Blast Cleaning to Near White Metal.

2. One bound each of the Steel Structures Painting Council pictorial standards, SSPC-VIS 1-89, Visual Standard For Abrasive Blast Cleaned Steel.

3. One bound copy of the Steel Structures Painting Council method SSPC-PA2, Paint Application Specification No. 2 - Measurement of Dry Film Thickness With Magnetic Gages.

4. One Air Thermometer, pocket type, -10°C to +40°C.

5. One Surface Thermometer, -10°C to +40°C.

6. One Magnetic Dry Film Thickness Gage, Type 2 (fixed probe), with a digital readout display capable of measuring 1 µm to 1500 µm in 1 µm increments.

7. Two Wet Film Thickness Gages, Prong Type, capable of measuring 25 µm to 125 µm in 25 µm increments.

c. Atmospheric Conditions.

• No paint shall be applied when the receiving surface and ambient temperatures

are less than 5°C or greater than 38°C.
• No paint shall be applied unless the receiving surface is absolutely dry.
• The receiving surface temperature shall be at least 3°C above the dew point.
•The relative humidity shall be less than 85%.

In general, no paint shall be applied in the months of December, January, February, or March. If the contractor requests approval to apply paint in winter months, and if in the Engineer's opinion satisfactory results can be achieved, then the substrate shall be enclosed, painted under cover, and protected from the surrounding air. The interior of the enclosure shall be heated and the steel painted when the surface temperature is 10°C or greater. Direct application of heat to the steel surface will not be allowed. The painted steel shall remain enclosed and heated for a minimum of eight hours, or until the applied coating is dry, whichever is longer. The humidity requirements of the paint system must be met or painting will not be allowed. No additional payment will be made for the cost of enclosing, heating and protecting paint that has been applied in conditions of cool weather.

When painting inside an enclosure adequate mechanical ventilation shall be supplied to meet OSHA regulations for worker exposure to solvents, fumes, lead and other provisions. When mechanical ventilation is provided, filtration of the exit air will not be required. No additional payment will be made for the cost of ventilation.

d. Mixing Paint. All paint shall be proportioned and thoroughly mixed with mechanical mixers in accordance with the paint manufacturer's recommendations. After mixing the bottom of the container shall have no unmixed pigment.

e. Solvents and Thinners. Paint may be thinned if recommended by the manufacturer, done in strict compliance with the manufacturer’s instructions, approved by the Engineer and mixed in the presence of the Engineer.

Unauthorized use of solvents and thinners shall result in re-cleaning and repainting of the surface in accordance with this specification, at the contractors expense.

f. Paint Application. No painting shall begin until cleaned surfaces have been inspected and approved by the Engineer. The contractor shall provide safe, stable, and direct access to the work area for the Engineer's inspection.

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Paint will be applied using brush and roller. Spray methods are prohibited. All paint shall be applied so as to produce a uniform, even coating free of runs, sags, drips, ridges or other defects.

To ensure adequate paint film thickness, stripe painting using primer shall be required on the following surfaces: all welds, rivets, bolts, nuts, and edges of plates, angles, bearings, lattice pieces or other shapes, and corners and crevices. To provide contrast, paint for stripe coating shall be a color that is different than the color of the receiving surface. The stripe coat may be applied before or after the first full coat of primer is applied. Such striping shall extend a minimum of 25 mm from the edge. To prevent removal of the stripe paint by the following coat of paint, the stripe coat shall be allowed to set-to-touch before the next paint coat is applied. However, on bare metal surfaces the stripe coat shall not be permitted to dry for a period long enough to allow rusting of the unprimed steel.

Complete protection against paint spatter, spillage, overspray, wind blown paint, or similar releases of paint shall be provided. Covers, tarps, mesh, and similar materials shall be placed around the work area to protect public and private property, pedestrian, vehicular, marine or other traffic, all portions of the bridge, highway appurtenances, waterways, and similar surrounding areas and property, upon, beneath, or adjacent to the structure.

g. Paint Film Thickness. Paint shall be applied in such a quantity so as to produce the minimum specified dry film thickness for the type of paint material being used. Wet film thickness measurements using a wet film thickness gauge shall be performed by the Contractor to predict the dry film thickness based on the percent solids by volume as a quality control measure. The frequency of this testing shall be such that a uniform dry film thickness is obtained.

The dry film thickness shall be determined in accordance with SSPC-PA 2, Paint Application Specification No. 2 - Measurement of Dry Film Thickness with Magnetic Gages, using a Type 2 fixed probe magnetic gages, equipped with a digital readout display.

Areas failing to meet the specified minimum dry film thickness shall be overcoated with the same type of paint to produce at least the total dry film thickness required.

h. Painting Schedule. Primer shall be applied to bare metal surfaces the same day

as the final blast cleaning operation and before visible rust appears on the cleaned surface. Failure to apply primer to a bare metal surface the same day as the final blast or before the appearance of visible rust shall result in re-cleaning the surface in accordance with this specification, at no additional cost.

All coats of paint shall be overcoated with the subsequent coat in accordance with the time period specified for the paint material that is being used (see Approved List - Paints for Structural Steel). To prevent intercoat adhesion failure, recoating with the next coat of primer, intermediate, and finish paint, must be performed within the maximum specified time period, or 14 days, whichever is shorter. If the contractor fails to recoat within the specified time period the surface to be painted shall be pressure washed, allowed to dry and recleaned by abrasive blast cleaning to bare metal, and repainted in accordance with this specification, at the contractor's expense. Again, it is important to note that the longer the steel, primer and intermediate coats are allowed to sit without overcoating, the greater the chance of chloride contamination and possible premature failure of the coating due to problems associated with soluble salts.

METHOD OF MEASUREMENT

Payment shall be made by the lump sum price bid.

BASIS OF PAYMENT

The lump sum price bid shall include the cost of all labor, materials and equipment necessary to complete the work. The cost of providing protection against damage during pressure washing and paint application shall be included in the bid price. Payment for the containment, treatment and disposal of dust and paint waste generated by surface preparation work will be paid for under other items. However, payment for the accumulation of paint removal waste for deposition in the paint waste containers shall be included in this item. Progress payments will be made based on the percentage of the structure cleaned and primed and painted with two full coats of paint in accordance with this specification.