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SEWERGARD® 210
ULTIMATE CORROSION PROTECTION

# SAUEREISEN SEWERGARD 210 QUALITY ASSURANCE GUIDELINES

To ensure the opportunity of a successful installation of the Sauereisen SewerGard No. 210 Epoxy Lining Systems the following Quality Assurance Guidelines are recommended. These guide when included within project specifications allow for the greatest opportunity for a high quality installation.

## Contractor Pre-Qualification Requirement

Sauereisen recommends a requirement that all installing contractors be factory trained prior to installation. Confirmation of training in all areas of installation is required and a certification program training course outline and letter of certification must be provided. Certification program must include an annual renewal.

## Surface Preparation and Coating Contractor Quality Assurance

It is recommended that a single applicator be engaged for the surface preparation and coating installation. Surface preparation and concrete rehabilitation by the General Contractor, for example, and then installation by the factory certified contractor is not recommended.

## Product Source Quality Control

Provide each component of protective coating produced by a single manufacturer, including recommended underlayment and resurfacing compound, filler compounds, active inflow and water-stop products and corrosion resistant lining. If components from different manufacturers are submitted then a letter from the corrosion coating manufacturer is required to confirm compatibility and ensure no loss of warranty.

## Surface Preparation of Concrete

Surface Preparation of Concrete. . Follow guidelines outlined in International Concrete Repair Institute - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays - Guideline No. 03732 and in accordance with NACE Standard 6/SSPC-SP13, NACE Standard 5/SSPC-SP12. Surface preparation requirement is to expose aggregate and obtain a uniform surface texture resembling ICRI CSP #4-6 comparator. Evaluate pH of existing substrate to confirm greater than neutral (pH 7 or higher).

a) Surface Tensile Strength of Prepared Concrete Surfaces and Adhesion of Applied Coatings. Utilize ASTM D 4541 or D 7234, Standard Test Methods for Pull-Off Strength of Coatings using Portable Adhesion Tester.
b) Moisture Content. Utilize one or both of the following:

1) ASTM D 4263 "Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method"
2) ASTM F 1869 "Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor using Anhydrous Calcium Chloride" -this method is commonly used on floor slabs only.

**Identified Active Leaks**

Stopping active leaks is required prior to installation of the corrosion coating. After surface cleaning, any visible leak should be reported to the Engineer. Consult corrosion coating manufacturer regarding recommended repair procedure. Repair products must be compatible with the resurfacing and/or corrosion coating.

**Uniformity of Resurfacing**

Resurfacing products shall be used for surface leveling, covering exposed aggregate, filling missing brick joints, large bug holes, and for general concrete patching and shall be installed and cured according to Manufacturer's written guidelines and as outlined in product technical data sheets. All existing voids and irregularities must be completely filled and entirely covered so that the finish of underlayment resurfacing compound is uniform in appearance. The minimum application thickness for resurfacing material is 1/8" thickness.

**Film Thickness of Protective Coating**

Test Methods for Measurements of Wet Film Thickness of Organic Coatings (ASTM D 1212 or D 4414). Due to the irregular anchor profile obtained on concrete, this measurement should be considered an approximation. Contractor should frequently compare the amount of product used to the amount of surface area coated.

**Visual Inspection**

The Inspector of the application should make a final visual inspection of the installed coating. Any deficiencies including sags, visible voids or pinholes, or blistering of the finished coating should be marked and repaired by the applicator per the manufacturer's requirements. In the case of excessive visual deficiencies as determined by the owner and/or inspector the manufacturer shall be consulted to confirm the recommended repair.

**Pull-Off Test of Concrete and Protective Coating**

Test Method for Pull-Off Strength of Coatings using Portable Adhesion Tester (ASTM D 4541 or D 7234). If coring around the perimeter of the test area is recommended by the Specifying Engineer, refer to that Section of SSPC-SP 13/NACE 6. Adhesion testing shall be performed on a minimum of 1 structure or 15 percent of all coated structures, whichever is greater. Adhesion testing shall be conducted after a minimum 24-hour cure of the Epoxy Lining Protective Coating at 70°F. A minimum of two measurement of bond strength of the protective coating to the substrate shall be made on representative surfaces approved by the Officer-in-Charge for each selected structure(s). Bond strength shall be measured in accordance with ASTM D4541 and modified herein or ASTM D 7234. Prior to the pull test, the tester shall utilize a scoring device to cut through the coating until the substrate is reached. The pull tests in each structure shall meet or exceed 200 psi and shall include substrate adhered to the back of the dolly or no visual signs of coating material in the test hole. The Project Engineer should evaluate any areas detected to have inadequate bond strength. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs should be made per manufacturers recommendation.

**Holiday Detection Testing and Repair of Protective Coating**
Holiday Testing of Protective Coatings using High Voltage Test Method - National Association of Corrosion Engineers (NACE) Standard RPO188-99 – Section #4, or High-voltage Continuity Testing - Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates (ASTM D 4787).

**Independent Test Verification/Requirement of Protective Coatings**
It is recommended that any coating specified meet the following independent resources requirements:

County Sanitation Districts of Los Angeles County; Evaluation of Protective Coatings for Concrete, 2004 Final Report. This extensive evaluation confirms the chemical resistance and characteristics of concrete protective coatings.

Standard Specifications for Public Works Construction (SSPWC) Section 210-2.3.3 Chemical Resistance Test (Pickle Jar Test). Report conclusion was "No specimens exceeded the maximum allowable weight change criteria of +1.5%" in order to confirm chemical resistance of coatings in specific wastewater environments.

University of Houston, TX- "Chemical Resistance Testing Program; Protective Lining Systems for Structures in Wastewater Treatment Industry

**Wastewater Application Case History**
Sauereisen SewerGard No. 210 System has been in service since 1988. It is recommended that a minimum similar application case history standard (typically 5 years) be required. It is further recommended that the case histories be from within the State (i.e. Hawaii or Alaska) to ensure an understanding of particular environments.

**Manufacturer Representative**
Sauereisen recommends that the manufacturer's representative must be an independent agency or company other than the installing coating contractor or General Contractor. J.A. CRAWFORD CO. has been offering technical representation and distribution for Sauereisen for over 30 years.

**Third Party Inspection**
It is recommended that project inspection responsibility be that of a third party inspector; not the general contractor or installing contractor. Typically, the facility owner or the consulting engineering firm is responsible for and hires the inspector. A NACE Certified Coating inspector should be employed for this purpose and qualification would include the understanding of the following guidelines:

Surface Preparation of Concrete- SSPC-SP 13/NACE 6-Surface Preparation of Concrete, New Standards International Concrete Repair Institute (ICRI) Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays, Guideline No. 03732

Film Thickness of Protective Coating- ASTM D 1212 and/or D 4414 "Test Methods for Measurements of Wet Film Thickness of Organic Coatings"; desire to establish uniform lining thickness

Holiday Detection Testing and Repair of Protective Coating- Holiday Testing of Protective Coatings using High Voltage Test Method as outlined by the National Association of Corrosion Engineers (NACE) Standard RPO188-99 Test Method or High-voltage Continuity Testing-Practice for Continuity Verification of Liquid of Sheet Linings Applied to Concrete Substrates…ASTM D 4787

Pull-Off Test of Concrete and Protective Coating- Test Method for Pull-Off Strength of Coatings using Portable Adhesion Tester…ASTM D 4541 or ASTM D 7234

## AREA PREPARATION

Temperature of Working Area - Store materials within a temperature range of 65° to 80°F for 48 hours prior to use. With material temperatures below 65°F, the application becomes more difficult and curing is retarded. Above 85°F material working time is reduced. Substrate and air temperatures must be above 50°F and below 105°F during application.

Application in direct sunlight and/or with rising surface temperatures will result in blistering of the materials due to expansion of entrapped air or moisture in the concrete. Concrete surfaces that have been in direct sunlight must be shaded for 24 hours prior to application and remain shaded until the initial set of the material has taken place. When the surface temperatures are rising, it may be necessary to postpone the application or apply during the cooler evening hours.

## SURFACE PREPARATION PROCEDURES

**New Concrete** - Concrete should be floated free of sharp edges, ridges or depressions. All structural cracks shall be repaired; voids filled and slopes reestablished (Call Sauereisen for recommended repair procedures). New concrete must be allowed to cure for a minimum of 28 days prior to applying a protective lining system. This usually is sufficient time to allow for shrinkage and for new concrete pours to dissipate a sufficient amount of moisture.

All concrete structures to receive lining system must be properly designed and capable of withstanding imposed loads. Surfaces must be dry, firm, free of laitance, form release agents, standing water and have attained 3000-psi compressive strength or be structurally sound as determined by architect / engineer.

Suitable surface preparation methods include Shotblasting, Abrasive Blasting, or Water Jetting. Surface preparation procedures shall be in accordance with ICRI Guideline No. 03732. Surface preparation requirement is to expose aggregate and obtain a uniform surface texture resembling an ICRI CSP # 3-5 comparators. (Note: ICRI = International Concrete Repair Institute)

### Moisture Testing

**Floors** - New concrete should be installed over a moisture barrier to eliminate moisture transmission through the concrete floor. Prior to the application of materials, the moisture content must be determined using a suitable Moisture Detection System per ASTM F-1869 - "Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride." One such manufacturer is Sealflex Industries, 2925 College Ave. #B4, Costa Mesa, CA (714-708-0850). An average value exceeding 3.0 lbs/1000 $ft^2$/24-hr period is unacceptable and will require additional cure time, the application of a surface penetrating vapor barrier or other corrective measure. Re-test after taking corrective measures to ensure an average value below 3.0 lbs.

**Moisture Testing for walls and overheads** - Test new concrete pours for moisture after completing surface preparation. Utilize ASTM D-4263 "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method." Any indication of moisture will require additional cure time, the application of a surface penetrating vapor barrier or other corrective measures. Re-test after taking corrective measure to ensure the absence of moisture.

**Old Concrete** - All concrete structures to receive lining system must be capable of withstanding imposed loads. All oil, grease and chemical contaminants must be removed from the surface of concrete by chemical cleaning. Surfaces must be firm, free of standing water, laitance, form release agents, and be structurally sound as determined by architect/engineer.

Suitable surface preparation methods include Shotblasting, Abrasive blasting, or Water Jetting. Surface preparation requirement is to expose aggregate and obtain a uniform surface texture resembling ICRI CSP # 4-6 comparators. (Note: ICRI = International Concrete Repair Institute). Evaluate pH of existing substrate to confirm greater than neutral (pH 7 or higher).

**Brick Structures** - All oil, grease and chemical contaminants must be removed from the brick by chemical cleaning. Hydroblast or abrasive blast to provide anchor profile on brickwork and to remove all existing paints, protective coatings, foreign particles, chemically attacked or unsound mortar. Loose brickwork and voids in the mortar joints should be re-pointed with Underlayment to create uniform surface. All active hydrostatic leaks must be stopped prior to SewerGard application.

**Metal** - Remove all visible oils, grease per SSPC-SP1, section 2.1 Remove contaminants from surface as per SSPC-SP1 section 3.2. Using CHLOR*RID INTERNATIONAL "CHLOR*TEST" test kits, determine level of chlorides on the metal surfaces. Level of acceptable chlorides shall be no more than 3 g/cm for immersion and no more than 5 g/cm for atmospheric conditions. Surfaces with unacceptable levels must be washed with CHOR*RID as per manufacturer's recommendations and then re-tested.

Using SSPC-VIS 1 as a guide, abrasive blast to a NACE 1/ SSPC-SP5 White Metal Blast for immersion and a NACE 2/SSPC-SP10 for other service conditions. An anchor profile range of 2.5-3.0 mil is preferable. All welds must be continuous, free of flux and have a smooth rounded radius without any sharp edges or be ground flat and free of flux, fins and spatter.

**Subject: Testing and Maintenance procedure for SAUEREISEN SewerGard Lining System**

The following guidelines are recommended for testing and repair of Sauereisen Epoxy Lining Systems. Refer to the standard Sauereisen specification for information pertaining to surface preparation and application methods.

As a corrosion-resistant material of construction, the maintenance procedure for Sauereisen linings involves the repair of pinholes or areas damaged due to impact. The maintenance is as follows:

**HIGH VOLTAGE SPARK Testing**

After the Epoxy Lining System has been allowed to cure for 24 hours, the surface shall be tested for pinholes using a high voltage-type spark tester similar to the Tinker Razor Holiday Detector, Model AP/W or an approved similar model. A test voltage of 100-volts/mil thickness is recommended. Blisters can be visually observed and a hammer may be used to "sound" the surface for non-adherence to the concrete substrate. Each pinhole and blister should be circled with a marker pen as an area to be repaired.

**REPAIR OF HOLIDAYS OR PINHOLES**

1. Use a drill with a masonry bit to open up the pinhole.
2. Sand the area surrounding the pinhole to allow for a 1" diameter repair.
3. Blow off all dust and debris.
4. Solvent wipe repair area.

5. Apply the mixed lining material with a putty knife, pushing it into the recess and coating the entire repair area.
6. Backroll the repair material with a short nap roller to smooth out.
7. After 24-hours the repair areas may then be re-tested using High Voltage Test Equipment.
8. Re-test only the repairs a second time, not the entire lining.

**FOR APPLICATIONS OVER CONCRETE: REPAIR OF AREAS DAMAGED BY IMPACT**

1. Remove all loose, damage material.
2. Determine the extent of damage by sounding the area surrounding the damaged section. A hollow sound will indicate loosely adhered material, while a solid ring is indicative of a firmly bonded lining.
3. Once the damaged area has been identified, mark the area with a pencil and using a grinder or diamond saw, cut through the lining, around the entire perimeter.
4. Chisel out the remaining material.
5. Remove dust, debris, etc.
6. Sand the material surrounding the repair area to allow a 1" overlap. Sand sufficiently to remove all gloss.
7. Repair damaged concrete with Underlayment F-121 or Epoxy Filler Compound No. 209
8. Solvent-wipe the sanded material surrounding the repair.
9. Apply mixed material with a putty knife or trowel, pushing it into the recess and coating the entire repair area.
10. Backroll the repair material with a water-dampened, short nap roller to smooth out.

Note: If there are any questions regarding a specific repair, contact a Sauereisen Representative. Following details pertaining to surface preparation and application techniques, which are provided in the Sauereisen standard specification, will help to ensure a successful installation