

SUGGESTED SPECIFICATION FOR INTERNAL MANHOLE OR PIPE JOINT SEALS

PART 1 GENERAL

1.01 SCOPE

This section includes the materials and procedures required to provide for the internal sealing of joints in Precast Concrete manholes and in most types of pipe, including but not limited to Reinforced Concrete, PVC, HDPE, Fiberglass, Steel or Vitrified Clay. The sealing shall be accomplished via the installation of a mechanical internal joint sealing system.

1.02 WORK REQUIRED

- A. Precast Manholes – An internal joint sealing system, meeting the requirements of this specification, shall be used to seal the joint area between two or more barrel sections of the manhole where infiltration or exfiltration is present.
- B. Pipe – An internal joint sealing system, meeting the requirements of this specification, shall be used to seal the joint area between two or more sections of pipe where infiltration or exfiltration is present.

1.03 DEFINITIONS

- A. Joints – The means of connecting sectional lengths of pipe into a continuous transmission line or means of connecting precast manhole wall sections to reach a specific elevation or grade.
- B. Manhole Joint Sealing – The means of sealing leaking or defective manhole wall joint by the installation of a mechanical sealing system which bridges the joint to prevent infiltration or exfiltration.
- C. Pipe Joint Sealing – The means of sealing leaking or defective pipe joints by the installation of a mechanical sealing system which bridges the joint to prevent infiltration or exfiltration.
- D. Pre-Approved Equal – A product that meets the material, performance and design life requirements of this specification and has been approved by the ENGINEER for use on this project a minimum of 7 calendar days prior to bid opening.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements – The internal joint sealing system shall be designed to prevent leakage in the above described portions of the pipe or manhole throughout a 50 year design life.
- B. Performance Requirements – The internal joint sealing system shall prevent the leakage of water into the pipe or manhole at the joints connecting each section and be capable of withstanding up to 14 feet (6psi) of external head pressure. Leakage shall be construed to mean freely dripping water emanating at the interface between the seal and the pipe or manhole wall or through the body of the seal itself. Moisture appearing at random locations in the form of patches or beads adhering to the surfaces shall not be construed as leakage. The seal shall

remain flexible and have the capability to maintain a watertight seal throughout its design life.

1.05 SUBMITTALS

Certification - The manufacturer of the internal joint sealing system shall submit a certification to the ENGINEER stating that their product meets the requirements of Section 1.04 A and B and Section 2.01, A, B and C.

1.06 QUALITY ASSURANCE

Acceptance Testing – Pipe and manhole joint seals shall be visually inspected after installation for proper positioning and tightness against the pipe or manhole wall. There shall be no voids or visible leakage points and the bands must be properly tightened and locked into place. Any seal or seals failing this test shall be reworked and inspected at no additional expense to the OWNER.

The ENGINEER reserves the right to test random internal joint seals for leakage using a method approved by the ENGINEER. A minimum of 10 percent of the sealed pipe and manhole joints shall be tested. Joints that fail shall be reworked and retested by the CONTRACTOR at no additional expense to the OWNER. If more than 5 percent of either the pipe or manhole joints tested fail the initial test, an additional 10 percent of the sealed pipe and manhole joints shall be tested. This process shall continue until the testing is satisfactory, or until all sealed pipe and manhole joints have been tested.

PART 2 PRODUCTS

2.01 INTERNAL JOINT SEAL

Internal joint seals shall consist of a flexible rubber sleeve, stainless steel expansion bands and/or restraining hoops conforming to the following requirements.

- A. Rubber Sleeve – The flexible rubber sleeve shall be molded or extruded 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 have a minimum width of 7-1/2 inches and a maximum unexpanded width of 13 inches with a minimum thickness of 3/16 inches. Both end sections of the sleeve shall have an integrally formed expansion band recess and series of sealing fins to facilitate a watertight seal. These sealing fins shall have teardrop holes or air pockets to allow them to conform to minor surface irregularities that may be encountered on the manhole or pipe surfaces.

- B. Expansion Bands – The expansion bands used to compress the sleeve against pipe or manhole wall shall be formed from a minimum 16 gauge stainless steel conforming to the applicable material requirements of ASTM C-923, Type 304 or 316 and shall have a minimum width of 1-3/4 inches.

The mechanism used to expand the bands shall have the capacity to develop the pressure necessary to provide a watertight seal once the bands have been locked into place. Any fasteners used to lock the bands into place after tightening shall be stainless steel conforming to ASTM F-593, Type 304.

- C. Restraining Hoop – Any restraining hoop used to prevent ballooning of the center section of the seal shall be a minimum 5/16 inch diameter stainless steel rod conforming to ASTM A-479, Type 304. The sleeve coupler tubes used to join the restraining hoop ends shall be a minimum 5 inches in length and be made of stainless steel conforming to ASTM A-479, Type 304.

- D. Acceptable Manufacturer's
 - 1. Cretex Specialty Products
 - 2. Pre-Approved Equal

2.02 EQUIPMENT

The CONTRACTOR shall have the manufacturer's recommended expansion tool and all other tools and equipment necessary to prepare the sealing surfaces and install the joint sealing system.

2.03 REPAIR MORTAR

Repair mortar shall be a single component, ready to use with water, high strength, non shrink, polymer modified cementitious patching mortar designed for horizontal, vertical or overhead use. Repair mortar shall not contain calcium chloride, added gypsum, metallic particles, lime or high alumina cements. Repair mortar shall have the following minimum requirements:

Compressive Strength	ASTM C-109	1 day 7 day 28 day	2800 psi 4600 psi 5800 psi
Flexural Strength	ASTM C-348	1 day 7 day 28 day	600 psi 750 psi 900 psi
	ASTM C-78	28 day	1500 psi
Slant Shear Bond Strength	ASTM C-882	7 day	1190 psi
		28 day	1640 psi

2.04 CEMENTITIOUS GROUT

Cementitious grout shall be a premixed, non-metallic, controlled expansion, high strength, versatile non-shrink grout meeting the requirements of CRD-C-588-70, CRD-C-621-81, ASTM C-827-82 and ASTM C-191-79. When mixed to a mortar or "plastic" consistency, the cementitious grout shall have minimum one day compressive strength of 6,000 psi and a 28 day compressive strength of 9,400 psi.

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain manhole or pipe service throughout the duration of the project.
- B. Provide 48 hour notice to the OWNER prior to start of work for the INSPECTOR to review and document the materials and equipment to be used for quality assurance and testing requirements.

3.02 QUALIFICATIONS

- A. The CONTRACTOR shall have completed the installation of the internal sealing system on a minimum of 10 joints. The CONTRACTOR may provide a minimum 8 hours (no cost to the OWNER) on-site training by an approved representative of the manufacturer in lieu of the experience requirement for installation. The

training must take place in the presence of the ENGINEER or designated representative.

- B. All installations of the internal joint sealing system must be supervised by a foreman responsible for installation of the joint sealing system on a minimum of 5 joints. The CONTRACTOR may provide a minimum 4 hours on-site training by an approved representative of the manufacturer in lieu of the experience requirement for installation. The training must take place in the presence of the ENGINEER or designated representative.

3.03 INSTALLATION

All work to be performed shall be in strict accordance with the ENGINEER's specifications and recommendations, including installation and application of all products as required and in accordance with the manufacturer's recommended installation and surface preparation instructions.

3.04 FIELD MEASUREMENTS

The CONTRACTOR shall be responsible for field measuring each pipe or manhole joint to be sealed. This information is required to determine the proper size and width of rubber sleeve and the size and number of expansion bands required to complete each installation.

3.05 SURFACE PREPARATION

The CONTRACTOR shall inspect approximately 4 inches of the surface on both sides of the manhole or pipe joint to be sealed for and rust, scale, mineral deposits or debris that would interfere with the installation of the seal. The CONTRACTOR shall be responsible to ensure all surfaces under the sealing area behind the expansion bands be clean, reasonably smooth, circular, and free of any defects that would prevent the rubber sleeve from achieving a watertight seal. On precast concrete pipe and manholes, repair mortar meeting the requirements of Section 2.03 shall be used to repair any defects and provide an adequate surface for the sleeve to compress against. For all other types of pipe materials, use a repair material that is compatible with the host pipe material. If the pipe or manhole joints are open, the CONTRACTOR shall be responsible for filling the void area with repair material meeting the requirements of Section 2.03 or 2.04. All surface preparation shall be in strict accordance with the internal joint seal manufacturer's recommended instructions.

PART 4 MEASUREMENT & PAYMENT

4.01 MANHOLE JOINT SEAL

This item shall be paid at the unit price bid per manhole joint seal by diameter and shall include the cost of furnishing and installing an internal joint seal and all the required surface preparation work needed to achieve a watertight installation. Measurement shall be based on the actual size and number of seals installed.

4.02 PIPE JOINT SEAL

This item shall be paid at the unit price bid per pipe joint seal by size and shall include the cost of furnishing and installing an internal joint seal and all the required surface preparation work needed to achieve a watertight installation. Measurement shall be based on the actual size and number of seals installed.