

# AEROSPACE MATERIAL SPECIFICATION

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Superseding AMS 3662B

Polytetrafluoroethylene Film  
General Purpose Grade

1. SCOPE:

1.1 Form: This specification covers one grade of polytetrafluoroethylene resin in the form of film.

1.2 Application: Primarily for gaskets and other parts for use up to 260°C (500°F) requiring good performance in mechanical, electrical, or chemical service.

1.3 Safety - Hazardous Materials: While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The applicable issue of referenced publications shall be the issue in effect on the date of the purchase order.

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2.1 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 149 - Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

ASTM D 638 - Tensile Properties of Plastics

ASTM D 638M - Tensile Properties of Plastics (Metric)

ASTM D 792 - Specific Gravity (Relative Density) and Density of Plastics by Displacement

ASTM D 1389 - Dielectric Proof-Voltage Testing of Thin Solid Electrical Insulating Materials

ASTM D 1708 - Tensile Properties of Plastics by Use of Microtensile Specimens

2.2 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.2.1 Military Standards:

MIL-STD-2073-1 - DOD Materiel, Procedures for Development and Application of Packaging Requirements

3. TECHNICAL REQUIREMENTS:

3.1 Material: Film shall be produced by skiving billets molded or extruded from polytetrafluoroethylene powder without admixture of fillers, pigments, or adulterants.

3.2 Color: May vary from white to light gray. Small gray, brown, or black spots shall not in themselves be unacceptable.

3.3 Properties: Film shall conform to the following requirements; tests shall be performed on the film supplied and in accordance with specified test methods, insofar as practicable:

3.3.1	Tensile Strength at 23°C ± 1 (73°F ± 2), minimum	2800 psi (19.3 MPa)	4.5.1
3.3.2	Elongation (Applicable only to widths 0.375 inch (9.52 mm) and over) at 23°C ± 1 (73°F ± 2), minimum	200%	4.5.1
3.3.3	Specific Gravity at 23°/23°C (73°/73°F)	2.14 - 2.20	ASTM D 792 Add 2 drops of wetting agent to the water

## 3.3.4 Dielectric Strength, Short Time Test, minimum

4.5.2

Specimen Thickness		
Inch	Millimeter	
0.003	0.08	2170 Volts per mil (85,433 V/mm)
0.005	0.13	1680 Volts per mil (66,141 V/mm)
0.010	0.25	1190 Volts per mil (46,850 V/mm)

3.3.5 Electrical Flaws: When specified, film 0.003 - 0.010 inch (0.08 - 0.25 mm), incl, in nominal thickness and 2 inches (51 mm) and over in width shall show not more than 80 electrical flaws per 100 feet (30.5 m) of length, determined in accordance with ASTM D 1389 at a film-movement speed of 25 feet per minute  $\pm 5$  (127 mm/second  $\pm 25$ ). Other methods of test may be used when agreed upon by purchaser and vendor.

3.4 Quality: Film, as received by purchaser, shall be uniform in quality and condition, smooth, and free from foreign materials and from imperfections detrimental to usage of the film.

3.5 Tolerances: The following tolerances apply at 23° - 30°C (73° - 86°F):

TABLE I

Nominal Thickness Inch	Nominal Width Inches	Thickness Tolerance Inch	
		plus	minus
0.002 to 0.003, incl	Up to 2, incl	0.0005	0.0003
Over 0.003 to 0.005, incl	2 to 12, incl	0.0005	0.0005
Over 0.005 to 0.015, incl	2 to 12, incl	0.0010	0.0010
Over 0.015 to 0.040, incl	2 to 12, incl	0.0015	0.0015
Over 0.040 to 0.061, incl	2 to 12, incl	0.0020	0.0020
Over 0.061 to 0.125, incl	2 to 12, incl	0.005	0.005

TABLE I (SI)

Nominal Thickness Millimeters	Nominal Width Millimeters	Thickness Tolerance Millimeter	
		plus	minus
0.05 to 0.08, incl	Up to 51, incl	0.013	0.008
Over 0.08 to 0.13, incl	51 to 305, incl	0.013	0.013
Over 0.13 to 0.38, incl	51 to 305, incl	0.025	0.025
Over 0.38 to 1.02, incl	51 to 305, incl	0.038	0.038
Over 1.02 to 1.55, incl	51 to 305, incl	0.051	0.051
Over 1.55 to 3.18, incl	51 to 305, incl	0.13	0.13

#### 4. QUALITY ASSURANCE PROVISIONS:

- 4.1 Responsibility for Inspection: The vendor of film shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the film conforms to the requirements of this specification.
- 4.2 Classification of Tests: Tests for all technical requirements are acceptance tests and preproduction tests and shall be performed prior to or on the initial shipment of film to a purchaser, on each lot, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.
- 4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction film shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement,
- 4.3 Sampling and Testing: Shall be as follows.
- 4.3.1 For Acceptance Tests: Sufficient film shall be taken at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.
- 4.3.1.1 A lot shall be all film of the same thickness made from the same batch of compound in one production run and presented for vendor's inspection at one time.
- 4.3.1.2 An inspection lot shall be not more than 200 pounds (91 kg) of film. A lot may be packaged in smaller quantities and delivered under the basic lot approval provided lot identification is maintained.
- 4.3.1.3 When a statistical sampling plan has been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6 shall state that such plan was used.
- 4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.
- 4.4 Approval:
- 4.4.1 Sample film shall be approved by purchaser before film for production use is supplied, unless such approval be waived by purchaser. Results of tests on production film shall be essentially equivalent to those on the approved sample,

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production film which are essentially the same as those used on the approved sample film. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample film. Production film made by the revised procedure shall not be shipped prior to receipt of reapproval.

#### 4.5 Test Methods:

4.5.1 Tensile Strength and Elongation: Shall be determined in accordance with ASTM D 638 or ASTM D 638M using the microtensile specimen of ASTM D 1708. The initial jaw separation shall be 0.875 inch  $\pm$  0.005 (22.22 mm  $\pm$  0.13) and the speed of testing shall be 2 inches (51 mm) per minute. Specimens shall be cut with the long axis parallel to the skive marks. Product over 0.062 inch (1.57 mm) thick shall be machined to 0.062 inch  $\pm$  0.016 (1.57 mm  $\pm$  0.41) thick before cutting specimens.

4.5.2 Dielectric Strength: Shall be determined in accordance with ASTM D 149 on specimens sufficiently large to prevent flashover and using electrodes of corrosion-resistant steel, nominally 0.25 inch (6.35 mm) in diameter with 0.031 inch (0.79 mm) radius at the edges. Tests shall be conducted in air for specimens up to 0.010 inch (0.25 mm), incl, in thickness and under oil for thicker specimens. The dielectric strength requirement for thicknesses other than those specified in 3.3.4 shall be calculated from the equation:

$$S = 840 \frac{K}{t}$$

where, S = dielectric strength in Volts per mil (mm)  
 K = 20 in inch/pound units or 787.4 in SI units  
 t = film thickness in mils

4.6 Reports: The vendor of film shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements. This report shall include the purchase order number, lot number, AMS 3662C vendor's compound number, size, and quantity.

4.7 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the film may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the film represented. Results of all tests shall be reported.