SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3238F

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Superseding AMS3238E

Butyl (IIR) Rubber
Phosphate Ester Resistant
65 - 75

RATIONALE

AMS3238F is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a butyl (IIR) rubber in the form of sheet, strip, tubing, extrusions, and molded shapes.

1.2 Application

This product has been used typically for parts, such as O-rings, gaskets, grommets, and seals, requiring resistance to phosphate esters or low permeability to gases, but usage is not limited to such applications. Not suitable for use in contact with petroleum-base fluids due to excessive swell.

1.3 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 724-776-4970 (outside USA), www.sae.org.

AMS2279	Tolerances, Rubber Products
AMS2810	Identification and Packaging, Elastomeric Products

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

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 D 297	Rubber Products - Chemical Analysis
ASTM D 395	Rubber Property - Compression Set
ASTM D 412	Vulcanized Rubber and Thermoplastic Elastomers -Tension
ASTM D 471	Rubber Property - Effect of Liquids
ASTM D 573	Rubber - Deterioration in an Air Oven
ASTM D 624	Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 1149	Rubber Deterioration - Cracking in an Ozone Controlled Environment
ASTM D 2137	Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics
ASTM D 2240	Rubber Property - Durometer Hardness

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be a compound, based on a butyl (IIR) elastomer, suitably cured to produce a product meeting the requirements of 3.2.

3.2 Properties

The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable:

TABLE 1 - PROPERTIES

Paragraph	Property	Requirement	Methods
3.2.1	As Received		
3.2.1.1	Hardness, Durometer "A" or equivalent	70 ± 5	ASTM D 2240
3.2.1.2	Tensile Strength, minimum	1500 psi (10.3 MPa)	ASTM D 412, Die B or C
3.2.1.3	Elongation, minimum	300%	ASTM D 412, Die B or C
3.2.1.4	Tear Resistance pounds force per inch (N/m), minimum	80% of Preproduction Value	ASTM D 624, Die B or C
3.2.1.5	Specific Gravity	Preproduction Value ± 0.03	ASTM D 297
3.2.2	Phosphate Ester Resistance (Immediate Deteriorated Properties)		ASTM D 471 Medium: Tri-n-butyl phosphate Temperature: 212 °F ± 2 (100 °C ± 1) Time: 70 hours ± 0.5
3.2.2.1	Hardness Change, Durometer "A" or equivalent	0 to -30	
3.2.2.2	Tensile Strength Change, maximum	-30%	
3.2.2.3	Elongation Change, maximum	-20%	

TABLE 1 - PROPERTIES (CON'T.)

Paragraph	Property	Requirement	Methods
3.2.2.4	Volume Change	0 to +30%	
3.2.3	Dry Heat Resistance		ASTM D 573 Temperature: 212 °F ± 2 (100 °C ± 1) Time: 70 hours ± 0.5
3.2.3.1	Hardness Change, Durometer "A" or equivalent	0 to +10	
3.2.3.2	Tensile Strength Change, maximum	-20%	
3.2.3.3	Elongation Change, maximum	-40%	
3.2.4	Compression Set		ASTM D 395, Method B Temperature: 212 °F ± 2 (100 °C ± 1) Time: 70 hours ± 0.5
3.2.4.1	Percent of Original Deflection, maximum	85	
3.2.5	Low-Temperature Resistance		
3.2.5.1	Brittleness	Pass	ASTM D 2137, Method A Temperature: -31 °F ± 2 (-35 °C ± 1) Time: 10 minutes ± 0.5

3.2.6 Weathering

The product shall show no evidence of cracking when tested in accordance with ASTM D 1149 for seven days at 104 °F ± 2 (40 °C ± 1). Test specimens shall be prepared and mounted in accordance with ASTM D 518, Method B.

3.3 Quality

The product, as received by purchaser, shall be uniform in quality and condition, smooth, as free from foreign materials as commercially practicable, and free from imperfections detrimental to usage of the product.

3.4 Tolerances

Shall conform to all applicable requirements of AMS2279.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Tests for the following requirements are acceptance tests and shall be performed on each lot:

TABLE 2

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
Volume Change in oil	3.2.2.4
Compression Set	3.2.4

4.2.2 Preproduction Tests

All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the product to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing

Shall be as follows:

4.3.1 For Acceptance Tests

Sufficient product 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 If specimens cannot be prepared from the product, ASTM test specimens prepared from the same batch and state of cure shall be used. When the product supplied is an extrusion of such shape that suitable test specimens cannot be cut from the product, a separate flat strip test sample from the same production lot shall be supplied upon request. This strip shall be prepared from tubing 1.000 inch ± 0.063 (25.40 mm ± 1.60) in OD by 0.075 inch ± 0.008 (1.90 mm ± 0.20) in wall thickness, mechanically slit and flattened into a strip while being extruded, and cured in the same manner as production product. When the product is a molded shape from which test specimens cannot be cut, a slab 6 inches (152 mm) square by 0.075 inch ± 0.008 (1.90 mm ± 0.20) molded from the same batch of compound shall be supplied upon request.

4.3.1.2 A lot shall be all product from the same batch of compound processed in one continuous production run and presented for vendor's inspection at one time. An inspection lot shall not exceed 1000 pounds (454 kg) and may be packaged in smaller quantities and delivered under the basic lot approval provided lot identification is maintained.

4.3.1.3 A batch shall be the quantity of compound run through a mill or mixer at one time.

4.3.1.4 When a statistical sampling plan has 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 shall state that such plan was used.

4.3.2 For Preproduction Tests

As agreed upon by purchaser and vendor.