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An American National Standard

Standard Specification for Pressure-Rated Composite Pipe and Fittings for Elevated Temperature Service[1]

This standard is issued under the fixed designation F1335; 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 specification covers pressure-rated composite pipe and fittings for the transport of hot or cold liquids, beverages, or gases that are compatible with the composite pipe and fittings.

1.2 Composite pipe is produced using a butt welded aluminum pipe as a core, with an extruded inside layer of crosslinked polyethylene (PEX) or polyethylene (PE). An adhesive layer is used to bond the inside layer to the wall of the aluminum pipe. An outer layer of polyethylene (PE) and an adhesive layer are extruded to the outer wall of the aluminum pipe.

1.3 Composite pipe is produced in four configurations and referenced in Fig. 1, as Classes 1, 2, 3, and 4 composite pipe.

1.4 This specification includes compression fittings and compression joints, which are referenced in Fig. 2. Compression fittings as described in this specification are not compatible for gas transportation. Threaded fittings are referenced in Fig. 3.

1.5 The following precautionary caveat pertains only to the test method portion 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 The values stated in acceptable SI units are to be regarded as the standard. The values given in parentheses are provided for information only. The values stated in each system are not exact equivalents, therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B283 Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)

B313/B313M Specification for Aluminum and Aluminum-Alloy Round Welded Tubes

B547/B547M Specification for Aluminum and Aluminum-Alloy Formed and Arc-Welded Round Tube

B584 Specification for Copper Alloy Sand Castings for General Applications

D618 Practice for Conditioning Plastics for Testing

D638 Test Method for Tensile Properties of Plastics

D1248 Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

D1505 Test Method for Density of Plastics by the Density-Gradient Technique

D1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

D1600 Terminology for Abbreviated Terms Relating to Plastics

D1898 Practice for Sampling of Plastics[3]

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

D2765 Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics

D3222 Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials

D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

D3418 Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry

F412 Terminology Relating to Plastic Piping Systems

2.2 *National Sanitation Foundation (NSF) Standards:*[4]

[1] This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.11 on Composite.

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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] Withdrawn.

[4] Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140.

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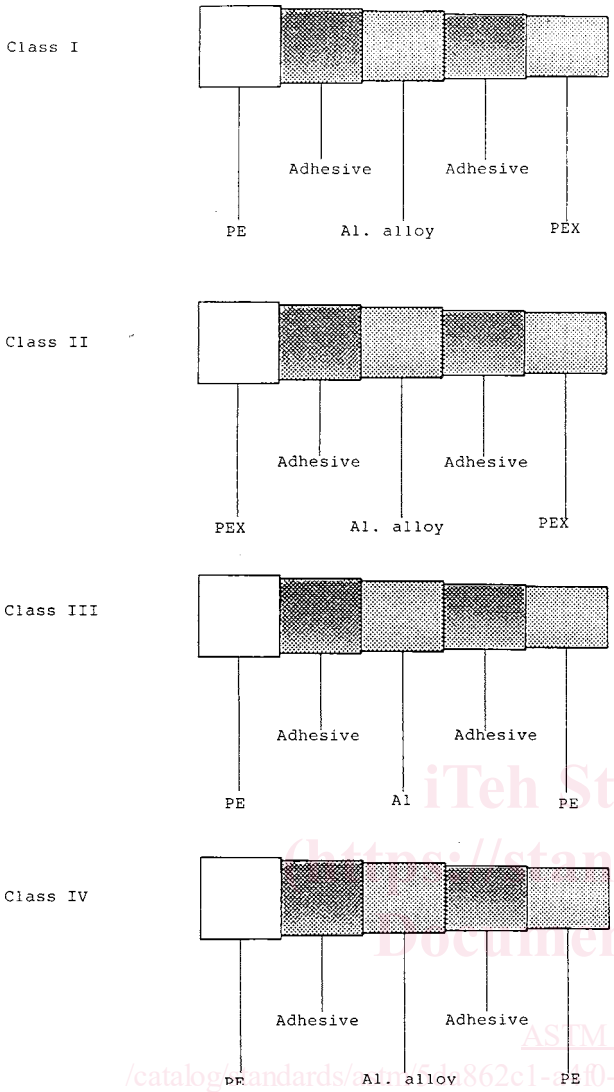

FIG. 1 Composite Pipe Composition

Standard No. 14 for Plastic Piping Components and Related Materials

Standard No. 61 for Drinking Water System Components—Health Effects

2.3 *ISO Standards:*[5]

ISO 31 - 0 General principles

ISO 32 3 Mechanics

ISO 10508 Thermoplastics Pipe and Fittings for Hot and Cold Water Systems

2.4 *DVGW Standard:*[6]

W 534 Technical Rules for Connecting Pipe Elements and Pipe Connections for Pipe in Drinking Water Installations; Requirements and Testing

2.5 *Federal Standard:*[7]

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

2.6 *Military Standard:*[7]

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.

3.1.1 *composite pipe*—pipe consisting of two or more different materials arranged with specific functional purpose to serve as pipe.

3.1.2 *crosslinked polyethylene plastic*—plastic prepared by crosslinking (curing) polyethylene compounds.

3.1.3 *pressure ratings (PR)*—the estimated maximum pressure that water in the pipe can exert continuously with a high degree of certainty that failure of the pipe will not occur.

3.1.4 The abbreviation for polyethylene is PE, and the abbreviation for crosslinked polyethylene is PEX.

3.1.5 *Fittings for Composite Pipe*:

3.1.5.1 *compression fittings, compression joints*—fittings and joints specially developed for composite pipe in which the aluminum core is used as a compression sleeve to develop sufficient mechanical strength for the connection.

3.1.5.2 *threaded fittings, threaded joints*—fittings and joints specially designed for composite pipe to avoid the possible galvanic current between the aluminum of the composite pipe and any metallic part of the fitting.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *adhesive*—a low-molecular weight polyethylene that functions as an adhesive layer and bonds the crosslinked polyethylene or the polyethylene to the aluminum pipe.

3.2.2 *Class 1 composite pipe*—composite pipe for elevated temperature and pressure ratings.

3.2.3 *Class 2 composite pipe*—composite pipe for elevated temperature and pressure ratings and better outside resistance.

3.2.4 *Class 3 composite pipe*—composite pipe for use at lower temperature and pressure ratings.

3.2.5 *Class 4 composite pipe*—composite pipe for low temperature, more specific for gas transportation.

3.2.6 *compression fittings for composite pipe,* (Fig. 2)—fittings specially developed for composite pipe in which the aluminum core is used as a compression sleeve to develop sufficient mechanical strength for the connection.

3.2.7 *threaded fittings* (Fig. 3)—specially developed for composite pipe for the transport of liquids and gases.

3.2.8 *lot*—a lot shall consist of all pipe of the same size produced from one extrusion line during one designated period.

4. Classification

4.1 Pipe and threaded fittings produced under this specification will provide suitable network for the transport of hot and cold liquids and compatible gases at specified pressure ratings and temperatures.

4.2 Pipe and compression fittings produced under this specification will provide suitable network for hot and cold compatible liquids at specified pressure rating and temperatures.

[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

[6] Available from DVGW Deutsche Vereinigung des Gas-u. Wasserfaches, Postfach 140362, Josef-Wirmerstr. 1–3, D-53123 Bonn.

[7] Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

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