SECTION  – common work results for metalwork finishing

1. GENERAL
   * + 1. SUMMARY
          1. This Section includes requirements regarding the appearance and surface preparation for [**non‑exposed**] [**, exposed**] [**and**] [**architecturally exposed**] priming, and finishing of the following metal items and assemblies:

Structural steel framing.

Steel joists.

Steel deck.

Metal fabrications.

Ornamental metal fabrications.

* + - * 1. Architecturally exposed structural steel welds require a higher degree of workmanship and finishing than standard exposed structural steel or metal fabrication components.

SPEC NOTE: Coordinate with Structural drawings and ensure that extent of AESS is indicated on Structural Drawings and Coordinated on Architectural Drawings. Keeping the Work Results aspect of MasterFormat 2004 documentation, it is important to recognize which building trade will read the drawings first - in this case it will in all likelihood be the structural steel fabricator.

* + - * 1. Architecturally exposed structural steel is identified on the Structural and Architectural Drawings as AESS1, AESS2, AESS3 or AESS4 depending on the level of finish identified in this Section; definitions for AESS applies equally to structural steel, [**and**] metal fabrications [**, and ornamental metal fabrications**].
        2. Architecturally exposed structural steel specifications and guidelines listed in this Section are based on recommended practices and procedures prepared by the Canadian Institute of Steel Construction (CISC).

SPEC NOTE: Steel joist finishing is the most difficult aspect of AESS finishing; it is costly and wasteful of materials to spray primer on steel joints. Due to its configuration, when painting is required, the best method of coating a joist is by immersion, therefore, it is recommended that the paint specified be of the type and colour which is standard with the OWSJ manufacturer (CAN/CSA S16.1 M89 clause 16.10). Special paints, colours, and coatings should be avoided because they have to be applied individually to each joist by spraying or other means. OWSJ are difficult to coat by spraying and the wasted over‑spray may become an environmental problem. Storage or disposal of left‑over special coatings present similar environmental difficulties and added cost.

* + - * 1. Related Requirements:

Section 05 05 00 – Common Work Results for Metals, for LEED requirements for submissions and use of low or no VOC containing materials.

Section 05 12 00 – Structural Steel Framing, for priming and finishing steel framing.

Section 05 21 00 – Steel Joist Framing, for priming and finishing of steel joists.

Section 05 31 00 – Steel Decking, for site installation of shear connectors, requirements relating to exposed steel decking and its connections, fastener spacing, and weld show through in areas where decking is visible in the finished structure and coordination of paint system requirements.

Section 05 50 00 – Metal Fabrications, for loose steel bearing plates and miscellaneous steel framing and assemblies.

Section 05 51 00 – Metal Stairs and Railings.

Section 05 70 00 – Decorative Metal.

Section 07 81 16 – Spray Applied Cementitious Fire-Resistant Material.

Section 07 81 23 – Intumescent Fireproofing.

Section 09 91 00 – Painting, for surface preparation and priming requirements, relating to architecturally exposed elements requiring finish painting.

* + - 1. DEFINITIONS

SPEC NOTE: Coordinate exposure classification of any exposed structural steel with engineer before finishing this section; coordinate drawing notes and ensure that they are descriptive of the actual work result required for the project. Notes such as "Galvanize all Exposed Steel" are not sufficient to fully describe the condition of exposure. Exposure has specific connotations in the steel finishing world, particularly where more than one condition could occur on the project and could then lead to interpretation of what "Exposed" actually means.

* + - * 1. Exposed Structural Steel: Structural steel that is exposed to view or concealed in final construction and is subject to weathering or aggressive conditions that require additional protection to prevent corrosion and loss of sectional area.
        2. Architecturally Exposed Structural Steel: The following finish levels for architecturally exposed structural steel as defined by CISC Code of Standard Practice, Table 1 are required by this specification, and apply to all forms of steel structures and metal fabrications identified:

SPEC NOTE: Select the appropriate level of finish or finishes required for the project and include specific references to the finish locations on the structural steel drawings. Close coordination with structural group is required to ensure that information is placed on the drawings having the biggest influence on the successful implementation of architecturally exposed structural steel finishes - structural drawings dictate structural steel finishes - placing these labels on architectural drawings only will lead to disputes and potential cost claims or loss of the desired appearance.

AESS1 Basic Elements: Steel structure requiring enhanced workmanship having surface preparation to SSPC-SP6, sharp edges ground smooth, continuous weld appearance, and using standard structural bolts and with weld spatters removed.

AESS2 Feature Elements Viewed at a Distance greater than 6 meters: Steel structure requiring enhanced workmanship as listed above for AESS1 and having fabrication tolerances reduced to 1/2 of standard, fabrication marks not apparent and with welds uniform and smooth.

AESS3 Feature Elements Viewed at Distance 6 meters and less: Steel structure requiring enhanced workmanship as listed above for AESS1 and AESS2 having mill marks removed, butt and plug welds ground smooth and filled, cross sectional abutting surfaces aligned, and joint gap tolerances minimized [**and all connections welded**].

AESS4 Showcase Elements: Steel structure requiring enhanced workmanship as listed above for AESS1 through AESS3 having no seams apparent for HSS members, welds contoured and blended, surfaces filled and sanded glove smooth, and weld show-through minimized.

SPEC NOTE: Members fabricated from unfinished, reused or weathering steel that are required to meet an AESS Category may still have erection marks, painted marks or other marks on surfaces in the completed structure; specify these special requirements as Category AESSC.

AESSC Custom Elements: Steel structure requiring enhanced workmanship as listed above for AESS1 through AESS4 and having [**list additional custom finishing requirements**].

* + - 1. REFERENCE STANDARDS
         1. American Society for Testing and Materials (ASTM):

ASTM A123/A123M‑08, Standard Specification for Zinc (Hot‑Dip Galvanized) Coatings on Iron and Steel Products.

ASTM A153/A153M‑05, Standard Specification for Zinc Coating (Hot‑Dip) on Iron and Steel Hardware.

ASTM A780‑01 (2006), Standard Practice for Repair of Damaged and Uncoated Areas of Hot‑Dip Galvanized Coatings.

ASTM B833-06, Standard Specification for Zinc and Zinc Alloy Wire for Thermal Spraying (Metallizing) for the Corrosion Protection of Steel.

ASTM B943-05, Standard Specification for Zinc and Tin Alloy Wire Used in Thermal Spraying for Electronic Applications.

ASTM D4417-03, Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel.

SPEC NOTE: Use the CGSB 1.40 Standard where an anticorrosive primer suitable for use as a shop primer or a site primer on ferrous surfaces such as steel bridges and structural steel where good durability to atmosphere exposure is required. Coordinate this requirement with temporary protective coatings listed in 1.4.5.1 and 1.4.5.2 below.

Use CGSB 1.181 Standard where anticorrosive primer is suitable as the final finish, and where corrosion resistance is not the primary selection factor, where hot dip galvanized coatings would be more appropriate. CGSB 1.181 can also be used as a site applied touch‑up paint for galvanized steel. It is grey to green/grey in colour depending on the paint base used by the manufacturer. CGSB 1.181 should not be applied to freshly applied galvanized coatings, the galvanizing should age for about 6 months to be compatible.

The CGSB 85.10 standard is intended to give the fabricator a guide for preparing surfaces for protective coating applied to mild and galvanized steels, copper and aluminum exposed to atmospheric (non-immersion) service conditions and contains recommendations and procedures for new coating systems that have performed satisfactorily after long term exposures, and repair of failed coating systems.

Delete item 1.4.2 below where permanent anticorrosive primer is not a project requirement.

* + - * 1. Canadian General Standards Board (CGSB):

CAN/CGSB 1.40‑97, Anticorrosive Structural Steel Alkyd Primer.

CAN/CGSB‑1.181, Single Component Organic Zinc Rich Primer.

CAN/CGSB 85.10‑99, Protective Coatings for Metals.

* + - * 1. Canadian Standards Association (CSA):

CSA W47.1‑92 (R1998), Certification of Companies for Welding of Steel Structures.

CSA W48‑01, Filler Metals and Allied Materials for Metal Arc Welding.

CSA W55.3‑1965 (R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

CSA W59‑M1989 (R1998), Welded Steel Construction (Metal Arc Welding).

CSA W178.2‑1996, Certification of Welding Inspectors.

* + - * 1. Canadian Welding Bureau (CWB Group Industry Services):

CWB 113E, 94‑1, Weld Quality and Examination Methods Study Guide.

* + - * 1. Canadian Institute of Steel Construction (CISC):

SPEC NOTE: The use of quick drying primers on steel structures has been greatly over‑rated in its effectiveness as a base coat for finishes on architectural exposed structural elements. Quick drying primers are intended for temporary protection of steel during fabrication and erection. If steel has a large enough sectional area, priming may not be necessary to prevent structural degradation of steel members arising from corrosion for non‑exposed steel members exposed to a normally dry environment.

The CISC 1‑73a Standard covers the selection and application of a one coat, quick drying primer that is economical from the point of view of the combined cost of materials, of surface preparation and of application, and is intended to protect steel for approximately 3 months under normal weathering conditions. This primer is generally sufficient as a finish coat on exposed steel in warehouses and similar buildings.

The CISC 2‑75 Standard applies to a two coat, quick drying primer for use on structural steel and is intended to cover the selection and application of a primer that is economical from the point of view of the combined cost of materials, surface preparation and application, and is intended to protect steel for approximately 6 months under normal weathering conditions, or three months in severe weathering conditions. This primer is generally sufficient as a primer for Alkyd based interior finishes for commercial projects such as shopping centres or box stores.

Delete items 1.4.5.1 and 1.4.5.2 below and include item 1.4.7 below instead where steel is to receive architectural finishes. Use 1.4.2.1 above where steel is being placed in a normal weathering environment. Additional coating systems may have to be considered where steel is being placed in a severe weathering environment.

Copies of the following standards are located at J:\Master Specification\Resources\Standards\ Canadian Institute of Steel Construction CISC

CISC/CPMA 1‑73a 1975, A Quick‑Drying One‑Coat Primer for Use on Structural Steel.

CISC/CPMA Standard 2‑75, A Quick‑drying Primer For Use On Structural Steel.

CISC Code of Standard Practice 7th Edition, 2009

CISC Code of Standard Practice, Appendix 1, Architecturally Exposed Structural Steel (AESS).

* + - * 1. Association for Materials Protection and Performance (AMPP) (Formerly The Society for Protective Coatings (SSPC))/National Association of Corrosion Engineers (NACE International):

Coating Materials Guidelines.

SPEC NOTE: SSPC‑SP3 is usually adequate for all non‑architecturally exposed structural steel applications. SSPC‑SP2 is pretty rough and ready work and denotes a lower standard of quality where pricing is a serious concern. SSPC‑SP6 is the minimum requirement for architecturally finished structural steel. SSPC‑SP5 may be used for highly visible locations but is much more expensive than SSPC‑SP6. Most primers used in architectural finishing have good hiding ability, minimizing the requirement for SSPC‑SP5 surface preparation. SSPC‑SP10 or SP5 may be required for certain rust inhibiting exterior applications, always check with the paint manufacturer's guidelines for surface preparation.

Surface Preparation Guidelines:

SSPC-SP 1, Solvent Cleaning.

SSPC‑SP2, Hand Tool Cleaning.

SSPC‑SP3, Power Tool Cleaning.

SSPC‑SP5/NACE No.1, White Metal Blast Cleaning.

SSPC‑SP6/NACE No. 3, Commercial Blast Cleaning.

SSPC‑SP10/NACE No.2, Near White Metal Blast Cleaning.

Application, Inspection and Quality Control Guidelines

SSPC-QP 1, Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures).

SSPC-QP 2, Standard Procedure for the Qualification of Painting Contractors (Field Removal of Hazardous Coatings from Complex Structures).

SPEC NOTE: SSPC-QP 3 also applies to metallizing contractor qualifications in addition to SSPC‑QP 1.

SSPC-QP 3, Standard Procedure for Evaluating Qualifications of Shop Painting Applicators.

SSPC-QP 4, Standard Procedure for Evaluating the Qualifications of Contractors Disturbing Hazardous Coatings during Demolition and Repair Work.

SSPC-QP 5, Standard Procedure for Evaluating the Qualifications of Coating and Lining Inspection Companies.

SSPC-QP 6, Standard Procedure for Evaluating the Qualifications of Contractors Who Apply Thermal Spray (Metallizing) for Corrosion Protection of Steel and Concrete Structures.

Metallizing Guidelines:

SSPC-AB 2, Specification for Cleanliness of Recycled Ferrous Metallic Abrasives.

SSPC-AB 3, Ferous Metallic Abrasive.

SSPC-CS 23.00, Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel.

SPEC NOTE: Delete 1.4.7 and 1.4.8 below where architecturally exposed structural steel framing is not a project requirement.

* + - * 1. Master Painter's Institute (MPI):

Architectural Painting Specification Manual.

* + - * 1. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 505‑88, Applied Coatings.

AMP 550‑89, Metal Product Outline.

AMP 555‑92, Code of Standard Practice for Architectural Metal Industry, including Miscellaneous Iron.

* + - 1. ADMINISTRATIVE REQUIREMENTS
         1. Pre-Installation Conference: Conduct a pre‑installation conference at Project site in accordance with requirements of Section [**01 31 19 – Project Meetings**] before starting any work of this Section to review requirements for finishing architecturally exposed structural steel:

Agenda for pre‑installation conference will include, but not be limited to coordinate requirements for shipping, special handling, attachment of safety cables and temporary erection bracing, touch up painting, fabrication and erection procedures, and other requirements affecting metalwork finishing for the project.

* + - * 1. Coordination: Coordinate coating requirements with affected Division 05 Sections with requirements specified for Section 09 91 00 – Painting, establish responsibilities, pre‑coating requirements, and site finishing requirements.

The use of bulk shop primers and temporary coatings for all exterior and interior architecturally exposed structural steel work will not be permitted unless it forms a part of a painting system specified in Section 09 91 00 – Painting.

Where non‑complying primers are used, this Section of work shall completely remove deficient primer from surfaces and prepare and prime surfaces in accordance with the requirements of Section 09 91 00 – Painting, for painted steel work at no additional cost to the Consultant or Owner.

Coordinate compatible shop primer for architecturally exposed structural steel with Section 09 91 00 – Painting as follows:

This Section will be responsible for surface preparation and application of compatible primer systems.

Structural steel [**and**] [**metal fabrications**] [**ornamental metal fabricator**] fabricator may use painting contractor for application of primer provided that Bid Price is coordinated through [**Contractor**] [**Construction Manager**].

Metal fabricators will be responsible for applying primer to match shop applied materials at site welds, immediately after completion of welds.

Section 09 91 00 – Painting, will perform minor site touch‑up and repair to priming system, and apply finish coats of paint.

This method of finishing has been specified to minimize primer and finish coating incompatibility, and to satisfy primer "open‑time" limits for proper application of finish coats.

The primers specified are intended to form a part of a total system and shall be compatible with and be produced by the same manufacturer as the finish coats.

Coordinate installation of anchors for AESS members that connect to the work of other trades as follows:

Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.

Deliver such items to the project site in time for installation.

\*\*\*\*\*\*\*[**Indicate anchorage concepts shop drawings.**]

* + - 1. SUBMITTALS
         1. Provide requested information in accordance with Section 01 33 00 – Submittal Procedures.
         2. Action Submittals: Provide the following submittals before starting any work of this Section:

Product Data: Submit product data for each type of coating products and primers [**that will receive subsequent architectural coatings**] indicating:

Submit components and application procedures of the paint system as a single coordinated submittal and indicate compatibility and maximum recoat times for each product.

Identify required surface preparation, primer, intermediate coat (if applicable) and finish coat.

Coordinate submittal information with finish coat specified in Section 09 91 00 - Painting.

Shop Drawings: Submit shop drawings detailing fabrication of AESS components, as follows:

Provide erection drawings clearly indicating which members are considered as AESS members.

Include details that clearly identify requirements listed in for Fabrication and Erection; provide connections for exposed AESS consistent with concepts shown on the architectural or structural drawings.

Indicate welds by standard CWB symbols, distinguishing between shop and site welds, and show size, length and type of each weld; identify grinding, finish and profile of welds as defined in this Section.

\*\*\*\*\*\*\*Indicate type, size, finish and length of bolts, distinguishing between shop and site bolts; identify high strength bolted slip critical, direct tensioned shear/bearing connections [**; indicate which direction bolt heads should be oriented in final assembly**].

Clearly indicate which surfaces or edges are exposed and class of surface preparation.

Indicate special tolerances and erection requirements as noted on the drawings or defined herein.

Samples: Submit samples indicating welds and finishing techniques prior to starting any architecturally exposed welding and finishing work, as follows:

SPEC NOTE: CISC AESS Category Matrix indicates that visual samples are optional for Category AESS2 and higher; items below indicate a minimum starting point at Category AESS3, review sample requirements with architectural designer and confirm which elements will require visual samples.

It is crucial to obtaining an accurate bid and to reducing the Contract Administration time for the project that architecturally exposed structural steel is indicated on the structural steel drawings. Coordination between the structural and architectural disciplines is crucial for the project's success. Metal Fabrications also have to be identified on the drawings as architecturally exposed or architectural quality in order to obtain the finish required; listing the Level of finish on the drawings is extremely helpful in enforcing the requirements for this section.

Submit sample of Hollow Structural Section (HSS) indicating [**AESS3 and AESS4**] [**AESSC**] welds, using same sized section as detailed on [**structural stair drawings**].

Submit sample of Channel indicating [**AESS3 and AESS4**] [**AESSC**] welds, using same sized section as detailed on [**structural stair drawings**].

Finish samples with primer listed in for use in this Section.

Prepare samples free of tool marks, foundry identification marks, pits and scale and other defects detrimental to finished appearance.

Sample will be used by the Consultant to determine acceptability of welds and surface preparation for architecturally exposed structural steel fabrications on site.

Consultant may request modifications to the submitted sample; fabricator shall make the changes as indicated until acceptance is obtained from the Consultant.

* + - * 1. Informational Submittals: Provide the following submittals when requested by the Consultant:

Qualification Statement: Submit qualification data for firms and persons fabricating and erecting AESS demonstrating their capabilities and experience when requested by the Consultant; include lists of completed project names and address, names and addresses of consultants and owners, and other information specified [**; and photographs showing detail of installed AESS in referenced projects**].

Certification: Submit SSPC certification listing qualifications of finish coating [**and metallizing**] application for finish systems and type of work specified in this Section.

* + - * 1. Sustainable Design Submittals: Coordinate project sustainable design requirements with [**Section 01 35 31 – LEED Special Project Procedures**] [**Section 01 35 63 – Sustainability Project Requirements**]; in addition, provide information for specific requirements listed in Section 05 05 00.
      1. QUALITY ASSURANCE
         1. Qualifications: Provide proof of qualifications when requested by Consultant:

Metallizing Applicator: Use a SSPC-QP 6sm Certified Contractor indicating that they have the technical capabilities and organizational structure necessary to perform the work of this Section.

Fabricator: In addition to qualifications specified in Section 05 05 00, engage a firm experienced in fabricating AESS similar to that indicated for this Project with a record of successful in‑service performance, as well as sufficient production capacity to fabricate AESS without delaying the Work.

Erector: In addition to qualifications listed in Section 05 05 00, engage an experienced erector who has completed AESS work similar in material, design, and extent to that indicted for this Project and with a record of successful in‑service performance.

* + - 1. \*\*\*\*\*\*\*MOCK‑UPS

SPEC NOTE: The following section should be edited to define how many mock‑up pieces are required. The Consultant must define the size and extent of the pieces which are required and what specific finishes must be demonstrated.

* + - * 1. Construct mock‑ups to demonstrate aesthetic effects as well as qualities of materials and execution at least four (4) weeks prior to fabricating AESS using materials indicated for final Work.
        2. Construct mock‑ups of each of the following elements:

Locate mock‑ups [**on site**] [**at fabricator's shop**].

Mock‑ups shall be full size pieces unless the Consultant specifically accepts smaller models’ representative of the work.

Notify the Consultant one week in advance of the dates and times when mock‑ups will be available for review.

Demonstrate the proposed range of aesthetic effects regarding each element specified or indicated on the drawings.

Construct mock‑up with final finished surface including surface preparation and paint system.

Obtain Consultant's acceptance of mock‑ups before starting fabrication of final units.

Retain and maintain mock‑ups during construction in an undisturbed condition as a standard for judging the completed work.

Accepted samples in an undisturbed condition at the time of Substantial Performance may become part of the completed work.

* + - 1. DELIVERY, STORAGE, AND HANDLING
         1. Delivery and Acceptance Requirements: Use special care in handling to prevent twisting or warping of AESS members:

Erect pre‑painted finish pieces using padded slings or other methods to protect them from damage arising from handling including, but not limited to, the following:

Provide padding as required to protect while rigging and aligning member's frames.

Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Consultant during the pre‑installation meeting.

Submit methods of removing temporary erection devices and finishing, and refinishing pre‑painted pieces for review and acceptance by the Consultant prior to erection.

* + - * 1. Storage and Handling Requirements: Store materials to permit easy access for review and identification; store steel members off ground by using pallets, platforms, or other supports; protect steel members and packaged materials from erosion and deterioration.

1. PRODUCTS

SPEC NOTE: Steel buildings require NO paint when the steel is hidden behind drywall and suspended ceilings. The humidity in such buildings is below the threshold limit for corrosion of steel to occur (Clause 6.5.2 of CSA Standard S16.1‑94 and S16‑01). Buildings that have exceptionally high humidity such as swimming pools and water treatment plants are the exceptions and should be treated as exterior exposed steel.

Steel exposed to view is generally painted for appearance. A one-coat paint system, such as performance specification CISC/CPMA 1‑73a, is sufficient for standard warehouse structures that will not be top coated. Since the building environment is controlled no corrosion occurs once the building is enclosed. These buildings perform adequately throughout the country. One-coat systems are referenced in Clause 28.8.6 of CSA Standard S16‑01.

Steel exposed to view that will be top coated for appearance requires a prime coat for adhesion. A fast dry primer, such as CISC/CPMA 2‑75, is sufficient to provide the necessary base as a minimum, although primers should be coordinated with MPI recommendations. To ensure that the paint system will perform for longer periods a greater degree of cleanliness is required by the specification. Consultants must ensure that the finish coats are compatible with the primer. Alkyds are generally acceptable with the CISC 2‑75 primer, but epoxies are not. Once the building is enclosed no corrosion occurs. Many discount department stores and food chains scattered throughout the country use these types of finishes very successfully.

Structural steel that is exposed to view and the elements on the exterior of buildings requires more thorough cleaning and finishing ensuring long term performance. Higher degrees of cleanliness along with better quality multi-coat paints should be considered under these circumstances. Epoxy systems over compatible primers are usually most suitable. Urethanes should be used when wear is a consideration.

Tender documents should include the following information to ensure good quality coating systems:

a) identification of the members to be painted

b) a specification for the degree of cleanliness required to ensure performance such as SSPC Surface Preparation Standards

c) compatible primer, intermediate and finish paints and if applicable

i) the manufacturer's product identification

ii) the average dry film thickness per coat

We recommend that you review the painting with your local fabricator to ensure that the most suitable system is chosen for your specific application. Fabricators are committed to providing the most economical structures for your specific application.

The CISC, as a representative of the Canadian steel industry, continues to stress that paints should only be applied where absolutely necessary.

* + - 1. METAL MATERIALS
         1. Coordinate requirements of this Section with related requirements of referenced Division 05 - Metals technical specification sections.
      2. SHOP FINISHING; EXPOSED STRUCTURAL STEEL

SPEC NOTE: Coordinate Zone locations with structural engineer and edit listing of zones to only those that are required for the project. Indicate Zone locations on drawings where more than one exposure class is required for a project. Our specifications offer some additional solutions to the basic coating systems offered by CISC - delete following table once selections have been completed.

| CISC TABLE OF  TYPICAL ZONE\* DEFENCE PAINTING  ENVIRONMENT SYSTEM | | |
| --- | --- | --- |
| Zone  0 | Dry interior where structural steel is imbedded in concrete, encased in masonry, or protected by membrane or non-corrosive contact type fireproofing. | Leave unpainted. |
| Zone  1A | Enclosed interior, normally dry (or temporary protection).  Very mild. (Oil base paints would last 10 years or more.) | 1. Leave unpainted.  2. CISC/CPMA 1-73a over nominal cleaning.  3. CISC/CPMA 2-75 over Brush Off Blast Cleaning if top coating specified. |
| Zone  1B | Exteriors normally dry. (Includes most areas where oil base paints now last 6 years or more and where bare steel corrosion rate is moderate.) | 1. CISC/CPMA 2-75 over Brush Off Blast Cleaning, one field coat enamel.  2. CISC/CPMA 2-75 over Commercial Blast Cleaning, if longer durability required, one or two field coats enamel. 37-50 mm (1-2 mils) dry film thickness per coat, minimum system dry film thickness, 75-100 mm (3-4 mils). |
| Zone  2A | Frequently wet by fresh water. Involves condensation, splash, spray, or frequent immersion.  (Oil base paints now last 5 years or less.) | Inorganic zinc primer over Commercial Blast Cleaning 63-75 mm (2-3 mils dry). Field coat of 75-100 mm (3-4 mils) high build, vinyl or epoxy. |
| Zone  2B | Frequently wet by salt water. Involves condensation, splash, spray or frequent immersion.  (Oil base paints now last 3 years or less.) | 1. Inorganic Zinc Primer over Near-White Blast Cleaning 63-75 mm (2-3 mils) dry. Field coat 75-100 mm (3-4 mils) high build vinyl or epoxy.  2. Same as 1 above, but additional topcoat 75-100 mm (3-4 mils) dry. Assure satisfactory adhesion of topcoats. |
| Zone  3 | Chemical exposures (acidic, alkaline, oxidizing, solvents etc.). | Same as Zone 2B but with chemically resistant finish coat system specially chosen to protect primer and base metal against specific chemical agent. Zinc rich unsatisfactory for acid or alkaline conditions unless top coated. Assure satisfactory adhesion topcoats. |
| Zone  4 | Special conditions. | For painting galvanized steel, mildew, temporary protection, rustproofing, painting welds, abrasion resistance, contact paint company coating specialist for specific conditions and advice. |

SPEC NOTE: There needs to be a clear distinction between what is classified as exposed structural steel and architecturally exposed structural steel; MAKE SURE THAT ALL PROJECT PARTICIPANTS UNDERSTAND THIS DISTINCTION and make the appropriate notes on the drawings. It may be possible that a severe weathering condition is present when an AESS finish is required - coordinate surface preparation, corrosion protection and finish type to account for these multiple definitions.

The following listing is a GUIDELINE and is applicable in most conditions that require minimal research and application of the tenets of the CISC recommended systems. Always keep in mind that actual project or site conditions can have an effect on the final coating requirements, especially where an architectural coating system forms a part of the basic structural steel requirements listed below.

* + - * 1. Clean and prepare exposed structural steel surfaces in accordance with coating manufacturer's recommended profile and surface specification requirements; where they are more stringent than the minimums listed in this Section, and for the following environmental exposure [**class**] [**classes**]:

Zone 0: Leave uncoated.

SPEC NOTE: Select CISC/CPMA 2-75 where an improved surface appearance is required; provide additional finish coats where maintenance of exposed structural steel is required. Shop priming as a temporary corrosion protection may not be required where steel has sufficient cross sectional mass that it will not be affected by any rusting that occurs during the construction of the building.

Zone 1A: **[Leave uncoated] [Shop prime using [CISC/CPMA 1‑73a over minimum SSPC‑[SP3] [SP11]] [CISC/CPMA 2-75 over minimum SSPC‑[SP7] [SP6 ready for site applied single finish coat of alkyd-based enamel specified in Section 09 91 00]]**.

Zone 1B: Shop prime using CISC/CPMA 2-75 over minimum SSPC‑**[SP7] [SP6 ready for site applied double finish coat of alkyd-based enamel specified in Section 09 91 00 – Painting]**.

Zone 2A: **[Shop prime using MPI EXT 5.1L Inorganic Zinc Primer over minimum SSPC‑SP6 ready for site applied high build zinc rich epoxy and double coat of high build polyurethane coating specified in Section 09 91 00] [Hot dip galvanize with 300 g/m2 coverage ready for [water based] [acrylic modified polysiloxane based] coating system listed below]**.

Zone 2B: **[Shop prime using MPI EXT 5.1L Inorganic Zinc Primer over minimum SSPC‑[SP10] [SP5] ready for site applied high build zinc rich epoxy and double coat of high build polyurethane coating specified in Section 09 91 00] [Hot dip galvanize with 600 g/m2 coverage ready for acrylic modified polysiloxane based coating system listed below]**.

Zone 3: Shop prime using MPI EXT 5.1F High Build Epoxy Primer over minimum SSPC‑**[SP10] [SP5]** ready for site applied high build epoxy and double coat of high build chemical resistant polyurethane coating specified in Section 09 91 00 – Painting.

SPEC NOTE: Following item can include many special coating systems including metallizing, cold applied zinc coatings or zinc rich epoxy coatings, special bridge or marine coatings .

Zone 4: **[Coordinate with painting specialist for specific surface preparation and coating requirements relating to any special conditions]**.

SPEC NOTE: Delete following requirements for priming where the requirement for the project is for the steel to be left uncoated.

* + - * 1. Do not prime exposed structural steel surfaces in the following conditions:

Surfaces that are embedded in concrete or mortar; prime partially embedded members to a depth of 50 mm only.

Surfaces that will be site welded.

Surfaces that will be high strength bolted with slip critical connections.

Surfaces that will receive sprayed applied fire-resistant material.

Galvanized surfaces.

* + - * 1. Apply primer under cover, on dry surfaces only and when surface and air temperatures are at and rising, or above manufacturer's recommended minimum application temperature; and maintain temperature until primer is thoroughly cured.
        2. Apply primer immediately after surface cleaning and priming in accordance with manufacturer's instructions and dry film thickness recommendations using methods as required to achieve full coverage of the following:

Joints, corners, edges, and exposed surfaces.

Corners, crevices, bolts, welds, and sharp edges.

Apply second coat of shop primer to surfaces that will be inaccessible after assembly or erection; change colour of second coat.

SPEC NOTE: Delete following requirement for finishing where the requirement for the project is for the steel to be left only in primed condition or is being left uncoated.

* + - * 1. Refer to Section 09 91 00 – Painting, for coating and application requirements for application of site applied finishing systems.
      1. SHOP PRIMING; ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

SPEC NOTE: Primers specified in this Section must be coordinated with the finish coat system listed in section 09 91 00 to ensure coating compatibility. Many of the "Generic" primers do not address current VOC concerns or requirements for LEED Certification and include references to lead and chromates.

Primers for steel come in a variety of resins such as alkyd, waterborne, epoxy, and zinc rich alkyd primers. These products are typically referred to as "shop coat primers” and can come in many different levels of quality depending on the level of corrosion protect required. This would include keeping the steel from flash rusting prior to being covered by in an interior wall up to long-term corrosion protection. They are fast drying, enabling the fabricator to quickly deliver product to the job site.

Standard alkyd primers can be finish coated with an alkyd or water-based enamel.

Universal alkyd primers can be used under high performance coatings such as epoxies or urethanes.

In general, for exterior exposure, a high quality, universal, rust inhibitive primer should be used. The increase in cost over a standard "Shop Coat" primer is on the order of $5.00 to $10.00 per gallon. The material cost of the paint represents a small portion of the total painting cost, while the higher quality provides greater corrosion protection to the steel.

Acrylic Primer: Acrylic primers are corrosion resistant and water soluble, often providing a lower VOC. They are available in shop coat quality up to a universal primer for use under high performance coatings such as epoxies and urethanes.

Epoxy Primer: Epoxy primers provide excellent corrosion protection for steel and can be top coated with a variety of finishes. Epoxy primers can be applied in the shop and typically have a high film build that will hide minor imperfections.

Zinc Rich Primer: Zinc rich primer provides superior corrosion protection by providing cathodic protection to the steel. Zinc rich coatings can be specified as either organic zinc or inorganic zinc. Both inorganic and organic will meet class B slip coefficients for bolted connections.

In arid regions (such as the Rocky Mountain Region) organic epoxy/zinc primers should be specified, as they do not rely on an outside source (humidity) for cure. Inorganic zinc requires a constant humidity of no less than 40% RH for proper cure.

If an intermediate and finish coat are to be completed in the shop, the lack of humidity can cause delays in both the painting process and project as the zinc must be cured prior to top‑coating.

Although a urethane finish coat can be applied directly over an organic zinc, it is suggested that an intermediate epoxy coating be used to prevent "pin holing" in the urethane coating, promote adhesion of the system, and increase film build to hide imperfections in the steel.

Alkyd finish coats should not be specified over zinc primers.

For galvanizing repair, an organic zinc with not less than 90% zinc by weight in the dry film should be used for re‑galvanizing welds and damage due to erection.

SPEC NOTE: Finish coating should be done in the site after erection wherever possible, however, many primers have a limited "open" time (the time when a finish coat can be applied successfully over the primer) and may have to have the first finish coat applied in the shop. Finish coats applied in the shop almost always incur damage from handling in shipping and erection. This often results in applying an additional finish coat in the site or completing costly touch up which often does not blend in with the original finish.

Finish coatings for commercial projects with AESS fall into the following categories:

Alkyds (Oil based): Acceptable finish coat for interior applications and some exterior application. Dries to hard durable finish. When applied specified for exterior use, alkyds will chalk and fade with UV exposure in a relatively short period. Can be brush, roll, or spray applied.

Acrylics (Waterborne): Often called HIPAC or water borne industrial coatings are the poor man's urethane finish. They are an acceptable finish coat for both interior and exterior service and provide good long-term durability. Acrylics provide good colour and gloss retention under UV exposure. Can be easily applied by brush, roller, or spray. Low odour and VOC for interior application.

Epoxy: Can be applied as a finish for interior use where abrasion resistance is required. High build nature of film can help cover imperfections in the steel. Will chalk and fade with UV exposure.

Polyurethane: Provides high performance protection with excellent colour and gloss retention. A higher film build than alkyd or acrylic helps cover imperfections in the steel. Should be sprayed applied for best appearance.

Siloxanes: Provides surface weathering characteristics similar to epoxy, and colour and gloss retention similar to polyurethane. It also has exceptional recoat capabilities, requiring less surface preparation for maintenance painting than epoxy and urethane. This system typically only requires one finish coat rather than the 2 required for epoxy or urethane, so can decrease costs to the project. Siloxanes are also available in 4 litre containers, unlike epoxies and urethanes that are usually only available in minimum 23 litre containers.

SPEC NOTE: Confirm degree of surface preparation required for finish system, some systems require a higher degree of surface preparation than others: SP6 = Commercial Blast Cleaning; SP10 = Near‑White Metal Blast Cleaning; and SP5 = White Metal Blast Cleaning, many high-performance coatings will require an SP10 or SP5 to prevent rust showing through for exposed building elements.

SPEC NOTE: Coordinate requirements with the surface preparation and finish‑coat specified in Section 09 91 00 and the MPI Manual.

SPEC NOTE: Water based primers can be troublesome for some metalwork fabricators and we are often called to solve a problem with flash rusting - flash rusting is seldom the real problem and is more indicative of improper application, surface preparation or curing conditions:

True Flash Rusting, defined as a rust bloom that is a direct result of applying a water borne coatings to bare steel and occurs within hours of primer application, is actually exacerbated by cleaner steel when the conditions causing flash rusting are present as in an SP-10 blast would show more rusting than an SP-6 which would show more than an SP‑3. This is for the simple reason that the cleaner the surface, the more quickly the steel will oxidize when water is applied. This is irrespective of the blast depth or profile.

Flash rusting prevention is a challenge for most manufacturers of water-based primers and additives are used to delay the onset of corrosion until the water has evaporated and these work in most cases most of the time; however, in severe conditions, excessively heavy film thickness, high humidity and cool temperatures, or poor ventilation during the drying process will sometimes cause True Flash Rusting to occur. The normal recommendation under these conditions is not to paint; however, if it must be done, a light "tack coat" followed by a coat at normal thickness usually resolves the problem.

The other form of rusting that is often misdiagnosed as flash rusting; since it looks similar, is a rust bloom that occurs within the first few days or weeks due to insufficient coverage over the blast peaks. This is where the blast profile is relevant and if in excess of the film thickness of the primer and if a corrosive environment exists, a bloom of pinhole rusting can result. In this scenario, surface cleanliness is important but not as much of a factor as above. In this case, the blast profile is much more relevant than the degree of blast. Also, in this scenario, the corrosion resistance will be better with anSP-3 prep as opposed to a sandblast as the "mountain tops" will not be there to protrude through the film. This better performance is only temporary and will never perform as well as a well-coated sandblasted surface.

The solution to this condition is to

know the blast profile of the surface preparation and specify a coating(s) system to cover this profile.

If the profile is in the 2 to 3 mil range generally two coats of a convention air-drying product are required. (2 coats primer or primer + topcoat).

If an attempt is made to try to achieve this thickness in one coat the True Flash Rusting increasingly becomes an issue as the excessively thick film takes considerably longer to dry thereby increasing the risk.

* + - * 1. Clean and prepare architecturally exposed structural steel surfaces in accordance with coating manufacturer's recommended profile and surface specification requirements; where they are more stringent than the minimums listed in this Section.

SPEC NOTE: Coordinate exposure class with requirements for exposed structural steel listed above and include the appropriate identification on drawings - coordinate with structural drawings and ensure that both ESS and AESS requirements are indicated on drawing details.

* + - * 1. Exposure Class: Zone [**1A**] [**1B**] [**2A**] [**2B**] [**3**] [**4**], as defined above for exposed structural steel.
        2. Primer for Bare Steel: As required by MPI Coating System specified in Section 09 91 00 – Painting, and as follows:

Surface preparation: Minimum SSPC‑[**SP6**] [**SP10**] [**SP5**] as required by Paint Finish System specified in Section 09 91 00.

MPI 19 Inorganic Zinc Rich Anticorrosive Primer for use in MPI [**EXT 5.1B**] [**EXT 5.1L**] [**INT 5.1H**].

MPI 20 Epoxy Zinc Rich, 2 or 3 component Anticorrosive Primer for use in MPI [**EXT 5.1P**] [**INT 5.1J**] [**INT 5.1P**].

MPI 79 Marine Alkyd Anticorrosive Primer for use in MPI [**EXT 5.1C**] [**EXT 5.1D**] [**EXT 5.1K**] [**INT 5.1C**] [**INT 5.1D**] [**INT 5.1E**] [**INT 5.1M**] [**INT 5.1Q**] [**INT 5.1R**].

MPI 95 Quick Drying Alkyd Primer for use in MPI [**EXT 5.1A**] [**INT 5.1A**].

MPI 101 Cold Curing 2 Component Anticorrosive Zinc Chromate Primer for use in MPI [**5.1F**] [**5.1H**] [**5.J**] [**5.1N**] [**INT 5.1F**] [**INT 5.1L**] [**INT 5.1N**].

MPI 107 Epoxy Based Waterborne Anticorrosive Primer for use in MPI [**EXT 5.1E**] [**EXT 5.1M**] [**INT 5.1B**] [**INT 5.1K**] [**INT 5.1S**].

**----OR----**

* + - * 1. Primer for Bare Steel: As required by MPI Coating System that will be specified in Section 09 91 00 – Painting, and as follows:

Surface preparation: Minimum SSPC‑SP6 as required by Paint Finish System specified in Section 09 91 00 – Painting.

MPI 107 Water Based Rust Inhibitive Primer for use in MPI EXT 5.1M and INT 5.1B Water Based Light Industrial Coatings.

Composition: Acrylic.

Colour: Grey.

MPI E Range: E3 to E2 qualifying for GPS.

Acceptable Materials:

Cloverdale EcoLogic Rustex Primer 703 Series.

ICI Devoe Devflex DTM Primer 4020 Series.

PPG WB Industrial Primer 215 Series.

Sherwin Williams DTM Acrylic Primer B66W1 Series.

* + - * 1. Primer for Galvanized Steel: As required by MPI Coating System specified in Section 09 91 00 – Painting, and as follows:

Surface preparation: Minimum SSPC‑[**SP1**] [**SP3**] as required by Paint Finish System specified in Section 09 91 00.

MPI 26 Cementitious Galvanized Metal Primer for use in MPI [**EXT 5.3A**] [**EXT 5.3B**] [**EXT 5.3F**] [**INT 5.3A**] [**INT 5.3B**] [**INT 5.3C**] [**INT 5.3F**].

MPI 35 Bituminous Coating for use in MPI EXT5.3E.

MPI 80 Vinyl Wash, Etch Type Primer for use in MPI [**EXT 5.3D**] [**INT 5.3E**].

MPI 101 Cold Curing 2 Component Anticorrosive Zinc Chromate Primer for use in MPI [**EXT 5.3C**] [**INT 5.3D**].

MPI 133 Water Based Galvanized Dry Fall Primer for use in MPI INT 5.3H.

MPI 134 Water Based Galvanized Primer for use in MPI [**EXT 5.3H**] [**EXT 5.3J**] [**INT 5.3J**] [**INT 5.3K**] [**INT 5.3M**] [**INT 5.3N**].

MPI 135 Non‑Cementitious Galvanized Primer for use in MPI INT 5.3L.

**----OR----**

* + - * 1. Primer for Galvanized Steel: As required by MPI Coating System specified in Section 09 91 00 and as follows:

Surface preparation: Minimum SSPC‑SP1 as required by Paint Finish System specified in Section 09 91 00 – Painting.

MPI 134 Water Based Galvanized Primer for use in MPI INT 5.3N

Composition: Acrylic.

Colour: Grey.

MPI E Range: E3 to E2 qualifying for GPS.

Acceptable Materials:

Cloverdale EcoLogic Rustex Primer 703 Series.

ICI Devoe Devflex DTM Primer 4020 Series.

PPG WB Industrial Primer 215 Series.

Sherwin Williams DTM Acrylic Primer B66W1 Series.

SPEC NOTE: Following paint system is for non‑MPI architectural finish system based on siloxane finish coats and shows extremely good performance in exterior environments. Note that colour selection is limited to the range offered by the paint system manufacturer, there are about 250 colours available, but they are not easily customized unless a large quantity is required. The primer in this system requires a fast recoat with the finish, so should be applied in the shop with any site finishing performed under Section 09 91 00. VOC's for siloxanes are in the range of 170 g/l, so be aware of this product in LEED project requirements.

* + - * 1. Primer and Finish System for [**Bare**] [**and**] [**Galvanized**] Steel: Non‑MPI Coating System, specified in Section 09 91 00 – Painting, and as follows:

Surface preparation: Minimum [**SSPC‑[SP6**] for bare steel] [**SSPC‑[SP1**] for galvanized steel] as required by Paint Finish System specified in Section 09 91 00.

Zinc Rich Anticorrosive Primer: Epoxy based, high solids 2 component organic zinc primer, applied to minimum 75 mm dry film thickness; type as recommended by finish coating manufacturer.

Siloxane Based Coating System: Acrylic modified polysiloxane, 2 component, isocyanurate‑free base and curing agent, providing superior gloss and colour retention, long term impact resistance and flexibility, applied to a minimum 125 mm dry film thickness.

Colour: Selected by Consultant from manufacturer's standard product range.

Gloss Level: [**G6**] [**G7**].

Edge Treatment: Stripe coat all edges to maintain minimum dry film thickness requirements.

Acceptable Material:

Carboline, Carboxane 2000 System.

International Protective Coatings, Interfine 979 System.

SPEC NOTE: Galvanized steel should not be painted with alkyd top coats as loss of adhesion will occur. An intermediate coat of high‑build epoxy should be used if an alkyd paint is described as the finish coat.

Zinc coatings produced by the Hot‑Dip galvanizing process are excellent corrosion protection systems. When the coating becomes very thick or dull grey, the coating might not be suitable for Architectural applications.

The appearance can become blotchy with sections of dull finish and sections with bright finish. Almost all of these surface effects last for the first couple of years and then the coating becomes uniformly dull grey as the protective layer of corrosion products is formed on the surface of the galvanized steel.

The cause of the irregular surface finishes is the variation in steel chemistry of the parts to be Hot‑Dip galvanized. ASTM A385 describes the effects of steel chemistry on the Hot‑Dip galvanized finish.

The two elements with the most influence are silicon and phosphorus. If these elements are controlled to recommended levels, the finish will be bright and shiny. Many steel makers control the overall impurity content but not these two specific elements, so there might be some parts that are bright and shiny and some that are dull grey.

Care should be taken when specifying any particular steel for Hot‑Dip galvanizing if an Architectural finish is expected. Include requirement for 300 g/m2 finish thickness for normal exposures and 600 g/m2 for corrosive, marine or immersion service.

* + - 1. GALVANIZING
         1. Hot Dip Galvanized Finish: Hot dip galvanize in accordance with ASTM A123 to locations indicated; [**300 g/m2**] [**600 g/m2**] minimum zinc coating; galvanize components after assembly where size permits.
         2. Cold Galvanizing Finish: [**Need information from Provider to complete this item**].

SPEC NOTE: Metallizing is an expensive option and should only be used where corrosion protection is considered necessary for long term; 16 to 22 years moderate environmental exposure protection, compared to 70 to 90 years for hot dip galvanizing, 7 to 10 years for zinc dust rich primers and about 80 years for cold zinc galvanizing in moderate to severe exposures. Initial costs are in the range of 250% more than hot dip galvanizing and 100% more than cold galvanizing.

SPEC NOTE: Electrical arc spray is more common in western Canada than flame spray; confirm availability in other parts of Canada. Minimum and maximum thicknesses must be specified, maximum thickness must not exceed 150% of minimum thickness.

* + - * 1. Shop Applied Zinc Spray Metallizing Finish: [**Electrical arc spray**] [**Flame spray**] wire zinc metallizing in accordance with [**ASTM B943**] [**ASTM B833**] to locations indicated; minimum [**200 mm**], maximum [**300 mm**] thickness and having a minimum tensile bond strength of 3.45 MPa; applied using equipment and techniques specified in SSPC-CS 23, and as follows:

SPEC NOTE: Use SSPC-SP 5 surface preparation for marine or immersion service; use SSPC-SP 10 for all other service applications.

* + - * 1. Surface Preparation: Degrease in accordance with SSPC-SP 1 followed by abrasive blast to [**SSPC-SP 10 near white**] [**SSPC-SP 5 white**] metal blast finish.

SPEC NOTE: Area of testing is directly dependent on exposure classification; include 10 m2 requirements for corrosive, marine or immersion service and 20 m2 all other installations.

Surface Profile: Prepare surface with a sharp angular surface profile depth of ≥65 mm in accordance with ASTM D4417 using recycled ferrous metallic or steel grit abrasives in accordance SSPC‑AB 2 or SSPC‑AB 3; peened profiles will not be acceptable; verify profile using three (3) measurements in a 10 cm2 area for each [**20**] [**10**] m2 of blasted area in accordance with SSPC-CS 23.

Preheating: Apply metallizing finish to starting area of 0.1 to 0.2 m2 to 120 deg C to prevent condensation occurring on substrate.

Zinc Coating: Build up required thickness with several thin crossing passes to maintain integrity and bond strength of coating to steel; apply within 4 hours of surface preparation and profiling to minimize flash rust; repair coated areas that show rust bloom, blistering or degradation of coating materials.

Sealers and Topcoats: Refer to Section 09 97 13.23 for decorative finishes and abrasion resistance requirements.

SPEC NOTE: Metallizing is an expensive option and should only be used where corrosion protection is considered necessary for long term; 16 to 22 years moderate environmental exposure, protection. Initial costs are in the range of 600% greater than zinc rich paints and 400% greater than cold process repair coatings.

* + - * 1. Site Applied Zinc Metallizing Repair Coating: Metallizing in accordance with ASTM A780, Method 3 with a minimum 180 mm, maximum 270 mm thickness and as specified above for surface preparation, profiling, and preheating; take special precautions when performing work at temperatures below freezing and where condensation conditions are more likely in accordance with SSPC-CS 23; and as follows:

Seal Coat: Apply penetrating epoxy seal coat at a rate to achieve a theoretical 38 mm dry film thickness to seal interconnected surface porosity.

Topcoats: Apply decorative finishes to items requiring full finish; leave non-decorative components with seal coat only.

* + - 1. SHOP COATINGS

SPEC NOTE: CGSB 1.181 is a solvent based, single component organic zinc anti‑corrosive primer that is suitable for new or repaired ferrous metal surfaces exposed to industrial and marine environments.

Surface preparation consists of SSPC SP6 ‑ Commercial Blast Cleaning for atmospheric exposure, although SSPC SP3 ‑ Power Tool Cleaning can be used for interior ‑ normally dry exposures. The minimum recommended surface preparation for industrial and marine environments is SSPC SP10 ‑ Near White Blast Cleaning, and SSPC SP5 ‑ White Metal Blast Cleaning where the primer will be used in a system for highly corrosive or immersion service.

These coatings typically have high zinc content, in the range of 90%, and can be applied as a single coat in mildly corrosive environments. They provide cathodic protection and can self‑heal when the films are scratched similar to zinc galvanized finish. The weight of the zinc in the coating is less than the amount of zinc in a hot dip galvanized application; therefore, there is less zinc to act as a sacrificial substance, so should not be recommended instead of galvanizing where corrosion resistance is critical.

Manufacturers identify that the product can be used by itself as a coating or as a primer for acrylic, epoxy or urethane topcoats. MPI covers the product number as 18, but this does not form a part of a listed Paint System. The manufacturers sell it as an Industrial Coating; and as such, this would explain its absence from the Paint Systems, which are Commercial Coatings.

In summation, it is an adequate coating to prevent corrosion for atmospheric exposures all by itself, no further coatings are required. Interior non‑exposed, normally dry conditions do not require primer. The rust that forms on heavy section steel is typically sufficient protection for this exposure rating.

* + - * 1. Zinc Rich Paint: Single component organic zinc anticorrosive primer in accordance with CAN/CGSB‑1.181 and as follows:

Clean metal to SSPC [**SP3‑ Power Tool Cleaning**] [**SP6‑Commercial Blast Cleaning**] [**SP10‑Near White Blast Cleaning**] [**SP5‑White Metal Blast Cleaning**] in accordance with surface preparation requirements and environmental exposure limitations listed in CAN/CGSB‑1.181.

Apply [**one (1) coat**] [**two (2) coats**] zinc rich paint to all surfaces exposed after assembly to manufacturer's minimum dry film thickness.

Apply coating immediately after cleaning.

* + - * 1. Isolation Coating: Acid and alkali resistant asphaltic paint to CAN/CGSB‑1.108.

Apply an isolation coating to contact surfaces of following components in contact with cementitious materials and dissimilar metals except stainless steel:

Exterior components.

Interior components exposed to high humidity conditions.

* + - * 1. Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 deg C.
        2. Do not paint surfaces to be site welded. Prime and apply first finish coat after site welding has been completed, immediately prior to applying final finish coat to completed assembly.
      1. FABRICATION OF ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS)
         1. Fabricate and assemble AESS in the shop to the greatest extent possible in accordance with CISC requirements for [**Category**] [**Categories**] listed for the project and as follows:

Detail AESS assemblies to minimize site handling and expedite erection.

Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the accepted sample.

Use special care in handling and shipping of AESS both before and after shop painting.

* + - 1. SHOP CONNECTIONS
         1. Bolted Connections: Make in accordance with Section 05 05 00 and 05 12 00.

Provide bolt type and finish as specified in this Section; align bolt heads as indicated on shop and erection drawings.

* + - * 1. Welded Connections:

Comply with requirements specified in Section 05 05 00 and 05 12 00.

Make appearance and quality of welds consistent with mock‑up.

Assemble and weld built‑up sections by methods that maintain alignment of members without warp exceeding tolerances of this Section.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify exposure of steel components, architectural or non‑exposed, and finish assemblies as specified.
          2. Report any discrepancy and potential problem areas to Consultant for direction before commencing finishing operations.
       2. APPLICATION OF PRIMERS [AND COATINGS]
          1. Primer: Spray applied at fabrication shop by this Section, touch‑up and recoating by Section 09 91 00, and as follows:

Work primer into all corners.

Touch‑up bare or worn areas on site after installation.

Leave surfaces unpainted as follows:

Surfaces that are embedded in concrete or mortar; prime partially embedded members to a depth of 50 mm only.

Surfaces that will be site welded.

Surfaces that will be high strength bolted with slip critical connections.

Surfaces that will receive sprayed applied fire-resistant material.

* + - 1. INSTALLATION OF ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS)
         1. Set AESS accurately in locations and to elevations indicated in accordance with CISC requirements for [**Category**] [**Categories**] listed for the project and as follows:
         2. Bolted Connections: Install bolts of specified type and finish in accordance with Section 05 12 00 and as follows:

Bolt Head Alignment is indicated on Drawings: Orient bolt heads for each connection as indicated on erection drawings and verify orientation on site.

Bolt Head Alignment is not indicated on Drawings; Orient bolt heads for each connection to one side acceptable to the Consultant.

* + - * 1. Welded Connections: Comply with CWB procedures for appearance; refer to Section 05 05 00 and 05 12 00 for other requirements, and as follows:

Assemble and weld built‑up sections by methods that will maintain true alignment of axes without warp.

Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.

Obtain Consultant's acceptance for appearance of welds in repaired or site modified work.

Make site welded profiles, quality, and finish consistent with mock‑ups accepted prior to fabrication.

Splice members only where indicated, or where found acceptable by the Consultant.

Obtain permission for any torch cutting or site fabrication from the Consultant; finish sections thermally cut during erection to a surface appearance consistent with the mock-up.

Do not enlarge unfair holes in members by burning or by using drift pins; ream holes that must be enlarged to admit bolts; replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.

* + - * 1. Site Quality Control: Perform testing and inspections in accordance with Section 05 05 00 to verify structural requirements for detailed bolt and weld connections.
        2. Acceptance of AESS Appearance: Consultant will observe AESS in place and determine acceptability based on mock‑up and samples; repair or remove and replace materials not meeting standard of workmanship up at no additional cost to the Owner or Consultant.
      1. ADJUSTING AND CLEANING

SPEC NOTE: Delete item 3.4.1 below if there is no requirement for primer or galvanizing.

* + - * 1. Site Touch‑Up and Repair [**Shop Primer**] [**and**] [**Galvanized**] Finishes:

Touch-Up Painting: Cleaning and touch‑up painting of site welds bolted connections, and abraded areas of shop paint shall complete to blend with the adjacent surfaces in accordance with manufacturer's instructions as specified in Section 09 91 00 – Painting.

Galvanized Surfaces: Clean site welds, bolted connections, and abraded areas and repair galvanizing in accordance with ASTM A780.

END OF SECTION