

SUGGESTED MANHOLE FRAME SEAL SPECIFICATION (New Construction w/External Seal)

PART 1 GENERAL

1.01 SCOPE

This specification includes the materials and procedures required for the external sealing of the entire chimney area of all new sanitary manholes, as shown on the attached drawings.

1.02 WORK REQUIRED

- A. An external flexible rubber frame seal and where necessary, an interlocking extension or extensions, meeting the requirements of this section, shall be used to seal the entire chimney of all sanitary manholes included in this project. The seal and extension or extensions shall extend from the lower base flange of the frame down to the top of the cone.

1.03 DEFINITIONS

- A. Chimney - The cylindrical variable height portion of the manhole structure used to support and adjust the finished grade of the manhole frame. The chimney extends from the top of the cone to the base of the manhole frame casting.
- B. Cone - That portion of the manhole structure which slopes upward and inward from the barrel of the manhole to the required chimney or frame diameter..

1.04 SYSTEM DESCRIPTION

- A. Design Requirements - The manhole frame seal shall be designed to prevent leakage of water through the above described portions of the manhole throughout a 50 year design life. The seal shall also be designed so that it can be installed on a manhole where the outside diameter of the frame's base flange and the chimney or cone differ by up to 4 inches.
- B. Performance Requirements - The frame seal shall be capable of repeated vertical movement of the frame of not less than 2 inches and/or repeated horizontal movement of not less than 1/2 inch after installation and throughout its design life.

1.05 SUBMITTALS

- A. Test Report - A test report from an approved testing agency, showing that the seal meets the performance requirements of Section 1.04 B, shall be provided by each frame seal manufacturer or supplier. The report shall include the results of the following test performed on a test unit on which the frame seal is attached. The test unit shall consist of a watertight base unit, at least 1 unsealed grade ring or brick course and a differentially moveable, unsealed, manhole frame. The Engineer reserves the right to observe the testing.
 1. The manhole frame shall be raised 2 inches and moved laterally 1/2 inch. The frame shall be held in this position for a minimum of 100 hours, after which it is returned to its normal position.
 2. The same test unit is then placed in a water tank filled to just below the top of the frame. The frame shall then be raised 2 inches and lowered back down through a minimum 30 cycles. The frame is then raised 2 inches and held in that position while the frame is moved laterally 1/2 inch. The frame is then returned to its normal position to complete the test.

The seal shall remain in place and watertight throughout the duration of the test. Any displacement, dislodgement or leakage of the seal shall be cause for failure. Any seal that fails the test may be reworked and retested.

- B. Certification (Affidavit of Compliance) - The manufacturers of all manhole frame seals shall submit a notarized certification to the Engineer stating that their product meets the design life requirements of Section 1.04 A and the applicable material requirements of Section 2.01 A&B.

1.06 QUALITY ASSURANCE

- A. Acceptance Testing - Manhole frame seals shall be visually inspected after installation to insure that the seal is properly positioned, tight against the manhole and frame surfaces, that no voids or leakage points exist and that the bands are securely locked in place. Any seals failing this test shall be reworked as necessary and retested at no additional cost to the owner. Any seals not passing this visual inspection may, at the Contractor's option, be tested for leakage using a method approved by the Engineer.

PART 2 PRODUCTS

2.01 FRAME SEAL

Frame seals shall consist of a flexible external rubber sleeve and extension and stainless steel compression bands, all conforming to the following requirements:

- A. Rubber Sleeve and Extension - The flexible rubber sleeve and extension shall be extruded or molded from a high grade rubber compound conforming to the applicable material requirements of ASTM C-923, with a minimum 1500 psi tensile strength, maximum 18% compression set and a hardness (durometer) of 48 ± 5 .

The rubber sleeve shall be corrugated, with a minimum thickness of 3/16 inches and shall be available in unexpanded vertical heights of 6 and 9 inches. The top section of the sleeve shall contain multiple sealing fins and be designed to extend both over and under the manhole frame's base flange, thereby allowing it to be mechanically locked to the frame. The bottom section of the sleeve shall contain an integrally formed compression band recess and a series of sealing fins to facilitate a watertight seal

The extension shall have a minimum thickness of 3/16 inches. The top portion of the extension shall be shaped to fit into the bottom band recess of the sleeve and have its own integrally formed band recess, which is located such that when assembled this recess is centered over that of the sleeve. The bottom section of the extension shall contain an integrally formed compression band recess and multiple sealing fins matching that of the rubber sleeve.

Any splice used to fabricate the sleeve and extension shall be hot vulcanized and have a strength such that the sleeve shall withstand a 180 degree bend with no visible separation.

- B. Compression Bands - The bands used to compress the sleeve against the manhole shall be integrally formed from 16 gauge stainless steel conforming to the applicable material requirements of ASTM C-923, Type 304, with no welded attachments and shall have a minimum width of 1 inch. The top compression band shall have a shape and width sufficient to, when tightened, will

mechanically lock the sleeve to the manhole frame's base flange. The lower compression band shall be a flat strip to allow placement into the lower band recess of the seal and or extension. The tightening mechanism on both bands shall have the capacity to develop the pressures necessary to make a watertight seal and shall have a minimum adjustment range of 2 diameter inches. Screws, bolts and nuts used on the bands shall be stainless steel conforming to ASTM F-593 and 594, Type 304.

- C. Acceptable Manufacturers
 - 1. Cretex Specialty Products

2.02 EQUIPMENT

The contractor shall have a manufacturer's recommended compression tool and all other equipment/tools necessary to prepare the surfaces of the manhole and install the frame seals.

2.03 CEMENTITIOUS GROUT

Cementitious grout shall be a premixed, non metallic, high strength, non-shrink grout which meets the requirements of ASTM C-191 and C-827 as well as CRD-C-588 and C-621. When mixed to a mortar or "plastic" consistency, it shall have minimum one day and 28 day compressive strength of 6,000 and 9,000 psi, respectively.

PART 3 EXECUTION

3.01 FIELD MEASUREMENTS

The Contractor shall measure the manhole to determine the information required on the manufacturer's "Sizing and Ordering" procedure. This information is needed to obtain the proper size of bands, the size and width of the rubber sleeve and the need for and size of any extensions.

3.02 SURFACE PREPARATION

All sealing surfaces shall be reasonably smooth, clean and free of any form offsets or excessive honeycomb. The top external portions of the cone shall have a minimum 3 inch high vertical surface. The preparation of this vertical surface when none exists shall be in accordance with the frame seal manufacturer's instructions. The manhole frame shall be set to the required grade while sitting on three 3/4 inch steel spacers which have been totally embedded in a course of cementitious grout conforming to the requirements of Section 2.03, mixed to a mortar or "plastic" consistency.

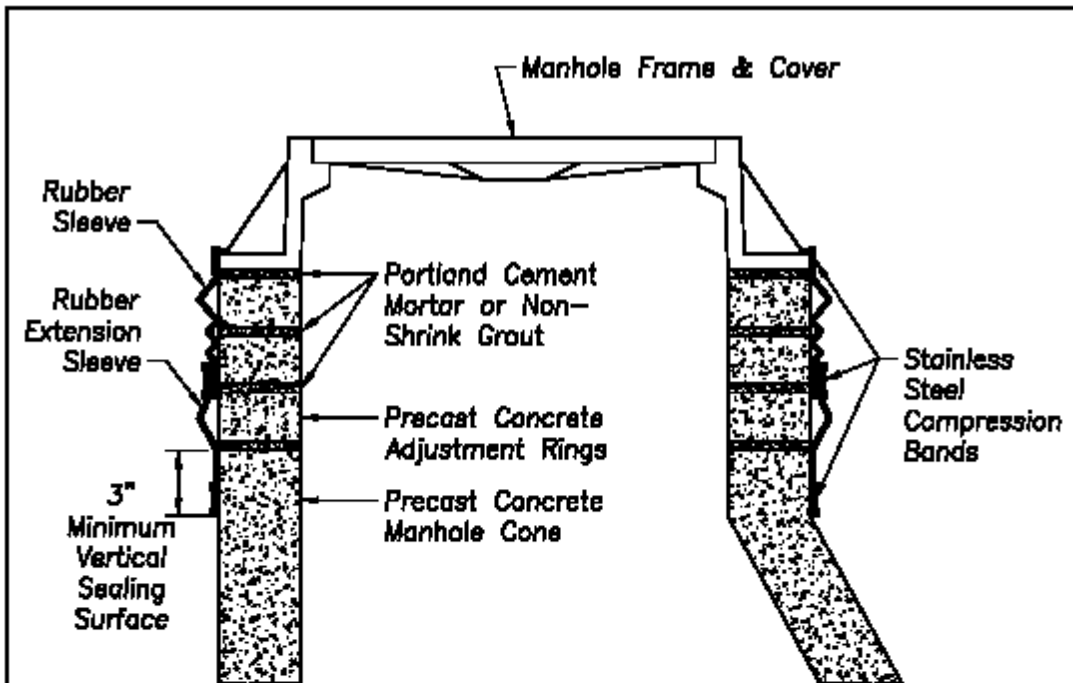
3.03 INSTALLATION OF FRAME SEAL

The external frame seals and extensions shall be installed in accordance with the manufacturer's instructions.

PART 4 MEASUREMENT AND PAYMENT

All costs for furnishing and installing a external frame seal and where necessary, an extension or extensions, shall be included in the unit price bid for sanitary manholes.

NOTE: A specifier is within his rights to issue a proprietary specification that names only one brand. If in the informed and professional judgment of the specifier, his client's needs will be best served by naming a particular brand, then he has the responsibility to limit his specification to one source. This practice is even acceptable on publicly funded projects. This principle of proprietary specification has found legal support in the case of Whitten Corp v. Paddock Pool Builders, Inc., a Federal District Court case from Massachusetts (376 F. Supp125). Further support came in 1975 when the U.S. Supreme Court rejected further appeal and review.



PRECAST MANHOLE WITH EXTERNAL SEAL

1. The rubber sleeve is available in heights of 6" (Standard) and 6" (Narrow).
2. See the chimney height table below for seal and extension combinations needed to span from the frame to the top of the cone on manholes with various chimney heights. Frame offsets or diameter differentials will reduce these span heights.
3. The top of the cone shall have a minimum of 3" high vertical sealing surface that is smooth and free of any form offsets or excessive honeycomb.

CHIMNEY HEIGHT TABLE

COMBINATIONS OF SEALS AND EXTENSIONS	TO SPAN HEIGHTS OF:
Narrow 6" Only	0" to 3"
Standard 6" Only	Over 3" - 6.5"
Standard Seal + Extension	Over 6.5" - 13.5"
Standard Seal + Multi Extensions	Over 13.5"
<i>Add 7" of coverage for each additional Extension.</i>	

**EXTERNAL MANHOLE CHIMNEY SEAL W/EXTENSIONS
PRECAST**