



Standard Specification for Chlorinated Poly(Vinyl Chloride)/Aluminum/Chlorinated Poly(Vinyl Chloride) (CPVC-AL-CPVC) Composite Pressure Tubing¹

This standard is issued under the fixed designation F2855; 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 a Chlorinated Poly(Vinyl Chloride)/Aluminum/Chlorinated Poly(Vinyl Chloride), (CPVC-AL-CPVC), composite pressure tubing with a welded aluminum tube reinforcement between the inner and outer layers. The inner and outer CPVC layers are bonded to the aluminum tube by a melt adhesive. Included is a system of nomenclature for the composite tubing, the requirements and test methods for materials, the dimensions of the component layers and finished tubing, adhesion tests, hydrostatic burst and sustained pressure and thermocycling performance. Also given are the requirements and methods of marking. The components covered by this specification are intended for use in residential and commercial, hot and cold, potable water distribution systems.

NOTE 1—The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.2 This specification covers only composite tubing incorporating a continuously welded aluminum tube. Tubing consisting of metallic layers not continuously welded together are outside the scope of this specification.

1.3 Specifications for internal bushings for use with composite tubing meeting the requirements of this specification are given in [Annex A1](#).

1.4 Tubing meeting the requirements of this standard are designed to be used with fittings and solvent cements meeting the requirements of Specification [D2846/D2846M](#) when assembled in accordance with [Annex A2](#). **Warning**—Pressurized (compressed) air or other compressed gases contain large amounts of stored energy which present serious safety hazards should a system fail for any reason.

1.5 The products covered by this specification are intended for use with the distribution of pressurized liquids only, which

are chemically compatible with the tubing materials. Due to inherent hazards associated with testing components and systems with compressed air or other compressed gases, some manufacturers do not allow pneumatic testing of their products. Consult with specific product manufacturers for their specific testing procedures prior to pneumatic testing.

1.6 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.

NOTE 2—Suggested hydrostatic design pressures and pressure ratings for tubing are listed in [Appendix X1](#).

1.7 The following safety hazards caveat pertains only to the test method portion, Section 9. *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.*

1.8 *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

[D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and 30°C with a Vitreous Silica Dilatometer](#)

[D1600 Terminology for Abbreviated Terms Relating to Plastics \(Withdrawn 2024\)](#)³

[D1784 Classification System and Basis for Specification for](#)

¹ This specification is under the jurisdiction of ASTM Committee [F17](#) on Plastic Piping Systems and is the direct responsibility of Subcommittee [F17.61](#) on Water.

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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 The last approved version of this historical standard is referenced on www.astm.org.

Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
D1898 Practice for Sampling of Plastics (Withdrawn 1998)³
D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
D2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
D2846/D2846M Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems
E8/E8M Test Methods for Tension Testing of Metallic Materials
F412 Terminology Relating to Plastic Piping Systems
F1281 Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe

2.2 Federal Standards:⁴

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

2.3 Military Standards:⁴

MIL-STD-129 Marking for Shipment and Storage

2.4 NSF Standards:⁵

Standard No. 14 for Plastic Piping Components and Related Materials

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

3. Terminology

3.1 Definitions:

3.1.1 *General*—Definitions used in this specification are in accordance with Terminology **F412** and abbreviations are in accordance with Terminology **D1600**, unless otherwise specified. The abbreviation for Aluminum is AL.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *CPVC-AL-CPVC composite tubing, n*—composite tubing produced by coextrusion or extrusion of layers of CPVC/Aluminum/CPVC bonded together with a melt adhesive. This construction is also known as “multilayer”.

3.2.2 *tubing, n*—For the purpose of this specification, pipe made the specific dimensions shown in **Table 1**.

3.2.3 *nominal tubing size (NTS), n*—A non-dimensional tubing sizing convention based on copper tubing sizing, CTS.

4. Classification

4.1 *Tubing*—This specification classifies CPVC-AL-CPVC composite tubing and CPVC bushings by a maximum continuous operating condition of 100 psi (690 kPa) at 180 °F (82 °C) and by nominal tubing sizes of ½ NTS, ¾ NTS and 1 NTS.

4.2 *Pressure Design Basis* The CPVC-AL-CPVC composite tubing shall have an established pressure design basis at 73 °F (23 °C) of 800 psi (5.52 MPa) or greater and at 180 °F (82 °C) of 200 psi (1.38 MPa) or greater in accordance with Test Method **D2837**.

5. Materials

5.1 *General*—The CPVC-AL-CPVC composite tubing is composed of an internal CPVC layer, adhesive layer, aluminum layer, adhesive layer and external CPVC layer. For tubing made to this specification, the constituent materials must meet the following requirements:

5.2 *Aluminum*—The thickness of the aluminum layer shall meet the dimensions and tolerance given in **Table 1**. The tensile properties of the aluminum material shall be a minimum tensile strength of 14 600 psi (100 MPa) and an elongation of 20 % when tested in accordance with Test Method **E8/E8M**.

5.3 *Melt Adhesive*—The melt adhesive that bonds the CPVC layers to the Aluminum layer shall be of sufficient strength that no debonding of the layers occurs when the CPVC-AL-CPVC composite tubing is tested to all the requirements in Section 6 of this standard and to the requirements for Hydrostatic Burst Strength and CPVC Adhesives as specified in Specification **D2846/D2846M**.

5.4 *CPVC*—The CPVC compound used to make the inner and outer layers shall meet the requirements specified in **5.4.1** and **5.4.2**.

5.4.1 *Short-Term Properties*—The CPVC compound shall meet the requirements of cell classification CPVC 23447 as specified in Specification **D1784**.

5.4.2 *Long-Term Hydrostatic Strength*—The CPVC compound shall have an established 180 °F (82 °C) hydrostatic design stress of 500 psi (3.45 MPa) or greater in accordance with Test Method **D2837**.

5.5 *Rework Material*—Rework material generated from CPVC-AL-CPVC composite tubing shall not be used.

6. Requirements

6.1 *General*—The requirements and test methods in this specification cover CPVC-AL-CPVC composite tubing. Tests on the individual layers that comprise this composite tubing are outside the scope of this specification. The raw materials used, however, must conform to the requirements as set out in Section 5.

6.2 Dimensions and Tolerance of Tubing:

6.2.1 *Tubing Diameter*—The minimum outside diameter and tolerances of the tubing shall meet the requirements given in **Table 1**, when measured in accordance Test Method **D2122**. Maximum and minimum (out-of-roundness) tolerances apply only to measurements made on tubing prior to coiling.

6.2.2 Tubing Wall Thickness:

6.2.2.1 *Overall Tubing Wall Thickness*—The overall tube wall thickness shall meet the requirements given in **Table 1**, when measured in accordance with Test Method **D2122**. The

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

⁵ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140, <http://www.nsf.org>.