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AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE

AMS 7276D

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Superseding AMS 7276C

RINGS, SEALING, FLUOROCARBON (FKM) RUBBER High-Temperature-Fluid Resistant Very-Low Compression Set 70 - 80

1. SCOPE:

1.1 Form:

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

1.2 Application:

These rings have been used typically as sealing rings 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 7280, at equal temperatures. The cross-section of such rings is usually not over 0.275 inch (6.98 mm) in nominal 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.

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 2817 Packaging and Identification, Preformed Packings
AMS 3021 Fluid, Reference, for Testing Di-Ester (Polyol) Resistant
Material
AMS 7280 Rings, Sealing, Fluorocarbon Rubber, High Temperature Fluid
Resistant, Low Compression Set, FKM Type (70-80)
AS568 Aerospace Size Standard for O-Rings
AS871 Manufacturing and Inspection Standards for Preformed Packings
(O-Rings)
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 a product meeting the requirements of 3.2.

3.1.1 Color: Shall be black.
(R)

3.2 Properties:

Rings shall conform to the requirements shown in Table 1; tests shall be performed on the rings supplied and in accordance with ASTM D 1414, insofar as practicable. Testing for tensile strength 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 does not eliminate testing for elongation; elongation testing can be done 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 and elongation may be made in accordance with AIR851.

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TABLE 1 - Properties

Paragraph	Property	Requirement	Method of Testing
3.2.1	As Received:		
3.2.1.1	Hardness, Durometer "A" or equivalent	75 $\pm$ 5	
3.2.1.2	Tensile Strength, minimum	1400 psi (9.65 MPa)	
3.2.1.3	Elongation, minimum	125%	
3.2.1.4	Corrosion	Nil	
3.2.1.5	Specific Gravity	Preproduction Value $\pm$ 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 $\pm$ 0.5
3.2.2.1	Hardness Change, Durometer "A" or equivalent	-5 to +5	
3.2.2.2	Tensile Strength Change, maximum	-15%	
3.2.2.3	Elongation Change, maximum	-15%	
3.2.2.4	Volume Change	0 to +5%	
3.2.3	Synthetic Lubricant Resistance: (R) (Immediate Deteriorated Properties)		Medium: AMS 3021 Temperature: 175 °C $\pm$ 3 (347 °F $\pm$ 5) Time: 70 hours $\pm$ 0.5
3.2.3.1	Hardness Change, Durometer (R) "A" or equivalent	+5 to -15	
3.2.3.2	Tensile Strength Change, (R) maximum (based on area before immersion)	-30	
3.2.3.3	Elongation Change, maximum (R)	-20	
3.2.3.4	Volume Change (R)	0 to +20%	

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TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Method of Testing
3.2.4	Dry Heat Resistance:		Temperature: 275 °C $\pm$ 3 (527 °F $\pm$ 5)
3.2.4.1	Hardness Change, Durometer "A" or equivalent	0 to +10	Time: 70 hours $\pm$ 0.5
3.2.4.2	Tensile Strength Change, maximum	-35%	
3.2.4.3	Elongation Change, maximum	-15%	
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 °C $\pm$ 3 (392 °F $\pm$ 5)
	Percent of Original Deflection, maximum		Time: 70 hours $\pm$ 0.5
	Ring Cross Section Diameter,		
	0.066 to 0.110, inch		
	(1.68 to 2.79 mm), incl	25	
	Over 0.110 inch (2.79 mm)	20	
3.2.6	Long-Time Compression Set:		Temperature: 200 °C $\pm$ 3 (392 °F $\pm$ 5)
	Percent of Original Deflection, maximum		Time: 336 hours $\pm$ 0.5
	Ring Cross Section Diameter,		
	0.066 to 0.110, inch		
	(1.68 to 2.79 mm), incl	45	
	Over 0.110 inch (2.79 mm)	40	
3.2.7	Low-Temperature Resistance:		
	Temperature Retraction, TR ₁₀ point, maximum	-15 °C (+5 °F)	

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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 usage of the rings. 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. Standard sizes are as shown in AS568. Inspection for conformance to dimensional requirements shall be made in accordance with AS871.

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 requirements shown in Table 2 are acceptance (R) 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
Specific Gravity, as received	3.2.1.5
Volume Change in fuel	3.2.2.4
Compression Set	3.2.5
Quality	3.3
Sizes and Tolerances	3.4

4.2.2 Periodic Tests: Tests for 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.

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TABLE 3 - Periodic Tests

Requirement	Paragraph Reference
Corrosion, as received	3.2.1.4
Tensile Strength Change in oil	3.2.3.2
Elongation Change in oil	3.2.3.3
Volume Change in oil	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.

4.3.1.1 A lot shall be all rings from the same batch of compound processed in one continuous run and presented for vendor's inspection at one time, but shall not exceed 1000 rings or 500 pounds (227 kg), whichever is the greater mass.

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