SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS3327D

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Superseding AMS3327C

Fluorosilicone (FVMQ) Rubber
High Temperature Fuel and Oil Resistant
70 - 80

RATIONALE

AMS3327D is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a fluorosilicone (FVMQ) rubber in the form of sheet, strip, and molded shapes.

1.2 Application

These products have been used typically for parts requiring resistance to jet fuel and lubricating oils, but usage is not limited to such applications. Generally, products are usable over a temperature range of -76 to +302 °F (-60 to +150 °C); each application, however, has to 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 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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2279 Tolerances, Rubber Products
AMS2810 Identification and Packaging, Elastomeric Products
AMS3021 Fluid, Reference, for Testing DiEster (Polyol) Resistant Materials

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS3327D

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 297 Standard Test Methods for Rubber Products Chemical Analysis
ASTM D 395 Standard Test Methods for Rubber Property Compression Set
ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 471 Standard Test Methods for Rubber Property - Effect of Liquids
ASTM D 573 Standard Test Methods for Rubber Property Deterioration in an Air Oven
ASTM D 624 Standard Test Methods for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 1415 Standard Test Methods for Rubber Property - International Hardness
ASTM D 2137 Standard Test Methods for Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics
ASTM D 2240 Standard Test Methods for Rubber Property - Durometer Hardness

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be a compound, based on a fluorosilicone (FVMQ) rubber, suitably cured to produce a product meeting the requirements of 3.2.

3.2 Properties

The product shall conform to requirements shown in Table 1, 3.2.11, and 3.2.12; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable.

TABLE 1 - PROPERTIES

Paragraph	Property	Requirement	Test Method
3.2.1	Hardness, Durometer "A" or equivalent	75 ± 5	ASTM D 2240 or ASTM D 1415
3.2.2	Tensile Strength, minimum	800 psi (5.52 MPa)	ASTM D 412, Die B or C
3.2.3	Elongation, minimum	100%	ASTM D 412, Die B or C
3.2.4	Tensile Stress at 100% Elongation	700 to 1000 psi (4.83 to 6.89 MPa)	ASTM D 412, Die B or C
3.2.5	Tear Resistance, minimum	40 pounds force per inch (7.01 kN/m)	ASTM D 624, Die B or C
3.2.6	Specific Gravity	Preproduction Value ± 0.03	ASTM D 297
3.2.7	Aromatic Fuel Resistance (Immediate Deteriorated Properties)		ASTM D 471 ASTM Ref. Fuel B Temperature: 68 to 86 °F C (20 to 30 °) Time: 70 hours ± 0.5
3.2.7.1	Hardness Change, Durometer "A" or equivalent	-15 to 0	
3.2.7.2	Tensile Strength Change, maximum	-30%	
3.2.7.3	Elongation Change, maximum	-25%	
3.2.7.4	Volume Change	0 to +20%	
3.2.8	Di-Ester Oil Resistance (Immediate Deteriorated Properties)		ASTM D 471 AMS 3021 Temperature: 302 °F ± 5 (150 °C ± 3) Time: 70 hours ± 0.5

TABLE 1 – PROPERTIES (CONTINUED)

Paragraph	Property	Requirement	Test Method
3.2.8.1	Hardness Change, Durometer "A" or equivalent , maximum	-10	
3.2.8.2	Tensile Strength Change, maximum	-20%	
3.2.8.3	Elongation Change, maximum	-25%	
3.2.8.4	Volume Change	0 to +12%	
3.2.9	Dry Heat Resistance		ASTM D 573 Temperature: 392 °F ± 5 (200 °C ± 3) Time: 70 hours ± 0.5
3.2.9.1	Hardness Change, Durometer "A" or equivalent	0 to +10	
3.2.9.2	Tensile Strength Change, maximum	-15%	
3.2.9.3	Elongation Change, maximum	-30%	
3.2.10	Compression Set		ASTM 395, Method B Temperature: 347 °F ± 5 (175 °C ± 3) Time: 22 hours ± 0.5
3.2.10.1	Percent of Original Deflection, maximum	40	
3.2.11	Low-Temperature Resistance		ASTM D 2137, Method A Temperature: -67 °F ± 5 (-55 °C ± 3)
3.2.11.1	Brittleness	Pass	

3.3 Quality

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

3.4 Tolerances

Shall conform to all applicable requirements of AMS2279.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer of the product shall supply all samples for required tests and shall be responsible for the 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 specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Tests for requirements shown in Table 2 are acceptance tests and shall be performed on each lot.

TABLE 2 - ACCEPTANCE TESTS

Requirement	Paragraph
Hardness	3.2.1
Tensile Strength	3.2.2
Elongation	3.2.3
Tensile Stress	3.2.4
Specific Gravity	3 .2.5
Volume Change in Fuel	3.2.6.4
Quality	3.3

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 4.2.2.1 and when purchaser deems confirmatory testing to be required.

4.2.2.1 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production product which are essentially the same as those used on the approved sample. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing, and, when requested, sample product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.3 Sampling and Testing

Shall be as follows:

4.3.1 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 for required tests. 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 ± 0.063 (25.40 mm ± 1.60) in OD by 0.075 inch ± 0.008 (1.90 mm ± 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 ± 0.008 (1.90 mm ± 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, produced in one continuous run, and presented for manufacturer's inspection at one time.

4.3.1.3 For o-rings and compression seals, refer to AMS7273.

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