

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS-7259

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Superseding AMS-7259

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: Primarily for use in contact with air or a variety of fuels, lubricants, and specific hydraulic fluids from -15° to 260°C (+5° to +500°F). The very low compression set of these rings gives longer life than rings of other fluorocarbon rubbers such as AMS-7279 at equal temperatures. The cross section of such rings is usually not over 0.275 inch (6.98 mm) in diameter or thickness. Standard sizes are as shown in AS568.
- 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.

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

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2.1.1 Aerospace Material Specifications:

AMS-2817 - Packaging and Identification, Preformed Packings

2.1.2 Aerospace Referee Materials:

ARM-100 - Reference Test Fluid (See 8.2)

2.1.3 Aerospace Standards:

AS568 - Aerospace Size Standard for O-Rings

AS871 - Manufacturing and Inspection Standards for Preformed Packings
(O-Rings)

2.1.4 Aerospace Information Reports:

AIR851 - O-Ring Tension Testing Calculations

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

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 following requirements; 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.

3.2.1 As Received:

3.2.1.1 Hardness, Durometer
"A" or equivalent 90 ± 5

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 850 psi
100% Elongation, minimum (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)

Medium: ASTM Ref. Fuel B
(ASTM D 471)

Temperature: 20° - 30°C
(68° - 86°F)

Time: 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 Synthetic Lubricant Resistance:
Ø (Immediate Deteriorated
Properties)

Medium: ARM-100

Temperature: 200°C ± 3
(392°F ± 5)

Time: 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%

3.2.4 Dry Heat Resistance:

Temperature: 275°C ± 3
(528°F ± 5)

Time: 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: Temperature: $200^{\circ}\text{C} \pm 3$
($392^{\circ}\text{F} \pm 5$)
Percent of Original Deflection, maximum Time: 70 hours ± 0.5

Ring Cross Section Diameter		
Inch	Millimetres	
0.066 to 0.110, incl	1.68 to 2.79, incl	40%
Over 0.110	Over 2.79	35%

3.2.6 Long-Time Compression Set: Temperature: $200^{\circ}\text{C} \pm 3$
($392^{\circ}\text{F} \pm 5$)
Percent of Original Deflection, maximum Time: 336 hours ± 2

Ring Cross Section Diameter		
Inch	Millimetres	
0.066 to 0.110, incl	1.68 to 2.79, incl	65%
Over 0.110	Over 2.79	60%

3.2.7 Low-Temperature Resistance:
Temperature Retraction, -15°C
TR₁₀ point, maximum ($+5^{\circ}\text{F}$)

3.3 Quality: Rings, as received by purchaser, shall be uniform in quality and condition, smooth, as free from foreign material 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 following requirements are acceptance tests and shall be performed on each lot:

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 following requirements are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

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 first-article 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.