

AEROSPACE MATERIAL SPECIFICATION

Issued DEC 1942
Revised JAN 1991
Reaffirmed NOV 2003

Superseding AMS 3215K

ACRYLONITRILE BUTADIENE (NBR) RUBBER Aromatic Fuel Resistant 65 - 75

1. SCOPE:

1.1 Form:

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

1.2 Application:

Primarily for parts, such as gaskets, diaphragms, bushings, grommets, and sleeves, requiring resistance to aromatic and aliphatic fuels when continuously or alternately exposed to both.

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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1 Aerospace Material Specifications:

AMS 2279	Tolerances, Rubber Products
MAM 2279	Tolerances, Metric, Rubber Products
AMS 2810	Identification and Packaging, Elastomeric Products

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 297	Rubber Products - Chemical Analysis
ASTM D 395	Rubber Property - Compression Set
ASTM D 412	Rubber Properties in Tension
ASTM D 471	Rubber Property - Effect of Liquids
ASTM D 518	Rubber Deterioration - Surface Cracking
ASTM D 573	Rubber - Deterioration in an Air Oven
ASTM D 624	Rubber Property - Tear Resistance
ASTM D 797	Rubber Property - Young's Modulus at Normal and Subnormal Temperatures
ASTM D 1149	Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimens)
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 an acrylonitrile-butadiene (NBR) 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:

3.2.1 As Received:

3.2.1.1 Hardness, Durometer "A" or equivalent	70 ± 5	ASTM D 2240
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AMS 3215L	SAE	AMS 3215L
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	250%	ASTM D 412, Die B or C
3.2.1.4 Tensile Stress at 100% Elongation, maximum	1000 psi (6.89 MPa)	ASTM D 412, Die B or C Stretch specimen twice to 125% elongation within 5 minutes before testing.
3.2.1.5 Tear Resistance, minimum	80% of Preproduction Value	ASTM D 624, Die B
3.2.1.6 Specific Gravity	Preproduction Value \pm 0.02	ASTM D 297
3.2.2 Aliphatic Fuel Resistance: (After 24 hours drying at 70°C \pm 1 (158°F \pm 2))		ASTM D 471 Medium: ASTM Ref. Fuel A Temperature: 20° - 30°C (68° - 86°F) Time: 24 hours \pm 0.5
3.2.2.1 Volume Change, maximum	-5%	
3.2.3 Aromatic Fuel Resistance: (Immediate Deteriorated Properties)		ASTM D 471 Medium: ASTM Ref. Fuel B Temperature: 20° - 30 °C (68° - 86°F) Time: 166 hours \pm 0.5
3.2.3.1 Hardness Change, Durometer "A" or equivalent	-20 to 0	
3.2.3.2 Tensile Strength Change, maximum		
3.2.3.2.1 For parts other than extrusions	-50%	
3.2.3.2.2 For extruded parts	-60%	
3.2.3.3 Elongation Change, maximum	-45%	
3.2.3.4 Volume Change in 24 hours	0 to +35%	

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3.2.3.5	Volume Change in 168 hours	0 to +35%	
3.2.3.6	Volume Change on Drying (after 168 hours immersion) at 70°C ± 1 (158°F ± 2) for 24 hours, maximum	-10%	
3.2.4	Dry Heat Resistance:		ASTM D 573
3.2.4.1	Hardness Change, Durometer "A" or equivalent	0 to +10	Temperature: 100°C ± 1 (212°F ± 2) Time: 70 hours ± 0.5
3.2.4.2	Tensile Strength Change, maximum	-20%	
3.2.4.3	Elongation Change, maximum	-40%	
3.2.5	Compression Set:		ASTM D 395, Method B
3.2.5.1	Percent of Original Deflection, maximum		Temperature: 100°C ± 1 (212°F ± 2) Time: 70 hours ± 0.5
3.2.5.1.1	For parts other than extrusions	75	
3.2.5.1.2	For extruded parts	80	
3.2.6	Low-Temperature Resistance:		ASTM D 2137, Method A
3.2.6.1	Brittleness	Pass	Temperature: -18°C ± 1 (0°F ± 2) Time: 10 minutes ± 1
3.2.6.2	Young's Modulus, maximum (See 8.2)	30,000 (207 MPa)	ASTM D 797 Temperature: -25°C ± 1 (-13°F ± 2) Time: 5 hours ± 0.5
3.2.7	Weathering: The product shall show no evidence of cracking when tested in accordance with ASTM D 1149 for 7 days at 40°C ± 1 (104°F ± 2). Test specimens shall be prepared and mounted in accordance with ASTM D 518, Method B.		

3.2.8 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, determined by a procedure agreed upon by purchaser and vendor. Discoloration of metal shall not be considered objectionable.

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:

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Shall conform with all applicable requirements of AMS 2279 or MAM 2279.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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

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:

Requirement	Paragraph
Hardness, as received	3.2.1.1
Tensile Strength, as received	3.2.1.2
Elongation, as received	3.2.1.3
Specific Gravity	3.2.1.6
Compression Set	3.2.5

4.2.2 Periodic Tests: Tests for the following requirements are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser:

Requirement	Paragraph
Tensile Stress at 100% Elongation, as received	3.2.1.4
Tear Resistance	3.2.1.5
Volume Change in Aliphatic Fuel	3.2.2.1
Volume Change in Aromatic Fuel	3.2.3.4

4.2.3 Preproduction Tests: Tests for 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.

4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

4.3 Sampling and Testing:

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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 φ 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 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 \pm 0.063 (25.40 mm \pm 1.60) in OD by 0.075 inch \pm 0.008 (1.90 mm \pm 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 \pm 0.008 (1.90 mm \pm 0.20) thick, molded from the same batch of compound shall be supplied upon request.

4.3.1.2 φ A lot shall be all product from the same batch of compound processed in one continuous run and presented for vendor's inspection at one time. An inspection lot shall not exceed 500 pounds (227 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 φ 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 Periodic Tests and Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample product shall be approved by purchaser before product for production use is supplied, unless such approval be waived by purchaser. Results of tests on production product shall be essentially equivalent to those on the approved sample.