Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 7280B
Superseding AMS 7280A

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

1. SCOPE:

1.1 Form: This specification covers a high-temperature-fluid resistant, low compression set fluorocarbon rubber in the form of molded rings.

1.2 Application: Sealing rings for use in contact with air or a variety of fuels, lubricants, and hydraulic fluids from -15° C (+5° F) to 260° C (500° F). Rings may be suitable for use at temperatures appreciably lower than the brittleness point as determined by common tests. 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 (AMS), Aerospace Standards (AS), and Aerospace Information Reports (AIR) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 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)

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

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a compound based on a fluorocarbon 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 the rings supplied and in accordance with ASTM D1414 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 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 and elongation may be made in accordance with AIR 851.

3.2.1 As Received:

3.2.1.1	Hardness, Durometer "A" or equiv.	75 ± 5
3.2.1.2	Tensile Strength, min	As in Table I

TABLE I

Ring Diameters, Inches		Tensile Strength
Cross Section	ID	psi, min
Up to 0.090, incl	All	1400
Over 0.090 to 0.110, incl	Up to 1.000, excl	1400
Over 0.090 to 0.110, incl	1.000 and over	1600
Over 0.110	All	1600

TABLE I (SI)

Ring Diameters, Millimetres		Tensile Strength
Cross Section	ID	MPa, min
Up to 2.29, incl	All	9.65
Over 2.29 to 2.79, incl	Up to 25.40, excl	9.65
Over 2.29 to 2.79, incl	25.40 and over	11.0
Over 2.79	All	11.0

3.2.1.3	Elongation, min	125%
3.2.1.4	Corrosion	Nil
3.2.1.5	Specific Gravity	Preproduction Value ± 0.02

3.2.2 Aromatic Fuel Resistance: (Immediate Deteriorated Properties)

Medium: ASTM Ref. Fuel B (ASTM D471)
Temperature: 20° - 30°C (68° - 86°F)
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	-15%
3.2.2.3	Elongation Change, max	-15%
3.2.2.4	Volume Change	0 to +10%

3.2.3 Synthetic Lubricant Resistance: (Immediate Deteriorated Ø Properties)			Medium: AMS 3021 (See 8.2) Temperature: 200°C ± 3 (392°F ± 5) Time: 70 hr ± 0.5
3.2.3.1	Hardness Change, Durometer "A" or equiv.	-15 to +5	
3.2.3.2	Tensile Strength Change, max (based on area before immersion)	-40%	
3.2.3.3	Elongation Change, max	-20%	
3.2.3.4	Volume Change	0 to -25%	
3.2.4 Dry Heat Resistance:			Temperature: 250°C ± 3 (482°F ± 5) Time: 70 hr ± 0.5
3.2.4.1	Hardness Change, Durometer "A" or equiv.	0 to +10	
3.2.4.2	Tensile Strength Change, max	-20%	
3.2.4.3	Elongation Change, max	-20%	
3.2.4.4	Weight Loss, max	5.0%	
3.2.4.5	Bend (flat)	No cracking or checking	
3.2.5 Compression Set:			Temperature: 200°C ± 3 (392°F ± 5) Time: 70 hr ± 0.5

Percent of Original Deflection, max

Ring Cross Section Diameter		
Inch	(Millimetres)	
0.066 to 0.110, incl	1.68 to 2.79, incl)	35
Over 0.110	(Over 2.79)	30

3.2.6 Long-Time Compression Set:		Temperature: 200°C ± 3 (392°F ± 5) Time: 336 hr ± 2

Percent of Original Deflection, max

Ring Cross Section Diameter		
Inch	(Millimetres)	
0.066 to 0.110, Incl	(1.68 to 2.79, incl)	60
Over 0.110	(Over 2.79)	55

3.2.7 Room-Temperature Compression Set:		Temperature: 20° - 30°C (68° - 86°F) Time: 70 hr ± 0.5

Percent of Original Deflection, max

Ring Cross Section Diameter		
Inch	(Millimetres)	
0.066 - 0.110, incl	(1.68 - 2.79, incl)	20
Over 0.110	(Over 2.79)	15

3.2.8 Low-Temperature Resistance:

Temperature Retraction, TR_{10} point, max	-15°C (+5°F)

3.3 Quality: The product shall be uniform in quality and condition, clean, smooth, as free from foreign material as commercially practicable, and free from internal imperfections detrimental to their performance. 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 agreed upon by purchaser and vendor.

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 such confirmatory testing as he deems 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 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
Specific Gravity, as received	3.2.1.5
Volume Change in fuel	3.2.2.4
Compression Set	3.2.5

4.2.2 Periodic Tests: Tests to determine conformance to the acceptance tests of 4.2.1 plus the following tests are classified as periodic tests and shall be performed on rings produced from a production batch of compound at intervals not longer than six months:

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