



PRODUCT SUBMITTAL DOCUMENT
INFORMATION

CIPMH™ (CURED-IN-PLACE
MANHOLE) LINING SYSTEM

CIPMH™ FULL DEPTH-PA
FOR STRUCTURAL REHABILITATION

Updated 9/25/14

Product Submittal Review

ITEM 1.

Manufacturer Company Name: LMK Technologies, LLC

Contact Individual(s) Rick Gage

Street Address: 1779 Chessie Lane

City, State, Zip Code: Ottawa, IL 61350

Telephone: 815.433.1275 ext.105 Facsimile: 815.433.0107

Product Submittal: THIS SUBMITTAL IS FOR THE CIPMH FULL-DEPTH MANHOLE PROCESS SPECIFICALLY DEISGNEED FOR THE REHABILITATION OF MANHOLES THROUGH THE USE OF A RESIN-IMPREGNATED STRETCHABLE LINER.

Only Certified Licensed Installers by LMK are authorized to install the LMK CIPMH Full-Depth Manhole System.

ITEM 2.

INTENT:

This specification covers requirements and test methods for the rehabilitation of manholes without excavation. The manhole is accessed through the existing manhole cover. The rehabilitation is accomplished by the installation of a one- piece resin impregnated stretchable liner that is cured under pressure. The liner is pressed against the existing manhole by a pressurized bladder until the thermo-set resins have cured ambiently. The liner shall start at the manhole cover seat and extend to a pre-determined length shy of the manhole bench. The cured-in-place manhole liner shall be bonded to the contours of the existing structure, significantly increase structural integrity, and provide a surface resistant to sewer gases.

The LMK CIPMH Full-Depth system has been installed extensively throughout the United States.

LMK Technologies, LLC is the owner of Trademarks: Performance Liner[®], CIPMH[™], and LMK[®].

Larry Kiest, Jr. President/Founder

Inventor of more than 110 issued patents teaching methods and apparatuses for the Rehabilitation of Underground Pipes, Conduits and similar 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, served 2-terms Board Member of NASSCO (2008-2012), Original chairman that initiated the NASSCO Lateral Committee, Active Board Member NASTT (2012-current), Member of No-Dig Planning Committee, Member of AWWA Standards Committee, Member of WEF, Member WEF Collections Committee, V.P. and active board member 2010-current) of MSTT, 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.

ITEM 3.

References:

- 1) John Vose, City of Naperville, Illinois
Title: Repairs and Excavation Supervisor
Phone: 630-420-6741 Fax 630-420-4119 E-mail: vosej@naperville.il.us
- 2) Wallace Davis III, City of Chicago, Illinois
Title: Dept. of Water Management, General Superintendent
Phone: 312-745-0379 E-mail: wallace.davis@cityofchicago.org
- 3) Bob Schull, City of Ottawa, Illinois
Title: Assistant Superintendent
Phone: 815-433-0245 E-mail: bshull@cityofottawa.org

ITEM 4.

4.0 The Technique	The manhole is accessed through the existing manhole cover. The rehabilitation is accomplished by the installation of a one-piece resin impregnated stretchable liner that is cured under pressure. The liner is pressed against the existing manhole by a pressurized bladder until the thermo-set resin has cured by ambient temperatures. The liner shall start at the manhole cover seat and extend to a pre-determined length shy of the manhole bench. The cured-in-place manhole liner shall be bonded to the contours of the existing structure, significantly increase structural integrity, and provide a surface resistant to sewer gases.
4.1 A brief description of the operation and technique; including materials and methods of installation.	The rehabilitation is accomplished using a stretchable, non-woven felt tube of particular length and a thermo-set resin with physical and chemical properties appropriate for the application. The liner is vacuum impregnated (saturated) on-site with the thermo-set resin. The saturated liner is then lowered into the manhole and is temporarily held in position. The installation device is then lowered and properly positioned inside the liner. The bladder on the installation device is then pressurized so that the liner is pressed against the existing structure. Once the resin-saturated liner is cured, the installation device is removed. The liner is then trimmed flush with the manhole cover seat.
4.2 Intended use:	The system is designed to rehabilitate deteriorated manhole structures. Typical installations are a direct result of structural defects, missing mortar and bricks, surface cracks and open joints.
4.3 Diameter Ranges	22" to 48"
4.4 Transitioning Diameters	Able to negotiate diameter changes due to liner stretching capabilities.
4.5 Circular and/or Non-Circular Capability	Liner will stretch to conform to the inside diameter of the manhole whether concentric or eccentric.
4.6 Material Limitations	The liner shall be continuous in length and consist of one or more layers of

	<p>a stretchable absorbent felt material. The liner is designed to withstand hydrostatic pressures, bridge missing mortar or brick segments, withstand freeze/thaw cycles, and conform to the contours of the existing structure. The saturated liner shall have uniform thickness and have excess resin distribution that, when compressed at installation pressures, will meet or exceed the design thickness after cure.</p> <p>The exposed layer of the stretchable liner shall be uncoated. The liner shall be marked correlating to the address or manhole identification number and date of installation.</p>
4.7 Lining Material Composition and Construction	The liner shall be a one-piece assembly sewn in the shape of a tube at a predetermined length to seal the casting and manhole structure. The sewn seams shall be sealed using a tape compatible with the liner coating. The liner wall thickness shall be uniform throughout. The liner will be capable of conforming to offset bricks and grade rings, missing mortar gaps, and disfigured and deteriorated chimneys.
4.8 Resin System	The resin system shall be the LMK656EN Filled ISO Polyester Resin. This resin is a physical property enhanced, promoted, thixotropic, corrosion resistant, unsaturated polyester resin.
4.9 Mechanical Properties	Excess resin migrates into pipe defects allowing a mechanical anchoring.
4.10 Corrosion attack	Chemical Resistance Testing. Test Method: ASTM D5813 and F1216 See Independent Laboratory Testing: Microbac Corrosion Test.
4.11 Resin Saturation Method	The lining tube is saturated with resin at the site using a wet-out roller to ensure full saturation.
4.12 Installation Recommendations	<p>Safety – All precautions for safety will meet or exceed OSHA regulations. Areas of concern are traffic, PPE, confined space (if necessary), and small tool safety. MSDS sheets for the resin and first aid kit shall be kept on site.</p> <p>Preparation – All surfaces to be lined must be stringently pressure washed with a minimum of 5,000 psi @ 5 gal/min pressure washer. Other alternatives to clean the structure may be used along with pressure washing such as abrasive blasting. Large voids and missing bricks shall be filled with hydraulic cement to provide an area that the liner can press up against. Smaller voids and missing mortar may go un-patched since these areas will be filled with excess resin. Steps that are located in the area to be lined shall be removed.</p> <p>Vacuum Impregnation – The liner shall be vacuum impregnated (saturated) on site under controlled conditions. The resin shall be measured on site to provide 5% to 7% excess resin for migration. The volume of resin used shall be sufficient to fill all voids in the linear material at nominal thickness and diameter. No dry or unsaturated areas in the liner shall be acceptable upon visual inspection.</p> <p>Installation Device – Once liner is place in the manhole, the installation device is inserted inside the liner. Spacing rings on top of the manhole allow the installation device to rest at the correct depth. Once inserted, the installation device bladder is pressurized. The installation device stays in place and is pressurized until the liner is cured.</p>

	<p>Curing – The liner is cured at ambient temperatures as it is pressed firmly against the structure. The curing time must take into consideration the resin system, ground conditions (temperature and moisture level), and weather conditions. Typically, two hours is needed to cure the liner. A curing log shall be used to document the cure time, pressure, resin usage, and other pertinent information.</p> <p>Trimming – Once cured, the installation device is removed and the liner is trimmed at the manhole cover seat.</p>
4.13 Sewer Preparation Involves Cleaning	High pressure cleaning, as well as leak stoppage with hydraulic cement and/or gap filling, may be necessary.
4.14 Inversion/Inflation Method	Liner is pressed tightly against the host pipe by use of the inflation bladder.
4.15 Maximum Length	1 foot to 15 feet deep.
4.16 Completed Liner	The finished cured-in-place manhole liner shall be continuous from the manhole cover seat to a predetermined measurement shy of the manhole bench. The liner shall provide a smooth surface that conforms to the existing structure. The liner shall be free of dry spots and delamination. The finished product must provide an air and watertight corrosion resistant liner protecting the manhole.

ITEM 5.

Advanced Materials:

- **Non-Woven Stretchable Felt Liner**
- **One-Size Fits Most Inflation Bladder**
- **Vacuum Impregnation.**
- **Structural CIPP**
- **10,000 hour chemical resistance testing**
- **Flexible construction**
- **No excavation required**

Respectfully Submitted By:

Larry Kiest, Jr.

Larry Kiest, Jr. President LMK Technologies, LLC.