

## **SECTION 09 90 00 – PAINTING AND COATING**

### **PART 1 - GENERAL**

#### **1.1 THE REQUIREMENT**

- A. The Work of this section consists of furnishing and applying paint for miscellaneous non-galvanized ferrous surfaces. Galvanized ferrous surfaces and stainless steel surfaces will not be painted.

#### **1.2 SUBMITTALS**

- A. A materials list and samples shall be submitted as required by MASS Section 10.05 Article 5.6 Product Data and as follows:
  1. Materials list naming each product to be used identified by manufacturer and type number.
  2. Volatile organic compound (VOC) level (gm/l) and manufacturer's certification of compliance with applicable air quality limits for each coating.
  3. Manufacturer's application recommendations for each product submitted.
  4. The Contractor shall submit a current chart of the Manufacturer's available colors for selection by the Engineer, 30 days prior to the start of coating and painting. Samples, when reviewed and accepted by the Engineer, shall establish the quality of the painted surface where these applications are indicated.
  5. The Owner shall select colors from the submittal information presented.

#### **1.3 DEFINITION**

- A. The term "paint" as used herein includes enamels, paints, sealers, emulsions and other coatings used as prime intermediate or finish coats for protection or decoration.

#### **1.4 COMPLIANCE WITH VOLATILE ORGANIC COMPOUND (VOC) LIMITS**

- A. All paint and coating products shall comply with the applicable limits on volatile organic compounds (VOC) as established by the United States Environmental Protection Agency and by State and local air quality regulating agencies. It shall be the Contractor's responsibility to verify compliance of all paints and coatings. In the event that any paint or coating listed herein is found to be non-compliant, the Contractor shall notify the Engineer and the Engineer will select a substitute coating or paint.

## **1.5 QUALITY ASSURANCE**

- A. General: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the Engineer.
- B. Workmen: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- C. Paint Coordination:
  - 1. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
  - 2. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
  - 3. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.
  - 4. Notify the Engineer in writing of anticipated problems in using the specified coating systems over prime-coatings supplied under other Sections.

## **1.6 DELIVERY AND STORAGE**

- A. All materials shall be brought to the job site in original sealed containers. Each container shall bear the manufacturer's name, coating type, batch number, date of manufacture, storage life, and special directions. They shall not be used until the Engineer has inspected contents and obtained data from information on containers or label. Materials exceeding storage life recommended by the manufacturer shall be rejected.
- B. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paints must be stored to conform with City, State and Federal safety codes for flammable coatings or paint materials. At all times coatings or paints shall be protected from freezing.

## **1.7 REFERENCED SPECIFICATIONS AND STANDARDS**

- A. Without limiting the general aspects of other requirements of these specifications, all surface preparation, coating and painting of surfaces shall conform to the applicable requirements of the National Association of Corrosion Engineers, the Steel Structures Painting Council, and the Manufacturer's printed instructions.

- B. The Engineer's decision shall be final as to interpretation and/or conflict between any on the reference specifications and standards contained herein.

## **1.8 AS COATED SUMMARY SHEET**

- A. Contractor shall supply a list of all the coating products used on the Project, including the exact stock number and the file numbers for the color tints added and amounts for each. The Summary Sheet should also list the local paint supply location for the particular brand of coating including the Name, address, phone number, and website for each product.

## **PART 2 - PRODUCTS**

### **2.1 PAINT AND FINISH PRODUCTS**

- A. Paint and coating products shall be fresh and well ground; shall not settle readily, cake, or thicken in the container; shall be broken up readily with paddle to a smooth consistency; and shall have easy application properties. Other painting materials such as linseed oil, turpentine, mineral spirits, miscellaneous thinners, varnish, and shellac shall be of the highest quality.
- B. All paints and coatings shall be specifically manufactured for use on projects of this type, and shall be used on surfaces intended by the paint manufacturer. Paints and coatings shall be Tnemec or approved equal. All paint and coatings shall be delivered in original containers, with seals unbroken.
- C. To establish a standard of quality, several specific paint and coating products are listed in the coating System Index under 2.4, this section.

### **2.2 COMPATIBILITY OF SHOP AND FIELD PAINTS**

- A. To ensure a satisfactory painting job it is essential that the paints applied in the shop and in the field be mutually compatible. Where prime coats are shop applied, the Contractor shall instruct suppliers to provide compatible primers with the finish coats selected by the Contractor. In no case will primers be allowed that are not manufactured by the suppliers of the finish coats unless approved by the Engineer.

### **2.3 COLORS**

- A. Color for the various surfaces to be painted shall be selected by the Engineer. Use of different colors for the various structures or for surfaces of a single structure may be directed by the Engineer.

## 2.4 SYSTEMS

- A. The coating systems in this section are for coatings manufactured by the Tnemec Company. The acceptance of “or equal” manufacturer’s products is at the sole discretion and approval of the Owner. The following index lists the various painting and coating systems by generic type:

**Paint Coatings System Index**

System ID.	Prime Coat	Finish Coats
A.	Polyamide Epoxy (1 coat at 4-6 mils DFT)	Aliphatic Acrylic Polyurethane (2 coats at 3-5 mils DFT each)
B.	Amine Cured Epoxy (1 coat at 3-5 mils DFT)	Amine Cured Epoxy (2 coats at 3-5 mils DFT each)

- B. System A – Exposed Ferrous Metal, Atmospheric Weathering:
1. Schedule/Service: For use with exposed miscellaneous metals or pipes subjected to water, condensation, or atmospheric weathering.
  2. Generic Type(s): Polyamide Epoxy / Aliphatic Acrylic Polyurethane.
  3. Surface Preparation: SSPC SP-6.
  4. Prime Coat: 1 coat Tnemec 66, Hi-Build Epoxoline, 4 – 6 DFT.
  5. Finish Coats: 2 coats Tnemec 1075, Endura-Shield II, 3 – 5 DFT.
  6. Total System: 10 – 16 mils total dry film thickness (DFT).
- C. System B – Buried Ferrous Metal:
1. Schedule/Service: Buried metal, such as valves, flanges, bolts, nuts, structural steel, fittings and metal piping in vaults.
  2. Generic Type(s): Amine Cured Epoxy, minimum 83% volume solids.
  3. Surface Preparation: SSPC-SP-10 (Near White Blast Cleaning).
  4. Prime Coat: Ameron Amercoat 395FD, 3-5 DFT.
  5. Finish Coats: 2 coats Ameron Amercoat 395FD, 3-5 DFT each coat.
  6. Total System: 9-15 mils total dry film thickness (DFT).

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. During scheduled coating periods, daily weather reporting is required (including, but not limited to, air and surface temperature, dew point, relative humidity, rain, snow, mist, fog, and wind. Further, daily reports shall include conditions that have

the potential to cause dust, insects, or debris adhere to coating.) Contractor is required to obtain preauthorization from Owner's representative and Engineer prior to coating and painting; authorization shall be whether dependent. At all times, Contractor shall comply with paint manufacturer's published recommendation for environmental conditions in which paint materials can be applied and as approved by the Engineer.

- B. All surface preparation, coating and painting shall conform to applicable standards of the National Association of Corrosion Engineers, the Steel Structures Painting Council, and the Manufacturer's printed instructions. Material applied prior to approval of surface by the Engineer shall be removed and re-applied to the satisfaction of the Engineer at the expense of the Contractor.
- C. All Work shall be performed by skilled craftsmen qualified to perform the required Work in a manner comparable with the best standards of practice.
- D. The Contractor shall provide a supervisor at the Work site during cleaning and application operations. The supervisor shall have the authority to sign any change orders, coordinate Work and make decisions pertaining to the fulfillment of the contract.
- E. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags.
- F. Coatings and painting systems include surface preparation, prime coating and finish coatings. Unless otherwise specified, prime coatings shall be field applied. Where prime coatings are shop applied, the Contractor shall instruct suppliers to provide the prime coat compatible with the finish coat specified. Any off-site Work which does not conform to the specification is subject to rejection by the Engineer.
- G. Shop applied prime coatings which are damaged during transportation, construction or installation shall be thoroughly cleaned and touched up in the field as directed by the Engineer. The Contractor shall use repair procedures which insure the complete protection of all adjacent primer.
- H. The specified repair method and equipment may include wire-brushing, hand or power tool cleaning or dry air blast cleaning. In order to prevent injury to surrounding painted areas blast cleaning may require use of lower air pressure, smaller nozzle and abrasive particle sizes, short blast nozzle distance from surface, shielding and masking. If damage is too extensive, the item shall be re-cleaned and coated or painted as directed by the Engineer.
- I. Previously painted surfaces: Repair surface defects. Remove grease, oil and other contaminants as specified for steel surfaces. Scrape carefully to remove deteriorated coatings. Glossy or very hard coatings should be sanded lightly to promote maximum adhesion of the subsequent coating. Surface must be thoroughly dry before coating.

- J. The Contractor's coating and painting equipment shall be designed for application of materials and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval by the Engineer.
- K. Application of the first coat shall follow immediately after surface preparation and cleaning and within an eight hour working day. Any cleaned areas not receiving first coat within eight-hour period shall be re-cleaned prior to application of first coat. This may include re-blasting.
- L. Prior to assembly, all surfaces made inaccessible after assembly shall be prepared as specified herein and shall receive the coating or paint system specified.

### **3.2 SURFACE PREPARATION, METALLIC SURFACES**

- A. Surface preparation will be based on comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces", SSPC-Vis 1, ASTM Designation D220: "Standard Methods of Evaluating Degree of Rusting on Painted Steel Surfaces", SSPC-Vis 2, ASTM Designation D610; Visual Standard for Surfaces of New Steel Air-blast Cleaned with Sand Abrasive", NACE Standard TM-01-70; and as described below. Anchor profile for prepared surfaces shall be measured by use of a non-destructive instrument such as a Keane-Tator Surface Profile Comparator or Testex Press-O-Film System.
- B. To facilitate inspection the Contractor shall, on the first day of abrasive blast cleaning operations, blast clean metal panels to the standard specified. These panels shall be equivalent to the supplied plate stock which is to be coated or painted and shall have minimum measurements of 8-½-inches by 11-inches. After agreeing a specific panel meets the requirements of the specification, it shall be initialed by the Contractor and Engineer and coated with a clear non-changing finish. Panels shall be utilized for inspection purposes throughout the duration of blast cleaning operations.
- C. Heavy deposits of grease or oil shall be removed with solvent oil cleaner and any chemical contamination shall be neutralized and/or flushed off prior to any other surface preparation.
- D. Surfaces scheduled for Near White or Commercial Blast Cleaning shall have all welds, edges, and sharp corners ground to a 1/16-inch radius and all weld splatter removed, and sandblasted in accordance with Steel Structures Painting Council Specifications, removing mill scale, rust, dirt, paint, or other foreign matter, and shall be slightly roughened to form a suitable anchor pattern for the coating application. Do not leave blasted surfaces overnight before coating. Remove all sand from the surface by brush or industrial vacuum.
- E. All other steel not scheduled for blast cleaning shall have all weld splatter removed, and rough edges and rough welds ground, and shall be cleaned by means of hand or power tools, in accordance with Steel Structures Painting Council Specification No. 2 or No. 3, removing all loose mill scale rust, dirt, paint, or other contaminants.

Blast cleaning may be used if practical. The remaining mill scale, rust, and paint must be sufficiently abraded to provide for good bonding of the coating.

- F. Field blast cleaning for all surfaces shall be dry method unless otherwise directed.
- G. Particle size of abrasives used in blast cleaning shall be that which will produce a 2 mil (50.0 microns) surface profile or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.
- H. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused unless specifically approved by the Engineer.
- I. During blast cleaning operations, caution shall be exercised to insure that existing coatings or paints are not exposed to abrasion from blast cleaning.
- J. The Contractor shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to performance of work or operation of existing facilities.
- K. Blast cleaned surfaces shall be cleaned prior to application of specified coatings or paints by a combination of blowing with clean dry air, brushing/brooming and/or vacuuming as directed by the Engineer.
- L. All welds shall be cleaned with a suitable chemical compatible with the specified coating materials.
- M. Specific Surface Preparation: Surface preparation for the specific system shall be as designated in the Systems Index, Part 2.4 of this specification section.
- N. Application SSPC specifications are as follows:
  - 1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.
  - 2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding, and wire-brushing.
  - 3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by power wire-brushing, power impact tools or power sanders.
  - 4. White Metal Blast Cleaning (SSPC-SP5): Blast cleaning to a gray-white uniform metallic color until each element of surface is free of all visible residues.
  - 5. Commercial Blast Cleaning (SSPC-SP6): Blast cleaning until at least two-thirds of each element of surface area is free of all visible residues.

6. Brush-off Blast Cleaning (SSPC-SP7): Blast cleaning to remove loose rust, loose mill scale and other detrimental foreign matter to degree specified.
7. Near White Blast Cleaning (SSPC-SP10): Blast cleaning to nearly white metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues.

### 3.3 COATING APPLICATION

- A. Coating and paint application shall conform to the requirements of the Steel Structures Painting Council Paint Application Specifications SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting", and recommended practices of the National Association of Corrosion Engineers, and the Manufacturer of the paint and coating materials.
- B. Before applying any paint or finish, all surfaces shall be thoroughly cleaned and prepared for painting as herein specified. All cleaned metal shall be primed or painted, as specified, immediately after cleaning to prevent new rusting or oxidation of cleaned surfaces.
- C. Protective coverings or drop cloths shall be use to protect floors, fixtures, and equipment. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.
- D. Application – Environmental Conditions:
  1. Do not paint surfaces that exceed manufacturer specified moisture contents.
  2. Do not paint or coat:
    - a. Under dusty conditions.
    - b. When light on surface measures less than 15 foot-candles.
    - c. When ambient or surface temperature is less than 40 degrees Fahrenheit.
    - d. When relative humidity is higher than 85 percent.
    - e. When surface temperature is less than 5 degrees Fahrenheit above dew point.
    - f. When surface temperature exceeds the manufacturer's recommendation.
    - g. When ambient temperature exceeds 90 degrees Fahrenheit, unless manufacturer allows a higher temperature.
  3. No coating work shall be done under unfavorable weather conditions to wet or damp surfaces or in rain, snow, fog or mist.
  4. When it is expected the air temperature will drop below 40 degrees F or less than 5 degrees F above the dewpoint within eight hours after application of coating or paint.



5. Dewpoint shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with the US Department of Commerce Weather Bureau Psychrometric Tables.
  6. If above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable, unless conditions are acceptable to the paint manufacturer for any given coating. The days coating or painting shall be completed in time to permit the film sufficient drying time to prevent damage by atmospheric conditions.
  7. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensation or dew on surface of substrate, coating between coats and within curing time following application of last coat.
  8. Provide adequate continuous ventilation and sufficient heating facilities to maintain minimum 45 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes.
- E. All painting shall be well applied, leaving no sags, laps, brush, or other defects. Each coat must thoroughly dry before applying next coat, and all work must be carefully cut into a true line and left smooth and clean. Hardware trim and other items shall be removed as required for proper application of coatings.
1. All painting shall conform to the following general conditions:
    - a. Thickness of coating in mils shall mean the dry film thickness. The number of coats specified shall mean the minimum number of coats to be used. Additional coatings shall be required if necessary to obtain the specified film thickness.
    - b. No coating work shall be done under unfavorable weather conditions.
    - c. Prime coats shall be provided where called for as a part of the painting system. Shop prime coats shall conform to the specified painting system for the given item. It shall be the responsibility of the Contractor to coordinate work so that factory prime items are primed or painted with a coating compatible with the specified finish painting system.
    - d. Particular attention shall be given to all welds, edges, and corners so as to get full and adequate coverage. Damaged shop prime coats or field applied prime coats shall be carefully replaced before finish painting. Surface preparation for replacement of damaged coats shall be such as to give a clean surface for proper bonding of prime coat. Surfaces shall be strip coated per SSPC PA1 section 2.1,6.6. Finish coatings shall not be applied until touch-up prime coat has completely dried.
    - e. Minimum between-coat drying items, as stated in the printed instructions of the coating manufacturer will be carefully observed.
    - f. Thinning shall be done only if necessary for workability of the coating material in accordance with the manufacturer's printed instructions. Use only the appropriate thinner.
    - g. Each coat shall be applied in a similar but different color from the preceding coat, the finish coat to be color selected by the Engineer.

### **3.4 INSPECTION**

#### **A. Inspection - General**

1. Thickness of coatings and paints on metal surfaces shall be checked with a non-destructive type thickness gauge and shall follow the guidelines specified in SSPC-PA 2. Coating integrity shall be tested with an approved inspection device.
2. In cases of dispute concerning film thickness or holidays, the Engineer's calibrated instruments and measurements shall predominate. Wide film thickness discrepancies shall be measured and verified with a micrometer or other approved measuring instrument.

#### **B. Inspection Devices**

1. The Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for measurement of dry-film thickness of coating and paint.
2. Dry-film thickness gauges shall be made available for the Engineer's use at all times until final acceptance.

### **3.5 SAFETY AND HEALTH REQUIREMENTS**

- A. General: In accordance with requirements set forth by regulatory agencies applicable to the construction industry and Manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of personnel protective lifesaving equipment for persons working in or about the project site.
- B. Head and Face Protection and Respiratory Devices: Equipment shall include protective helmets which shall be worn by all persons in the vicinity of the Work. In addition, workers engaged in or near the Work during abrasive blasting shall wear eye and face protection devices and air purifying, half-mask or mouthpiece respirator with appropriate filter. Barrier creams shall be used on any exposed areas of skin.
- C. Ventilation: Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.
- D. Sound Levels: Whenever the occupational noise exposure exceed maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.
- E. Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Illumination shall be as provided in SSPC-Guide 12. Whenever required by the Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be

inspected. The level of illumination for inspection purposes shall be determined by the Engineer.

- F. Temporary Ladders and Scaffolding: All temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Engineer to facilitate inspection and be removed by the Contractor to locations requested by the Engineer.

### **3.6 PRESERVATION**

- A. During construction, painter shall assume the preservation of all his work against damage by accident or otherwise, and shall leave the Work clean and whole. The Work will not be accepted until all of the Work has been completed and all retouching has been done. All Work which is rejected, or for any reason has to be done over, will be done by the Contractor at his expense.

### **3.7 CLEANING**

- A. During the progress of the Work, all other work shall be covered and fully protected from injury or painter's finish, and care shall be exercised not to splatter paint, enamel, etc., on adjacent work. Upon completion of the Work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Name and data plates on equipment shall not be painted and shall be left clean and legible upon completion of the project. All damage to surfaces resulting from the Work of this section shall be cleaned, repaired, or refinished to the satisfaction of the Engineer at no expense to the Agency.

### **3.8 SURFACES REQUIRING PAINTING**

- A. In general, the following surfaces are to be coated or painted:
  - 1. Exposed non-galvanized ferrous metal surfaces.
  - 2. Buried metal surfaces.

### **3.9 SURFACES NOT REQUIRING PAINTING**

- A. Galvanized surfaces.
- B. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this Section except as scheduled.
- C. Portions of metal embedded and contacting concrete, except for aluminum surfaces.
- D. Electrical equipment with factory applied finish.

- E. Do not paint moving parts of operating units; mechanical or electrical parts such as valve operators; linkages; sensing devices; and motor shafts, unless otherwise indicated.
- F. Do not paint over required labels or equipment identification, performance rating, name, or nomenclature plates.

**END OF SECTION 09 90 00**