

# Grout 250

## Specifications

Rev: 06-2018



**INTENT:** To provide a system for the filling of voids behind substrates to prevent leaks and subsidence in typical soils with good porosity and for the filling of abandoned lines.

### 1.0 General

- 1.1 This specification shall govern all work, materials, and equipment required for filling voids behind substrates to prevent leaks and subsidence and for filling abandoned lines as a result of injecting or pumping an environmentally friendly, volume-stable, flowable cementitious mixture.
- 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 applying a cementitious grout with equipment specially designed for the application. All aspects of the installation shall be in accordance with the manufacturer's recommendations and per the following procedures to include:
- A. The filling of voids
  - B. The filling of abandoned lines

### 2.0 Materials

- 2.1 Patching Material:  
Strong-Seal® QSR, 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 shall meet the following performance specifications:

QSR Performance Specifications:

Compressive Strength	ASTM C109	>1,500 psi @ 1 hour >2,000 psi @ 24 hours >3,000 psi @ 28 days
Bond Strength	ASTM C882	>1,500 psi @ 28 days
Drying Shrinkage	ASTM C596	0% @ 90% RH
Wet Unit Weight	ASTM C138	105 ± 5 lb/ft <sup>3</sup>
Placement Time		5 – 15 minutes
Set Time	ASTM C403	15 – 30 minutes

- 2.2 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

- 2.3 Grout Material:  
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 meet the following performance specifications:

Grout 250 Performance Specifications:

Compressive Strength	ASTM C109	>250 psi @ 28 days
Drying Shrinkage	ASTM C596	0% @ 90% RH
Wet Unit Weight	ASTM C138	70 ± 5 lb/ft <sup>3</sup>

- 2.3.1 Grout 250 shall be made with Type I/II Portland Cement and used per manufacturer's recommendations. Grout 250 shall be factory blended requiring only the addition of water at the jobsite. The bag weight shall be 60-64 pounds. The contents shall have a dry bulk density of 30-33

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pounds per cubic foot. When mixed with manufacturer's recommended amount of water it shall have a wet density in the range of 65-75 pounds per cubic foot and shall have a typical yield of 1.91 cubic feet per bag.

2.3.2 Grout 250 shall meet or exceed industry standards and shall not have any basic ingredient that exceeds EPA maximum allowable limits for heavy metals.

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 2.3.1 without prior approval or recommendation from The Strong Company, Inc.

### 3.0 Equipment

3.1 Applicator shall use approved equipment designed and manufactured by the liner material supplier specifically for the application of cementitious liners in sanitary systems.

3.2 Specially designed equipment consisting of a progressive cavity pump and an air system for low velocity spray application of product shall be used for applying Strong-Seal® products. Equipment shall be complete with water storage and metering system. SprayMate® 35C, SprayMate® 35D, and MiniMate II are approved equipment models for applying Strong-Seal® products. Other models may be approved after review by The Strong Company, Inc.

3.3 A specially designed grouting nozzle with flow control valve and pressure gauge, as well as grout packers, shall be used for applying Strong-Seal® cementitious grouts.

### 4.0 Application

4.1 Surface Preparation:

4.1.1 Filling Voids:

4.1.1.1 A Strong-Seal® cementitious liner such as MS-2®A, MS-2®C, and High Performance Mix or approved equal shall be installed per manufacturer's recommendations prior to grouting if the strength of the existing substrate is deemed questionable.

4.1.1.2 Covers shall be placed over invert to prevent extraneous material from entering the sewer lines.

4.1.1.3 All areas of infiltration shall be clearly identified, paying close attention to service line entries, intersections, lifting holes, and joints. It may be necessary to soak the surrounding soil to verify these areas.

4.1.1.4 Grout material will stop infiltration; however, minor active leaks may be stopped using Strong-Plug® (2.2) or approved equal per manufacturer's recommendations. Weep holes may be used to relieve outside water pressure and localize the infiltration during application. After application, the weep holes shall be plugged with Strong-Plug® (2.2) or approved equal.

4.1.1.5 Voids, cracks, and incoming lines shall be filled and sealed with QSR (2.1) to prevent leaks of grout material during application. Minor cracks shall be sealed with Strong-Plug® as necessary.

4.1.1.6 Injection holes shall be drilled through the substrate into the soil using a pattern recommended by the manufacturer. Drill pattern may vary from application to application.

4.1.2 Filling Abandoned Lines:

4.1.2.1 A concrete bulkhead with inlet and outlet riser pipes shall be installed at each manhole junction of the abandoned line. The riser pipes shall be extended through the concrete bulkhead into the abandoned line to allow for the uninterrupted flow of grout material.

4.1.2.2 The risers shall be turned 90 degrees from the bulkhead in such a manner as to allow them to extend up and out of the manhole to be easily accessed outside of the manhole. The inlet pipes shall be fitted at the end to connect to a hose that conveys the grout material. The outlet riser shall be turned 90 degrees once outside of the manhole and extended horizontally such that any occurring spillage does not enter the manhole.

4.2 Mixing of Grout Material:

4.2.1 For each bag of product, 8.0 gallons of water shall be used. The required amount of water shall be added to the mixer first, followed by the bag of product. Only enough water shall be used to produce a flowable mix using approved equipment for mixing and application. All other mixing procedures as noted on product bag shall be followed.

- 4.2.2 Mixed grout material shall be discharged into a hopper and another batch prepared to occur in such a manner as to allow operating continuously without interruption until each application is complete.
- 4.3 Application of Grout Material:
  - 4.3.1 Filling Voids:
    - 4.3.1.1 A grout packer shall be placed into an injection hole and tightened until a snug fit is achieved. A grouting channel shall be created by pumping water into the grout packer using the grouting nozzle until water discharges from another injection hole. Once water has discharged from another injection hole, that hole shall be plugged to divert flow and form a channel to the next hole. Pumping shall cease if a pressure rise of 10 psi or more occurs and shall proceed to an injection hole where there has been no discharge of water. This process shall be repeated until water has discharged from each injection hole.
    - 4.3.1.2 The plugs installed in 4.3.1.1 shall be removed once the grouting channel has been created. The grout material shall then be pumped using the procedure described in 4.3.1.1. Pumping shall cease if a pressure rise of 10 psi or more occurs. Plugs and packers shall be removed 3 hours after grouting has been completed. Holes shall be plugged with QSR (2.1) or approved equal.
  - 4.3.2 Filling Abandoned Lines:
    - 4.3.2.1 A flow-through packer shall be placed and in the inlet riser and inflated until it is seated in the riser. Grout material shall be pumped through the inlet riser until material discharges from the outlet riser. The risers shall be removed 3 hours after grouting has been completed.

## 5.0 Curing

- 5.1 No special curing requirements are needed.
  - 5.1.1 Plugs, packers, and risers shall not be removed until 3 hours have passed after grouting was completed.

## 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 Acceptance

- 7.1 Four 2 inch cube specimens shall be cast each day or from every pallet of liner material used, whichever occurs first. Specimens shall be properly packaged, labeled, and returned to manufacturer for testing in accordance with the owner's or manufacturer's directions for compression strength per ASTM C109.

## 8.0 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.

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