Designation: D6585 – 11

Standard Specification for Unsintered Polytetrafluoroethylene (PTFE) Extruded Film or Tape[1]

This standard is issued under the fixed designation D6585; 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 unsintered extruded films or tapes manufactured from virgin, unpigmented polytetrafluoroethylene, in nominal thickness from 0.025 to 0.51 mm (0.001 to 0.020 in.), which are >99 % PTFE in composition.

NOTE 1—For unsintered pigmented products, refer to Specification D7193.

1.1.1 The use of recycled PTFE for production of unsintered extruded films or tapes has not been identified at this time. When commercial usable processes and materials are available, this specification will be revised to include recycled materials.

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

1.3 The following precautionary statement pertains only to the test method 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 and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 2—Although this specification and ISO/DIS 13000-1 and ISO/DIS 13000-2 differ in approach or detail, data obtained relating to specific properties, using either are technically equivalent.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

D257 Test Methods for DC Resistance or Conductance of Insulating Materials

D618 Practice for Conditioning Plastics for Testing

D882 Test Method for Tensile Properties of Thin Plastic Sheeting

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

D1711 Terminology Relating to Electrical Insulation

D3892 Practice for Packaging/Packing of Plastics

D6040 Guide to Test Methods for Unsintered Polytetrafluoroethylene (PTFE) Extruded Film or Tape

D7193 Specification for Unsintered Pigmented Polytetrafluoroethylene (PTFE) Extruded Film or Tape

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

IEEE/ASTM SI-10 Standard for Use of the International System of Units (SI): The Modern Metric System

2.2 *ISO Standard:*[3]

ISO 13000-1 Plastics—Polytetrafluoroethylene (PTFE) Semi-Finished Products—Part 1: Requirements and Designation

ISO 13000-2 Plastics—Polytetrafluoroethylene (PTFE) Semi-Finished Products—Part 2: Preparation of Test Specimens and Determination of Properties Designation

2.3 *GSA Standard:*

A-A-58092 Tape, Anti-seize, Polytetrafluorethylene[4]

NOTE 3—Supersedes MIL-T-27730A (ASG) 7 January 1997.

3. Terminology

3.1 *Definitions:* Definitions are in accordance with Terminology D1711, Terminology D883, and Test Method D257 and abbreviated terms are in accordance with Terminology D1600, unless otherwise specified.

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials.

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

[4] A-A-58092 can be obtained from General Services Administration, Engineering and Commodity Management Division (9FTE-10), 400 15th St. SW, Auburn, WA 98001.

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

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *film, n*—full width material received as finished film.

3.2.2 *tape, n*—material that has been slit from the finished film.

3.2.3 *tensile strength at yield, n*—from Test Methods D882.

4. Classification

4.1 This specification covers three types of unsintered extruded PTFE tapes:

4.1.1 *Type I*—Thread seal tape (T.S.T.) with an apparent density of 0.50 to 1.60 g/cm^3.

4.1.2 *Type II*—Low density tape with an apparent density of 0.60 to 0.80 g/cm^3.

4.1.3 *Type III*—Wire and cable tape with an apparent density of 1.50 to 1.70 g/cm^3.

4.2 Grades of tape are identified in Tables 1-3.

NOTE 4—Other products that do not fall into these density ranges are available. The values vary on these products and must be agreed to between supplier and purchaser.

4.3 A line callout system is used to specify materials in this specification. The system uses pre-defined cells to refer to specific aspects of this specification, as illustrated below:

Standard Number Block	Type	Specification Grade	Class	Special Notes
Example: ASTM D6585	III	2 mil	—	—

For this example, the line call-out would be: ASTM D6585, III, 2 mil, specifies an unsintered wire and cable tape, 2 mil thick, and having all of the properties listed for that type and grade in the appropriate specified properties tables. A comma is used as the separator between the standard number and the type. Separators are not needed between the type and grade because they are, in turn, Roman numerals and Arabic digits as provided in Section B8 of the *Form and Style for ASTM Standards*. Provision for "Special Notes" is included so that other information is provided when required. This example relates to wire and cable tape with no special or added requirements. When special notes are used, they shall be preceded by a comma.

5. Performance Requirements

5.1 Basic requirements from the property tables are always in effect unless superseded by specific suffix requirements, which always take precedence.

5.2 The materials shall conform to the requirements in Tables 1-4 and suffix requirements as they apply.

5.3 The dielectric breakdown strength of unsintered samples shall be tested in accordance with Test Method D149. The required values are to be agreed upon between producer and consumer.

5.4 If invoked by contract, or to gain understanding of the electrical performance consistency of a particular material dielectric constant and volume resistivity shall be tested in accordance with Test Methods D150 and D257, as seen in the guidelines found in Guide D6040.

5.5 The width tolerance of slit tape shall be in accordance with Table 4 unless otherwise specified by contract.

6. Sampling

6.1 Sampling shall be in accordance with an adequate statistical sampling procedure.

7. Conditioning

7.1 For those tests where conditioning is required, condition the test specimens in accordance with Procedure A of Practice D618, except the time shall be for a period of at least 4 h prior to test instead of the 40 h required by this method. If the test material has been exposed to temperatures below 20°C (68°F) within 24 h period prior to test, the conditioning shall be at least 24 h.

7.2 Conduct tests at the standard laboratory temperature of 23 ± 2°C (73.4°F ± 3°F). The maintenance of constant humidity is not necessary. In reference cases, the standard atmosphere and 50 ± 5 % relative humidity shall apply.

8. Test Methods

8.1 The properties enumerated in this specification shall be determined in accordance with test methods referenced in Section 2 of Guide D6040.

8.1.1 The number of samples shall be consistent with the requirements of Section 6.

8.1.2 One set of test specimens shall be considered sufficient for testing each lot. The average result of the specimens shall conform to the requirements of this specification.

9. Inspection and Certification

9.1 Inspection and certification of the material supplied with reference to a specification based on this classification system shall be for conformance to the requirements specified herein.

TABLE 1 Type I Thread Seal Tape with an Apparent Density of 0.50 to 1.60 g/cm^3

NOTE 1—Where no property is listed there is no requirement.

Grade	Apparent Density, g/cm^3		Thickness				Tensile Strength at Yield		Elongation at Maximum Strength
	min	max	mm	tolerance	in.	tolerance	MPa	psi	min, %
Economy	0.50	0.90	0.076	. . .	0.0030	. . .	. . .	. . .	. . .
Standard	0.80	1.10	0.076	±0.0127	0.0030	±0.0005	. . .	. . .	50
Mil Spec., A-A-58092	1.20		0.088	+0.0254, −0.0381	0.0035	+0.0010, −0.0015	. . .	. . .	40
Premium	1.20	1.60	0.076	±0.0127	0.0030	±0.0005	11.72	1700	75

TABLE 2 Type II Low Density Tape with an Apparent Density of 0.60 to 0.80 g/cm³

Grade	Apparent Density, g/cm³		Thickness				Tensile Strength at Yield		Elongation at Maximum Strength
	min	max	mm	tolerance	in.	tolerance	MPa	psi	min, %
4 mil	0.60	0.80	0.102	±0.0076	0.004	±0.0003	13.10	1900	40
5 mil	0.60	0.80	0.127	±0.0102	0.005	±0.0004	13.10	1900	40
10 mil	0.60	0.80	0.254	±0.0127	0.010	±0.0005	8.27	1200	40

TABLE 3 Type III Wire and Cable Tape with an Apparent Density of 1.50 to 1.70 g/cm³

NOTE 1—In cases where actual product thickness is between thickness values called out in this table, the actual thickness should be rounded to the nearest defined increment using guidelines found in Practice E29, and the corresponding requirements applied.

Grade	Apparent Density, g/cm³		Thickness				Tensile Strength at Yield		Elongation at Maximum Strength
	min	max	mm	tolerance	in.	tolerance	MPa	psi	min, %
2 mil	1.50	1.70	0.050	±0.0076	0.002	±0.0003	12.41	1800	30
3 mil	1.50	1.70	0.076	±0.0076	0.003	±0.0003	12.41	1800	30
4 mil	1.50	1.70	0.102	±0.0076	0.004	±0.0003	10.34	1500	30
5 mil	1.50	1.70	0.127	±0.0076	0.005	±0.0003	10.34	1500	30
6 mil	1.50	1.70	0.152	±0.0102	0.006	±0.0004	7.58	1100	30
7 mil	1.50	1.70	0.178	±0.0102	0.007	±0.0004	6.89	1000	30
8 mil	1.50	1.70	0.203	±0.0102	0.008	±0.0004	6.55	950	30
9 mil	1.50	1.70	0.229	±0.0102	0.009	±0.0004	6.21	900	30
10 mil	1.50	1.70	0.254	±0.0127	0.010	±0.0005	5.52	800	50
11 mil	1.50	1.70	0.279	±0.0152	0.011	±0.0006	4.83	700	50
12 mil	1.50	1.70	0.305	±0.0229	0.012	±0.0009	4.14	600	50
13 mil	1.50	1.70	0.330	±0.0279	0.013	±0.0011	3.79	550	50
14 mil	1.50	1.70	0.356	±0.0330	0.014	±0.0013	3.10	450	50
15 mil	1.50	1.70	0.381	±0.0381	0.015	±0.0015	2.76	400	50
16 mil	1.50	1.70	0.406	±0.0406	0.016	±0.0016	2.76	400	50
17 mil	1.50	1.70	0.432	±0.0432	0.017	±0.0017	2.76	400	50
18 mil	1.50	1.70	0.457	±0.0457	0.018	±0.0018	2.76	400	50
19 mil	1.50	1.70	0.483	±0.0483	0.019	±0.0019	2.76	400	50
20 mil	1.50	1.70	0.508	±0.0508	0.020	±0.0020	2.76	400	50

TABLE 4 Width Tolerances

Width (mm)	Tolerance (mm)	Width (in.)	Tolerance (in.)
Below 6.35	±0.38	Below ¼	±0.015
Between 6.35 and 25.4	±0.51	Between ¼ and 1	±0.020
Between 25.4 and 50.8	±0.64	Between 1 and 2	±0.025
Between 50.8 and 76.2	±0.89	Between 2 and 3	±0.035
Between 76.2 and 152.4	±1.91	Between 3 and 6	±0.075
Between 152.4 and 304.8	±3.18	Between 6 and 12	±0.125
Greater than 304.8	±6.35	Greater than 12	±0.250

9.2 Lot-acceptance inspection shall be the basis on which acceptance or rejection of the lot is made. The lot-acceptance inspection shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

9.3 Periodic check inspection with reference to a specification based upon this classification system shall consist of the tests for all requirements of the material under the specification. Inspection frequency shall be adequate to ensure the material is certifiable in accordance with 9.4.

9.4 Certification shall be that the material was manufactured by a process in statistical control, sampled, tested, and inspected in accordance with this classification system, and that the average values for the lot meet the requirements of the specification.

9.5 A report of test results shall be furnished when requested. The report shall consist of results of the lot-acceptance inspection for the shipment, or the results of the most recent periodic-check inspection, or both.

10. Packaging and Package Marking

10.1 *Packaging*—The materials shall be packaged in standard commercial containers constructed so as to ensure acceptance by common carrier unless otherwise specified in the contract or order.

10.2 *Package Marking*—Shipping containers shall be marked with the name of the material, type, thickness, and quantity contained therein. Each roll or package of sheets shall be marked to designate type, lot number and manufactures name.

10.3 All packaging and marking provision of Practice D3892 shall apply to this specification.

11. Keywords

11.1 apparent density; elongation; extruded; film; fluorocarbon film and tape; PTFE; tape; tensile; thread seal tape; unsintered

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue, D6585 - 05, that may impact the use of this standard. (February 1, 2011)

(1) Revised permissive text throughout.
(2) Changed composition percentage of virgin material from 97 % to 99 % in section 1.1 and added note directing the user to the appropriate standard for pigmented versions of this material.
(3) Updated reference standards section 2.1 and 2.3.
(4) Changed test method from D638 to D882 in section 3.2.3 to harmonize with D6040.
(5) Revised note 3 in section 4 regarding alternate, user-specific, required densities.
(6) Added section 5.3 to address dielectric breakdown requirements.
(7) Added section 5.4 to address dielectric constant and volume resistivity requirements should they exist.
(8) Added section 5.5 and Table 4 covering width tolerance of slit tapes.