



Designation: **F2561 – 17 F2561 – 20**

Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in- Place Liner^{1,2}

This standard is issued under the fixed designation F2561; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This practice covers requirements and test methods for the reconstruction of a sewer service lateral pipe having an inner diameter of 3 to 12 in. (7.6 to 30.5 cm) and its connection to the main pipe having an inner diameter of 6 to 24 in. (15.2 to 61.0 cm) and up the lateral a maximum of 150 ft (46 m) without excavation. The lateral pipe is accessed remotely from the main pipe and from a lateral access point. This will be accomplished by the installation of a resin impregnated one-piece main and lateral cured-in-place lining (MLCIPL) by means of air inflation and inversion. The MLCIPL is pressed against the host pipe by pressurizing a bladder and is held in place until the thermoset resins have cured. When cured, the MLCIPL shall be a continuous, one piece, tight fitting, corrosion resistant lining extending over a predetermined length of the lateral pipe and the adjacent section of the main pipe, providing a verifiable non-leaking structural connection and seal.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 There is no similar or equivalent ISO Standard.

1.4 **Warning**—Mercury has been designated by many regulatory agencies as a hazardous substance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury-containing products. See the applicable product Safety Data Sheet (SDS) for additional information. Users should be aware that selling mercury or mercury-containing products, or both, may be prohibited by local or national law.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*³

[D618 Practice for Conditioning Plastics for Testing](#)

[D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials](#)

[D1600 Terminology for Abbreviated Terms Relating to Plastics](#)

[D2290 Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe](#)

¹ This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.67 on Trenchless Plastic Pipeline Technology.

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² The rehabilitation of a sewer service lateral and its connection to the main using a one-piece main and lateral cured-in-place liner is covered by patents 6,994,118, 7,975,726, 8,240,340, 8,240,341, 8,567,451, 8,636,036, 8,651,145, 8,667,991, 8,678,037, 8,689,835, 9,169,957, 9,366,375, 9,562,339, 9,551,449, (LMK Enterprises, Inc. 1779 Chessie Lane, Ottawa, IL 61350). Interested parties are invited to submit information regarding the identification of acceptable alternatives to this patented item to the Committee on Standards, ASTM Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Your comments will receive careful consideration at a meeting of the responsible technical committee which may attend.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

[D3681 Test Method for Chemical Resistance of “Fiberglass” \(Glass–Fiber–Reinforced Thermosetting–Resin\) Pipe in a Deflected Condition](#)

[D5813 Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems](#)

[F412 Terminology Relating to Plastic Piping Systems](#)

[F1216 Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube](#)

[F3097 Practice for Installation of an Outside Sewer Service Cleanout through a Minimally Invasive Small Bore Vacuum Excavation⁵](#)

[F3240 Practice for Installation of Seamless Molded Hydrophilic Gaskets \(SMHG\) for Long-Term Watertightness of Cured-in-Place Rehabilitation of Main and Lateral Pipelines](#)

2.2 *NASSCO Guidelines*.⁴

Recommended Specifications for Sewer Collection System Rehabilitation

3. Terminology

3.1 *Definitions*—Unless otherwise indicated, definitions are in accordance with Terminology [F412](#), and abbreviations are in accordance with Terminology [D1600](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *access point*—an existing manhole at either the upstream or downstream end of a sewer main or a cleanout or a pipe opening located on the lateral pipe.

3.2.2 *bladder*—a translucent flexible plastic hose that when pressurized, causes the main sheet to be pressed against the main pipe walls and the lateral tube to invert up into the sewer service lateral. The bladder joined with the textile lining creates a liner/bladder assembly.

3.2.3 *inversion*—the process of turning a resin-impregnated tube inside out by the use of air or water pressure.

3.2.4 *launcher*—combination of a rigid elongated tube and lay-flat hose apparatus where the main bladder is attached and the main sheet is wrapped around the exterior of the rigid portion. The lateral bladder and lateral tube are drawn inside the hose. The launcher is positioned within the main pipe; air pressure is introduced into the hose causing inflation of the main bladder/sheet and inversion of the lateral bladder tube.

3.2.5 *lift*—a portion of the MLCIPL that has cured in a position such that it has pulled away from the host pipe wall.

3.2.6 *main and lateral cured-in-place lining (MLCIPL)*—a textile including plastic coating impregnated by a thermosetting resin. This pipe is formed within a portion of the existing main pipe and the lateral pipe. Therefore, it takes the shape of an existing TEE or WYE fitting and fits tightly to the existing pipes.

3.2.7 *resin*—polyester, vinyl ester, epoxy or silicate resin systems being ambient, steam, hot water, or cured UV light.

3.2.8 *resin slug*—excess resin at a terminating end of a CIPP lateral lining.

3.2.9 *sewer service lateral*—a pipe servicing a ~~commercial~~, commercial, industrial or residential building.

3.2.10 *sheet*—a flat textile sheet that is formed into a 16 in. (40.6 cm) long tube within the main pipe. The sheet is connected to the lateral tube forming a one-piece TEE or WYE shaped fitting.

3.2.11 *transition*—the change in pipe diameter commonly found in lateral pipes.

3.2.12 *warranty period*—the period of time that the manufacturer will guarantee the design life and service life of the properly installed product.

4. Significance and Use

4.1 This practice is for use by designers and specifiers, regulatory agencies, owners, and inspection organizations who are involved in the rehabilitation of sewer service laterals and its connection to the main through the use of a resin-impregnated tube installed within an existing sewer lateral. As for any practice, modifications may be required for specific job conditions.

5. Materials

5.1 *Tube and Sheet:*

5.1.1 The main sheet and lateral tube shall consist of one or more layers of absorbent textile that is, needle punched felt or circular knit that ~~meet~~ may contain fiberglass and meets the requirements of Practice [F1216](#) and Specification [D5813](#), Sections 6 and 8. The main sheet and lateral tube shall be constructed to withstand installation pressures and to have sufficient strength to bridge missing pipe segments and flexibility to fit irregular pipe sections. The assembly of the tube and main sheet must be stitched

⁵ The Installation of an Outside Sewer Service Cleanout through a Minimally Invasive Small Bore Vacuum Excavation is covered by patents 8,757,930 (LMK Enterprises, Inc. 1779 Chessie Lane, Ottawa, IL 61350). Interested parties are invited to submit information regarding the identification of acceptable alternatives to this patented item to the Committee on Standards, ASTM Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Your comments will receive careful consideration at a meeting of the responsible technical committee which may attend.

⁴ Available from NASSCO, Inc. 44521 Cronridge Drive, Suite J, Owings Mills, MD 21117-2470 Longstone Lane Suite M, Marriottsville, MD 21104. www.nassco.org

and sealed. The interface of the main sheet and tube shall be vacuum tested with 10 in. of Mercury (Hg) by the manufacturer to verify a leak-free connection. The volume of resin used should be sufficient to fill all voids in the tube material at nominal thickness and diameter. The wet-out main sheet and lateral tube shall have a uniform thickness and excess resin distribution that when compressed at installation pressures, the MLCIPL will meet or exceed the design thickness after cure.

5.1.2 The outside layer of the tube (before inversion) and the interior of the main sheet (before inflation) shall be coated with an impermeable, translucent flexible membrane. The main sheet before insertion shall be permanently marked with a lateral identification correlating to the address of the building that the lateral pipe services. In addition the manufacturers material batch codes for the liner and the resin shall be marked on the main sheet. The main sheet and lateral tube shall be surrounded by a second impermeable, flexible translucent membrane (translucent bladder) that will contain the resin and facilitate vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wet-out) procedure.

5.1.3 The main sheet and lateral tube shall be a one-piece assembly formed as a into the appropriate TEE or WYE shaped fitting. No intermediate or encapsulated elastomeric layers shall be in the textile that may cause delamination in the cured-in-place pipe. The main sheet will be flat with one end overlapping the second end and sized accordingly to create a circular lining equal to the inner diameter of the main pipe. The lateral tube will be continuous in length and the wall thickness shall be uniform. The lateral tube shall include a hydrophilic O-ring attached to the interior surface at the tail A 2 in. (5.2 cm) strip of uncoated felt shall be sewn on to one end of the tube. One O-ring shall be attached four inches from the end of the liner and the other shall be attached six inches from the end of the liner. flat sheet. When saturated with resin and wrapped around the launcher and then inflated the felt strip overlaps the flat sheet to allow resin on resin contact and form a complete circle pressed against the main sewer pipe. The lateral tube will be capable of conforming to offset joints, bells, and disfigured pipe sections. continuous in length and the wall thickness shall be uniform.

5.2 Resin:

5.2.1 The resin/liner system shall conform to Test Method For design purposes a 50-year time-dependent flexural modulus shall be determined in accordance with D3684D2290, 10-000-h test, with a minimum test duration of 10 000 h.

5.2.2 Materials containing fiberglass shall meet the requirements of Specification D5813, Section 8.2.2.

5.2.3 The resin shall be a corrosion resistant polyester, vinyl ester, epoxy or silicate resin and catalyst system that when properly cured within the composite pipe assembly, meets the requirements of Practice F1216, the physical properties herein, and those, which are to be utilized in the design of the MLCIPL for this project.

5.2.4 The resin shall produce a MLCIPL, which will comply with the structural and chemical resistance requirements of Practice F1216.

5.3 Seamless Molded Hydrophilic Gaskets: (SMHG)

5.3.1 All of the Seamless Molded Hydrophilic Gaskets required for the MLCIPL must conform to Practice F3240, Section 6.

5.3.2 The lateral tube shall include two SMHG O-rings attached to the interior surface at the tail end of the tube (upstream side of the lateral). One O-ring shall be attached 4 in. (10.2 cm) inches from the end of the liner and the other shall be attached 6 in. (15 cm) from the end of the liner. The O-rings shall be attached to the liner in accordance with Practice F3240 section 7.2.3.2. See Fig. 1.

5.3.3 The MLCIPL shall include an SMHG Connection Seal. The Connection Seal shall be attached to the main/lateral liner after the resin saturation process by stainless steel snaps, Velcro®, or other mechanical means that prevent it from being detached from the main/lateral liner according to Practice F3240 Section 7.2.2.2. See Fig. 2.

5.3.4 In lieu of the SMHG Connection Seal, (4) four SMHG O-rings shall be used to seal the connection. Two O-rings shall be placed on each side of the connection on the mainsheet according to Practice F3240 Section 7.2.2.3 and Table 2. See Fig. 3 showing typical placement of the O-rings.



FIG. 1 SMHG O-Rings on Lateral Tube



FIG. 2 SMHG Connection Seal



FIG. 3 Flanged-Shaped Gasket SMHG O-rings on Main Sheet

6. Design Considerations

6.1 The MLCIPL shall be designed in accordance with Practice F1216, Appendix X1, with respect to the lateral tube and main line sheet formed into tubes. If the mainline pipe has been renewed with a structural lining from manhole to manhole, lining, then the mainline portion of the MLCIPL is designed only for hydrostatic buckling.

6.1.1 The design for the main sheet and lateral tube shall assume no bonding to the host pipe.

7. Installation Recommendations

7.1 *Access Safety*—Prior to entering access areas such as manholes or an excavation pit, performing inspection, or cleaning operations, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen shall be undertaken in accordance with local, state, or federal safety regulations.

7.1.1 *Cleaning and Pre-Inspection and Post Inspection*, in accordance with NASSCO (National Association of Sewer Service Companies) Guidelines.

7.1.2 *Accessing the Lateral*—The access point shall be located outside of the building and upstream at the upper terminating end of the finished lateral lining. In order to access both the upstream and downstream sides of the lateral pipe, it is recommended that the access point is TEE shaped where the lateral and riser pipe join. The Tee serves the purpose of access for CCTV and proper maintenance for both the upstream and downstream side. One approved method of providing an access point is described in Practice F3097. See Fig. 44.

7.1.3 *Plugging the Lateral*—The upstream side of the access point shall be plugged during insertion and curing of the MLCIPL assembly, ensuring the following:

(1) *Public Safety* by putting controls in place that prevents the potential for air, steam, or unwanted vapors to enter the building or private residence.

(2) *Quality Control* by preventing flows and unwanted waste from entering the pipe during liner insertion and contaminating the resin saturated liner resulting in low physical properties.

(3) *Quality Assurance* by inserting a sewer camera to confirm the liner is fully deployed and provides access to effectively remove resin slugs.

7.1.4 *Plugging the Main*—When required, the main pipe flows will be bypassed. The pumping system will be sufficiently sized for normal to peak flow conditions. The upstream manhole is monitored at all times and an emergency deflate system will be incorporated so that the plugs may be removed at any time without requiring confined space entry