LMK TECHNOLOGIES®

SUBMITTAL DOCUMENT

INSIGNIA™ HYDROPHILIC O-RING

SUBMITTAL DOCUMENT FOR INSIGNIA™ HYDROPHILIC O-RING

Item 1

Manufacturer Company Name: LMK Enterprises, Inc.

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Product Submittal: This submittal is for the Insignia™ Hydrophilic O-Ring process specifically designed to seal and provide a structural, verifiable non-leaking repair at the terminating ends of lateral liners.

Item 2

Insignia™ by LMK® are hydrophilic sealing gaskets used to seal terminating ends of liners and lateral to main connections

LMK Enterprises, Inc. is the owner of Trademarks: Insignia™ and LMK®. LMK Enterprises, Inc. is owned and operated by President Larry W. Kiest, Jr.

Larry Kiest, Jr. CEO/President
Inventor of more than 60 issued patents teaching methods and apparatuses for the Rehabilitation of Underground Pipes, Conduits and Structures. Mr. Kiest is a Licensed Plumber in the State of Illinois, Advisory Board Member of Trenchless Technology Center Louisiana Tech University, Member of ASCE/ PINS Lateral Committee, Board Member of NASSCO, Chairman of NASSCO Lateral Committee, Active Board Member NASSCO 2008-2010, Member of NASTT, Member of AWWA Standards Committee, Member of WEF, Member of MSTT, Active Board Member MSTT 2008-2010, Member of ASTM, and Chairman of Task Committee F17, subcommittee 17.67 standard practice for rehabilitation of a sewer service lateral using a one piece main and lateral cured-in-place liner installed by means of air inversion. Mr. Kiest has conducted business in the field of Trenchless Pipe Renewal Systems since 1985.

LMK's Management Team

Vice President:	Rick Gage
General Manager:	Bruce Kamin
Sales Manager:	Jeff Tinlin
R&D Director:	Jason Mathey
In-house Engineer:	Sahar Hasan
Marketing Manager:	Kristina Kiest
Orders Manager:	Kara Kamin
Shipping Manager:	Tommy Stringham
Assistant to President:	Amber Sibley
Technical Trainer:	Kyle Mucci
Mfg. Manager:	Sharon Biagoni
Accounting:	Lori Lohnes
Human Resources:	Brenda Newkirk

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References:

1. Jim Shelton PE, Malcolm Pirnie Engineering, Wilmington, Delaware
   Title: Senior Engineer
   Phone: 302-658-1718 Fax 302-884-6909 E-mail: jshelton@pirnie.com

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4.1 Description The Insignia™ Hydrophilic O-Ring is used to create a compression seal at the terminating end of lateral liners. The Insignia™ O-Ring is hydrophilic which causes it to absorb water and swells to 3 to 5 times its original size creating a watertight connection.

4.2 Technique The Insignia™ O-Ring is a seamlessly molded seal consisting of neoprene rubber which gives the Insignia™ O-Ring its properties of durability and chemical inertness. The Insignia™ O-Ring is installed with lateral liners such as the Lateral Performance Liner® by LMK. The Insignia™ O-Rings are positioned on the liner and the flexibility of the O-Rings allows it to stay positioned on the liner during the inversion process. The liner is inverted into the lateral pipe thus positioning the Insignia™ O-Ring at the mainline/lateral connection.

4.3 Intended Use It is believed that CIPP Liners provide a water tight connection. The truth is, CIPP resins shrink upon curing which causes an annular space between the liner and the host pipe. The Insignia™ O-Ring product provides a uniform seal and consistent wall thickness between the liner and the lateral pipe.

4.4 Existing Sewer (Main and Lateral) The system is compatible with all types of pipes; V.C.P., concrete, cast iron, P.V.C and existing main pipes that have been renewed by a CIPP process.

4.5 Diameter Ranges Laterals: 4 – 18 inch diameters.

4.6 Properties

Characteristic	Unit	Value	Test Method
Shore A Hardness	point	50 +/- 5	ASTMD2240
Tensile Strength	psi	177	ASTMD412
Elongation at Break	%	523	ASTMD412
Specific Gravity		1.2	ASTMD297
Swell Capacity in Water Contact	%	200	GRCSC

4.7 Effects on Homeowners Homeowners and building occupants at a minimum will receive a door knob notice bulletin 48 hours prior to the scheduled work and personal contact is attempted to be made the day of the scheduled work. The notice bulletin summarizes the scope of work, tentative time of service disruption and home/building owner cooperation for non-use of water/sewer for a 2-hour period or less. A brief explanation of “dry fixture traps” is also included.

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5.1 Sewer Preparation	The main and the laterals are cleaned utilizing high-pressure water and mechanical cleaning tools. Pressures may range from 2,000 to 4,000 PSI removing all roots, debris and obstructions. Cleaning of the lateral is performed robotically from the main pipe. Any protruding service connections will be removed prior to liner insertion. The current condition of the pipe will be compared to the original designed condition to verify that design parameters have not changed. Normal mainline flows are plugged or by-passed during the process, depending on flow.
5.2 Mainline Service	Typical time for plugging the mainline is one-hour (1) or less.
5.3 Specific Requirements	Accesses to the upstream and downstream manholes are mandatory.
5.4 Cleanout System	This process does not require a clean-out to be accessible.
5.5 Installation Crew & Equipment	A typical crew consists of (3 to 4) technicians. A mobile wet out unit is required for onsite vacuum impregnated of the liner. Traffic disruption is minimal. The installation process is typically quick, efficient and non-disruptive when compared to open cut replacement methods.
5.6 Handling Sewer Access	Certified and Licensed Technicians remotely carry out the installation. Internal pipe cleaning, inspection and insertion of the lining are typically performed without the need for confined space entry. Entry into a manhole may be required in order to insert a sewer plugs or to assist insertion of equipment in small diameter manholes or where drop inlets exist. If confined entry is required, Federal, State and Local Laws apply.
5.7 Document Final Video and Testing Procedures	A final video inspection is performed from the main if the termination point of the liner can be seen with zoom cameras.
5.8 Design Life	50 - 100 Year Service Life based physical properties, chemical resistance and extrapolations. upon

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Advanced Materials:

- Insignia Hydrophilic O-Ring (Gasket Sealing Technology)

Respectfully Submitted By:

Larry Kiest, Jr.

Larry Kiest, Jr., President/CEO, LMK Enterprises, Inc.