



Designation: F 2735 – 08a

# Standard Specification for Plastic Insert Fittings For SDR9 Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing<sup>1</sup>

This standard is issued under the fixed designation F 2735; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This specification establishes requirements for sulfone plastic insert fittings and copper crimp rings for three sizes ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , and 1) of cross-linked polyethylene (PEX) and polyethylene of raised temperature (PE-RT) plastic tubing. These fittings are intended for use in 100 psi (690 kPa) cold- and hot-water distribution systems operating at temperatures up to and including 180°F (82°C). Included are the requirements for material, molded part properties, performance, workmanship, dimensions, and markings to be used on the fittings and rings.

1.2 *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.

1.3 The following is an index of the appendix in this specification.

GO/NO-GO Crimp Gauges

Appendix X1

1.4 The following precautionary caveat pertains only to the test method portions, Sections 11 and 12, 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.*

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

**D 1600** Terminology for Abbreviated Terms Relating to Plastics

**D 2122** Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

**D 6394** Specification for Sulfone Plastics (SP)

**F 412** Terminology Relating to Plastic Piping Systems

**F 876** Specification for Crosslinked Polyethylene (PEX) Tubing

**F 877** Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems

**F 1498** Specification for Taper Pipe Threads 60° for Thermoplastic Pipe and Fittings

**F 1807** Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing

**F 2623** Specification for Polyethylene of Raised Temperature (PE-RT) SDR 9 Tubing

2.2 *ASME Standard*:<sup>3</sup>

**B1.20.1** Pipe Threads General Purpose Inch

2.3 *NSF International Standard*:<sup>4</sup>

**NSF/ANSI Standard No. 14** for Plastic Piping Components and Related Materials

**NSF/ANSI Standard No. 61** for Drinking Water System Components-Health Effects

## 3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology **F 412** and abbreviations are in accordance with Terminology **D 1600**, unless otherwise indicated.

## 4. Classification

4.1 This specification governs one class of fittings and copper crimp rings suitable for use with nominal size  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and 1 size PEX tubing that meets the requirements of Specifications **F 876** and polyethylene of raised temperature (PE-RT) tubing that meets the requirements of Specification **F 2623**.

## 5. Ordering Information

5.1 *Material*—Fittings shall be molded from sulfone plastic (SP) as specified in Specification **D 6394**. The material shall be

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.10 on Fittings. Current edition approved Nov. 1, 2008. Published November 2008. Originally approved in 2008. Last previous edition approved in 2008 as F2735-08.

<sup>2</sup> 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.

<sup>3</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.

<sup>4</sup> Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140, http://www.nsf.org.

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

unreinforced polyphenylsulfone (group 03, class 1, grade 2) or an unreinforced blend of polyphenylsulfone and polysulfone (group 01, class 1, grade 2) with the polyphenylsulfone continuous phase comprising 55 to 80 % of the blend. Fittings shall be made from virgin plastic or reworked plastic in accordance with 5.1.2.

5.1.1 Since fittings specified by this standard will be used in hot-and-cold water plumbing systems, a material used to manufacture fittings in accordance with this specification must demonstrate qualities consistent with that application in addition to the performance requirements of this specification. Those qualifying characteristics include, but are not limited to, an established hydrostatic design basis (HDB) or stress design basis (SDB) in accordance with PPI TR-3 or similar rating and a demonstration of resistance to the long-term effects of those chemicals normally found in potable water at the maximum temperature stated in this specification.

5.1.2 *Rework Material*—Clean rework material of the same commercial designation, generated from the manufacturer's own production may be used by the same manufacturer, provided the fittings meet all of the requirements of this specification. Reworked material shall not be introduced at a ratio exceeding 25 %.

5.2 *Potable Water Requirements*—Products intended for the transport of potable water shall be evaluated, tested and certified for conformance with NSF/ANSI Standard No. 61 or the health effects portion of NSF/ANSI Standard No. 14 by an acceptable certifying organization when required by the regulatory authority having jurisdiction.

5.3 *Crimp Rings*—Crimp rings shall be manufactured and marked in accordance with the requirements of Specification F 1807.

## 6. Molded Part Properties

6.1 *Insert Crush*—The fitting insert shall not crack, split, or shatter when tested in accordance with 12.1.

6.2 *Splay*—The molded part shall be free of visible splay excepting some slight blushing at the gate location.

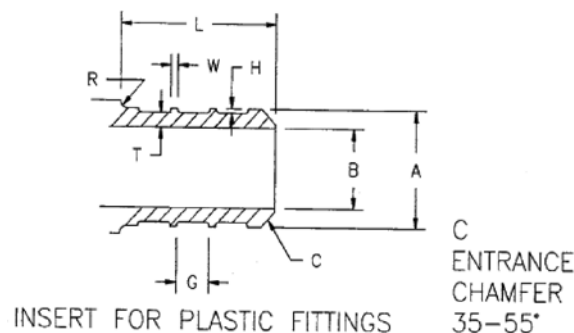
## 7. Performance Requirements

7.1 *General*—All performance tests shall be performed on assemblies of fittings, crimp rings, and PEX tubing. Fittings and crimp rings shall meet the material and dimensional requirements of this standard. PEX tubing shall meet the requirements of Specification F 876. Assembly of test specimens shall be in accordance with Section 10. Use separate sets of assemblies for each performance test requirement.

7.2 The following sections of Specification F 877 constitute a part of this specification:

- 7.2.1 Hydrostatic Burst,
- 7.2.2 Hydrostatic Sustained Pressure Strength,
- 7.2.3 Thermocycling,
- 7.2.4 Excessive Temperature-Pressure Capability, and
- 7.2.5 Test Methods.

7.3 In addition, when a section with a title identical to that referenced in 7.2 appears in this specification, it contains additional requirements that supplement those appearing in Specification F 877.



|            | A                | B <sup>A</sup> | L <sup>B</sup> | H                  |                             | W              | G              | T                         | R              | Maximum Flash and Mismatch             |
|------------|------------------|----------------|----------------|--------------------|-----------------------------|----------------|----------------|---------------------------|----------------|----------------------------------------|
| Size (in.) | Outside Diameter | Minimum ID     | Insert Length  | Minimum Rib Height | Number of Ribs <sup>C</sup> | Rib Width Type | Gap Width Type | Minimum Wall <sup>D</sup> | Minimum Radius | Total on Crest Diameter <sup>E,F</sup> |
| 1/2        | 0.471 ± .004     | 0.315          | 0.480 ± .004   | 0.011              | 2                           | 0.02- 0.04     | 0.114±.004     | 0.059                     | 0.03           | 0.005                                  |
| 3/4        | 0.667 ± .004     | 0.490          | 0.480 ± .004   | 0.011              | 2                           | 0.02- 0.04     | 0.114±.004     | 0.067                     | 0.03           | 0.005                                  |
| 1          | 0.856 ± .004     | 0.645          | 0.480 ± .004   | 0.011              | 2                           | 0.02- 0.04     | 0.114±.004     | 0.084                     | 0.03           | 0.005                                  |

<sup>A</sup>The minimum ID shall be maintained through the insert length and into the fitting, intersecting and minimum ID of the other fitting.

<sup>B</sup>Fitting shall be designed with sufficient overall dimensions to allow proper use of crimp tool without interference with previously completed crimps on the same fitting.

<sup>C</sup>Lead chamfer area is not considered rib.

<sup>D</sup>Applies to entire fitting and not just insert area.

<sup>E</sup>The maximum flash and mismatch at the root diameter between the ribs may not exceed 30% of rib height

<sup>F</sup>The total flash and mismatch is assumed to be the difference between the dimensions X and Y (See Fig. 2a.) These dimensions may be measured with appropriate callipers or micrometres. See Fig. 2b for a graphic definition of flash and mismatch created by imperfection in die half interfaces.

FIG. 1 Fitting Insert Dimensions and Tolerances