SECTION 09 67 23.30
RESINOUS (EPOXY BASE) HIGH PERFORMANCE FLOORING

1.1 SECTION INCLUDES

A. Resinous Systems of the Following Types:
1. Basis of Design: Sherwin-Williams HPF, Resuflor SB.

1.2 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete.

1.3 REFERENCES

A. ASTM International (ASTM):
1. ASTM C 413 - Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
2. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
3. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
4. ASTM D1475 - Standard Test Method For Density of Liquid Coatings, Inks, and Related Products.
5. ASTM D 2047 - Standard Test Method for Static Coefficient of Friction of Polish- Coated Flooring Surfaces as Measured by the James Machine.
6. ASTM D 2240 - Standard Test Method for Rubber Property—Durometer Hardness.
7. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
8. ASTM D2369 - Standard Test Method for Volatile Content of Coatings.
9. ASTM D 2370 - Standard Test Method for Tensile Properties of Organic Coatings.
10. ASTM D 3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
11. ASTM D 4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
12. ASTM D 4366 - Standard Test Methods for Hardness of Organic Coatings by Pendulum Damping Tests
13. ASTM D5441 - Standard Test Method for Analysis of Methyl Tert-Butyl Ether (MTBE) by Gas Chromatography.
14. ASTM D 7234 - Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
15. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
16. ASTM F 2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

17. ASTM G 154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

B. Deutsches Institut fur Normung (DIN):
1. DIN 53460 - Testing of Plastics; Determination of the Vicat Softening Temperature of Thermoplastics.

C. International Concrete Repair Institute (ICRI):
1. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

D. Military Specifications (MIL):
1. MIL-D-3134J - Deck Covering Materials.

E. National Floor Safety Institute (NFSI):
1. ANSI/NFSI B101.1 - Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data:
1. Manufacturer's data sheets on each product to be used, including properites, VOC content, wet static coefficient of friction, compressive strength, tensile strength, eloongation and similar properties.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Typical installation methods.

C. Verification Samples: Two representative units of each system, including color and texture.

D. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.

E. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

F. Manufacturer’s Project References: Submit manufacturer’s list of successfully completed resinous flooring system projects, including project name and location, name of architect, and type and quantity of flooring systems furnished.

G. Applicator’s Project References: Submit applicator’s list of successfully completed resinous flooring system projects, including project name and location, name of architect, and type and quantity of flooring systems applied.

H. Care and Maintenance Instructions: Submit manufacturer’s care

and maintenance instructions, including cleaning instructions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Applicator's Qualifications:
   1. Applicator regularly engaged, for a minimum of 5 years, in application of resinous flooring systems of similar type to that specified.
   2. Employ persons trained for application of resinous flooring systems.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock -up as acceptable to Architect and provide temporary foundations and support.
   1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
   2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
   3. Retain mock-up during construction as a standard for comparison with completed work.
   4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, and batch number.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until application.
   3. Store materials in clean, dry area indoors between 65 and 80 degrees F (18 and 27 degrees C).
   4. Store materials out of direct sunlight.
   5. Keep materials from freezing.
   6. Protect materials during storage, handling, and application to

prevent contamination or damage.

1.8 PROJECT CONDITIONS

A. Apply flooring system under the following ambient conditions:
1. Ambient and Concrete Floor Temperatures: Between 65 and 85 degrees F (18 and 29 degrees C).
2. Material Temperature: Between 65 and 85 degrees F (18 and 29 degrees C).
3. Relative Humidity: Maximum 80 percent.
4. Dew Point: Floor temperature more than 5 degrees over dew point.

B. Do not apply flooring system under ambient conditions outside manufacturer's limits.

1.9 WARRANTY

A. Submit manufacturer's standard warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: The Sherwin-Williams High Performance Flooring, 866-540-1299 swflooring@sherwin.com Website: https://industrial.sherwin-williams.com dustin.e.kaatz@sherwin.com

B. Requests for substitutions will be considered and must be provided 2 weeks prior to bid for alternate product approval.

C. **ADDM #3** Basis of Design: RESUFLOR NOVALAC SB.
1. Primer Coat: Resuprime MVB, 3-5 mils- dependent on moisture levels. General Contractor must conduct moisture content test on new concrete slab and provide results to VA COR and Architect for direction before proceeding with work.
2. Broadcast Coat with sand (30/50 mesh or acceptable size): Resuflor 3746 pigmented, 10-12 mils.
3. Grout Coat: Resuflor 3741 Novalac, 12-15 mils.
4. Topcoat: Resutile HTS 100, 3 mils.
5. Color: As selected by Architect from manufacturer's full range.
6. Cove Base: Resuflor 3561V or ResiCove

2.2 SYSTEM PROPERTIES

A. Basis of Design:
1. Abrasion Resistance, Taber Abraser CS-17 Taber Abrasion Wheel, 1,000 gram load, 1,000 revolutions, ASTM D4060, 18 mg/loss
2. Adhesion to Concrete, psi [MPa], ASTM D4541, 450 [3.10] (concrete failed)
3. Adhesion to Concrete, psi [MPa[, ASTM D7234, 732 [4.48] (concrete failed)
4. Coefficient of Friction-COF, James Friction Tester, ASTM D2047, 0.63
5. Coefficient of Friction-Wet Static, BOT 3000, ANSI/NFSI B101.1,

0.94

6. Compressive Strength, psi [MPa], ASTM D695, 13,500 [93.079]
7. Flammabilitymm/min, ASTM D635, 182 mm/min
8. König Hardness, ASTM D22540, 171.3
9. Shore D hardness, ASTM D2240, 80-85 @ 0 sec | 75-80 @ 15 sec
10. Sward Hardness (1mil flim), ASTM D2240, 30-40
11. Tensile Strength, psi [MPa], ASTM D2370, 8,000 [55.158]
12. Percent Elongation (resin only), ASTM D2370, 6%
13. Volatile Organic Compound, VOC,lb/gal [g/l], ASTM D3960, Resuflor MPE A+B= 0.41
    [49] Resuflor UVE A+B=0.67 [81] Resutile HTS 100 A+B+C=0.05 [6]
14. Water Absorption (24 hours0, ASTM D570, 0.2% weight increase

2.3 PRODUCT PROPERTIES

A. Basis of Design: Resuflor 3746: A neutral, two-component, high solids epoxy.
   1. Percent Solids, by weight (by volume), ASTM D1475, A + B: 95.45 (94.56).
   2. Volatile Organic Compound-VOC, ASTM D3960, Mixed A + B: 0.41 lb./gal (49 g/L).
   3. Abrasion Resistance, mg loss, Taber Abraser, C-17 Taber Abrasion Wheel, 1,000 gram load, 1,000 revolutions, ASTM D4060: 83.1.
   4. Coefficient of Friction-COF, James Friction Tester, ASTM D2047: 0.59-0.62.
   5. Adhesion to Concrete, ASTM D5441: 732 psi (4.48 MPa) concrete failed.
   6. Adhesion to Concrete, ASTM D7234: 450 psi (3.10 MPa) concrete failed.
   7. Compressive Strength, ASTM D695: 13,500 psi (93.079 MPa).
   8. Tensile Strength, ASTM D2370: 8,000 psi (55.158 MPa).
   9. Percent Elongation, ASTM D2370: 5.
   10. Shore D Hardness, ASTM D2240: 80-85 @ 0 sec, 75-80 @ 15 sec.

B. Basis of Design: Resutile HTS 100: A clear high solids, three-component, satin finish, aliphatic, moisture- cure urethane.
   1. Percent Solids, by weight (by volume), ASTM D2369, A + B + C: 94.02 (92.57).
   2. Volatile Organic Compound-VOC, ASTM D3960, Mixed A + B + C: 0.05 lb/gal (6 g/L).
   3. Abrasion Resistance, mg loss, Taber Abraser, C-17 Taber Abrasion Wheel, 1,000 gram load, 1,000 revolutions, ASTM D4060: 18.
   4. Coefficient of Friction-COF, James Friction Tester, ASTM D2047: 0.63.
   5. Wet Static Coefficient of Friction, BOT 3000, ANSI/NFSI B101.1: 0.94.
   6. Flammability, ASTM G154: 182 mm/min.
   7. Resistance to Yellowing as measured using ASTM D2244 after 1000 consecutive hours UV exposure in QUV, ASTM G154, <10 increase of yellow units (CIE Lab Δb)
   8. Tensile Strength, (resin only), ASTM D2370: 6,250 psi (43,092 MPa).

9. Percent Elongation, (resin only), ASTM D2370: 6.
10. König Hardness, (3 mil/76.2 micron film), ASTM D4366: 171.3.
11. Water Absorption, 24-hour immersion, ASTM C413: 0.2 percent weight increase.

C. Broadcast Sand: Organic minerals, additives, integrally non-pigmented.
   a. Shape: Random.
   b. Size: 30/50 Mesh.
   c. Surface Texture: Slip Resistant- Semi-Smooth
   d. Color: N/A or Selected by Architect if decorative. **ADDM #3**

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine concrete surfaces to receive flooring system. Verify concrete is structurally sound.

B. Moisture Testing of Concrete: Perform at least one of the following two tests to determine moisture in concrete. Type of test and frequence as recommended by manufacturer and installer.
   1. In-situ Probe Test:
      a. Measure relative humidity in concrete in accordance with ASTM F 2170.
      b. Application of flooring system shall start only if test results are below 75 percent relative concrete humidity.
      c. If test results are above limits, notify Architect and flooring manufacturer in writing.

C. Do not begin preparation or installation until satisfactory moisture test results are achieved. Provide flooring manufacturer's recommended moisture vapor control coating if required.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Protection of In-Place Conditions: Protect adjacent surfaces and adjoining walls from contact with flooring system materials.

C. Surface Preparation:
   1. Prepare concrete surface in accordance with manufacturer’s instructions.
   2. Remove dirt, dust, debris, oil, grease, curing agents, bond breakers, paint, coatings, sealers, silicones, and other surface contaminants which could adversely affect application of flooring system.
   3. Mechanical Preparation: Steel shot blast concrete or grind to a minimum surface profile of ICRI 310.2R, CSP 3-5.
   4. Key-cut termination points with 1/4-inch (6-mm) by 1/4-inch (6-mm) cut.

5. Patch depressions, divots, and cracks in concrete in accordance with manufacturer's instructions.
6. Mechanically remove loose, delaminated, and damaged concrete and repair in accordance with manufacturer's instructions.
7. Joints: Fill joints in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. Install flooring system in accordance with manufacturer's instructions and approved submittals at locations indicated on the Drawings.

B. Ensure concrete is dry, clean, and prepared in accordance with manufacturer's instructions.

C. Allow concrete to cure a minimum of 7 days before applying flooring system.

D. Mixing:
1. Mix material components together in accordance with manufacturer's instructions.
2. Mix only enough material that can be applied within working time.
3. Add and mix colorants with materials in accordance with manufacturer's instructions to achieve uniform color.

E. Apply flooring system materials to obtain consistent mil thickness and smooth, uniform appearance and texture.

F. Overlay: Apply overlay in accordance with manufacturer's instructions. Apply overlay to prepared concrete surface.

G. Traction Aggregate: Broadcast traction aggregate in accordance with manufacturer's instructions. Broadcast traction aggregate into wet overlay.

H. Cove:
1. Apply cove primer and cove in accordance with manufacturer's instructions at locations indicated on the Drawings.
2. Apply cove to height and shape as indicated on the Drawings.
3. Apply cove to create seamless, smooth transition between flooring and walls.

I. Seal Coat:
1. Apply seal coat in accordance with manufacturer's instructions.

3.4 Apply seal coat over traction aggregate.

3.5 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.6 CLEANING AND PROTECTION

A. Allow flooring system to dry in accordance with manufacturer's instructions before opening to traffic.

B. Allow flooring system to dry a minimum of 1 week before cleaning by mechanical means.

C. Protect completed flooring system from damage during construction.

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