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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 7267F

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Superseding AMS 7267E

RINGS, SEALING, SILICONE (VSI) RUBBER
Heat-Resistant, Low Compresssion Set
70 - 80

1. SCOPE:

1.1 Form: This specification covers a heat-resistant, low-compression-set silicone (VSI) rubber in the form of molded rings.

1.2 Application: Sealing rings for use from -65° to +260°C (-85°to +500°F) in contact with air. 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 form 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

2.1.2 Aerospace Standards:

AS 568 - Aerospace Size Standard for O-Rings
AS 871 - Manufacturing and Inspection Standards for Preformed Packings (O-Rings)

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2.1.3 Aerospace Information Report:

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 D575 - Rubber Properties in Compression
ASTM D1414 - Testing Rubber O-Rings

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a compound based on a silicone (VSI) elastomer, suitably cured to produce sealing rings meeting the requirements of 3.2.

3.1.1 Color: Shall be rust.
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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. 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 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	650 psi (4.50 MPa)
3.2.1.3	Elongation, min	125%
3.2.1.4	Compression-Deflection, at 20% deflection, min	4.5.1
	At 20°- 30°C (68°- 86°F)	200 psi (1.40 MPa)
	At 250°C ± 3 (480°F ± 5)	150 psi (1.05 MPa)
3.2.1.5	Corrosion	Nil
3.2.1.6	Specific Gravity	Preproduction Value ± 0.05

3.2.2	Lubricating Oil Resistance: (Immediate Deteriorated Properties)		Medium:	ASTM Oil No. 1 (ASTM D471)
			Temperature:	175°C +3 (345°F ±5)
3.2.2.1	Hardness Change, Durometer "A" or equiv.	-10 to +5	Time:	70 hr ± 0.5
3.2.2.2	Tensile Strength Change, max (based on area before immersion)	-30%		
3.2.2.3	Elongation Change, max	-30%		
3.2.2.4	Volume Change	0 to +15%		
3.2.3	Dry Heat Resistance:			
3.2.3.1	Hardness Change, Durometer "A" or equiv.	-5 to +10	Temperature:	250°C +3 480°F ±5
3.2.3.2	Tensile Strength Change, max	-30%	Time:	70 hr ±0.5
3.2.3.3	Elongation Change, max	-45%		
3.2.3.4	Blend (flat)	No cracking or checking		
3.2.4	Polymer Reversion:			4.5.2
3.2.4.1	Hardness Change, max Durometer "A" or equiv.	-10		
3.2.5	Compresssion Set:		Temperature:	225° C ± 3 (435°F ± 5
	Percent of Original Deflection, max		Time:	22 hr ± 0.25
	Ring Cross Section Diameter			
	0.066 to 0.110 in. (1.65 to 2.75 mm), incl	70		
	Over 0.110 in. (2.75 mm)	60		
3.2.6	Low-Temperature Resistance:			
	Temperature Retraction, TR point, max 10	-42°C (-44°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 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.

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 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 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	3.2.1.6
Volume Change in Oil	3.2.2.4
Compression Set	3.2.5

4.2.2 Periodic Tests: Tests to determine conformance to the following Ø requirements are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser:

Requirement	Paragraph Reference
Corrosion, as received	3.2.1.5
Tensile Strength Change in Oil	3.2.2.2
Elongation Change in Oil	3.2.2.3
Hardness Change after dry heat exposure	3.2.3.1
Bend after dry heat exposure	3.2.3.4
Temperature Retraction, TR_{10} point	3.2.6

4.2.3 Preproduction Tests: Tests to determine conformance to all technical Ø 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.

4.2.3.1 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 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 size from the same batch of compound Ø 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 greater mass. A lot may be packaged and delivered in smaller quantities under the basic lot approval provided lot identification is maintained.

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 4.5.1 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 and as follows:

4.3.3.1 Specimens for the compression-deflection test shall be discs cut from molded slabs and stacked to 0.500 in. ± 0.010 (12.50 mm ± 0.25) thickness.

4.3.3.2 Specimens for the polymer reversion test shall be discs 1.129 in. + 0.005 (28.50 mm + 0.12) in diameter stacked to a total thickness of 0.500 - 0.550 in. (12.50 - 14.00 mm).

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 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, vendor shall submit for reapproval a statement of the proposed changes in material, processing, or both 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:

4.5.1 Compression-Deflection: Shall be determined in accordance with ASTM D575, Method A, on specimens as in 4.3.2.1 except using a compression rate of 0.10 in. (2.5 mm) per min. and omitting buffing of the surfaces. For tests at 250°C (480°F), the compression apparatus shall be surrounded by a suitable heater and the specimen and test fixture stabilized at test temperature for 1 hr before applying the load.

4.5.2 Polymer Reversion: Hardness of the stacked discs as in 4.3.2.2 shall be measured and the specimen placed in the cup of the test fixture (See Fig. 1). The fixture shall be assembled and the screw cap tightened to 25 lb-in. (2.8 N·m) torque. The fixture shall be placed in an oven which is at 250°C ± 3 (480°F ± 5) for 6 hr ± 0.2, removed, cooled to room temperature in not less than 2 hr, and disassembled. Test specimen shall be removed and hardness again determined.

4.6 Report: The vendor of rings shall furnish with each shipment a report showing Ø the results of tests to determine conformance to the acceptance test requirements and, when performed, to the periodic test requirements and stating that the rings conform to the other technical requirements of this specification. This report shall include the purchase order number, AMS 7267F, vendor's compound number, lot number, 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 and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Marking: Shall be in accordance with AMS 2817.