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AEROSPACE MATERIAL SPECIFICATION

AMS 3642C
Superseding AMS 3642B

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PLASTIC MOLDINGS, LAMINATED, THERMOSETTING RESIN
Glass Cloth Reinforced
Heat Resistant

1. SCOPE:

1.1 Form: This specification covers one type of glass-cloth-reinforced thermosetting resin in the form of laminated, pressure-bag or matched-die moldings.

1.2 Application: Primarily for parts requiring thermal stability consistent with good mechanical properties, when exposed to temperatures up to 260°C (500°F) continuously or up to 540°C (1000°F) intermittently.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) 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

REAFFIRMED

Printed in U.S.A.

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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 Electrical Insulating Materials at Commercial Power Frequencies
ASTM D150 - A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials at Commercial Power Frequencies
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 D790 - Flexural Properties of Plastics and Electrical Insulating Materials
ASTM D792 - Specific Gravity and Density of Plastics by Displacement

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: The product shall consist of layers of woven glass cloth impregnated with a thermosetting resin and molded to the required shape by pressure-bag or matched-die techniques.

3.1.1 Glass Cloth Reinforcement: Shall be a continuous-filament woven cloth. Prior to being impregnated with the resin, the cloth shall have been heat-cleaned followed by chemical treatment with a suitable glass cloth finish such as hydrolyzed aminotriethoxysilane. Mat or unidirectional (nonwoven) fabrics suitably treated may be used in noncritical areas, as required, for bosses, fillins, and corner reinforcements or as thickening agents.

3.1.2 Impregnating Resin: Shall be a heat-resistant, thermosetting resin formulated to meet the requirements of this specification.

3.1.3 Gel Coat: Integrally-molded resin gel-coats, overlays, or other surfacing materials shall not be used.

3.1.4 Gaps: There shall be no gaps between pieces of glass cloth. Lap widths shall be not less than 0.5 in. (12 mm).

3.2 Appearance: The product shall be furnished in its natural color and condition.

3.3 Properties: The product, in areas having a parallel layup, shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable:

3.3.1 As Received:

3.3.1.1	Tensile Strength, min	40,000 psi (275 MPa)	ASTM D638
3.3.1.2	Compressive Strength, min (Edgewise)	35,000 psi (240 MPa)	ASTM D695
3.3.1.3	Flexural Strength, min	35,000 psi (240 MPa)	ASTM D790
3.3.1.4	Impact Resistance, min per unit of notch	10 ft-lb per in. (535 J/m)	ASTM D256, Method A
3.3.1.5	Water Absorption (24 hr immersion), max	0.3%	ASTM D570
3.3.1.6	Specific Gravity, min at 23°/23°C (73°/73°F)	1.9	ASTM D792 Method A
3.3.1.7	Flammability, max Burn length after flame removal	1 in. (100 mm)	ASTM D635 (See 8.2)
3.3.1.8	Dielectric Constant, Dry, max at 10^6 Hz	6.0	ASTM D150
3.3.1.9	Dissipation Factor, Dry, max at 10^6 Hz	0.03	ASTM D150
3.3.1.10	Dielectric Strength, Short Time Test, parallel to laminations, min	10kV	ASTM D149

3.3.2 Dry Heat Resistance:

3.3.2.1	Compressive Strength, min (Edgewise) at 260°C (500°F) after 1000 hr at 260°C (500°F)	10,000 psi (70 MPa)	ASTM D695
3.3.2.2	Flexural Strength at 260°C (500°F) after 30 min., ± 2 at 260°C (500°F) % retained, min	75	ASTM D790

3.3.2.3 Impact Resistance at 260°C (500°F) after 1000 hr at 260°C (500°F), min per unit of notch	5 ft-lb per in. 265 J/m	ASTM D256 Method A

3.3.3 Weathering: When specified, the product shall have weather resistance acceptable to the purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.3.4 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service.

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

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing all Ø required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Test to determine conformance to the following requirements are classified as acceptance tests and shall be performed on each lot:

Requirement	Paragraph Reference
Flexural Strength, as received	3.3.1.3
Water Absorption	3.3.1.5
Specific Gravity	3.3.1.6
Dielectric Strength	3.3.1.10
Flexural Strength at 260°C (500°F) after exposure to 260°C (500°F)	3.3.2.2

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 moldings to a purchaser, when a change in material 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, the contracting officer, or the request for procurement.

4.3 Sampling: 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 tests for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three. If test specimens cannot be Ø prepared from the product, a separate laminated test specimen shall be prepared upon request of the purchaser. This laminated test sample shall be 0.125 in. ± 0.010 (3.12 mm ± 0.25) thick, having parallel layup and having the same materials and processing as used for the moldings represented; the specific gravity of the test panel shall be within ±0.05 of that of the moldings.

4.3.1.1 A lot shall be all moldings of the same configuration made from the same Ø batches of ingredients in one production run and submitted for vendor's inspection at one time.

4.3.1.2 An inspection lot shall be not more than 400 moldings or 200 lb (90 kg), Ø whichever is the lesser mass. A lot may be packaged or delivered in small quantities under the basic lot approval provided the lot identification is maintained.

4.3.1.3 When a statistical sampling plan and acceptance quality level (AQL) have Ø 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 4.5.1 shall state that such plan was used.

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

4.4 Approval:

4.4.1 Sample moldings shall be approved by purchaser before moldings for production use are supplied, unless such approval be waived by purchaser. Results of tests on production moldings 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 moldings which are essentially the same as those used on the approved sample moldings. 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 and/or processing and, when requested, sample moldings. Production moldings made by the revised procedure shall not be shipped prior to receipt of reapproval.