5.6  PAINTING METAL STRUCTURES

5.6.1 Description

This work shall consist of, unless otherwise provided in the Contract, the preparation of the metal surfaces on existing structures, the application, protection and drying of the paint coatings and the supplying of all tools, tackle, scaffolding, labour and materials necessary for the entire work as shown on the Drawings.

5.6.2 Materials

5.6.2.1 General

All paints to be used for the painting system shall be obtained from one manufacturer. Paint shall be supplied in sealed containers of not more than 5 litres capacity and these shall be used in strict order of delivery. The paint shall be adequate in all respects for the intended purpose and shall be obtained from the manufacturer ready for the use specified.

Paint shall be stored in sealed containers in a lock-up store where it is not exposed to extreme temperature. Any special storage conditions recommended by the manufacturer shall be observed.

Paint not used within the shelf life period specified on the containers, or within 18 months of the date of manufacture, shall be replaced.

At the end of a working period, paint with a limited pot life or any two pack primers etc. shall be discarded. Other types of paint shall be returned to the store and kept in sealed containers.

5.6.2.2 Prime Coat

The prime coat of paint for metal shall be a red lead paint and shall conform to the AASHTO Specification for Red Lead Ready-Mixed Paint, M 72.

Red lead pigment in the dry form or as a paste in oil shall conform to ASTM D 83. The 97% grade shall be specified for dry pigment.

In mixing for paint, raw linseed oil (ASTM D 234) may be replaced with boiled linseed oil (ASTM D 260) to the extent of 50% of the total oil content.

The paint, preferably, shall be factory mixed. As an alternative the pigment shall be furnished in the form of red lead paste.

5.6.2.3 Undercoat

The undercoat shall be red lead paint as specified above, tinted light brown with lamp black in an amount not exceeding 1/32 kilogram per litre of linseed oil. Dry film thickness shall be 50 micron.

5.6.2.4 Finish Coat

The finish coat shall be as shown on the Drawings or as specified by the Engineer. It shall conform to one of the following AASHTO Specifications:

1) Foliage Green Bridge Paint M 67

2) Black Bridge Paint M 68
3) Aluminium Paint (Paste-Mixing Vehicle) M 69

4) White and Tinted Ready-Mixed Paint (Lead and Zinc Base) M70

5.6.3 Construction Methods

5.6.3.1 Cleaning of Surfaces

A) General

Surfaces of metal to be painted shall be thoroughly cleaned, removing rust, loose mill scale, dirt, oil or grease and other foreign substances. Unless cleaning is to be done by sand blasting, all weld areas, before cleaning is begun, shall be neutralised with a proper chemical, after which they shall be thoroughly rinsed with water.

Cleaning may be carried out by hand, mechanical means, chemically, sand blasting or by flame cleaning. The method used in any area shall be approved by the Engineer. Methods of cleaning are described as follows. All cleaning shall be approved by the Engineer before the application of any paint.

B) Hand Cleaning

The removal of rust, scale and dirt shall be done by the use of metal brushes, scrapers, chisels, or hammers or other effective means. Oil and grease shall be removed by the use of gasoline or benzene. Bristle or wood fibre brushes shall be used for removing loose dirt.

C) Mechanical Cleaning

Steelwork shall be mechanically cleaned using power driven tools such as carborundum grinding discs, chipping hammers and needle guns, followed by steel wire brushing, washing and dusting to remove all loosened material. Excessive burnishing of the metal through prolonged application of rotary wire brushes shall be avoided. Any visible peaks and ridges produced by the use of mechanical cleaning tools shall be removed.

D) Sandblasting

The sandblasting shall remove all loose mill scale and other substances down to the bare metal. Special attention shall be given to cleaning of corners and re-entrant angles. Before painting, sand adhering to the steel in corners and elsewhere shall be removed. The cleaning shall be approved by the Engineer prior to any painting, which shall be done within 2 hours and before rust forms.

E) Flame Cleaning

Metal shall be flame cleaned in accordance with the following operations:

1) Oil, grease and similar adherent matter shall be removed by washing with a suitable solvent. Excess solvent shall be wiped from the work before proceeding with subsequent operations.

2) The surface to be painted shall be cleaned and dehydrated (free of occluded moisture) by the passage of oxyacetylene flames which shall have an oxygen to acetylene ratio of at least one. The inner cones of these flames shall have a ratio of length to port diameter of at least 8 and shall be not more than 3.7 mm centre to
centre. The oxyacetylene flames shall be traversed over the surfaces of the steel in such manner and at such speed that the surfaces are dehydrated; and dirt, rust, loose scale in the form of blisters or scabs, and similar foreign matter are freed by the rapid, intense heating by the flames. The flames shall not be traversed so slowly that loose scale or other foreign matter is fused to the surface of the steel. The number, arrangement and manipulation of the flames shall be such that all parts of the surfaces to be painted are adequately cleaned and dehydrated.

3) Promptly after the application of the flames, the surfaces of the steel shall be wire brushed, hand scraped wherever necessary, and then swept and dusted to remove all free materials and foreign particles. Compressed air shall not be used for this operation.

4) Paint shall be applied within 2 hours after the steel has been cleaned and while the temperature of the steel is still above that of the surrounding atmosphere, so that there will be no re-condensation of moisture on the cleaned surfaces.

5.6.3.2 Number of Coats and Colour

All steel shall be painted with one prime coat, and with not less than two field coats. The thickness of the prime coat shall not be less than 75 microns and the total thickness of the two field coats shall not be less than 125 microns.

The colour shall be as specified or determined by the Engineer. The coats shall be sufficiently different in colour to permit detection of incomplete application.

5.6.3.3 Weather Conditions

Paint shall not be applied when the air is misty, or when, in the opinion of the Engineer, conditions are otherwise unsatisfactory for the work. It shall not be applied upon damp surfaces.

Material painted under cover in damp weather shall remain under cover until dry or until weather conditions permit its exposure in the open. Painting shall not be done when the metal is hot enough to cause the paint to blister and produce a porous paint film.

5.6.3.4 Mixing of Paint

Paint shall be factory mixed. All paint shall be re mixed before applying in order to keep the pigments in uniform suspension.

5.6.3.5 Application

A) General

Painting shall be done in a neat and workmanlike manner. Paint may be applied with hand brushes or by spraying except that aluminum paint preferably shall be applied by spraying. By either method, the coating of paint applied shall be smoothly and uniformly spread so that no excess paint collects at any point. If work done by spraying is not satisfactory to the Engineer, hand brushing shall be required.
B) Brushing

When brushes are used, the paint shall be so manipulated under the brush as to produce a smooth, uniform, even coating in close contact with the metal or with previously applied paint, and shall be worked into all corners and crevices.

On all services, which are inaccessible for paint brushes, the paint shall be applied by spraying or applied with sheepskin daubers, to ensure thorough covering.

C) Spraying

Power spraying equipment shall apply the paint in a fine, even spray without the addition of any thinner. Paint, when applied with spray equipment, shall be immediately followed by brushing when necessary to secure uniform coverage and to eliminate wrinkling, blistering and airholes.

D) Removal of Paint

If the painting is unsatisfactory to the Engineer, the paint shall be removed and the metal thoroughly cleaned and repainted.

E) Thinning Paint

Paint as delivered in containers when thoroughly mixed is ready for use. If it is necessary to thin the paint in order that it shall spread more freely, this shall be done only by heating in hot water or on steam radiators, and liquid shall not be added nor removed unless permitted by the Engineer.

5.6.3.6 Painting Galvanised Surfaces

Galvanised surfaces, which are required to be painted, shall first be treated as follows:

For the purpose of conditioning the surface of galvanised surfaces for painting, the painting shall be deferred as long as possible in order that the surface may weather. Before painting galvanised surfaces they shall be treated as follows:

In 1 gallon of soft water dissolve 2 ounces each of copper chloride, copper nitrate, and sal ammoniac, then add 2 ounces of commercial muriatic acid. This should be done in an earthen or glass vessel, never in tin or other metal receptacle. Apply the solution with a wide flat brush to the galvanised surface, after which it will assume a dark, almost black, colour, which on drying becomes a greyish film.

The Contractor may propose any alternative process as a method of treatment subject to the approval of the Engineer.

5.6.4 Measurement

The quantity of work done under this section shall be measured in square metres to include all painting required on each structure or structural unit.

5.6.5 Payment

Payment will be made for the work, materials, labour and equipment as detailed on the Drawings and as specified in the Bill of Quantities.

Pay item shall be:

5/6/1 Preparation and Painting of Existing Structures as Detailed on the Drawings and as stated in the Bill of Quantities.

MAY 2001

Page 5.47