SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3611 REV. E

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Superseding AMS3611D

Plastic Sheet, Polycarbonate General Purpose

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 polycarbonate resin in the form of sheet.

1.2 Application:

This sheet has been used typically for parts, such as aircraft heating ducts, cabin liners, fairings, storage boxes, and, decorative laminates, requiring high impact strength, high strength, and dimensional stability, but usage is not limited to such applications. This material is sensitive to some solvents; each application must be evaluated on its own merits.

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, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM D 149	Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 150	A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials
ASTM D 256	Impact Resistance of Plastics and Electrical Insulating Materials
ASTM D 257	D-C Resistance or Conductance of Insulating Materials
ASTM D 570	Water Absorption of Plastics
ASTM D 635	Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
ASTM D 638	Tensile Properties of Plastics
ASTM D 638M	Tensile Properties of Plastics (Metric)
ASTM D 648	Deflection Temperature of Plastics Under Flexural Load
ASTM D 790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D 790M	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials (Metric)
ASTM D 792	Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 1637	Tensile Heat Distortion Temperature of Plastic Sheeting

2.2 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 be a polycarbonate resin with fillers, plasticizers, and modifiers necessary to meet the requirements of 3.2 and 3.3.

3.2 Color:

Shall be translucent with a water-white or light straw color.

3.3 Properties:

Sheet shall conform to the requirements shown in Table 1 and 3.3.12; tests shall be performed on the sheet supplied and in accordance with specified ASTM methods, insofar as practicable.

TABLE 1 - Properties

Paragraph Property	Requirement	Test Method
3.3.1 Tensile Properties:		ASTM D 638 or ASTM D 638M
Tensile Strength, minimum	8000 psi (55.2 MPa)	Speed C
Elongation at Rupture, minimum	60%	
3.3.2 Modulus of Elasticity in Tension, minimum	285 ksi (1965 MPa)	ASTM D 638 or ASTM D 638M Speed B
3.3.3 Flexural Strength, minimum	11.0 ksi (75.8 MPa)	ASTM D 790 or ASTM D 790M
3.3.4 Impact Strength, minimum Unnotched at 25 °C (77 °F)	60 foot-pounds/inch (3203 J/m)	ASTM D 256 Method A
3.3.5 Heat Distortion:		ASTM D 1637-83
3.3.5.1 Sheet Up to 0.060 Inch (1.52 mm), Incl, Thick: Tensile Heat Distortion Temperature at 50 psi (345 kPa) Tensile Stress and 2% Extension, minimum	140 °C (284 °F)	
3.3.5.2 Sheet Over 0.060 inch (1.52 mm) Thick: Deflection Temperature, 264 psi (1820 kPa) fiber stress, minimum	130 °C (266 °F)	ASTM D 648
3.3.6 Specific Gravity at 23/23 °C (73/73 °F)	1.19 to 1.21	ASTM D 792
3.3.7 Dielectric Constant at 25 °C ± 1 (77 °F ± 2). 50% RH, and 60 cycles, minimum	2.75	ASTM D 150
3.3.8 Dielectric Strength at 23 °C ± 1 (73 °F ± 2), in air or oil, minimum	360 volts per mil (14.2 kV/mm)	ASTM D 149 (0.125 inch [3.18 mm] thick specimen; short time test, 1 inch [25 mm] electrodes)
3.3.9 Volume Resistivity at 23 °C ± 1 (73 °F ± 2) and 50% RH, minimum	1.0 x 1014 ohm-cm	ASTM D 257
3.3.10 Water Absorption after 24 hours immersion at 23 °C ± 1 (73 °F ± 2) maximum	0.35%	ASTM D 570
3.3.11 Flammability (see 8.2)	Self-extinguishing	ASTM D 635

3.3.12 Corrosion: The sheet shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, determined by a procedure agreed upon by purchaser and supplier. Discoloration of metals shall not be considered objectionable. Method of test and acceptance standards shall be as agreed upon by purchaser and supplier.

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:

Thickness shall not vary more than ±10% from the thickness ordered.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of sheet shall supply all samples 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 tensile properties (3.3.1), impact strength (3.3.4), specific gravity (3.3.6), and quality (3.4) are acceptance tests and shall be performed on each lot.

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 by the manufacturer, 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:

4.3.1 For Acceptance Tests: Sufficient product 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 product produced in a single production run from the same batches of raw materials under the same fixed conditions and presented for manufacturer's inspection at one time.

4.3.1.2 When a statistical sampling plan has been agreed upon by purchaser and supplier, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1, and the report of 4.5 shall state that such plan was used.

4.3.1.3 Specimens for impact strength (3.3.4) shall be nominally 1/2 x 1/8 inch (12.7 x 3.2 mm).

4.3.2 For Preproduction Tests: As agreed upon by purchaser and supplier.

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 Manufacturer 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. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer 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 Reports:

The supplier 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. This report shall include the purchase order number, lot number, AMS 3611E, manufacturer's compound number, size, and quantity.

4.6 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.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Shall be accomplished to ensure that the sheet, during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any other normal hazard.

5.1.1.1 A lot of sheet may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.