



AEROSPACE MATERIAL SPECIFICATION

AMS3786™

Issued

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Elastomer: Nitrile Rubber (NBR)
Synthetic Oil Resistant
Sheets, 65 to 75 Type A Hardness
for Products in Engine Oil Systems

RATIONALE

New specification to supersede AMS-R-7362 Type II.

1. SCOPE

1.1 Form

This specification covers a nitrile rubber (NBR) elastomer that can be used to manufacture product in the form of sheet, strip, tubing, extrusions, and molded shapes. For molded rings, compression seals, and molded-in-place gaskets for aeronautical and aerospace applications, use the AMS7289 specification.

1.2 Application

This material has resistance to diester and polyol ester synthetic oils, but usage is not limited to such applications. This material may not be suitable for use in some high temperature stabilized, "HTS," engine oils. Each HTS oil should be evaluated separately. Examples of HTS oils are those oils conforming to MIL-PRF-23699 Class HTS, MIL-PRF-7808 Grade 4, and AS5780 Class HPC. This material has a typical service temperature range of -65 to 250 °F (-54 to 121 °C). 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.
3. Specification referenced on the drawing.
4. This document.
5. All specifications referenced in this document.

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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 document 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.

AMS2279	Tolerances, Rubber Products
AMS2810	Identification and Packaging, Elastomeric Products
AMS3021	Fluid, Reference, for Testing Di-Ester (Polyol) Resistant Material
AMS7289	Elastomer: Nitrile Rubber (NBR), Diester Synthetic Oil Resistant, Compression Seals, 65 to 75 Type A Hardness, for Products in Engine Oil Systems
AS5752	Aerospace - Visual Inspection Standard for Elastomeric Sealing Elements Other than O-Rings

2.2 ANSI Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

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

2.3 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

ASME B46.1 Surface Texture (Surface Roughness, Waviness and Lay)

2.4 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	Chemical Analysis of Rubber Products
ASTM D395	Test Methods for Rubber Property - Compression Set
ASTM D412	Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D471	Standard Test Method for Rubber Property - Effects of Liquids
ASTM D573	Standard Test Method for Rubber - Deterioration in an Air Oven

ASTM D1329 Standard Test Method for Evaluating Rubber Property - Retraction at Lower Temperatures

ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness

2.5 Uniform Classification Committee

Available from Uniform Classification Committee, 202 Chicago Union Station, Chicago, IL 60606.

Uniform Freight Classification Rules

2.6 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

MIL-PRF-7808 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

3. TECHNICAL REQUIREMENTS

3.1 Materials

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. Material used shall be 100% virgin NBR elastomer.

3.2 Physical Properties

The product shall conform to the requirements shown in Table 1.

The following testing shall be performed every 5 years and test reports shall be made available upon request.

Table 1 - Physical properties

Paragraph	Property	Test Sample	Requirements	Test Method
3.2.1	As received			
3.2.1.1	Hardness, durometer Type "A"	Button or plied platens	70 ± 5	ASTM D2240
3.2.1.2	Tensile strength, minimum	ASTM platen	1500 psi (10.3 MPa)	ASTM D412, Die C
3.2.1.3	Elongation, minimum	ASTM platen	250%	ASTM D412, Die C
3.2.1.4	Specific gravity/relative density	ASTM platen	As determined	ASTM D297 Hydrostatic Method
3.2.1.5	Temperature retraction test [TR-10], maximum	2 inch or 1 inch specimens	-40 °F (-40 °C)	ASTM D1329
3.2.1.6	Compression set Percent of original deflection, maximum	ASTM platen, plied discs	40	ASTM D395, Method B Temperature: 257 °F ± 2 °F (125 °C ± 1 °C) Time: 22 hours ± 0.5 hour
3.2.2	Dry heat resistance ASTM D573			
3.2.2.1	Hardness change, durometer Type "A"	Button or plied platens	-0 to +20	ASTM D573 Temperature: 257 °F ± 2 °F (125 °C ± 1 °C) Time: 70 hours ± 1 hour
3.2.2.2	Tensile strength decrease, maximum	ASTM platen	20	
3.2.2.3	Tensile elongation decrease, maximum	ASTM platen	60	
3.2.3	AMS3021 resistance ASTM D471			
3.2.3.1	Hardness change, durometer Type "A"	Button or plied platens	-10 to +10	4.7.1 ASTM D471 Temperature: 257 °F ± 2 °F (125 °C ± 1 °C) Time: 70 hours ± 1 hour Fluid: AMS3021
3.2.3.2	Tensile strength decrease, maximum	ASTM platen	50	
3.2.3.3	Tensile elongation decrease, maximum	ASTM platen	60	
3.2.3.4	Volume change	ASTM platen	2 to 15%	
3.2.3.5	180 degree flat bend	ASTM platen	Shall not crack	
3.2.3.6	Temperature retraction test [TR-10], maximum (ASTM D1329)	2 inch or 1 inch specimens	-30 °F (-34 °C)	
3.2.3.7	Compression set Percent of original deflection, maximum	ASTM platen, plied discs	60	



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