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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 7257A

Issued 4-1-85
Revised 10-1-86

Superseding AMS 7257

RINGS, SEALING, PERFLUOROCARBON RUBBER
High Temperature Fluid Resistant
FFKM Type
70-80

1. SCOPE:

1.1 Form: This specification covers a high temperature fluid resistant perfluorocarbon (FFKM) rubber in the form of molded O-rings.

1.2 Application: Sealing rings for use in contact with air or a variety of fuels, lubricants, and hydraulic fluids from -15°C to +290°C (5°F to 555°F). Each application, however, has to be considered individually. Instances are known when this material has been used below -15°C (5°F) and above 290°C (555°F). The cross section of such rings is usually not over 0.275 in. (7.0 mm) in diameter or thickness. Standard sizes are as shown in AS 568.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications, Aerospace Standards, and Aerospace Information Reports shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

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

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2817 - Packaging and Identification, Preformed Packings
AMS 3021 - Reference Fluid for Testing Di-Ester (Polyol) Resistant Materials

2.1.2 Aerospace Standards:

AS 568 - Aerospace Size Standard for O-Rings
AS 871 - Manufacturing and Inspection Standards for Preformed Packings (O-Rings)
AS 1241 - Fire Resistant Hydraulic Fluid for Aircraft

2.1.3 Aerospace Information Reports:

AIR 851 - O-Ring Tension Testing Calculations

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D471 - Rubber Property - Effect of Liquids
ASTM D1414 - Testing Rubber O-Rings
ASTM D2240 - Rubber Property - Durometer Hardness

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a compound based on a perfluorocarbon (FFKM) elastomer, suitably cured to produce a product meeting the requirements of 3.2.

3.2 Properties: Rings shall conform to the following requirements; tests shall be performed on slabs and rings as in 4.3.1.1 and in accordance with ASTM D1414 insofar as practicable except that hardness shall be determined in accordance with ASTM D2240. Calculations of tensile strength and elongation may be made in accordance with AIR 851.

3.2.1 As Received:

3.2.1.1 Hardness, Durometer "A" or equiv. Ø	70 - 80	
3.2.1.2 Tensile Strength, min	1500 psi (10 MPa)	
3.2.1.3 Elongation, min.	120%	
3.2.2 Synthetic Lubricant Resistance		Medium: AMS 3021 Temperature: 175°C + 3 (347°F ∓ 5) Time: 70 hr ∓ 0.5
3.2.2.1 Hardness Change, Durometer "A" or equiv.	-5 to +5	
3.2.2.2 Tensile Strength Change, max Ø	-10%	
3.2.2.3 Elongation Change, max	-15%	
3.2.2.4 Volume Change Ø	0 to +5%	

3.2.3 Hydraulic Fluid Resistance:		Medium:	AS 1241, Type IV, Class 1 or Class 2
3.2.3.1 Hardness Change, Ø Durometer "A" or equiv.	-15 to 0	Temperature:	125°C ± 3 (255°F ± 5)
		Time:	70 hr ± 0.5
3.2.3.2 Tensile Strength Change, Ø max	-40%		
3.2.3.3 Elongation Change, max	-15%		
3.2.3.4 Volume Change Ø	0 to +15%		
3.2.4 Aromatic Fuel Resistance:		Medium:	ASTM Ref. Fuel B (ASTM D471)
3.2.4.1 Hardness Change, Durometer "A" or equiv.	-5 to +5	Temperature:	20° - 30°C (68° - 86°F)
		Time:	70 hr ± 0.5
3.2.4.2 Tensile Strength Change, max	-20%		
3.2.4.3 Elongation Change, max	-15%		
3.2.4.4 Volume Change	0 to + 5%		
3.2.5 Dry Heat Resistance:		Temperature:	290°C ± 3 (550°F ± 5)
3.2.5.1 Hardness Change, Durometer "A" or equiv.	-5 to +5	Time:	70 hr ± 0.5
3.2.5.2 Tensile Strength Change, max	-20%		
3.2.5.3 Elongation Change, max	-5%		
3.2.5.4 Weight Loss, max	5%		
3.2.6 Compression Set: Percent of Original Deflection, max	40%	Temperature:	230°C ± 3 (450°F ± 5)
		Time:	70 hr ± 0.5
3.2.7 Low-Temperature Resistance: Temperature Retraction TR10 Point, max	+5°C (+40°F)		

3.3 Quality: Rings, as received by purchaser, shall be uniform in quality and condition, clean, smooth, as free from foreign material as commercially practicable, and free from internal imperfections detrimental to usage of the rings. Surface imperfections shall, unless otherwise specified, be no greater than permitted by AS 871 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 AS 871, unless otherwise specified.

3.5 Part Numbers: Shall consist of the following: This specification number (AMS 7257) a dash, and the appropriate dash number from AS 568.

Example 1	Example 2
AMS 7257-014	AMS 7257-121

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. Results of such tests shall be reported to the purchaser as required by 4.5. 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 to determine conformance to the following requirements are classified as acceptance tests and shall be performed on each batch of compound:

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
Compression Set	3.2.6

4.2.2 Periodic Tests: Tests to determine conformance to the following requirements are classified as periodic tests and shall be performed on rings produced from a production batch of compound at intervals not longer than one year.

Requirement	Paragraph Reference
Tensile Strength Change in Synthetic Lubricant	3.2.2.2
Elongation Change in Synthetic Lubricant	3.2.2.3
Volume Change in Synthetic Lubricant	3.2.2.4
Volume Change in Hydraulic Fluid	3.2.3.4
Hardness Change after dry heat exposure	3.2.5.1
Temperature Retraction, TR10 Point	3.2.7

4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the first-article shipment of rings to a purchaser, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling: Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient rings and slabs shall be made from each batch of compound 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 Samples for acceptance tests shall be AS 568-214 rings and slabs not less than 0.065 in. (1.65 mm) thick.

4.3.1.2 A batch shall be the quantity of compound processed through a mill or mixer at one time and shall not exceed 55 lb (25 kg).

4.3.1.3 When a statistical sampling plan and acceptance quality level (AQL) have 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 for the batch from which the samples are taken.

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

4.4 Approval:

4.4.1 Sample rings shall be approved by purchaser before rings for production use are supplied, unless such approval be waived by purchaser. Results of tests on production rings shall be essentially equivalent to those on the approved samples.

4.4.2 Vendor shall establish for each size of ring parameters for the process control factors which will produce rings meeting the technical requirements of this specification. These shall constitute the approved manufacturing procedures and shall be used for manufacturing production rings. If necessary to make any change in parameters for the process control factors, vendor shall submit for reapproval a statement of the proposed changes in material, processing, or both and, when requested, sample rings, slabs, or both. Production rings made by the revised procedure shall not be shipped prior to receipt of reapproval.