



# AEROSPACE MATERIAL SPECIFICATION

**AMS3212™****REV. R**

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Superseding AMS3212P

(R) Elastomer: Acrylonitrile Butadiene Rubber (NBR)  
Aromatic Fuel Resistant  
55 to 65 Type 'A' Durometer Hardness  
For Products in: Aromatic and Aliphatic Fuel Systems

## RATIONALE

For periodic Five-Year Review and to update this specification to the latest 3XXX series format.

### 1. SCOPE

#### 1.1 Form

This specification covers an Acrylonitrile Butadiene 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, O-ring cord, and molded-in-place gaskets for aeronautical and aerospace applications, use the AMS7000 series specification.

#### 1.2 Application

This material type has resistance to both aromatic and aliphatic fuels when continuously or alternately exposed to both, but usage is not limited to such applications. This material type has a typical service temperature range of 0 °F (-18 °C) to +212 °F (100 °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

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 and/or design data.
3. Specifications 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 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 revision 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](http://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](http://www.astm.org).

ASTM D297      Standard Test Methods for Rubber Products - Chemical Analysis

ASTM D395      Standard Test Methods for Rubber Property - Compression Set

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

ASTM D471      Standard Test Methods for Rubber Property - Effect of Liquids

ASTM D573      Standard Test Methods for Rubber Deterioration in an Air Oven

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

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

ASTM D2137      Standard Test Methods for Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics

ASTM D2240      Standard Test Methods for Rubber Property - Durometer Hardness

### 2.3 Other

Available online from the National Conference of Standards Laboratories, [www.ncsli.org](http://www.ncsli.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 a product meeting the requirements of 3.2. The use of reprocessed vulcanized material is not acceptable.

#### 3.2 Properties

The product shall conform to requirements shown in Table 1.

**Table 1 - Physical property requirements**

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

| Paragraph | Property                                                   | Test Specimen            | Requirement               | Test Methods                                                                                            |
|-----------|------------------------------------------------------------|--------------------------|---------------------------|---------------------------------------------------------------------------------------------------------|
| 3.2.1     | As Received                                                |                          |                           |                                                                                                         |
| 3.2.1.1   | Hardness, Durometer Type 'A'                               | BUTTON or Plied Platens  | 60 ± 5                    | ASTM D2240                                                                                              |
| 3.2.1.2   | Tensile Strength, minimum                                  | ASTM Platen              | 1700 psi (11.7 MPa)       | ASTM D412, Die C                                                                                        |
| 3.2.1.3   | Elongation, minimum                                        | ASTM Platen              | 300%                      | ASTM D412, Die C                                                                                        |
| 3.2.1.4   | Tensile Stress at 100% Elongation, maximum                 | ASTM Platen              | 650 psi (4.48 MPa)        | ASTM D412, Die C<br>(Stretch specimen twice to 125% elongation within 5 minutes before testing.)        |
| 3.2.1.5   | Tear Resistance, minimum                                   | ASTM Platen              | 100 ppi (17.5 kN/m)       | ASTM D624, Die B                                                                                        |
| 3.2.1.6   | Specific Gravity/Relative Density                          | ASTM Platen              | Preproduction Value ±0.03 | ASTM D297, Hydrostatic Method                                                                           |
| 3.2.1.7   | Compression Set<br>Percent of Original Deflection, maximum | ASTM Platen, Plied Discs | 50%                       | ASTM D395, Method B<br><br>Temperature: 212 °F ± 4 °F (100 °C ± 2 °C)<br><br>Time: 70 hours ± 0.5 hour  |
| 3.2.1.8   | Low Temperature Brittleness                                | ASTM Platen              | No Crack/<br>No Break     | ASTM D2137, Method C<br><br>Temperature: 0 °F ± 2 °F (-18 °C ± 1 °C)<br><br>Time: 10 minutes ± 1 minute |
| 3.2.2     | Dry Heat Resistance - ASTM D573                            |                          |                           |                                                                                                         |
| 3.2.2.1   | Hardness Change, Durometer Type 'A'                        | BUTTON or Plied Platens  | 0 to +10                  | ASTM D573<br><br>Temperature: 212 °F ± 4 °F (100 °C ± 2 °C)<br><br>Time: 70 hours ± 0.5 hour            |
| 3.2.2.2   | Tensile Strength Change, maximum                           | ASTM Platen              | -20%                      |                                                                                                         |
| 3.2.2.3   | Elongation Change, maximum                                 | ASTM Platen              | -50%                      |                                                                                                         |