

1.0 DESCRIPTION

The Work shall consist of:

- .1 Surface preparation and application of a high-build coating on structural and non-structural steel components in the fabrication shop or in the field as described in this Specification and shown on the Drawings;
- .2 Provision of environmental protection during surface preparation and coating of said components in the field, including the necessary enclosure system(s); and
- .3 The quality control (QC) testing of all materials.

2.0 REFERENCES AND RELATED SPECIFICATIONS

All reference standards and related specifications shall be current issue or latest revision at the date of tender advertisement.

2.1 References

- SSPC - Steel Structures Painting Council
- AASHTO - American Association of State Highway and Transportation Officials
- ASTM - American Society for Testing and Materials
- PI - Petroleum Institute

2.2 Related Specifications

- Specifications for Supply and Fabrication of steel components
- Specifications for erection of structural steel and related steel components

3.0 SUBMITTALS

The Contractor shall submit the following to the Engineer, in accordance with the Special Provisions:

- .1 The Contractor shall submit written certification stating that the surface preparation procedures will comply with Manufacturer's guidelines for proper preparation as well as those procedures described in the Specification or shown in the Drawings. Unless specifically specified by the Engineer, this coating system does not normally require abrasive blasting prior to coating.
- .2 Prior to any required abrasive blasting, the Contractor shall submit written certification from a certified laboratory, stating that the abrasive media meets the material requirements shown on the Drawings and described in the Specification.
- .3 Before commencing the application of the coating system, the Contractor shall submit written certification, from the coating manufacturer, stating that all materials supplied are as specified on the Drawings, described in this Specification and in accordance with the Manufacturer's current product data sheets.
- .4 Manufacturer's product data sheets describing the following:
 - Recommended maximum dry film thicknesses for each coating layer
 - Mixing directions
 - Recommended application techniques
 - Acceptable humidity level and temperature range for application
 - Minimum acceptable recoat time periods

- .5 Details of of surface preparation and coating system application to areas difficult to access
- .6 Proposed environmental protection measures to be taken during surface preparation and coating of steel structures in the field.

The detailed submission shall include a description of the environmental protection measures to be undertaken so as to ensure complete containment, collection and disposal of spent blasting abrasives, removed paint, all other debris products from surface preparation as well as new coating system over spray. The detailed submission shall also include a detailed description of the proposed methods and procedures, sequence of operations, equipment, detailed drawings of the proposed enclosure system and all other applicable details relating to environmental protection measures during surface preparation and coating.

The Contractor shall be responsible for ensuring that the enclosure system is constructed, installed and functions in accordance with the Shop Drawings. The Contractor shall provide the Engineer with proof that the enclosure system is constructed in accordance with the Shop Drawings. This proof shall be in the form of a letter bearing the seal of a Professional Engineer will be required to inspect the enclosure system installation(s) on site to ensure conformance with the Shop Drawings. The enclosure system shall be designed, constructed, erected, operated, maintained and removed in accordance with Workplace Safety and Health requirements.

- .7 A written guarantee from the supplier of the coating system within fourteen (14) days of completion of coating operations stating that the product will perform satisfactorily for a minimum period of five (5) years from the completion date, provided that both the surface preparation and application of the coating system has been carried out in accordance with the Manufacturer’s recommendations. The supplier shall state that they have reviewed this Specification and the surface preparation and application procedures and find them in accordance with their recommendations. The supplier shall guarantee the replacement of the coating (material) at no cost to the Customer in the event that the coating system does not perform satisfactorily over the five (5) year guaranteed time period.

4.0 MATERIALS

4.1 Water

Water used for high-pressure washing shall be clean and free from oil, acid, alkali, organic matter or other deleterious substances. The water shall be equal to potable water in physical and chemical characteristics.

4.2 Abrasive Media

Blast abrasive media shall be free of corrosion producing contaminants and oil. The type of blast media, hardness and grit size shall be such as to achieve a surface profile, onto which the coating system is to be applied, which is compatible with the requirements of the coating system.

4.3 Coating System

The Coating System shall be the following or an equivalent approved by the Engineer. An acceptable Manufacturer is Encore Coatings, LLC, Cartersville, GA. 888-776-2242. encorecoatings.com

Prime Coat (Optional)	Intermediate Coat	Top Coat
KnockOut Rust Killer & Primer	RustOx	RustOx

Thickness	Prime Coat (optional)	Intermediate Coat	Top Coat
mils (min/max)	2/4	6/8	4/6

All materials must be water-based and low VOC (50g/L or less). The Manufacturer must show conclusive tests results from an ISO-900 laboratory, meeting the following minimums:

ASTM B-117-11, Modified.

Panels shall be tested following the above standard. Panels shall be immersed 50% in 5% salt water solution and exposed to at least 720 hours of continuous exposure. The published lab report must show a rust grade of no less than 8 on areas of the panels above the water-line and a rust grade of no less than 10 below the water-line.

Each coat of the coating system shall be colored such that each coat is distinguishable from the other. To achieve this capability, the intermediate coat shall be one color shade lighter than the top coat. The variations in color shall be such that the required dry film thickness of each successive coat subsequent to the first coat shall be achieved without over application. The Contractor shall supply a dry color sample for the proposed coating system, a minimum of 300 mm x 300 mm in size, to the Engineer for verification and approval prior to commencing coating operations.

The prime coat of the coating system applied to faying surfaces at locations of bolted connections shall be qualified by test as a Class A coating as per the AASHTO LFRD Bridge Design Specifications.

4.4 Incidental Materials

Incidental materials needed to complete the surface preparation and coating works shall be strictly in accordance with the Manufacturer's guidelines and recommendations. This shall include paint additives, thinners, mineral spirits, solvent mixtures associated with cleaning operations and all other incidental materials required to complete the Work.

5.0 CONSTRUCTION METHODS

5.1 Environmental Protection During Surface Preparation and Application of Coating System in the Field

.1 General

The Contractor shall undertake measures to ensure that all debris, spent water from high pressure washing, spent blasting abrasives and removed paint from surface preparation as well as over spray from new coating system application will not result in harmful effects or nuisance to, or be deposited into the waterway or onto ground surfaces and all other areas in the vicinity of the Work. The Contractor shall undertake his operations during surface preparation and coating so as to ensure that contamination of the waterway, ground surfaces and all other areas in the vicinity of the Work does not occur.

The Contractor shall conduct his operation in accordance with all current Federal, State, Municipal and other applicable laws, regulations and requirements with respect to environmental protection, disposal of materials and pollution control. It shall be the Contractor's responsibility to be familiar with all applicable laws, regulations and requirements, to obtain all necessary approvals and permits for his operations and to ensure that all applicable laws, regulations and requirements are met and adhered to.

.2 High Pressure Water Washing

The Contractor shall ensure that the amount of high pressure water washing is kept to an absolute minimum by conscientious efforts of the Contractor's workforce and by efficient use of equipment. The Contractor shall control and contain all spent water from the process as to ensure that it is not deposited into the waterway or onto underlying ground surfaces and all other areas in the vicinity of the Work.

.3 Low Dust Generating and High Dust Generating Surface Preparation

Partial enclosures shall be used to contain and collect surface preparation debris products, including substrate material, removed paint and localized dust from low dust generating surface preparation methods such as hand tool cleaning or power tool cleaning.

Except as specified for vacuum abrasive blasting and filtration, a full enclosure with a negative pressure system shall be installed and maintained around all surface preparation locations where high dust generating

.4 Vacuum Abrasive Blasting

For surface preparation locations where vacuum abrasive blasting equipment is used, a full enclosure with negative pressure may not be required provided that there is no escape of the products of surface preparation including spent blasting abrasives, removed paint and associated dust. At minimum, a partial enclosure with work platform floor covers and ground covers shall be provided to prevent accidental escape.

.5 Application of Coating System

KnockOut and RustOx can be sprayed, brushed, or rolled onto the substrate. When the application is undertaken without spray equipment, an enclosure is not required provided that escape of coating system material is prevented. The contractor shall provide a method of containment that protects the waterway, underlying ground surfaces and all other areas in the vicinity of the Work from spills and drips of coating system materials.

The Contractor shall provide a full enclosure that prevents the escape of coating system material when the application is undertaken with spray equipment.

The amount of over spray from the application of the coating system shall be kept to the absolute minimum by conscientious efforts of the Contractor's workforce and by efficient use of equipment.

.6 Enclosures

.1 General

The Contractor shall supply, install, operate and maintain enclosures to contain dust, spent blasting abrasives, removed paint, and all other debris from surface preparation operations and new coating system over spray and to limit the random escape of material during surface preparation and coating operations. When no longer required, the enclosures shall be disassembled and removed from the site.

When openings or tears occur in the enclosure, surface preparation operations shall cease until repair is completed.

Existing bridge deck drains shall be temporarily extended or diverted to redirect run off and prevent it discharging into the enclosure.

Work platforms on the ground surface, where work is being undertaken from the ground, shall be covered with tarps with overlapping edges or other means to protect the ground surface from contamination and to provide for containment and recovery of spent material.

Enclosures shall be designed and constructed to provide a safe working environment and access to the surface preparation and coating system application areas for the Contractor's personnel as well as for the Engineer and other personnel as designated by the Engineer.

The Contractor shall be responsible for monitoring the enclosure and verifying its safe and effective operation.

The Contractor shall ensure that there is no escape of dust or materials while dismantling, moving or otherwise handling the enclosure. Walls, floors and joints of the enclosure shall be cleaned by vacuuming prior to moving or dismantling it. All dust and material not previously accessible or found in cracks and joints during dismantling shall be immediately vacuumed.

.2 Partial Enclosures

Partial enclosure systems shall be installed to prevent the escape of all materials including localized dust. Partial enclosure systems shall not be used if significant dust is being generated, as determined by the Engineer. Partial enclosure systems may consist of vertical and floor tarps, provided the tarps are overlapped and securely fixed together at their seams.

.3 Full Enclosures

Full enclosure systems shall be impervious to dust and wind and prevent the escape of all materials including dust. A full enclosure on its own shall not be used for high dust generating surface preparation operations such as abrasive blast cleaning. Full enclosures shall be free from any openings and shall have joints, seams and overlaps fully sealed.

.4 Full Enclosures With Negative Pressure

Full enclosure systems with negative pressure shall consist of the full enclosure system, equipped with a negative pressure system to prevent the escape of all materials including dust from the abrasive blast cleaning. The negative pressure system shall be operated during abrasive blasting clean up activities and surface blow down, prior to coating system application. The full enclosure with negative pressure shall be designed for complete containment while providing adequate ventilation.

.5 Dust Collector

Air evacuated from an enclosure system shall be conveyed in fully sealed conduits to a dust collector appropriately sized for the material and airflow. There shall be no escape of materials from conduits and dust collectors.

.7 Recycling Equipment

Where spent abrasive material is recycled, there shall be no escape of dust or materials during the mobilization, operation, clean up or demobilization of abrasive recyclers, conduits, dust collectors and associated equipment. The collectors and filters shall arrive on site undamaged, empty and free of dust and debris.

.8 Handling and Storage of Spent Materials

Spent material from an enclosure system shall be collected daily. Spent material from recycling equipment and dust collectors shall be collected on a regular basis to maintain the effective performance of the equipment. All spent material shall be collected and stored in containers which are sealed tight. The containers shall be intact and in sound condition. The containers shall be rigid steel or plastic with lids which can be sealed tight, or other types of containers specifically designed and intended for storage of spent material from such steel surface preparation and coating operations. The containers shall keep the material dry at all times and prevent their escape. There shall be no escape of material during transfers to and from containers, enclosures, recycling equipment or dust collectors.

.9 Containment Around Equipment and Materials

All surfaces under the Contractor's equipment or materials located on the job site or adjacent areas shall be covered with tarps to contain any spills or leaks from the equipment or materials. The tarps shall be sufficiently overlapped, impervious to water and free of holes and openings. All spills accumulated on this containment shall be prevented from escaping onto the surrounding surface and immediately cleaned up.

.10 Management of Spent Materials

The Contractor shall dispose of the contained and collected dust, spent blasting abrasives, removed paint, all other debris products from surface preparation as well as new coating system over spray in accordance with all current Federal, State, Municipal and other applicable laws, regulations and requirements with respect to environmental protection, disposal of materials and pollution control. It shall be the Contractor's responsibility to be familiar with all applicable environmental laws, regulations and requirements, to obtain all necessary approvals and permits for his operations and to ensure that all applicable environmental laws, regulations and requirements are met and adhered to.

5.2 Surface Preparation and Surface Profile

NOTE: This coating system does not require the use of blast cleaning or pressure washing unless the surface contains loose coating, or is otherwise contaminated with oil or other surface debris. It may be applied over rusted surfaces as long as loose rust scale is removed prior to application.

Surfaces adjacent to areas to be abrasive blast cleaned shall be protected from damage during surface preparation.

Fins, slivers, burred or sharp edges, weld splatter and slag shall be removed by power grinding prior to surface preparation.

All oil and grease shall be removed with solvent cleaning as specified in SSPC-SP1, Solvent Cleaning using a solvent such as MEK, Mineral Spirits, or other dispersant formulated to remove hydrocarbon contaminants from painted and unpainted surfaces.

Should existing steel surfaces to be surface prepared and coated require further cleaning, methods such as blasting and pressure washing may be employed. The water pressure shall be a minimum of 15 MPa with the nozzle not more than 300 mm from the surface. The water wash shall be undertaken to effectively dissolve and remove contaminants such as roadway deicing chemicals such that the level of chloride ion content of 30 mg/m² is not exceeded. The Contractor shall conduct tests on the cleaned surfaces to determine the chloride ion content. The coating shall not be applied to any surface on which the chloride ion content exceeds 30 mg/m². Any area exceeding this limit shall be high pressure washed again and retested for chloride ion content until the acceptable level of chloride ion content is achieved.

Loose rust scale must be removed using whatever mechanical means necessary to obtain a smooth clean surface. Surfaces with substantial rust shall be abrasive blast cleaned to obtain a 2-4 mil surface profile. The abrasive blast cleaning shall be undertaken so as not to contaminate any previously painted areas. The edges of existing sound paint adjacent to abrasive blast cleaned surfaces shall be feathered and no loose or abrupt edges shall remain. The quality of blast cleaning shall be evaluated using the criteria provided in SSPC-VIS1, Guide and Reference Photographs for Steel Surfaces Prepared by Abrasive Blast Cleaning. Freshly prepared steel surfaces shall be coated as quickly as possible, however, if the freshly prepared steel flash rusts, it may be surface blown.

Surface preparation of areas difficult to access, shall be carried out to the extent practical as detailed in the Contractor's submission for areas difficult to access. The surface preparation standard for these areas shall be based on reasonable effort demonstrated in the field and found to be acceptable by the Engineer.

Following all abrasive cleaning operations, all surfaces shall be blown off with compressed air or cleaned by vacuum so that all products of abrasive blast cleaning are removed from surfaces, pockets and corners.

5.3 Application of Coating System

.1 General

The coating system shall be stored, handled, mixed, and applied in accordance with the recommendation on Encore Coating's Product Data Sheet.

When there is a drop in temperature after the coating is applied, the recoat time period shall be as per Encore Coating's Product Data Sheet for the lower temperature.

If specified by the engineer, all steel surfaces of the structure shall be primed with Knockout. The intermediate coat of RustOx may be applied when the primer coat is dry to the touch. The top-coat of RustOx may be applied once the intermediate coat is dry to the touch. As cure times are temperature-dependent, cure times will vary based on weather conditions.

For each application of the primer and coating system, the Contractor shall coat the outside edges of the steelwork prior to completely coating all surfaces.

All runs and sags shall be brushed as the application progresses.

Application related failures in coatings described in the chapter "Coating Failures" of the SSPC Coating Manual Vol. 1, shall be corrected prior to application of a subsequent coat and after the application of the top coat.

Where excessive coating thickness produces "Mud Cracking", the coating shall be scraped back and sanded to a soundly bonded coating and the area recoated to the required thickness.

Application of coating system onto areas difficult to access, shall be carried out to the extent practical as detailed in the Contractor's submission for areas difficult to access. The coating system application standard for these areas shall be based on reasonable effort demonstrated in the field and found to be acceptable by the Engineer. Where limited access precludes the successful use of spray equipment, all areas and edges of structural steel and fastener components shall be coated by brush or other application methods appropriate to the particular area as recommended by Encore Coatings.

.2 New Steel Surfaces

The time between final surface preparation and prime coat application on steel inside the fabrication shop is indefinite as is steel subjected to outdoor exposure. Nonetheless, it is imperative that all steel surface be properly cleaned and prepared prior to the application of the primer and subsequent top coats. To prevent contamination of the surface, the maximum of time between final preparation and coating shall be 10 hours or less.

Faying surfaces of bolted surfaces shall have either the primer coat applied or the initial coat applied.

Prior to assembly, surfaces not in contact with other steel surfaces, but that will be inaccessible after assembly, shall have the coating shop-applied.

Surfaces inaccessible for coating after erection shall be coated prior to erection.

At least 100 mm of bare steel and 100 mm of each coat of the new coating system shall be left exposed for lapping of subsequent coats, where the continuous application of coating or final surface preparation is interrupted in a section.

.3 Existing Structures in the Field

The maximum time between the final surface preparation and the prime coat application shall be 10 hours.

When tying into existing coatings, that portion of the existing coating within 300 mm of the edge of the new coating, shall be power washed using potable water to remove all contaminants. The edges of existing coating shall be feathered into areas cleaned to bare steel so that at least 4 mm of each coat of the existing coating is exposed.

Faying surfaces of bolted connections shall have only the prime coat on the initial coat applied.

.4 Slip Critical Bolted Connections

At slip critical bolted connections, the entire faying surface plus an area at least 50 mm beyond the faying surface shall be coated with only the prime coat or initial coat prior to assembly and erection. Assembly and erection of joints at prime coated faying surface areas shall not commence until the prime coat has fully cured.

.5 Dry Film Thickness.

See Section 4.3 herein.

.6 Repair of Coating System

Damaged areas of coated surfaces shall be prepared by removing loose or damaged coating and feathering the coating back to tightly bonded coating. The substrate shall be cleaned with MEK or other solvent cleaner and allowed to dry. The prepared surface shall be recoated with the primer and two subsequent coats of coating and shall comply with minimum mil thickness guidelines for said materials.

6.0 QUALITY MANAGEMENT

6.1 Quality Control & Quality Assurance

The Contractor shall be responsible for quality control testing required to ensure the Work meets the requirements shown on the Drawings and described in this Specification, including the required surface preparation.

The Contractor shall arrange for the coating manufacturer to provide technical assistance prior to and during the coating system application operations. The Contractor shall arrange for the Engineer to visit the site during the coating operations so as to ensure that the surface preparation is in accordance with this Specification.

The Contractor shall record the quality of the surface preparation and measurements of surface profile, temperature, humidity, dew point and dry film thickness. Written documentation of the results of quality control inspection shall be submitted to the Engineer on a daily basis.

Acceptability of surface preparation will be based on the applicable SSPC surface preparation specifications and pictorial standards given in SSPC-VIS 3. Surface profile measurements should be recorded using a spring micrometer and an extra coarse pressure sensitive replica tape in accordance with ASTM D-4417

Dry film thickness (DFT) measurements shall be measured using Type 2 pressure probe magnet gauges. Dry film thickness measurements shall be undertaken in accordance with SSPC-PA 2, Measurement of Dry Coating Thickness with Magnetic Gauges. Determination of the acceptability of the DFT of the coating shall be made in accordance with SSPC-PA 2 shall be the Manufacturer's recommended minimum and maximum DFT as shown on the submitted product data sheets. To facilitate the calibration procedure, the Contractor, at a location selected by the Engineer, shall mask off a 75 mm x 75 mm area of the prepared steel. After all tests are completed, this area shall be coated as specified for the coating system.

Adhesion of the coating system may be tested in accordance with ASTM D4541 at the discretion of the the Engineer.

END OF SPECIFICATION

