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

AEROSPACE MATERIAL SPECIFICATION

AMS 7260C
Superseding AMS 7260B

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RINGS, PACKING, NITRILE RUBBER
Fuel and Low Temperature Resistant
70 - 80

1. SCOPE:

1.1 Form: This specification covers a fuel and low-temperature resistant nitrile rubber in the form of molded rings.

1.2 Application: Primarily for gland type packings and seals in flexible couplings for use at temperatures as low as -67°F (-55°C) where resistance to fuel is required. Standard sizes for O-rings 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 D395 - Rubber Property - Compression Set
ASTM D412 - Rubber Properties in Tension
ASTM D471 - Rubber Property - Effect of Liquids
ASTM D573 - Rubber Deterioration in an Air Oven
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 nitrile elastomer suitably cured to produce packing or 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 in accordance with specified test methods, insofar as practicable. Tensile strength testing 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.

3.2.1 As Received:

3.2.1.1	Hardness, Durometer "A" or equivalent	75 ± 5	4.5.1
3.2.1.2	Tensile Strength, min	1000 psi (6.90 MPa)	4.5.2
3.2.1.3	Elongation, min	100%	4.5.2
3.2.1.4	Corrosion	Nil	4.5.3
Ø 3.2.1.5	Specific Gravity	Preproduction Value ± 0.02	4.5.3

3.2.2 Aromatic and Non-Aromatic Fuel Resistance: 4.5.4

3.2.2.1	Volume Change after 96 hr ± 1 immersion in 30% aromatic fuel	+30 to +50%
3.2.2.2	Volume Change after 96 hr ± 1 immersion in 30% aromatic fuel followed by 72 hr ± 1 immersion in non-aromatic fuel (based on unimmersed volume)	Positive Swell
3.2.2.3	Volume Change after cyclic immersion and 48 hr ± 0.5 drying at 70°C ± 1 (158°F ± 2) max (based on unimmersed volume)	-12%

3.2.3 Low-Temperature Flexibility: 4.5.5

3.2.3.1	As Received, max	-50°C (-59°F)
3.2.3.2	After heat aging, cyclic immersion in fuel and drying, max	-40°C (-40°F)

3.2.4 Compression Set: 4.5.6

Temp.: 125°C ± 2 (257°F ± 4)
Time: 70 hr ± 0.5

3.2.4.1	Percent of Original Deflection, max	
	Ring Cross Section Diameter, Inch (mm)	
	0.066 to 0.110 (1.68 to 2.79), incl	85
	Over 0.110 (2.79)	75

3.2.4.1.1 Compression set shall be determined on complete rings if the ID of the ring is 2 in. (51 mm) or less; for larger rings, a section approximately 1 in. (25 mm) long cut from the ring shall be used.

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 and external imperfections detrimental to their performance. Surface imperfections on O-Rings 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	3.2.1.5
Volume Change in Fuel	3.2.2
Low Temperature Flexibility	3.2.3
Compression Set	3.2.4

4.2.2 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.

4.2.2.1 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 submitted 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 shall state that such plan was used.

ø 4.3.2 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.

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production rings which are essentially the same as those used on the approved sample rings. If any
ø change is necessary in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material and processing and, when requested, sample rings. Production rings made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods: Shall be as follows:

4.5.1 Hardness: In accordance with ASTM D2240 for packing rings; in accordance with ASTM D1414 for O-rings.

4.5.2 Tensile Strength and Elongation: In accordance with ASTM D412 for packing rings; in accordance with ASTM D1414 for O-rings.

4.5.3 Corrosion and Specific Gravity: In accordance with ASTM D1414.

4.5.4 Aromatic and Non-Aromatic Fuel Resistance: In accordance with ASTM D471 for packing rings and in accordance with ASTM D1414 for O-rings and as follows:

4.5.4.1 Immerse in 30% aromatic fuel (ASTM Reference Fuel B) at 20° - 30°C (68° - 86°F) for 96 hr ± 1; determine volume change.

4.5.4.2 Reimmerse in non-aromatic fuel (ASTM Reference Fuel A) at 20° - 30°C (68° - 86°F) for 72 hr ± 1; determine volume change.

4.5.4.3 Specimens, after the immersion of 4.5.4.2, may be allowed to air dry for such time as may suit the testing schedule and shall then be dried in an oven at 70°C ± 1 (158°F ± 2) for 48 hr ± 0.5, cooled in desiccator to room temperature, and the volume change determined.

4.5.5 Low-Temperature Flexibility: Rings 1.00 in. (25.4 mm) and under in OD shall be tested in full size; larger rings shall have a section removed and this section fastened at the ends to form a ring 1 in. (25.4 mm) or less in OD for testing as in 4.5.5.1 and 4.5.5.2. In testing cut sections, the joint shall be at approximately top center in the fixture and the fastened ends shall be in the same vertical plane.

4.5.5.1 As Received: Ring shall be placed in the fixture illustrated in Fig. 1 and the space between retaining walls adjusted so that ring will not shift its position during bending. Fixture shall be placed in refrigerator at -50°C ± 1 (-58°F ± 2) and held at that temperature for 5 hr ± 0.25. Without removing fixture from refrigerator, the ring shall be bent flat by striking upper end of plunger with a hammer. Fracture of seal or evidence of any cracks after removal from fixture and warming to room temperature will be considered failure.

4.5.5.2 After Heat Aging, Cyclic Fuel Immersion, and Drying: Rings shall be oven aged in accordance with ASTM D573 at 100°C ± 1 (212°F ± 2) for 70 hr ± 1 and then subjected to cyclic immersion in fuels and oven drying as in 4.5.4.1 through 4.5.4.3. Rings shall then be refrigerated and tested as in 4.5.5.1 except that the refrigerator shall be maintained at -40°C ± 1 (-40°F ± 2).

4.5.6 Compression Set: In accordance with ASTM D395 for packing rings, in accordance with ASTM D1414 for O-rings.