

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 05 12 33 - Structural Steel for Bridges
 - .3 Section 05 50 00 - Metal Fabrications
- 1.2 MEASUREMENT AND PAYMENT
- .1 Payment for this item shall be included in the contract unit price, lump sum, for Structural Steel for Bridges (refer to Section 05 12 33 - Structural Steel for Bridges).
- 1.3 REFERENCES
- .1 All reference standards in this section shall be current issue or latest revision at the first date of project tender advertisement.
 - .1 ASTM D269, Test Method for Insoluble Matter in Rosin and Rosin Derivatives.
 - .2 ASTM D4541, Test Method for Pull-Off Strength of Coatings Using Portable Adhesion-Testers.
 - .3 CGSB-GP-12C, Standard Paint Colours, Parts 1 of 3.
 - .4 CGSB 1-GP-171M, Coating, Inorganic Zinc.
 - .5 CGSB 1-GP-180Ma, Coating, Polyurethane, Two Package, General Purpose.
 - .6 CGSB 164-GP-IMP, Leachate Extraction Procedure.
 - .7 CSA-S269.2-M87, Access Scaffolding for Construction Purposes, the National Building Code of Canada.
 - .8 SSPC, (Steel Structure Painting Council), Steel Structures Painting Manuals - Volumes 1 and 2, "Good Painting Practice" and "Systems and Specifications".
 - .9 SSPC PS 20.00, Zinc-Rich Primers.
 - .10 SSPC-Guide 6, Guide for Containing Debris Generated During Paint Removal Operations.
 - .11 SSPC-Guide 7, Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.
 - .12 NEPCOAT Qualified Products List A for Protective Coatings for New and 100%
-

Bore Existing Steel for Bridges.
.13 CSA S6-14 Canadian Highway Bridge Design
Code (CHBDC)

1.4 SUBMITTALS

- .1 Submit three (3) copies of the following in accordance with Section 01 33 00 - Submittal Procedures prior to the start of coating operations.
 - .1 Abrasive to be utilized along with manufacturer's specifications.
 - .2 Coating(s) to be utilized along with the manufacturer's specifications.
 - .3 Material Safety Data Sheets for all products. MSDS must remain at the place of work at all times.
 - .4 Design of platform, scaffolds and enclosure stamped by a Professional Engineer registered in Nova Scotia.

1.5 QUALITY CONTROL

- .1 All material and equipment furnished and work done, shall be subject to inspection by the Departmental Representative. An appointed inspector may be on site during all operations. Such inspection shall not relieve the Contractor of the responsibility for furnishing the qualified labour, equipment, staging, etc., necessary to meet the requirements of this specification, or the safe accessibility to the work for the purposes of inspection.
- .2 Keep accurate records containing details such as weather, temperatures, dew points and times for the various coating applications and shall make these records available to the Departmental Representative upon request.
- .3 All work shall be subject to inspection by the Departmental Representative or appointed representative, who shall be given at least 48 hours notice prior to work commencing. The Contractor shall coordinate activities with the Departmental Representative to ensure that all aspects of the work are inspected.

Defective work not conforming to this specification shall be repaired at no additional cost.

- .4 Methods of inspection and inspection procedures shall be as directed by the Departmental Representative, who shall govern both methods and standards. All findings will be recorded and will become part of the Project's Quality Assurance Records.
 - .5 Coating inspection shall be performed in accordance with the procedures outlined in SSPC Manual, Volume 1, Chapter 5, "Inspection".
 - .6 Profile measurements shall be made on a random basis by use of replica tape and spring micrometer or by micrometer depth gauge.
 - .7 Dry film coating thickness readings shall be performed in accordance with SSPC-PA 2, "Measurement of Dry Paint Thickness with Magnetic Gages".
 - .8 When necessary, the testing of ambient and surface temperature and humidity shall be done by thermometer, surface thermometer and psychrometer with recognized psychrometric tables.
 - .9 Destructive testing may be required where inadequate adhesion of the coating(s) is suspected. Adhesion testing shall be done in accordance with ASTM D4541. The minimum adhesion of the coating under evaluation shall be 1.7 MPa (250 psi). Coatings damaged as the result of destructive testing shall be repaired at no extra cost to the Contract. Repair procedures and materials shall be approved by the Departmental Representative prior to application.
-

1.6 DELIVERY OF
PRODUCT

- .1 All coating materials shall be supplied in new condition. Two component coatings shall be packaged separately.
- .2 Coating components shall be packaged in proportions that are consistent with the manufacturer's normal method of packaging.
- .3 Each container shall bear a label which shall clearly show the manufacturer's name or brand of coating, the lot number and date of manufacture.

PART 2 - PRODUCTS

2.1 COATING SYSTEMS

- .1 Coatings applied to structural steel shall consist of:
 - .1 Inorganic zinc primer plus high build modified aluminum epoxy mastic mid-coat plus high build aliphatic polyurethane top coat in a selected colour. The top coat color shall be gray color (FS16440), approved by the Departmental Representative. Provide paint sample to Departmental Representative for approval prior to ordering coatings.
- .2 Application of coating systems: the inorganic zinc primer shall be applied to the prepared metal surface by airless spray equipment or as recommended by the manufacturer. The inorganic zinc shall be applied at the shop. Application of the intermediate coat shall also be done in the shop. Repair all damage due to transport, erection or construction activities and ensure touch-ups blend with the shop applied top coat to provide a uniform, aesthetically pleasing end product. The appearance of the final product shall meet with the approval of the Departmental Representative.
- .3 Acceptable products: the contractor is responsible for ensuring that the latest formulation of the proposed coating products to be utilized in the work satisfies the requirements of this specification. Coating system must be listed on the Nova Scotia Transportation and Infrastructure renewal Paint "System A". All coating work and systems for the

purpose of this specification shall be considered a fully cured system prior to being accepted by the Departmental Representative. No accelerators for the purpose of force curing the coating system will be accepted without prior written approval.

2.2 ETHYL SILICATE/
POTASSIUM ZINC-RICH PRIMER

- .1 Inorganic zinc primer shall be a two-component self-curing type which, when mixed and applied in accordance with the manufacturer's instructions, cures without the use of a separate curing solution, and shall have the properties described herein. The inorganic zinc primer shall meet or exceed the requirements of Steel Structures Painting Council Specification PS 20.00 (Type 1).
- .2 Pigment: the zinc portion of the pigment shall be a finely divided zinc powder containing, by weight, a minimum of 94% metallic zinc. All other fillers contained in the pigment shall be inert substances with an average particle size of 6 microns.
- .3 Vehicle: the vehicle components shall consist primarily of a partially hydrolyzed ethyl and or potassium silicate, in an appropriate hydrocarbon solvent. The storage life of the vehicle shall be nine (9) months minimum at 25°C.
- .4 Mixed coating: the total zinc portion shall be at least 84% by dry weight of the total solids of the dried coating. The coating shall tolerate up to 1% water contamination by weight without gelation, within five (5) minutes. The usable pot life of the mixed coating shall be not less than four (4) hours at 25°C. There shall be no hard settling which cannot be easily re-dispersed during this period.
- .5 Colour: the inorganic zinc coating shall be formulated so as to produce a distinct contrast in colour with the blast cleaned metal surfaces.
- .6 Primer coating shall be certified as a Class B coating for slip coefficient and creep resistance as per Appendix A of the ASTM A0325 or A-490 Bolt Specification. All faying surfaces shall be coated with the Class B primer coating as outlined in the ASTM A-325 or A-490 Bolt

Specification. As such, all bolted connection faying surfaces shall receive the primer coating, including splice plates.

2.3 HIGH BUILD MODIFIED
ALUMINUM EPOXY MASTIC

- .1 Coating shall be a self-priming, two-component, high build, aluminum filled epoxy mastic. The coating shall be compatible with inorganic zinc primers, catalyzed epoxies, catalyzed phenols or other coatings as recommended by the coating manufacturer. The coating shall also be compatible to be used over most generic types of coatings which are tightly adhering and properly prepared.
- .2 Solids by volume of the coating, when mixed, shall be 90 +/- 2% when tested in accordance with ASTM D269, total pigment by weight.
- .3 Pigment: the primary pigment shall be aluminum and shall represent a minimum of 17% of the total pigment by weight.
- .4 Mixed coating: the mixed coating must be capable of being top coated with most generic types of coatings after curing a minimum of 24 hours at 24°C. Final cure shall be attained after five days minimum at 24°C. The pot life of the mixed coating shall be a minimum of 4 hours when the material and ambient temperature are 24°C and the material has been thinned according to manufacturer's recommendations. The coating shall be capable of being applied when the material is at a temperature as low as 10°C.

2.4 HIGH BUILD ALPHATIC
POLYURETHANE FINISH COAT

- .1 High build aliphatic polyurethane finish coat shall be a two component, high solids, high build, spray applied coating with a satin or semi-gloss finish that is highly resistant to weather, abrasion, corrosive fumes, splash and spillage of acids, alkalis, solvents, salts and water. It shall provide adequate hiding when applied in a single coat directly over aluminum mastic and shall provide long term colour and gloss retention. The coating shall be compatible with inorganic zinc primers, catalyzed epoxies, catalyzed phenols or other overcoats, as recommended by the coating manufacturer. The coating shall also be compatible to be applied

over most generic types of coatings which are tightly adhering and properly prepared.

- .2 Mixed coating: the two components of the system shall have a shelf life of 12 months minimum. The pot life for the mixed material shall be four hours at 24°C.
- .3 Finish coat colour to be gray color, approved by the Departmental Representative. Provide colour chip to Departmental Representative prior to executing work.
- .4 Finish coat on girders shall be applied in the shop unless otherwise approved. All touchups carried out in the field are to be colour matched to the satisfaction of the Departmental Representative. If the touch-up colour match cannot be achieved, the Contractor is responsible to re-apply the entire finish coat in the field at their own expense.
- .5 All field coating activities shall be completed within an appropriate containment system to ensure that no materials fall or spill into the river or land area surrounding the structure.

2.5 BLAST MEDIA

- .1 Abrasive blast media shall be clean and sharp silica sand, washed industrial sand, steel grit, or a slag material of suitable size, weight and angular shape to produce the degree of cleaning specified and anchor pattern/profile required. The blast media shall contain no more than 1% by weight of water soluble solids. There shall be less than 10ppm oil in the abrasive and no trace of salts or toxic material. When cleaning by air blasting with sand abrasives, adequate separators and traps shall be provided to remove detrimental amounts of water and oil from the compressed air before it reaches the nozzle.
- .2 Materials unsuitable for use in the work shall be disposed of offsite in an approved manner at no additional cost to the Contract. Re-claimed abrasive material will not be acceptable with the exception of steel grit.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Coating systems shall be as detailed in these specifications. The manufacturer's data sheets

- are part of this specification. Should there be any conflict between these two specifications, the decision of the Departmental Representative shall prevail.
- .2 All surfaces to be coated shall be free from contamination prior to any application. No coating work shall be done when the surface is less than 3°C above the dew point, nor when it is likely that there will be a change in the weather within four (4) hours of application that would be detrimental to the coating system. All coatings shall be uniformly applied without sags, foreign material, dust, contamination, cracks or other blemishes. Defects shall be removed and repaired to the satisfaction of the Departmental Representative.
 - .3 The Contractor shall arrange for site visits from the coating manufacturer's technical representative a minimum of one visit per month while the job is in progress. For projects scheduled for completion in less than one month, the manufacturer's representative shall arrange to visit the site at least once. After each visit, the manufacturer's representative shall provide a written report to the Departmental Representative within 5 working days.
 - .4 All coating work and systems for the purpose of this specification shall be considered a fully cured system prior to being accepted by the Departmental Representative. No accelerators for the purpose of force curing the coating system will be accepted without prior written approval. No coating shall be applied when the wind speed exceeds 15 km per hour unless the Contractor can demonstrate to the Departmental Representative that adequate precautions have been made available which are acceptable to the Departmental Representative. The decision of the Departmental Representative shall be final.
 - .5 Do not paint faying surfaces. Do not paint top of top flange of girders (including do not paint shear studs to be embedded in concrete).
 - .6 Interior surfaces of girder shall be coated with minimum one coat of specified inorganic zinc primer. All other painted surfaces shall be
-

coated with three coat system.

3.2 SURFACE PREPARATION

- .1 Equipment: abrasive blast cleaning equipment shall be of a quality and size sufficient to perform the work within the time available in the contract. Blast equipment must have adequate in line "driers" to ensure moisture is completely removed during blasting operations. All spray and blasting equipment must be adequately grounded to avoid build-up of static electricity. Detrimental amounts of water and oil shall be removed from any compressed air supply used for blast cleaning by means of appropriate functional traps, separators and heaters before the airstream reaches the nozzles.
- .2 All deposits of oil or greasy contamination shall be removed in accordance with SSPCSP-1, "Solvent Cleaning" before commencing other surface preparation. Solvent wash solutions shall have prior approval.
- .3 Field coated surfaces shall be cleaned using high pressure fresh water wash to remove all sand, dirt, carbonation, salt and other contaminants. Enclosure shall be provided at this time if necessary to prevent wash material from entering the environment. Wash water shall be filtered through an approved filter medium (e.g., non-woven geotextile, minimum tensile strength 600 N, permeability 0.22 cm/sec) prior to discharge into the environment. Total maximum chloride contamination of any surface shall not exceed 30 ppm as tested using a standard SCAT kit. The high pressure wash shall start at the top and proceed down to the bottom of the steel. Special emphasis must be placed on corner and crevices where members are joined together. Solvent wash solutions shall have prior approval.
- .4 All weld splatter, slag, rust, burrs, slivers etc., shall be removed prior to coating in accordance with the requirements of SSPC-SP 2 "Hand Tool Cleaning" and/or SSPC-SP 3 "Power Tool Cleaning". Any sharp edges, not in accordance with Good Painting Practices, shall be ground to produce a minimum radius of 4 mm. Corners and edges of flanges, stiffeners and bracing shall be broken on items which are to be coated. This work shall

be approved by the Departmental Representative prior to blast cleaning.

- .5 All steel surfaces to be coated shall be abrasive blast cleaned in accordance with the requirements of SSPC-SP 10 "Near-White Blast Cleaning".
- .6 Steel surface profile requirements shall be a minimum of 20% of the total film thickness specified, or as recommended by the coating manufacturer to achieve good coating adhesion and coverage.

3.3 FIELD DISPOSAL OF
SPENT ABRASIVE

- .1 Spent abrasive material shall remain dry at all times in accordance with SSPC Guide 7.
- .2 Representative samples of the spent blasting medium containing coating chips and dust removed from the bridge will be taken by the Departmental Representative and submitted to a laboratory to be tested according to leachate test procedures in the CGSB provisional standard 164-GP-IMP. The abrasive must be kept in a water tight enclosure until the results of the tests are known in order to ensure that no contaminants are released in to the environment.
- .3 If the leachate test results indicate the spent blasting medium is classified as a nonhazardous solid waste, then transport the medium from the project site to an approved waste disposal site at no additional cost to the Contract.
- .4 If the leachate test results indicate the spent blasting medium is classified as a hazardous solid waste, then transport the medium to a temporary storage location that has a fenced storage compound as approved by the Departmental Representative. Required loading and transportation charges shall be included in the Contract Price. Ultimate disposal of the stored material would then become the responsibility of the Departmental Representative.
- .5 Materials that qualify under the Dangerous Goods and Hazardous Wastes Management Act must be disposed of in a manner acceptable to the Newfoundland and Labrador Department of

Environment and Conservation and as approved by the Departmental Representative.

- .6 All blast abrasive material shall be weighed before being delivered to site. The spent abrasive shall be weighted as it is removed from the site. Provide a weight slip every two(2) weeks for all abrasive delivered to and removed from the site. A minimum of 90% of the abrasive used in the work shall be recovered.
- .7 No additional payment will be made due to delays in sampling and/or receiving leachate test results from the spent abrasive.

3.4 REPAIR OF DEFECTS

- .1 Before application of any further coat of material, all damage and/or contamination to previous coats shall be repaired to the approval of the Departmental Representative. In the case of repair, the procedures shall be in an acceptable manner as approved by the Departmental Representative. In the case of removal, the work shall be replaced by work and materials which shall conform to the specification. This clause shall have full effect regardless of the fact that the defective work may not have been previously identified by the Departmental Representative.

3.5 ENVIRONMENTAL AND SAFETY CONTROLS

- .1 Protect and preserve the environment during the progress of the Work in conformance with the Guidelines for the "Application and Removal of Structural Steel Protective Coatings".
- .2 Provide protective enclosures and filters to contain dust or water in an effective manner and to minimize impacts from dust, water and coating particles entering the environment when washing or removing coating.
- .3 Ensure that waste materials, i.e., used coatings, solvents and refuse will not be disposed of in the aquatic environment, elsewhere on the highway or adjacent the right-of-way. Such material shall be disposed of according with applicable legislation.
- .4 All methods and materials for constructing the protective enclosure shall be in accordance with

regulatory agency requirements having jurisdiction.

- .5 Materials collected or accumulated within the enclosure shall be removed and contained so as to prevent their escape. The collected material shall be disposed of off the site as indicated in Clause 3.3 herein.

3.6 PLATFORMS AND ENCLOSURES

- .1 Platforms and enclosures shall be provided by the Contractor where environmental protection is required, i.e., to protect the work piece or work place from the environment, or the environment from the work being performed. This shall include, but not be limited to, tents, heating or ventilating, negative air pressure, dust collectors, enclosures, etc. These shall be provided at no additional cost to the Contract. For field operations, install a full (total) enclosure surrounding all washing, coating and surface preparation activities. Refer to SSPC Guide 6.
- .2 The plans and drawing for the enclosure, scaffolds and platforms shall be submitted for review as detailed in Clause 1.4. Construction shall not begin until all these documents have been reviewed. Drawings are to include, but not be limited to, the following detailed information:
 - .1 Method and schedule of construction
 - .2 Actual loads to be imposed on the structure.
 - .3 Details of proposed attachments to the structure.
 - .4 Size and shape of all platform components.
 - .5 Scaffold erection and dismantling diagrams.
 - .6 Material specifications and sources.
 - .7 Arrangement of access platforms, ladders and guardrail.
- .3 At the conclusion of sandblasting and coating operations, the protective enclosure shall be dismantled and removed from the site.

3.7 COATING APPLICATION

- .1 Apply all coatings in the shop prior to transporting to site, including top coat. Allow for Departmental Representative to conduct inspection prior to transport and follow-up inspection following erection. Fully repair defects to coating system. For outer webs exposed

to view, the repaired finished product shall exhibit no visual defects or colour variation as viewed from 1.5m in daylight.

- .2 All coatings shall be applied in accordance with the manufacturer's written instructions.
- .3 All coatings shall be applied as per the specified minimum and maximum film thicknesses. The nominal rate of application for the coating systems shall have a minimum/maximum DFT of 250 - 400 μm . The inorganic zinc shall be applied at 75 +/-25 μm , the aluminum epoxy mastic shall be applied at 150 +/- 25 μm DFT and the aliphatic polyurethane shall be applied at 100 +/- 25 μm DFT.
- .4 All measurements concerning DFT shall be measured by calibrating the Dry Film Gauge to read zero at the "top of the blasted profile". Measuring methods and equipment shall conform to SSPC-PA2.
- .5 For coating system, all edges, corners, crevices, rivets, bolts, welds and sharp edges shall be stripe coated with the aluminum polyamide epoxy mastic prior to the steel receiving the final coat in accordance with the coating manufacturer's recommendations. Such striping shall be done with brushes, daubers, or mitts and extend a minimum of 2.5 cm from the edge being coated. Brushes and daubers shall be provided and used to work coatings into cracks, crevices and locations which cannot be adequately coated by spray application.

3.8 EXTENDED WARRANTY

- .1 The Contractor shall warrant the coating system applied under the terms of this Contract for new construction to be free of defects in materials and workmanship for a period of 60 months from the date of final completion of the contract.
- .2 During the warranty period, the Departmental Representative will inspect the coating system, and will advise the Contractor and Manufacturer, in writing, of any repairs that are required. Intermediate inspections may be made and warranty repairs claimed and repaired by the Contractor and Manufacturer each year of the 60 months warranty period.

- .3 Failure of the protective coating system may include but not be limited to:
 - .1 Any debonding or failure of adhesion of the coating either to the structural steel or other coatings.
 - .2 The appearance of any rust stains on the coated structure due to loss of coating or leaking from joints between structural members.
 - .3 Failure of the coating to resist chipping and abrasion from normal site conditions.
 - .4 Any loss of normal gloss or rapid colour change.
- .4 Warranty repair will be completed within 45 days of notification, or if this would place repair in unsuitable weather conditions, by June 15 of the following year.
- .5 Repairs under warranty shall include all costs to supply material, labour and equipment necessary to restore the coating system to acceptable condition. Payment for warranty repairs will not be made separately, but will be considered included in the unit bid price for the fabricated steel trapezoidal box girders (Reference Section 05 12 33, Structural Steel for Bridges).

END OF SECTION