AN AMERICAN NATIONAL STANDARD

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# AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3669C

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Submitted for recognition as an American National Standard

Superseding AMS 3669B

## POLYTETRAFLUOROETHYLENE SHEET, MOLDED
## Premium Grade, As Sintered

1. SCOPE:

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

1.2 Application: Primarily for parts requiring higher mechanical and electrical properties than AMS 3667 and chemical resistance up to 260°C (500°F). When dimensional stability is important, sheet may be stress-relief annealed but best results will be obtained by machining parts almost to size, stress-relief annealing, and taking a thin, finishing cut.

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.

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 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: Sheet shall be molded from virgin polytetrafluoroethylene powder without admixture of fillers, pigments, or adulterants and shall be sintered.

3.2 Color: Shall be opaque white. Minor discolorations or contamination shall not in themselves be unacceptable.

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

| | | | |
|---|---|---|---|
| 3.3.1 | Tensile Strength at 23°C ± 1 (73°F ± 2), minimum | 4000 psi (27.6 MPa) | 4.5.1 |
| 3.3.2 | Elongation at 23°C ± 1 (73°F ± 2), minimum | 300% | 4.5.1 |
| 3.3.3 | Specific Gravity at 23°/23°C (73°/73°F) | 2.14 - 2.19 | ASTM D 792 Add 2 drops of wetting agent to the water |
| 3.3.4 | Dielectric Strength, Short Time Test, minimum | 600 Volts per mil (23,622 V/mm) | 4.5.2 |

3.4 Quality: Sheet, 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 sheet.

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

3.5.1 Thickness:

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TABLE I

| Nominal Thickness (T) Inches | Tolerance, Inch plus | Tolerance, Inch minus |
|---|---|---|
| 0.0312 to 0.0625, incl | 0.015 | 0.005 |
| Over 0.0625 to 0.0938, incl | 0.015 | 0.005 |
| Over 0.0938 to 0.125, incl | 0.016 | 0.008 |
| Over 0.125 to 0.1563, incl | 0.018 | 0.009 |
| Over 0.1563 to 0.1875, incl | 0.022 | 0.011 |
| Over 0.1875 to 0.250, incl | 0.030 | 0.015 |
| Over 0.250 to 0.375, incl | 0.038 | 0.019 |
| Over 0.375 to 0.500, incl | 0.046 | 0.022 |
| Over 0.500 to 0.625, incl | 0.054 | 0.027 |
| Over 0.625 to 0.750, incl | 0.070 | 0.035 |
| Over 0.750 to 1.000, incl | 0.087 | 0.043 |
| Over 1.000 to 1.250, incl | 0.102 | 0.051 |
| Over 1.250 to 1.500, incl | 0.118 | 0.059 |
| Over 1.500 to 1.750, incl | 0.134 | 0.067 |
| Over 1.750 to 2.000, incl | 0.150 | 0.075 |
| Over 2.000 | 0.10T | 0.05T |

TABLE I (SI)

| Nominal Thickness (T) Millimeters | Tolerance, Millimeters plus | Tolerance, Millimeters minus |
|---|---|---|
| 0.792 to 1.588, incl | 0.38 | 0.13 |
| Over 1.588 to 2.382, incl | 0.38 | 0.13 |
| Over 2.382 to 3.18, incl | 0.41 | 0.20 |
| Over 3.18 to 3.970, incl | 0.46 | 0.23 |
| Over 3.970 to 4.762, incl | 0.56 | 0.28 |
| Over 4.762 to 6.35, incl | 0.76 | 0.38 |
| Over 6.35 to 9.52, incl | 0.96 | 0.48 |
| Over 9.52 to 12.70, incl | 1.17 | 0.56 |
| Over 12.70 to 15.88, incl | 1.37 | 0.68 |
| Over 15.88 to 19.05, incl | 1.78 | 0.89 |
| Over 19.05 to 25.40, incl | 2.21 | 1.09 |
| Over 25.40 to 31.75, incl | 2.59 | 1.30 |
| Over 31.75 to 38.10, incl | 3.00 | 1.50 |
| Over 38.10 to 44.45, incl | 3.40 | 1.70 |
| Over 44.45 to 50.80, incl | 3.81 | 1.90 |
| Over 50.80 | 0.10T | 0.05T |

3.5.2 Width and Length: Shall not vary more than +0.250 inch (+6.35 mm), -0.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of sheet shall supply all samples Ø 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 sheet 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 sheet 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 sheet 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:
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4.3.1 For Acceptance Tests: Sufficient sheet 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 sheet of the same size 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 sheet. 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 Ø 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 sheet shall be approved by purchaser before sheet for production use is supplied, unless such approval be waived by purchaser. Results of tests on production sheet 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 sheet which are essentially the same as those used on the approved sample sheet. 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 sheet. Production sheet 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 ± 0.005 (22.22 mm ± 0.13) and the speed of testing shall be 2 inches (51 mm) per minute. Sheet over 0.062 to 0.625 inch (1.57 to 15.88 mm), excl, in nominal thickness shall be machined to 0.062 inch ± 0.010 (1.57 mm ± 0.25) thick before cutting specimens. From sheet 0.625 inch (15.88 mm) and over in nominal thickness, a slice somewhat thicker than 0.062 inch (1.57 mm) shall be cut in a plane parallel to, and not less than 0.5 inch (13 mm) from, the plane of one end of the sheet; this slice shall be machined on both faces to 0.062 inch ± 0.010 (1.57 mm ± 0.25) thick and the specimen cut from the machined slice. In all cases of specimens reduced to specified thickness by machining, tool marks shall be removed by light sanding in a longitudinal direction.

4.5.2 Dielectric Strength: Shall be determined in accordance with ASTM D 149 on specimens 0.060 inch ± 0.010 (1.52 mm ± 0.25) thick. Tests shall be conducted under oil 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.

4.6 Reports: The vendor of sheet 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 3669C, 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 sheet 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 sheet represented. Results of all tests shall be reported.