Designation: F3182 – 23

Standard Practice for the Application of Spray-Applied Polymeric Liners Inside Pipelines for Potable Water[1]

This standard is issued under the fixed designation F3182; 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 describes the procedures for the rehabilitation of potable water pipes using spray-applied polymeric coatings for pipelines constructed of iron, steel, or asbestos cement using resin materials that have been certified in accordance with NSF/ANSI 61 for the in-situ lining of potable water mains.

1.2 This practice applies to potable water pipelines constructed of metallic or non-metallic piping in the diameter ranges of 4 in. (10 cm) to 36 in. (90 cm). Specialist advice should be sought from the product manufacturer for polymeric linings applied to other nonmetallic surfaces and for applied linings outside of these diametric limitations.

1.3 This practice applies to in-situ pipes requiring AWWA Class I (nonstructural) linings through Class III (semi-structural) linings (see AWWA M28).

1.4 This practice does not address lining system design. Assistance with lining system design is available from lining system manufacturers and operators who have been professionally trained and experienced in polymeric liner design.

1.5 *Units*—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.

1.6 *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.*

1.7 *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:*[2]

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

D3359 Test Methods for Rating Adhesion by Tape Test

D4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

D6677 Test Method for Evaluating Adhesion by Knife

D7091 Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

F412 Terminology Relating to Plastic Piping Systems

2.2 *AWWA Documents:*[3]

AWWA C651 Disinfecting Water Mains

AWWA M28 Rehabilitation of Water Mains

AWWA C222 Polyurethane coatings for the Interior and Exterior of Steel Water Pipe and Fittings

2.3 *NSF Standards:*[4]

NSF/ANSI 61 Drinking Water System Components – Health Effects

NSF/ANSI 14 Plastic Piping System Components and Related Materials

NSF/ANSI 372 Drinking Water System Components – Lead Content

2.4 *Society of Protective Coating/NACE Standards:*[5,6]

SSPC-SP 6 /NACE NO. 3 Commercial Blast Cleaning

SSPC-SP 7 /NACE NO. 4 Brush-off Blast Cleaning

[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] 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.

[3] Available from American Water Works Association (AWWA), 6666 W. Quincy Ave., Denver, CO 80235, http://www.awwa.org.

[4] Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48105, http://www.nsf.org.

[5] Available from The Society for Protective Coatings, 40 24th Street, Sixth Floor, Pittsburgh, PA 15222

[6] Available from NACE International (NACE), 15835 Park Ten Pl., Houston, TX 77084, http://www.nace.org.

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

3. Terminology

3.1 *Definitions:* Definitions are in accordance with Terminology F412 and abbreviations are in accordance with Terminology D883 and D1600, unless otherwise specified.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *accredited third party certification organizations, n*—agencies accredited by an independent and authoritative conformity assessment body (for example, International Laboratory Accreditation Cooperation) to operate a material and product testing, and listing (certification) system that is accepted by the Authority Having Jurisdiction.

3.2.2 *certified applicator*—any individual or firm who is certified by the manufacturer or his designated certifying representative to apply or supervise the application of the manufacturer's product or technology.

3.2.3 *metallic piping, n*—a tubular shape made of metal, intended to convey liquids or gases.

3.2.3.1 *Discussion*—Usually semi-rigid or rigid metal such as galvanized steel, galvanized wrought iron, black steel, stainless steel, copper, brass, cast iron, ductile iron or similar metal.

3.2.4 *non-metallic piping, n*—a tubular shape made of non-metallic materials, intended to convey liquids or gases.

3.2.4.1 *Discussion*—Non-metallic pipe materials include asbestos cement, concrete, thermoplastics such as HDPE and PVC, and composites such as fiberglass.

3.2.5 *non-structural lining, n*—a lining bonded to the host pipe internal diameter that can withstand abrasion and support limited specified loads including vacuum loads, but relies on the transfer of all other loads (internal and external) to the host pipe.

3.2.6 *owner's representative or designate*—The designated official who has the legal authority to act on behalf of the owner (for example, consultant).

3.2.7 *semi-structural lining, n*—an interactive lining bonded to the host pipe internal diameter whose hoop strength may be less than that required to support the maximum operating pressure (MOP) for the pressure pipe, but that can withstand abrasion and independently withstand vacuum, and pressure loads at holes or gaps.

3.2.7.1 *Discussion*—All other internal and external loads are sustained by the host pipe for the life of the liner.

3.2.8 *spray-in-place pipe, SIPP, n*—spray-applied polymeric (thermoset) lining for the interior of pipes that consists of a two-component system designed to provide a non-structural or semi-structural enhancement to pipes used for potable water conveyance.

4. Summary of Practice

4.1 This practice describes the procedures for the rehabilitation of potable water mains using spray-applied polymeric coatings for the inside of pipes. It includes material requirements, cleaning requirements, lining procedures, performance requirements (testing) and quality control provisions.

5. Significance and Use

5.1 This practice is for use by water utilities or other owners, contractors, specifiers, regulatory agencies, inspection organizations or other users who are involved in the rehabilitation of potable water pipelines and wish to specify or permit the use of spray-applied polymeric liners.

6. Material Requirements

6.1 The polymeric lining materials used for in-situ, spray-applied lining of water mains shall be evaluated, tested and certified for conformance with NSF/ANSI 61 or the health effects portion of NSF/ANSI 14 and NSF/ANSI 372 by an accredited third party certification organization when required by the regulatory authority having jurisdiction. These certification requirements relate to the effect of these materials on water quality and do not indicate fitness for use or purpose in terms of physical performance.

6.2 It shall be the manufacturer's responsibility to provide the owner or his designated representative with the physical performance and test data for the supplied polymeric lining materials (see 8.5). It shall be the manufacturer's further responsibility to ensure that testing and certification for these material and physical performance parameters is obtained using accredited third-party certification organizations' testing laboratories. These testing reports and certifications shall be made available to the owner's representative upon request.

7. Lining Procedures

7.1 *General*—The lining materials shall be applied in accordance with the manufacturer's recommendations using the means and methods specified by the manufacturer. All lining applications shall be completed by manufacturer-approved, certified applicators, using manufacturer-approved, calibrated equipment and written procedures. All material applications shall be pre-planned by a certified applicator in accordance with the manufacturer's recommendations and subject to the quality control requirements of Section 9 of this practice.

7.1.1 All lining equipment used in the lining process shall be sanitized for contact with potable water to the satisfaction of the contract provisions or owner. This includes cleaning equipment, spray rig including umbilical/tether, and CCTV equipment contacting the water pipe. Controls shall be put in place by the certified applicator to ensure that lining equipment does not bring contaminants into the pipe. The use of multiple application lining equipment for water pipe lining operations shall only be permitted when pre-authorized by the owner, and only after full sanitary cleaning measures imposed by the owner have been taken and proven.

7.2 *Preparatory Planning*—Comprehensive planning is required before the commencement of polymeric lining operations. The following list of considerations is provided to the user for guidance and is not exhaustive:

(1) Review and analysis of system architecture, surface and subsurface information,

(2) zoning restrictions and regulations,

(3) safety and health concerns and requirements,

(4) access and egress considerations,

(5) customer care planning,