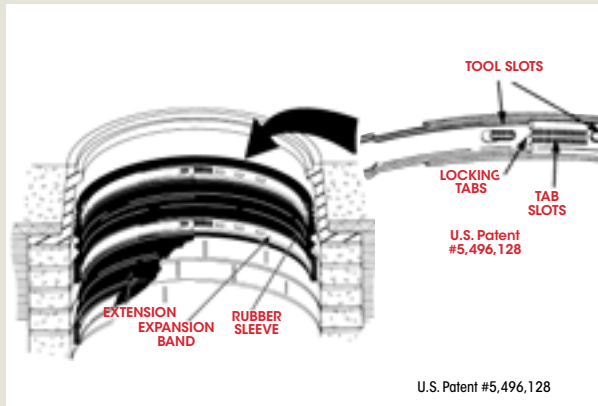


INTERNAL MANHOLE CHIMNEY SEAL

Internal rubber sleeve developed to stop inflow under the manhole frame.



RUBBER SLEEVE Available in STANDARD 8-3/8", WIDE 10", and EXTRA-WIDE 13" sleeves are made of rubber which conforms to the applicable material requirements of ASTM C-923, as modified, with a minimum 3/16 inch thickness for durability and resistance to puncturing or tearing. The STANDARD sleeve is double pleated, the WIDE sleeve is triple pleated, and the EXTRA-WIDE is quadruple pleated to provide for a minimum 2 inch vertical or horizontal movement before stretching the material. Flexibility of this material allows one size to fit a frame/chimney diameter range of more than 20%.

EXTENSION The 7" and 10" wide rubber extensions are made from the same material and have the same minimum thickness as the sleeve. The top portion fits into the sleeve's lower band recess, under the lower band.h

EXPANSION BANDS The one piece channeled expansion bands are 1-3/4 inches wide and are fabricated from high quality, corrosion resistant, 16 gauge stainless steel conforming to the requirements of ASTM A-240 Type 304. The multiple transverse tab slots in the band provides for 2-1/2 inches of diameter range. An easy to use mechanical expansion tool quickly expands the band to compress the rubber sleeve against the manhole frame and chimney. Once expanded, the band is locked in place by the engagement of the locking tabs in the proper slots, providing a flexible watertight seal.

ADVANTAGES:

- Provides watertightness, while having the flexibility to allow the manhole frame to move with the surrounding pavement as it reacts to the forces of frost heave, thermal expansion/contraction and traffic loadings.
- Reduces excess clearwater in sanitary sewer system by stopping manhole frame/chimney inflow, thereby providing more system capacity and reducing treatment and pumping costs.
- Installed in the inside of existing manholes, no expensive time-consuming excavating and pavement replacement is needed.
- Installed in new manholes after paving is complete without interfering with or delaying paving operations.
- Reusable — can be moved or removed and reused elsewhere if needed.
- Constructed of high quality, long-lasting materials.



U.S. PATENT # 4,305,679 AND # 4,469,467



SPECIFICATIONS

GENERAL

This section includes the materials and procedures required for the internal sealing of the frame-chimney joint area of brick and block manholes and the entire chimney area of precast, fiberglass and plastic manholes.

FRAME SEAL

Frame seals 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 remain flexible throughout this design life, allowing repeated vertical movements of the frame of not less than 2 inches and/or repeated horizontal movement of not less than 1/2 inch, at rates greater than 1/10 inch per minute.

Frame seals shall consist of a flexible internal rubber sleeve, extensions, and stainless steel expansion bands, all conforming to the following requirements:

1. RUBBER SLEEVE AND EXTENSION - The flexible rubber sleeve, extensions and wedge strips 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 sleeve shall be either double, triple, quadrupled pleated with a minimum unexpanded vertical height of 8 inches, 10 inches, and 13 inches respectively and a minimum thickness of 3/16 inches. The top and bottom section of the sleeve shall contain an integrally formed expansion band recess and multiple sealing fins.

The top section of the extension shall have a minimum thickness of 3/32 inches and shall be shaped to fit into the bottom band recess of the sleeve under the bottom chimney seal band. The remainder of the extension shall have a minimum thickness of 3/16 inches. The bottom section of the extension shall contain an integrally formed expansion 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.

2. EXPANSION BANDS - The expansion bands used to compress the sleeve against the manhole shall be 16 gauge stainless steel conforming to ASTM A-240, Type 304, with a minimum width of 1-3/4 inches.

The bands shall have a minimum adjustment range of 2-1/2 diameter inches and the mechanism used to expand the band shall have the capacity to develop the pressures necessary to make a watertight seal. The band shall be permanently held in this expanded position with a positive locking mechanism, any studs and nuts used for this mechanism shall be stainless steel conforming to ASTM F-923 and 594, Type 304.

INSTALLATION

The contractor shall field 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 the bands, the size and shape of the rubber sleeve and the need for and size of any extensions.

The surfaces against which the sleeve and extension are to be compressed shall be circular, clean, reasonably smooth and free of any loose material and excessive voids. If the masonry surface is rough, sloped, or irregular and would not provide an effective seal, an approved non-shrink patching mortar shall be used to prepare a uniformly vertical surface for the bottom of the sleeve and extension to seal against. Any flaws in the manhole frame such as cracks, pits or protrusions, shall be repaired by either filling with mortar or grinding smooth.

After the rubber sleeve and extension, where needed, has been placed in the proper position, the stainless steel expansion bands shall be installed in the band recesses and individually expanded as required to provide a watertight seal.

Installation shall be in accordance with the manufacturer's instructions.

PHYSICAL PROPERTIES

| | |
|--|--|
| Tensile Strength | 1500 psi |
| Elongation at break | 350% min |
| Hardness (Durometer) | 48 ±5 |
| Accelerated oven-aging | max. 15% decrease of tensile, 20% of elongation |
| Chemical resistance | no weight loss in 1 N of sulfuric or hydrochloric acid. |
| Compression set | 18% max. decrease |
| Water absorption | max 10% increase by weight |
| Ozone resistance | Rating 0 |
| Low temperature brittle point | No fracture at -40 C° |
| Tear resistance | 200lb. f/in. |
| Splice strength | 180° bend with no visible separation |

Manhole Repair



SIZING AND ORDERING PROCEDURE

MEASUREMENTS

FRAME — Measure the inside diameter of the frame at its base **D1**, and note the height of the flat surface and if this surface is straight or tapered.

1. The width of the sealing surface must be at least 2-1/2".
2. If the inside surface is tapered, measure and note the frame's diameter at a point 3" up from its base.
3. The frame can not be offset from the chimney or cone/corbel by more than approximately 3 inches.

CHIMNEY — Measure the inside diameter **C1**, and height **H1** of the chimney.

1. The inside diameter of the chimney **C1** must be within a maximum of 20 percent of the inside diameter of the frame **D1**. If mortar is to be used on the chimney to provide a sealing surface or to bring it within this tolerance, estimate what the diameter will be after mortaring.
2. A minimum 2-1/2" high vertical sealing surface must be provided on either the chimney, the cone/corbel, or both.

CONE/CORBEL — If the chimney height **H1** is less than approximately 2-1/2 inches, or if an extension is to be used, measure the inside diameter **C2** and height of the straight section **H2** of the cone/corbel. See installation instructions if **H2** = 0.

SEAL SIZES

The rubber sleeves and extensions are normally available in 20, 22, 24, 26, 28, 30 and 36 inch diameters. The steel expansion bands are available in the same sizes and increments, with each having a 2-1/2" diameter range that extends from approximately 1" smaller to 1-1/2" larger than the stated size. Sizes of sleeves, extensions and bands other than these are available by special order.

ORDERING

SLEEVE AND EXTENSION DIAMETER — Order the sleeve and extension the even size closest to the smaller of either the frame diameter **D1** or the applicable chimney or cone/corbel diameter **C1** or **C2**.

BAND DIAMETERS — Order the bands the same size as the sleeve if the diameters of both sealing surfaces, **D1** and **C1** or **C2** are within the band's diameter range; if however, one of these surface diameters is larger than the band's range, order the next larger band for sealing against that surface.

SLEEVE SHAPE — Order either a "Straight", "**T-1**", "**T-2**" or "**T-3**" sleeve as required to fit the manhole configuration. If necessary, also order one of the "Wedge Inserts". Refer to the "Cross Sections and Usage" sheet for details.

EXTENSION HEIGHT — Order the height of extension or extensions necessary to span from the frame to the precast cone.

ORDERING AND REPORT FORM

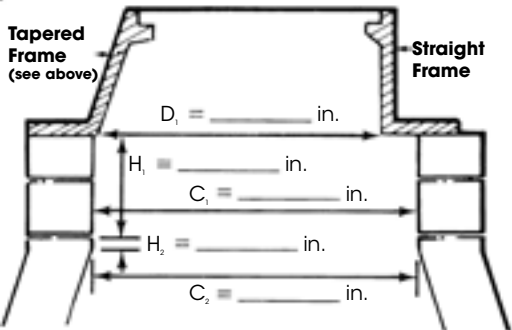
Community: _____ Manhole No: _____
 Location: _____ Date: _____

Describe any pertinent factors:

SLEEVE: Dia. _____ Width _____ Shape _____ Wedge _____

EXTENSION: Diameter _____ 7" _____ 10" _____ Band _____

BAND DIAMETER: Top _____ Bottom _____





INTERNAL INSTALLATION INSTRUCTIONS

SURFACE PREPARATION – All loose and protruding mortar and brick that would interfere with the seal's performance shall be removed and the appropriate surfaces of the frame, chimney and/or cone/corbel prepared in accordance with the manufacturer's instructions.

INSTALLATION – See the "Installation Variations" and "Cross Section and Usage" sheets for various installation options. Read complete instructions before starting installation.

1. Install the rubber sleeve with the printing at the top and the top edge lined up with the previously applied alignment marks.
2. Wipe off the outside of one stainless steel band and apply a moderate coating of band lubricant to the slot area and a light to moderate coating to the remainder of the band's outside surface. Either the top band or the smaller band, if two different sized bands are being used, is to be installed first.
3. Install the band in the appropriate band recess with the slotted end against the rubber surface. Position the expansion tool as shown below and expand the band until the locking tabs pop into the tightest slots possible. Loosen the tool slowly until the tabs are fully engaged in the slots, then continue to loosen and remove the tool. When installing a larger diameter band, use one of the auxiliary tool slots to start the expansion process. Move one leg of the tool to the primary tool slot if necessary to complete expansion.

4. Lubricate the second band and install it in the other band recess, attach the tool and expand as before, keeping the bands parallel. The bands can be put closer together if only a limited height is available or if excessive sleeve expansion is desired.
5. If an extension is being used, position it such that the top portion of the extension fits snugly into the lower band recess of the chimney seal sleeve, prior to installing the band. Lubricate and install the band inside the recess formed by the top portion of the extension and expand as before, thereby compressing both the extension and the sleeve against the manhole surface.
6. If multiple extensions are required, repeat step 5.
7. Position the extension's bottom sealing surface on the vertical surface of the cone. Lubricate and install the third band in the lower band recess of the extension and expand as before.
8. Check the top and bottom edges of the installed sleeve to insure that they have been properly compressed against the surfaces.

NOTE: ALWAYS WEAR GLOVES WHEN HANDLING BANDS

