SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3669 REV. G

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Superseding AMS3669F

Polytetrafluoroethylene (PTFE) Sheet, Molded Premium Grade, As Sintered

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

STABILIZED NOTICE

This document has been declared "Stabilized" by SAE AMS P, Polymeric Materials Committee, and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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1. SCOPE

1.1 Form

This specification covers virgin, unfilled polytetrafluoroethylene (PTFE) in the form of sheet, manufactured by compression molding and sintering.

1.2 Application

This sheet has been used typically for machined parts requiring chemical inertness up to 500 °F (260 °C), with better mechanical properties and/or electrical properties than AMS3667, but usage is not limited to such applications.

1.3 Classification

Sheet covered by this specification is classified as follows:

Type 1 For parts requiring chemical inertness and good mechanical and electrical properties up to 500 °F (260 °C). Testing of all specified properties is required.

Type 2 For parts requiring chemical inertness and good mechanical properties up to 500 °F (260 °C), where electrical insulation is not a consideration. Dielectric strength test (3.3.4) is not required.

1.3.1 Unless a specific type is ordered, Type 1 shall be supplied.

1.4 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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS3667 Polytetrafluoroethylene Sheet, Molded, General Purpose Grade, As Sintered

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 149 Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 792 Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 4894 Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials

3. TECHNICAL REQUIREMENTS

3.1 Material

Sheet shall be molded from virgin polytetrafluoroethylene (PTFE) powder ASTM D 4894 Polytetrafluoroethylene (PTFE) conforming to ASTM D 4894 Type IV or Type V without admixture of fillers, pigments, or adulterants and shall be sintered. "Virgin" shall mean no previous heat or pressure history.

3.2 Color

Shall be predominantly white. Surface discoloration from sintering and/or annealing may vary from white to mottled gray or brown. Small gray, brown, or black spots shall not in themselves be unacceptable provided they have no detrimental effect on the end usage of the finished product.

3.3 Properties

Sheet shall conform to the requirements shown in Table 1; tests shall be performed on the sheet supplied and in accordance with specified test methods, insofar as practicable.

TABLE 1 - PROPERTIES

Paragraph	Property	Requirement	Test Method
3.3.1	Tensile Strength at 73 °F ± 2 (23 °C ± 1), minimum	4000 psi (27.6 MPa)	4.3.1
3.3.2	Elongation at 73 °F ± 2 (23 °C ± 1), minimum	300%	4.3.1
3.3.3	Specific Gravity at 73 °F (23 °C)	2.14 to 2.19	ASTM D 792 Add two drops of wetting agent to the water
3.3.4	Dielectric Strength, applicable only to Type 1 sheet Short Time Test, minimum	600 Volts per mil (23.6 kV/mm)	4.3.2

3.4 Tolerances

Unless otherwise agreed between vendor and purchaser, dimension tolerances of molded sheets shall be in accordance with Table 2, determined at 73 to 86 °F (23 to 30 °C).

3.4.1 Thickness

Shall be shown in Table 2.

TABLE 2 - THICKNESS TOLERANCES

Nominal Thickness (T) Inch (Millimeter)	Tolerance Inch (Millimeter) Plus	Tolerance Inch (Millimeter) Minus
0.0312 (0.792) to 0.0938 (2.382) incl	0.015 (0.38)	0.005 (0.13)
Over 0.0938 (2.382) to 0.125 (3.180) incl	0.016 (0.41)	0.008 (0.20)
Over 0.125 (3.180) to 0.1563 (3.970) incl	0.018 (0.46)	0.009 (0.23)
Over 0.1563 (3.970) to 0.1875 (4.762) incl	0.022 (0.56)	0.011 (0.28)
Over 0.1875 (4.762) to 0.250 (6.350) incl	0.030 (0.76)	0.015 (0.38)
Over 0.250 (6.350) to 0.375 (9.520) incl	0.038 (0.96)	0.019 (0.48)
Over 0.375 (9.520) to 0.500 (12.70) incl	0.046 (1.17)	0.022 (0.56)
Over 0.500 (12.70) to 0.625 (15.88) incl	0.054 (1.37)	0.027 (0.68)
Over 0.625 (15.88) to 0.750 (19.05) incl	0.070 (1.78)	0.035 (0.89)
Over 0.750 (19.05) to 1.000 (25.40) incl	0.087 (2.21)	0.043 (1.09)
Over 1.000 (25.40) to 1.250 (31.75) incl	0.102 (2.59)	0.051 (1.30)
Over 1.250 (31.75) to 1.500 (38.10) incl	0.118 (3.00)	0.059 (1.50)
Over 1.500 (38.10) to 1.750 (44.45) incl	0.134 (3.40)	0.067 (1.70)
Over 1.750 (44.45) to 2.000 (50.80) incl	0.150 (3.81)	0.075 (1.90)
Over 2.000 (50.80)	0.10T	0.05T

3.4.2 Width and Length

Shall not vary more than +0.250 inch (+6.35 mm), -0.00 inch (-0.00 mm).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer of sheet shall supply all test coupons and shall be responsible for the performance of all required tests for each lot of molded sheet. Purchaser reserves the right to sample and to perform any testing deemed necessary to ensure that the sheet conforms to specified requirements. Manufacturer of machined parts shall furnish substantiating test data acquired by the manufacturer of molded sheet(s). Purchaser of parts machined from molded sheet(s) also reserves the right to perform confirmatory testing provided the parts will yield test coupons that conform to the testing procedure(s) listed in 4.5.

4.2 Classification of Tests

4.2.1 Acceptance Tests

All technical requirements are acceptance tests and shall be performed on each lot of moldings (See 4.3.1).

4.3 Sampling and Testing

Shall be as follows:

4.3.1 Sufficient test coupons shall be taken at random from each production lot of molded sheet(s) to perform all required tests. Otherwise test samples shall be machined from a test or other suitable molded sheet from the same resin lot. 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.

4.3.2 A lot of moldings shall be all the molded sheets of the same configuration made from the same batch of PTFE resin in one continuous run and presented for manufacturer's inspection at one time. Where multiple shipments are made from one lot of molded sheets, lot traceability shall be maintained. A lot shall consist of not more than 200 pounds (91 kg) of moldings.

4.3.3 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3.1 and the report of 4.6 shall state that such plan was used.

4.4 Approval

4.4.1 Test results from sample product shall be approved by purchaser before production molded sheets are supplied, unless such approval is waived by purchaser. Results of tests on samples from the production lot shall be essentially equivalent to those on the approved sample. Production product made by a revised procedure shall not be shipped prior to receipt of reapproval. If necessary to make any change in parameters or the process control factors, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample product or test coupons shall be provided.

4.4.2 Manufacturer of the product shall make no significant change in material, processes, or control factors from those on which the approval was based, unless the change is approved by the purchaser's engineering department. A significant change is one which, in the judgment of the purchaser's engineering department, could affect the properties or performance of the product.

4.5 Test Methods

Shall be as follows

4.5.1 Tensile strength and elongation shall be determined in accordance with ASTM D 4894 and the test specimens shall be prepared from production sheet(s) of sufficient size, or if production sheet(s) will not yield suitable samples, from a test or suitable production sheet from the same resin lot. Test specimens where size permits, shall conform to ASTM D 4894, Figure 11. Specimens shall be prepared from slices 0.031 inch ± 0.002 (0.79 mm ± 0.05) thick cut from the product. The initial jaw separation shall be 0.875 inch ± 0.005 (22.2 mm ± 0.13) and the speed of testing shall be 2 inches (50 mm) per minute. All results shall be reported.

4.5.2 The tensile strength coupon shall be pulled perpendicular to the direction of molding. The values shown are the minimum values required.

4.5.3 Specific Gravity shall determined in accordance with ASTM D 792, Method A, with two drops of wetting agent added to the water.

4.5.4 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.