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AEROSPACE MATERIAL SPECIFICATION

SAE AMS-R-3065

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Rubber, Fabricated Products

NOTICE

This document has been taken directly from U.S. Military Specification MIL-R-3065E, Notice 1, Amendment 1, and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace MIL-R-3065E, Notice 1, Amendment 1. Any part numbers established by the original specification remain unchanged.

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1. SCOPE:

1.1 Scope:

This specification establishes the requirements for fabricated products of vulcanized rubber, synthetic rubber or rubberlike compositions alone or in combination, together with procedures for the inspection of such products (see 6.1).

2. APPLICABLE DOCUMENTS:

The following publications, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

NN-P-530	Plywood, Flat Panel
UU-P-268	Paper, Kraft, Wrapping
PPP-B-601	Boxes, Wood, Cleated Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Boxes, Shipping, Fiberboard
PPP-B-640	Boxes, Fiberboard, Corrugated, Triple-Wall
PPP-T-45	Tape, Gummed, Paper, Reinforced and Plain, for Sealing and Securing
MIL-P-116	Preservation, Packaging, Methods of
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-177	Rubber Products, Terms for Visible Defects of
MIL-STD-190	Identification Marking of Rubber Products
MIL-STD-289	Visual Inspection Guide for Rubber Sheet Material
MIL-STD-298	Visual Inspection Guide for Rubber Extruded Goods
MIL-STD-407	Visual Inspection Guide for Rubber Molded Items
MIL-STD-417	Classification System and Tests for Solid Elastomeric Materials
MIL-STD-1523	Age Controls of Elastomeric Materials
MIL-HDBK-695	Rubber Products: Recommended Shelf Life

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 2000	Elastomeric Materials for Automotive Applications
ASTM D 3183	Rubber-Preparation of Pieces for Test from other than Standard Vulcanized Sheets
ASTM D 3951	Standard Practice for Commercial Packaging

2.3 Rubber Manufacturer's Association Publications:

Available from Rubber Manufacturer's Association, 1901 Pennsylvania Avenue, N.W., Washington, DC 20006.

Rubber Handbook, Specifications for Rubber Products
Rubber Sheet Packing Handbook
Vendors Identification Guide for Molded and Extruded Goods

3. REQUIREMENTS:

3.1 Material:

Rubber products furnished under this specification shall be made from rubber compositions in accordance with one of the grades, types, classes and suffixes designated in ASTM D 2000 (see 6.2 and 6.4).

3.2 Physical properties:

The physical properties of the rubber products covered by this specification shall be determined from specimens cut from the product or from specimens prepared from samples furnished by the contractor (see 4.3.3). The properties shall be determined in accordance with procedures and applicable documents established in ASTM D 2000 and shall conform to the values for the applicable grade, type and class listed in ASTM D 2000 (see 6.1 and 6.1.1).

3.3 Dimensions and tolerances:

Dimensions and tolerances shall be in accordance with the applicable part drawing or as indicated in the contract or purchase order (see 6.2). If no tolerances are specified, A-3 commercial tolerances of the Rubber Manufacturer's Association (RMA) Rubber Handbook as shown in table I, shall apply for molded solid rubber products and the commercial tolerances of the RMA Rubber Sheet Packing Handbook, as shown in table II, shall apply for sheet packing. Commercial tolerances as shown in tables III, IV and V shall apply for extruded shapes, extruded tubing and calendered sheet, respectively.

3.4 Identification marking:

When specified (see 6.2) identification marking shall be in accordance with MIL-STD-190 and the RMA Vendors Identification Guide for Molded and Extruded Goods. Unless otherwise specified, sheet material shall have the applicable NSN legibly marked on one side of each sheet in at least one place within 304.8 mm (12 in.) of a narrow edge and in numbers of not less than 12.7 mm (0.5 in) in height. The marking material used shall not be deleterious to the rubber material, nor shall the markings be obliterated by normal handling.

3.4.1 Cure date: For all rubber (or synthetic elastomers) furnished to ASTM D 2000, a cure date shall be marked and the marking shall be in accordance with MIL-STD-129 and applied using the calendar quarter and year (see 6.5).

3.5 Age control:

3.5.1 Shelf life: Unless otherwise specified, MIL-HDBK-695 shall be used as guidance to determine the expected shelf storage life of elastomeric products (see 6.2).

3.5.2 Delivery date: Delivery date of elastomeric products shall be as specified in the contract (see 6.2).

3.6 Color:

Unless otherwise specified (see 6.2) the color of the rubber products (except those fabricated from classes FC, FE, FK, and GE compounds of ASTM D 2000) shall be black. Products fabricated from compounds from class FC, FE, FK and GE of ASTM D 2000 may be black or any one of several colors in which these compounds are normally supplied, such as clear, amber, white, gray or red, etc.

3.7 Recoverable Materials:

Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and shall be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term “recoverable materials” means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified (see 6.2).

TABLE I. RMA A3 dimensional tolerances for molded solid rubber products 1/

Size (Millimeters)			Fixed dimension tolerances 2/ (millimeters)	Closure dimension tolerances 3/ (millimeters)	Size (Inches-approx.)		Fixed dimension tolerances 2/ (inches)	Closure dimension tolerances 3/ (inches)
Above 0	-	Incl. 9.99	± 0.20	± 0.32	Above 0	Incl. 0.399	± 0.008	± 0.013
10	-	15.99	0.25	0.40	0.40	0.629	0.010	0.016
16	-	24.99	0.32	0.50	0.63	0.999	0.013	0.020
25	-	39.99	0.40	0.63	1.00	1.599	0.016	0.025
40	-	62.99	0.50	0.80	1.60	2.499	0.020	0.032
63	-	99.99	0.63	1.00	2.50	3.999	0.025	0.040
100	-	159.99	0.80	1.25	4.00	6.299	0.032	0.050
160 & over - To find fixed dimensional tolerances multiply by 0.5%.					6.30 & over - To find fixed dimensionsl tolerances multiply by 0.5%.			

1/ This table should be used only with common shaped, all-rubber parts.

2/ Fixed dimension tolerances apply individually to each fixed dimension by its own size.

3/ Closure dimension tolerances are determined by the largest closure dimension and this single tolerance is used for all other closure dimensions. (Closure dimension refers to any dimension in a plane parallel to the plane traced when the mold closes).

TABLE II. RMA Commercial Tolerances for Rubber Sheet Packing

Thickness		Tolerances	
Millimeters	Inches (approx.)	Millimeters	Inches
Under 0.80	Under 0.031	± 0.25	± 0.010
0.80 to 1.59	0.031 to 0.059	0.30	0.012
1.60 to 3.19	0.060 to 0.124	0.40	0.016
3.20 to 4.79	0.125 to 0.186	0.50	0.020
4.80 to 9.49	0.187 to 0.374	0.80	0.031
9.50 to 14.29	0.375 to 0.561	1.20	0.047
14.30 to 19.19	0.562 to 0.749	1.60	0.063
19.20 to 25.39	0.750 to 0.999	2.40	0.093
25.40 and over	1.00 and over	10%	10%

TABLE III. Commercial tolerances for special extruded shapes, except tubing

Dimensions		Tolerance	
Millimeters	Inches (approx.)	Millimeters	Inches
0 - 2.49	0 - 3/32	± 0.41	± 0.016
2.50 - 3.99	3/32 - 5/32	0.51	0.020
4.00 - 6.29	5/32 - 1/4	0.64	0.025
6.30 - 9.99	1/4 - 13/32	0.76	0.030
10.00 - 15.99	13/32 - 5/8	1.02	0.040
16.00 - 24.99	5/8 - 1	1.60	0.063
25.00 - 39.99	1 - 1-5/8	2.03	0.080
40.00 - 63.00	1-5/8 - 2-1/2	2.03	0.080

TABLE IV. Commercial tolerances for extruded tubing

Sizes		Tolerances of mandrel cured items		Tolerances of other cured items	
		I.D.		I.D.	O.D.
Millimeters	Inches (approx.)	mm	(in.)	± mm (in.)	± mm (in.)
0- 9.99	0.0 - 0.393	+0, -0.25	(0.016)	0.51 (0.020)	0.78 (1/32)
10 - 15.99	0.40 - 0.629	+0, -0.31	(0.020)	0.78 (1/32)	1.19 (3/64)
16 - 24.99	0.63 - 0.984	+0, -0.40	(0.025)	0.78 (1/32)	1.19 (3/64)
25 - 39.99	0.99 - 1.574	+0, -0.50	(0.032)	1.19 (3/64)	1.69 (1/16)
40 - 62.99	1.60 - 2.479	+0, -0.63	(0.040)	1.19 (3/64)	1.69 (1/16)
63 -100.00	2.48 - 3.937	+0, -0.80	(0.050)		

TABLE V. Commercial tolerances for calendered sheet

Dimensions		Tolerances	
Millimeters	Inches (approx.)	Millimeters	Inches
0 to 0.99	0 to 0.039	± 0.18	± 0.007
1.00 to 1.75	0.04 to 0.069	0.30	0.012
1.75 to 3.40	0.07 to 0.134	0.43	0.017
3.41 and over	0.135 and over	0.56	0.022

4. QUALITY ASSURANCE PROVISIONS:

4.1. Responsibility for inspection:

Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Quality conformance inspection:

Quality conformance inspection shall be performed on the sample units selected in accordance with 4.3.2 and 4.3.3. The inspection shall include the examination of 4.4 and the tests of 4.5.

4.3 Sampling:

4.3.1 Lot: For the purpose of sampling, a lot of fabricated rubber products shall consist of all like units of product of the same dimensions and of the same composition (same grade, type, class and suffix per ASTM D 2000, as applicable) in a single shipment offered for delivery at one time.

4.3.1.1 Unit of product: The unit of product shall be defined as shown in table VI.

TABLE VI. Definitions for unit of product

Type of product	Unit of product
Molded end item	One complete item
Sheet packing	One standard sheet or roll
Calendered sheet	One standard sheet or roll
Special extruded shapes	One cut length
Extruded tubing	One cut length
Others	As specified in contract or purchase order (see 6.2)

4.3.2 Sampling for examination: Unless otherwise specified (see 6.2), a random sample of units of product shall be taken from each lot offered to the Government in accordance with MIL-STD-105 at inspection level II.

4.3.3 Sampling for test:

4.3.3.1 Molded products: Whenever the size and shape of the product permit, samples for laboratory acceptance tests shall be cut from the product. Contractors shall indicate where specimens are to be cut if not indicated on the drawing. Samples per a and b below shall either be cut from end item in accordance with ASTM D 3183, or if shape and size do not permit, be prepared from same rubber and cured with the product.

a. Six test slabs, each approximately 152.4 mm (6 in.) by 152.4 mm (6 in.) by 2 mm to 3.2 mm (0.078 in. to 0.125 in.) of the same rubber as used in the molded product and of the equivalent cure.

b. Six test buttons, cut from approximately 13 mm (0.51 in.) thick slab of the same rubber as used in the molded product and of equivalent cure. The circular die used for cutting the specimens shall have an inside diameter of 28.7 ± 0.025 mm (1.129 ± 0.001 in.). An optional method of preparing the standard test buttons may be the direct molding of a circular disk nominally 12.7 mm (0.50 in.) in thickness and 28.7 mm (1.129 in.) in diameter.

c. Additional test samples. The number and dimensions of additional test samples, if required for determining conformance of suffix letter requirements, shall be as specified in ASTM D 2000 as applicable.

4.3.3.2 Extruded products: For extruded products, the sample shall be approximately 2 metre (6.6 ft.) strip prepared from a 25.4 mm (1 in.) nominal outside diameter by 1.91 mm (0.075 in.) (nominal) wall tubing which shall be split and flattened into a strip while being extruded. The strip shall be cured in the same manner as the production materials.

4.3.3.3 Calendered sheets: For calendered sheet, the sample shall be approximately 1.5 metre (4.92 ft.) run by product width of approximately 2 mm (0.079 in.) thickness and cured in the same manner as the production materials.

4.3.3.4 Other products: Samples of other forms of products shall be specified by the procuring activity (see 6.2).

4.4 Examination:

Each fabricated unit of product selected in accordance with 4.3.2 shall be examined in accordance with the classification of defects and acceptable quality level shown in table VII. The visual defects shown in MIL-STD-289, MIL-STD-298 and MIL-STD-407 are defined in MIL-STD-177. Any product in the sample containing one or more defects shall be rejected, and if the number of defects in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

TABLE VII. Classification of defects in accordance with MIL-STD-105

Categories	Defects per 100 units	Inspection method
Critical	None defined	
Major	AQL = 1.5 percent	
101	Any defect classified as major in MIL-STD-289	Visual
102	Any defect classified as major in MIL-STD-298	Visual
103	Any defect classified as major in MIL-STD-407	Visual
104	Color not as specified	Visual
Minor	AQL = 10 percent	
201	Any defect classified as minor in MIL-STD-289	Visual
202	Any defect classified as minor in MIL-STD-298	Visual
203	Any defect classified as minor in MIL-STD-407	Visual
204	Dimensions and Tolerances not as specified	Gage
205	Marking not as specified	Visual
206	Improper use of preservatives	Visual

4.4.1 Examination of preparation for packaging: Examination of packaging, packing and marking shall be in accordance with the applicable requirements of section 5 of this specification.

4.5 Test procedures:

Testing for conformance with the applicable basic and suffix requirements shall be accomplished in conformance with the testing procedures specified in ASTM D 2000 as applicable.

4.6 Acceptance tests:

Acceptance tests are those tests accomplished on rubber products submitted for acceptance under contract. Acceptance tests shall consist of those tests contained in ASTM D 2000 that are applicable to the composition specified.

4.7 Rejection and retest:

The requirements for rejection and retesting on the basis of the results of the acceptance tests shall be extablished by the procuring activity.

4.7.1 Non-determinable cure date: Elastomeric materials produced to this specification shall be rejected when the cure date cannot be determined.

5. PACKAGING:

5.1 Preservation:

5.1.1 Rubber products without metal fittings: Items manufactured from compositions conforming to the requirements of this specification and ASTM D 2000 shall not be treated with preservative oils or compounds. Unless otherwise specified, items which are unit packaged in multiple quantities shall be dusted with technical talcum (soapstone), conforming to commercial standard, or shall be separated by kraft or polyethylene film separators.

5.1.2 Rubber products with bare steel fitting: Exposed steel surfaces shall be coated with preservative P-1 of MIL-P-116. Care shall be exercised to avoid coating any rubber surface.

5.2 Packaging:

Packaging shall be level A or commercial as specified (see 6.2).

5.2.1 Level A:

5.2.1.1 Molded products: Molded rubber products shall be packaged in containers conforming to PPP-B-636, weather-resistant class. The unit quantity shall be 25, or as specified by the procuring activity. Containers shall be closed in accordance with the box specification.