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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 7259B

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Superseding AMS 7259A

Submitted for recognition as an American National Standard

RINGS, SEALING, FLUOROCARBON (FKM) RUBBER
High-Temperature-Fluid Resistant
Very-Low Compression Set
85 - 95

1. SCOPE:

1.1 Form:

This specification covers a fluorocarbon (FKM) rubber in the form of molded rings.

1.2 Application:

These products have been used typically in contact with air or a variety of fuels, lubricants, and specific hydraulic fluids from -15 to +260 °C (+5 to +500 °F) but usage is not limited to such applications. The very low compression set of these rings gives longer life than rings of other fluorocarbon rubbers such as AMS 7278 when used at similar temperatures. The cross section of such rings is usually not over 0.275 inch (6.98 mm) in diameter or thickness.

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.

Printed in U.S.A.
91-0942/ EG

2.1 SAE Publications:

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

AMS 2817 Packaging and Identification, Preformed Packings
AMS 3021 Reference Fluid for Testing Di-Ester (Polyol) Resistant Materials
AMS 7278 Rings, Sealing, Fluorocarbon Rubber, High-Temperature-Fluid Resistant, 70 - 80
AIR851 O-Ring Tension Testing Calculations
AS568 Aerospace Size Standard for O-Rings
AS871 Manufacturing and Inspection Standards for Preformed Packings (O-Rings)

2.2 ASTM Publications:

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

ASTM D 471 Rubber Property - Effect of Liquids
ASTM D 1414 Testing Rubber O-Rings
ASTM D 2240 Rubber Property - Durometer Hardness

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a compound, based on a fluorocarbon (FKM) elastomer, suitably cured to produce sealing rings meeting the requirements of 3.2.

3.1.1 Color: Shall be black.

3.2 Properties:

Rings shall conform to the requirements shown in Table 1; tests shall be performed on the rings supplied and, except as otherwise specified herein, in accordance with ASTM D 1414, insofar as practicable. Testing for tensile strength and tensile stress is not required on rings which are too small to permit assembly on rollers and are, after cutting, too short to permit testing as a single strand. Eliminating testing for tensile strength and tensile stress does not eliminate testing for elongation; elongation test can be made by stretching a ring over a mandrel of a size which will stretch the ring sufficiently to produce the required elongation when figured on the ID of the ring. Calculations of tensile strength, elongation, and tensile stress may be made in accordance with AIR851.

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Methods
3.2.1	As Received:		
3.2.1.1 (R)	Hardness, Durometer "A" or equivalent	90 ± 5	ASTM D 2240

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Methods
3.2.1.2	Tensile Strength, minimum	1200 psi (8.27 MPa)	
3.2.1.3	Elongation, minimum	100%	
3.2.1.4	Tensile Stress at 100% Elongation, minimum	850 psi (5.86 MPa)	
3.2.1.5	Corrosion	Nil	
3.2.1.6	Specific Gravity	Preproduction Value ± 0.02	
3.2.2	Aromatic Fuel Resistance: (Immediate Deteriorated Properties)		ASTM Ref. Fuel B (ASTM D 471) 20 - 30 °C (68 - 86 °F) 70 hours ± 0.5
3.2.2.1	Hardness Change, Durometer "A" or equivalent	-5 to +5	
3.2.2.2	Tensile Strength Change, maximum	-20%	
3.2.2.3	Elongation Change, maximum	-15%	
3.2.2.4	Volume Change	0 to +5%	
3.2.3 (R)	Synthetic Lubricant Resistance: (Immediate Deteriorated Properties)		AMS 3021 175 °C ± 3 (347 °F ± 5) 70 hours ± 0.5
3.2.3.1	Hardness Change, Durometer "A" or equivalent	+0 to -15	
3.2.3.2	Tensile Strength Change, maximum	-30%	
3.2.3.3	Elongation Change, maximum	-20%	
3.2.3.4	Volume Change	0 to +20%	

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Methods
3.2.4	Dry Heat Resistance:		275 °C ± 3 (528 °F ± 5) 70 hours ± 0.5
3.2.4.1	Hardness Change, Durometer "A" or equivalent	0 to +10	
3.2.4.2	Tensile Strength Change, maximum	-45%	
3.2.4.3	Elongation Change, maximum	-20%	
3.2.4.4	Weight Loss, maximum	10%	
3.2.4.5	Bend (Flat)	No cracking or checking	
3.2.5	Compression Set:		200 °C ± 3 (392 °F ± 5) 70 hours ± 0.5
	Percent of Original Deflection, maximum for Ring Cross Section Diameter in Inches (mm)		
3.2.5.1	0.066 to 0.110, inclusive (1.68 to 2.79, inclusive)	40%	
3.2.5.2	Over 0.110 (Over 2.79)	35%	
3.2.6	Long-Time Compression Set:		200 °C ± 3 (392 °F ± 5) 336 hours ± 2
	Percent of Original Deflection, maximum for Ring Cross Section Diameter in Inches (mm)		
3.2.6.1	0.066 to 0.110, inclusive (1.68 to 2.79), inclusive	65%	
3.2.6.2	Over 0.110 (Over 2.79)	60%	
3.2.7	Low-Temperature Resistance:		
	Temperature Retraction, TR_{10} point, maximum	-15 °C (+5 °F)	

3.3 Quality:

Rings, as received by purchaser, shall be uniform in quality and condition, smooth, as free from foreign materials as commercially practicable, and free from internal imperfections detrimental to their performance. Surface imperfections shall be no greater than permitted by AS871 for minor defects.

3.4 Sizes and Tolerances:

Shall be as specified on the drawing. Inspection for conformance to dimensional requirements shall be made in accordance with AS871. Standard sizes are as shown in AS568.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of rings 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 rings conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for the requirements shown in Table 2 are acceptance tests and shall be performed on each lot:

TABLE 2 - Acceptance Tests

Requirement	Paragraph Reference
Hardness, as received	3.2.1.1
Tensile Strength, as received	3.2.1.2
Elongation, as received	3.2.1.3
Tensile Stress, as received	3.2.1.4
Specific Gravity, as received	3.2.1.6
Volume Change in fuel	3.2.2.4
Compression Set	3.2.5

4.2.2 Periodic Tests: Tests for the requirements shown in Table 3 are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

TABLE 3 - Periodic Tests

Requirement	Paragraph Reference
Corrosion, as received	3.2.1.5
Tensile Strength Change in synthetic lubricant	3.2.3.2
Elongation Change in synthetic lubricant	3.2.3.3
Volume Change in synthetic lubricant	3.2.3.4
Hardness Change after dry heat exposure	3.2.4.1
Bend after dry heat exposure	3.2.4.5
Temperature Retraction, TR_{10} point	3.2.7

4.2.3 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of rings 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.

4.2.3.1 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:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient rings 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 A lot shall be all rings of the same nominal size, produced from the same batch of compound, processed in one continuous series of operations, and presented for vendor's inspection at one time.

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

4.3.1.3 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 Periodic Tests: As in 4.3.1.

4.3.3 For Preproduction Tests: As agreed upon by purchaser and vendor. AS568-214 rings shall be used for preproduction tests.