

SECTION 921

SURFACE PREPARATION AND PAINTING OF STRUCTURAL STEEL

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921.01 SCOPE

This specification covers the supply of all labour, equipment and materials necessary to conduct surface preparation and paint application on structural steel work.

The Department will not supply any material required for work under this contract. All blast clean and paint work shall be fully completed by September 30th unless an extension is given by the Department.

Structural steel must be cleaned and painted for the areas listed below:

- a) All areas of steel either primed or painted previously or
- b) All superstructure and substructure steel exposed to the atmosphere or
- c) Areas specified on the Contract drawings

921.02 SUBMITTALS

The Contractor shall submit the following to the Owner's Representative for review at least 3 weeks prior to commencement of blast cleaning or painting operations.

Details of the methods, procedures, and sequence of operation to be employed to complete the work, including Working Drawings and schedules. The procedures shall detail the equipment, application process, in-process quality control and the job control records to be used for the work.

Details of surface preparation and coating of areas that are difficult to access and the method of application.

Details of proposed method for management of spent material.

Detailed description of environmental protection to be employed, including details for enclosure, erection of the enclosure, and relocation procedure for the enclosure and equipment. Contractor's plan for environmental protection must be accepted by the Owner's Representative.

Product data sheets containing manufacturer's recommended maximum and minimum dry film thickness, mixing and thinning directions, recommended spray nozzles and pressures, recommended temperature range and acceptable humidity levels for application, minimum acceptable recoat time period for temperatures in the intervals of 5 degrees Celsius and from 0 degrees Celsius to 30 degrees Celsius.

Material certification from the coating manufacturer stating all materials supplied are as specified in the Contract Documents and the manufacturer's current product data sheets. Material certification from a laboratory certified by an organization accredited by the Standards Council of Canada stating that the abrasive media meets the material requirements specified in this specification.

The Contractor shall provide to the Owner's Representative a guarantee in writing, stating that the paint coating will perform satisfactory for a period of 5 years from the date of completion. In the event the paint coating system does not perform satisfactorily, the Contractor shall provide reapplication of blast clean and paint at no additional cost to the Department.

921.03 MATERIALS

The Department may consider alternative methods for surface preparation on request from the Contractor.

921.03.01 Sand

Sand shall be in accordance with CGSB 31-GP-421M and of a class that will yield a 1 to 3 mil steel profile.

921.03.02 Primer

The primer shall be one coat of PPG Dimetcote 302H Inorganic Zinc Rich Primer or an approved equal. Minimum dry film thickness shall be 2.5 mils or as recommended by the manufacturer, if thicker. The colour of the primer shall be green.

921.03.03 Paint

The intermediate coat shall be one coat of PPG Amerlock 2 Surface Tolerant Epoxy or an approved equal. Dry film thickness at 5.0 mils to 7.0 mils. The colour of the intermediate coat shall be white.

The finish coat shall be one coat of PPG Pitthane ultra urethane (Product code # 95-8000) supplied by Pittsburg Paints or an approved equal. Dry film thickness shall be between 3.0 mils to 4.0 mils. The colour of the finish coat shall be haze grey.

921.03.04 Solvent

Solvents must be compatible with the primer and paint being utilized.

921.04 ENVIRONMENTAL PROTECTION, SAFETY PRECAUTIONS AND DAMAGE PREVENTION

All safety equipment and devices for the protection of the operation and personnel shall be supplied by the Contractor.

No paint shall be allowed to smear the abutments or piers. If such happens, the paint stains shall be cleaned immediately with a proper solvent.

All work shall be performed in accordance with the Occupational Health and Safety Act and all amendments, and Sections 815, 820 and 825 of the Departmental Specification.

The Contractor shall take steps to ensure that debris or spray from blast cleaning and painting operations will not result in harmful effects or deposit in waterways or structures within the vicinity of the work. Any damage to abutting property, vehicles, utilities, pedestrians, animals or to any portion of the structure due to the cleaning or painting operations shall be the responsibility of the Contractor.

921.05 SURFACE PREPARATION

All areas to be painted shall first be blast-cleaned to a near white metal finish and in accordance with SSPC SP 10 "Near White Metal Blast Cleaning", latest revision.

All accessible weld flux and spatter, rust, paint and mill scale shall be removed.

The accessible portions of partially enclosed steel members shall be blast-cleaned.

Rivet heads, cracks, crevices, lap-joints, fillet welds and re-entrant angles shall be blast-cleaned.

Loose paint, sharp edges, thick layers of rust, dried soil, and other loosely adhering foreign matter not efficiently removed by blast-cleaning shall be removed by hand or power tools and the underlying surface blast-cleaned.

Final surface preparation before paint coating application shall only be carried out when the temperature, moisture and humidity satisfy the criteria specified in SSPC PA 1 "Shop, Field, and Maintenance Coating of Metals" for coating application.

All areas that are to be painted shall be blast cleaned.

921.06 SURFACE CLEANING

After blast-cleaning operations are completed, dust or other loose matter shall be removed from the surface. If detrimental amounts of grease or oil are present, these substances shall be removed with solvent.

921.07 PAINTING

921.07.01 General

All areas listed in Section 921.01 shall receive primer, intermediate and finish coat.

All thickness measurements are to be made when the coatings are dry. Thickness of coatings must conform to Section 921.03.

Five separate spot measurements of the dry film shall be taken with a dry film thickness gauge; these readings shall be spaced evenly over each section of the structure 10 square metres in area. The average for the 5 spot measurements for each section shall not be less than the specified thickness. No single spot measurement in any section shall be less than 80% of the specified thickness.

As many applications as necessary shall be applied until the dry thicknesses specified in Section 921.03 are obtained.

921.07.02 Storage

All paint and thinner shall be stored in a separate building or room that is well ventilated and free from excessive heat, sparks, flame or the direct rays of the sun and in accordance with the manufacturer's requirements. Paints susceptible to damage from freezing shall be kept in heated storage space when necessary.

All containers of paint should remain unopened until required for use; any containers opened for longer than specified by the manufacturer shall not be used.

Paint, which has in the Department's opinion, become livered, gelled or expired as well as otherwise deteriorated during storage shall not be used.

921.07.03 Cleaning

Any oil, grease, soil, dust or foreign matter deposited on the surface after the surface preparation is completed shall be removed prior to painting. In the event that rusting occurs after completion of the surface preparation, the surface shall be again cleaned in accordance with the specified method.

Particular care shall be taken to prevent the contamination of cleaned surfaces with salt before the primer is applied and between applications of the remaining paint. Such contaminants shall be removed from the surface. The primer paint shall be applied within one hour after the surface has been cleaned. The successive applications shall be applied before contamination of the under surface occurs.

If the under surface, after the application, becomes contaminated by salt, it shall be washed off with clear fresh water.

921.07.04 Mixing and Thinning

All ingredients in any container of paint shall be thoroughly mixed before use and shall be agitated often enough during application to keep the pigment in suspension.

Paint mixed in the original container shall not be transferred until all settled pigment is incorporated into the vehicle. This does not imply that part of the vehicle can not be poured off temporarily to simplify the mixing.

Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface.

Where a skin has formed in the container, the skin shall be cut loose from the sides of the container, removed and discarded. If such skins are thick enough to have a practical effect on the composition and quality of the paint, the paint shall not be used.

The paint shall be mixed in a manner which will ensure breaking up of all lumps, complete dispersion of settled pigment and a uniform composition. If mixing is done by hand most of the vehicle shall be poured off into a clean container. The pigment in the paint shall be lifted from the bottom of the container with a broad, flat paddle, lumps shall be broken up and the pigment thoroughly mixed with the vehicle. The poured-off vehicle shall be returned to the paint with simultaneous stirring or pouring repeatedly from one container to another until the composition is uniform. The bottom of the container shall be inspected for unmixed pigment.

Paint which does not have a limited pot life or does not deteriorate on standing may be mixed at any time before using, but if settling has occurred it must be remixed immediately before using. Paint shall not remain in spray pots, painter's buckets, etc., overnight, but shall be gathered into a container and remixed before use.

No thinner shall be added to the paint unless necessary for proper application and conforms to the manufacturer's recommendations. Paints to be sprayed, if not specifically formulated for spraying, may require thinning when proper adjustment of the spray equipment and air pressure does not result in satisfactory paint application. In no case shall more than five percent of thinner be added unless the paint is intentionally formulated for greater thinning. This shall also apply when painting in cold weather.

The type of thinner shall comply with the paint specification or manufacturer's instructions.

When the use of thinner is permissible, thinner shall be added to paint during the mixing process. Painters shall not add thinner to paint after it has been thinned to the correct consistency. All thinning shall be done under the supervision of one acquainted with the correct amount and type of thinner to be added to the paint. Notwithstanding the foregoing, all mixing and thinning shall be done in accordance with the manufacturer's recommendations.

921.07.05 Application

921.07.05.01 General

The Owner's Representative must be notified by the Contractor 48 hours in advance of mixing and applying paint coating.

Paint shall be applied by brushing or spraying or a combination of these methods. Daubers or sheepskins may only be used when no other method is practicable for proper application in places of difficult access.

Paint shall not be applied when the surrounding air temperature is not within the maximum/minimum range recommended by the paint manufacturer. Paint shall not be applied to steel at a temperature that will cause blistering, porosity or otherwise will be detrimental to the life of the paint. When steel is painted in hot weather, precautions must be taken to ensure that the specified thickness of paint is obtained.

Paint shall not be applied in rain, snow, fog or mist or when the relative humidity exceeds 95 percent. Paint shall not be applied to wet or damp surfaces; paint shall not be applied on frosted or ice coated surfaces. Water or ice on the surface must be visible to prevent painting under this provision.

When paint must be applied in damp or cold weather, the steel must be painted under cover, protected, sheltered, or the surrounding air and the steel heated to a satisfactory temperature. In all such cases, the temperature and the humidity conditions specified

above must be met. Such steel shall remain under cover or be protected until dry or until weather conditions permit its exposure.

Any paint exposed to freezing, excess humidity, rain, snow or condensation, shall be permitted to dry. Damaged areas of paint shall then be removed and the surface again prepared and then repainted to the specified thickness.

All outside corners, rivets, sharp edges and weld joints shall first be given a separate brushed on stripe coat before each complete coat of primer, intermediate and finish coat is applied.

To a maximum extent practical, each application of paint shall be applied as a continuous film of uniform thickness free of pores. Any thin spots or areas missed in the application shall be repainted and permitted to dry before the next application of paint is applied.

Each undercoat of paint shall be in a proper state of cure or dryness before the succeeding application is applied. Paint shall be considered dry for recoating when an additional coat can be applied without the development of any detrimental film irregularities, such as lifting or loss of the undercoat.

921.07.05.02 Brush Application

Brush application of paint shall be in accordance with the following:

- a) Brushes shall be of a style and quality that will enable proper application of paint. Round or oval brushes are generally considered most suitable for rivets, bolts, irregular surfaces and rough or pitted steel. Wide, flat brushes are suitable for large flat areas but they should not have a width over 127mm.
- b) The brushing shall be done so that a smooth coat, as nearly uniform in thickness as possible, is obtained. This usually may best be accomplished by applying the paint in short strokes, depositing uniform amounts of paint in each stroke, brushing the paint into all surface irregularities and finally smoothing or levelling the paint film with longer strokes at about right angles to the direction of the first strokes allowing only enough of the tip of the bristles to drag in the paint film to smoothen the film without leaving deep or detrimental brush marks.
- c) Paint shall be worked into all crevices and corners.
- d) Any runs or sags shall be brushed out.

- e) There shall be a minimum of brush marks left in the applied paint.
- f) Surfaces not accessible to brushes shall be painted by spray, or by daubers, or by sheepskins.

921.07.05.03 Spray Application

Spray application of paint shall be in accordance with the following:

- a) The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.
- b) The air caps, nozzles and needles shall be those recommended by the manufacturer of the equipment for the material being sprayed. The equipment shall be kept in satisfactory condition to permit proper paint application.
- c) Traps or separators shall be provided to remove oil and condensed water from the air. These traps or separators must be of adequate size and must be drained periodically during operations. The air from the spray gun impinging against the surface shall show no condensed water or oil.
- d) Paint ingredients shall be kept properly mixed in the spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
- e) The pressure on the material in the pot and of the air at the gun shall be adjusted for optimum spraying effectiveness. The pressure on the material in the pot shall be adjusted when necessary for changes in elevation of the gun above the pot. The atomizing air pressure at the gun shall be high enough to properly atomize the paint but not so high as to cause excessive fogging of paint, excessive evaporation of solvent, or loss of over spray.
- f) Spray equipment shall be kept sufficiently clean so that dirt, dried paint and other foreign materials are not deposited in the paint film. Any solvents left in the equipment shall be completely removed before applying paint to the surface being painted.

- g) Paint shall be applied in a uniform layer, with overlapping at the edge of the spray pattern. The spray pattern shall be adjusted so that the paint is deposited uniformly. During application, 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.
- h) All runs and sags shall be brushed out immediately or the paint shall be removed and the surface repainted.
- i) Areas inaccessible to the spray gun shall be painted by brush; if not accessible by brush, daubers or sheepskins shall be used. Brushes shall be used to work paint into cracks, crevices and blind spots which are not adequately painted by spray. The foregoing notwithstanding, the Contractor shall conform to the paint manufacturer's recommendations.

921.07.06 Drying of Painted Steel

No paint shall be force-dried under conditions which will cause cracking, wrinkling, blistering, formation of pores, or detrimentally affect the condition of the paint.

No drier shall be added to paint on the job unless specifically called for in the specification for the paint.

Paint shall be protected from rain, condensation, contamination, snow and freezing until dry to the fullest extent practicable or as recommended by the manufacturer.

921.08 SUPERVISION

The Department will have a qualified painting inspector on the site at all times when work is in progress. The Contractor shall supply all safety equipment (respirator, goggles, etc.) required by the Inspector.

921.09 EXPERIENCE

The Contractor is required to submit a list of projects involving surface preparation and painting of structural steel at the preconstruction meeting.

921.10 MEASUREMENT FOR PAYMENT

Measurement for payment will be lump sum as tendered under the item "Surface Preparation and Painting of Structural Steel" as listed in the Unit Price Table. Interim

payments for the percentage of work done may be made at the discretion of the Owner's Representative.

921.11 BASIS OF PAYMENT

Payment shall be lump sum and constitute full compensation for all labour, materials, access, plant, and equipment required to complete all surface preparation and painting or repainting of structural steel as outlined in this specification.