

AEROSPACE MATERIAL SPECIFICATION



AMS 3346E

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Superseding AMS 3346D

Submitted for recognition as an American National Standard

SILICONE RUBBER 1000 psi (6.89 MPa) Minimum Tensile Strength 55 - 65 Durometer

1. SCOPE:

1.1 Form:

This specification covers a silicone rubber in the form of sheet, strip, tubing, molded shapes, and extrusions.

1.2 Application:

These products have been used typically for parts required to operate or seal at temperatures from -90 to +205 °C (-130 to +401 °F), compounded especially for high strength, but usage is not limited to such applications. Silicone elastomer is resistant to deterioration by weathering and aircraft piston engine oil and remains flexible over the temperature range noted. These products are not normally suitable for use in contact with gasoline or aromatic fuels and low-aniline-point petroleum-base fluids due to excessive swelling of the elastomer.

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 latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2279 Tolerances, Rubber Products

MAM 2279 Tolerances, Metric, Rubber Products

AMS 2810 Identification and Packaging, Elastomeric Products

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 297 Rubber Products - Chemical Analysis

ASTM D 395 Rubber Property - Compression Set

ASTM D 412 Rubber Properties in Tension

ASTM D 471 Rubber Property - Effect of Liquids

ASTM D 573 Rubber - Deterioration in an Air Oven

ASTM D 624 Rubber Property - Tear Resistance

ASTM D 797 Rubber Property - Young's Modulus at Normal and Subnormal Temperatures

ASTM D 2137 Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics

ASTM D 2240 Rubber Property - Durometer Hardness

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a compound, based on a silicone rubber, suitably cured to produce a product meeting the requirements of 3.2.

3.2 Properties:

The product shall conform to the requirements shown in Table 1, 3.2.6, and 3.2.7; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable:

TABLE 1 - Properties

Paragraph	Test	Requirement	Test Method
3.2.1	As Received:		
3.2.1.1	Hardness, Durometer "A" or equivalent	60 $\pm$ 5	ASTM D 2240
3.2.1.2	Tensile Strength, minimum	1000 psi (6.89 MPa)	ASTM D 412, Die B or C
3.2.1.3	Elongation, minimum	400%	ASTM D 412, Die B or C
3.2.1.4	Tear Strength, minimum	150 pounds force/inch (26.3 kN/m)	ASTM D 624, Die B
3.2.1.5	Specific Gravity	Preproduction Value $\pm$ 0.03	ASTM D 297
3.2.2	Petroleum Lubricating Oil Resistance:		ASTM D 471 ASTM Oil No. 1
3.2.2.1	Hardness Change, Durometer "A" or equivalent	-10 to +5	150 $^{\circ}$ C $\pm$ 3 (302 $^{\circ}$ F $\pm$ 5) 70 hours $\pm$ 0.5
3.2.2.2	Tensile Strength Change, maximum	-25%	
3.2.2.3	Elongation Change, maximum	-35%	
3.2.2.4	Volume Change, maximum	0 to +15%	
3.2.3	Dry Heat Resistance:		ASTM D 573
3.2.3.1	Hardness Change, Durometer "A" or equivalent	0 to +20	200 $^{\circ}$ C $\pm$ 3 (392 $^{\circ}$ F $\pm$ 5) 70 hours $\pm$ 0.5
3.2.3.2	Tensile Strength Change, maximum	-40%	
3.2.3.3	Elongation Change, maximum	-50%	
3.2.4	Compression Set:		ASTM D 395, Method B
3.2.4.1	Percent of Original Deflection, maximum	55	175 $^{\circ}$ C $\pm$ 3 (347 $^{\circ}$ F $\pm$ 5) 22 hours $\pm$ 0.5

TABLE 1 - Properties (Continued)

Paragraph	Test	Requirement	Test Method
3.2.5	Low-Temperature Resistance:		
3.2.5.1	Brittleness	Pass	ASTM D 2137, Method A -90 °C $\pm$ 3 (-130 °F $\pm$ 5)
3.2.5.2 (R)	Young's Modulus, maximum (See 8.2)	10.0 ksi (68.9 MPa)	ASTM D 797 -75 °C $\pm$ 3 (-103 °F $\pm$ 5) 5 hours $\pm$ 0.2

3.2.6 Weathering: When specified, the product shall have weather resistance acceptable to purchaser, determined by a procedure acceptable to purchaser.

3.2.7 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, determined by a procedure acceptable to purchaser. Discoloration of metal shall not be considered objectionable.

3.3 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, smooth, as free from foreign materials as commercially practicable, and free from imperfections detrimental to usage of the product.

3.4 Tolerances:

(R)

Shall conform to all applicable requirements of AMS 2279 or MAM 2279.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

(R)

The vendor of the product shall supply all samples for vendor's tests 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 product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for the following requirements are acceptance tests and shall be performed on each lot:

- Hardness, as received (3.2.1.1)
- Tensile Strength, as received (3.2.1.2)
- Elongation, as received (3.2.1.3)
- Specific Gravity (3.2.1.5)

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 a product to a purchaser, 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:

(R)

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 If specimens cannot be prepared from the product, ASTM test specimens prepared from the same batch and state of cure shall be used. When the product supplied is an extrusion of such shape that suitable test specimens cannot be cut from the product, a separate flat strip test sample from the same production lot shall be supplied upon request. This strip shall be prepared from tubing 1.000 inch $\pm$ 0.063 (25.40 mm $\pm$ 1.60) in OD by 0.075 inch $\pm$ 0.008 (1.90 mm $\pm$ 0.20) in wall thickness, mechanically slit and flattened into a strip while being extruded, and cured in the same manner as production product. When the product is a molded shape from which test specimens cannot be cut, a slab 6 inches (152 mm) square by 0.075 inch $\pm$ 0.008 (1.90 mm $\pm$ 0.20) thick molded from the same batch of compound shall be supplied upon request.

4.3.1.2 A lot shall be all product from the same batch of compound processed in one continuous run and submitted for vendor's inspection at one time. An inspection lot shall not exceed 500 pounds (227 kg).

4.3.1.3 A batch shall be the quantity of compound run through a mill or mixer at one time.

4.3.1.4 When a statistical sampling plan has 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 shall state that such plan was used.

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