

SECTION 09960
HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes surface preparation and field application of high-performance coating systems to items and surfaces scheduled.
- B. Related Sections:
 - 1. Division 5 Section "Structural Steel" for shop priming structural steel.
 - 2. Division 9 Section "Painting" for general field painting.

1.3 SUBMITTALS

- A. Product Data: For each coating system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.
- B. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
 - 1. After color selection, Construction Manager will furnish color chips for surfaces to be coated.
- D. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
 - 1. Provide stepped Samples defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. List of material and application for each coat of each sample. Label each sample for location and application.
 - 3. Submit samples on the following substrates for Construction Manager's review of color and texture:
 - a. Concrete: Provide two 4-inch- square samples for each color and finish.
 - b. Concrete Masonry: Provide two 8-inch square samples of masonry, with mortar joint in the center, for each finish and color.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.
- B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
 - 1. Construction Manager will select one room, area, or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft. (9 sq. m) of wall surface.
 - b. Small Areas and Items: Construction Manager will designate items or areas required.
 - 2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface as specified. Provide the required sheen, color, and texture of each surface.
 - a. After finishes are accepted, Construction Manager will use the room or surface to evaluate coating systems of a similar nature.
 - 3. Final approval of colors will be from benchmark samples.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
 - 1. Name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. Handling instructions and precautions.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.6 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95 deg F (7 and 35 deg C).
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
 - 1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated in the coating system descriptions.
- B. Manufacturers' Names: The following manufacturers are referred to in the coating system descriptions by shortened versions of their names shown in parenthesis:
 - 1. Carboline Company (Carboline).
 - 2. PPG Keeler & Long.

2.2 COATINGS MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 COLORS

- A. Colors: Match Construction Manager's samples.

2.4 HIGH-PERFORMANCE COATING SYSTEMS

- A. HPC-1 Concrete: Decontaminable Coating System: Provide the following finish systems over interior concrete floors: Epoxy primer and finish applied at spreading rate recommended by manufacturer. Primer:
 - 1. Carboline:
 - a. Primer: Carboguard 1340; applied at 2 mils DFT
 - b. Finish: Carboguard 890 applied at 4 to 6 mils DFT
 - 2. PPG Keeler & Long:
 - a. Primer: KL3200 Kolor-Poxy applied at 4 to 6 mils
 - b. Finish: Intermediate coat KL3200 Kolor-Poxy applied at 4-6 mils DFT and KL9600 Keelock-poxy applied over intermediate coat at 4-6 mils DFT
- B. HPC-2 Concrete Floor Sealer: Provide the single coat epoxy concrete sealer:
 - 1. Sealer: Epoxy concrete sealer.
 - a. Carboline: Carboguard 890; applied at 8 mils DFT
 - b. PPG Keeler & Long: KL3200 Kolor-Poxy applied at 4 mils DFT
- C. HPC-3 Chemical Resistance Coating system: Provide the following finish systems:
 - 1. Carboline:
 - a. Carboline: Plasite 5602 applied at 3/8" thickness
 - 2. PPG Keeler & Long:
 - a. Primer: KL3200 Kolor-Poxy applied at 4 to 6 mils
 - b. Finish: Intermediate coat KL3200 Kolor-Poxy applied at 4-6 mils DFT and KL9600 Keelock-poxy applied over intermediate coat at 4-6 mils DFT
- D. HPC-4 Concrete Masonry Walls and Ceilings: Decontaminable Coating System: Provide the following finish over interior cast-in-place concrete walls and ceilings and over interior concrete unit masonry walls: Epoxy finish applied at spreading rate recommended by manufacturer:
 - 1. Carboline:
 - a. Primer: Carboguard 1340; applied at 2 mils DFT
 - b. Filler: Carboguard 2011S (sand filled epoxy finish); applied at 20-40 mils DFT
 - c. Carboguard 890 applied at 5 to 8 mils DFT.
 - d. Decontamination and radiation tolerance shall comply with ANSI 101.2 and ANSI N5.12 decontamination certification in accordance with Nuclear Regulatory Commission (NCR) requirements.

- E. HPC-5: Epoxy Flooring and Wall Surfacing: flooring consisting of epoxy primer, epoxy resin, aggregate, and coating. Provide only factory-supplied and -packaged materials including aggregate for all components of flooring system.
1. Texture: Match accepted sample, as required for specified coefficient of friction.
 2. Color: Selected by Construction Manager from manufacturer's standard colors.
 3. Thickness:
 - a. Floor and Base: Minimum nominal thickness of 1/4"
 - b. Walls: Minimum thickness of vertical surface of 1/8"
 4. Wearing Surface: Antislip on floor and Smooth on walls.
 5. Base: 4-inch- high integral cove base.
 6. Components: Provide manufacturer's standard components complying with requirements, unless otherwise indicated. Provide the following optional components:
 - a. Primer.
 - b. Waterproofing membrane.
 - c. Reinforcing membrane.
 - d. Top coat.
 7. System Physical Properties:
 - a. Compressive Strength: 10,000 psi, ASTM C-579.
 - b. Tensile Strength: 1,750 psi, ASTM C-307.
 - c. Flexural Strength: 4,300, ASTM C-580.
 - d. Flexural Modulus of Elasticity: 2.0×10^6 psi, ASTM C-580.
 - e. Hardness: 85-90, ASTM D-2240
 - f. Water Absorption: 0.2% maximum, ASTM C-413.
 - g. Indentation: No indentation, MIL-D-3134F.
 - h. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16 inch permanent indentation, MIL-D-3134.
 8. Slip Resistance: ASTM C-2047. Provide texture to achieve the following coefficients of friction:

Horizontal Surface Coefficient of Friction - Wet: 0.6 - 0.7.

 - a. Horizontal Surface Coefficient of Friction - Dry: 0.7 - 0.8.
 - b. Ramp Coefficient of Friction - Wet: 0.8.
 - c. Ramp Coefficient of Friction - Dry: 0.8 - 0.9.
 9. Products: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. Dex-O-Tex, Crossfield Products Corp.
 - b. General Polymers.
 - c. Stonhard Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. With Applicator present, examine substrates and conditions under which high-performance coatings will be applied, for compliance with coating application requirements.
1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
 2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.

3.2 PREPARATION

- A. General: 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.
1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.

- B. Cleaning: Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
 - a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
- D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 - 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 - 3. Use only the type of thinners approved by manufacturer and only within recommended limits.
- 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.

3.3 APPLICATION

- A. General: Apply high-performance coatings according to manufacturer's written instructions.
 - 1. Use applicators and techniques best suited for the material being applied.
 - 2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
 - 3. Coating colors, surface treatments, and finishes are indicated in the coating system descriptions.
 - 4. Provide finish coats compatible with primers used.
- B. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. Brush Application: Use brushes best suited for material applied and of appropriate size for the surface or item being coated.
 - a. Apply primers and first coats by brush unless manufacturer's written instructions permit using roller or mechanical applicators.
 - b. Brush out and work brush coats into surfaces in an even film.
 - c. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.
 - 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for the material and texture required.
 - 3. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.
 - a. Use spray equipment with orifice size recommended by manufacturer for material and texture required.
 - b. Apply each coat to provide the equivalent hiding of brush-applied coats.

- c. Do not double back with spray equipment building-up film thickness of two coats in one pass, unless recommended by manufacturer.
- C. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- D. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.
 - 1. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.
- E. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
 - a. Quantitative materials analysis.
 - b. Absorption.
 - c. Alkali and mildew resistance.
 - d. Abrasion resistance.
 - e. Apparent reflectivity.
 - f. Washability.
 - g. Dry opacity.
 - h. Recoating.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, Contractor may be required to remove rejected materials from previously coated surfaces if, on recoating with specified materials, the two coatings are not compatible.

3.5 CLEANING

- A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - 1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Construction Manager, and leave in an undamaged condition.
 - 1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
 - 2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09960