

SECTION 099060 – INDUSTRIAL INTERIOR EXTERIOR PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior/exterior substrates. The following interior/exterior substrates include:

1. Carbon Steel.
2. Stainless Steel.
3. Wrought Iron.
4. Galvanized Metal.
5. Aluminum.
6. Other Non-Ferrous Metals.
7. Anodized Aluminum.
8. Kynar.
9. Drywall/Plaster.
10. CMU.
11. Vertical Concrete and Masonry.
12. Vertical Concrete and Masonry Shower Areas.
13. Fiberglass – FRP.
14. PVC.
15. ABS.

- B. Related Requirements:

Factory- or shop-applied primers applied as Work of other Sections must be coordinated with field-applied finish coats. Review other Sections for factory- or shop-primed products and reference this Section for product requirements:

1. Division 5 (055000) Sections for shop priming of metal substrates with primers specified in this Section.
2. Section 09 96 00 "High-Performance Coatings" for high-performance and special-use coatings.

1.3 DEFINITIONS

- A. Definitions of gloss levels below are from "MPI Architectural Painting Specification Manual" (hereafter, "MPI Manual").

1. Gloss Level 1, Matte or Flat finish: 0 to 5 units at 60 degrees and maximum 10 units at 85 degrees.
2. Gloss Level 2, Velvet finish: Maximum 10 units at 60 degrees and 10 to 35 units at 85 degrees.
3. Gloss Level 3, Eggshell finish: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
4. Gloss Level 4, Satin finish: 20 to 35 units at 60 degrees and minimum 35 units at 85 degrees.
5. Gloss Level 5, Semi-Gloss finish: 35 to 70 units at 60 degrees.
6. Gloss Level 6, Gloss finish: 70 to 85 units at 60 degrees.

7. Gloss Level 7, High-Gloss finish: More than 85 units at 60 degrees.

Actual gloss levels may differ by manufacturers. Please refer to Manufacturers Product Data Sheets/Technical Data Sheets for actual gloss categorization.

- B. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.
- C. ASTM: ASTM International develops international standards for materials, products, systems and services used in construction, manufacturing and transportation: www.astm.org.
- D. Bio-Pruf™: Anti-microbial additive that inhibits the growth of odor and stain causing mold and mildew on the paint film. “Antimicrobial” is defined as any means or mode of restricting growth or spread of microbes.
- E. CHPS: Collaborative for High Performance Schools. A national movement to improve student performance and the entire educational experience by building the best possible schools: www.chps.net.
- F. CRGI: Coatings Research Group Inc. is an international association of paint and coatings manufacturers dedicated to the benefits of shared research and development: crgiconnect.com.
- G. DTM: Direct to metal. A coating that can be applied directly to a metal surface; refer to manufacturer’s product information for surface preparation and application instructions.
- H. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA: www.epa.gov.
- I. EPR: Environmental Performance Rating. Master Painters Institute’s formula that relates VOC, Performance of Category, Gloss and Appropriate specified use. Higher values equate to greater eco-efficiency.
- J. HAP: Hazardous Air Pollutant: According to the United States Environmental Protection Agency (EPA), Hazardous air pollutants, also known as toxic air pollutants or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects: www.epa.gov.
- K. LEED: LEED (Leadership in Energy and Environmental Design) is a voluntary, consensus-based, market-driven program that provides third-party verification of green buildings: www.usgbc.org.
- L. MPI: Master Painters Institute. An organization that establishes architectural paint standards and quality assurance programs in North America: www.paintinfo.com.
- M. NACE: National Association of Corrosion Engineers www.nace.org.
- N. PDCA: Painting & Decorating Contractors of America: www.pdca.org.
- O. RAVOC: Reactivity adjusted VOC. ‘Reactivity’ means the ability of a VOC to promote ozone formation.
- P. SCAQMD: South Coast Air Quality Management District is defined as most of Los Angeles, Orange, Riverside, and San Bernardino counties in California.
- Q. CARB: California Air Resources Board District is defined as the counties outside of SCAQMD.

- R. OTC: Refers to the Ozone Transmission Commission.
- S. SSPC: The Society for Protective Coatings. Surface preparation standards and specifications. www.sspc.org.
- T. ICRI: International Concrete Repair Institute. www.icri.org.

1.4 DEFINITIONS FOR SERVICE ENVIROMENTS

- A. Service Environment: The Service Environment is the condition to which the successfully installed coatings system specified will be exposed.
- B. Service environments listed in the D-E Finish Schedules and specified here in are defined as follows:
 - 1. Mild Service Environment: Outdoor weathering, mild industrial fumes and normal humidity with mold and mildew conditions.
 - 2. Moderate Service Environment: Frequent fumes and spills of mild chemical occasional product spills, occasional chemical cleaning, intermittent high humidity, moisture, mold and mildew conditions.
 - 3. Severe Service Environment: Frequent fumes and spills of strong chemicals (Acids, Alkalis, and Solvents) high humidity and, moisture conditions and frequent chemical cleaning.
- C. For Service Environments not listed above including but not limited to Immersion, Potable Water Applications, Anti-Graffiti, High Temperatures, and all others not defined. Please contact your Dunn-Edwards Representative for specification choices.

1.5 ACTION SUBMITTALS

- A. Product Data (PDS/TDS & SDS): For each type of product. Include preparation requirements and application instructions.
- B. LEED Submittals:

"Product Data for Credit IEQ 4: Low-Emitting Materials" Subparagraph below applies to LEED. Coordinate with requirements for paints and coatings.

 - 1. Product Data for Credit IEQ 4: For paints and coatings, including printed statement of VOC content.
- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and in each color and actual gloss level for topcoat.
 - 1. Contractor to submit samples on rigid backing, no smaller than 7 inches X 10 inches (177 X 254 mm) or larger than 8.5 X 11 inches (216 X 280 mm).
 - 2. Label each Sample for project, architect, general contractor, painting contractor, paint color name and number, paint brand name, "P" number if applicable, and application area.
- E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Following the format prescribed in Part 2. PRODUCTS, submit physical properties data and appropriate test results for each proposed product substitution.
3. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
4. VOC content.

1.1 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents for single component products. All 2 component products supplied will be un-catalyzed.

1.2 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Owner or Owners Representative/General Contractor may require a mock-up to be provided. If this case occurs please contact you Dunn-Edwards Representative for details.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in accordance with manufacturer's written instructions and acceptable ranges published in their PDS/TDS and SDS sheets.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.4 SAFETY

1. All jobsite safety procedures shall be in compliance with OSHA and EPA standards, as well as any other local, state and project requirements.
2. Please refer to Safety Data Sheets (SDS) for each specific product to ensure all proper PPE and safety requirements are being met for the job by the contractor.
3. Additional project specific safety procedures may exist in other project documents including those outlined in Division 1.

1.5 PRE-JOB CONFERENCE

1. A pre-job conference to review and clarify the specification is recommended.
2. Those attending the meeting shall consist of at minimum contractor, owner (or owners representative), coatings inspector (if applicable), architect or engineer.
3. Should certified coatings inspection be required as part of the specifying documents; a pre-job conference shall become a mandatory part of the project.
4. Attendees of this mandatory meeting must include all parties identified above.

1.6 FIELD CONDITIONS

- A. Manufacturer's written/published information regarding surface preparation, and coating application requirements shall over-rule this document. This information can be found in the manufacturer's Product Data Sheets/Technical Data Sheets PDS/TDS and is seen as the manufacturers written instructions for their product.
- B. Coatings shall be applied only when air and surface temperatures between 50 and 105 degrees Fahrenheit (10 and 41 degrees Celsius).
- C. Do not apply coatings when relative humidity exceeds 85 percent.
- D. Do not apply coatings when surface temperatures are less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
- E. All bare/exposed steel shall be coated within 8 hours of surface preparation.
- F. Painting contractor should follow proper painting practices in accordance with SSPC-PA1 and ensure environmental conditions are within range of acceptability as documented in manufacturers Product Data Sheets/Technical Data Sheet (PDS/TDS).
- G. Should NACE Certified Coatings Inspection be part of this contract; field conditions shall be verified at the beginning of shift, and three additional times throughout the shift.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products listed from:
 - 1. Dunn-Edwards
 - 2. Rust-Oleum
 - 3. Devco
 - 4. US Coatings
 - 5. Jotun
 - 6. Carboline
- B. Products: Subject to compliance with requirements, provide product listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. Material Compatibility:

Systems could fail if paints used for individual coats are incompatible. Paint systems match primers and topcoats and take compatibility into consideration.

- 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the U.S. EPA National Emissions Standards for Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows).
1. Flat Coatings: 250 g/L.
 2. Nonflat Coatings: 380 g/L.
 3. Nonflat – High Gloss Coatings (default Nonflat): 380 g/L.
 4. Floor Coatings: 400 g/L.
 5. Industrial Maintenance Coatings: 450 g/L.
 6. Pre-Treatment Wash Primers: 780 g/L.
 7. Primers and Undercoaters: 350 g/L.
 8. Rust Preventative Coatings: 400g/L.
 9. Waterproofing Sealers and Treatments: 600g/L.
 10. Zinc-Rich Primers (default Industrial Maintenance): 450g/L.
 11. All Shop-Primed Metal to be coated in accordance with applicable federal, state, and local regulations.
- C. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the Maricopa County Air Quality Department Rule 335 – Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows.
1. Flat Coatings: 250 g/L.
 2. Nonflat Coatings: 250 g/L.
 3. Nonflat – High Gloss Coatings (default Nonflat): 250 g/L.
 4. Floor Coatings: 250 g/L.
 5. Industrial Maintenance Primers and Topcoats: 420 g/L.
 6. Pre-Treatment Wash Primers (default Industrial Maintenance): 420 g/L.
 7. Primers, Sealers, and Undercoaters: 350 g/L.
 8. Rust Preventative Coatings (default U.S. EPA): 400 g/L.
 9. Waterproof Sealers: 400 g/L.
 10. Zinc-Rich Primers (default Industrial Maintenance): 420 g/L.
 11. All Shop-Primed Metal to be coated in accordance with applicable federal, state, and local regulations.
- D. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the California Air Resources Board 2007 Suggested Control Measure for Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows:
1. Flat Coatings: 50 g/L.
 2. Nonflat Coatings: 100 g/L.
 3. Nonflat – High Gloss Coatings: 150 g/L.
 4. Floor Coatings: 100 g/L.
 5. Industrial Maintenance Coatings: 250 g/L.
 6. Pre-Treatment Wash Primers: 420 g/L.
 7. Primers, Sealers, and Undercoaters: 100 g/L.

8. Rust Preventative Coatings: 250 g/L.
 9. (Waterproofing) Concrete/Masonry Sealers: 100g/L.
 10. Zinc-Rich Primers 340g/L.
 11. All Shop-Primed Metal to be coated in accordance with applicable federal, state and local regulations.
- E. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the South Coast Air Quality Management District Rule 1113: Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows:
1. Flat Coatings: 50 g/L.
 2. Nonflat Coatings: 50 g/L.
 3. Nonflat – High Gloss Coatings (default Nonflat): 50 g/L.
 4. Floor Coatings: 50 g/L.
 5. Industrial Maintenance (IM) Coatings: 100 g/L.
 6. Pre-Treatment Wash Primers: 420 g/L.
 7. Primers, Sealers, and Undercoaters: 100 g/L.
 8. Rust Preventative Coatings: 100 g/L.
 9. Waterproofing Concrete/Masonry Sealers: 100 g/L.
 10. Zinc-Rich IM Primers 100g/L.
 11. All Shop-Primed Metal to be coated in accordance with applicable federal, state, and local regulations.
- F. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, and shall comply with the applicable VOC limits of Rule 1113, as follows:
1. Colorants for Architectural Coatings, excluding IM Coatings: 50 g/L.
 2. Colorants for Solventborne Industrial Maintenance Coatings: 600 g/L.
 3. Colorants for Waterborne Industrial Maintenance Coatings: 50g/L.
- G. Colors: [As selected by Architect from manufacturer's full range] [Match Architect's samples] [As indicated in a color schedule].
1. When the final color has not been selected prior to bid submittal, Contractor may need to bid additional coats when submitting their bid. The Owner should be aware that if a color is chosen following the bid process and the color is significantly different from original color, a change order for an additional finish coat might be required.

2.3 SOURCE QUALITY CONTROL FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site.
 2. Samples will be provided in new, unopened sealed containers tinted to the colors specified and certified as valid materials by testing agency.
 3. Testing agency may perform tests for compliance with product requirements.

4. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will comply with requirements to use compatible products and systems as described in 2.2.A. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

2.4 QUALITY ASSURANCE

- A. Contractor shall provide verification of conformance with this specification, referenced standards and related documents. This verification to be performed by a THIRD PARTY, minimum NACE Level 1 Certified Coatings Inspector.
- B. Contractor shall provide documentation verifying inspector's certification is both valid and current.
- C. Should coatings inspector verification be required as part of these documents, and unless otherwise specified within the document or by the coatings manufacturer; the following shall be required of the coatings inspector.

NOTES FOR INSPECTION: If you choose to hire a THIRD PARTY inspector the following notes are some of the criteria for the inspector to follow/approve. Additional SSPC, NACE and ASTM testing criteria can be found at the following websites. (www.astm.org -- www.nace.org -- www.sspc.org -- www.icri.org)

1. All environmental conditions must fall in accordance with manufacturers written instructions for all phases of the coatings project including surface preparation, coatings application, and curing.
 2. Environmental readings shall be taken a minimum of 4 times per 8 hour shift with the first reading being taken before shift commencement.
 3. All compressed air shall be verified as clean at the beginning of each shift by means of "blotter test" (ASTM D4285).
 4. Any exposed (bare metal) prepared must be coated within 8 hours of preparation.
 5. Any prepared metal that displays flash rusting must be re-prepared in accordance with the standard specified prior to coating application.
 6. All levels of cleanliness, profile ranges, DFT ranges, environmental conditions and other coatings project details must conform with coating manufacturers published instructions.
 7. Holiday testing is required for areas subject to immersion or buried service environments.
- D. The following standards and notes for compliance verification of coatings shall apply to the document. This guide is for your reference and or for you to include if you so choose for your project as a guideline for the THIRD PARTY INSPECTOR tying back to the Quality Assurance of Standards for the project. These guidelines are some of the most applicable standards but are in no way the only standards that may apply to the referenced project.
1. ASTM D3276, Standard Guide for Painting Inspectors (Metal Substrates)
Description: This standard states that unless otherwise publicized by the coating manufacturer; the minimum surface temperature for coating application is usually 5°C (40°F). It may be as low as -18°C (0°F) for cold-curing one or two-component systems or 10°C (50°F) for conventional two-component systems. Coating specifications may further state that coating should not be undertaken when the temperature is dropping and within

3°C (5°F) of the lower limit. Also unless otherwise stated by the coating manufacturer; the maximum surface temperature for coating application is typically 50°C (125°F), unless otherwise clearly specified. A surface that is too hot may cause the coating solvents to evaporate so fast that application is difficult, blistering takes place, or a porous film results. Also of note, coatings should only be applied a substrate when that substrate is at least 3°C (5°F) above the determined dew point in order to prevent moisture on the surface from being coated.

2. **SSPC-PA1 – Shop, Field, and Maintenance Painting of Steel**
Description: This specification covers procedures for the painting of steel surfaces. The scope of this specification is rather broad, covering both specific as well as general requirements for the application of paint. This specification does not provide detailed descriptions of surface preparation, pretreatments, or selection of primers and finish coats. This specification does provide detailed coverage of the procedures and methods for application after the selection of the coating materials has been made.
3. **SSPC-PA COM – Commentary on all PA Guidelines (Paint Application)**
Description: This commentary is for information only and is not part of the standards and guides in this chapter. Its purpose is to present a general description of the sections that comprise this chapter. The documents in this section focus on aspects of the coating application process. They provide requirements and guidance procedures for applying coatings to both steel and concrete substrates, measuring film thickness on steel and concrete substrates after coating application, safety considerations for coating applicators, and requirements for coating application for specialized services.
4. **SSPC-PA5 – Guide to Maintenance Coating of Steel Structures in Atmospheric Service**
Description: This guide covers procedures for developing a maintenance coating program for steel structures. The guide may be used for one-time recoat programs or long-range recoat programs. The guide is intended for use primarily by owners' representatives. It is not intended to be a do-it-yourself guide, but is representative of the processes that a coating specialist (such as a Protective Coating Specialist [PCS] certified by SSPC or equivalent by NACE) would follow to develop a maintenance coating plan for specific facilities.
5. **SSPC-PA11 – Protecting Edges, Crevices, and Irregular Steel Surfaces by Stripe Coating**
Description: This guide discusses the technique called “stripe coating” or “striping” as a way of providing extra corrosion protection measures on edges, outside corners, crevices, bolt heads, welds, and other irregular steel surfaces, including optional surface preparation techniques for sharp edges to improve coating performance. Some details, including the advantages and limitations of specific methods of obtaining additional coating thickness, are described to assist the specification writer in assuring that the project specification will address.
6. **SSPC-PA10 - Guide to Safety and Health Requirements for Industrial Painting Projects**
Description: It is generally recognized that facility owners and specifiers should consider construction risks as part of their overall risk management programs. This document provides guidance for facility owners and project specifiers who have a mandate to incorporate appropriate requirements for safety and health program submittals and associated acceptance criteria in contract documents. It also alerts contractors to their responsibilities to protect workers as required by the US. Occupational Safety and Health Administration (OSHA). Both owners and contractors should be familiar with the OSHA Compliance Directive CPL 02-00-124 of December 10, 1999, which clarifies citation policies for multi-employer worksites, including owners, contractors, and subcontractors. Guidance and recommendations made herein are not all-inclusive and are not intended to supplant, replace or supersede any specific federal, state or local statute or regulation applicable to safety and health hazards or programs on industrial and marine painting projects.

7. **ASTM - D4285 Blotter Test**
Description: Standard Test Method for Indicating Oil or Water in Compressed Air. Requires an absorbent collector, such as white absorbent paper, cloth on a rigid backing, or a non-absorbent collector 6 mm (1/4in.) made of transparent plastic. Center the collector in the discharging air stream within 61 cm (24 in.) of the discharge point for one minute. Conduct the test on the discharging air as close to the use point as possible and after the required inline oil and water separators. Use the blotter test to check for any visible traces of oil or water in compressed air for abrasive blasting or spray coating application. According to ASTM D 4285, any indication of oil discoloration on the collector shall be cause for rejection of the compressed air for use in abrasive blast cleaning, air blast cleaning, and coating application operations.
8. **ISO 8502-3 Dust Assessment Test on Prepared Surface Description: Tests for the assessment of surface cleanliness—Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)”** (Geneva, Switzerland: ISO). Unless otherwise specified; the maximum allowable dust rating shall be level 3.
9. **SSPC-SP1 Solvent Cleaning**
Definition: Solvents such as water, xylol, toluol etc., are used to remove solvent-soluble foreign matter from the surface of ferrous metals. Rags and solvents must be replenished frequently to avoid spreading the contaminant rather than removing it. Low-pressure (1500 - 4000 psi) high volume (3 - 5 gal/min.) water washing with appropriate cleaning chemicals is a recognized "solvent cleaning" method. All surfaces should be should be cleaned per this specification prior to using hand tools or blast equipment.As a note of caution – solvent which leave a residue such as mineral spirits, naphtha, lacquer thinner etc. must not be used as they will lead to adhesion issues and premature coating failure.
10. **SSPC-SP2 – Hand Tool Cleaning**
Description: hand tool cleaning removes all loose mill scale, rust, paint, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Mill scale, rust, and paint are considered adherent if they cannot be removed by “lifting” with a dull putty knife.
11. **SSPC-SP3 – Power Tool Cleaning**
Description: power tool cleaning removes all loose mill scale, rust, paint, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Mill scale, rust, and paint are considered adherent if they cannot be removed by “lifting” with a dull putty knife.
12. **SSPC-SP11 – Power Tool Cleaning to Bare Metal (with a 1 mil profile)**
Description: a steel surface cleaned with power tools to bare metal, when viewed without magnification, shall be free from visible oil, grease, dirt, dust, coating, oxides, mill scale, corrosion products, and other foreign matter. Slight residues of rust and paint may also be left in the bottom of the pits if the original surface is pitted. The surface profile roughness shall be a minimum of 25.4 µm (1.0 mil) as measured in accordance with Method C of ASTM D 4417 or other mutually agreed upon method. The peaks and valleys on the surface shall form a continuous pattern with no smooth, “non-profiled” spots in between.
13. **SSPC-SP15 – Commercial Grade Power Tool Cleaning Description: a commercial grade power tool cleaned surface, when viewed without magnification, shall be free from visible oil, grease, dirt, dust, coating, oxides, mill scale, corrosion products, and other foreign matter, except as noted in Section 2.2. Random staining shall be limited to no more than 33% of each unit area of surface. Staining may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings. Slight residues of rust and paint may also be left in the bottom of the pits if the original surface is pitted.**

14. SSPC-SP5 / NACE #1 – White Metal Blast Cleaning
NACE No. 1/SSPC-SP5, White Metal Blast Cleaning Description: when viewed without magnification, the surface shall be free from visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter. This is the ultimate in blast cleaning. Use where maximum performance of protective coatings is necessary due to exceptionally severe conditions such as constant immersion in water or liquid chemicals.
15. SSPC-SP10 / NACE #2
NACE No. 2/SSPC-SP 10, Near-White Metal Blast Cleaning Description: when viewed without magnification, the surface shall be free from visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter. Random staining shall be limited to no more than 5% of each unit area of surface and may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
16. SSPC-SP6 / NACE #3 NACE No. 3/SSPC-SP 6, Commercial Blast Cleaning Description: when viewed without magnification, the surface shall be free from visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter. Random staining shall be limited to no more than 33% of each unit area of surface and may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
17. SSPC-SP7 / NACE #4 NACE No. 4/SSPC-SP 7, Brush-Off Blast Cleaning Description: when viewed without magnification, the surface shall be free from visible oil, grease, dust, dirt, loose mill scale, loose rust, and loose coating. Tightly adherent mill scale, rust, and coating may remain on the surface. Mill scale, rust, and coating are considered tightly adherent if they cannot be removed by lifting a dull putty knife.
18. SSPC-SP16 Brush Off Blast SSPC-SP16, Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steel and Non-Ferrous Metals Definition: A brush-off blast cleaned non-ferrous metal surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter. Intact, tightly adherent coating is permitted to remain. A coating is considered tightly adherent if it cannot be removed by lifting with a dull putty knife. Bare metal substrates shall have a minimum profile of 19 micrometers (0.75 mil). Surface preparation using this standard is used to uniformly roughen and clean the bare substrate and to roughen the surface of intact coatings on these metals prior to coating application. Substrates that may be prepared by this method include, but are not limited to, galvanized surfaces, stainless steel, copper, aluminum, and brass. For the purpose of this standard, the zinc metal layer of hot-dip galvanized steel is considered to be the substrate, rather than the underlying steel.
19. SSPC-SP13 / NACE#6 – Surface Preparation of Concrete Description: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems. When required, a minimum concrete surface strength, maximum surface moisture content, and surface profile range should be specified in the project specifications.
20. ASTM-D4417 – Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel – This standard describes three methods for profile assessment or measurement, one of which could be a visual or tactile comparison method. The other two methods measure the peak-to-valley height in different ways.

The three methods listed in ASTM-D4417 include:

1. Method A:
The blasted surface is visually compared to standards prepared with various surface profile depths and the range determined.
 2. Method B:
Profile depth is measured using a fine pointed probe at a number of locations and the arithmetic mean determined.
 3. Method C:
“Replica Tape” produced by the “Testex Corporation” is impressed into the blast cleaned surface forming a reverse image of the profile and the maximum peak to valley distance measured with a micrometer. It is suggested that Methods B or C be used to perform these tests as they are less subjective than Method A and are quantitative tests. To this point; the method to be used (B or C) must be agreed upon prior to project commencement to avoid conflict between differing results between the 2 methods.
21. SSPC-PA2 - Procedure for Determining Conformance to Dry Coating Thickness Requirements
Description: This standard describes a procedure for determining shop or field conformance to a specified coating dry film thickness (DFT) range on ferrous and non-ferrous metal substrates using nondestructive coating thickness gages (magnetic and eddy current) described in ASTM D7091.1.
The procedures for adjustment and measurement acquisition for two types of gages: “magnetic pull-off” (Type 1) and “electronic” (Type 2) are described in ASTM D7091. This standard defines a procedure to determine whether coatings conform to the minimum and the maximum thickness specified. See Note 12.1 for an example of a possible modification when measuring dry film thickness on over-coated surfaces.
22. NACE SP0188 – Holiday Testing of New Protective Coatings on Conductive Substrates
Description: This standard provides procedures for low-voltage wet sponge testing and high voltage spark testing of new coatings on conductive substrates.
This standard is not intended to provide data on service life, adhesion, coating cure, or film thickness.
This standard is intended for use only with new coatings applied to conductive substrates. Inspecting a coating previously exposed to an immersion service condition could produce an erroneous detection of discontinuities due to permeation or moisture absorption of the previously applied coating.
23. ICRI Surface Prep Standards --ICRI has identified nine distinct profile configurations which may be produced by the methods summarized herein. As a set, these profiles replicate degrees of roughness considered to be suitable for the application of one or more of the sealer, coating, or polymer overlay systems, up to a thickness of 1/4 inch (see Appendix B). Each profile carries a CSP number ranging from a base line of CSP 1 (nearly flat) through CSP 9 (very rough). The profile capabilities for each preparation method are identified by CSP number in the "Profile" section of the method summaries.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

- B. For previously coated surfaces; Old coatings allowed to remain as per the standard specified shall be defined as tightly adherent if they cannot be scraped away with a dull putty knife.
- C. Initial “Steel Surface Conditions” shall be recorded by use of SSPC Visual Guide #1, #2, #3, #4, #5, or #6 as applicable to the project and the level of cleanliness specified herein.
- D. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows: Percentages in five subparagraphs below are based on "MPI Manual.”
- E. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- F. Verify that plaster is fully cured including pH testing to determine that alkalinity is within limits established by the manufacturer.
- G. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- H. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- I. Verify environmental conditions are within coating manufacturer’s specified range. Environmental conditions shall be monitored at 4 points throughout each shift. Once at beginning, once at end, and two additional times in between. Recording must be taken at area where work is being performed.
- J. Each set of environmental readings shall consist of:
 - 1. Relative humidity
Unless otherwise stated; relative humidity must not exceed 85%
 - 2. Ambient/Air Temperature
 - 3. Dew Point
 - 4. Δ - (+/-Difference between surface temperature and dew point)
Surface must be a minimum of 5°F / 3°C above dew point
- K. Dust levels remaining on surface shall be verified in accordance with ISO 8502-3. A dust level 3 or cleaner shall be deemed as acceptable.
- L. Surface profile shall be verified in accordance with ASTM D4417. Surface profile ranges must be within ranges listed in manufacturers published data.
- M. Proceed with coating application only after unsatisfactory conditions have been corrected.
- N. Application of coating indicates acceptance of surfaces and conditions.
- O. DFT ranges per coat must fall within manufacturer’s recommended ranges. Measurements shall be taken in accordance with SSPC-PA2 “method for evaluating DFT”.
- P. Holiday testing in accordance with NACE SP0188 shall be performed on all surfaces subject to below grade or immersion service environments. All holidays must be marked, mapped and repaired by contractor.

3.2 SURFACE PREPARATION

- A. Comply with all manufacturer's written instructions and recommendations pertaining to surface preparation of the substrate being coated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
- C. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- D. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants in accordance with SSPC-PA1.
- E. Remove incompatible primers and re-prime substrate with compatible primers as required to produce coating systems indicated.
- F. Coordination of shop-applied prime coats with topcoats is critical.
- G. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 SURFACE PREPARATION COMMENTS REGARDING SPECIFIC SUBSTRATES

- A. Concrete Substrates:
 - 1. Prepare all concrete substrates (floors and walls) in accordance with coatings manufacturer's written instructions.
 - 2. Remove release agents, curing compounds, efflorescence, and chalk. Verify removal by means of a standard water-bead test. Remove all laitance and weak concrete.
 - 3. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 4. Concrete surfaces must pass ASTM D4268 "plastic sheet method prior to commencement".
 - 5. Clean surfaces with pressurized water. Use pressure range of [1500 to 4000 psi (10 350 to 27 580 kPa) at 6 to 12 inches (150 to 300 mm)] [4000 to 10,000 psi (27 580 to 68 950 kPa)].
 - 6. Unless otherwise stated by the coatings manufacturer in writing; all concrete/masonry surfaces shall be prepared in accordance with NACE 6/SSPC-SP13 "Surface Preparation of Concrete Surfaces".
 - 7. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- B. Steel Substrates:
 - 1. All oil, grease, dirt, dust and other foreign material must be removed prior to surface preparation commencement.
 - 2. All loose coatings, mill scale and rust must be removed until only tightly adherent of the same remain unless otherwise specific with an appropriate reference standard or spelled out by the coatings manufacturer.

3. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended as outlined/written per the manufacturer in the TDS.

SSPC-SP 7/NACE No. 4 permits tight residues of rust, mill scale, and coatings to remain. Be aware that blast cleaning methods may not be practical for use at Project site and may not be allowed by authorities having jurisdiction.

Such areas/projects may be abrasive blasted with newer technologies such as vapor blasting or sponge blasting. Please contact your D-E Industrial specialist for further information on such surface preparation methods.

C. Shop-Primed Steel Substrates:

1. Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
2. Acceptable methods of cleaning shall be in accordance with manufacturer's written instructions.
3. Blast clean according to SSPC/NACE standard specified.
4. [SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning] [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning] [SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning] [SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning]."

D. Galvanized-Metal Substrates:

1. Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
2. Blast clean new galvanized metal substrates to receive field-applied fluoropolymer coating to SSPC-SP7/NACE No. 4, "Brush-Off Blast Cleaning," to surface profile of 1.0 to 2.0 mils. Remove all passivator residue.
3. Clean weathered galvanized metal substrates to receive field-applied fluoropolymer coating to [SSPC-SP3/NACE No. 4, "Power Tool Cleaning,"] [SSPC-SP7/NACE No. 4, "Brush-Off Blast Cleaning," to surface profile of 1.0 to 2.0 mils].

E. Aluminum Substrates:

1. Remove surface oxidation and pre-clean substrates in accordance with SSPC-SP1 "Solvent Cleaning." Using any acceptable method listed therein.
2. After SSPC-SP1 obtain adequate surface profile using hand sanding with 120 to 220 grit sandpaper, Scotch-Brite pad, or SSPC-SP2 "Hand Tool Cleaning," as appropriate to metal and condition of substrate. Avoid creating surface defects that will not be concealed by new coating system.

F. Previously Anodized or Painted Metal Substrates:

1. Clean substrates in accordance with SSPC-SP1 "Solvent Cleaning." Using any acceptable method listed therein.
2. Extrusions and Small Areas: Abrade surfaces to remove gloss and to obtain adequate surface profile using hand sanding with 120 to 220 grit sandpaper, Scotch-Brite pad, or SSPC-SP2 "Hand Tool Cleaning," as appropriate to metal and condition of substrate. Avoid creating surface defects that will not be concealed by new coating system.

3. Large Areas: Abrade surfaces to remove gloss and to obtain adequate surface profile using methods recommended by paint manufacturer.
4. Remove residue following abrading by in accordance with SSPC-SP1 "Solvent Cleaning".
5. Test substrates for adhesion as recommended by manufacturer prior to applying bonding primer.
6. For previously coated surfaces; test coatings for compatibility between existing coating and new coatings to be applied.

G. Wood Substrates:

1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view and dust off.
3. Prime edges, ends, faces, undersides, and back sides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler.
5. Sand smooth when dried prior to applying topcoat.

3.4 INTERIOR and EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Light Duty Service Environments Interior and Exterior Substrates: Outdoor weathering, mild industrial fumes and normal humidity with mold and mildew conditions.

1. Dunn-Edwards
2. Rust-Oleum
3. Carboline
4. Devoe
5. Jotun
6. US Coatings

B. Moderate Service Environment Interior and Exterior Substrates: Outdoor weathering, mild industrial fumes and normal humidity with mold and mildew conditions.

1. Dunn-Edwards
2. Rust-Oleum
3. Carboline
4. Devoe
5. Jotun
6. US Coatings

C. Severe Service Environment: Frequent fumes and spills of strong chemicals (Acids, Alkalis, and Solvents) high humidity and, moisture conditions and frequent chemical cleaning.

1. Dunn-Edwards
2. Rust-Oleum
3. Carboline
4. Devoe
5. Jotun
6. US Coatings

3.5 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions.
- B. Use applicators and techniques suited for coating and substrate indicated.
- C. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
- D. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- E. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- F. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- G. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.
- H. All welds, rivets, Bolts, Threaded areas" and edges shall be "stipe-coated" in advance of coating application.
- I. Apply all coatings according to manufacturer's written instructions producing surface films at DFT thicknesses within manufacturer's recommended DFT ranges.
- J. When viewed without magnification; coating films shall be without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections.
- K. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- L. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturer.
- M. Thinning should be avoided unless required to aid in application. If thinning is performed use the minimum amount required to achieve desired application consistency and not to exceed manufacturers published instructions.
- N. Use only the thinner listed in the coating manufacturer's published documents. Caution must be taken when selecting the thinner as thinners are often different from clean-up solvents.

3.6 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. Upon completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 09 90 60