



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 3237C

Superseding AMS 3237B

Issued 2-15-53

Revised 12-15-74

BUTYL RUBBER Phosphate Ester Resistant 35 - 45

1. SCOPE:

- 1.1 Form: This specification covers a butyl rubber in the form of sheet, strip, extrusions, and molded shapes.
- 1.2 Application: Primarily for parts such as diaphragms, gaskets, grommets, and seals requiring resistance to phosphate esters or low permeability to gases. Not suitable for use in contact with petroleum-base fluids due to excessive swell.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

- 2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

AMS 2810 - Identification, Natural and Synthetic Rubber Materials

- 2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM D395 - Compression Set of Vulcanized Rubber

ASTM D412 - Tension Testing of Vulcanized Rubber

ASTM D471 - Change in Properties of Elastomeric Vulcanizates

Resulting from Immersion in Liquids

ASTM D573 - Accelerated Aging of Vulcanized Rubber by the Oven Method

ASTM D624 - Tear Resistance of Vulcanized Rubber

ASTM D797 - Young's Modulus in Flexure of Elastomers at Normal and Sub-normal Temperatures

ASTM D2137 - Low-Temperature Impact Test for Brittleness Determination of Flexible Polymeric Materials or Fabrics Coated Therewith, or Both

ASTM D2240 - Indentation Hardness of Rubber and Plastics by Means of a Durometer

3. TECHNICAL REQUIREMENTS:

- 3.1 Material: Shall be a compound based on a butyl elastomer, suitably cured to produce a product meeting all technical requirements of this specification.
- 3.2 Properties: The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with the specified ASTM methods, insofar as practicable:

SAE Technical Board rules provide that: "All technical reports, including standards, approved practices, and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against infringement of patents."

3.2.1 As Received:

3.2.1.1	Hardness, Durometer Ø "A" or equiv.	40 $\pm$ 5	ASTM D2240
3.2.1.2	Tensile Strength, min	1100 psi (7.58 MPa)	ASTM D412, Die B or C
3.2.1.3	Elongation, min	550%	ASTM D412, Die B or C
3.2.1.4	Tear Resistance, Ø lb per in. (kg/m) min	80% of Qualification Value	ASTM D624, Die B or C

3.2.2 Phosphate Ester Resistance:
(Immediate Deteriorated Properties)

ASTM D471

Medium: Tri-n-butyl
phosphate
Temperature: 100° C $\pm$ 1
(212° F $\pm$ 1.8)
Time: 70 hr $\pm$ 0.5

3.2.2.1	Hardness Change, Durometer "A" or equiv.	0 to -20
3.2.2.2	Tensile Strength Change, max	-40%
3.2.2.3	Elongation Change, max	-20%
3.2.2.4	Volume Change	0 to +35%

3.2.3 Dry Heat Resistance:

ASTM D573

Temperature: 100° C $\pm$ 1
(212° F $\pm$ 1.8)
Time: 70 hr $\pm$ 0.5

3.2.3.1	Hardness Change, Durometer "A" or equiv.	0 to +15
3.2.3.2	Tensile Strength Change, max	-25%
3.2.3.3	Elongation Change, max	-50%

3.2.4 Compression Set:

ASTM D395, Method B

Temperature: 100° C $\pm$ 1
(212° F $\pm$ 1.8)
Time: 70 hr $\pm$ 0.5

3.2.4.1	Percent of original deflection, max	85
---------	--	----

3.2.5 Low Temperature Resistance:

3.2.5.1	Brittleness Ø	Pass
---------	------------------	------

ASTM D2137, Method A

Temperature: -35° C $\pm$ 1
(-31° F $\pm$ 1.8)
Time: 10 min. $\pm$ 0.5

3.2.5.2	Young's Modulus, max (See 8.2)	10,000 psi (69.0 MPa)
---------	-----------------------------------	--------------------------

ASTM D797

Temperature: -40° C $\pm$ 1
(-40° F $\pm$ 1.8)

3.2.6 Weathering: When specified, the product shall have weather resistance acceptable to the purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.2.7 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metal shall not be considered objectionable.

3.3 Quality: The product shall be uniform in quality and condition, clean, smooth, as free from foreign material as commercially practicable, and free from imperfections detrimental to fabrication, appearance, or performance of parts.

3.4 Tolerances: Unless otherwise specified, the following tolerances shall apply:

3.4.1 Sheet and Strip:

TABLE I

Nominal Thickness Inches	Tolerance, Inch plus and minus
Up to 0.125, incl	0.016
Over 0.125 to 0.500, incl	0.032
Over 0.500	0.047

TABLE I (SI)

Nominal Thickness Millimetres	Tolerance, Millimetres plus and minus
Up to 3.18, incl	0.41
Over 3.18 to 12.70, incl	0.79
Over 12.70	1.19

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to the following requirements are classified as acceptance or routine control tests and shall be performed on each lot of product:

Property	Paragraph
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 Qualification Tests: Tests to determine conformance to all technical requirements of this specification are classified as qualification or periodic control tests and may be the basis for approval of the compound (See 4.4.1).

4.3 Sampling: Sufficient material shall be taken at random from each lot or batch to perform all required tests in triplicate. 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 shall be supplied upon request. This strip shall be prepared from 1 in. $\pm$ 1/16 (25 mm $\pm$ 1.6) OD by 0.075 in. $\pm$ 0.008 (1.90 mm $\pm$ 0.20) thick wall tubing which shall be mechanically split and flattened into a strip while being extruded and then cured in the same manner as production material.

4.3.1 A lot shall be all product from the same batch of compound processed in one continuous run and submitted for the vendor's inspection at one time.

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

4.4 Approval:

- 4.4.1 Sample material shall be approved by purchaser before material for production use is supplied, unless such approval be waived. Results of tests on production material shall be essentially equivalent to those on the approved sample.
- 4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production material which are essentially the same as those used on the approved sample material.
- Ø If any change is necessary in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the revised materials and processing and, when requested, sample revised material. No production material made by the revised procedure shall be shipped prior to receipt of reapproval.

4.5 Reports:

- 4.5.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests made on the product to determine conformance to the acceptance test requirements of this specification and a statement that the product conforms to all other technical requirements. This report shall include the purchase order number, material specification number and its revision letter, vendor's compound number, form or part number, and quantity.
- Ø
- 4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, supplier's compound number, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.
- 4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.
- Ø

5. PREPARATION FOR DELIVERY:

- 5.1 Identification: The product shall be identified in accordance with AMS 2810.

5.2 Packaging:

- 5.2.1 Packaging shall be accomplished in such a manner as to ensure that the product, during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any normal hazard.
- 5.2.2 Each package shall be permanently and legibly marked in accordance with AMS 2810.
- 5.2.3 The product shall be prepared for shipment in accordance with commercial practice to assure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.
- Ø

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.