Designation: F3240 – 19ε1

Standard Practice for Installation of Seamless Molded Hydrophilic Gaskets (SMHG) for Long-Term Watertightness of Cured-in-Place Rehabilitation of Main and Lateral Pipelines[1,2]

This standard is issued under the fixed designation F3240; 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.

ε[1] NOTE—6.1.2 and the caption of Fig. 4 were editorially corrected in December 2019.

1. Scope*

1.1 This practice covers the requirements for the installation of seamless molded hydrophilic gaskets (SMHG) in cured-in-place pipe (CIPP) rehabilitation of main and lateral pipelines.

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 *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]

D1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment

D1600 Terminology for Abbreviated Terms Relating to Plastics

D2240 Test Method for Rubber Property—Durometer Hardness

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

F1743 Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

F2019 Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)

F2599 Practice for The Sectional Repair of Damaged Pipe By Means of An Inverted Cured-In-Place Liner

F2561 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

2.2 *NASSCO Guidelines:*[4]

Recommended Specifications for Sewer Collection System Rehabilitation.

PACP NASSCO Pipeline Assessment & Certification Program

[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] Practice for Installation of Seamless Molded Hydrophilic Gaskets (SMHG) for Long-Term Watertightness of Cured-in-Place Rehabilitation of Main and Lateral Pipelines 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 Technologies, 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 you 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.

[4] Available from NASSCO 2470 Longstone Lane, Suite M Marriottsville, MD 21104 https://www.nassco.org/

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

2.3 *ISO Standard*[5]

ISO 17025 General requirements for the competence of testing and calibration laboratories

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 *seamless molded hydrophilic gasket (SMHG)*—a single piece molded neoprene expansion gasket is positioned between the host pipe and the liner. The gasket absorbs water and expands to form a long-term watertight seal between the CIPP and host pipe, which prevents infiltration and exfiltration.

3.2.2 *SMHG End Seal Sleeve*—a molded neoprene expansion gasket in the shape of an elongated sleeve. The SMHG End Seal Sleeve is engineered to maximize the sealing surface area, to be self-supporting when placed at the ends of the host pipe within 6 in. from the manhole, and to form a robust seal. See Fig. 1.

3.2.3 *SMHG Connection Seal*—a molded neoprene expansion gasket consisting of a tubular portion and a brim portion. The SMHG Connection Seal when positioned at the connection of the lateral pipe and main pipe will form a robust seal between a main pipe or a main liner, and a lateral liner. See Fig. 2.

3.2.4 *SMHG O-Ring*—a molded neoprene expansion gasket in the shape of a circular ring. The SMHG O-Ring is designed to attach to a liner tube near the terminating end of a liner that is either inverted or pulled into place to form a robust seal. Two SMHG O-rings shall be placed within a few inches from the terminating end of a lateral tube. Whenever a SMHG Connection Seal is not used, two SMHG O-rings are placed around the main sheet on each side of the lateral tube to form a robust seal for the connection. See Fig. 3. SMHG O-rings shall also be placed at the terminating ends of a sectional liner tube. See Fig. 4.

3.2.5 *SMHG lateral cap*—a molded neoprene expansion gasket in the shape of a circular disc. The SMHG Lateral Cap is designed to attach to liner used to abandon non-active sewer service laterals to form a robust seal.

3.2.6 *main pipe*—main collector pipe of a sewer collection system

3.2.7 *lateral pipe*—branch pipe that provides sewer service from a building to the main pipe.

3.2.8 *host pipe*—the pipe to be rehabilitated using CIPP or folded pipe liners.

3.2.9 *cured-in-place pipe*—a thermoset resin saturated into an absorbent textile tube pressed against an inner pipe wall and cured to form a new pipe within a pipe.

3.2.10 *liner*—A resin impregnated cured-in-place pipe fabric tube that takes the shape of a main pipe, lateral pipe, or a main to lateral connection when installed.

3.2.11 *main/lateral connection liner*—-One-piece resin saturated liner assembly consisting of a main tube or a main sheet formed into tube (minimum of 16 in. in length) and a lateral tube forming a main/lateral connection liner.

3.2.12 *lateral liner*—Resin saturated liner tube used to renew a lateral pipe.

3.2.13 *main liner*—Liner (CIPP or Folded liner) used to renew a main pipe.

[5] Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, http://www.iso.org.

FIG. 1 SMHG End Seal Sleeve

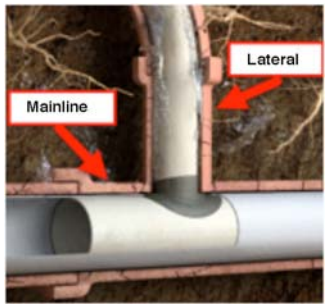

FIG. 2 SMHG Connection Seal

FIG. 3 SMHG O-Rings on Lateral Tube and Main Sheet

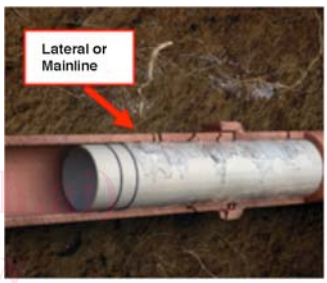

FIG. 4 SMHG O-Rings on Sectional Instead of on Main Sheet

3.2.14 *sectional liner*—CIPP installed in a portion of the main or lateral pipe for repairing a localized defect or a section of the pipe.

3.2.15 *inverting liner*—A liner that progresses through a pipe by turning inside out.

3.2.16 *leading edge*—the edge of the SMHG End Seal Sleeve that faces the direction of liner installation.

3.2.17 *watertight*—for the purposes of this standard, the SMHG shall not allow water to pass through or around the gaskets at head pressures up to 10 psi.

4. Summary of Practice

4.1 This is a practice for materials and the installation of a gasket having specific hydrophilic properties, positioned between the host pipe and the liner, which has been seamlessly molded into various shapes for specific applications relating to sewer pipeline renovation such as an elongated end seal sleeve, a flange having a tubular portion extending therefrom to form a connection seal, and, O-Rings connected to a liner. The purpose of the molded gaskets is to form a long-term watertight seal when a sewer pipeline is being renovated to prevent leakage otherwise known as infiltration and exfiltration.

4.1.1 The SMHG End Seal Sleeve is positioned at the upstream and downstream ends of a main pipe section typically 6 in. from a manhole connection prior to the Main Liner installation. The SMHG End Seal Sleeve is held in place by a mechanical fastener. For large diameter pipe (diameter 18 in. and larger), the sleeve and its fastener are held in place by anchor screws. Once the liner is installed and cured the SMHG End Seal Sleeve shall remain positioned between the host pipe and the CIPP at both ends of the main pipe within 6 in. of the manhole. See Fig. 1.

4.1.2 The SMHG Connection Seal is attached to the Main/Lateral Connection Liner after resin impregnation by two stainless steel snaps located on opposite sides of the SMHG Connection Seal. The SMHG Connection Seal can be manufactured to fit a Tee or Wye connection. Once the liner is installed and cured the SMHG Connection Seal shall remain positioned between the host pipe and the CIPP at the main and lateral connection. See Fig. 2.

4.1.3 The SMHG O-Rings are used to seal CIPP ends with limited access, such as the upper end of a lateral liner inverted from the main pipe. See Fig. 3. Another use would be at the upstream and downstream ends of a sectional CIPP located in a main pipe or in a lateral pipe. The SMHG O-Rings are attached to an inverting liner near its terminating ends before resin impregnation. See Fig. 4 SMHG. When a SMHG Connection Seal is not used SMHG O-Rings shall be placed around flat sheet liners that are formed into a tube by wrapping the sheet around an inflatable plug. Once the liner is installed and cured the SMHG O-Rings shall remain positioned between the host pipe and the CIPP liner. See Fig. 3 and Fig. 4.

4.1.4 The SMHG Lateral Cap is attached to a short liner that is formed from a flat sheet of resin absorbent material suitable for CIPP. The forming of the tube is accomplished using a textile sheet 24 in. in length and a width sufficient to create a circular lining equal to the inner diameter of the main pipe by one end of the sheet overlapping a second end. The SMHG Lateral Cap shall be centered with the lateral opening.

4.1.5 Applicable ASTM standards or manufacturer's recommendations, or both, shall govern the installation procedures for the various CIPP rehabilitation methods.

5. Significance and Use

5.1 This practice is for use by designers and specifiers, regulatory agencies, owners, and inspection organizations that are involved in the rehabilitation of main and lateral pipelines and manholes. As for any practice, modifications may be required for specific job conditions.

6. Materials

6.1 *Seamless Molded Hydrophilic Gasket (SMHG):*

6.1.1 The SMHGs shall be made with Neoprene rubber having hydrophilic properties. The gaskets shall be submerged in water for a maximum of 14 days and demonstrate a minimum of 800 % expansion by volume. An ISO 17025 accredited testing facility shall perform the testing.

6.1.2 The SMHGs shall be subjected to a 10 000-hour hydration/dehydration test performed by an ISO 17025 accredited testing facility. The test shall include submerging the gaskets in water for a period of 2, 7, 30, 90, 180 and 416 days then removed, measured, and weighed. The gaskets shall remain out of water for the same period of time as they were submerged except for the 416 day interval. This process is repeated until all samples within their respective cycles have been tested for 10 000 h. Results must show that the SMHGs continue to stay flexible after the hydration cycles by bending the sample in half and observing no cracking. The SMHGs shall retain the ability to absorb water and swell and demonstrate a minimum weight increase of 800% for all periods.

6.1.3 The SMHGs shall have a Shore A Hardness of at least 45 when tested in accordance with Test Method D2240.

6.1.4 The SMHGs shall meet the requirements of Test Method D1149, Test Method for Rubber Deterioration - Cracking in an Ozone Controlled Environment. The test results shall demonstrate no cracking. An ISO 17025 accredited testing facility shall perform testing.

6.1.5 The SMHG End Seal Sleeve shall have the following dimensions for the respective host pipe inside diameter (ID). See Table 1.

6.1.6 The SMHG O-Ring shall have the following dimensions for the respective host pipe inside diameter (ID).

6.1.7 The SMHG Connection Seal shall have minimum values for the thickness, flange width, and length of tubular portion of 0.125 in., 2.5 in., and 1.6 in. respectively. The SMHG Connection Seal shall be molded in either a Wye or Tee configuration and in a manner in which it creates a circular or elliptical shape in the portion that extends into the lateral when the flange portion is forced to curve around the CIPP. The SMHG Connection Seal will conform to the curvature of main pipes from 6 in. diameter and larger.

6.1.8 The SMHG Lateral Cap shall be a circular disk with a thickness of 2.5 mm and a diameter of 12 in.

6.2 *Mechanical Fastener for End Seal Sleeve:*