



Standard Specification for Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings¹

This standard is issued under the fixed designation F409; 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 requirements and test methods for materials, dimensions and tolerances, hydrostatic pressure, joint integrity, and solvent cement for thermoplastic tube and fittings for accessible and replaceable domestic waste connections. Marking requirements are also included. Thermoplastic that does not meet the material requirements specified in Section 5 is excluded.

1.2 The text of this specification references notes, footnotes, and appendixes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the specification.

1.3 *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.

1.4 The following safety hazards caveat pertains only to the test methods portion, Section 8, 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

D1784 Classification System and Basis for 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

D2235 Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

D2564 Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems

D2657 Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings

D2661 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings

D2665 Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

D3965 Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings

D4000 Classification System for Specifying Plastic Materials

D4101 Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials

F402 Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

F412 Terminology Relating to Plastic Piping Systems

F1498 Specification for Taper Pipe Threads 60° for Thermoplastic Pipe and Fittings

2.2 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)³

2.3 Military Standard:

MIL-STD-129 Marking for Shipment and Storage³

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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 DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

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

TABLE 1 Dimensions and Tolerances for Outside Diameters and Thickness of Plastic Tube

Nominal Tube Size	Outside Diameter			Wall Thickness
	Average	Tolerance on Average	Out-of-Roundness (maximum minus minimum)	Minimum
in.	in. (mm)	in. (mm)	in. (mm)	in. (mm)
1¼	1.250 (31.75)	±0.005 (±0.127)	0.020 (0.51)	0.062 (1.575)
1½	1.500 (38.10)	±0.005 (±0.127)	0.020 (0.51)	0.062 (1.575)

2.4 *ASME Standard:*

B1.20.1 Pipe Threads, General Purpose (Inch)⁴

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminologies **D883** and **F412**. Abbreviations are in accordance with Terminology **D1600**, unless otherwise specified. Plastic materials are classified in accordance with Classification **D4000**.

4. Significance and Use

4.1 The requirements of this specification are intended to provide accessible and replaceable tube and fittings to convey domestic waste from fixtures to the drain, waste, and vent (DWV) system.

5. Materials and Manufacture

5.1 *Tube*—The tube shall be made of one of the following materials:

5.1.1 Virgin acrylonitrile-butadiene-styrene (ABS) plastic which shall meet the requirements of Specification **D3965**, Cell Classification 4-2-2-2.

5.1.2 Virgin poly(vinyl chloride) (PVC) plastic which shall meet the requirements for 12454 materials in accordance with Specification **D1784**, or

5.1.3 Virgin polypropylene plastic which shall meet the requirements of Specification **D4101**, Cell Classification PP0110B55140 and PP0105G20A33350.

5.2 *Fittings and Mechanical Joint Components*—The fittings and components of mechanical joints shall be comprised of one or more of the following materials:

5.2.1 Virgin ABS plastic which shall meet the requirements of Specification **D3965**, Cell Classification 2-0-2-1-1.

5.2.2 Virgin PVC plastics which shall meet the requirements of 12454 materials as defined in Specification **D1784**, or

5.2.3 Virgin polypropylene plastic which shall meet the requirements of Specification **D4101**, Cell Classification PP0110B55140, and PP0105G20A33350.

5.3 *Rework Material*—The manufacturers shall use only their own clean rework tube and fitting material and the tube or fittings produced shall meet all the requirements of this specification. The different types of material shall not be mixed.

5.4 *Solvent Cement*—The ABS solvent cement shall meet the requirements of Specification **D2235**. The PVC solvent

cement shall meet the requirements of Specification **D2564**. No solvent cement or adhesive joining of propylene plastic (PP) is permissible.

6. Mechanical Connections

6.1 Compression or threaded connections shall incorporate American National Straight Pipe Thread, Mechanical Joints for Fixtures (NPSM). The thread form shall be the form of American National Straight Pipe Thread and the dimensions shall be in accordance with ASME B1.20.1 (NPSM). All threads shall have a minimum three-thread engagement for fittings and plastic nuts.

6.2 *Taper Pipe Threads*—For all fittings having taper pipe threads, threads shall conform to Specification **F1498** and be gaged in accordance with **8.5**.

6.3 *Straight Pipe Threads (NPSM)*—For all fittings having straight pipe threads, threads shall conform to ASME B1.20.1 (NPSM) and be gaged in accordance with **8.6**.

6.4 All tube and fittings made from propylene plastic shall be assembled by either mechanical connections or by heat fusion, in accordance with Practice **D2657**.

7. Requirements

7.1 *General*—The tube and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, or other injurious defects. They shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

7.2 *Dimensions and Tolerances:*

7.2.1 *Tube:*

7.2.1.1 *Tube Dimensions*—The tube dimensions shall meet the requirements given in **Table 1** when measured in accordance with Test Method **D2122**.

7.2.1.2 *Tube Length*—The tolerance on tube lengths is $\pm \frac{1}{8}$ in. (± 3 mm).

7.2.2 *Fittings:*

7.2.2.1 *Fitting Dimensions*—The dimensions of fittings shall meet the requirements of **Table 2** when measured in accordance with Test Method **D2122**.

7.2.2.2 *Fitting Laying Length Dimensions*—The laying lengths and other critical dimensions of fittings are shown in **Tables 3-13**.

7.2.2.3 Where applicable for assembly, refer to Table A1.1 in Specification **D2661**, ABS Schedule 40 Fittings.

7.2.2.4 Where applicable for assembly, refer to Table 1 in Specification **D2665**, PVC Schedule 40 Fittings.

⁴ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, <http://www.asme.org>.