



AEROSPACE MATERIAL SPECIFICATION

AMS7271™**REV. K**

Issued 1953-06
Revised 2019-12
Reaffirmed 2025-10

Superseding AMS7271J

(R) Rubber: Acrylonitrile-Butadiene Rubber (NBR)
Fuel and Low Temperature Resistant
60 - 70 Type "A" Hardness
For Seals in Fuel Systems

RATIONALE

The document was revised to fix errors and to align it with the latest template.

AMS7271K has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

1.1 Form

This specification covers an acrylonitrile-butadiene rubber in the form of molded rings, compression seals, O-ring cord, and molded-in-place gaskets for aeronautical and aerospace applications.

1.2 Application

This material type has shown to exhibit resistance to both aromatic as well as non-aromatic fuels and has a typical service temperature range of -67 to 212 °F (-55 to 100 °C) with intermittent usage up to 257 °F (125 °C). The service temperature range of the material is a general temperature range, but the presence of particular fluids and design requirements may modify this range. Each application should be considered separately. It is the responsibility of the user to determine that this specification is appropriate for the environments (temperature range, fluids exposure, etc.) in which it is sought to be used.

1.3 Order of Precedence

Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained. This specification is in addition to and in no way limiting, superseding, or abrogating any contractual obligation as required by the applicable procurement document. In the event of conflict in requirements, the order of precedence shall be:

1. Procurement Document or Contractual Agreement and all statutory and regulatory requirements (excluding this document)
2. Applicable purchaser's drawing or AS3578 Parts Standard
3. Specification referenced on the drawing
4. This document
5. All specifications referenced in this document

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Documents

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1.4 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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2470	Anodic Treatment of Aluminum Alloys, Chromic Acid Process
AMS2817	Packaging and Identification of Molded Elastomeric Seals and Sealing Components
AIR851	O-Ring Tension Testing Calculations
ARP3050	Suitable Test Sizes for O-ring Specifications
AS291	Surface Texture, Roughness, Waviness and Lay
AS568	Aerospace Size Standard for O-rings
AS3578	Packing, Preformed - O-ring Seal, AMS7271
AS5752	Aerospace - Visual Inspection Standard for Elastomeric Sealing Elements Other than O-rings
AS6414	Manufacturing Processing Requirements for Molded Elastomer Components Used in Aerospace Applications
AS9100	Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations
AS9491	Bolt, Machine - Hexagon Head, Full Shank, Corrosion and Heat Resistant Steel, UNS S66286, 130 ksi min, .3125-24 UNJF-3A
AS9882	Nut, Plain, Hexagon - Drilled, Cadmium Plated - UNS G878400, 125 ksi Min

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D297	Standard Test Methods for Rubber Products - Chemical Analysis
ASTM D395	Standard Test Methods for Rubber Property - Compression Set
ASTM D471	Standard Test Method for Rubber - Effect of Liquids

ASTM D573 Standard Test Method for Rubber Property - Deterioration in an Air Oven

ASTM D1414 Standard Test Methods for Rubber O-Rings

ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness

2.3 ISO Publications

Available from International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, Tel: +41 22 749 01 11, www.iso.org.

ISO 3601-1 Fluid power systems - O-rings - Part 1: Inside diameters, cross-sections, tolerances and designation codes

ISO 3601-3 Fluid power systems - O-rings - Part 3: Quality acceptance criteria

2.4 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD2000 Procedures for an Industry Qualified Product Management Process

PD2102 Aerospace Quality Assurance, Product Standards, Qualification Procedure, Elastomeric Seal

2.5 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada), 001-800-514-1564 (Mexico) or +1-414-272-8575 (all other locations), www.asq.org.

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.6 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NAS1149 Washer, Flat

3. TECHNICAL REQUIREMENTS

3.1 Compound

Shall be prepared from ingredients as shall be necessary to achieve the requirements detailed in this standard and shall be a compound, based on the polymer specified in 1.1, suitably cured to produce product meeting the requirements of 3.2. Reprocessed vulcanized material is not acceptable.

3.2 Qualification Properties

The material as processed by the molder in the form as defined in Table 1 (test sample) shall conform to the requirements shown in Table 1. Calculations of tensile strength and elongation may be made in accordance with AIR851.

Material shall be tested on the part standard AS3578-214 O-rings to determine the qualification properties.

Table 1 - Qualification properties

Paragraph	Property	Test Sample	Requirements	Test Method
3.2.1	As Received			
3.2.1.1	Hardness, Durometer Type "A"	AS3578-214 O-rings	65 ± 5	ASTM D1414 (ASTM D2240)
3.2.1.1 a	Hardness, Durometer Type "A"	Solid BUTTON or plied specimens	65 ± 5	ASTM D2240
3.2.1.2	Tensile Strength, minimum	AS3578-214 O-rings	1200 psi (8.27 MPa)	ASTM D1414
3.2.1.3	Elongation, minimum	AS3578-214 O-rings	200%	ASTM D1414
3.2.1.4	Specific Gravity	AS3578-214 O-rings	Preproduction Value ±0.02	ASTM D1414 (ASTM D297) Hydrostatic Method
3.2.2	Compression Set Percent of Original Deflection, maximum	AS3578-214 O-rings	75%	ASTM D1414 (ASTM D395) Temperature: 257 °F ± 5 °F (125 °C ± 3 °C) Time: 70 hours ± 0.5 hours
3.2.3	Low Temperature Flexibility - see 4.4.2			
3.2.3.1	As Received	AS3578-214 O-rings	NO CRACKS NO BREAKS	See 4.4.2.1 -58 °F (-50 °C)
3.2.3.2	After Aromatic Fuel Immersion & Dry	AS3578-214 O-rings	NO CRACKS NO BREAKS	See 4.4.2.2 -53 °F (-47 °C)
3.2.4	Dry Heat Resistance - ASTM D573			
3.2.4.1	Hardness Change, Durometer "A"	AS3578-214 O-rings	0 to +15	ASTM D1414 (ASTM D573) Temperature: 257 °F ± 5 °F (125 °C ± 3 °C) Time: 70 hours ± 0.5 hours See 4.4.5
3.2.4.2	Tensile Strength Change, maximum	AS3578-214 O-rings	-25%	
3.2.4.3	Elongation Change, maximum	AS3578-214 O-rings	-50%	
3.2.4.4	Bend Test	AS3578-214 O-rings	No cracking or checking	
3.2.5	Fluid Resistance #1 - ASTM D471 - ASTM Reference Fuel A			
3.2.5.1	Immediate Volume Change, % (see 4.4.1, 4.4.1.1, 4.4.1.2)	AS3578-214 O-rings	>0 (Positive Swell)	ASTM D1414 (ASTM D471) Reference Fuel A Temperature: 68 to 86 °F (20 to 30 °C) Time: 70 hours ± 0.5 hours
3.2.6	Fluid Resistance #2 - ASTM D471 - ASTM Reference Fuel B & Reference Fuel A - Consecutively			
3.2.6.1	Immediate Volume Change, % (see 4.4.1, 4.4.1.1)	AS3578-214 O-rings	+40 to +70%	ASTM D1414 (ASTM D471) Reference Fuels A & B Temperature: 68 to 86 °F (20 to 30 °C) Time: 70 hours ± 0.5 hours
3.2.6.2	Volume Change After Dry - 48 hours @ 158 °F ± 2 °F (70 °C ± 1 °C)	Same specimen as 3.2.6.1	-15% max (based upon unimmersed volume)	See 4.4.1.3
3.2.6.3	Re-immersion in ASTM Ref. Fuel A for 5 hours @ 68 to 86 °F (20 to 30 °C)	Same specimen as 3.2.6.1 and 3.2.6.2	-5% max (based upon unimmersed volume)	See 4.4.1.4



Paragraph	Property	Test Sample	Requirements	Test Method
3.2.7	Simulated Component Test	AS3578-229 O-rings	Pass	See 4.4.3
3.2.8	Neckdown Tests	AS3578-214 O-rings	Pass	See 4.4.4
3.2.8.1	Dry Neckdown Test	AS3578-214 O-rings	Pass	See 4.4.4.1
3.2.8.2	Wet Neckdown Test	AS3578-214 O-rings	Pass	See 4.4.4.2

3.2.9 Corrosion

The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, determined by a procedure agreed upon by purchaser and supplier. Discoloration of metal shall not be considered objectionable.

3.3 Quality

All product, as received by purchaser, shall be as specified in the AS3578 parts standard, drawing or purchase document (see 1.3). If not specified, O-ring surface quality shall conform to ISO 3601-3 Grade S requirements. For all other compression seal geometries, the parts other than O-rings, shall meet AS5752 Type 2 requirements.

3.4 Dimensions and Tolerances

All dimensions and tolerances shall be as specified in the AS3578 parts standard, drawing or purchase document (see 1.3). If not specified, O-rings standard sizes and tolerances shall be per AS568. The procedures outlined in Annex B of ISO 3601-1 shall be followed for dimensional inspection.

3.5 Qualification

Products sold to this specification shall be listed on the PRI qualified products list (QPL). Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: +1 724-772-1616, Fax: +1 724-772-1699. The online QPL is available at www.eAuditNet.com. The qualified products list shall be in accordance with PD2000 (see 8.2). If no products are listed on the PRI qualified products list, then product qualification shall be as agreed between the purchaser and manufacturer until a QPL is established.

3.5.1 The qualified product list (QPL) is a listing of manufacturers of product using a specific compound and not a listing of manufacturers of base polymers used in this specification.

3.5.2 Qualification of product shall be reapproved every 3 years in accordance with PD2000, PD2102, and the instructions from the Performance Review Institute. Testing shall be in accordance with this specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer of the product shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that product conforms to the AMS7271 requirements.

4.1.1 Manufacturer shall be on the current PRI Qualified Manufacturers List (QML), www.eAuditNet.com.