



Designation: D1430 – 22

Standard Classification System for Polychlorotrifluoroethylene (PCTFE) Plastics¹

This standard is issued under the fixed designation D1430; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This classification system covers polychlorotrifluoroethylene (PCTFE) plastics that consist of at least 90 % chlorotrifluoroethylene and are suitable for extrusion and for compression and injection molding. Additional components allow for chemical modifications, such as co-monomers, but not colorants, fillers, plasticizers, or mechanical blends with other resins. This classification system does not cover recycled PCTFE materials.

1.2 The physical and electrical properties of parts molded or extruded from PCTFE molding compounds vary with the crystalline content obtained during processing and subsequent annealing. Accordingly, the numerical values listed in **Table 1** apply only to the test specimens molded in accordance with **Section 8**. These values are not applicable as design criteria to semi-finished and finished parts prepared and annealed under other conditions.

1.3 The values stated in SI units as detailed in **IEEE/SI-10** are to be regarded as the standard. The values given in parentheses are for information only.

1.4 The following precautionary statement pertains only to the test methods portion, **Section 10**, of this classification system: *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.*

NOTE 1—Although this classification system and ISO 20568-1 and ISO 20568-2 differ in approach or detail, data obtained using either are technically equivalent.

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 Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

- D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation
- D618 Practice for Conditioning Plastics for Testing
- D621 Test Methods for Deformation of Plastics Under Load (Withdrawn 1994)³
- D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- D883 Terminology Relating to Plastics
- D1600 Terminology for Abbreviated Terms Relating to Plastics
- D3418 Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry
- D3892 Practice for Packaging/Packing of Plastics
- D4591 Test Method for Determining Temperatures and Heats of Transitions of Fluoropolymers by Differential Scanning Calorimetry
- D4895 Specification for Polytetrafluoroethylene (PTFE) Resin Produced From Dispersion
- D7194 Specification for Aerospace Parts Machined from Polychlorotrifluoroethylene (PCTFE)
- D7211 Specification for Parts Machined from Polychlorotrifluoroethylene (PCTFE) and Intended for General Use
- IEEE/SI-10 Standard for Use of the International System of Units (SI): The Modern Metric System

2.2 ISO Standard:⁴

- ISO 20568-1 Plastics—Fluoropolymer Dispersions and Moulding and Extrusion Materials, Part 1
- ISO 20568-2 Plastics—Fluoropolymer Dispersions and Moulding and Extrusion Materials, Part 2

¹ This classification system is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials (Section D20.15.12).

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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.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

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

TABLE 1 Requirements for PCTFE Molded Test Specimens

Group	Class	Description	Grade	Properties							
				Specific Gravity, ^A 23/23°C	Zero Strength Time, s ^B	Deformation Under Load ^{C,D}	Melting Point, °C ^E	Dielectric Constant ^F , max		Dissipation Factor ^G , max	
								KHz	MHz	KHz	MHz
01	1	homopolymer	1	2.10-2.15	100-199	10	210-220	2.70	2.50	0.030	0.012
			2	2.10-2.15	200-299	10	210-220	2.70	2.50	0.030	0.012
			3	2.10-2.15	300-450	10	210-220	2.70	2.50	0.030	0.012
			0								
	2	modified homopolymer	1	2.10-2.12	100-199	15	200-210	2.70	2.50	0.030	0.012
			2	2.10-2.12	200-299	15	200-210	2.70	2.50	0.030	0.012
			0								
	3	copolymer	1	2.08-2.10	100-199	20	190-200	2.70	2.50	0.035	0.015
			2	2.07-2.10	200-299	25	190-200	2.70	2.50	0.035	0.015
			0								
			0								
	0	other									

^ASee 10.1.7.

^BSee 10.1.3.

^CSee 10.1.4.

^DMaximum at 1112 N (250 lbf), 24 h, 70°C, %.

^ESee 10.1.5.

^FSee 10.1.6.

^GSee 10.1.6.

3. Terminology

3.1 Definitions:

3.1.1 Definitions of terms used in this classification system shall be in accordance with Terminology D883.

3.1.2 *lot, n*—one production run or uniform blend of two or more production runs.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *preforming, n*—a process to compress the material under pressure in a mold to form a preform.

3.2.2 *zero strength time (ZST), n*—time measured in accordance with Section 10 of this classification system to check the relative molecular weight of PCTFE material.

3.3 Abbreviations:

3.3.1 Abbreviated terms are in accordance with Terminology D1600.

4. Classification

4.1 PCTFE materials in powders and pellets are classified into one group. The group is subdivided into classes based on chemical composition. These classes are subdivided into grades as shown in the Basic Property Table (Table 1).

An example of this classification system is given as follows:

Group 01 = PCTFE

Class 1 = homopolymer

Grade 2 = having properties per Table 1 (Grade 2)

4.1.1 To facilitate incorporation of future material the “other” category for group (01), class (0), and grade (0) are shown in Table 1.

5. General Requirements

5.1 The molding or extrusion material shall be of uniform composition and so compounded as to conform to the requirements of this classification system.

6. Detail Requirements

6.1 Test specimens prepared in accordance with Section 9 shall conform to the requirements prescribed for the particular type and grade in Table 1.

6.2 For finished PCTFE parts made from resin meeting Group 01, Class 1, Grade 3 requirements, and intended for aerospace use, detail requirements given in Specification D7194 shall be followed.

6.3 For finished PCTFE parts made from resin Group 01, Class 1, Grade 0, 1, 2, or 3 requirements, and intended for general use, detail requirements given in Specification D7211 shall be followed.

7. Sampling

7.1 Sampling shall be statistically adequate to satisfy the requirements of 11.4.

8. Number of Tests

8.1 One set of test specimens as prescribed in Section 9 shall be considered sufficient for testing each batch. The average result for the specimens tested shall conform to the requirements prescribed in this classification system.

9. Specimen Preparation

9.1 Test specimens shall be cut from compression-molded sheets 1.58 ± 0.08 mm (0.062 ± 0.003 in.) thick, prepared from the resins in the following manner:

9.1.1 *Preforming*—Powder resin shall be preformed prior to molding in the following way: Place 30 ± 0.5 g of resin into a 57-mm (2.25-in.) diameter positive-pressure compression mold and compress the material at room temperature into a preform having a density of 1.4 to 1.5 g/cm³. A pressure of 68.9 MPa (10 000 psi) will satisfactorily accomplish the densification.