



AEROSPACE MATERIAL SPECIFICATION

AMS3306**REV. C**

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Superseding AMS3306B

Rubber, Silicone
1200 psi (8.27 MPa), High Modulus
55 - 65

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

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1. SCOPE:

1.1 Form:

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

1.2 Application:

These products have been used typically as seals from -65 to +225 °C (-85 to +437 °F), compounded especially for high strength. Silicone rubber is resistant to deterioration by weathering and by high-aniline-point petroleum-base lubricating oil and phosphate ester hydraulic fluid, and remains flexible over the temperature range noted. This material is not normally suitable for use in contact with hydrocarbon-based fuels and low-aniline-point petroleum-base fluids due to excessive swelling of the elastomer, but usage is not limited to such applications. Each application should be considered individually.

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 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.

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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

AMS 3021 Fluid, Reference, For Testing Di-Ester (Polyol) Resistant Material

AS1241 Fire Resistant, Phosphate Ester Hydraulic Fluid

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 395 Rubber Property - Compression Set

ASTM D 412 Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension

ASTM D 471 Rubber Property - Effect of Liquids

ASTM D 573 Rubber - Deterioration in an Air Oven

ASTM D 624 Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

ASTM D 792 Density and Specific Gravity (Relative Density) of Plastics by Displacement

ASTM D 797-82 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

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-810 Environmental Test Methods and Engineering Guidelines

3. TECHNICAL REQUIREMENTS:

3.1 Material:

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

3.2 Properties:

This product shall conform to the requirements shown in Table 1, 3.2.14, and 3.2.15; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable.

TABLE 1 - Properties

	Property	Requirement	Test Method
3.2.1	Hardness, Durometer "A" or equivalent	60 ± 5	ASTM D 2240
3.2.2	Tensile Strength, min	1200 psi (8.27 MPa)	ASTM D 412, Die B or C
3.2.3	Elongation, min	400%	ASTM D 412, Die B or C
3.2.4	Tensile Stress at 100% Elongation, min	150 psi (1.03 MPa)	ASTM D 412, Die B or C
3.2.5	Tear Resistance, min	150 pounds force per inch (26 kN/m)	ASTM D 624, Die B
3.2.6	Specific Gravity	Preproduction Value ±0.03	ASTM D 792
3.2.7	Synthetic-Lubricating Oil Resistance:		ASTM D 471 Medium: AMS 3021 150 °C ± 3 (302 °F ± 5) 70 hours ± 0.5
3.2.7.1	Hardness Change, Durometer "A" or equivalent	-20 to +5	
3.2.7.2	Tensile Strength, Change, max	-45%	
3.2.7.3	Elongation Change, max	-40%	
3.2.7.4	Volume Change	0 to +35%	
3.2.7.5	Decomposition	None	
3.2.7.6	Surface Tackiness	None	
3.2.8	Phosphate Ester Hydraulic Fluid Resistance:		ASTM D 471 AS1241, Type IV Class 1 Hydraulic Fluid 70 °C ± 3 (158 °F ± 5) 70 hours ± 0.5
3.2.8.1	Hardness Change, Durometer "A" or equivalent	-20 to +5	
3.2.8.2	Tensile Strength Change, max	-45%	
3.2.8.3	Elongation Change, max	-40%	
3.2.8.4	Volume Change	0 to ±35%	

TABLE 1 - Properties (Continued)

	Property	Requirement	Test Method
3.2.8.5	Decomposition	None	
3.2.8.6	Surface Tackiness	None	
3.2.9	Dry Heat Resistance:		ASTM D 573 225 °C ± 3 (437 °F ± 5) 70 hours ± 0.5
3.2.9.1	Hardness Change, Durometer "A" or equivalent	0 to +10	
3.2.9.2	Tensile Strength Change, max	-35%	
3.2.9.3	Elongation Change, max	-40%	
3.2.10	Compression Set:		ASTM D 395, Method B 175 °C ± 3 (347 °F ± 5) 22 hours ± 0.5
	Percent of Original Deflection, max	30	
3.2.11	Low Temperature Resistance:		
3.2.11.1	Brittleness	Pass	ASTM D 2137 Method A -65 °C ± 3 (-85 °F ± 5) 3 minutes ± 0.3
3.2.11.2	Young's Modulus max (See 8.2)	10,000 psi (68.9 MPa)	ASTM D 797 -50 °C ± 1 (-58 °F ± 2) 5 hours ± 0.2
3.2.12	Thermal Shock:	No cracking, surface tackiness, or degradation	MIL-STD-810, Method 503.2 Low Temperature: -65 °C ± 3 (-85 °F ± 5) High Temperature: 225 °C ± 3 (437 °F ± 5)
3.2.13	Flame Resistance:		ASTM D 635
3.2.13.1	Burning Rate, max	2.5 inches (63.5 mm) per minute	

3.2.14 Weather Resistance: The product shall have weather resistance acceptable to purchaser, determined by a procedure agreed upon by purchaser and supplier.

3.2.15 Corrosion: The product shall not cause cracking, pitting, or other corrosive effects on other materials with which it is in contact when exposed to conditions normally encountered in service, determined by a procedure agreed upon by purchaser and supplier. 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 Sizes and Tolerances:

Shall conform to AMS 2279 or MAM 2279.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer shall supply all samples and shall be responsible for performance of 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 specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: The requirements shown in Table 2 are acceptance tests, and shall be performed on each lot.

TABLE 2 - Acceptance Tests

Requirement	Paragraph
Hardness, as received	3.2.1
Tensile Strength, as received	3.2.2
Elongation, as received	3.2.3
Specific Gravity	3.2.6.2

4.2.2 Preproduction Tests: All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of a product by the manufacturer, when a change in ingredients and/or processing requires reapproval as in 4.4.1, and when purchaser deems confirmatory testing to be required.

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, except as otherwise specified in 4.3.1.4.
- 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 the 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 produced from the same batch of compound processed in one continuous run and presented for manufacturer's inspection at one time.
- 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 A statistical sampling plan acceptable to the purchaser may be used in lieu of sampling as in 4.3.1. Sample size for visual and dimensional requirements shall be as shown in Table 3; sample unit shall be one molded part and acceptance based on zero defects.

TABLE 3 - Visual and Dimensional Inspection

Lot Size		Sample Size
2 to	8	Entire Lot
9 to	90	8
91 to	150	12
151 to	280	19
281 to	500	21
501 to	1200	27
1201 to	3200	35
3201 to	10000	38
10001 to	35000	46
35001 to	150000	56
150001	and Over	65