AEROSPACE MATERIAL SPECIFICATION

AMS7260™	REV. E

Issued 1955-03
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Reaffirmed 2018-08

Superseding AMS7260D

Rings, Butadiene-Acrylonitrile (NBR) Rubber, Molded Fuel and Low Temperature Resistant 70 - 80

RATIONALE

AMS7260E has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE:

1.1 Form:

This specification covers a fuel and low-temperature resistant butadiene-acrylonitrile (NBR) rubber in the form of molded rings.

1.2 Application:

These rings have been used typically for gland type packings and seals in flexible couplings for use at temperatures from -55 °C to +100 °C (-67 to 212 °F) where resistance to fuel is required, but usage is not limited to such applications.

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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://standards.sae.org/AMS7260E

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2817 Packaging and Identification, Preformed Packings

AS568 Aerospace Size Standard for O-Rings
AS871 Manufacturing and Inspection Standards for Preformed Packing (O-Rings)

AIR851 O-Ring Tension Testing Calculations

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 395 Rubber Property - Compression Set
ASTM D 412 Rubber Properties in Tension
ASTM D 471 Rubber Property - Effect of Liquids
ASTM D 573 Rubber - Deterioration in an Air Oven
ASTM D 1414 Testing Rubber O-Rings
ASTM D 2240 Rubber Property - Durometer Hardness

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a compound, based on a butadiene-acrylonitrile (NBR) elastomer, suitably cured to produce packing or sealing rings meeting the requirements of 3.2.

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 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. Calculations of tensile strength and elongation may be made in accordance with AIR851.

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.2.1	Hardness, Durometer "A", or equivalent	75 ± 5	4.5.1
3.2.2	Tensile Strength, min	1000 psi (6.89 MPa)	4.5.2
3.2.3	Elongation, min	100%	4.5.2
3.2.4	Corrosion	Nil	ASTM D 1414
3.2.5	Specific Gravity	Preproduction Value ±0.02	ASTM D 1414
3.2.6	Aromatic and Non-aromatic Fuel Resistance		4.5.3
3.2.6.1	Volume Change after 96 hours ± 1 immersion in 30% aromatic fuel	+30 to +50	
3.2.6.2	Volume Change after 96 hours ± 1 immersion in 30% aromatic fuel followed by 72 hours ± 1 immersion in non-aromatic fuel (based on unimmersed volume)	Positive Swell	
3.2.6.3	Volume Change, max, after cyclic immersion and 48 hours ± 0.5 drying at 70 °C ± 1 (160 °F ± 2) (based on unimmersed volume)	-12%	
3.2.7	Low-Temperature Flexibility		4.5.4
3.2.7.1	As Received, max	-50 °C (-58 °F)	
3.2.7.2	After heat aging, cyclic immersion in fuel, and drying, max	-40 °C (-40 °F)	
3.2.8	Compression Set		4.5.5 125 °C ± 2 (257 °F ± 4) 70 hours ± 0.5
3.2.8.1	Percent of Original Deflection, max Ring Cross Section Diameter, 0.066 to 0.110 inch, incl (1.68 to 2.79 mm, incl) Over 0.110 inch (2.79 mm)	 85 75	
3.2.8.1.1	Compression set shall be determined on complete rings if the ID of the ring is 2 inches (51 mm) or under; for larger rings, a section approximately 1 inch (25 mm) long cut from the ring shall be used.		

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 on O-Rings shall be no greater than permitted by AS871 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 AS871. Standard sizes of O-Rings are shown in AS568.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of rings shall supply all samples and shall be responsible for 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: The following requirements are acceptance tests and shall be performed on each lot.

TABLE 2 - Acceptance Tests

Requirement	Paragraph Reference
Hardness	3.2.1
Tensile Strength	3.2.2
Elongation	3.2.3
Specific Gravity	3.2.5
Volume Change in Fuel	3.2.6
Low-Temperature Flexibility	3.2.7
Compression Set	3.2.8

4.2.2 Preproduction Tests: 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.

4.2.2.1 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, 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 of the same nominal size, from the same batch of compound, processed in one continuous run, and presented for manufacturer's inspection at one time.

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 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3.1 and the report of 4.6 shall state that such plan was used.

4.3.2 For Preproduction Tests: Shall be acceptable to purchaser.

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 sample.

4.4.2 Manufacturer 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 necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or 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 D 2240 for packing rings; in accordance with ASTM D 1414 for O-rings.

4.5.2 Tensile Strength and Elongation: In accordance with ASTM D 412 for packing rings; in accordance with ASTM D 1414 for O-rings.

4.5.3 Aromatic and Non-Aromatic Fuel Resistance: In accordance with ASTM D 471 for packing rings and in accordance with ASTM D 1414 for O-rings and as follows:

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

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

4.5.3.3 Specimens, after the immersion of 4.5.3.2, 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 hours ± 0.5, cooled in a desiccator to room temperature, and the volume change determined.

4.5.4 Low-Temperature Flexibility: Rings 1.00 inch (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 inch (25.4 mm) or under in OD for testing as in 4.5.4.1 and 4.5.4.2. 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.

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

4.5.4.2 After Heat Aging, Cyclic Fuel Immersion, and Drying: Rings shall be oven aged in accordance with ASTM D 573 at 100 °C ± 1 (212 °F ± 2) for 70 hours ± 1 and then subjected to cyclic immersion in fuels and oven drying as in 4.5.3.1 through 4.5.3.3. Rings shall then be refrigerated and tested as in 4.5.4.1 except that the refrigerator shall be maintained at -40 °C ± 1 (-40 °F ± 2).

4.5.5 Compression Set: In accordance with ASTM D 395 for packing rings, in accordance with ASTM D 1414 for O-rings.

4.6 Reports:

The supplier of rings shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the rings conform to the other technical requirements. This report shall include the purchase order number, lot number, AMS 7260E, manufacturer's identification, part number, and quantity.

4.7 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the rings may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the rings represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Marking:

Shall be in accordance with AMS 2817.