TENDER DOCUMENTS

SUBSECTION 6.42
PAINTING

TABLE OF CONTENTS

PAGE

SUBSECTION 6.42 PAINTING

6.42.1 GENERAL

6.42.1.1 This subsection sets out the requirements related to painting of steel surfaces under this Contract.

6.42.1.2 Any specific requirements related to painting of steel surfaces under this Contract are set out in Section 4 *Special Technical Conditions*.

6.42.1.3 The requirements related to temporary facilities are set out in subsection 6.15 *Scaffolding, Platforms and Other Temporary Devices*.

6.42.1.4 The requirements related to steelwork are set out in subsection 6.41 *Steelwork*.

6.42.2 REFERENCE STANDARDS

6.42.2.1 The **Contractor** shall perform all painting work in accordance with the requirements of the following standards and documents to which the provisions of the Contract are added:

6.42.2.1.1 (ASTM) ASTM International

- ASTM B117-07a *Standard Practice for Operating Salt Spray (Fog) Apparatus*;
- ASTM B499-96(2002) *Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals*;
- ASTM D185-07 *Standard Test Methods for Coarse Particles in Pigments*;
- ASTM D521-02 (2007) *Standard Test Methods for Chemical Analysis of Zinc Dust (Metallic Zinc Powder)*;
- ASTM D523-08 *Standard Test Method for Specular Gloss*;
- ASTM D562-01(2005) *Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer;*
- ASTM D609-00(2006) *Standard Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products*;
- ASTM D610-08 *Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces*;
- ASTM D714-02e1 *Standard Test Method for Evaluating Degree of Blistering of Paints*;
- ASTM D1210-05 *Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage*;

- ASTM D1475-98(2008) *Standard Test Method for Density of Liquid Coatings, Inks, and Related Products*;
- ASTM D1640-03 *Standard Test Method for Drying, Curing, or Film Formation of organic Coatings at Room Temperature*;
- ASTM D1654-05 *Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments*;
- ASTM D2244-07 *Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates*;
- ASTM D2369-07 *Standard Test Method for Volatile Content of Coatings*;
- ASTM D2371-85(2005) *Standard Test Method for Pigment Content of Solvent-Reducible Paints*;
- ASTM D2621-87(2005) *Standard Test Method for Infrared Identification of Vehicle Solids from Solvent-Reducible Paints*;
- ASTM D2697-03 *Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings*;
- ASTM D3359-08 *Standard Test Methods for Measuring Adhesion by Tape Test*;
- ASTM D3960-05 *Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings*;
- ASTM D4214-07 *Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films*;
- ASTM DD4414-95(2007) *Standard Practice for Measurement of Wet Thickness by Notch Gages*;
- ASTM G154-06 *Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials*.

6.42.2.1.2 (CSA) Canadian Standards Association

- CAN/CSA-Z94.4-02(C2007) *Selection, Use, and Care of Respirators*

6.42.2.1.3 (CGSB) Canadian General Standards Board

- CGSB 1-GP-71 *Methods of Testing Paints and Pigments*

6.42.2.1.4 (ISO) International Organization for Standardization

- ISO 3549:1995 Zinc d*ust pigments for paints - Specifications and test methods*

6.42.2.1.5 (SSPC) The Society for Protective Coatings

- SSPC-PA 1, *Shop, Field and Maintenance Painting of Steel*;
- SSPC-PA 2, *Measurement of Dry Coating Thickness with Magnetic Gages*;
- SSPC-SP 1, *Solvent Cleaning;*

- SSPC-SP 2, *Hand Tool Cleaning*;
- SSPC-SP 3, *Power Tool Cleaning*;
- SSPC-SP 5/NACE No. 1, *White Metal Blast Cleaning*;
- SSPC-SP 6/NACE No. 3, *Commercial Blast Cleaning*;
- SSPC-SP 7/NACE No. 4, *Brush-Off Blast Cleaning;*
- SSPC-SP 10/NACE No. 2, *Near-White Blast Cleaning*;
- SSPC-SP 11, *Power Tool Cleaning to Bare Metal*;
- SSPC-SP 15, *Commercial Grade Power Tool Cleaning*;
- SSPC-Paint 20, *Zinc-Rich Coating (Type I Inorganic and Type II Organic)*;
- SSPC-Paint 29, *Zinc Dust Sacrificial Primer, Performance-Based*;
- SSPC-VIS 1 *Visual Standard for Abrasive Blast Cleaned Steel;*
- SSPC-VIS 3 *Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning.*

6.42.2.1.6 (FED STD) Federal Standards

- FED-STD-595B *Colors Used In Government Procurement.*

6.42.3 MATERIALS

6.42.3.1 GENERAL

6.42.3.1.1 Paints used in a given multi-coat system shall be supplied by the same manufacturer.

6.42.3.1.2 All products shall be lead and chromate free apart from traces in driers or other paint additives.

6.42.3.1.3 The colour of the topcoat applied to a system shall be the same as the colour of the existing paint on the structure, that is:

6.42.3.1.3.1 24300 green conforming to standard FED-STD-595B for the Champlain and Jacques-Cartier bridges;

6.42.3.1.3.2 16329 grey conforming to standard FED-STD-595B for the Honoré-Mercier Bridge.

6.42.3.1.4 The **Contractor** shall note that no equivalents will be accepted as substitutes for the paint materials prescribed in this Contract.

6.42.3.1.5 Unless otherwise indicated in the *Special Technical Conditions*, the steel surfaces of existing bridge members that come into contact with new steel plates shall be primed using a product the specifications sheet for which clearly indicates that the product is "Class B slip and creep coefficient, suitable for used on bolted connections". The product shall be obtained from the same manufacturer and shall be compatible with the paint products used for subsequent coats, such as the intermediate and reinforcing coats and the topcoat.

6.42.3.2 GALVANIZING/EPOXY RESIN/POLYURETHANE RESIN PAINT SYSTEM

6.42.3.2.1 Primer

6.42.3.2.1.1 The primer shall be organic zinc (Type II) conforming to standard SSPC-Paint 20 or organic zinc (Type II, Level 2) conforming to standard SSPC-Paint 29. The following primers meet these requirements:

MANUFACTURER	PRODUCT NAME	COLOUR
Ameron Canada	Amercoat 68HSC	Standard colour (green)
International Paint	Interzinc 52	Standard colour (grey green)
Pittsburgh Paints	UC65383/UC65384	Standard colour (grey green)
Sherwin-Williams	Zinc Clad 200	Standard colour (grey green)
Stoncor Group	Carbozinc 859	0300 (green)

6.42.3.2.2 Intermediate coat and reinforcing coat

6.42.3.2.2.1 The intermediate coat and the reinforcing coat shall be two (2) component epoxy paint.

6.42.3.2.2.2 One of the following products shall be used to apply and harden the intermediate coat and the reinforcing coat at temperatures above 10°C:

MANUFACTURER	PRODUCT NAME	COLOUR
Ameron Canada	Amercoat 385	Intermediate coat: WH-1 (white) Reinforcing coat: 7821 (red)
International Paint	Intergard 475HS	Intermediate coat: 71020 (beige) Reinforcing coat: 71003 (red)
Pittsburgh Paints	Pitt-Guard 97-946/97-949	Intermediate coat: standard colour (white)
	Pitt-Guard 97-948/97-949	Reinforcing coat: standard colour (grey)

MANUFACTURER	PRODUCT NAME	COLOUR
Sherwin-Williams	Macropoxy 646 Fast Cure Epoxy	Intermediate coat: SW4036 (white) Reinforcing coat: SW4014 (beige)
Stoncor Group	Carboguard 893	Intermediate coat: 0800 (white) Reinforcing coat: 0500 (red)

6.42.3.2.2.3 One of the following products shall be used when the application and during of the intermediate coat and the reinforcing coat are done at temperatures below 10°C and up to the minimum temperature specified by the manufacturer of the product:

MANUFACTURER	PRODUCT NAME	COLOUR
Ameron Canada	Amercoat 370	Intermediate coat: WH-1 (white) Reinforcing coat: 7821 (red)
International Paint	Intergard 670HS	Intermediate coat: 71020 (beige) Reinforcing coat: 71003 (red)
Pittsburgh Paints	Pitt-Guard 97-946/97-949	Intermediate coat: standard colour (white)
	Pitt-Guard 97-948/97-949	Reinforcing coat: standard colour (grey)
Sherwin-Williams	Macropoxy 846 Winter Grade Epoxy	Intermediate coat: SW4036 (white) Reinforcing coat: SW4014 (beige)
Stoncor Group	Carbomastic 242	Intermediate coat: C901 (aluminum) Reinforcing coat: M500 (red)

6.42.3.2.3 Topcoat

6.42.3.2.3.1 The topcoat shall be two-component acrylic urethane and shall be supplied by the same manufacturer as the primer and intermediate coats. The topcoat shall not be applied if the temperature is below 5°C. One of the following products shall be used for the topcoat:

MANUFACTURER	PRODUCT NAME
Ameron Canada	Amercoat 450HS
International Paint	Interthane 990HS

MANUFACTURER	PRODUCT NAME
Pittsburgh Paints	Pitthane 95-8000/95-819
Sherwin-Williams	Sherthane 2K
Stoncor Group	Carbothane 134HG

6.42.3.3 EPOXY RESIN AND ALUMINUM PIGMENT/POLYURETHANE RESIN PAINT SYSTEM

6.42.3.3.1 Primer and intermediate coats

6.42.3.3.1.1 The primer and intermediate coats shall be two (2) component epoxy and aluminum paint.

6.42.3.3.1.2 One of the following products shall be used to apply and cure the primer and intermediate coats.

MANUFACTURER	PRODUCT NAME
Ameron Canada	Amercoat 400AL
International Paint	Interseal 670HS

6.42.3.3.2 Topcoat

6.42.3.3.2.1 The topcoat shall be two-component acrylic urethane and shall be supplied by the same manufacturer as the primer and intermediate coats. The topcoat shall not be applied if the temperature is below 5°C. One of the following products shall be used for the topcoat:

MANUFACTURER	PRODUCT NAME
Ameron Canada	Amercoat 450HS
International Paint	Interthane 990HS

6.42.3.4 THINNERS AND SOLVENTS

6.42.3.4.1 Thinners and solvents used by the **Contractor** shall meet the requirements of the paint manufacturer.

6.42.3.5 ABRASIVES

6.42.3.5.1 Unless otherwise indicated in the *Special Technical Conditions*, abrasives shall produce on average a steel surface with no irregularities exceeding 65 μm (micrometers) (2.5 mils).

6.42.3.5.2 Abrasives shall not contain crystalline silica.

6.42.4 DELIVERY, HANDLING AND STORAGE

6.42.4.1 No paint product shall be ordered without authorization from the Engineer.

6.42.4.2 All materials shall be delivered to the site in their original sealed container bearing a label containing the following information:

- name of manufacturer;
- name of product;
- volume of containers in litres;
- production batch number;
- type, colour and colour number;
- date container filled;
- mixing and application instructions;
- quantity and type of thinners;
- WHMIS (Workplace Hazardous Materials Information System) requirements.

6.42.4.3 Samples to be submitted to the Engineer shall be placed in sealed one (1) litre high-density polyethylene containers.

6.42.4.4 All materials shall be stored and used in the manner and under the conditions recommended by the manufacturer.

6.42.4.5 The storage temperature shall be the temperature specified by the manufacturer or, if no temperature is specified, between 5°C and 40°C.

6.42.4.6 After mixing, each paint shall meet the requirements of these specifications.

6.42.5 EQUIPMENT AND TOOLS

6.42.5.1 GENERAL

6.42.5.1.1 All equipment needed to clean and paint the roadway infrastructure shall meet the requirements of these specifications and the instructions from the manufacturer of the paint products to be applied.

6.42.5.1.2 All equipment shall meet the minimum requirements set out in the standard applicable to the paint system used.

6.42.5.2 VENTILATION SYSTEM

6.42.5.2.1 The ventilation system shall be appropriate for the surface preparation, cleaning and painting work.

6.42.5.2.2 To ensure ventilation of the space within the enclosures during cleaning and surface preparation, the **Contractor** shall install an initial ventilation system that meets the following requirements:

6.42.5.2.2.1 the system shall comprise fans and dust removers with filters;

6.42.5.2.2.2 the capacity of the system shall ensure that the air inside the enclosures is changed at least four (4) times an hour; additional capacity shall be contemplated for air brought inside the enclosures by the air hoses used to clean the steel;

6.42.5.2.2.3 the system shall create negative pressure inside the enclosures;

6.42.5.2.2.4 the system shall reduce the concentration of contaminants inside the enclosures to levels below the thresholds permitted by the applicable legislation and government regulations and shall minimize the emission of contaminants into the outside air;

6.42.5.2.2.5 the filters in the system shall be cleaned and changed regularly so as to maintain the effectiveness of the system.

6.42.5.2.3 To ensure ventilation of the space within the enclosures during painting, the **Contractor** shall install a second initial ventilation system that meets the following requirements:

6.42.5.2.3.1 the system shall comprise fans, vacuums and filters;

6.42.5.2.3.2 the capacity of the system shall ensure that the air inside the enclosures is changed at least twice an hour;

6.42.5.2.3.3 the system shall create negative pressure inside the enclosures;

6.42.5.2.3.4 the system shall reduce the concentration of paint fumes and particles inside the enclosures to levels below the allowable concentrations and shall minimize their emission into the outside air;

6.42.5.2.3.5 the filters in the system shall be cleaned and changed regularly in order to maintain the effectiveness of the system.

6.42.5.3 DEHUMIDIFIER

6.42.5.3.1 The **Contractor** shall supply and install humidity control (drying) equipment inside the enclosures if needed according to the Engineer's instructions and so as to meet the requirements of the paint manufacturer.

6.42.5.4 BREATHABLE COMPRESSED AIR SYSTEM

6.42.5.4.1 The **Contractor** shall install a fixed network of rigid breathable compressed air pipes inside each enclosure with a sufficient number of air outlets. The outlets shall be placed such that all parts of the work site can be accessed by representatives of the Engineer and the **Contractor**. Each outlet shall be fitted with a breathable compressed air hose not more than 5 m long.

6.42.5.4.2 The **Contractor** shall supply three (3) breathable compressed air lines for the Engineer and the Engineer's representatives for the entire period of work. These breathable air lines shall conform to standard CAN/CSA-Z94.4.

6.42.5.4.3 The **Contractor** shall supply its stripping and painting workers with a sufficient number of breathable air lines and respirators in accordance with standard CAN/CSA-Z94.4.

6.42.6 EXECUTION OF WORK

6.42.6.1 GENERAL

6.42.6.1.1 The **Contractor** shall supply all the labour, machinery, equipment, tools and temporary structures needed to perform the cleaning and painting work as prescribed by the drawings and specifications.

6.42.6.2 PLANNING

6.42.6.2.1 At least twenty-one (21) calendar days prior to the start of the painting work, the **Contractor** shall submit colour samples of each coat of paint for approval by the Engineer.

6.42.6.2.2 At least fourteen (14) calendar days prior to the start of access devices and enclosures installation work, the **Contractor** shall submit to the Engineer for review and comment drawings and design notes for temporary access devices and enclosures and technical data sheets for all cables, trusses and other components used to construct them, in accordance with the requirements of subsection 6.15 *Scaffolding, Platforms and Other Temporary Devices*.

6.42.6.2.3 At least fourteen (14) calendar days prior to the start of steel clearing work, the **Contractor** shall submit to the Engineer for approval the technical and safety data sheets for the paints and thinners, cleaning products and abrasives it plans to use.

6.42.6.2.4 At least fourteen (14) calendar days prior to the start of the painting work, the **Contractor** shall submit for approval by the Engineer the following samples:

6.42.6.2.4.1 for one (1) component paints and thinners, two (2) one (1) litre samples;

6.42.6.2.4.2 for two (2) component paints, two (2) samples of each component unmixed and in the proportions recommended by the manufacturer.

6.42.6.2.5 At least fourteen (14) calendar days prior to the start of cleaning and painting work, the **Contractor** shall submit to the Engineer a list of the specialized equipment and material it plans to use to perform the work. Equipment and material may not be used unless it is approved by the Engineer.

6.42.6.3 PROTECTION OF EXISTING EQUIPMENT

6.42.6.3.1 Before starting cleaning and painting work, the **Contractor** shall at a minimum cover and seal all moving parts of all expansion components, supports, equipment and control panels near the work site in order to prevent them from coming into contact with abrasives, dust, dirt and paint.

6.42.6.3.2 The **Contractor** shall fully clean any parts, components or equipment referred to in paragraph 6.42.6.3.1 that may be soiled as a result of the work.

6.42.6.4 SURFACE PREPARATION

6.42.6.4.1 Galvanizing/epoxy resin/polyurethane resin paint system

6.42.6.4.1.1 The **Contractor** shall clean by means of abrasive blasting all steel components that are to be painted in order to remove any salt, oil, grease, dust, rust or existing paint so that the surfaces are cleaned in accordance with standards SSPC-SP 5/NACE No. 1 and SSPC-VIS 1 and to the Engineer's complete satisfaction.

6.42.6.4.1.2 The **Contractor** shall clean surfaces that cannot be reached by dry abrasive blasting so as to obtain a minimum degree of preparation that conforms to standard SSPC-SP 11 or is to the Engineer's satisfaction. Only the Engineer can authorize preparation that conforms to standard SSPC-SP 11 rather than standard SSPC-SP 5/NACE No. 1. Accordingly, the **Contractor** shall use mechanical and hand tools and solvents to remove all salt, oil, grease, dust, rust, rust scale and existing paint. The **Contractor** shall use needle scalers, shears and other equipment approved by the Engineer to remove rust from crevices.

6.42.6.4.1.3 Dust and other dirt on surfaces to be repainted following blast cleaning and on the floors, walls and joints of enclosures shall be removed using a vacuum or compressed air blasting.

6.42.6.4.2 Epoxy resin and aluminum pigment/polyurethane resin paint system

6.42.6.4.2.1 The **Contractor** shall clean by means of abrasive blasting all steel components that are to be painted in order to remove any salt, oil, grease, dust, rust or existing paint. The cleaned surfaces shall conform to standards SSPC-SP 6/NACE No. 3 and SSPC-VIS 1 and shall be to the Engineer's complete satisfaction.

6.42.6.4.2.2 Where the surfaces to be painted are smaller than 10 m^2 in total and subsequent to approval by the Engineer, the **Contractor** shall clean the surfaces of the steel components to be painted using mechanical and hand tools and solvents to remove all salt, oil, grease, dust, rust, rust scale and existing paint so that the cleaned surfaces conform to standards SSPC-SP 11 and SSPC-VIS 3 and are to the Engineer's complete satisfaction.

6.42.6.4.3 Immediately prior to painting, the **Contractor** shall use a blast of dry compressed air to remove any loose particles from the cleaned surfaces.

6.42.6.4.4 The quality of the surface preparation of the metal to be painted shall be approved by the Engineer prior to the start of painting work. The **Contractor** shall provide the Engineer with access and sufficient time to inspect the cleaning work. In the event of non-conformity, the **Contractor** shall redo the work at no additional cost to the **Owner**, to the Engineer's satisfaction.

6.42.6.4.5 For purposes of surface preparation, the heat, light, humidity and ventilation conditions inside the enclosures shall meet the requirements of these specifications and the manufacturer's recommendations and are at all times subject to approval by the Engineer.

6.42.6.5 APPLICATION CONDITIONS

6.42.6.5.1 Paint shall be applied in accordance with the requirements of these specifications and the paint manufacturers' technical data sheets. Any deviation from a requirement of these specifications shall be approved by the Engineer in writing prior to the start of work.

6.42.6.5.2 For purposes of paint application, the heat, light, humidity and ventilation conditions inside the enclosures shall meet the requirements of these specifications and the paint manufacturer's recommendations and are at all times subject to approval by the Engineer. In case of contradiction between requirements of the two (2) documents, the requirements or the specifications the most favourable to the **Owner** shall prevail.

6.42.6.5.3 All cleaned surfaces shall be covered with a first coat of paint as soon as possible following surface preparation and before surface rust appears, and in all cases within six (6) hours.

6.42.6.5.4 Any surface rust that appears between the completion of cleaning and the application of the first coat of paint shall be removed using light abrasive blasting to the Engineer's satisfaction.

6.42.6.5.5 The **Contractor** shall apply each coat that is part of the paint system when:

6.42.6.5.5.1 the temperature of the air and the surfaces to be covered is above 5°C;

6.42.6.5.5.2 the temperature of the surface to be covered is above the dew point plus 3°C;

6.42.6.5.5.3 the surface to be covered is dry;

6.42.6.5.5.4 the previous coat of paint is sufficiently dry.

6.42.6.5.6 If necessary, the **Contractor** shall heat the enclosures to maintain the temperature of the surfaces to be painted and the inside of the enclosures at a minimum of 5°C while the paint is being applied and until the paint has cured.

6.42.6.6 PAINTING OF SURFACES

6.42.6.6.1 General

6.42.6.6.1.1 The **Contractor** shall mechanically stir each paint component according to the manufacturer's recommendations in order to ensure that the products are homogenous before they are mixed.

6.42.6.6.1.2 The **Contractor** shall mix and mechanically stir the components of the paint to be applied according to the manufacturer's recommendations in order to ensure that the mixture is homogenous before it is applied.

6.42.6.6.1.3 The **Contractor** shall use for the painting gun the minimum air pressure needed to obtain a suitable spray.

6.42.6.6.1.4 The **Contractor** shall mix the paint thoroughly and run it through a sieve when pouring it into the gun containers or paint cans.

6.42.6.6.1.5 Once the paint is applied, the dried film shall be free of runs, coarse particular and pits.

6.42.6.6.1.6 The appearance of the dried film of paint shall be even in terms of texture, colour and sheen.

6.42.6.6.1.7 The application and drying of paint shall meet the requirements of these specifications and the recommendations of the paint manufacturer.

6.42.6.6.1.8 The **Contractor** shall not apply a new coat until any dust that may have adhered to the previous coat is removed.

6.42.6.6.1.9 The **Contractor** shall, immediately after applying each coat, take all necessary precautions to prevent dust, abrasives or any other foreign matter from falling onto the freshly painted surfaces.

6.42.6.6.2 Galvanizing/epoxy resin/polyurethane resin paint system

6.42.6.6.2.1 The **Contractor** shall paint all prescribed steel surfaces with a coat of organic zinc primer with a minimum dried film thickness of 75 µm (3.0 mils) applied with a spray gun using multiple criss-crossing passes to produce an even film thickness.

6.42.6.6.2.2 The intermediate coat of two-component epoxy paint shall be applied to all surfaces, including crevices, rivets, bolts, nuts and washers, which shall be painted with a coat of epoxy. The intermediate coat shall have a dried film thickness of at least 150 µm (6 mils).

6.42.6.6.2.3 The **Contractor** shall then apply, using a brush and/or spray gun, a reinforcing coat of two-component epoxy paint onto the edges of members, rivets, bolts, welds, nuts and washers and rust areas in cracks located between surfaces in contact with members reinforced by superposition, such as deck beams, deck girders, diagonal members of trusses, top and bottom members of trusses, uprights of trusses and cross bracing, in accordance with the manufacturer's instructions and as indicated on the drawings.

6.42.6.6.2.4 The reinforcing coat shall be applied so as to ensure complete coverage and penetration of the paint in and around the components referred to in paragraph 6.42.6.6.2.3. The reinforcing coat shall extend at least 40 mm beyond the perimeter of the component to be covered, as indicated on the drawings.

6.42.6.6.2.5 The two (2) component acrylic urethane topcoat shall be applied after the epoxy paint has dried and shall have a minimum dried film thickness of 50 µm (2 mils).

6.42.6.6.2.6 The topcoat shall be applied as prescribed in the manufacturer's technical sheets not more than seven (7) days after the first coat of paint is applied.

6.42.6.6.3 Epoxy resin and aluminum pigment/polyurethane resin paint system

6.42.6.6.3.1 The **Contractor** shall apply to all prescribed steel surfaces, using a brush or gun, a coat of two (2) component epoxy resin and aluminum pigment primer with a minimum dried film thickness of 100 µm (4.0 mils).

6.42.6.6.3.2 The **Contractor** shall then apply a second coat of two-component epoxy resin and aluminum pigment paint with a minimum dried film thickness of 100 µm (4.0 mils) to all surfaces using a brush or gun.

6.42.6.6.3.3 The two-component acrylic urethane topcoat shall be applied after the second coat of epoxy paint has dried and shall have a minimum dried film thickness of 50 µm (2 mils).

6.42.6.7 TOUCH-UPS

6.42.6.7.1 The **Contractor** shall take every precaution to minimize the need for surfaces to be touched up.

6.42.6.7.2 Painted surfaces damaged during the work shall be cleaned so as to remove any damaged paint and any other contaminant to the Engineer's satisfaction. After cleaning, dust and other dirt on the surface to be touched up shall be removed, recovered and disposed of.

6.42.6.7.3 Touch-ups shall be done on all surfaces damaged during the work period by applying the original system paint.

6.42.6.7.4 Existing painted surfaces damaged during work to modify or repair a metal frame or member shall be touched up using an epoxy resin and aluminum pigment/polyurethane resin system.

6.42.6.8 PAINTING METALLIZED AND GALVANIZED STEEL SURFACES

6.42.6.8.1 The surfaces to be covered shall be cleaned by hand using a wire brush and a solvent in order to remove the sheen but without damaging the zinc coating, in accordance with the paint manufacturer's requirements.

6.42.6.8.2 The epoxy resin and polyurethane resin paint used to paint freshly metallized and galvanized steel surfaces shall be one of the products prescribed in paragraphs 6.42.3.2.2 and 6.42.3.2.3.

6.42.6.8.3 A prime coat for the first coat of paint shall be applied. The prime coat consists of a mist of the epoxy resin paint used for the first coat thinned according to the manufacturer's recommendations.

6.42.6.8.4 The first coat is a coat of epoxy resin paint with a minimum dried film thickness of 100 µm (4.0 mils).

6.42.6.8.5 The topcoat is a coat of polyurethane resin paint with a minimum dried film thickness of 50 µm (2.0 mils).

6.42.6.8.6 All metallized surfaces shall be covered with a first coat of paint as soon as possible after the surfaces are metallized, to the Engineer's satisfaction.

6.42.6.8.7 The topcoat shall be applied as prescribed by the manufacturer's technical sheets within seven (7) days after the first coat of paint is applied.

6.42.6.8.8 If there is moisture in the pores of the metallized coating, the steel shall be heated to a temperature of 120°C in order to remove the moisture before the paint is applied.

6.42.6.9 DISPOSAL OF MATERIALS

6.42.6.9.1 The **Contractor** shall collect and dispose of contaminated paint and abrasive waste resulting from abrasive blasting so as to prevent the contamination of persons, traffic, property and the natural environment.

6.42.6.9.2 The **Owner** will not tolerate any discharge of abrasives or other stripping material from enclosures, platforms or scaffolding.

6.42.6.9.3 The **Contractor** shall place the waste in sealed containers and store them on site temporarily.

6.42.6.9.4 The **Contractor** shall take representative samples and determine the properties of cleaning waste. Analyses of concentrations of contaminants in leachate from the waste shall be carried out by a registered laboratory retained by the **Contractor**, and the results shall be submitted to the Engineer in writing before the waste is removed from the site.

6.42.6.9.5 Materials to be disposed of under this Contract and deemed to be *hazardous materials* shall be removed from the **Owner**'s property in accordance with the applicable environmental protection statutes and regulations and the requirements of subsection 6.13 *Environmental Protection*, at no additional cost to the **Owner**.

6.42.6.9.6 To monitor contaminated abrasives, the **Contractor** shall periodically submit to the Engineer on site a mass balance of incoming and outgoing abrasives.

6.42.7 QUALITY CONTROL

6.42.7.1 GENERAL

6.42.7.1.1 The **Contractor** shall develop, implement and maintain a quality assurance program for surface preparation, cleaning and painting. The quality assurance system shall be developed so as to meet the requirements set out in these specifications, the standards of professional practice and the Engineer's specific instructions.

6.42.7.1.2 Cleaning and painting work will be marked by stop points. A stop point is a point beyond which the **Contractor** must not continue without written authorization from the Engineer. There will be a minimum of seven stop points, one after each of the operations listed in paragraphs 6.42.7.1.7.1 to 6.42.7.1.7.7.

6.42.7.1.3 At each stop point, the **Contractor** shall submit to the Engineer and the Engineer shall acknowledge a quality control sheet on its work completed by the **Contractor**. The control sheet shall include complete information and surveys related to quality control of the work done during the phase in question. The control sheet shall also clearly indicate the boundaries of the work area covered by the sheet.

6.42.7.1.4 Acknowledgment of control sheets by the Engineer in no way means that the Engineer has verified the information and surveys recorded on the sheet and in no way relieves the **Contractor** of its duty to perform the work in accordance with the Contract requirements.

6.42.7.1.5 The Engineer will monitor the quality of the work and will designate for that purpose painting inspectors or other representatives (hereinafter referred to as "the Engineer's Representative") who will be assigned to the task. The **Contractor** shall provide the necessary assistance to ensure that the required monitoring is carried out effectively. To that end, the **Contractor** shall meet at least the following requirements:

6.42.7.1.5.1 the **Contractor**, jointly with the painting inspectors or any other Engineer's Representative, shall conduct an inspection of each phase of work in order to ensure that the work meets the requirements of this Contract;

6.42.7.1.5.2 the **Contractor** shall leave the scaffolding, walkways and other access devices in place for at least twenty-four (24) hours after application of the topcoat to allow the painting inspectors or any other Engineer's Representative to verify the quality of the work. This period may be increased if weather conditions so require.

6.42.7.1.5.3 the **Contractor** shall stop stripping work for twenty (20) minutes three times a day to allow the painting inspectors or any other Engineer's Representative to inspect the work being done on the steel surfaces. The schedule of such inspections is set by the Engineer and the **Contractor** to the Engineer's satisfaction prior to the start of work.

6.42.7.1.5.4 if work is being done simultaneously in two (2) separate enclosures, the **Contractor** shall plan the stoppages so as to allow the enclosures to be inspected at different times.

6.42.7.1.6 The Engineer may decide to forgo one or more inspections. The **Contractor** remains responsible for quality control of its work and therefore is solely responsible for any deficiencies in the paint system, disruption of the **Contractor**'s activities or additional costs to redo work in areas where work was completed but deemed unsatisfactory by the Engineer.

6.42.7.1.7 For all members to be cleaned and painted, inspections by the painting inspectors or any other Engineer's Representative will be conducted after each of the following phases of work:

6.42.7.1.7.1 surface preparation;

6.42.7.1.7.2 cleaning of surfaces prior to the start of primer application;

6.42.7.1.7.3 application of primer;

6.42.7.1.7.4 application of intermediate coat;

6.42.7.1.7.5 brush application of a coat of two-component epoxy paint coat to all edges, crevices, rivets, bolts, nuts, washers and welds, as applicable, in the case of the system described in article 6.42.3.2 *Galvanizing/epoxy resin/polyurethane resin paint system*;

6.42.7.1.7.6 application of topcoat;

6.42.7.1.7.7 touch-ups.

6.42.7.1.8 The Engineer may conduct additional inspections as needed to ensure the quality of the work. In such cases, the **Contractor** shall provide all the assistance needed to ensure that the inspections are carried out effectively.

6.42.7.1.9 The **Contractor** shall measure the thickness of the fresh paint film as application proceeds to ensure that the stipulated dried film thickness is obtained.

6.42.7.1.10 The fresh film thickness corresponding to the stipulated dried film thickness of the various coats of paint shall be determined based on the requirements of standard ASTM D4414-95(2001).

6.42.7.1.11 The fresh film thickness corresponding to the stipulated dried film thickness is determined by the following formula:

$$H = T \bullet \left(\frac{100 + D}{B} \right)$$

H: thickness of fresh film (µm)

T: stipulation thickness of dried film (µm)

D: percentage volume of thinner added, if necessary

B: percentage volume of non-volatile compounds in unthinned material.

6.42.7.1.12 The dried film thickness of the various coats of paint shall be determined in accordance with the requirements of standard SSPC-PA 2.

6.42.7.1.13 Depending on the type of instrument used to measure the thickness of the dried film, one of the following methods shall be used:

6.42.7.1.13.1 SSPC-PA 2 Type 1 for repeat gauges;

6.42.7.1.13.2 SSPC-PA 2 Type 2 for fixed-probe electromagnetic gauges.

6.42.7.1.14 The minimum adhesion of the system's paint film determined by *Test Method A – X Cut Tape Test* in standard ASTM D3359-02 shall be 3 A.

END OF SUBSECTION