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An American National Standard

Standard Specification for Folded/Formed Poly (Vinyl Chloride) Pipe Type A for Existing Sewer and Conduit Rehabilitation[1]

This standard is issued under the fixed designation F1871; 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—Tables 1, 3 and 4 were editorially corrected in May 2005.~~

1. Scope

1.1 This specification covers requirements and test methods for materials, dimensions, workmanship, flattening resistance, impact resistance, pipe stiffness, extrusion quality, and a form of marking for folded/formed poly (vinyl chloride) (PVC) pipe for existing sewer and conduit rehabilitation.

1.2 Pipe produced to this specification is for use in non-pressure sewer and conduit rehabilitation where the folded PVC pipe is installed into and then expanded to provide a close fit to the wall of the original conduit, forming a new structural pipe-within-a-pipe.

NOTE 1—For installation procedures refer to Practice F1867.

1.3 This specification includes pipe made only from materials specified in Section 6. This specification does not include pipe manufactured from reprocessed, recycled, or reclaimed PVC.

1.4 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are provided for information only.

1.5 The following precautionary statement pertains only to the test method portion, Section 11, of this specification. *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.*

1.6 There is no similar or equivalent ISO Standard.

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2. Referenced Documents

2.1 *ASTM Standards:*[2]

D618 Practice for Conditioning Plastics for Testing

D638 Test Method for Tensile Properties of Plastics

D648 Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position

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

D1600 Terminology for Abbreviated Terms Relating to Plastics

D1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

D2152 Test Method for Adequacy of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion

D2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

D2444 Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

F412 Terminology Relating to Plastic Piping Systems

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[1] This standard is under the jurisdiction of Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.67 ~~on Trenchless Plastic Pipline Technology.~~

~~Current edition approved Sept. 10, 2002. Published December 2002. Originally approved in 1998. Last previous edition approved in 1998 as D1871–98ε2. DOI: 10.1520/F1871-02E01.~~on Trenchless Plastic Pipeline Technology.

Current edition approved April 1, 2011. Published May 2011. Originally approved in 1998. Last previous edition approved in 2002 as F1871-02ε1 which was withdrawn January 2011 and reinstated in April 2011. DOI: 10.1520/F1871-11.

[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.

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F1057 Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique
F1867 Practice for Installation of Folded/Formed Poly (Vinyl Chloride) (PVC) Pipe Type A for Existing Sewer and Conduit Rehabilitation

2.2 *Federal Standard:*[3]
Fed. Std. No. 123 Marking for Shipment (Civil Agencies)
2.3 *Military Standard:*[3]
MIL-STD-129 Marking for Shipment and Storage

3. Terminology

3.1 *Definitions:* Definitions are in accordance with Terminology F412, and abbreviations are in accordance with Terminology D1600, unless otherwise specified. The abbreviation for poly(vinyl chloride) plastics is PVC.

3.1.1 The term TYPE A is not an abbreviation, but rather an arbitrary designation for PVC compounds with a minimum value for modulus in tension as listed in 6.1 and a maximum value as defined by cell limit 1 of Specification D1784.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *folded pipe*, *n*—pipe that has been manufactured and calibrated round, then subsequently cooled and deformed into a folded shape for use in existing sewer and conduit rehabilitation (see Fig. 1).

3.2.2 *formed pipe*, *n*—A folded pipe that has been inserted into an existing sewer or conduit and expanded with steam heat and pressure, and, if required by the manufacturer, with a squeegee device or similar device to provide a close fit to the existing pipe (see Fig. 1).

3.2.3 *formed field sample*, *n*—A formed field sample is formed when the folded pipe has been inserted into a mold pipe and expanded with steam heat and pressure, and, if required by the manufacturer, with a squeegee device or similar device to provide a close fit to the mold pipe.

[3] Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA ~~19111–5094, Attn: NPODS.~~19111-5098, http://dodssp.daps.dla.mil.

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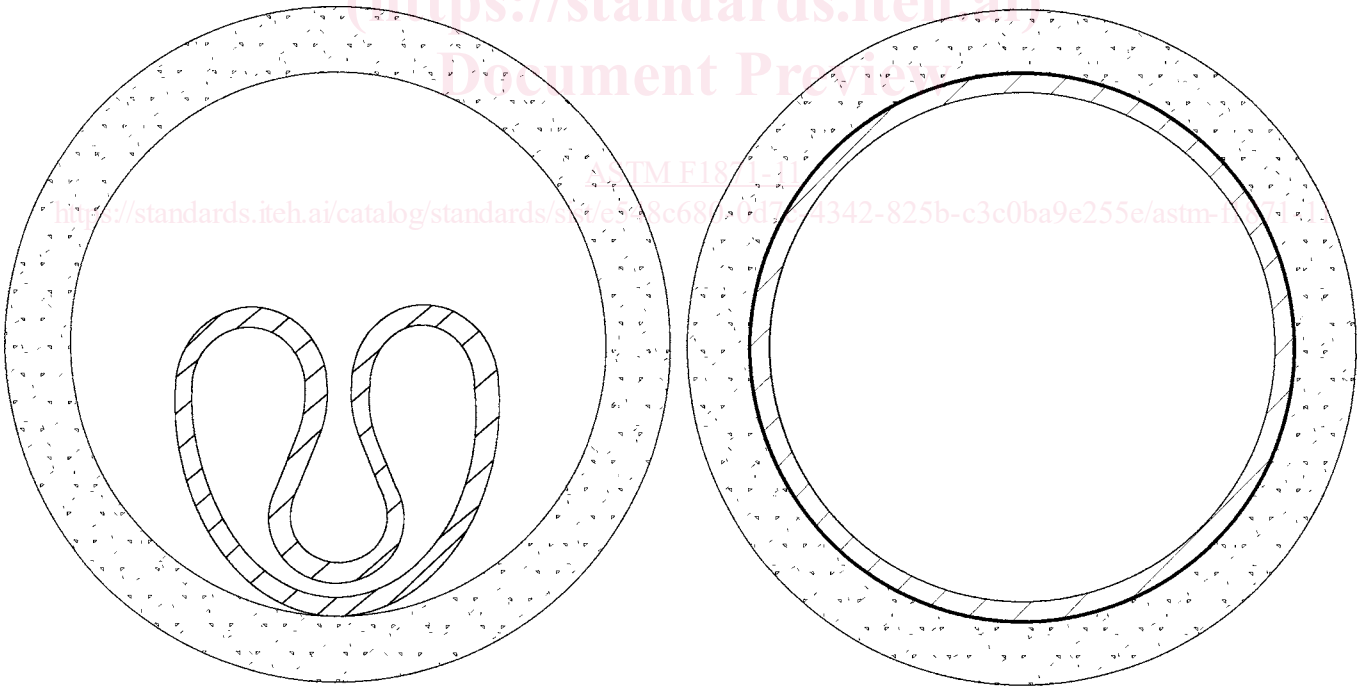

NOTE 1—This figure is intended only for clarification of terms specific to this specification, and shows a representative folded pipe shape. Other folded pipe shapes may meet the requirements of this specification.

FIG. 1 Folded Pipe and Formed Pipe—Clarification of Terms

4. Significance and Use

4.1 This specification is for use by designers and specifiers, regulatory agencies, owners, and inspection organizations who are involved in the rehabilitation of non-pressure sewers and conduits. Modifications may be required, depending on specific job conditions to establish a project specification. The manufacturer of the product should be consulted for design and installation information. Industrial waste disposal lines should be installed only with the specific approval of the cognizant code authority, since chemicals not commonly found in drains and sewers and temperatures in excess of 140°F (60°C) may be encountered.

5. Applications of Material

5.1 The nominal folded PVC pipe sizes specified in Section 8 can be obtained for use in a range of original pipe inside diameters. Table 1 presents recommended ranges that are available for each nominal size.

6. Materials and Manufacture

6.1 *Basic Materials*—The pipe shall be made from virgin PVC compound meeting all the requirements for cell classification 12111 as defined in Specification D1784 and with minimum physical properties as listed below:

Tensile Strength	Test Method D638	3 600 PSI	(25 MPa)
Tensile Modulus	Test Method D638	155 000 PSI	(1069 MPa)
Flexural Strength	Test Method D790	4 100 PSI	(28 MPa)
Flexural Modulus	Test Method D790	145 000 PSI	(1000 MPa)
Heat Deflection Temperature tested at 264 psi	Test Method D648 (2 MPa)	115°F	(46°C)

6.1.1 Compounds meeting the above minimum properties that have different cell classifications because one or more properties are greater than those of the specified compounds are also acceptable, except modulus in tension shall not exceed 280 000 psi.

6.2 *Rework Material*—Clean rework material from this type of pipe, generated from the manufacturer's own production may be used by the same manufacturer, provided that the rework material meets all the requirements of 6.1 and that the pipe produced meets all the requirements of this specification.

7. Other Requirements

7.1 *Pipe Flattening*—There shall be no evidence of splitting, cracking, or breaking when the rounded pipe is tested in accordance with 11.3.

7.2 *Pipe Impact Strength*—The impact strength of rounded pipe shall not be less than the values given in Table 2 when tested in accordance with 11.4.

NOTE 2—This test is intended only for use as a quality control test, not as a simulated service test.

7.3 *Pipe Stiffness*—Pipe stiffness values for the rounded pipe shall comply with Table 3, when tested in accordance with 11.5.

7.4 *Extrusion Quality*—The extrusion quality of the pipe shall be evaluated by both of the following test methods.

7.4.1 *Acetone Immersion*—The pipe shall not flake or disintegrate when tested in accordance with 11.6.1.

7.4.2 *Heat Reversion*—The extrusion quality shall be estimated by heat reversion method in accordance with 11.6.2.

7.5 *Flexural Properties*—Flexural modulus of elasticity values for the rounded pipe shall comply with 6.1.

8. Dimensions, Mass, and Permissible Variations

8.1 *Formed Pipe Diameter*—The average outside diameter of the formed pipe shall meet the requirements given in Table 4 with

TABLE 1 Folded PVC Pipe Recommended Size Ranges of Use

NOTE—The minimum and maximum recommended existing pipe inside diameters shown are mean inside diameters along the pipe length and are not intended as absolute limits on localized dimensions. Consult the manufacturer for use of folded PVC pipe for sizes of existing pipe beyond the recommended ranges shown.

Folded Pipe Nominal Outside Diameter, in. (mm)	Recommended Existing Pipe Inside Diameter Range, in. (mm)		Resulting Installed DR Range			
	Min	Max	DR 26	DR 32.5	DR 35	DR 41
4 (102)	3.6 (91)	4.1 (104)	24-27	31-38		
6 (152)	5.7 (145)	6.1 (155)	25-27	31-38		
8 (203)	7.6 (193)	8.2 (208)	25-27	31-38	34-36	
9 (229)	8.6 (218)	9.2 (234)	25-27	31-38	34-36	
10 (254)	9.5 (241)	10.2 (259)	25-27	31-38	34-36	
12 (305)	11.6 (295)	12.6 (320)	25-27	31-38	34-36	
15 (381)	14.5 (368)	15.4 (391)	25-27	31-38	34-36	
18 (457)	17.6 (447)	18.2 (462)			34-36	40-42

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