NOTE: The document identifier and heading has been changed on this page to reflect that this is a performance specification. There are no other changes to this document. The document identifier on subsequent pages has not been changed, but will be changed the next time this document is revised.

MIL-PRF-900F
30 March 1973
SUPERSEDING
MIL-R-900E
3 November 1966
(See 6.4)

PERFORMANCE SPECIFICATION

RUBBER GASKET MATERIAL, 45 DUROMETER HARDNESS

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

1. SCOPE

1.1 This specification covers rubber gasket material for watertight and airtight closures, in the temperature range of -20° to 130°F (-28.9° to 54.4°C), and other uses.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL
PPP-B-566 - Boxes, Folding, Paperboard.
PPP-B-636 - Boxes, Shipping, Fiberboard.
PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple-Wall.
PPP-B-676 - Boxes, Set-Up.

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

STANDARDS

FEDERAL
FED-STD-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-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.

(Copies of specifications, standards, drawings, and publications 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
D1149-64 - Accelerated Ozone Cracking of Vulcanized Rubber, Test for.

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

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

OFFICIAL CLASSIFICATION COMMITTEE
Uniform Freight Classification Rules

(Copies may be obtained from the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606.)

3. REQUIREMENTS

3.1 Material. The material shall be vulcanized rubber which meets the requirements specified herein.

3.1.1 Plasticizer exudation. The rubber shall not show evidence of plasticizer exudation; however, a light bloom of non-liquid material shall be considered acceptable (see 4.3).

3.1.2 Ozone resistance. For ozone resistance, the material shall not show any cracks on the surface when tested as specified (see 4.7.11).

3.2 Form. The rubber gasket material shall be furnished in the form specified (see 6.2). This form may be sheets, strips of rectangular cross section, shapes cut from sheets, molded shapes, or extruded shapes.

3.2.1 Sheet. Sheet rubber shall have smooth surfaces and shall have the thickness specified (see 6.2). Unless otherwise specified (see 6.2), the tolerances in thickness given in table I shall apply. The sheet rubber shall be furnished in rolls approximately 35 to 42 inches wide. Unless otherwise specified, rolls shall weigh 100 ± 10 pounds, and a roll of sheet rubber 1/8 inch or less in thickness shall consist of not more than four lengths. A roll of sheet rubber over 1/8 inch in thickness shall consist of not more than three lengths.

3.2.2 Strip. Strip rubber of rectangular cross section shall have smooth surfaces and shall have the cross sectional dimensions specified (see 6.2). Unless otherwise specified (see 3.2.4 and 6.2), the tolerances in thickness and width given in table I shall apply. Strip rubber shall be furnished in lengths of approximately 12, 16, 22, or 100 feet ± 1/2 foot in length. When 100 foot lengths are supplied, a maximum of four seams per length will be acceptable.

Table I - Tolerances in width and thickness.

Width, inches	Tolerance (plus or minus)	Thickness, inch	Tolerance (plus or minus) inch
1/4 to 1/2, inclusive	1/32 inch	Less than 1/16	0.010
Over 1/2 to 1, inclusive	3/64 inch	1/16 to 1/8, inclusive	1/64
Over 1 to 2, inclusive	1/16 inch	Over 1/8 to 1/2, inclusive	1/32
Over 2	3 percent	Over 1/2 to 1, inclusive	3/64
		Over 1	1/16

3.2.3 Cut, molded, and extruded shapes. Cut, molded, and extruded shapes shall have the form, dimensions, and tolerances specified (see 6.2).

3.2.4 Tolerance of joined seams. The tolerances across joined (spliced) seams shall not exceed plus or minus 0.005 inch when inspected in accordance with 4.3.

3.3 Physical requirements. The rubber shall conform to the physical requirements specified in table II except joined (spliced) seams.

3.3.1 Joined seams. The tensile strength and ultimate elongations of joined seams before and after oven aging shall be not less than 80 percent of the requirements specified in table II and tested in accordance with 4.8.

Table II - Physical requirements of rubber.

	Requirement	Test procedure
Initial properties:		
Tensile strength, psi, minimum	1000	4.7.1
Ultimate elongation, percent, minimum	300	4.7.1
Hardness, durometer units	45 ± 5	4.7.2
Specific gravity, maximum	1.40	4.7.3
Sealing pressure, psi, minimum	95	4.7.4
Properties after oven aging		4.7.5
Tensile strength, percent of initial, minimum	75	4.7.5.1
Ultimate elongation, percent of initial, minimum	70	4.7.5.1
Hardness, durometer units, maximum	55	4.7.5.2
Hot compression set, percent, maximum	30	4.7.5.3
Sealing pressure, psi, minimum	70	4.7.5.4
Properties after light aging:		4.7.6
Tensile strength, percent of initial, minimum	75	4.7.6
Ultimate elongation, percent of initial, minimum	70	4.7.6
Properties after low temperature aging:		4.7.7
Hardness, durometer units, maximum	60	4.7.7.1
Cold compression set, percent, maximum		
10 seconds after release	75	4.7.7.2
30 minutes after release	40	
Properties after liquid immersions:		
Volume change from water immersion, percent	minus 2 plus 5	4.7.8
Water extraction, percent maximum	1.0	4.7.9
Delamination after immersion	no delamination	4.7.10

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 as 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 Sampling.

4.2.1 Lot. For the purpose of definition, a lot shall consist of material of the same form and dimensions produced in one plant under essentially the same conditions, and offered for delivery at one time. The appropriate lot size, for the purpose of sampling, examinations, and tests, shall be number of square feet, number of pieces or number of pounds, as determined in accordance with 4.2.2.1, table III, or table IV as appropriate.

4.2.2 Sampling for examination. For the examination specified in 4.3 representative samples shall be selected at random from each lot in accordance with 4.2.2.1 and 4.2.2.2.

4.2.2.1 Sampling of material in rolls. The lot size shall be stated in square feet and the sample also. The numbers of MIL-STD-105 at Inspection Level II shall be used. The sample shall be selected in equal amounts from 4 rolls, or from all of the rolls if there are less than 4. The acceptable quality level (AQL) shall be 6.5 defects per hundred units for major defects and 15 defects per hundred units for total defects.

4.2.2.2 Sampling of gaskets. Gaskets shall be sampled in accordance with table III.

Table III - Sampling for examination of gaskets.

Number of gaskets in lot	Number of gaskets in sample Diameter or width of gaskets (inches)			
	Up to 6	Over 6 to 12	Over 12 to 30	Over 30
15 and under	8	5	3	2
16 to 40	13	8	5	3
41 to 100	20	13	8	5
101 to 250	32	20	13	8
251 to 630	50	32	20	13
631 to 1600	80	50	32	20

Note: The acceptance numbers are as follows:

Sample sizes	2	3	5	8	13	20	32	50	80
Acceptance number,									
Major defects	0	0	0	0	0	1	1	2	3
Minor defects	0	0	1	1	2	3	5	7	10

4.2.3 Sampling for tests. Representative material shall be selected at random from each lot that passes the requirements of 4.3 in accordance with table IV to conduct the production check test or the quality conformance tests specified in 4.4 and 4.5, as applicable.

Table IV - Sampling for tests.

Lot size, pounds of material	Sample size[1/][2/] Number of specimens required for each test
Up to 80	1
81 to 170	2
171 to 350	3
351 to 700	4
701 to 1400	5
1401 to 2500	7

1/ In sheet and strip material, each test specimen shall be cut from a different roll. If this is not possible, then from a different length in the roll.

2/ If the items are of such size or shape that test specimens cannot be prepared from them, substitute specimens shall be provided in the form of a piece or pieces of rubber having dimensions appropriate for the tests required. Material for these specimens shall be taken from different parts of the batch or batches used to make the items to be represented by the specimens. The substitute specimens shall be certified to have received a cure equivalent to that used in the lot of finished material offered for delivery.

4.3 Examination. Each of the samples taken in accordance with 4.2.2 shall be subjected to examination for workmanship, dimensions, tolerances, and exudation of plasticizer. MIL-STD-289, MIL-STD-298, and MIL-STD-407 shall be used to determine and evaluate visual defects.

4.3.1 Rejection. If the number of defects in the sample exceed the applicable acceptance number, this shall be cause for rejection of the entire lot represented by the sample.

4.4 Production check tests. Production check tests shall be conducted on samples from (or representing) the first lot of material and from every tenth lot hereafter. All the tests specified in 4.7 and 4.8 shall be conducted.

4.5 Quality conformance tests. Quality conformance tests shall be conducted on samples from (or representing) all lots on which production check tests are not conducted. The tests specified in 4.7.1, 4.7.2, 4.7.3, and 4.7.5.3 shall be conducted.

4.6 Action in case of nonconformance. If any of the samples in the production check tests or quality conformance tests is found not to be in conformance with the requirements of this specification, this shall be cause for rejection of the lot represented by the sample. Furthermore, production check tests shall be performed on each succeeding lot of the contract or purchase order. This additional testing shall be discontinued, except as specified in 4.4, after four successive lots have passed the production check tests.

4.7 Test procedures.[1/]

4.7.1 Tensile strength and ultimate elongation. Tensile strength and ultimate elongation shall be determined by methods 4111 and 4121, respectively, of FED-STD-601. Die III specimens, 0.080 ± 0.010 inch thick, shall be used.

4.7.2 Hardness. The hardness shall be determined by method 3021 of FED-STD-601. An instantaneous reading shall be taken using a Shore A type durometer. The specimens shall be at least 1/4 inch thick but not more than 1/2 inch thick. Material less than 1/4 inch thick may be plied up.

4.7.3 Specific gravity. The specific gravity shall be determined by method 14011 of FED-STD-601.

4.7.4 Sealing pressure. The sealing pressure shall be determined in accordance with method 3211 of FED-STD-601, except the aging shall be for 46 ± 1/4 hours at 90° ± 1.1°C (194° ± 2°F).

4.7.5 Oven aging. Specimens for tensile strength, ultimate elongation, hardness, compression set, and sealing pressure tests shall be aged in a dry circulating air oven for 46 ± 1/4 hours at 100° ± 1.1°C (212° ± 2°F).

4.7.5.1 Tensile strength and ultimate elongation. The tensile strength and ultimate elongation shall be determined after oven aging in accordance with method 7221 of FED-STD-601, except aging shall be as specified in 4.7.5.

4.7.5.2 Hardness after oven aging. The hardness shall be determined, as specified in 4.7.2, after oven aging the specimens in accordance with method 7221 of FED-STD-601, except aging shall be as specified in 4.7.5.

4.7.5.3 Hot compression set. Hot compression set shall be determined by method 3311 of FED-STD-601, with specimens clamped to 40 percent deflection and aged in accordance with 4.7.5.

4.7.5.4 Sealing pressure after oven aging. Sealing pressure shall be determined as specified in 4.7.4, after oven aging in accordance with 4.7.5.

4.7.6 Tensile strength and ultimate elongation after light aging. Specimens shall be light-aged in accordance with method 7311 of FED-STD-601, except the specimens shall be 0.080 ± 0.010 inch thick and the exposure time shall be 100 ± 1/2 hours. After light-aging, the tensile strength and ultimate elongation shall be determined as specified in 4.7.1.

4.7.7 Low temperature aging. Specimens for hardness test and compression set test shall be aged in air or carbon dioxide for 94 ± 1/2 hours at minus 40° ± 1.1°C (minus 40° ± 2°F).

[1/] Unless otherwise indicated in the test method, tests shall not be conducted on the test specimens prior to a conditioning period of 4 hours at 27° ± 5°C (80° ± 9°F). Sample preparation may be undertaken without regard to this time interval.

4.7.7.1 Hardness after low temperature aging. Hardness shall be determined by method 5511 of FED-STD-601 after aging as specified in 4.7.7. The instantaneous reading shall be taken using a Shore A type durometer.

4.7.7.2 Cold compression set. Cold compression set shall be determined in accordance with method 5411 of FED-STD-601. The specimens shall be compressed to 40 percent deflection during aging as specified in 4.7.7.

4.7.8 Volume change. The change in volume shall be determined after immersion in distilled water, in accordance with method 6211 of FED-STD-601, except that the immersion time shall be 24 ± 1/4 hours.

4.7.9 Extraction in distilled water. The percent extraction shall be determined by method 6621 of FED-STD-601, except that the specimens shall be 1 by 2 by 0.080 ± 0.010 inch.

4.7.10 Delamination. The delamination test shall be conducted in accordance with method 6311 of FED-STD-601.

4.7.11 Ozone resistance. Specimens shall be tested in accordance with ASTM D1149-64 with the following additions and modifications:

(a) The test specimen for procedure "A" shall be used.
(b) The 24 hour preconditioning period (while stretched) shall be in an oven at 40° ± 1°C (104° ± 1.8°F).
(c) The ozone concentration shall be 100 ± 5 parts per hundred million by volume.
(d) The test temperature shall be 40° ± 1°C (104° ± 1.8°F).
(e) The exposure time shall be 70 hours ± 1/2 hour.
(f) Magnification shall be 7-power for the examination of duplicate specimens.

4.8 Joined (spliced) seams. Seams which are joined (spliced) to form the proper configuration shall be tested to determine the strength properties of the bond joint. For this evaluation, all tensile property determinations required for production check tests (see 4.4), or quality conformance tests, (see 4.5) as appropriate, shall be conducted on spliced specimens. If dimensions of the rubber gasket material being procured precludes a specimen being tested on a tensile test machine, appropriate size spliced specimens shall be used to represent the procured material.[2/] These substitute specimens shall be certified to have been spliced in a manner identical to those materials offered for delivery.

4.9 Examination of preparation for delivery. The packaging, packing, and marking shall be examined for compliance with section 5 of this document.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.3.)

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

5.1.1 Level A.

5.1.1.1 Rubber sheets and strips. Rubber sheets shall be unit packaged in rolls and securely tied or banded to prevent unrolling. Strips shall be individually coiled and securely tied with salvaged duck cloth. Sheets and strips shall be packaged in accordance with method III of MIL-P-116.

5.1.1.2 Cut, molded, and extruded gaskets. Gaskets shall be packaged in accordance with method III of MIL-P-116.

5.1.1.3 Interior containers. Unit and intermediate containers, when used, shall conform to PPP-B-566, PPP-B-636, or PPP-B-676, at the option of the supplier. Container closure, weight limitation, and sealing shall be in accordance with the applicable container specification or appendix thereto.

2/ When test specimens cannot be prepared from the gaskets, substitute samples shall be provided in the form of pieces of rubber having dimensions appropriate to the tests required. The substitute samples shall be certified to have received an equivalent cure and to have been selected from the same material used to make up the lot of material offered for delivery.

5.1.2 Level C. Packaging shall afford protection against deterioration and physical damage during shipment from the supply source to the using activity for immediate use.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.2).

5.2.1 Level A. Rubber sheets, strips, cut, molded, and extruded gaskets, packaged as specified (see 6.2), shall be packed for shipment in containers conforming to class weather-resistant of PPP-B-636, or class 2 of PPP-B-640, at the option of the supplier. Boxes conforming to PPP-B-636 shall be closed, waterproofed, and reinforced in accordance with the requirements of method V in the appendix to PPP-B-636 as applicable to class weather-resistant boxes. Boxes conforming to PPP-B-640 shall be closed, waterproofed, and reinforced in accordance with the requirements of the appendix to PPP-B-640. The gross weight of fiberboard boxes shall not exceed the weight limitations of the applicable fiberboard box specification. Intermediate fiberboard containers (see 5.1.1.3) conforming to class weather-resistant of PPP-B-636, closed, sealed, and banded as specified herein may be used as the shipping container and need not be overpacked.

5.2.2 Level B. Rubber strips, cut, molded, and extruded gaskets, packaged as specified (see 6.2), shall be packed in containers conforming to the requirements of class domestic of PPP-B-636, or class 1 of PPP-B-640, at the option of the supplier. Box closures shall be as specified in the applicable box specification or appendix thereto. The gross weight of the containers shall not exceed the weight limitations of the applicable box specification. Intermediate containers (see 5.1.1.3) conforming to PPP-B-636, closed, sealed, and banded as specified herein may be used as the shipping container and need not be overpacked. Rubber sheets will require no further packing.

5.2.3 Level C. Rubber sheets, strips, cut, molded, and extruded gaskets packaged as specified, shall be packed in a manner which will insure acceptance by common carrier, at the lowest rate, and will afford protection against physical or mechanical damage during direct shipment from the supply source to the first receiving activity for immediate use. This level in general shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation may be used.

5.3 Marking. In addition to any special marking required by the contract or order (see 6.2), interior packages and exterior containers shall be marked in accordance with MIL-STD-129 and shall also include cure date (month and year).

6. NOTES

6.1 Intended use. Material covered by this specification is intended for use in gaskets for watertight and airtight closures. It is not intended for use in equipment for food service or containers for potable water.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Form of material required (see 3.2).
(c) Dimensions, tolerances, and shape required (see 3.2).
(d) Level of packaging and packing required (see 5.1 and 5.2).
(e) Special marking required (see 5.3).

6.3 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in Section 2 do not apply when material and parts are procured by the supplier for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 THE MARGINS OF THIS SPECIFICATION ARE MARKED "#" TO INDICATE WHERE CHANGES (ADDITIONS, MODIFICATIONS, CORRECTIONS, DELETIONS) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS WAS DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

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