



SUBMITTAL DOCUMENT

INSIGNIA™ HYDROPHILIC END SEAL

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Submittal Document for Insignia™ Hydrophilic End Seal

ITEM 1 – General Information

Manufacturer Company Name: LMK Technologies, LLC
Contact Individual(s) Danny Sanders
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Product Submittal: *This submittal is for the Insignia™ End Seal product is specifically designed to be used in conjunction with CIPP, Fold and Form and UV cured mainlined linings.*

ITEM 2 - Definitions

Insignia™ Compression Gaskets by LMK Technologies® are hydrophilic sealing gaskets are used to seal the junction of a main or lateral pipe and a manhole.

LMK Technologies is the owner of Trademarks: Insignia™ and LMK®.

Larry Kiest, Jr. Founder

Mr. Kiest is the inventor of more than 100 U.S. and foreign 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 of Sales and Marketing:	Chris Duda
Director of Sales:	Danny Sanders
Director of Operations:	Todd Trowbridge
Chief Financial Officer:	Tom Serena

ITEM 3 – References:

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3. John Vose, Repairs and Excavation Supervisor
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6. Tyson Crandall, Project Manager
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Sanford, FL
Phone: 812-865-3232
Fax: 812-865-3075
7. Bob O'Conner, President
Spectrum Sealing Products (Municipal and Contractors Sealing Products)
Phone: 513-482-3300
Fax: 513-482-3309

8. Alex Sharpe, Project Manager
Insituform
Indianapolis, IN
Phone: 317-489-3867

9. Breck Vinson, Project Manager,
Reynolds In-Liner
Phone: 812-865-3232

Projects:

Sanitation District #1

1045 Eaton Drive Ft. Wright, KY 41017
Utility Contact: Rich McGillis
Senior Manager of Collection Systems
859-547-1642
General Contractor: Reynolds Inliner
Contact: Tyson Crandall, Project Manager 812-865-3232

Lawrence Indiana Sewer Utilities Department

9201 Harrison Park, Lawrence Indiana 46216
Phone: 317-542-0511
General Contractor: Reynolds Inliner
Contact: Breck Vinson, Phone 812-865-3232

West Central Conservancy District

243 South County Road 625 East Avon, IN 46123
Phone: (317) 272-2980
General Contractor: Insituform
Contact: Alex Sharpe, Phone 317-489-3867

ITEM 4 – Materials, Installation and Design

4.1	Intent	<p>It is the intent of this specification to detail a safe, efficient, cost-effective installation method of a hydrophilic pipe end sealing product called INSIGNIA™ END SEAL for the junction of a main or lateral pipe and a manhole. The INSIGNIA™ END SEAL provides a full-circle compression seal to a substantial area at the ends of a pipe rehabilitated by lining. This hydrophilic sealing product is intended for use in conjunction with most all pipe rehabilitation systems, including but not limited to: inverted CIPP liners, pull-in-place CIPP liners, and fold-and-form plastic pipe liners. The INSIGNIA™ END SEAL product shall be commercially available from LMK Technologies or a distributor for use as an adjunct to rehabilitative pipe lining projects on a price per kit basis.</p>
4.2	Technique	<p>The INSIGNIA™ END SEAL product and process consists of providing a full-circle seal at the junction of a main or lateral pipe and a manhole by using a tubular sleeve of hydrophilic material specifically tailored to provide the most safe, efficient, cost-effective, watertight seal at the ends of a rehabilitated pipe. The INSIGNIA™ END SEAL product and process overcomes major deficiencies of other known products and methods used at the junction of a pipe at the manhole. For example, the use of a hydrophilic rope is commonly used near the ends of rehabilitated pipe. The use of such a hydrophilic rope may result in imprecise placement within the host pipe, as the flexible rope is prone to shift within the pipe or fall during installation of a pipe liner, resulting in an incomplete seal at the pipe ends. Another example of material used to seal pipe ends is a hydrophilic caulk. The use of such a caulk to seal the ends of a pipe at the manhole may result in inconsistent wall thickness and imprecise placement before and after a pipe-liner is installed. Since there are no structural elements to hold the caulk in place, the caulk is allowed to smear and spread throughout the pipe. Additionally, the use of either hydrophilic rope or caulk requires arduous cleaning of the pipe interior before application in an attempt to stick and retain the seal to the pipe as a liner is installed.</p> <p>The INSIGNIA™ END SEAL product and process overcomes these deficiencies by the use of a sealing product that provides a hydrophilic material that does not shift or move during installation of a rehabilitative pipe liner. Additionally, the INSIGNIA™ END SEAL product provides a uniform seal and consistent wall thickness around the pipe end after installation of a pipe liner. Furthermore, the INSIGNIA™ END SEAL product does not require arduous cleaning of the pipe end before installation.</p> <p>The INSIGNIA™ END SEAL product includes a tubular sleeve constructed of a hydrophilic polymeric material, designed with a specified length and wall thickness to provide a compression seal to the end of a pipe at the manhole. A mechanical fastener is provided with the tubular sleeve that is specifically designed to hold the tubular sleeve in place during installation of a pipe liner. The mechanical fastener may utilize a double-sided adhesive to ensure that neither the tubular sleeve nor the fastener shift during installation.</p> <p>The most common method utilized and associated with the INSIGNIA™ END SEAL includes placing the tubular hydrophilic sleeve within the pipe to be rehabilitated adjacent to the manhole. A mechanical fastener is placed against the inner wall of the tubular sleeve during installation, securing the tubular sleeve against the inner wall of the pipe. After the mechanical fastener is secured in place, a pipe-liner is inserted through the tubular sleeve utilizing</p>

		known installation methods. After the pipe-liner is set in place, the tubular sleeve will swell in the presence of water, creating a full-circle seal between the newly-installed pipe-liner and the host pipe for the entire length of the INSIGNIA™ END SEAL.
4.3	Material	The materials utilized for the INSIGNIA™ END SEAL shall be provided in kits that are designed to accommodate varying pipe diameters, manhole depths, junction configurations, and pipe liner products. The INSIGNIA™ END SEAL kits are compatible with most rehabilitative pipe liner products, including cured-in-place, and fold-and-form. Additionally, the INSIGNIA™ END SEAL kit may be used with many different pipe liner installation and curing methods, including inversion, pull-in-place, hot water curing, steam curing, ultra violet curing, and ambient curing methods. The components of the INSIGNIA™ END SEAL include either a tubular sleeve or roll of rubber from which to produce a sleeve (based on size), and a mechanical fastener.
4.4	Existing Sewer	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	Pipe Diameter Ranges	Main: The Insignia End Seal Sleeve is available in sizes of 6", 8", 10", 12", 15", 18", 21", 24", 27", 30", 33", 36", 42", 48", 54", 60", 66", 72", 84" and 96"
4.6	Geometry and Materials	The member that creates the end seal is a hydrophilic neoprene rubber of approximately 50 Shore A durometer. The tubular sleeve has a uniform wall thickness of 1.5 mm-6mm (depending on diameter – see section 4.11 below) , a length of approximately 3.5 inches, and a diameter slightly less than the interior pipe diameter.

4.7	Physical Property	Unit	Value	Test Method
	Shore A Hardness	Point	50 + 5	ASTM D2240
	Tensile Strength	PSI	1177	ASTM D412
	Elongation at Break	%	523	ASTM D412
	Specific Gravity		1.2	ASTM D297
	Swell Capacity in Water Contact	%	200	GRCS

4.8	Mechanical Fastener	There are several mechanical fasteners available for use with the INSIGNIA™ END SEAL product. A first option is a shape-memory alloy that has been formed into a specific accurate or other curvilinear configuration having an outer profile that is generally greater than the circumference of the pipe before insertion. This conformation allows the alloy to be bent into a configuration that fits inside of the tubular sleeve and the pipe. Once inside the pipe, the alloy is pressed against the wall of the tubular sleeve, thus pressing the tubular sleeve against the wall of the pipe. The shape memory characteristic of the fastener urges the fastener to return to its original profile. The alloy remains in a strained configuration, pressing the tubular sleeve against the pipe wall. A second option for a mechanical fastener is a ratcheting retaining ring. The ratcheted retaining ring includes a strip of material having a total length generally greater than the pipe diameter. A ratcheting worm gear is attached to the strip and the strip is formed into a ring shape of variable diameter. The ratcheting retaining ring allows an operator to manually adjust the outer profile of the mechanical fastener, allowing for a small initial diameter before placement into the pipe. After the ratcheting retaining ring is placed within the pipe, the diameter of the retaining ring may be expanded by actuation of the
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		worm gear to tightly hold the tubular sleeve in place.
4.9	Installation Recommendations: Access to the ends of the pipe to be rehabilitated	Access a manhole where a main pipe or a lateral pipe connects. A technician may access the manhole interiors via conventional methods to access the main or lateral pipe to be rehabilitated. The pipe interior at the manhole shall be measured from 6:00 to 12:00 and from 3:00 to 9:00. The mean shall be the nominal inner diameter.
4.10	Material Compatibility	After the INSIGNIA™ END SEAL product has been placed into the ends of the pipe, a rehabilitative liner product shall be installed into the pipe. The INSIGNIA™ END SEAL product is intended for use in conjunction with most pipe rehabilitation systems, including but not limited to: cured-in-place pipe liners and fold-and-form pipe liners. The INSIGNIA™ END SEAL kit may be used with many different pipe liner installation and curing methods including, inversion, pull-in-place, hot water curing, steam curing, ultra violet curing, and ambient curing. Since the INSIGNIA™ END SEAL product has a uniform wall thickness and is held firmly within the pipe to be rehabilitated, a compression seal will be provided to a large area of the pipe end adjacent the manhole. Since the INSIGNIA™ END SEAL product may be used with a variety of rehabilitative pipe liners, the standard installation practices of each individual pipe liner method should be closely followed. Therefore, procedures should be used that meet applicable NASSCO, ASTM, NACE and SSPC standards and provide quality assurance controls that meet the manufacturer's printed recommendations.

4.11 End Seal Width and Thickness

End Seal Size in Inches	Width in Inches	Thickness in Inches
6	3.5	.059
8	3.5	.098
10	3.5	.12
12	3.5	.12
15	3.5	.12
18	3.5	.12
21	3.5	.12
24	3.5	.12
27	3.5	.177
30	3.5	.177
33	3.5	.177
36	3.5	.177
42	3.5	.177
48	3.5	.236
54	3.5	.236
60	3.5	.236
66	3.5	.236
72	3.5	.236
84	3.5	.236
96	3.5	.236

ITEM 5 – Preparation and Testing

5.1	Cleaning and Inspection	All roots, deposits, and debris should be removed from the pipe with hydraulically powered equipment, high velocity jet cleaners, or mechanically powered equipment as per NASSCO recommended specifications for sewer collection system rehabilitation. Since the INSIGNIA™ END SEAL provides a seal based on compression instead of adhesion, extensive cleaning beyond obvious obstructions is optional. A full-circle seal at the ends of the pipe will be achieved regardless of the presence of fats, oils, and grease which is inherent in sewer pipes even after high velocity jet cleaning. It should be noted that the various pipe rehabilitation installation methods have different installation standards (such as ASTM standards and manufacturer’s recommendations), and those installation standards should be observed during installation of the liner.
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Item 6 – Other

Advanced Materials:

- Insignia Hydrophilic End Seal (Compression Gasket Sealing Technology)

Respectfully Submitted By:

Larry Kiest, Jr.

Larry Kiest, Jr.
President
LMK Technologies, LLC