

SECTION 099635

High Performance Lining System

1.0 - GENERAL

1.01 Scope:

A. This specification covers the work necessary to furnish and install the chemical resistant system, complete, as shown on the drawings and as specified herein. Work includes, but is not limited to, the following:

1. Surface preparation, bug hole repair, honeycomb repair, crack and joint detailing, penetration detailing, and installation of the Medium Film system.
2. Surface preparation and protective coating of miscellaneous exposed structural and mechanical metals as shown on the drawings.

1.02 Related Work Specified in Other Sections

- | | | |
|----|---------------|------------------------------------|
| A. | Section 03300 | Cast-in-Place Concrete |
| B. | Section 03251 | Expansion and Construction Joints |
| C. | Section 07194 | Under Slab Vapor Barrier |
| D. | Section 07200 | Exterior Below Grade Waterproofing |
| E. | Section 07900 | Joint Sealants |

1.03 Referenced Specifications Codes and Standards

A. Without limiting the generality of other requirements of these specifications, all work hereunder shall conform to the applicable requirements of the referenced portions of the following documents, to the extent that the requirements therein are not in conflict with the provisions of this Section. All references and standards listed shall be the latest revisions. Joint and individual documents are referenced.

1. SSPC – The Society for Protective Coatings
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4643
(412) 281-2331
2. NACE – National Association of Corrosion Engineers
P.O. Box 218340
Houston, TX 77218-8340
(281) 492-0535
 - a. SSPC-SP 13/NACE No. 6 Surface Preparation of Concrete

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- b. SSPC-TU 2/NACE 6G197 “Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment”
 - c. SSPC-SP 5/NACE No. 1, White Metal Blast Cleaning
 - d. SSPC-SP10/NACE No. 2, Near White Metal Blast Cleaning
 - e. SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning
 - f. NACE RP0892 “Linings over Concrete for Immersion Service”
 - g. NACE SP0188 “Discontinuity Holiday Testing of Protective Coatings”
 - h. NACE RP 6F-164 “Curing of Interior Tank Linings”
 - i. NACE RP 6F-166 “Recommended Practice for Inspection of Linings on Steel and Concrete”
3. ICRI – International Concrete Repair Institute
3166 S. River Rd., Suite 132
Des Plaines, IL 60018
(847) 827-0830
- a. Technical Guideline No.03372, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays”
 - b. Technical Guideline No. 03731, “Guide for Selecting Application Methods for the Repair of Concrete Surfaces”
 - c. Technical Guideline No. 03741/SSPC-TR 5/NACE Pub 02203, “Design, Installation, and Maintenance of Protective Polymer Flooring Systems for Concrete”
4. ASTM – American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
(610) 832-9585
- a. ASTM F1869 “Standard Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”
 - b. ASTM E-337: Test Method for Measuring Humidity with a Psychrometer
 - c. ASTM D 4258 “Practice for Surface Cleaning Concrete for Coating”
 - d. ASTM D 4261 “Practice for Surface Cleaning Unit Masonry for Coating”
 - e. ASTM D 4262 “Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces”
 - f. ASTM D 4414 “Standard Practice for Measurement of Wet Film Thickness by Notch Gages”
 - g. ASTM Committee D01.23: Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings

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- h. Using an Ultrasonic Gauge
ASTM D 4541 "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers"
 - i. ASTM D 4787 "Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates"
 - j. ASTM D 5162 "Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates"
5. ACI – American Concrete Institute
Box 19150, Redford Station
Detroit, Michigan 48219
(248) 848-3700
- a. ACI 344R-T "Design and Construction of Circular Pre-stressed Concrete Structures with Circumferential Tendons"
 - b. ACI 344R-W "Design and Construction of Circular Wire and Strand Wrapped Pre-stressed Concrete Structures"
 - c. ACI 350-01 "Code Requirements for Environmental Engineering Concrete Structures"
 - d. ACI 350.1 "Testing of Reinforced Concrete Structures for Water Tightness"
 - e. ACI 350.2 "Concrete Structures for Containment of Hazardous Material"
 - f. ACI 503 "Use of Epoxy Compounds with Concrete"
 - g. ACI 504 "Guide to Sealing Joints in Concrete Structures"

1.04 Submittals:

- A. Submit product data for each component specified including data substantiating that the proposed materials comply with specified requirements, and recommendations by the manufacturer covering all materials.
- B. Samples of the cured system as described in Part 3.03.D to include the following
 - 1. Finish texture as determined by the owner or owners' authorized representative.
 - 2. Stepped samples showing stages of multi-layer applications.

1.05 Quality Assurance

- A. Acceptable Manufacturers: A company with a minimum of 5 years experience in manufacturing of, and providing technical service for chemical resistant systems equivalent to those specified herein.

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- B. Single Source Supply: All products described in Part 2.01 shall be manufactured by or approved for use by the manufacturer of the chemical resistant system specified herein.
- C. Installer Qualifications: A firm experienced in the application of chemical resistant systems, or a facility owner's approved maintenance organization.
- D. Pre-Installation Conference
 - 1. The contractor, the installation sub-contractor, and the chemical resistant system manufacturer's representative shall meet on site with the owner's representative. Particular emphasis shall be placed on these specifications, safety, weather conditions, surface preparation, material application, and inspection.
 - 2. The contractor shall submit to the owner's representative any revisions or changes agreed upon, reasons thereof, and parties agreeing or disagreeing with them.
- E. Substrate Conditions: Do not proceed with work until substrate preparation and tolerances have been approved by the owner's representative, chemical resistant system manufacturer's representative, the approved installation sub-contractor, and the contractor.

1.06 Delivery, Storage, and Handling

- A. Deliver products to the job site in manufacturer's original, unopened containers bearing manufacturer's name and label and the following information
 - 1. Product name
 - 2. Product description (generic product classification)
 - 3. Manufacturer's lot number
 - 4. Color
- B. Store materials in sealed original manufacturer's containers. Store materials in a protected area out of direct sunlight. Keep containers clean and undamaged. Adhere to manufacturer's published storage temperature and shelf life recommendations. Protect all materials from freezing.

2.00 PRODUCTS

2.01 Acceptable Manufacturers and Materials

- A. The Medium Film Coating System shall consist of one or more systems for concrete repair and corrosion protection. Products are specified as a standard of quality, and are manufactured by The Sherwin-Williams Company, Cleveland, Ohio.

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1. Concrete repair of bug holes and honeycombs – Designated areas to be treated shall receive application of Sherwin-Williams Steel-Seam FT910 epoxy patching and resurfacing compound or Dura-Plate 2300 epoxy cementitious resurfacer. Thickness shall be sufficient to fill voids and restore the surface to required surface plane. The selection of cementitious or epoxy mortar shall be at the discretion of the contractor to meet the desired requirements of workability and cure time.
2. Concrete Crack and Joint Details – Exposed cracks, construction joints, contraction joints, and isolation joints shall be prepared and detailed in accordance with the attached detail drawings. Should any conditions or joint design be discovered that is not detailed in the attached drawings, the contractor shall notify the owner and consult with the material manufacturer for recommendations.
3. Miscellaneous steel surfaces to be treated shall receive application of Sherwin-Williams' Dura-Plate 5900 Medium Film Coating/Lining System.
4. Concrete surfaces to be treated shall receive application of Sherwin-Williams' Dura-Plate 5900 Medium Film Coating/Lining System.

2.02 Performance Criteria

- A. The chemical resistant system shall be resistant to the chemical concentrations, temperatures, and duration of exposure, as submitted by the owner or authorized owners' representative.
- B. Physical Properties
 1. Adhesion, ASTM D-4541: 800 psi minimum.
 2. Abrasion Resistance, ASTM D-4060 (CS 17): 20.8 mg. wt. Loss
 3. Flexibility, ASTM D-522: Passes 9.7% elongation
 4. Pencil Hardness, ASTM D-3363: 3H

3.0 EXECUTION

3.01.1 Surface Preparation

- A. Concrete
 1. The NACE/SSPC Joint Surface Preparation Standards for concrete surface preparation are incorporated in and made part of this specification. All references to SSPC SP-13/NACE No 6 designate the definitions and other requirements in these documents. The International

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Concrete Repair Institute (ICRI) Technical Guideline #03732, Guide to Surface Preparation of Concrete to Receive Sealers, Coatings and Polymer Overlays shall be used to visually evaluate the concrete surface profile. Refer to Sherwin-Williams' Concrete Surface Preparation Guide.

2. Inspect concrete surface for soundness, flatness, levelness and overall condition. Report any discrepancies to the owner's representative.
3. Create a minimum surface profile for the system specified in accordance with the methods described in ICRI No. 03732 to achieve profile CSP-3 to CSP-5
4. Following surface preparation, concrete surfaces shall be tested for moisture vapor emissions in accordance with ASTM F1869, Standard Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride Moisture Emissions Test. Report results to owner's representative and Sherwin-Williams' Industrial & Marine Representative.
5. Concrete Surface Repair: Bug holes and honeycombs
 - a. Areas less than 1/2" deep shall be repaired with Steel-Seam FT910 epoxy patching and resurfacing compound or Dura-Plate 2300 epoxy cementitious resurfacer.
 - b. Areas that are greater than 1/2" deep shall be repaired with A.W. Cook MSM repair mortar.
6. Provide a clean, saturated surface dry (SSD) concrete surface with no free standing or moving water, with a minimum surface profile as defined above. All substrates are to be vacuumed, swept and blown down with clean, dry air to remove spent abrasive, dust and other foreign material that might interfere with the adhesion of the primer and lining.

B. Miscellaneous Metals

1. The NACE / SSPC Joint Surface Preparation Standards for abrasive blasting approved in October 1994 are incorporated in and made a part of this specification. All references to SSPC-SP7 / NACE No. 3 and SSPC-SP10 / NACE No. 2 designate the definitions and other requirements in these documents. SSPC VIS 1-89 Visual Standard for Abrasive Blast Cleaned steel shall be used to visually evaluate the blast cleanliness.
2. Remove all oil and grease from surface by solvent cleaning per SSPC-SP1. Minimum surface preparation is SSPC-SP10 / NACE No. 2, Near White Metal Blast Cleaning. Abrasive blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (3 mils). Prime any bare steel the same day as it is cleaned and before flash rusting occurs.

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Refer to Sherwin-Williams Guidelines Procedures for Surface Preparation of Metals.

- a. Inspect the surfaces to be coated. All holes in the steel surfaces or pits greater than 1/8 inch shall be repaired in accordance with the owner's repair procedures.
- b. Remove or grind down all sharp burrs, edges, and weld spatter from all steel that is to be coated. Corners and edges shall be chamfered 1/16" at a 45° angle minimum or rounded to a 1/16" radius (1/8" diameter) minimum. Abrasive blasting prior to the application of the coating materials shall restore the anchor profile.
- c. All substrates are to be vacuumed, swept and blown down with clean, dry air to remove spent abrasive, dust and other foreign material that might interfere with the adhesion of the primer or basecoat.
- d. The maximum allowable residual salt contamination, as measured with a KTA Scat Kit or equivalent field test method, immediately prior to the application of the first coat is as follows:
 - 5 micrograms per square centimeter (50mg/m²) most commodities up to 120°F
 - 2 micrograms per square centimeter (20mg/m²) most commodities at 120°F and greater
 - 2 micrograms per square centimeter (20mg/m²) for demineralized (deionized, distilled) water
- e. Corrosion pits in the blasted steel shall be filled flush with the substrate with Steel-Seam FT 910 patching and resurfacing compound.
- f. Projections and lap joints on welded plates and on riveted plates to be coated shall be filled with Steel-Seam FT 910 patching and resurfacing compound in order to smooth out the surface and provide for a smooth transition of the coating over the substrate.

3.02 Application

- A. Comply with manufacturers written installation procedures and individual product data sheet application bulletins.
- B. Apply materials in accordance with the following material coverage:

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Dura-Plate 5900 Epoxy Medium Film Coating/Lining System

<u>Products</u>	<u>Thickness (mils dft)</u>
<i>Primer</i>	
Corobond 100 (if required)	4-6
<i>Repair/Patching and resurfacing Compound</i>	
Steel-Seam FT910 or Dura-Plate 2300	As needed
<i>First Coat</i>	
NONE	N/A
<i>Second Coat</i>	
Dura-Plate 5900	40-125
Total Targeted Thickness:	
	40-125 (plus primer)

3.03. Inspection and Testing

- A. The owner or owner's authorized representative may require the services of an independent testing laboratory to test the installed system.
- B. If test results indicate noncompliance with the specification, the following corrective action may be required of the Contractor:
 - 1. Remove non-compliant systems or components.
 - 2. Replace system or components in (1)
 - 3. Assume the testing expenses.
- C. Minimum requirements of the chemical resistant system are that it be free of the following:
 - 1. Uncured material
 - 2. Inadequate thickness
 - 3. Pinholes
 - 4. Blisters
 - 5. Delamination
 - 6. Foreign matter
 - 7. Unspecified materials

3.04. Protection

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- A. Chemical resistant system shall be protected from damage or detrimental elements during cure and until the time of final acceptance.

End of Section 099635