CMS 10K
SPECIFICATIONS

RAINSTOPPER
Inflow and Infiltration Solutions

INTENT

To provide a system for the rehabilitation of concrete or masonry structures to stop inflow, infiltration, exfiltration, and restore structural integrity where there is no evidence of hydrogen sulfide (biogenic) corrosion.

1 GENERAL

1.1 SCOPE

This specification shall govern all work, materials, and equipment required for substrate rehabilitation for the purpose of eliminating infiltration, repair of voids, and restoration of the structural integrity of the substrate as a result of applying a fiber-reinforced structural monolithic cementitious liner to the wall and bench surfaces of brick, concrete, or any other masonry construction material.

1.2 PROCEDURES

Described herein are the procedures to be followed prior, during, and after the use of Rainstopper products. The applicator, approved and trained by the manufacturer, shall furnish all labor, equipment and materials for applying a cementitious mix to form a structural monolithic liner of a minimum ½-inch thickness, 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 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
F. The spray application of a cementitious material to form a structural monolithic liner.

2 MATERIALS

2.1 LINER MATERIAL

CMS 10K, a cementitious liner product, shall be used to form a structural monolithic liner covering all interior substrate surfaces. CMS 10K shall meet the following performance specifications:

Compressive strength	ASTM C109	>9,000 psi @ 28 days
Tensile strength	ASTM C496	>800 psi @ 28 days
Flexural strength	ASTM C293	>1,200 psi @ 28 days
Bond strength	ASTM C882	>2,000 psi @ 28 days
Freeze/Thaw resistance	ASTM C666	300 cycles, no damage
Drying shrinkage	ASTM C596	0% @ 90% RH
Wet unit weight	ASTM C138	134 ± 5 lbs/ft^3
Packaging		50 lbs bags 54 bags/pallet

Yield per bag	0.58 ft^3 / 14 ft^2

2.4.1 CMS 10K shall be made with Type I/II Portland cement and used per manufacturer's recommendations in applications where there is no evidence of hydrogen sulfide (biogenic) corrosion (pH of substrate surface is 3.0 or higher). CMS 10K shall be factory blended requiring only the addition of water at the jobsite. The bag weight shall be 50 pounds. The contents shall have a dry bulk density of 82-85 pounds per cubic foot. When mixed with manufacturer's recommended amount of water it shall have a wet nozzle density in the range of 129-139 pounds per cubic foot and shall have a typical yield of 0.58 cubic feet per bag.

2.4.2 CMS 10K shall be reinforced with alkaline resistant fiberglass rods not less than 1/4 inch in length.

2.4.3 CMS 10K shall meet or exceed industry standards and shall not have any basic ingredient that exceeds EPA maximum allowable limits for heavy metals.

2.2 WATER

Water used to mix product shall be clean and free of contaminants. Questionable water shall be tested by a laboratory per ASTM C94. Potable water need not be tested.

2.3 OTHER MATERIALS

No other material shall be used with CMS 10K without prior approval or recommendation from Rainstopper, LLC.

3 EQUIPMENT

3.1 APPROVED APPLICATORS

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 CMS 10K. Equipment shall be complete with water storage and metering system. SprayMate® 35C, SprayMate® 35D, and MiniMate II are approved equipment models for applying CMS 10K.

3.2 OTHER EQUIPMENT

If using other equipment, please contact Rainstopper (see footer).

4 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. Any large voids present shall be filled with QSR (2.1) or approved equal.

4.1.3 Fill any large voids with a rapid-setting patching product per manufacturer's recommendations.

4.1.4 Stop active leaks using an instant-setting, specially formulated product per manufacturer's recommendations. Some leaks may require weep holes to localize the infiltration during the application. After application, the weep holes shall be plugged with the instant-setting product prior to final pass.

4.1.4 When severe infiltration exists, pressure grouting may be required. Follow manufacturer's recommendations when pressure grouting.

4.2 INVERT REPAIR

4.2.1 After surface preparation has been completed, the covers shall be temporarily removed. All remaining loose material shall be removed and the substrate shall be washed again.

4.2.2 Any bench, invert, or service line repairs shall be made at this time using QSR (2.1) or approved equal per manufacturer's recommendations.

4.2.3 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, QSR (2.1) or approved equal shall be applied to the invert in an expeditious manner. The 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. 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 material. Covers shall be replaced at this time prior to spraying of liner material.

4.3 MIXING

4.3.1 For each bag of product, 1.2 to 1.5 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 mix consistency to allow application of liner material up to 1 inch thick in a single application without material "sagging" on a vertical surface using approved equipment for mixing and application. All other mixing procedures as noted on product bag shall be followed.

4.3.2 Mixed liner material shall be discharged into a hopper and another batch prepared to occur in such a manner as to allow spraying continuously without interruption until each application is complete.

4.4 SPRAYING

4.4.1 The substrate shall be clean and free of all foreign material and shall be damp without noticeable free water droplets or running water prior to the application of liner material. Liner material shall be applied up to 1 inch thick in one or more passes starting from the bottom of the frame; however, minimum total thickness shall not be less than 1/2 inch. The surface shall then be firmly troweled to a smooth finish being careful not to over trowel. A wet brush finish shall be applied to the trowel-finished surface.

4.4.2 Manufacturer's recommendations shall be followed whenever more than 24 hours have elapsed between applications.

4.2.3 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, QSR (2.1) or approved equal shall be applied to the invert in an expeditious manner. The 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. 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 material. Covers shall be replaced at this time prior to spraying of liner material.

4.5 BENCH APPLICATION

4.5.1 The covers shall be removed at this time and the bench sprayed with liner material as mixed per specifications (4.3) and spray 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 CURING

5.1 EXPOSURE

Caution shall be taken to minimize exposure of applied liner material to sunlight and air movement. If time between applications of additional passes is to be longer than 15 minutes, the structure shall be covered. The structure shall not be exposed to sunlight or air movement for longer than 15 minutes before covering or closing access. In extremely hot and arid climates, the structure shall be shaded during application. The liner material shall be kept damp for the first 72 hours if humidity levels are below 70%. A curing compound conforming to ASTM C309 may be used in lieu of keeping the liner material damp if a polymeric topcoat will not be applied. Follow manufacturer's recommendations while applying curing compound.

5.2 MINIMUM CURING TIME

Surfaces recently coated with CMS 10K shall have the following minimum cure times before being subjected to flow.

Storm run-off and surcharge	8 hours
Force main impact	12 hours

6 WEATHER

6.1 LOWER TEMPERATURE LIMITATIONS

No application shall be made if ambient temperature is below 40°F. No application shall be made to frozen substrates or if the substrate is expected to freeze within 24 hours after application.

6.2 UPPER TEMPERATURE LIMITATIONS

Precautions shall be taken to keep the mix temperature at time of application below 90°F. Water temperature shall not exceed 80°F. Chill with ice if necessary.

7 ACCEPTANCE

7.1 SAMPLE CASTS

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 LIMITED WARRANTY

8.1 LIMITATIONS

Rainstopper, LLC 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 CMS 10K 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.

8.2 REMEDY

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.

8.3 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.