

**SECTION 09962**  
**CHEMICAL RESISTANT COATINGS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY:**

- A. Section Includes:
1. Chemical-Resistant Coatings (CRCs) and accessories including but is not limited to:
  2. Surface preparation and application of CRCs to concrete walls and drywall partitions.
  3. Sealing of construction joints.

**1.3 REFERENCES / PROJECT REQUIREMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Additional project requirements:
1. ASTM C 579 – Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.
  2. ASTM D 578 – Standard Test Method for Linearity of Fluorescence Measuring Systems
  3. ASTM D 579 – Standard Test Method for Limit Detection of Fluorescence of Quinine Sulfate
  4. ASTM C 580 – Standard Test Method for Flexural Strength and Modulus of Elasticity of chemical Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.
  5. ASTM D 635 – Standard Test Method for Rate of Burning and/or Extent and Time of burning of Plastics in a Horizontal Position
  6. ASTM D 1005 – Standard Test Method for Measurement of Dry Film Thickness of Organic Coatings Using Micrometers
  7. ASTM D2240 – Standard Test Method for Rubber Property Durometer Hardness
  8. ASTM D 4060 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
  9. ASTM D 4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
  10. ASTM D 4541 – Standard Test Method for Pull Off Strength of Coatings Using Portable Adhesion Testers
  11. ASTM D 5222 – Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
  12. ASTM E84 - Surface Burning Characteristics of Building Materials.
  13. ASTM E 595 – Standard Test Method for total Mass Loss and collected Volatile Condensable Materials from Out gassing in a Vacuum Environment
  14. ASTM F 150 – Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
  15. SSPC (Steel Structures Painting Council).

**1.4 SYSTEM DESCRIPTION**

- A. General

1. Use of amine or ammonia based materials will not be allowed in the clean air stream. Organophosphates, N-Methylpyrrolidone(NMP) and Dioctyl Phtalate(DOP) are not to be present in the coating systems or accessories.
  2. Crack Bridging: CRC systems shall bridge substrate cracks up to 0.381mm wide which may occur during or after CRC application, as measured by ASTM D 522 test standards. The CRC system shall remain liquid tight under the specified conditions of manufacturer's specification. In addition comply with the following:
    - a. Lining Reinforcement: Fiberglass chopped-strand or woven-mat lining reinforcement is required at the floor and walls of below-grade containment trenches, sumps, and pits. The fiberglass reinforcement should conform to ASTM D 578 and D 579 standards for class "C" chemical grade glass.
    - b. Provide fiberglass or synthetic fabric reinforcement at large substrate cracks to maintain liquid tight requirements under the specified conditions of service.
- B. CRC's to be suitable for continuous contact with liquid chemicals for 80 hours. Initial contact at 95 degree F (35 degree C) temperature for 8 hours' and additional 72 hours at 70 degree F (21 degree C). The coating shall show no effects except moderate softening for the duration of contact and no permanent damage.
- C. CLEAN AREAS (CA)
1. Collected Volatile Condensable Material (CVCM) of cured material shall not exceed 0.06 percent when tested in accordance with ASTM E595.
  2. Total Mass Loss (TML) of cured material shall not exceed 2 percent when tested in accordance with ASTM E595.

#### 1.5 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract:
1. Complete and submit CRC system data sheets according to the requirements in the Room Schedule for each proposed CRC system. Identify each material by the manufacturer's catalog number and general classification.
  2. Manufacturer's MSDSs for all CRC materials to be used on this job site.
  3. Provide chemical resistance data to show the resistance to all chemicals and concentrations listed in Section 2.2 of this Specification. Include chemical-resistance test results for chemicals not listed in the manufacturer's standard data sheets.
  4. Manufacturer's technical information, including basic materials analysis and application instructions for each coating material, reinforcement and joint material to document compliance with the performance requirements of this section.
  5. Written certification that the Contractor is approved by manufacturer and has the required project experience. The Contractor shall also provide references of previous projects where these CRC systems or similar systems were installed.
  6. Submit out gassing tests of CRCs exposed to clean air stream, to document compliance with the "clean area" requirements specified in this section.
  7. Submit documentation indicating conformance to regulatory requirements limiting the emission of Volatile Organic Compounds (VOC) for each coating material.
  8. Samples:
    - a. Submit 12"x12" (300mmx300mm) samples of each CRC system with selected colors for review of color and texture only. List material and application for each coat of each finish sample.
    - b. Submit 12" (300mm) long samples of grounding strap.
  9. Furnish maintenance instructions including cleaning chemicals for each CRC system for use during construction and after completion of the project.
  10. Submit details for the following (details shall have the review approval of the material manufacturer):

- a. Construction joints (both static and dynamic).
- b. Treatment of cracks in substrates prior to application of CRCs.
- c. Trench/wall base details.
- d. Trench details at steel angle frames.
- e. Transition and termination detail at edge of CRC system.
- f. Other conditions as required for complete installation.

## 1.6 QUALITY ASSURANCE

- A. The CRC manufacturer shall provide a representative to visit the job site at intervals during surface preparation and application to assure finished product quality when installed. Manufacturer's representative may also be required to be on site as necessary to resolve field problems attributable to or associated with the manufacturer's products furnished under this Contract.
- B. The Contractor shall be trained and approved by the coating manufacturer.
- C. The Contractor shall have successfully completed at least three projects of similar size and scope with the specified products.
- D. Single-Source Responsibility: All CRC materials including primer, finish coats, and accessories, to be installed under this Section shall be produced by a single manufacturer.
- E. Coordination of Work: The Contractor shall review sections related to the various substrates prior to applying CRC's to ensure the coating systems when installed meets the performance criteria. The Contractor shall notify the Architect of anticipated concerns, accompanied with a recommended solution.
- F. Apply CRCs only when the temperature, moisture content, and humidity of surfaces to be coated and surrounding atmosphere comply with the manufacturer's printed instructions.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label and the following information:
  1. Name or title for material.
  2. Manufacturer's name, stock numbers, and dates of manufacture.
  3. Contents by volume for major pigment and vehicle constituents
  4. Thinning instructions.
  5. Application instructions.
  6. Color name and number.
  7. Handling instructions and precautions.
  8. Material Safety Data Sheets (MSDS) complete for each shipment.
- B. Store materials are not in actual use. It covered the containers tightly at a minimum ambient temperature of 45 degrees F in a well-ventilated area. Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue. Storage of materials not in use shall be in accordance with manufacturer's recommendation and in approved container.
- C. Take necessary precautionary measures to ensure that workmen and work areas are adequately protected from fire hazard and health hazards resulting from storage, handling, mixing, and application of coatings.

- D. Use CRC materials within manufacturer's recommended shelf life. Coordinate shelf life schedule with delivery to site and installation schedule.

## 1.8 WARRANTY

- A. Complete applications shall be warranted jointly and severally on a single document by the materials manufacturer and the Contractor against defects of materials and workmanship, which compromise a liquid-tight and chemical-resistant installation.
- B. Warranty shall be for a period of 2 years and shall begin following Date of Substantial Completion of the project.
- C. Warranty shall include all labor and material necessary to complete required activities and repairs, including joint scaling, penetration seals, bolts, and anchoring and grounding details.
- D. Upon completion and acceptance of the work of this Section, submit an executed copy of the warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. No preferred manufacturer.
- B. Products listed below are the products of Stonhard, Inc. These products are listed as a basic standard for the type of coating required. The contractor shall propose their equivalent products that for each system that meet the performance requirements outlined in this specification.

### 2.2 MATERIALS

- A. High performance coatings shall be designed to meet the performance requirements in accordance with the Systems of Coatings defined below.
- B. General:
  - 1. Provide materials, which meet the current industry standards and recommended practices as prescribed by the National Association of Corrosion Engineers (NACE). Use only materials displaying manufacturer's identification as a standard, best-grade product.
  - 2. Color pigments shall be pure, non-fading, applicable types to suit substrates and service indicated.
  - 3. Color Selection: Pigmented finishes coat, colors as selected by the Architect from manufacturer's standard color range.
  - 4. Coating products shall conform to regulatory requirements limiting the emission of volatile organic compounds (VOC) for the jurisdiction where the project is located.
- C. Systems of High Performance Coatings
  - 1. System 1 – Trench sides and bottom: Stonlux SL (or approved equivalent) System comprised of a penetrating and sealing, two-component epoxy primer and a three-component, free flowing epoxy formulation including resin, hardener, reactive flow enhancers and finely graded aggregate and powder.
    - a. Technical Properties:

Compressive Strength:	8,700 psi
Abrasion Resistance:	Taber test: 30mg/1000 times,CS-17
Adhesion Strength:	>250 psi (100% concrete failure)

- Flexural Strength: 3,500 psi
    - Hardness: 80-85 Shore D Hard Scale
    - Flammability: Self Extinguishing
    - Impact Resistance: Passed ¼" Dupont test
    - Odor: Low
    - Thermal Resistance: Approx. 140oF continuous exposure
    - Toxicity: Physically safe
  - b. Chemical Resistance: Resistance to splash or spillage of the following industrial chemicals without degradation.
    - Inorganic Acids: 50% Sulfuric acid  
37% Hydrochloric acid  
50% Phosphoric acid
    - Organic Acid: 10% Lactic acid  
5% Formic acid
    - Alkaline: 30% Calcium chloride  
20% Potassium chloride  
Saturated Calcium hydroxide  
25% Ammonia  
50% Sodium hydroxide  
10% Sodium hydrochloride
    - Organic Solvent: Methyl alcohol  
Toluene  
Petrol
    - Aqueous solution: Water  
Sugar solution  
10% sodium chloride
  - c. Provide 6" high standard radius coved base at all floor/wall or floor/column intersections.
  - d. If required by the coating manufacturer or applicator to provide a complete system that meets the requirements of this specification including the warranty; flooring system to provide a penetrating, moisture tolerant, two component epoxy primer designed to withstand osmotic pressure which may exist within the floor slabs. Coating manufacturer and applicator shall satisfy himself of the suitability of the installed vapor barrier prior to recommending products for System 1.
2. System 2 – Concrete Walls and Drywall Partitions: Stoncrest GS3 in conjunction with Stonglaze VSC (or approved equivalent) System comprised of a two-component, general service, epoxy polyamide primer, two-component epoxy pin-hole repair material and a two-component, high performance, high solids, epoxy glaze coating.
- a. Technical Properties:
    - Abrasion Resistance: Taber test: 30mg/1000 times,CS-17
    - Adhesion Strength: >250 psi (100% concrete failure)
    - Flexural Strength: 3,500 psi
    - Hardness: 80-85 Shore D Hard Scale
    - Flammability: Self Extinguishing
    - Impact Resistance: Passed ¼" Dupont test
    - Odor: Low
    - Thermal Resistance: Approx. 140oF continuous exposure
    - Toxicity: Physically safe
  - b. Chemical Resistance: Resistance to splash or spillage of the following industrial chemicals without degradation.
    - Inorganic Acids: 50% Sulfuric acid  
37% Hydrochloric acid

Organic Acid:	50% Phosphoric acid 10% Lactic acid 05% Formic acid
Alkaline:	30% Calcium chloride 20% Potassium chloride Saturated Calcium hydroxide 25% Ammonia 50% Sodium hydroxide 10% Sodium hydrochloride
Organic Solvent:	Methyl alcohol Toluene Petrol
Aqueous solution:	Water Sugar solution 10% sodium chloride

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. The Contractor shall review concrete work, and specified steel primer, to verify compatibility with CRC systems.
- B. Examine substrates and conditions under which coating will be performed for compliance with requirements for application of coatings. Do not proceed with application until unsatisfactory conditions have been corrected.
- C. Test substrate for moisture content using ASTM D 4263, Plastic Sheet Test. Do not proceed with application until moisture content is within CRC manufacturer's recommended limits.
- D. Test substrate for vapor transmission with calcium chloride test.
- E. Start of coating work will be construed as the Contractor's acceptance of surfaces within particular area.

#### 3.2 SURFACE PREPARATION

- A. General
  - 1. Perform preparation and cleaning procedures in compliance with coating manufacturer's instructions for particular substrate conditions and as specified in this Section.
  - 2. Protect other surfaces not intended to receive CRCs. Provide drop cloths to prevent coating materials from falling on or marring any adjacent surfaces. Protect working parts of all mechanical and electrical equipment from damage during surface preparation and application.
  - 3. Clean surfaces to be coated before applying coatings or surface treatments. Schedule cleaning and application so that dust and other contaminants will not fall on cleaned surfaces prior to application of coatings.
  - 4. The Contractor shall comply with applicable air pollution and environmental control regulations for blast cleaning and disposition of spent aggregate and debris.
- B. Concrete and Concrete Masonry Units Surface Preparation
  - 1. Surfaces shall be clean and, unless required for proper adhesion, shall be dry prior to coating.

2. Surface preparation shall not begin until a minimum 28 days after the concrete has been placed. After 28 days, the criteria to proceed shall be based on the moisture content of the substrate material.
3. Remove all grease, oil, dirt, salts, or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
4. Concrete surfaces shall be mechanically cleaned to remove all loose concrete and provide a tooth for binding. Surface profile after cleaning shall meet the manufacturer requirements for the coating system to be applied. Clean, dry, compressed air shall be used for nozzle blasting. The following methods of mechanically cleaning may be used:
  - a. Dry abrasive blasting using compressed air blast nozzles, and abrasive.
  - b. Dry abrasive blasting using closed cycle, recirculating abrasive system with compressed air, blast nozzle and abrasive, with vacuum for dust and abrasive recovery.
  - c. Dry abrasive blasting, using a closed cycle, recirculating abrasive system with centrifugal wheels and abrasive.
5. If metallic blast aggregate is used, all residual blast aggregate that is embedded in the concrete surface shall be removed prior to application of coating system.
6. After abrasive blast cleaning the surface to be coated and surrounding surface shall be vacuumed, and wiped free of dust, residual abrasives, and other contaminants.
7. Patching and repair of substrate shall be done so as to maintain the structural integrity of the substrate and to meet the performance requirements specified.
8. Contractor shall be responsible for patching and repairing of concrete surfaces including but not limited to blowholes, gouges, pin holes, spalls, fins and incidental concrete spills.

C. Materials Preparation

1. Carefully mix and prepare materials in compliance with manufacturer's directions.
2. Do not mix coating materials produced by different manufacturers unless otherwise permitted by manufacturer's written instructions.
3. Maintain containers used in mixing and application of CRC in a clean condition, free of foreign materials and residue.
4. Stir materials before application to produce a mixture of uniform density and as required during application. Do not stir film, which may form on surfaces into material. Remove films and, if necessary, strain material before using.

### 3.3 APPLICATION

A. General

1. Apply CRCs by spray, towel, or other applicators in accordance with manufacturer's directions.
2. Coating shall be applied continuously over all intersections of vertical and horizontal surfaces.
3. Do not apply succeeding coats until previous coat has cured as recommended by coating manufacturer.
4. Prevent dust and other contaminants from falling on wet newly coated surfaces. Provide temporary enclosures to protect wet surfaces.
5. Application of the product shall be in accordance with the manufacturer's specification. It is the responsibility of the contractor to produce a finished surface, which is true, consistent in color and tone and surface for the application for which is intended. In particular the finished surface should be flat, free of any surface inconsistencies and even in color.
6. Finish coats of chemical resistance coatings are to be applied to thickness recommended by manufacture.
7. Finish coat shall differ in color from preliminary coat.

- B. Film Thickness
  - 1. Provide coverage as required by manufacturer to meet specified performance criteria, but a minimum thickness acceptable for CRC.
    - a. Trench/Sump: Side 1.5mm
    - b. Trench/Sump: Bottom 2.0mm
  - 2. All surfaces to receive CRCs shall be visually inspected to ensure proper and complete coverage has been attained.
  
- C. Porous Surfaces
  - 1. Porous surfaces may have the prime coat thinned with manufacturer's approved product to provide maximum penetration and adhesion.
  - 2. Type and amount of thinning shall be determined by the coating manufacturer and are dependent upon the surface density and type of coating.
  
- D. Damaged Coatings
  - 1. Damaged coatings, pinholes and holidays shall have the edges feathered and repaired in accordance with the recommendations of the coatings manufacturer.
  - 2. All finish coats, including touch up and damage-repair coats, shall be applied in a manner which will present a uniform texture and color-matched appearance.
  - 3. Surface preparation and patching activities shall not generate dusting of cleaned surfaced.

### 3.4 FIELD QUALITY CONTROL

- A. CRC System Tests: The Contractor shall carry out tests on CRC as listed below:
  - 1. Surface profile.
  - 2. Holiday test.
  - 3. Film thickness.
  - 4. ASTM-approved test to ensure proper application and quality of material.
  - 5. Chemical-resistance test.
  - 6. Pull-out Test
    - a. Minimum pull out strength, for chemical resistant coating system on concrete substrate shall be >250psi
    - b. Frequency of test shall be limited to a maximum of one test per 250s.f. of coated surfaces
  
- B. All CRC system tests shall be ASTM-approved tests unless otherwise specified.

### 3.5 CLEANING

- A. Clean-up
  - 1. Upon completion of work, clean glass and spattered surfaces. Remove spattered coatings by washing, scrapping, or other proper methods, using care not to scratch or damage adjacent finished surfaces.
  
- B. Disposal
  - 1. All coating materials and accessories remaining from clean-up activities shall be disposed of in accordance with all local disposal requirements for the particular material being disposed.

### 3.6 PROTECTION

- A. Protect work of other trades, whether to be coated or not, against damage from coating.

- B. Provide wet paint signs to protect newly coated finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of coating operations.
- C. At completion of contraction activities of other trades, touch up and restore damaged or defaced surfaces to like-new appearance.

**END OF SECTION 09962**