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Am American National Standard

Standard Practice for The Sectional Repair of Damaged Pipe By Means of An Inverted Cured-In-Place Liner[1, 2]

This standard is issued under the fixed designation F2599; 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 sectional cured-in-place lining (SCIPL) repair of a pipe line (4 in, through 60 in.) by the installation of a continuous resin-impregnated-textile tube into an existing pipe by means of air or water inversion and inflation. The tube is pressed against the host pipe by air or water pressure and held in place until the thermo set resins have cured. When cured, the sectional liner shall extend over a predetermined length of the host pipe as a continuous, one piece, tight fitting, corrosion resistant and verifiable non-leaking cured-in-place pipe.

1.2 The values stated in inch-pound units are to be regarded as ~~the~~ 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 and health practices and determine the applicability of regulatory limitations prior to use. Particular attention is drawn to those safety regulations and requirements involving entering into and working in confined spaces.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D1600 Terminology for Abbreviated Terms Relating to Plastics

D3681 Test Method for Chemical Resistance of Fiberglass (GlassFiberReinforced 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

2.2 *NASSCO Guidelines:*[4]

Recommended Specifications for Sewer Collection System Rehabilitation.

3. Terminology

3.1 *Definitions:*

3.1.1 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*, *n*—upstream or downstream manholes, that serve as the point of entrance or exit for the liner assembly into the existing pipe.

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[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 sectional repair of damaged pipe by means of inversion of a cured in place liner is covered by patents (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 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] NASSCO, 1314 Bedford Avenue, Suite 201, Baltimore, MD 21208~~

[4] NASSCO, Inc. 11521 Cronridge Drive, Suite J, Owings Mills, MD 21117. http://www.nassco.org.

3.2.2 *bladder*, *n*—a translucent plastic apparatus that when pressurized, causes the tube to be inverted through the damaged pipe section and pressed against the pipe walls. The bladder joined with the tube creates a liner/bladder assembly.

3.2.3 *frangible connection*, *n*—a joining or combining of two objects that can be easily disconnected or separated by means of force.

3.2.4 *hydrophilic O-ring*, *n*—a neoprene O-ring that is moisture activated with expansion characteristics of 5-8 times its original thickness, producing a compression gasket seal between the cured liner tube and the host pipe.

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

~~3.2.5~~

3.2.6 *launcher*, *n*—an elongated flexible pressure vessel (hose apparatus) with one open end and one closed end capable of receiving air pressure to cause a liner/bladder assembly to invert forward out from the launcher.

~~3.2.6~~

3.2.7 *lift*, *n*—a portion of the cured liner that has cured in a position such that it has pulled away from the existing pipe wall.

~~3.2.7~~

3.2.8 *liner/bladder assembly*, *n*—a combination of a tube and bladder that are frangibley connected.

~~3.2.8~~

3.2.9 *nominal thickness*, *n*—the finished liner thickness after curing.

~~3.2.9~~

3.2.10 *resin*, *n*—polyester, vinyl ester, epoxy or silicate resin systems being ambient or steam cured.

~~3.2.10~~

3.2.11 *sectional cured in place lining (SCIPL)*, *n*—a textile tube impregnated by a thermo setting resin, which is formed within a portion of the existing pipe, thereby taking the shape of, and fitting tightly to the existing pipe.

~~3.2.11~~

3.2.12 *tube*, *n*—a textile tube capable of absorbing a thermo set resin.

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 pipes through the use of a resin-impregnated tube installed within a damaged existing pipe. As for any practice, modifications may be required for specific job conditions.

5. Materials

5.1 *Tube*—

5.1.1 The textile tube shall consist of one or more layers of absorbent textile, for example, needle punched felt or circular knit, fiberglass or similar textile materials that meet the requirements of Practice F1216 and Requirements and Test Methods sections of Specification D5813. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe segments, and flexibility to fit irregular pipe sections. The wetout tube shall meet Resin Impregnation Requirements of Practice F1216, and shall have a uniform thickness and with excess resin distribution that when compressed at installation will meet or exceed the design thickness after cure.

5.1.2 The tube shall be surrounded by an impermeable flexible translucent bladder that will contain the resin and facilitate visual monitoring of the vacuum impregnation (wetout) procedure.

5.1.3 The tube shall be continuous. No intermediate or encapsulated elastomeric layers shall be in the textile that may cause de-lamination in the finished cured in place pipe. The tube shall be sized accordingly to create a circular lining equal to the inside of the main pipe.

5.1.4 The tube shall be fabricated with a 2 inch ring of compressible textile material at the upstream and downstream ends, to create a smooth transition. The compressible textile material will compress to meet the host pipe at its leading end and match the wall thickness of the tube at its opposite end.

5.1.5 The tube shall be fabricated to include a hydrophilic neoprene rubber O-ring at each end of the tube. The O-ring shall be attached to the inner side of the liner tube prior to resin saturation.

5.2 *Resin*

5.2.1 The resin/liner system shall conform to Test Methods section of Specification D5813- 10,000-hour test and Test Method D3681 using a 10,000 hour test period.

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

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

6. Design Considerations

6.1 The SCIPL shall be designed per Practice F1216, Appendix X1, Section X1.1.2.

6.2 The SCIPL design for the sectional liner shall assume no bonding to the original pipe.