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

AEROSPACE MATERIAL SPECIFICATION

AMS 7272D
Superseding AMS 7272C
Issued 7-1-57
Revised 7-15-80

RINGS, SEALING, NITRILE RUBBER
Synthetic Lubricant Resistant
65 - 75

1. SCOPE:

1.1 Form: This specification covers a nitrile rubber in the form of molded rings.

1.2 Application: Sealing rings for use up to 150°C (300°F) in contact with diester synthetic lubricants. 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

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 nitrile elastomer, suitably cured to produce Ø sealing rings 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, except as otherwise specified, in accordance with ASTM D1414, insofar as practicable. Testing for tensile strength and tensile stress is not required on Ø 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 for tensile strength, elongation, and tensile stress may be made in accordance with AIR 851.

Printed in U.S.A.

3.2.1	As Received:		
3.2.1.1	Hardness, Durometer "A" or equiv.	70 ±5	
3.2.1.2	Tensile Strength, min	1500 psi (10.3 MPa)	
3.2.1.3	Elongation, min	250%	
3.2.1.4	Tensile Stress at 100% Elongation, min	500 psi (3.45 MPa)	
3.2.1.5	Corrosion	Nil	
3.2.1.6	Specific Gravity	Preproduction Value ±0.02	
3.2.2	Synthetic Lubricant Resistance: (Immediate Deteriorated Properties)		Medium: ASTM Service Fluid No. 101 (ASTM D471) Temperature: 150°C ± 3 (302°F ± 5) Time: 70 hr ± 0.5 Prepare specimens as in 4.5.1
3.2.2.1	Tensile Strength Change, max	-70%, but actual strength shall be not lower than 600 psi (4.14 MPa)	
3.2.2.2	Elongation Change, max	-70%	
3.2.2.3	Volume Change	0 to +15%	
3.2.2.4	Decomposition	None	
3.2.2.5	Surface Tackiness	None	
3.2.3	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
3.2.3.1	Tensile Strength Change, max (based on area before immersion)	-60%	
3.2.3.2	Elongation Change, max	-55%	
3.2.3.3	Volume Change	0 to +35%	
3.2.3.4	Volume Change after 70 hr ± 0.5 immersion in 30% aromatic fuel followed by 48 hr ± 0.5 drying at 70°C ± 1 (158°F ± 2), max (based on un-immersed volume)	-10%	

3.2.4 Dry Heat Resistance:		Temperature:	125°C ± 2 (275°F ± 4)
3.2.4.1 Tensile Strength Change, max	-25%	Time:	70 hr ± 0.5
3.2.4.2 Elongation Change, max	-50%		
3.2.4.3 Bend (flat)	No cracking or checking		
3.2.5 Compression Set:		Temperature:	125°C ± 2 (257°F ± 4)
3.2.5.1 Percent of Original Deflection, max		Time:	70 hr ± 5
Ring Cross Section Diameter, 0.066 to 0.110 in. (1.68 to 2.79 mm), incl	85		
Over 0.110 in. (2.79 mm)	75		
3.2.6 Low-Temperature Resistance:			
3.2.6.1 Temperature Retraction TR_{10} point, max	-26°C (-15°F)		

3.3 Quality: Rings 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 4.6. 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	3.2.1.6
Volume Change in synthetic lubricant	3.2.2.3
Decomposition in synthetic lubricant	3.2.2.4
Surface Tackiness in synthetic lubricant	3.2.2.5
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
Tensile Stress, as received	3.2.1.4
Corrosion, as received	3.2.1.5
Tensile Strength Change in synthetic lubricant	3.2.2.1
Elongation Change in synthetic lubricant	3.2.2.2
Tensile Strength Change in aromatic fuel	3.2.3.1
Elongation Change in aromatic fuel	3.2.3.2
Volume Change in aromatic fuel	3.2.3.3 and 3.2.3.4
Tensile Strength Change after dry heat exposure	3.2.4.1
Elongation Change after dry heat exposure	3.2.4.2
Bend after dry heat exposure	3.2.4.3
Temperature Retraction, TR_{10} point	3.2.6.1

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.

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, the contracting officer, or the request for procurement.

4.3 Sampling: 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 tests 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 size 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 100 lb (45 kg), whichever is the lesser 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 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 4.6.1 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. Results of tests on production rings shall be essentially equivalent to those on the approved samples.