

QSR Plus

Specifications

Rev: 06-2018



INTENT: To provide a system for the rehabilitation of concrete or masonry benches and inverts and the repairing of voids in concrete or masonry substrates prior to the application of Strong-Seal® products.

1.0 General

- 1.1 This specification shall govern all work, materials, and equipment required for substrate rehabilitation for the purpose of rebuilding benches and inverts and repairing of voids as a result of hand applying a fiber-reinforced, rapid-setting, chemical resistant patching material to the surfaces of brick, concrete, or any other masonry construction material.
- 1.2 Described herein are the procedures to be followed prior, during, and after the use of Strong-Seal® products. The applicator, approved and trained by the manufacturer, shall furnish all labor, equipment and materials for hand applying a patching material a minimum 1/2 inch thick. All aspects of the installation shall be in accordance with the manufacturer's recommendations and per the following procedures to include:
- A. The removal of any loose and unsound material
 - B. Cleaning of the area to be sprayed
 - C. The elimination of active infiltration prior to liner application
 - D. The repair and filling of voids
 - E. The repair and sealing of the invert and benches

2.0 Materials

- 2.1 Infiltration Control Material:
Strong-Seal® Strong-Plug®, an instant-setting cementitious product specifically formulated for leak control, shall be used to stop minor water infiltration and shall be mixed and applied per manufacturer's recommendations. Strong-Plug® shall meet the following performance specifications:

Strong-Plug® Performance Specifications:

Compressive Strength	ASTM C109	>1,000 psi @ 1 hour >2,500 psi @ 24 hours
Sulfate Resistance	ASTM C267	No weight loss after 15 cycles @ 2000 ppm
Freeze/Thaw Resistance	ASTM C666	100 cycles
Pull Out Strength	ASTM C234	14,000 lb
Set Time	ASTM C403	<1 minute

- 2.2 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 per manufacturer's recommendations. Grout 250 shall be volume stable and shall have a minimum 28 day compressive strength of 250 psi.
- 2.3.2 Strong-Seal® Grout 1,000, a cementitious grout, shall be used in special soil conditions for stopping very active infiltration and filling voids, and applied per manufacturer's recommendations. Grout 1,000 shall be volume stable, and shall 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 recommendations.
- 2.3 Patching Material:
Strong-Seal® QSR Plus, a rapid-setting, corrosion resistant, fiber reinforced, calcium aluminate cement based product, shall be used as a patching material and is to be mixed and applied per manufacturer's recommendations. QSR Plus shall meet the following performance specifications:

QSR Plus Performance Specifications:

Compressive Strength	ASTM C109	>2,000 psi @ 1 hour >4,000 psi @ 24 hours >5,000 psi @ 28 days
Bond Strength	ASTM C882	>2,000 psi @ 28 days
Drying Shrinkage	ASTM C596	0% @ 90% RH
Wet Unit Weight	ASTM C138	134 ± 5 lb/ft ³
Placement Time		5 – 15 minutes
Set Time	ASTM C403	15 – 30 minutes

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- 2.4 Water:
Water used to mix product shall be clean and free from contaminants. Questionable water shall be tested by a laboratory per ASTM C94. Potable water need not be tested.
- 2.5 Other Materials:
No other material shall be used with the material described in 2.3 without prior approval or recommendation from The Strong Company, Inc.

3.0 Equipment

- 3.1 Applicator shall use equipment that permits for the mixing of small batches of patching material either by hand, spoon, trowel, or handheld drill in a clean pail or bowl.

4.0 Application

- 4.1 Surface Preparation:
- 4.1.1 Covers shall be placed over invert to prevent extraneous material from entering the sewer lines before cleaning.
- 4.1.2 All foreign material shall be removed from the manhole wall and bench using a high pressure water spray (minimum 3,000 psi). If grease, chemicals, previous coatings or linings, or other surface contaminants are present, the substrate shall be cleaned with steam, chemical cleaning compounds, or surface abrading as necessary to provide a clean substrate. Loose and protruding brick, mortar, and concrete shall be removed using a mason's hammer and chisel and/or scraper.
- 4.1.3 Active leaks shall be stopped using Strong-Plug® (2.2) or approved equal per manufacturer's recommendations. Some leaks may require weep holes to localize the infiltration during application. After application, the weep holes shall be plugged with Strong-Plug® (2.2) or approved equal prior to final pass. When severe infiltration exists, pressure grouting may be required by using a cementitious grout such as Grout 250 (2.3.1), Grout 1,000 (2.3.2), or approved equal, or by using chemical grouts (2.3.3). Manufacturer's recommendations shall be followed when pressure grouting is required.
- 4.2 Mixing of Patching Material:
- 4.2.1 For each pound of product, 4.0 to 5.0 fluid ounces of water shall be used. The required amount of water shall be added to the pail or bowl first, followed by the product. Only enough water shall be used to produce a mix consistency to allow application of liner material up to 1 inch thick in a single application without material "sagging" on a vertical surface. The product shall be mixed near the application site by hand, spoon, trowel, or handheld drill in amounts that can be applied within 15 minutes. All other mixing procedures as noted on product bag or pail shall be followed.
- 4.3 Application of Patching Material:
- 4.3.1 Void Repair:
- 4.3.1.1 Place the patching material directly into the void by hand or trowel, applying pressure and holding in position until material remains in place. Do not trowel the patching material to a smooth finish.
- 4.3.2 Invert Repair:
- 4.3.2.1 After surface preparation has been completed, the covers shall be removed. All remaining loose material shall be removed and the substrate shall be washed again.
- 4.3.2.2 Invert repair shall be performed on all inverts with visible damage or where infiltration is present or when vacuum testing is specified. After blocking flow through the manhole and thoroughly cleaning the invert, the patching material shall be applied to the invert in an expeditious manner. The patching material shall be troweled uniformly onto the damaged invert at a minimum thickness of 1/2 inch at the invert extending out onto the bench of the manhole sufficiently to tie into the structural monolithic liner to be spray applied later. The finished invert surfaces shall be smooth and free of ridges. Flow may be re-established in the manhole within 30 minutes of the last placement of patching material.
- 4.3.3 Bench Repair:
- 4.3.3.1 The covers shall be removed and any bench repairs shall be made at this time. The patching material shall be applied in such a manner that a gradual slope is produced from the walls to the invert with the thickness at the invert to be no less than 1/2 inch. The wall/bench intersection shall be rounded to a uniform radius the full circumference of the intersection.

5.0 Curing

- 5.1 No special curing requirements are needed.
5.1.1 QSR Plus shall have the following minimum cure times before being subjected to flow:

Hold Times Before Releasing Flow:

Storm run-off and surcharge	30 minutes
Force main impact	1 hour

- 5.1.2 QSR Plus shall have the following minimum cure times before application of liner material:
Hold Times Before Application of Liner Material:

Cementitious liners	1 hour
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6.0 Weather

- 6.1 No application shall be made if ambient temperature is below 40 degrees Fahrenheit. No application shall be made to frozen substrates or if the substrate is expected to freeze within 24 hours after application.
- 6.2 Precautions shall be taken to keep the mix temperature at time of application below 90 degrees Fahrenheit. Water temperature shall not exceed 80 degrees Fahrenheit. Chill with ice if necessary.

7.0 Limited Warranty

The Strong Company, Inc. warrants that this product was produced in conformity with its standard specifications or formulations within recognized tolerances, free of adulteration or contamination, and that the product will perform in accordance with representations in Strong-Seal® literature 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 variance in the product beyond recognized tolerances in the specifications is 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, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

