



Standard Specification for PTFE Resin Skived Tape¹

This standard is issued under the fixed designation D 3308; 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 Department of Defense.

1. Scope*

1.1 This specification covers skived tape in thicknesses from 0.013 to 6.35 mm [0.0005 to 0.250 in.] manufactured by skiving (Note 1) from PTFE resin molding and extrusion materials.

NOTE 1—Skiving is the process of continuously shaving a film on a lathe from the outer surface to the core of a molded cylindrical tube of material.

NOTE 2—Abbreviations have been approved from Terminology D 1600.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in brackets are for information only.

1.3 The following hazard caveat 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 3—This specification and ISO 13000-1 and ISO 13000-2 differ in approach or detail, and data obtained using either may not be technically equivalent.

2. Referenced Documents

2.1 ASTM Standards:²

- D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
- D 374 Test Methods for Thickness of Solid Electrical Insulation
- D 618 Practice for Conditioning Plastics for Testing
- D 638 Test Method for Tensile Properties of Plastics
- D 792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

- D 882 Test Method for Tensile Properties of Thin Plastic Sheet
- D 883 Terminology Relating to Plastics
- D 1389 Test Method for Proof-Voltage Testing of Thin Solid Electrical Insulating Materials
- D 1600 Terminology for Abbreviated Terms Relating to Plastics
- D 3892 Practice for Packaging/Packing of Plastics
- D 4894 Specification for Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials

2.2 ISO Standards:

- ISO 13000-1 Plastics—Polytetrafluoroethylene (PTFE) Semi-Finished Products Part 1: Requirements and Designation³
- ISO 13000-2 Plastics—Polytetrafluoroethylene (PTFE) Semi-Finished Products Part 2: Preparation of Specimens and Determination of Properties³

3. Terminology

3.1 Definitions:

Definitions are in accordance with Terminology D 883 unless otherwise specified.

3.2 Definitions of Terms Specific to this Standard:

- 3.2.1 *lot, n*—One production run, or a uniform blend of two or more production runs.
- 3.2.2 *film, n*—full-width material received as finished film.
- 3.2.3 *Mil, n*— $\frac{1}{1000}$ (0.001) of an inch.

4. Classification

4.1 This specification covers four types of PTFE resin skived tape:

- 4.1.1 *Type I*—Premium; normally used for exacting electrical, mechanical, or chemical applications.
- 4.1.2 *Type II*—General purpose; for electrical, mechanical, and chemical applications not requiring premium material.
- 4.1.3 *Type III*—Commercial; for non-critical chemical, electrical, and mechanical applications.
- 4.1.4 *Type IV*—Utility; having no electrical requirements, and with mechanical properties at lower level.

³ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

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

TABLE 1 Width Tolerances for Skived Tape

Width		Tolerance	
mm	in.	mm	in.
Up to 12.700	Up to 0.500	-0/+0.510	-0/+0.020
12.701 to 25.400	0.501 to 1.000	-0/+0.640	-0/+0.025
25.401 to 50.800	1.001 to 2.000	-0/+0.890	-0/+0.035
50.801 to 76.200	2.001 to 3.000	-0/+1.905	-0/+0.075
76.201 to 152.400	3.001 to 6.000	-0/+3.175	-0/+0.125
152.401 or greater	6.001 or greater	-0/+6.350	-0/+0.250

4.2 Types I, II, III, and IV may be subdivided into two grades in accordance with the base resin used as follows:

4.2.1 *Grade 1*—Made only from virgin resin.

4.2.2 *Grade 2*—May be made using reprocessed resin, or a mixture of virgin and reprocessed resin.

4.3 A one-line system may be used to specify materials covered by this specification. The system uses predefined cells to refer to specific aspects of this specification, as illustrated below:

Specification				
Standard Number Block	Type	Grade	Class	Special Notes
:	:	:	:	:
_____	_____	_____	_____	_____
Example: Specification D 3308 – 06	I	2

For this example, the line callout would be: Specification D 3308 – 06, I2, Oil and would specify a skived tape that has all of the properties listed for that Type and Grade, in the appropriate specified properties, tables, or both, in the specification identified. 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.⁴ Provision for “Special Notes” is included so that other information can be provided when required. This example would be premium PTFE tape without special requirements. When Special Notes are used, they should be preceded by a comma.

5. Physical Requirements

5.1 The tape shall be made from unpigmented PTFE resin.

5.2 The length and width of the roll shall be as agreed upon between the purchaser and the seller. Width tolerances shall be in accordance with Table 1.

5.3 The melting point for all types of tape shall be 327 ± 10°C [621 ± 18°F].

5.4 The thickness tolerances for skived tape shall be as shown in Table 2.

5.5 Tensile strength and elongation shall meet the requirements shown in Table 3.

5.6 The requirements for specific gravity shall be as shown in Table 3.

⁴ See the ASTM Form and Style Manual. Available from ASTM Headquarters.

TABLE 2 Thickness Tolerances for Skived Tape

Thickness		Tolerance	
mm	in.	mm	in.
0.013 to 0.025	0.0005 to 0.0010	±0.003	±0.0001
0.028 to 0.076	0.0011 to 0.0030	±0.008	±0.0003
0.091 to 0.254	0.0036 to 0.0100	±0.013	±0.0005
0.257 to 0.381	0.0101 to 0.0150	±0.025	±0.0010
0.384 to 1.016	0.0151 to 0.0400	±0.038	±0.0015
1.019 to 3.175	0.0401 to 0.1250	±0.127	±0.0050
>3.175	>0.1250	±0.254	±0.0100

5.7 The minimum required values for dielectric strength *S* (V/mil), shall be computed for applicable thicknesses of materials in accordance with the following formulas, where *t* is the thickness of the tape in mils.

Type I: $S = 1000$ times square root of $(20/t)$

Type II (thickness ≥ 0.003 in.): $S = 840$ times square root of $(20/t)$

Type II (thickness < 0.003 in.): $S = 630$ times square root of $(20/t)$

Type III: $S = 500$ times square root of $(20/t)$

Type IV: No requirement for dielectric strength

5.8 The number of non-dielectric strength failure mode electrical flaws shall be determined in accordance with Test Method D 1389.

6. Sampling

6.1 Sampling shall be statistically adequate to satisfy the requirements of 9.4.

7. Number of Tests and Retests

7.1 One set of test specimens as prescribed in Section 8 shall be considered sufficient for testing each batch. The average result of the specimens shall conform to the requirements of this specification.

8. Test Methods

8.1 The properties enumerated in this specification shall be determined in accordance with the following test methods:

8.1.1 *Conditioning*—For those tests where conditioning is required, condition the test specimens in accordance with Procedure A of Practice D 618 for a period of at least 4 h prior to test. If the test material has been exposed to temperatures below 20°C within 24 h prior to test, the conditioning shall be for at least 24 h.

TABLE 3 Mechanical Requirements for Skived Tape

Type	Tensile Strength, ^A min		Elongation, min, %	Specific Gravity
	MPa	psi		
I	27.58	4000	300	2.14 to 2.19
II	19.31	2800	200	2.14 to 2.19
III	11.00	1600	75	2.14 min
IV	9.66	1400	50	2.14 min

^A Tape 6.35 mm (¼ in.) or wider.

8.1.2 *Test Conditions*—Conduct tests at the standard laboratory temperature of 23 ± 2°C [70 to 77°F]. The maintenance of constant humidity is not necessary. In reference cases, the standard atmosphere, 50 ± 5 % relative humidity, shall apply.

8.1.3 *Thickness*—Measure thickness in accordance with Method A of Test Methods D 374, for all thicknesses.

8.1.4 *Melting Point*—Determine the melting point on one specimen in accordance with the test method stated in Specification D 4894.

8.1.5 *Tensile Properties*—Determine the tensile strength and percentage elongation at break in accordance with Test Method D 638, for tapes or films 1.0 mm [0.04 in.] thick or greater, using Type I specimen at 20 in./min \pm 10 %. For tapes or films less than 1.0 mm [0.04 in.] thick, determine the tensile strength and percentage elongation at break in accordance with Test Method D 882.

8.1.6 *Dielectric Strength*—Determine the dielectric strength in accordance with Test Methods D 149 using the short time test. Use air as the test medium for tapes up to and including 0.254 mm [0.010 in.] in thickness. For tapes greater than 0.254 mm [0.010 in.] thick, or where specimen configuration could result in flashover or partial discharge (corona) during the test, the test medium shall be oil. Use three specimens in determining the dielectric strength of each lot of tape.”

NOTE 4—Dielectric values obtained in oil is a requirement for the laminate industry. Therefore, it is necessary to test dielectric strength in oil when requested by these customers. Values obtained when testing thin skived tape in oil are significantly different than those obtained using the air method.

8.1.7 *Specific Gravity*—Determine the specific gravity on two specimens in accordance with Method A of Test Methods D 792. Add 2 drops of a wetting agent (liquid detergent or other surfactant) to the water in order to reduce the surface tension and ensure complete wetting of the sample.

8.1.8 *Electrical Flaws*—Methods D 1389.

9. Inspection

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.

9.2 Lot-acceptance shall be the basis on which acceptance or rejection of the lot is made. Lot-acceptance testing shall consist of the tests seen in Section 8

9.3 Periodic check inspection with reference to a specification based on this classification system shall consist of the tests for all requirements of the material under the specification.

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 (line callout).

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 and the results of the most recent periodic-check inspection.

10. Packaging and Marking

10.1 *Packaging*—The material shall be packaged in standard commercial containers so constructed as to ensure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery, unless otherwise specified in the contract or order.

10.2 *Marking*—Shipping containers shall be marked with the name of the material, type, size, and quantity contained therein. Each roll of tape shall be marked to designate type, grade, and lot number. The marking will be, preferably, on the core.

10.3 All packing, packaging, and marking provisions of Practice D 3892 shall apply to this specification.

10.4 Packaging and marking requirements defined by the purchaser shall take precedence over the above.

11. Keywords

11.1 fluorocarbon polymer; fluoropolymers; granular PTFE; polytetrafluoroethylene; PTFE; PTFE basic shapes; PTFE film; PTFE skived tape

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue, D 3308 - 01, that may impact the use of this standard. (April 1, 2006)

- (1) Amended verbiage in 3.2.1 defining “lot” to be consistent with other D20.15.12 standards.
- (2) Changed mils to mil in section 3.2.3.
- (3) Changed to table and text in 4.3 to reflect revision year 2006.
- (4) Changed dielectric calculation method for thin film Type II materials in 5.7. When 0.0005 in. through 0.0029 in. were added as part of the scope of this standard, it was recognized that physical properties for thin film could be affected. The elongation was reduced at that time from 270 % to 200 % but dielectric was not changed. Dielectric strength is affected in these thinner films and the change serves to accommodate these changes.
- (5) Changed wording in 8.1.6.
- (6) Changed wording in 8.1.7 and removed footnote that

recommends a specific brand of wetting agent.

(7) Added 10.4.

(8) Revised Table 1 with the following changes: *a*) Corrected typo where width tolerance was the same for 2 in. and 3 in. rolls in millimetres but different in inches. *b*) Corrected typo where width tolerance for 6 in. rolls was different in millimetres than in inches. *c*) Corrected typo where width tolerance for 12 in. rolls was different in millimetres than in inches. *d*) Revised eliminate ambiguity in tolerances of material, which is slit to widths between standard inches.

(9) Revised Table 2 with the following changes: *a*) Amended ranges to include 0.0001 in. increments as typically these units of measure are used in thin film production. *b*) Revised metric converted values to reflect changes made to inch/decimal units.

(10) Removed reference to “FDIS” from Note 3.



- (11) Removed the word “oil” in example given in Section 4, and amended related wording below example.
- (12) Revised 5.2.
- (13) Revised 5.8 to delete reference to agreement between purchaser and seller and the instance of “permissible electrical flaws”.
- (14) Revised 9.2.

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