Strong-Seal® Epoxy Specifications for New Structures: A 100% solids epoxy for providing corrosion protection to new concrete manholes, under-ground vaults, concrete pipe, and other structures.

Intent: To provide a 100% solids epoxy to provide corrosion protection for new precast or formed concrete structures.

PART 1.0 GENERAL

1.1 The specification shall govern all work, materials, and equipment required for the purpose providing corrosion protection for new concrete structures as a result of applying a Strong-Seal® Epoxy to the interior of new concrete structures.

1.2 Described are procedures for cleaning, preparation, application and testing. The applicator, approved and trained by the manufacturer, shall furnish all labor, equipment and materials for applying a Strong-Seal® Epoxy to form a monolithic liner, with machinery specially designed for the application. All aspects of the installations shall be in accordance with the manufacturer’s recommendation and per the following specifications which includes:

A. The removal of any loose and unsound material  
B. Cleaning of the area to be coated.  
C. The elimination of active infiltration prior to liner application.  
D. The repair and filling of voids  
E. The application of a 100% solids epoxy primer  
F. The spray application of a Strong-Seal® Epoxy to provide corrosion protection.

PART 2.0 MATERIALS

2.1 PATCHING MATERIAL (Strong-Seal® QSR):

Strong-Seal® QSR, a quick setting corrosion resistant cementitious material, shall be used as a patching material and is to be mixed and applied according to manufacturer's recommendations and shall have the following minimum requirements:
2.2 INFILTRATION CONTROL MATERIAL (Strong-Seal® Strong Plug®):

Strong Plug®, a rapid setting cementitious product specifically formulated for leak control, shall be used to stop minor water infiltration and shall be mixed and applied according to manufacturer's recommendations and shall have the following minimum requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>ASTM</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Compressive Strength</td>
<td>C109</td>
<td>&gt;400 psi, 1 hour</td>
</tr>
<tr>
<td>B. Sulfate Resistance</td>
<td>C267</td>
<td>No weight loss</td>
</tr>
<tr>
<td>C. Freeze/Thaw</td>
<td>C666</td>
<td>100 cycles</td>
</tr>
<tr>
<td>D. Pull Out Strength</td>
<td>C234</td>
<td>14,000 pounds</td>
</tr>
<tr>
<td>E. Placement Time</td>
<td></td>
<td>&lt;1.0 minute</td>
</tr>
</tbody>
</table>

2.3 GROUTING MATERIAL:

2.3.1 Strong-Seal® Grout 250, a cementitious grout, shall be used for stopping very active infiltration and filling voids and shall be mixed and applied according to manufacturer’s recommendations. The cementitious grout shall be volume stable, and have a minimum 28 day compressive strength of 250 psi.

2.3.2 Strong-Seal® Grout 1000, a cementitious grout, shall be used for the same application as Grout 250, but is designed for special soil conditions, and shall be used per manufacturer’s recommendations. The cementitious grout shall be volume stable and have a minimum 28 day compressive strength of 1000 psi.

2.3.3 Chemical grouts may be used for stopping very active infiltration and shall be mixed and applied per manufacturer’s recommendation.
PART 3.0 APPLICATIONS

3.1 New Pre-cast and Poured in Place Structures

3.1.1 Standard Portland cement or new concrete structures (not quick set high strength cement) must be well cured prior to the application of the protective coating. Generally, 28 days is adequate cure time for ordinary Portland cement. If earlier application is desired, compressive or tensile strength of the concrete can be tested to determine if acceptable cure has occurred. (Note: Bond strength of the coating to the concrete surface is generally limited to the tensile strength of the concrete itself. Engineer may require Elcometer pull tests to determine suitability of concrete for coatings.)

3.1.2 Contact Strong-Seal® Systems if the structure contains a Quick setting high strength concrete with latex or curing compound additives.

3.1.3 Contact Strong-Seal® Systems if the structure contains and existing coating.

PART 4.0 APPLICATION OF STRONG-SEAL® PRIMER

4.1 Strong-Seal® Primer Physical Properties

<table>
<thead>
<tr>
<th>ASTM Standard</th>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. D4541</td>
<td>Adhesion</td>
<td>&gt;350psi</td>
</tr>
<tr>
<td>B. D4060</td>
<td>Abrasion Resistance</td>
<td>100 mg lost</td>
</tr>
<tr>
<td>C. D2240</td>
<td>Durometer hardness</td>
<td>Shore D-80</td>
</tr>
<tr>
<td>D. E96</td>
<td>Water Vapor transmission</td>
<td>V.015 perm in</td>
</tr>
</tbody>
</table>

4.2 Surface Preparation

4.2.1 Applicator shall inspect all surfaces specified to receive the 100% solids Strong-Seal® Primer and Strong-Seal® Epoxy prior to application. Applicator shall notify owner of any noticeable disparity in the surfaces, which may interfere with the proper application of Strong-Seal® Primer and Strong-Seal® Epoxy.

4.2.2 Place cover over bench and invert, all pipe openings and plug to prevent extraneous material from entering the sanitary sewer system.

4.2.3 Test structural liner surfaces prior to application of Strong-Seal® Primer and Strong-Seal® Epoxy, rinse thoroughly to achieve a
final PH between 8.0 and 11.0. Allow to dry thoroughly prior to coating.

4.2.4 If grouting or patching is required allow 24 hrs to dry before applying Strong-Seal® Primer or Strong-Seal® Epoxy.

4.3 Application of Strong-Seal® Primer

4.3.1 Application procedures shall conform to the recommendations of Strong-Seal® Systems including material handling, mixing, safety, spray equipment and environmental controls during application.

4.3.2 The spray equipment shall be specifically designed to accurately ratio and apply the Strong-Seal® Primer lining materials and shall be regularly maintained and in proper working order, and must be approved by Strong-Seal® Systems.

4.3.3 Specified surfaces shall be coated by spray application of Strong-Seal® Primer as further described herein. The minimum spray application will be 4 mils.

4.3.4 Airless spray application equipment approved by Strong-Seal® Systems shall be used to apply Strong-Seal® Primer to avoid any potential contamination from compressor air oil which may encourage inter-coat delamination.

PART 5.0 APPLICATION OF STRONG-SEAL® EPOXY

5.1 Strong-Seal® Epoxy Physical Properties

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>A. ASTM – D638</td>
<td>Tensile Strength</td>
<td>&gt; 7,700 psi</td>
</tr>
<tr>
<td>B. ASTM – D790</td>
<td>Flexural Strength</td>
<td>&gt;12,400 psi</td>
</tr>
<tr>
<td>C. ASTM – D4541</td>
<td>Adhesion</td>
<td>&gt;350 psi</td>
</tr>
<tr>
<td>D. ASTM – D2584</td>
<td>VOC</td>
<td>0%</td>
</tr>
<tr>
<td>E. ASTM – D2240</td>
<td>Durometer hardness</td>
<td>Shore D-70</td>
</tr>
</tbody>
</table>

5.2 Surface Preparation

5.2.1 Applicator shall inspect all surfaces specified to receive Strong-Seal® Epoxy protective lining prior to application. Applicator shall notify owner of any noticeable disparity in the surfaces, which may interfere with the proper application of the protective lining.
5.2.2 Cover shall be placed over bench and invert or pipe openings shall be plugged to prevent extraneous material from entering the sanitary sewer system.

5.2.3 Test structural liner surfaces prior to application of Strong-Seal® Epoxy lining if a specific pH or moisture content is required according to manufacturers recommendations.

5.3 Approved Equipment

5.3.1 Model 185 Xtreme plural component machine and Model HSS spray cartridge unit machine are both approved application equipment. All equipment must be a 2:1 ratio. Other equipment than the proceeding must be approved by Strong-Seal® Systems personnel.

5.3.2 Applications must comply with all safety requirements and wear approved safety equipment as recommended by Strong-Seal® Systems.

5.4 Application of Strong-Seal® Epoxy

5.4.1 Application procedures shall conform to the recommendations of Strong-Seal® Systems including material handling, mixing, safety, spray equipment and environmental controls during application.

5.4.2 The spray equipment shall be specifically designed to accurately ratio and apply the Strong-Seal® Epoxy lining materials and shall be regularly maintained and in proper working order, and must be approved by Strong-Seal® Systems.

5.4.3 Specified surfaces shall be coated by spray application of Strong-Seal® Epoxy as further described herein. The minimum spray application will be 60 mils.

5.4.4 After the application of Strong-Seal® Epoxy is applied, if specified, a broadcasting of sand (i.e. oven dried 20 to 30 gradation) may be applied to the bench area while the Strong-Seal® Epoxy is tacky to provide a non-slip surface.

5.5 Testing and inspection acceptance

5.5.1 During application, a mil thickness gage as designated by Strong-Seal® Systems, shall be used to ensure a monolithic lining and uniform thickness during application.
5.5.2 Measurement of bond strength of the protective coating to the substrate can be measured in accordance with ASTM D4541 if desired. The Project Engineer shall evaluate any areas detected to have inadequate bond strength. Further bond tests may be performed in that area and repairs shall be made by applicator in strict accordance with manufacturer’s recommendations.

5.5.3 Verification of total coverage of structure with Strong-Seal® Epoxy may be done using high voltage holiday detection equipment. Testing is to be done after material has set (hard to touch) usually 4 to 8 hours after application. An induced holiday shall be made on to the coated concrete surface and shall serve to determine the minimum / maximum voltage to be used to test the coating for holidays at the particular area. The spark tester shall be initially set at 100 volts per 1 mil (25microns) of film thickness applied but may be adjusted as necessary to detect any induced holiday. All detected holidays shall be marked and repaired by abrading the coating with grit disc paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch up/ repair procedures shall follow Strong-Seal® System’s recommendations.

5.5.4 Vacuum testing, per ASTM 1244-93 procedure.

5.5.5 The inspector and contractor shall make a final visual inspection. Any deficiencies in the finished coating shall be marked and repaired according to the manufacturer.

PART 6.0 LIMITED WARRANTY:

The Strong Company, Inc. warrants that this product was produced in conformity with its standard specification or formulations within recognized tolerances, free of adulteration or contamination, and that the product will perform in accordance with representations in Strong-Seal® Systems literature and Technical Data Sheets when properly applied in strict conformance with the printed instructions on container and prescribed in technical data instructions and when applied to a properly prepared surface.

The sole remedy of the purchaser shall be replacement of the product or refund of the purchase price of the product if any defect in material or workmanship or variance in the product beyond recognized tolerances in the specifications are found to exist.
No other remedy including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss shall be available to the purchaser.

DISCLAIMER:

THE WARRANTY DESCRIBED IN THE ABOVE PARAGRAPHS SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.