

the Engineer will be used during the construction season shall be eligible for payment. The Contractor shall provide the Engineer calculations indicating the total m<sup>2</sup> (square feet) of steel to be painted during the construction season. He shall also provide calculations showing the total number of liters (gallons) required. The Contractor shall be responsible to store the paint on the project in such manner to prevent theft and adverse temperatures. He shall provide thermometers capable of monitoring the maximum high and low temperatures within the storage facility. The Contractor is responsible for properly disposing of all unused paint and paint containers.

The Contractor shall furnish shipping invoices for all materials used on the project to the Engineer, prior to use.

**815.07 MIXING AND THINNING.** All ingredients in any container of paint shall be thoroughly mixed immediately before use and shall be agitated often enough during application to maintain a uniform composition; however, the primer shall be continuously mixed by an automated agitation system (hand held mixers not allowed). Paint shall be carefully examined after mixing for uniformity and to verify that no unmixed pigment remains on the bottom of the container. The paint shall be mixed with a high shear mixer (such as a Jiffy Mixer). Paddle mixers or paint shakers are not allowed. Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface.

All paint shall be strained after mixing. Strainers shall be of a type to remove only skins and undesirable matter, but not pigment.

No thinner shall be added to the paint without the Engineer's approval, and only if necessary for proper application as recommended by the manufacturer. When the use of thinner is permissible, thinner shall be added slowly to the paint during the mixing process. All thinning shall be done under supervision of the Engineer. In no case shall more thinner be added than that recommended by the manufacturer's printed instructions. Only thinners recommended and supplied by the paint manufacturer may be added to the paint. No other additives shall be added to the paint.

Catalysts, curing agents, or hardeners which are in separate packages shall be added to the base paint only after the base paint has been thoroughly mixed. The proper volume of catalyst shall then be slowly poured into the required volume of base with constant agitation. Liquid which has separated from the pigment shall not be poured off prior to mixing. The mixture shall be used within the pot life specified by the manufacturer. Therefore only enough paint shall be catalyzed for prompt use. Most mixed, catalyzed paints cannot be stored, and unused portions of these shall be discarded at the end of each working day.

**815.08 COATING APPLICATION.** Coating application will be as follows.

**A. General** All structural steel, scuppers, expansion joints (except top surface), steel railing, exposed steel piling, drain troughs and other areas as indicated in the plans shall be painted. Galvanized surfaces shall not be painted unless otherwise noted on plans.

The following methods of application are permitted for use by this specification, as long as they are compatible with the paint being used: brush, spray, or any combination of these methods unless specified differently in the plans. Daubers, small diameter rollers or sheepskins may be used for places of difficult access when no other method is practical and in all cases shall be used where cross-frame angles are located within 50 mm (2 inches) of the bottom flange and where end cross frames are within 150 mm (6 inches) of the backwall and bottom of bottom flanges around bearings less than 150 mm (6 inches) in height.

If the surface is degraded or contaminated after surface preparation and before painting, the surface shall be restored before painting application. In order to prevent degradation or contamination of cleaned surface, the prime coat of paint shall be applied the same day of blast cleaning as required in surface preparation above.

Cleaning and painting shall be so programmed that dust or other contaminants do not fall on wet, newly-painted surfaces. Surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Overspray and pigeon droppings shall be removed with a stiff bristle brush, wire screen, or a water wash with sufficient pressure to remove overspray without damaging the paint. The overspray must be removed before applying the next coat. All abrasives and residue shall be removed from painted surfaces, before recoating, with a vacuum system equipped with a brush type cleaning tool.

No visible abrasives from adjacent work shall be left on the finish coat. Abrasives on the finish coat shall be removed.

If brush application of the coating is used, it shall produce a smooth coat. Care shall be taken to work the paint into all crevices, corners, and around all bolt and rivet heads.

**B. Spray Application (General).** All spray application of paint shall be in accordance with the following:

Primer ingredients shall be kept uniformly mixed in the spray pot or container during application by continuous, automated mechanical agitation (hand held mixers not allowed).

Spray equipment shall be kept clean so that dirt, dried paint and other foreign materials are not deposited in the paint film. Any solvent left in the equipment shall be completely removed before using.

Paint shall be applied in a uniform layer with overlapping at the edges of the spray pattern. The border of the spray pattern shall be painted first; with the painting of the interior of the spray pattern to follow, before moving to the next spray pattern area. A spray pattern area is such that the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of paint is deposited on the surface. The trigger of the gun should be released at the end of each stroke. All bolts and rivet heads shall be sprayed from at least 2 directions or brushed to assure coverage.

Each spray operator shall demonstrate to the Engineer his ability to apply the paint as specified. Any operator who does not demonstrate this ability shall not spray.

If mud cracking occurs, the affected area shall be cleaned to bare metal in accordance with surface preparation above and repainted.

All gaps and crevices 3 mm (1/8 inch) or less shall be filled with primer.

All spray equipment used shall be suitable for use with the specified paint. Paint manufacturer's equipment recommendations shall be followed to avoid paint application problems.

If air spray is used, traps or separators shall be provided to remove oil and condensed water from the air. The traps or separators must be of adequate size and must be drained periodically during operations. The following test shall be made by the Contractor and verified by the Engineer to insure that the traps or separators are working properly.

Air shall be blown from the spray gun for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil, water or other contaminants are

present on the cloth or blotter, painting shall be suspended until the problem is corrected and the operation is verified by repeating this test.

This test shall be made at the start of each shift and at 4 hour intervals. This is not required for an airless sprayer.

Spray application of all coats shall not be used unless the operation is totally enclosed to prevent overspray damage to the ground, public and private property, any and all vegetation, streams, lakes, etc. This containment shall be accomplished with tarps, plywood or other shields. If brush is used, more than one coat may be necessary to produce the required thickness.

**C. Application Approval.** The beginning of the application of each of the three different coats shall be subject to inspection and approval to detect any defects which might result from the Contractor's methods. If defects are discovered, the Contractor shall make all necessary adjustments to his method of application to eliminate them before proceeding with coat application.

**D. Temperature.** Paint shall not be applied when the temperature of the air, steel, or paint is below 10° C (50° F). Paint shall not be applied when the steel surface temperature is expected to drop below 10° C (50° F) before the paint has cured for the minimum times specified below:

	10° C (50° F)	16° C (60° F)	21° C (70° F)
Primer	4 hrs.	3 hrs.	2 hrs.
Intermediate	6 hrs.	5 hrs.	4 hrs.
Finish	8 hrs.	6 hrs.	4 hrs.

The above temperatures and times shall be monitored with the recording thermometer.

A heated enclosure may be used. The heat within the enclosure may be supplied by any means which will maintain the required temperature continuously and uniformly in all parts of the enclosure. The heat will be supplied as required to maintain the required minimum temperature until the coating has cured.

If combustion type heating units are used, they will be vented away from the enclosure, and exhaust fumes will not be permitted to enter the enclosure. No open combustion of any kind will be permitted in the enclosure.

**E. Moisture.** Paint shall not be applied when the steel surface temperature is less than 3° C (5° F) above the dew point. Paint shall not be applied to wet or damp surfaces or on frosted or ice-coated surfaces. Paint shall not be applied when the relative humidity is greater than 85%. Paint shall not be applied during rain, fog or mist unless the above moisture criteria is met.

**F. Repair Procedures.** Damaged areas, and areas which do not comply with the requirements of this specification, shall have the paint removed and all defects corrected. The steel should then be retextured to a near white condition to produce a profile of between 40 to 90 µm (1.5 to 3.5 mils). This profile should be measured immediately prior to the application of the prime coat to insure that the profile is not destroyed during the feathering procedure.

The existing paint should be feathered to expose a minimum of 13 mm (½ inch) of each coat.

During the reapplication of the paint, care shall be used to insure that each paint coat is applied only within the following areas. The prime coat shall only be applied to the surface of the bare steel and the existing prime coat which has been exposed by feathering. The prime coat shall not be applied to the adjacent intermediate coat. The intermediate coat shall only be applied to the new prime coat and the existing feathered intermediate coat. The intermediate coat shall not be applied to the adjacent finish coat. The finish coat shall only be applied to the new intermediate coat and the existing finish coat which has been feathered or lightly sanded. The finish coat shall not extend beyond the areas which have been feathered or lightly sanded.

At the perimeter of the repair area, the first two coats shall be applied by brush. The finish coat shall be applied by either brush or spray.

It may be necessary to make several applications in order to achieve the proper thickness for each coat.

During the application of the prime coat, the paint shall be continuously mixed.

All surface preparation and painting shall still be done in accordance with the specifications. In lieu of abrasive blasting, alternate methods of surface preparation may be allowed.

All repairs shall be made in a manner to blend the patched area with the adjacent coating. The finished surface of the patched area shall have a smooth, even profile with the adjacent surface.

The Contractor shall submit his method of correcting runs in writing to the Director for approval.

**G. Continuity.** Each coat of paint shall be applied as a continuous film of uniform thickness free of all defects such as holidays, runs, sags, etc. All thin spots or areas missed shall be repainted and permitted to dry before the next coat of paint is applied.

**H. Dry Film Thickness.** Prime thickness, cumulative prime and intermediate thickness, and cumulative prime, intermediate and finish thickness shall be determined by use of Type 2 magnetic gage in accordance with the following:

Five separate spot measurements shall be made, spaced evenly over each 9 m<sup>2</sup> (100 square feet) of area to be measured. These measurements shall be taken on flanges, webs, cross bracing, stiffeners, etc. Three gage readings shall be made for each spot measurement of either the substrate or the paint. The probe shall be moved a distance of 25 to 75 mm (1 to 3 inches) for each new gage reading. Any unusually high or low gage reading that cannot be repeated consistently shall be discarded. The average (mean) of the 3 gage readings shall be used as the spot measurement. The average of five spot measurements for each such 9 m<sup>2</sup> (100 square foot) area shall not be less than the specified thickness. No single spot measurement in any 9 m<sup>2</sup> (100 square foot) area shall be less than 80% of the specified minimum thickness nor greater than 150% of the maximum specified thickness. Any one of 3 readings which are averaged to produce each spot measurement, may under run or overrun by a greater amount. The 5 spot measurements shall be made for each 9 m<sup>2</sup> (100 square feet) of area as follows:

1. For structures not exceeding 27 m<sup>2</sup> (300 square feet) in area, each 9 m<sup>2</sup> (100 square foot) area shall be measured.
2. For structures not exceeding 90 m<sup>2</sup> (1,000 square feet) in area, three 9 m<sup>2</sup> (100 square foot) areas shall be randomly selected and measured.
3. For structures exceeding 90 m<sup>2</sup> (1,000 square feet) in area, the first 90 m<sup>2</sup> (1,000 square feet) shall be measured as stated in section 2 and for each additional 90 m<sup>2</sup> (1,000 square feet), or increment thereof, one 9 m<sup>2</sup> (100 square foot) area shall be randomly selected and measured.