



<b>AEROSPACE MATERIAL SPECIFICATION</b>	<b>AMS7274™</b>	<b>REV. K</b>
	Issued 1949-03 Revised 2020-07	
Superseding AMS7274J		
(R) Rubber: Acrylonitrile-Butadiene (NBR) Engine Oil Resistance, 65 to 75 Hardness, for Seals in Aircraft Engine Oil Systems		

### RATIONALE

AMS7274K results from a Five-Year Review and update of this specification.

#### 1. SCOPE

##### 1.1 Form

This specification covers an acrylonitrile-butadiene (NBR) rubber in the form of molded rings, compression seals, O-ring cord, and molded-in-place gaskets for aeronautical and aerospace applications. For sheet, strip, tubing, extrusions, and molded shapes, use the AMS3XXX specification which is intended for that use.

##### 1.2 Application

These products have resistance to hot-petroleum-based lubricating oil, but usage is not limited to such applications. This acrylonitrile-butadiene (NBR) has a typical service temperature range of -67 to +302 °F (-55 to +150 °C) in engine oil. The service temperature range of the material is a general temperature range, but the presence of particular fluids and specific 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 AS3570 parts standard.
3. Specification referenced on the drawing.
4. This document.
5. All specifications referenced in this document.

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<https://www.sae.org/standards/content/AMS7274K>

## 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 form 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](http://www.sae.org).

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
AS568	Aerospace Size Standard for O-Rings
AS3570	O-Ring Molded from AMS7274 Material
AS5316	Storage of Elastomer Seals and Seal Assemblies Which Include an Elastomer Element Prior to Hardware Assembly
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

### 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](http://www.astm.org).

ASTM D297	Standard Test Methods for Rubber Products Chemical Analysis
ASTM D471	Standard Test Method for Rubber Property - Effects of Liquids
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](http://www.iso.org).

ISO 3601-1	Fluid Power Systems - O-Rings - Part 1: Inside Diameter, Cross Sections, Tolerances and Size Identification Code
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](http://www.pri-network.org).

PD 2000 Procedures for an Industry Qualified Product Management Process

PD 2102 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](http://www.asq.org).

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

## 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. Material used shall be based on 100% virgin butadiene-acrylonitrile elastomer. 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 AS3570-214, pertaining to this material specification.

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**Table 1 - Qualification properties**

Paragraph	Property	Test Sample	Requirements	Test Method
<b>3.2.1</b>	<b>As Received</b>			
3.2.1.1	Hardness, Durometer Type "A"	AS3570-214 O-rings	70 ± 5	ASTM D1414
3.2.1.2	Hardness, Durometer Type "A"	Hardness solid button or plied specimens	70 ± 5	ASTM D2240
3.2.1.3	Tensile Strength, Minimum	AS3570-214 O-rings	1500 psi (10.3 MPa)	ASTM D1414
3.2.1.4	Elongation, Minimum	AS3570-214 O-rings	150%	ASTM D1414
3.2.1.5	Specific Gravity/Relative Density	AS3570-214 O-rings	Preproduction Value ± 0.02	ASTM D1414 (ASTM D297) Hydrostatic Method
3.2.1.6	Corrosion	AS3570-214 O-rings	Nil	ASTM D1414
<b>3.2.2</b>	Compression Set Percent of Original Deflection, Maximum	AS3570-214 O-rings	75	ASTM D1414 (ASTM D395, Method B) Temperature: 257 °F ± 4 °F (125 °C ± 2 °C) Time: 70 hours ± 0.5 hour
<b>3.2.3</b>	Low Temperature Brittleness (After Aging in Lubricating Oil)	AS3570-214 O-rings	No cracking	4.4.1
<b>3.2.4</b>	<b>Dry Heat Resistance ASTM D573</b>			
3.2.4.1	Hardness, Durometer Type "A" Change	AS3570-214 O-rings	0 to +10	ASTM D1414 (ASTM D573) Temperature: 212 °F ± 2 °F (100 °C ± 1 °C) Time: 70 hours ± 0.5 hour
3.2.4.2	Tensile Strength Change, Maximum	AS3570-214 O-rings	-25%	
3.2.4.3	Elongation Change, Maximum	AS3570-214 O-rings	-40%	
3.2.4.4	Bend (Flat)	AS3570-214 O-rings	No cracking or checking	
<b>3.2.5</b>	<b>Fluid IRM 901 Oil Resistance ASTM D471</b>			
3.2.5.1	Hardness, Durometer Type "A" Change	AS3570-214 O-rings	-5 to +10	ASTM D1414 (ASTM D471) Temperature: 302 °F ± 5 °F (150 °C ± 3 °C) Time: 96 hours ± 0.5 hour Fluid: IRM 901 Oil
3.2.5.2	Tensile Strength Change, Maximum	AS3570-214 O-rings	-60%	
3.2.5.3	Elongation Change, Maximum	AS3570-214 O-rings	-50%	
3.2.5.4	Volume Change	AS3570-214 O-rings	0 to +10 %	
3.2.5.5	Decomposition	AS3570-214 O-rings	None	
3.2.5.6	Surface Tackiness	AS3570-214 O-rings	None	
<b>3.2.6</b>	<b>Fluid IRM 903 Oil Resistance ASTM D471</b>			
3.2.6.1	Hardness, Durometer Type "A" Change	AS3570-214 O-rings	-20 to 0	ASTM D1414 (ASTM D471) Temperature: 302 °F ± 5 °F (150 °C ± 3 °C) Time: 70 hours ± 0.5 hour
3.2.6.2	Volume Change	AS3570-214 O-rings	+25 to + 45%	
3.2.6.3	Decomposition	AS3570-214 O-rings	None	
3.2.6.4	Surface Tackiness	AS3570-214 O-rings	None	

### 3.3 Quality

All product, as received by purchaser, shall be as specified in the AS3570 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 AS3570 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). The qualified products list shall be in accordance with PD 2000 (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 PD 2000, PD 2102, 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. The purchaser reserves the right to sample and perform any testing deemed necessary to ensure that the product conforms to the AMS7274K requirements.

4.1.1 The manufacturer shall be on the current PRI Qualified Manufacturer's List (QML) ([www.eAuditNet.com](http://www.eAuditNet.com)).

### 4.2 Classification of Tests

#### 4.2.1 Batch Testing

AS6414 defines batch testing. Testing on the same batch and state of cure are acceptable as long as the AS3570-214 O-rings are cured and tested within 90 days of the manufacture of the subject lot.

Batch and the blending of compound as defined in AS6414. All incoming batches and or blended batches shall be tested per Table 2.

**Table 2 - Batch tests**

Paragraph	Property	Test Sample	Requirements	Test Method
<b>3.2.1</b>	<b>As Received</b>			
3.2.1.1	Hardness, Durometer Type "A"	AS3570-214 O-rings	70 ± 5	ASTM D1414 (ASTM D2240)
3.2.1.2	Tensile Strength, Minimum	AS3570-214 O-rings	1500 psi (10.3 MPa)	ASTM D1414
3.2.1.3	Elongation, Minimum	AS3570-214 O-rings	150%	ASTM D1414
3.2.1.4	Specific Gravity/Relative Density	AS3570-214 O-rings	Preproduction Value ± 0.02	ASTM D1414 (ASTM D297) Hydrostatic Method
<b>3.2.2</b>	Compression Set Percent of Original Deflection, Maximum	AS3570-214 O-rings	75	ASTM D1414 (ASTM D395, Method B) Temperature: 257 °F ± 4 °F (125 °C ± 2 °C) Time: 70 hours ± 0.5 hour
<b>3.2.5</b>	<b>Lubricating Oil Resistance ASTM D471</b>			
3.2.5.4	Volume Change	AS3570-214 O-rings	0 to +10%	Medium: IRM 901 Oil (ASTM D471) Temperature: 302 °F ± 5 °F (150 °C ± 3 °C) Time: 96 hours ± 0.5 hour
3.2.5.5	Decomposition	AS3570-214 O-rings	None	
3.2.5.6	Surface Tackiness	AS3570-214 O-rings	None	

## 4.2.4 Acceptance Lot Tests

## 4.2.4.1 Acceptance Lot Tests for O-Rings

Requirements shown in Table 3 are acceptance tests and shall be performed on each lot on the O-rings being supplied.

The term “part” in Table 3 shall be interpreted to mean the O-ring shipped. It shall be permitted to use multiple such O-rings which shall be made from the same lot and batch to perform the applicable test. Testing shall be performed on the O-ring part shipped unless the size of the O-ring shipped is such that the test cannot be performed, in which case AS3209-214 O-ring molded from the same lot/batch shall be used as a test specimen but only for that specific test or tests.

O-ring sizes that are suitable for testing (tensile and elongation) are shown in ARP3050.

**Table 3 - Acceptance lot tests for O-rings**

Paragraph	Property	Test Sample	Requirements	Test Method
<b>3.2.1</b>	<b>As Received</b>			
3.2.1.1	Hardness, Durometer Type “A”	Part	70 ± 5	ASTM D1414 (ASTM D2240)
3.2.1.2	Tensile Strength, Minimum	Part	1500 psi (10.3 MPa)	ASTM D1414
3.2.1.3	Elongation, Minimum	Part	150%	ASTM D1414
3.2.1.4	Specific Gravity/Relative Density	Part	Preproduction Value ± 0.02	ASTM D1414 (ASTM D297) Hydrostatic Method
<b>3.2.2</b>	Compression Set Percent of Original Deflection, Maximum Ring Cross Section Diameter 0.066 to 0.110 inch (1.68 to 2.79 mm), incl Over 0.110 inch (2.79 mm)	Part	85  75	ASTM D1414 (ASTM D395, Method B) Temperature: 257 °F ± 4 °F (125 °C ± 2 °C) Time: 70 hours ± 0.5 hour
<b>3.2.5</b>	<b>Lubricating Oil Resistance ASTM D471</b>			
3.2.5.4	Volume Change	Part	0 to +10%	Fluid: IRM 901 Oil (ASTM D471) Temperature: 302 °F ± 5 °F (150 °C ± 3 °C) Time: 96 hours ± 0.5 hour
3.2.5.5	Decomposition	Part	None	
3.2.5.6	Surface Tackiness	Part	None	

## 4.2.4.2 Acceptance Tests for All Other Seal Geometries

The term “part” in Table 4 shall be interpreted to mean the elastomer seal part being shipped. It shall be permitted to use multiple such parts which shall be made from the same lot and batch to perform the applicable test.

**Table 4 - Acceptance lot test for all other seal geometries except plate seals and O-rings**

Paragraph	Property	Test Sample	Requirements	Test Method
<b>3.2.1</b>	<b>As Received</b>			
3.2.1.4	Specific Gravity/Relative Density	Part	Preproduction Value ± 0.02	ASTM D1414 (ASTM D297) Hydrostatic Method
<b>3.2.5</b>	<b>Lubricating Oil Resistance ASTM D471</b>			
3.2.5.4	Volume Change	Part	0 to +10%	Fluid: IRM 901 Oil (ASTM D471) Temperature: 302 °F ± 5 °F (150 °C ± 3 °C) Time: 96 hours ± 0.5 hour
3.2.5.5	Decomposition	Part	None	
3.2.5.6	Surface Tackiness	Part	None	

#### 4.2.5 Plate Seal

A plate seal is defined as an elastomer bonded to any substrate material whose primary function is to perform as a seal.

4.2.5.1 For plate seals, a suitable test plan shall be agreed upon between the user and supplier; if no specific test plan is established, requirements in 4.2.1, including Table 2 tests, shall be performed.

#### 4.2.6 Lot

As defined in AS6414.

#### 4.2.7 Random Sampling

The method shall be as specified in the part standard, drawing or purchase document. If not specified, product shall be taken at random from each lot to perform all the required testing in Tables 3 and 4 where applicable per the part type. The number of test iterations for each requirement shall be specified in the applicable test procedure.

#### 4.2.8 Qualification Tests

All technical requirements shall be in accordance with applicable material specification and performed prior to the initial shipment of the product to a purchaser. Any change in process or ingredients that would require requalification are listed in the AS6414 document unless otherwise specified by the purchase order, print, or design data. For initial qualification, all specimens shall be from the same production batch and lot using test samples as specified in Table 1.

##### 4.2.8.1 Qualification Test Report

The supplier of the product shall make a qualification test report available upon request. This report shall include at a minimum: AMS number, manufacturer's identification and product designation, batch and lot number, date of manufacture, and the results of all qualification tests.

#### 4.3 Inspection

Dimensional and visual inspection:

4.3.1 Prior to inspection, mold flash shall be removed from the parts in such a manner that they conform to the requirements specified herein. For end of process inspection, each individual part (100%) shall be visually inspected at 1X magnification for mold flash, backrind, parting line projection, non-fills, flow lines, and other significant defects in accordance with ISO 3601-3, Grade S or AS5752 requirements. The entire part surface shall be inspected.

4.3.2 For final inspection, the sample size shall be in accordance with ANSI/ASQ Z1.4 single sampling plan inspection Level II with an AQL 1.0 except that the acceptance number shall be zero.

4.3.3 The sample unit shall be one part. Inspection shall be according to ISO 3601-3, Grade S or AS5752 requirements as applicable under 2X magnification. In case of disagreement, the visual inspection at 2X magnification shall govern. The entire part surface shall be manually inspected. The procedures outlined in Annex B of ISO 3601-1 shall be followed for dimensional inspection. If the purchaser requires a different sampling plan or visual inspection criteria, the manufacturer shall be informed prior to the time of order.

#### 4.4 Test Method for Bend (Flat) Test per 3.2.4.4

4.4.1 The specimen for rings 2 inches (51 mm) and under in nominal ID shall be a complete ring; the specimen for rings over 2 inches (51 mm) in nominal ID shall be a piece 3 inches (76 mm) long cut from a ring. The specimen shall be immersed in lubricating oil in accordance with 3.2.2 and, after cooling in air to room temperature, shall be placed in a refrigerator at  $-40\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$  ( $-40\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$ ) and held at that temperature for 5 hours  $\pm$  0.1 hour. At the end of the refrigeration time, the specimen, while in the refrigerator or within 10 seconds after removal from the refrigerator, shall withstand, without cracking, bending as follows: The complete ring shall be ovalized until the minor axis is equal to 50% of the original ID, and the 3 inch (76 mm) specimen shall be bent around to form a circle.