



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 3662A
Superseding AMS 3662

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POLYTETRAFLUOROETHYLENE FILM General Purpose Grade

1. SCOPE:

- 1.1 Form: This specification covers one grade of polytetrafluoroethylene resin in the form of film and film tape.
- 1.2 Application: Primarily for gaskets and other parts for use at temperatures up to 260° C (500° F) requiring good performance in mechanical, electrical, or chemical service.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

- 2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

- 2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D149 - Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies

ASTM D638 - Tensile Properties of Plastics

ASTM D792 - Specific Gravity and Density of Plastics by Displacement

ASTM D1389 - Dielectric Proof-Voltage Testing of Thin Solid Electrical Insulating Materials

ASTM D1708 - Tensile Properties of Plastics by Use of Microtensile Specimens

- 2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

- 3.1 Material: Film shall, unless otherwise permitted by purchaser, 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.

SAE Technical Board rules provide that: "All technical reports, including standards, specifications, and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against infringement of patents."

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 $23^{\circ}\text{C} \pm 1$ (73.4° F ± 1.8), min 2800 psi (19.3 MPa) 4.5.1
- 3.3.2 Elongation (Applicable only to widths 0.375 in. (9.52 mm) and over) at $23^{\circ}\text{C} \pm 1$ (73.4° F ± 1.8), min 200% 4.5.1
- 3.3.3 Specific Gravity at $23^{\circ}/23^{\circ}\text{C}$ (73.4°/73.4° F) 2.14 - 2.20 ASTM D792
Add 2 drops of wetting agent to the water
- 3.3.4 Dielectric Strength, Short Time Test, min 4.5.2

Specimen Thickness		
Inch	(Millimetre)	
0.003	(0.08)	2170 V per mil (85,430 V/mm)
0.005	(0.13)	1680 V per mil (66,140 V/mm)
0.010	(0.25)	1190 V per mil (46,850 V/mm)

3.3.5 Electrical Flaws: When specified, film 0.003 - 0.010 in. (0.08 - 0.25 mm), incl, in nominal thickness and 2 in. (51 mm) and over in width shall show not more than 80 electrical flaws per 100 ft (30.5 m) of length, determined in accordance with ASTM D1389 at a film-movement speed of 25 ft per min. ± 5 (127 mm/sec ± 25). Other methods of test may be used when agreed upon by purchaser and vendor.

3.4 Quality: Film shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from internal and external imperfections detrimental to fabrication, appearance, or performance of parts.

3.5 Tolerances: Unless otherwise specified, the following tolerances apply at $23^{\circ} - 30^{\circ}\text{C}$ (73.4° - 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 Millimetres	Nominal Width Millimetres	Thickness Tolerance Millimetre	
		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 and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the film conforms to the requirements of this specification.
- 4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests.
- 4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, qualification test material shall be submitted to the cognizant qualification agency as directed by the request for procurement, the procuring activity, or the contracting officer.
- 4.3 Sampling: Sufficient film shall be taken from each lot to perform all required tests in triplicate; a lot shall be all film produced in a single production run from the same batch of raw material and presented for vendor's inspection at one time.
- 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. 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 any change is necessary in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material and 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 D638, using the microtensile specimen of ASTM D1708. The initial jaw separation shall be 0.875 in. \pm 0.005 (22.22 mm \pm 0.13) and the speed of testing shall be 2 in. (51 mm) per minute. Specimens shall be cut with the long axis parallel to the skive marks. Product over 0.062 in. (1.57 mm) thick shall be machined to 0.062 in. \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 D149 on specimens sufficiently large to prevent flashover and using electrodes of corrosion-resistant steel, nominally 0.25 in. (6.4 mm) in diameter with 0.031 in. (0.79 mm) radius at the edges. Tests shall be conducted in air for specimens up to 0.010 (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:

$$S = 1000 \sqrt{\frac{K}{t}}$$

where, S = dielectric strength in V per mil (mm)
 K = 20 in U.S. Conventional units or 787.4 in SI units
 t = film thickness in mils (mm)

4.6 Reports:

- 4.6.1 The vendor of film shall furnish with each shipment three copies of a report showing the results of tests to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, vendor's compound number, size, and quantity.
- 4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of film, supplier's compound number, part number, and quantity. When film for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of film to determine conformance to the requirements of this specification, and shall include in the report a statement that the film conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.
- 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 and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

- 5.1.1 Packaging shall be accomplished in such a manner as to ensure that the film during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any normal hazard.
- 5.1.2 Each package shall be permanently and legibly marked to show not less than the following information:

POLYTETRAFLUOROETHYLENE FILM
 General Purpose Grade
 AMS 3662A
 SIZE _____
 LOT NUMBER _____
 PURCHASE ORDER NUMBER _____
 QUANTITY _____
 MANUFACTURER'S IDENTIFICATION _____