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SUPERSEDING
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MILITARY SPECIFICATION

RUBBER SHEET: SYNTHETIC, MEDIUM SOFT, GENERAL-PURPOSE GASKET MATERIAL (FOR EXTREME CLIMATIC CONDITIONS)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers synthetic rubber gasket material for extreme climatic conditions.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

QQ-S-781	- Strapping, Steel, and Seals.
PPP-B-601	- Boxes, Wood, Cleated-Plywood.
PPP-B-621	- Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636	- Boxes, Shipping, Fiberboard.

Military

MIL-P-116	- Preservation-Packaging, Methods of.

STANDARDS

Federal

FED. STD. No. 356	- Commercial Packaging of Supplies and Equipment.
FED. TEST METHOD STD. No. 601	- Rubber: Sampling and Testing.

Military

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	- Marking for Shipment and Storage.
MIL-STD-130	- Identification Marking of US Military Property.
MIL-STD-177	- Rubber Products, Terms for Visible Defects of.

(Copies of specifications and standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 395	- Compression Set of Vulcanized Rubber.
D 412	- Tension Testing of Vulcanized Rubber.
D 573	- Accelerated Aging of Vulcanized Rubber by the Oven Method.
D 749	- Calibrating a Light Source Used for Accelerating the Deterioration of Rubber.
D 750	- Operating Light- and Weather-Exposure Apparatus (Carbon-Arc Type) for Artificial Weather Testing of Rubber Compounds.
D 792	- Specific Gravity and Density of Plastics by Displacement.
D 1053	- Low-Temperature Stiffening of Rubber and Rubber-Like Materials by Means of a Torsional Wire Apparatus.
D 1149	- Accelerated Ozone Cracking of Vulcanized Rubber.
D 2240	- Indentation Hardness of Rubber and Plastics by Means of a Durometer.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

3. REQUIREMENTS

3.1 Description. The gasket material shall be vulcanized synthetic rubber compound as specified herein.

3.2 Material. The gasket material shall be a vulcanized compound of synthetic rubber which will withstand a temperature range of from minus 65° F to plus 212° F. No polyurethane elastomer shall be used.

3.3 Physical properties. The physical properties of the gasket material shall be as specified in Table I.

Table I. Physical Properties

Property	Requirement
As furnished	
Tensile strength, psi, min	1200
Ultimate elongation, percent, min	300
Hardness, Shore A	47 ± 3
Specific gravity, max	1.40
Resistance to water, immersion in distilled water at plus 73.4° F, plus or minus 5° F, for 24 hours	
Volume increase, percent, max	5
Volume decrease, percent, max	2
Extraction, boiled in distilled water for 1 hour, extraction by weight, percent, max	0.5
After accelerated aging (46 hours at 212° F)	
Tensile strength, percent of as-furnished tensile strength, min	75
Ultimate elongation, percent of as-furnished ultimate elongation, min	70
Hardness change, max	-2 to +8
Compression set, percent, max	40
After light aging (100 hours)	
Tensile strength, percent of as-furnished tensile strength, min	70
Ultimate elongation, percent of as-furnished ultimate elongation, min	60

Table I. Physical Properties (Cont'd)

Property	Requirement
After ozone exposure (300 hours)	
Tensile strength, percent of as-furnished tensile strength, min	85
Ultimate elongation, percent of as-furnished ultimate elongation, min	85
No cracks shall be visible under 7X magnification	
After low temperature conditioning (94 hours at minus 65° F)	
Compression set (after 30-minute recovery), percent, max	60
Torsional stiffness ratio, max	10

3.4 Sheets, strips, and cut or molded shapes. The gasket material shall be furnished in sheets, strips, or cut or molded shapes, as specified (see 6.2).

3.4.1 Sheets. When applicable, thickness of sheets shall be as specified (see 6.2). Tolerance for thickness of sheets shall be as shown in Table II. Width of sheets shall be in increments of 1 inch and shall be between 35 and 42 inches, as specified (see 6.2). When no width is specified, the width shall be either 35 or 42 inches. Unless otherwise specified (see 6.2), sheets shall be furnished in rolls, each roll weighing 100 pounds, plus or minus 5 pounds. For sheets 1/8 inch or less in thickness, each roll shall contain not more than 4 sheets. For sheets more than 1/8 inch thick, each roll shall contain not more than 3 sheets. The length of any sheet in any roll shall be greater than the width of the roll.

Table II. Tolerance for Thickness

Thickness	Tolerance (plus or minus)
Inch	Inch
Less than 1/16 inch	0.010
1/16 thru 1/8	1/64
Over 1/8 thru 3/8	1/32

Table II. Tolerance for Thickness (Cont'd)

Thickness	Tolerance (plus or minus)
Inch	Inch
Over 3/8 thru 3/4	3/64
Over 3/4	1/16

3.4.2 Strips. When applicable, the width and thickness of strips shall be as specified (see 6.2). Tolerances shall be as shown in Tables II and III. Length of strips shall be 12, 16, or 22 feet, as specified (see 6.2). Tolerance for length shall be plus 1/2 foot, minus 0 feet. If the strip can be rolled, it shall be rolled to minimum practicable diameter. If the strip cannot be rolled, it shall be furnished straight.

Table III. Tolerance for Width of Strip Material

Width	Tolerance (plus or minus)
Inches	Inch
1/4 thru 1/2	1/32
Over 1/2 thru 1	3/64
1 thru 2	1/16
Over 2	3 percent

3.4.3 Cut or molded shapes. When applicable, cut or molded shapes shall be of the dimensions, tolerances, and shapes specified (see 6.2).

3.5 Finish. The surface of the gasket material shall be smooth, except that a fine fabric finish will be permitted.

3.6 Identification marking. The gasket material shall be identified in accordance with MIL-STD-130. Marking shall not impair the surface or have a detrimental effect on the gasket material.

3.7 Workmanship. Gasket material shall be free of defects as specified in MIL-STD-177.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified in the contract or order, the supplier 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 Classification of inspections. Inspections shall be classified as follows:

(a) Quality conformance inspection (see 4.3).
(b) Inspection of preparation for delivery (see 4.5).

4.3 Quality conformance inspection.

4.3.1 Sampling. Sampling for examination and tests shall be in accordance with MIL-STD-105.

4.3.2 Examination. Samples selected in accordance with 4.3.1 shall be examined as specified in 4.4.1. AQL shall be 1.0 percent defective.

4.3.3 Tests. Samples selected in accordance with 4.3.1 shall be tested as specified in 4.4.2 through 4.4.2.5.2.5. AQL shall be 4.0 percent defective.

4.4 Inspection procedure.

4.4.1 Examination. The gasket material shall be examined as specified herein for the following major defects:

101. Dimensions not as specified.
102. Weight of roll and number of sheets per roll not as specified.
103. Finish not as specified.
104. Identification marking not as specified or has detrimental effect on gasket material.
105. Workmanship not as specified.

4.4.2 Tests. Unless otherwise specified herein, tests shall be performed in accordance with the appropriate ASTM test method specified in Table IV. Unless otherwise specified herein, specimens shall be buffed; no tests shall be conducted prior to conditioning the buffed samples for 4 hours at room temperature.

Table IV. Tests

Tests	Methods			
	As furnished (see 4.4.2.1)	After accelerated aging (see 4.4.2.2)	After light aging (see 4.4.2.3)	After ozone exposure (see 4.4.2.4)
1	2	3	4	5
Tensile strength	D 412	D 412	D 412	D 412
Ultimate elongation	D 412	D 412	D 412	D 412
Hardness	D 2240	D 2240	-	-
Specific gravity	D 792	-	-	-
Compression set	-	D 395 4/	-	-
Resistance to water	6211 1/2/	-	-	-
Extraction	6621 1/3/	-	-	-

1/ FED. TEST METHOD STD. No. 601

2/ Medium No. 10 of FED. TEST METHOD STD. No. 601, Method 6001, shall be used and the specimen shall be immersed for 24 hours.

3/ Medium No. 10 of FED. TEST METHOD STD. No. 601, Method 6001, shall be used and the specimen shall be immersed in boiling water for 1 hour.

4/ Method B of ASTM D 395 shall be used.

4.4.2.1 As furnished. Gasket material tested as specified in Column 2 of Table IV and failing to meet each requirement specified under "As furnished" in Table I shall constitute failure of this test.

4.4.2.2 Accelerated aging. Specimens shall be aged 46 hours, plus or minus 2 hours, in accordance with ASTM D 573, at an operating temperature of 212° F, plus or minus 2° F. Gasket material tested as specified in Column 3 of Table IV and failing to meet each requirement specified under "After accelerated aging" in Table I shall constitute failure of this test.

4.4.2.3 Light aging. Specimens shall be aged in accordance with ASTM D 749 and D 750, except as specified herein. All specimens shall be buffed on both sides and shall be stretched to and racked at 10 percent elongation within 3 hours after buffing. The stretched samples shall be aged from 16 to 24 hours at plus 100° F, plus or minus 5° F, immediately after racking to facilitate blooming of protective waxes. The exposure in the light-aging unit shall be started within 1 hour after removal from the 100° F oven preconditioning period. Exposure for 100 hours shall be made at 10 percent elongation, using Union Carbide Corp. "Sunshine" carbons or equal. Four of the eight "Corex D" filters shall be removed leaving every alternate glass in place. Total dosage in decomposition of oxalic acid by uranyl oxalate actinometer shall be not less than 20 grams per square decimeter. Gasket material tested as specified in Column 4 of Table IV and failing to meet each requirement specified under "After light aging" in Table I shall constitute failure of this test.

4.4.2.4 Ozone exposure.

4.4.2.4.1 Exposure chamber. The tests for ozone resistance shall be performed using the equipment described in ASTM D 1149. The ozone concentration shall be controlled at 50 parts, plus or minus 3 parts, per 100 million parts of air by the techniques described in ASTM D 1149. The chamber temperature shall be maintained at plus 100° F, plus or minus 2° F.

4.4.2.4.2 Test specimens. Test specimens shall be prepared as specified in 4.4.2.3, except that the specimens shall be elongated 20 percent.

4.4.2.4.3 Procedure. The stretched specimens shall be exposed in the chamber for 300 hours. Following exposure, the stretched specimens shall be examined for any cracks visible with the aid of a 7X magnifying glass. The specimens shall be removed from the stretching racks and allowed to rest at room temperature for 16 to 48 hours before testing for tensile strength and ultimate elongation. Gasket material tested as specified in Column 5 of Table IV and failing to meet each requirement specified under "After ozone exposure" in Table I shall constitute failure of this test.

4.4.2.5 After low temperature conditioning at minus 65° F.

4.4.2.5.1 Compression set. The compression set shall be determined in accordance with ASTM D 395 using the cutting die described therein and compressing the specimens 40 percent. The compressed specimens shall be exposed for 94 hours, plus or minus 1/2 hour, at minus 65° F, plus or minus 2° F. After 30-minute recovery, compression set exceeding 60 percent shall constitute failure of this test.

4.4.2.5.2 Torsional stiffness ratio test.

4.4.2.5.2.1 Exposure of specimens and test apparatus. Specimens shall be exposed for 94 hours, plus or minus 1/2 hour, in a chamber maintained at minus 65° F, plus or minus 2° F. Test apparatus shall be exposed for not less than 2 hours at minus 65° F, plus or minus 2° F.

4.4.2.5.2.2 Test specimens. Test specimens shall be T-50 (I-shaped) specimens 0.080 inch wide x 0.080 inch thick x 1-1/2 inches long with a 1/4-inch-square stub at each end. Three specimens from each lot shall be tested.

4.4.2.5.2.3 Test apparatus. The test apparatus shall be a Gehman torsional tester conforming to FED. TEST METHOD STD. No. 601, Method 5611, except that only the torsion apparatus, the stand, and a suitable bracket to hold the lower clamp shall be used. A beryllium-copper torsion wire of appropriate torsion constant shall be used.

4.4.2.5.2.4 Test procedure. The test procedure shall be as follows:

(a) With the specimen and the test apparatus at plus 73° F, plus or minus 5° F, the lower end of the specimen shall be secured in the rigidly mounted clamp of the test apparatus and the upper end shall be secured in the upper pinch clamp attached to the lower end of the torsional wire.

(b) The pointer shall be adjusted to the zero position by rotating the protractor scale. The torsional head shall be turned 180 degrees and the pointer reading shall be recorded after a period of 10 seconds.

(c) The specimens and test apparatus shall be conditioned as specified in 4.4.2.5.2.1. When conditioning has been completed, the 10-second reading as obtained in (b) shall be recorded, with specimens and apparatus remaining at minus 65° F, plus or minus 5° F.

4.4.2.5.2.5 Calculations. The torsional stiffness ratio, or torsional modulus, shall be computed according to Paragraphs 5.1.1 and 5.1.2 of FED. TEST METHOD STD. No. 601, Method 5612. Torsional stiffness factors may be found in ASTM D 1053, Table 2. An average torsional stiffness ratio greater than 10 shall constitute failure of this test.

4.5 Inspection of preparation for delivery.

4.5.1 Quality conformance inspection of pack.

4.5.1.1 Unit of product. For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.

4.5.1.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.5.1.3 Examination. Samples selected in accordance with 4.5.1.2 shall be examined for the following defects. AQL shall be 2.5 percent defective.

106.	Gaskets and gasket material not dusted as specified.
107.	Preservation not as specified for Level A or B.
108.	Gross weight of wood boxes exceeds 200 pounds for Levels A and B.
109.	Strapping not as specified for Level A.
110.	Fiberboard boxes not closed as specified for Level B.
111.	Gross weight of fiberboard boxes exceeds the weight limitation of the box specification for Level B.
112.	Marking illegible, incorrect, or incomplete.

5. PREPARATION FOR DELIVERY

5.1 Dusting. Prior to preservation, all surfaces of the gasket material shall be dusted with soapstone or talc.

5.2 Preservation. Preservation shall be Level A, B, or Commercial, as specified (see 6.2).

5.2.1 Level A. The sheets, strips, and cut or molded shapes shall be preserved in accordance with MIL-P-116, Method IC-1 or IC-3.

5.2.2 Level B. The sheets, strips, and cut or molded shapes shall be preserved in accordance with MIL-P-116, Method III.

5.2.3 Commercial. The sheets, strips, and cut or molded shapes shall be preserved in accordance with FED. STD. No. 356.

5.3 Packing. Packing shall be Level A, B, or Commercial, as specified (see 6.2).

5.3.1 Level A. The gasket material preserved as specified in 5.2 shall be packed in a close-fitting box conforming to PPP-B-621, Class 2, style optional, or PPP-B-601, Overseas Type, style optional, Grade B. The gross weight of each box shall not exceed 200 pounds. The boxes shall be closed and strapped in accordance with the appendix to the applicable box specification, except that strapping shall conform to QQ-S-781, Class 1, Type I or IV, size as applicable; and, unless otherwise specified (see 6.2), strapping shall be Finish B. When specified (see 6.2), strapping shall be Finish A.

5.3.2 Level B. The gasket material preserved as specified in 5.2 shall be packed in a close-fitting box conforming to PPP-B-621, Class 1, style optional, PPP-B-601, Domestic Type, style optional, Grade B, or PPP-B-636, Class V3c or equivalent. The gross weight of wood boxes shall not exceed 200 pounds. The gross weight of fiberboard boxes shall not exceed the weight limitation of the box specification, and the boxes shall be closed and sealed in accordance with Method V of the appendix to the box specification.

5.3.3 Commercial. The gasket material preserved as specified in 5.2 shall be packed in accordance with FED. STD. No. 356.

5.4 Marking.

5.4.1 Military. Marking for military levels of protection shall be in accordance with MIL-STD-129.

5.4.2 Commercial. Marking for commercial packaging shall be in accordance with FED. STD. No. 356.

6. NOTES

6.1 Intended use. The gasket material covered by this specification is intended for use as gaskets for watertight and air closures subject to temperatures as low as minus 65° F and as high as plus 212° F.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number and date of this specification.
(b) Whether the gasket material shall be furnished in sheets, strips, or cut or molded shapes (see 3.4).
(c) Thickness of gasket material sheets and width of roll required (see 3.4.1).
(d) When sheets shall not be furnished in rolls (see 3.4.1).
(e) Weight of roll if other than as specified (see 3.4.1).
(f) Width, thickness, and length of strips required (see 3.4.2).
(g) Dimensions, tolerances, and shape required for cut or molded gasket material (see 3.4.3).
(h) Preservation and packing required (see 5.2 and 5.3). Level B preservation and packing is intended to provide economical but limited protection and should be specified only when it is determined that the gasket material will be held in covered storage.
(i) When strapping shall be other than as specified (see 5.3.1).

Custodian:

Army - ME

Preparing activity:

Army - ME

Review activities:

Army - WC, MU, MD, AV, EL, GL, MI
DSA - IS

User activities:

Army - AT, PA

Project No. 5330-A055

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

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CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

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4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

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