

STOP WATER INFLOW



Cretex
Specialty Products

STANDING THE TEST OF TIME



Affiliated with the Cretex Companies, Inc., Cretex Specialty Products was established in September 1983 to market the Cretex Chimney Seals to the municipal and engineering community for sealing the frame chimney area of both existing and newly constructed manholes. The inflow of storm water into any sewer system can be extremely costly. Cretex Chimney Seals are designed to reduce surcharging/bypassing and to lower pumping and treatment costs in a sanitary sewer system. In storm sewer systems, Cretex Chimney Seals provide protection from infiltration of surrounding soil which in turn can undermine pavements. Our 50 year warranty is the best in the industry.



PREVENT

these problems from happening by installing either an INTERNAL or EXTERNAL CHIMNEY SEAL on all new manholes. Tests have shown that frame-chimney leakage begins within a year or two after construction. The minimal initial cost of putting a chimney seal on all new manholes is far outweighed by the long term cost savings.



STOP

these problems in existing manholes by installing the INTERNAL CHIMNEY SEAL. Designed to be installed in existing manholes, this seal does not require excavation or entry into the manhole. These internal seals have the versatility to fit virtually any size or type of manhole. Hundreds of thousands of these reusable seals have been installed in brick, block and precast manholes.



CRETEX EXTERNAL SEAL



CRETEX INTERNAL SEAL

NASSCO REPORT: MANHOLES

Long term Performance of Mechanical Manhole Frame-Chimney Seals

By NASSCO's
Manhole Committee

In 1979, the Milwaukee Metropolitan Sewerage District (MMSD) conducted a Sewer System Evaluation Study (SSES) and found that more than 49 percent of the total defects identified were related to manholes. The study also concluded that more than 65 percent of the leakage attributed to manholes entered at the frame-chimney interface. Based on the results of this SSES, a Request for Proposals (RFP) was sent out looking for solutions to repair this defect in manholes.

Of the 29 repair methods tested in the original MMSD pilot project, four methods were ultimately approved for general use on manhole rehabilitation work. Of the four approved methods, the only one still in use today is the mechanical frame-chimney seal consisting of a rubber sleeve and stainless steel expansion bands. When first introduced and put into use, these seals were said to have an expected design life of 20 to 25 years. Subsequent inspections and testing have extended that design life to a minimum of 35 years and possibly even 50 years based on the independent test data.

Background



Seal Prior to Removal

In December 2014, one of the oldest known seals was located in a manhole (Basin WA-30) in Wauwatosa, Wis., a suburb of Milwaukee. Based on city records, this seal had been installed as part of an MMSD manhole rehab project in late 1982 or early 1983, making the seal approximately 32 years old. The seal was visually inspected and appeared to be in good condition, with no obvious defects or visible leakage.

The seal and bands were removed; the substrate behind the seal was inspected and was also found to be in relatively

good condition, considering a basic Portland mortar mix was used for surface preparation during the original installation. Today, there are higher quality, more suitable repair materials available for use in these applications.

Testing



Cleaned
Rubber
Seal Prior
to Testing

The rubber seal and stainless steel bands were sent to an independent testing company, Engineered Systems Inc. (ESI) in Aurora, Ill., for physical properties testing. The purpose of this testing was to compare the old seal and bands to the minimum requirements for the physical properties of a new seal and bands. Test criteria was established using Table 1, Resilient Materials Test from ASTM C 923-08, Standard Specification for Resilient Connectors Between Concrete Manhole Structures, Pipes and Laterals. ASTM C 923 is the specification that is most often referenced by manufacturers of mechanical frame-chimney seals and it provides for a natural or synthetic rubber compound and stainless steel Type 302 through Type 316.

Materials testing showed changes in the physical properties of the rubber seal that are consistent with long-term aging. The properties of the aged seal were very similar to previously reported test data from a 22-year-old seal tested in 2005. The average Tensile Strength of the aged seal was 891.3 psi compared to 1,200 psi minimum required by C 923. The elongation of the aged rubber seal averaged 474 percent, which exceeds the minimum of 350 percent as required by ASTM C 923. Compression Set measure 15.6 percent, which is within the requirement of 25 percent max decrease in ASTM C 923. The Durometer (hardness) of the aged seal was 51 and within the manufactures requirement



Cleaned Stainless Steel
Bands Prior to Testing

of 48 ± 5 . The seal exhibited minor surface cracking/checking on the exposed (interior) side of the seal with the worst being limited to approximately 10 to 15 percent of the seal's minimum thickness of 3/16 in.

The visual appearance of the stainless steel bands indicated some surface rust, but these areas did not penetrate the base metal and was only a surface condition. Test results on the stainless steel bands indicated that the material met the requirements of ASTM A 240, Type 304 as required in ASTM C 923.

Conclusion

Based on these independent test results, the only physical property not meeting the requirements of ASTM C 923 was Tensile Strength, with all others exceeding the ASTM and manufacturer's requirements for a new seal. Once installed, these seals are designed to accommodate any movement or displacement of the frame, so the seal is typically not put into a stressed condition where the initial tensile strength is required. Based on this information, it would seem reasonable to expect that mechanical frame-chimney seals meeting the physical requirements of ASTM C 923 will exhibit a minimum 35-year design life, and possibly that could be extended to 50 years. One may also consider that with such a long design life and the ability to easily inspect, remove and reinstall these seals, they are an extremely cost effective method to prevent the entry of clear water into new or rehabilitated sanitary sewer manholes.

This article was provided by NASSCO's Manhole Committee.