

PLASTIC SHEET
Cotton Fabric Reinforced Phenol-Formaldehyde

1. SCOPE:

- 1.1 Form: This specification covers phenol/formaldehyde-resin-impregnated, cotton fabric laminates in the form of sheet.
- 1.2 Application: Primarily for parts requiring good mechanical properties but where electrical properties are of secondary importance and no post-forming is required. Often used for fairleads and tubing supports.

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

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

ASTM D256 - Impact Resistance of Plastics and Electrical Insulating Materials

ASTM D570 - Water Absorption of Plastics

ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

ASTM D638 - Tensile Properties of Plastics

ASTM D695 - Compressive Properties of Rigid Plastics

ASTM D709 - Laminated Thermosetting Materials

ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

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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 and Fabrication: Sheet shall be constructed of laminations of cotton fabric which have been impregnated with a phenolic-type synthetic resin and properly cured.

3.1.1 Color: Shall be natural (tan). Supplementary coloring, when specified, shall be substantially uniform throughout the sheet. Faces of sheet shall be substantially free from streaks and stains.

3.1.2 Finish: Shall be semi-gloss.

3.2 Properties: Sheet shall conform to the following requirements in both the warp and filling directions of the base fabric; tests shall be performed on the sheet supplied and in accordance with specified test methods, insofar as practicable. Where requirements vary with standard thickness, use the value for the next lower thickness for thicknesses not specified.

3.2.1 Tensile Strength, min	7,500 psi (50 MPa)	ASTM D638
3.2.2 Compressive Strength, flatwise, min	35,000 psi (240 MPa)	ASTM D695
3.2.3 Flexural Strength, flatwise, min	16,000 psi (110 MPa)	ASTM D790
3.2.4 Impact Strength, edgewise, min per unit of notch	2.0 ft-lb per in. (107 J/m)	ASTM D256
3.2.5 Afterglow, max (See 8.2)		4.5.1

Nominal Thickness		Afterglow, sec	
Inches	Millimetres	Without Heating	After Heating
Up to 1/4, incl	Up to 6.0, incl	4	15
Over 1/4 to 1/2, incl	Over 6.0 to 12.5, incl	15	25
Over 1/2 to 1, incl	Over 12.5 to 25.0, incl	35	45
Over 1	Over 25.0	45	70

3.2.6 Water Absorption, 24 hr immersion, max

ASTM D570

Nominal Thickness		Weight Gain, %
Inches	Millimetres	
1/32	0.8	8.0
3/64	1.2	5.2
1/16	1.6	4.4
3/32	2.4	3.2
1/8	3.0	2.5
5/32	4.0	2.2
3/16	4.5	1.9
7/32	5.5	1.8
1/4	6.0	1.6
1/2	12.5	1.2
3/4	19.0	1.1
1 and over	25.0 and over	1.0

3.2.7 Weather Resistance: When specified, sheet shall have weather resistance acceptable to purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.2.8 Corrosion: Sheet shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metals shall not be considered objectionable. Method of test and standards for acceptance shall be as agreed upon by purchaser and vendor.

3.2.9 Machinability: Sheet, at room temperature, shall not split, crack, chip, or delaminate when punched in nominal thicknesses 1/8 in. (3 mm) and under or when drilled, sawed, or machined in any thickness.

3.3 Quality: Sheet, as received by purchaser, shall be uniform in quality and condition and free from blisters, wrinkles, cracks, crazing, delamination, and surface roughness, and reasonably free from other imperfections such as scratches and dents.

3.4 Sizes and Tolerances: Shall be as follows:

3.4.1 Thickness: Standard thicknesses and tolerances shall be in accordance with Table I.

TABLE I

Nominal Thickness Inch	Tolerance Inch plus and minus	Nominal Thickness Inch	Tolerance Inch Plus only	Nominal Thickness Inches	Tolerance Inch Plus only
1/32	0.0065	5/16	0.035	1	0.065
3/64	0.0075	3/8	0.040	1-1/8	0.069
1/16	0.0075	7/16	0.044	1-1/4	0.073
3/32	0.009	1/2	0.048	1-3/8	0.077
1/8	0.010	5/8	0.053	1-1/2	0.081
5/32	0.011	3/4	0.058	1-5/8	0.085
3/16	0.0125	7/8	0.062	1-3/4	0.089
7/32	0.014			2	0.097
1/4	0.030				

TABLE I (SI)

Nominal Thickness Millimetres	Tolerance Millimetres plus and minus	Nominal Thickness Millimetres	Tolerance Millimetres Plus only	Nominal Thickness Millimetres	Tolerance Millimetres Plus only
0.8	0.162	7.8	0.88	25.0	1.62
1.2	0.188	9.5	1.00	28.0	1.72
1.6	0.188	11.0	1.10	31.0	1.82
2.4	0.22	12.5	1.20	34.5	1.92
3.0	0.25	15.5	1.32	37.5	2.02
4.0	0.28	19.0	1.45	40.5	2.12
4.5	0.312	22.0	1.55	44.0	2.22
5.5	0.35			50.0	2.42
6.0	0.75				

3.4.2 Length and Width: Shall not vary more than ± 1 in. (± 25 mm) from the nominal dimensions ordered.

3.4.3 Warp and Twist: Shall not exceed 1% based on a 36 in. (900 mm) length, determined in accordance with ASTM D709.

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. 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 Classifications of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for compressive strength (3.2.2), flexural strength (3.2.3), and water absorption (3.2.6) are classified as acceptance tests and shall be performed on each lot.

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:

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 nominal thickness produced from the same batches of raw materials in a single production run under the same fixed conditions and presented for vendor's inspection at one time but shall not exceed 1500 sq ft (140 m²); a lot may be packaged and delivered in smaller quantities under the basic lot approval provided lot identification is maintained.

4.3.1.2 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 Afterglow: Specimens approximately 1/2 x 6 in. (12.5 x 150 mm) shall be placed in a shielded area of subdued light, such as an unlighted fume hood, and mounted horizontally as in ASTM D635, except that the screen shall not be used. A Meker or similar large-top burner with a flame approximately 1 in. (25 mm) long shall be placed so that the tip of the flame contacts the sheet and approximately 1 in. (25 mm) of the sheet is covered by the flame. Specimens shall be heated for 15 sec $\pm$ 1 for each 1/32 in. (0.8 mm) of nominal thickness. At the end of the ignition period, the burner shall be removed, the flame on the specimen blown out, and the duration of visible glow noted.

- 4.5.1.1 Specimens to be tested without heating shall be conditioned for not less than 4 hr at 23°C $\pm$ 1 (73°F $\pm$ 2) and 50% $\pm$ 2 relative humidity.

- 4.5.1.2 Specimens to be tested after heating shall be conditioned for 168 hr $\pm$ 2 at 105°C $\pm$ 1 (225°F $\pm$ 2).

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 3607E, 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 3607E, contractor or other direct supplier of sheet, supplier's material designation, 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.