



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 3642 B

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PLASTIC MOLDINGS, LAMINATED, THERMOSETTING RESIN
Glass Fabric Reinforced
Heat Resistant, 500°F (260°C)

1. SCOPE:

1.1 Form: This specification covers one type of glass-fabric-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 500°F (260°C) continuously or up to 1000°F (538°C) 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 Society of Automotive Engineers, Inc., 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 D149 - Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies

ASTM D150 - A-C Loss Characteristics and Dielectric Constant (Permittivity) of Solid Electrical Insulating Materials

ASTM D256 - Impact Resistance of Plastics and Electrical Insulating Materials

ASTM D570 - Water Absorption of Plastics

ASTM D635 - Flammability of Self-Supporting Plastics

ASTM D638 - Tensile Properties of Plastics

ASTM D695 - Compressive Properties of Rigid Plastics

ASTM D790 - Flexural Properties of Plastics

ASTM D792 - Specific Gravity and Density of Plastics by Displacement

2.3 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 fabric impregnated with a thermosetting synthetic resin and molded to the required shape by pressure-bag or matched-die techniques.

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3.1.1 Glass Fabric Reinforcement: Shall be a continuous-filament woven fabric. Prior to being impregnated with the resin, the fabric shall have been heat-cleaned followed by chemical treatment with a suitable glass fabric finish such as hydrolyzed aminotriethoxysilane. Mat or unidirectional (nonwoven) fabrics suitably treated may be used in noncritical areas, as required, for bosses, fill-ins, 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 fabric. Lap widths shall be not less than 0.5 in. (13 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 (276 MPa)	ASTM D638
3.3.1.2 Compressive Strength, min (Edgewise)	35,000 psi (241 MPa)	ASTM D695
3.3.1.3 Flexural Strength, min	35,000 psi (241 MPa)	ASTM D790
3.3.1.4 Impact Resistance, min Ft-lb per inch of notch (N·m per metre of notch)	10 (534)	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 73.4°/73.4°F (23°/23°C)	1.9	ASTM D792, Method A
3.3.1.7 Flammability, max Ø Burn length after flame removal	4 in. (102 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	40kV	ASTM D149

3.3.2 Dry Heat Resistance:

- 3.3.2.1 Compressive Strength, min
(Edgewise) at 500°F (260°C)
after 1000 hr at 500°F (260°C) ASTM D695
10,000 psi
(69 MPa)
- 3.3.2.2 Flexural Strength at 500°F (260°C)
After 30 min. ± 2 at 500°F (260°C)
% retained, min ASTM D790
75
- 3.3.2.3 Impact Resistance at 500°F (260°C)
after 1000 hr at 500°F (260°C), min ASTM D256,
Method A
Ft-lb per inch of notch 5
(N·m per metre of notch) (267)

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 shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from internal and external imperfections detrimental to fabrication, appearance, or performance of parts.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems 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 or routine control tests and shall be performed on each lot of material:

Test	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 500°F (260°C) after exposure to 500°F (260°C)	3.3.2.2

4.2.2 Qualification Tests: Tests to determine conformance to all technical requirements of this specification are classified as qualification or periodic control tests and may be the basis for approval of the product (See 4.4.1).

4.2.2.1 For direct U. S. Military procurement, qualification test material and supporting test data shall be submitted to the cognizant qualification agency as directed by the request for procurement, the procuring activity, or the contracting officer.

- 4.3 Sampling: Sufficient material shall be taken from each lot to perform all required tests in triplicate. When the product is a molding having a layup of such configuration that suitable test specimens cannot be cut from the product, a separate laminated test sample shall be supplied upon request. This laminated test sample shall be 0.125 in. \pm 0.010 (3.18 mm \pm 0.25) thick, having a parallel layup, and using the same materials and processes as used for the moldings represented; the specific gravity of the test panel shall be within \pm 0.05 of that of the product.
- 4.3.1 A lot shall be all moldings made from the same batches of basic materials in one continuous run and submitted for vendor's inspection at one time.
- 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. 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 any change is necessary 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 processing and, when requested, sample revised moldings. No production moldings made by the revised procedure shall be shipped prior to receipt of reapproval.
- 4.5 Reports:
- 4.5.1 The vendor of moldings shall furnish with each shipment three copies of a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the moldings conform to the other technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, vendor's compound number, form and size or part number, and quantity.
- 4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of moldings, part number, and quantity. When moldings for making parts are produced or purchased by the parts vendor, that vendor shall inspect each lot of moldings to determine conformance to the requirements of this specification, and shall include in the report a statement that the moldings conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.
- 4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the moldings 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 moldings represented and no additional testing shall be permitted. Results of all tests shall be reported.
5. PREPARATION FOR DELIVERY:
- 5.1 Product Identification: Each molding of suitable size shall have the part number molded or permanently impressed therein. If size precludes integral marking, parts of each different part number shall be packed in separate, suitable containers marked with the part number.
- 5.2 Packaging and Package Identification: