



AEROSPACE MATERIAL SPECIFICATION

AMS3941™

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Rubber: Butyl (IIR)
Low Compression Set and Low Moisture/Gas Permeability
65 to 75 Type A Hardness
for Applications Requiring Resistance to Gas and/or Water Vapor Permeation

RATIONALE

New butyl specification for low gas and water vapor permeability parts for use in applications where gas and/or moisture ingress prevention is critical.

1. SCOPE

1.1 Form

This specification covers a butyl elastomer that can be used to manufacture product in the form of sheet, strip, tubing, extrusions, and molded shapes.

1.2 Application

This butyl elastomer is intended for applications requiring resistance to gas and/or water vapor permeation but usage is not limited to such applications. This butyl elastomer has a typical service temperature range of -53 to 250°F (-47 to 121°C) for static applications. 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 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 documents. In the event of conflict in requirements, the order of precedence shall be:

- 1.3.1 All applicable international, national, federal, state and/or local laws, if any.
- 1.3.2 All statutory and regulatory requirements.
- 1.3.3 Procurement Documents and Contractual Agreements between purchaser and supplier.
- 1.3.4 Applicable purchaser's technical data package including but not limited to purchaser's drawing.

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1.3.5 Specifications referenced on the drawing.

1.3.6 This document.

1.3.7 All specifications referenced in this document.

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.

AMS2279 Tolerances, Rubber Products

AMS2810 Identification and Packaging, Elastomeric Products

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 Rubber Products - Chemical Analysis

ASTM D395 Test Methods for Rubber Property - Compression Set

ASTM D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

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

ASTM D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

ASTM D1149 Test Methods for Rubber Deterioration - Cracking in an Ozone Controlled Environment

ASTM D1329 Test Method for Evaluating Rubber Property - Retraction at Lower Temperatures (TR Test)

ASTM D2240 Test Method for Rubber Property - Durometer Hardness

ASTM E96 Test Method for Water Vapor Transmission of Materials

2.3 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

3. TECHNICAL REQUIREMENTS

3.1 Material

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 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 property requirements

Paragraph	Property	Test Sample	Requirements	Test Method
3.2.1	As Received			
3.2.1.1	Hardness, Durometer Type "A"	Button or plied platens/sheets	70 ± 5	ASTM D2240
3.2.1.2	Tensile Strength, minimum	ASTM Test specimen cut from platen/sheet	1500 psi (10.3 MPa)	ASTM D412, Die C
3.2.1.3	Elongation, minimum	ASTM Test specimen cut from platen/sheet	250%	ASTM D412, Die C
3.2.1.4	Tear Strength, minimum	ASTM Test specimen cut from platen/sheet	150 ppi (26 kN/m)	ASTM D624, Die B
3.2.1.5	Specific Gravity/Relative Density	Test specimen cut from platen/sheet	Preproduction Value ± 0.02	ASTM D297 Hydrostatic Method
3.2.1.6	Compression set Percent of original deflection, max	Button or plied platens/sheets	40%	ASTM D395, Method B Temperature: 212 °F ± 2 °F (100 °C ± 1 °C) Time: 70.0 hours ± 0.5 hour
3.2.1.7	Temperature Retraction Test (TR- 10), max	Test specimen cut from platen/sheet	-43°F (-45°C)	ASTM D1329
3.2.2	Dry Heat Resistance ASTM D573			
3.2.2.1	Hardness change, Durometer Type "A"	Button or plied platens/sheets	-5 to 5	ASTM D573 Temperature: 212 °F ± 2 °F (100 °C ± 1 °C) Time: 70.0 hours ± 0.5 hour
3.2.2.2	Tensile strength change, max	ASTM Test specimen cut from platen/sheet	-20%	
3.2.2.3	Tensile elongation change, max	ASTM Test specimen cut from platen/sheet	-30%	
3.2.5	Permeability/water vapor transmission, max	Test specimen cut from platen/sheet	2.9E-12 g m ⁻¹ s ⁻¹ Pa ⁻¹	ASTM E96 Procedure A - Desiccant Method [73+/-2F (23+/- 1C); 50+/- 2% relative humidity]
3.2.6	Permeability/water vapor transmission, max	Test specimen cut from platen/sheet	2.9E-12 g m ⁻¹ s ⁻¹ Pa ⁻¹	ASTM E96 Procedure E - Desiccant Method [100+/-2F (38+/-1C); 90+/- 2% relative humidity]
3.2.7	Weathering	Test specimen cut from platen/sheet	No cracking	ASTM D1149, Method B, Procedure B1 Static Strain 168+/-1 hr 104+/-2F (40+/-1C) 50+/-5 pphm ozone concentration 20% elongation Visual examination at 7x magnification