SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3666 REV. E

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Superseding AMS3666D

Polytetrafluoroethylene (PTFE) Sheet, Glass Cloth Reinforced

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 a glass-cloth-reinforced polytetrafluoroethylene (PTFE) resin in the form of sheet.

1.2 Application:

This sheet has been used typically for electrical, electronic, and mechanical applications requiring a composite having the high strength and nondeforming characteristics of woven glass cloth and the electrical, chemical, and heat resistance and the anti-stick and low-friction properties of PTFE resin, 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 260 °C (500 °F). Testing for all specified properties is required.

Type 2 - For parts requiring chemical inertness and good mechanical properties up to 260 °C (500 °F). Testing for dielectric strength and heat resistance 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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 3824 Cloth, Type "E" Glass, Finished for Resin Laminates

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM D 149	Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 257	D-C Resistance or Conductance of Insulating Materials
ASTM D 618	Conditioning Plastics and Electrical Insulating Materials for Testing
ASTM D 774	Bursting Strength of Paper
ASTM D 902	Testing Flexible Resin-Coated Glass Fabrics and Glass Fabric Tapes Used for Electrical Insulation
ASTM D 1389	Dielectric Proof-Voltage Testing of Thin Solid Electrical Insulating Materials

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall consist of woven glass cloth impregnated and coated or laminated on both sides with polytetrafluoroethylene (PTFE) resin, the impregnated resin being fused after application to the cloth. The surfaces shall be smooth and free of pronounced ripples.

3.1.1 Glass Fabric: Shall conform to the requirements of AMS 3824 applicable to the style number shown in Table 1 for each nominal thickness.

TABLE 1 - Fabric Styles

Nominal Thickness of Coated Fabric Inch	Nominal Thickness of Coated Fabric Millimeter	Fabric Style
0.003	0.08	108 or 1080
0.005	0.13	116
0.006	0.15	116
0.008	0.20	125
0.010	0.25	128 or 1528
0.012	0.30	128 or 1528
0.014	0.36	141
0.016	0.41	141
0.018	0.46	141
0.020	0.51	141

3.2 Color:

Shall be unbleached, light to dark brown.

3.3 Properties:

Sheet shall conform to requirements shown in Table 2, Table 3, Table 4, 3.3.3, 3.3.4, 3.3.5, and 3.3.6; tests shall be performed on the sheet supplied and in accordance with specified test methods, insofar as practicable.

3.3.1 Breaking Strength, Warp Threads: Shall be as shown in Table 2, determined in accordance with ASTM D 902.

TABLE 2A - Minimum Breaking Strength, Inch/Pound Units

Nominal Thickness Inch	Pounds Force/Inch Width
0.003	35
0.005	50
0.006	50
0.008	100
0.010	200
0.012	200
0.014	350
0.016	350
0.018	350
0.020	350

TABLE 2B - Minimum Breaking Strength, SI Units

Nominal Thickness Millimeter	kN/m Width
0.08	6.13
0.13	8.76
0.15	8.76
0.20	17.5
0.25	35.0
0.30	35.0
0.36	61.3
0.41	61.3
0.46	61.3
0.51	61.3

3.3.2 Dielectric Strength; applicable only to Type 1 sheet: Shall be as shown in Table 3, determined in accordance with 4.5.1.

TABLE 3A - Minimum Dielectric Strength, Inch/Pound Units

Nominal Thickness Inch	Volts per mil
0.003	700
0.005	600
0.006	600
0.008	500
0.010	500
0.012	400
0.014	400
0.016	400
0.018	400
0.020	400

TABLE 3B - Minimum Dielectric Strength, SI Units

Nominal Thickness Millimeter	kV/mm
0.08	27.6
0.13	23.6
0.15	23.6
0.20	19.7
0.25	19.7
0.30	15.7
0.36	15.7
0.41	15.7
0.46	15.7
0.51	15.7

3.3.3 Volume Resistivity: Shall be not less than 1×10^{11} ohm·cm, determined in accordance with ASTM D 257 on specimens conditioned in accordance with ASTM D 618, Procedure A.

3.3.4 Electrical Flaws: Shall be not more than 10 per yard (11/m), determined in accordance with 4.5.2.

3.3.5 Bursting Strength: Shall be as shown in Table 4, determined in accordance with ASTM D 774 in areas determined to be free of electrical flaws.

TABLE 4A - Minimum Bursting Strength, Inch/Pound Units

Nominal Thickness Inch	psi
0.003	25
0.005	25
0.006	25
0.008	50
0.010	100
0.012	100
0.014	300
0.016	300
0.018	300
0.020	300

TABLE 4B - Minimum Bursting Strength, SI Units

Nominal Thickness Millimeter	kPa
0.08	172
0.13	172
0.15	172
0.20	345
0.25	689
0.30	689
0.36	2068
0.41	2068
0.46	2068
0.51	2068

3.3.6 Heat Resistance; applicable only to Type 1 sheet: Shall be as specified in 3.3.6.1, determined in accordance with 4.5.3.

3.3.6.1 Dielectric Strength: Shall be not lower than 60% of as-received value.

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:

Shall be as shown in Table 5; measurements shall be made in accordance with ASTM D 902.

TABLE 5A - Tolerances, Inch/Pound Units

Nominal Thickness Inch	Tolerance plus and minus Inch
0.003	0.0005
0.005	0.0005
0.006	0.001
0.008	0.001
0.010	0.001
0.012	0.0015
0.014	0.0015
0.016	0.0015
0.018	0.0015
0.020	0.0015

TABLE 5B - Tolerances, SI Units

Nominal Thickness Millimeter	Tolerance plus and minus Millimeter
0.08	0.013
0.13	0.013
0.15	0.025
0.20	0.025
0.25	0.025
0.30	0.038
0.36	0.038
0.41	0.038
0.46	0.038
0.51	0.038

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of sheet 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 sheet conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for requirements shown in Table 6 are acceptance tests and shall be performed on each lot:

TABLE 6 - Acceptance Tests

Requirement	Paragraph Reference
Breaking Strength	3.3.1
Dielectric Strength (Type 1 Only)	3.3.2
Electrical Flaws	3.3.4
Bursting Strength	3.3.5
Tolerances	3.5

4.2.2 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of sheet to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material 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; a lot shall be all sheet produced in a single production run from the same batches of raw materials and presented for vendor's inspection at one time:

4.3.1 For Acceptance Tests: Sufficient sheet shall be taken at random from each lot to perform all required tests. Except as specified in 4.3.1.1, 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, with the further exception that, in either case, the electrical flaws test shall be performed on each sheet.