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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 3666C
Superseding AMS 3666B

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POLYTETRAFLUOROETHYLENE (PTFE) SHEET, GLASS CLOTH REINFORCED

1. SCOPE:

1.1 Form: This specification covers glass-cloth-reinforced polytetrafluoroethylene (PTFE) resin in the form of sheet.

1.2 Application: Primarily 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.

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

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 3824 - Cloth, Type "E" Glass, Finished for Resin Laminates

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 Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D257 - D-C Resistance or Conductance of Insulating Materials
ASTM D618 - Conditioning Plastics and Electrical Insulating Materials for Testing
ASTM D774 - Bursting Strength of Paper

2.2 (Continued):

ASTM D902 - Testing Flexible Resin-Coated Glass Fabrics and Glass Fabric Tapes Used for Electrical Insulation
ASTM D1389 - Dielectric Proof-Voltage Testing of Thin Solid Electrical Insulating Materials

2.3 U.S. 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: Shall consist of woven glass cloth impregnated and coated on both sides with polytetrafluoroethylene resin, the 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 for each nominal thickness:

Nominal Thickness of Coated Fabric		
Inch	Millimetre	Fabric Style
0.003	0.08	108
0.005	0.12	116
0.006	0.15	116
0.010	0.25	128

3.2 Color: Shall be unbleached (light to dark brown).

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 As-Received:

3.3.1.1 Breaking Strength, Warp Threads, min ASTM D902

Nominal Thickness			
Inch	Millimetre	lb per in. width	N/m width
0.003	0.08	35	6,130
0.005	0.12	50	8,760
0.006	0.15	50	8,760
0.010	0.25	200	35,000

3.3.1.2 Dielectric Strength, min 4.5.1

Nominal Thickness			
Inch	Millimetre	V per mil	V/mm
0.003	0.08	700	27,550
0.005	0.12	600	23,600
0.006	0.15	600	23,600
0.010	0.25	500	19,700

3.3.1.3 Volume Resistivity, min 1×10^{11} ohm·cm 4.5.2

3.3.1.4 Electrical Flaws, max 10 per yd (11/m) 4.5.3

3.3.1.5 Bursting Strength, min 4.5.4

Nominal Thickness			
Inch	Millimetre	psi	kPa
0.003	0.08	25	170
0.005	0.12	25	170
0.006	0.15	25	170
0.010	0.25	100	690

3.3.2 Heat Resistance: 4.5.5

3.3.2.1 Dielectric Strength, min 60% of as-received value

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

3.5 Tolerances: Shall be as follows; measurements shall be made in accordance with ASTM D902:

Nominal Thickness		Tolerance, plus and minus	
Inch	Millimetre	Inch	Millimetre
0.003	0.08	0.0005	0.012
0.005	0.12	0.0005	0.012
0.006	0.15	0.001	0.02
0.010	0.25	0.001	0.02

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. Results of such tests shall be reported to the purchaser as required by 4.6. 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 to determine conformance to the following requirements are classified as acceptance tests and shall be performed on each lot:

Requirement	Reference Paragraph
Breaking Strength	3.3.1.1
Dielectric Strength as received	3.3.1.2
Electrical Flaws	3.3.1.4
Bursting Strength	3.3.1.5
Tolerances	3.5

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of sheet to a purchaser, when a change in material, processing, or both 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, the contracting officer, or the request for procurement.

4.3 Sampling: 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 specimens for each test 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.

4.3.1.1 When a statistical sampling plan and acceptance quality level (AQL) have 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 4.6.1 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 material, processing, or both 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 Dielectric Strength: Shall be determined in accordance with ASTM D149, short time test, on specimens conditioned in accordance with ASTM D618, Procedure A, using rod-type electrodes and 500 - 600 V per sec rate of rise to breakdown.

4.5.2 Volume Resistivity: Shall be determined in accordance with ASTM D257 on specimens conditioned in accordance with ASTM D618, Procedure A.

4.5.3 Electrical Flaws: Shall be determined in accordance with ASTM D1389 at 200 - 250 V per mil (7870 - 9840 V/mm) and a speed of 25 ft per min. ± 5 (125 mm/sec ± 25). Flaws shall be marked with a crayon within a 1-in. (25-mm) diameter circle. Testing within 1 in. (25 mm) of the edges is not required.

4.5.4 Bursting Strength: Shall be determined in accordance with ASTM D774 in areas determined by 4.5.3 to be free of electrical flaws.

4.5.5 Heat Resistance: Specimens of sheet shall be conditioned at 275°C ± 3 (525°F ± 5) for 400 hr ± 2. The specimens shall then be tested as in 4.5.1 for dielectric strength.

4.6 Reports:

4.6.1 The vendor of sheet shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the sheet conforms to the other technical requirements of this specification. This report shall include the purchase order number, lot number, AMS 3666C, vendor's material designation, size, and quantity.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3666C, contractor or other direct supplier of sheet, supplier's compound number, part number, and quantity. When sheet for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of sheet to determine conformance to the requirements of this specification and shall include in the report either a statement that the sheet conforms or copies of laboratory reports showing the results of tests to determine conformance.