

PLASTIC MOLDINGS, THERMOSETTING
Silicone, Glass Roving Filled,
Heat Resistant

1. SCOPE:

1.1 Form: This specification covers a glass-roving-filled silicone resin in the form of compression moldings or transfer moldings.

1.2 Application: Primarily for parts requiring good mechanical and electrical properties and thermal stability in continuous service up to 315°C (600°F) or intermittent service up to 370°C (700°F).

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

SAE Technical Board rules provide that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade or their use by governmental agencies is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

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 D257 - D-C Resistance or Conductance of 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 D648 - Deflection Temperature of Plastics Under Flexural Load

ASTM D651 - Tensile Strength of Molded Electrical Insulating Materials

ASTM D695 - Compressive Properties of Rigid Plastics

ASTM D790 - Flexural Properties of Plastics and 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 and Fabrication: Shall be a glass-roving-filled silicone resin fabricated by compression molding or transfer molding to meet the requirements of 3.2.

3.1.1 Color: Shall be brown-red opaque, unless otherwise specified.

3.1.2 Glass Filler: The glass roving, prior to being chopped, shall be heat cleaned to a No. 112 finish followed by washing to a neutral pH or shall be subjected to an equivalent procedure which will promote good adhesion to the silicone resin. The length of the chopped glass shall be 1/2 - 5/8 in. (13 - 16 mm).

3.2 Properties: Moldings shall conform to the following requirements; tests shall be performed on the moldings supplied and in accordance with specified test methods, insofar as practicable. Wet tests shall be performed within 1 min. after immersion in water at $23^{\circ}\text{C} \pm 1$ ($73^{\circ}\text{F} \pm 2$) for not less than 24 hours.

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3.2.1	Tensile Strength, min Tested at 25°C (77°F) after 72 hr at 370°C (700°F)	1800 psi (125 MPa)	ASTM D651
3.2.2	Flexural Strength, min		ASTM D790
3.2.2.1	Tested at 25°C (77°F) after 2 hr at 260°C (500°F)	15,000 psi (105 MPa)	
3.2.2.2	Tested at 370°C (700°F) after 72 hr at 370°C (700°F)	8,000 psi (55 MPa)	
3.2.3	Compressive Strength, min		ASTM D695
3.2.3.1	Tested at 25°C (77°F) after 2 hr at 260°C (500°F)	12,000 psi (85 MPa)	
3.2.3.2	Tested at 370°C (700°F) after 72 hr at 370°C (700°F)	4,000 psi (25 MPa)	
3.2.4	Impact Resistance, min		ASTM D256
3.2.4.1	Tested at 25°C (77°F) after 2 hr at 260°C (500°F)	10 ft-lb per in. (535 J/m)	
3.2.4.2	Tested at 370°C (700°F) after 72 hr at 370°C (700°F)	4 ft-lb per in. (215 J/m)	
3.2.5	Heat Deflection Temperature at 264 psi (1.8 MPa) Fiber Stress, min	370°C (700°F)	ASTM D648 Heating Rate 2°C (3.5°F) per min.
3.2.6	Water Absorption (24 hr immersion), wt gain, max	0.30%	ASTM D570
3.2.7	Dielectric Constant at 10 ⁶ Hz, max		ASTM D150
3.2.7.1	As molded		
3.2.7.1.1	Dry	4.7	
3.2.7.1.2	Wet	4.8	
3.2.8	Dissipation Factor at 10 ⁶ Hz, max		ASTM D150
3.2.8.1	As Molded		
3.2.8.1.1	Dry	0.005	

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3.2.8.1.2	Wet	0.01	
3.2.8.2	After 72 hr at 370°C (700°F)		
3.2.8.2.1	Dry	0.005	
3.2.8.2.2	Wet	0.03	
3.2.9	Dielectric Strength, v per mil, min		ASTM D149 Short time test 0.125 in. (3.12 mm) thick specimen
3.2.9.1	As Molded	250	
3.2.9.2	After 72 hr at 370°C (700°F)	180	
3.2.10	Insulation Resistance, ohms, min		ASTM D257
3.2.10.1	As Molded		
3.2.10.1.1	Dry	1×10^{13}	
3.2.10.1.2	After exposure for 96 hr \pm 1 at 23°C \pm 1 (73°F \pm 2) and not less than 96% relative humidity	1×10^{13}	
3.2.10.2	After 72 hr at 370°C (700°F)		
3.2.10.2.1	Dry	1×10^{12}	
3.2.10.2.2	After exposure for 96 hr \pm 1 at 23°C \pm 1 (73°F \pm 2) and not less than 96% relative humidity	1×10^{10}	
3.2.11	Flammability (See 8.2)		ASTM D635
3.2.11.1	Time of burning	5 sec	
3.2.11.2	Burn length after flame removal, max	2 in. (50 mm)	
3.2.12	<u>Weathering</u> : When specified, the product shall have weather resistance acceptable to the purchaser, determined by a procedure agreed upon by purchaser and vendor.		

- 3.2.13 Corrosion: The product 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 vendor. Discoloration of metals shall not be considered objectionable.
- 3.3 Quality: The product, as received by purchaser, shall be uniform in quality 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 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: Tests to determine conformance to requirements for compressive strength (3.2.3.1), impact resistance (3.2.4.1), water absorption (3.2.6), and flammability (3.2.11) 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 moldings to a purchaser, when a change in material or 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 moldings 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. If test specimens cannot be prepared from the moldings, a separate molded test specimen shall be prepared upon request of the purchaser. This test sample shall be 0.125 in. \pm 0.010 (3.12 mm \pm 0.25) thick, having the same materials and processing as used for the moldings represented; the specific gravity of the test panel shall be within \pm 0.05 of that of the moldings.

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- 4.3.1.1 A lot shall be all moldings of the same configuration made from the same 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 less than 400 moldings or 200 lb (90 kg), 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 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.

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 or processing, or both, and, when requested, sample moldings. Production moldings made by the revised procedure shall not 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, AMS 3643A, 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, AMS 3643A, contractor or other direct supplier of moldings, supplier's compound number, 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 either a statement that the moldings conform or copies of laboratory reports showing the results of tests to determine conformance.