

INCH-POUND
MIL-PRF-15624G
15 June 2009
SUPERSEDING
MIL-PRF-15624F
25 May 1994

## PERFORMANCE SPECIFICATION

### GASKET MATERIAL, RUBBER, 50 DUROMETER HARDNESS (MAXIMUM)

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

#### 1. SCOPE

1.1 Scope. This specification establishes the requirements for synthetic rubber materials for gaskets 50 durometer hardness (maximum).

1.2 Classification. The synthetic rubber is furnished in the following classes, as specified (see 3.2 and 6.2):

- Class I - Oil resistant, (chloroprene rubber).
- Class II - Non-oil resistant, (butadiene-styrene rubber).
- Class III - Fuel resistant, (butadiene-acrylonitrile rubber).

#### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

##### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

##### DEPARTMENT OF DEFENSE STANDARDS

- 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-1916 - DoD Preferred Methods for Acceptance of Product

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

Comments, suggestions, or questions on this document should be addressed to Commander, Naval Sea Systems Command, ATTN: SEA 05M2, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to [CommandStandards@navy.mil](mailto:CommandStandards@navy.mil), with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil>.

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2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

## BUREAU OF MEDICINE AND SURGERY (BUMED)

BUMED INST 6270.8 - Occupational Health Hazard Assessment

(Copies of this document are available from the Bureau of Medicine and Surgery, Department of the Navy, 2300 E Street, NW, Washington DC 20372-5300 or online at <http://navymedicine.med.navy.mil>.)

## NAVAL SEA SYSTEMS COMMAND (NAVSEA) PUBLICATIONS

S9510-AB-ATM-010 - Nuclear Powered Submarine Atmosphere Control Manual

(Copies of the chapter titled "Material Control Program" are available online at <https://smcl.dt.navy.mil> or from Commander, Naval Sea Systems Command, ATTN: SEA 05Z4, 1333 Isaac Hull Ave. SE Stop 5122, Washington Navy Yard, DC 20376-5122.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

## ASTM INTERNATIONAL

ASTM D395 - Standard Test Methods for Rubber Property - Compression Set. (DoD adopted)

ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension. (DoD adopted)

ASTM D471 - Standard Test Method for Rubber Property - Effect of Liquids. (DoD adopted)

ASTM D573 - Standard Test Method for Rubber - Deterioration in an Air Oven. (DoD adopted)

ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement. (DoD adopted)

ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness. (DoD adopted)

ASTM D2565 - Standard Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications. (DoD adopted)

(Copies of these documents are available from ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA 19428-2959 or online at [www.astm.org](http://www.astm.org).)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 First article. When specified (see 6.2 and 3.1.1), a sample shall be subjected to first article inspection in accordance with 4.2.

3.1.1 First article inspection. First article inspection shall be performed when one or more of the following apply:

- a. Upon initial offering of a material to the government by the vendor.

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- b. When any change in material formulation is made from previous first article test samples.
- c. When any change in manufacturing processes or conditions are made from previous first article test samples.
- d. When the product being offered is manufactured at a plant different than that of previous first article test samples.
- e. When required by the Naval Sea Systems Command.

3.2 Material. The material shall be vulcanized synthetic rubber, which meets the applicable requirements specified herein.

3.2.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.2.2 Form. The synthetic 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. Laminated form shall not be used.

3.2.2.1 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 specified in [table I](#) shall apply. Unless otherwise specified (see 6.2), sheet rubber shall be furnished in rolls  $36 \pm 1$  inch wide and the length shall be  $60 \pm 1$  inch. Rolls shall consist of not more than four lengths of sheet. In no case shall the length of a sheet be less than the width.

TABLE I. Tolerances in width and thickness.

Width, Inches	Tolerance (Plus or Minus)	Thickness, Inch	Tolerance (Plus or Minus)
Less than $\frac{1}{16}$	$\frac{1}{100}$ Inch	$\frac{1}{32}$ to $\frac{1}{16}$	$\frac{1}{128}$ Inch
$\frac{1}{16}$ to $\frac{1}{8}$ , inclusive	$\frac{1}{64}$ Inch	$\frac{1}{16}$ to $\frac{1}{8}$ , inclusive	$\frac{1}{64}$ Inch
$\frac{1}{8}$ to $\frac{1}{2}$ , inclusive	$\frac{1}{32}$ Inch	$\frac{1}{8}$ to $\frac{1}{2}$ , inclusive	$\frac{1}{32}$ Inch
$\frac{1}{2}$ to 1, inclusive	$\frac{3}{64}$ Inch	$\frac{1}{2}$ to 1, inclusive	$\frac{3}{64}$ Inch
1 to 2, inclusive	$\frac{1}{16}$ Inch	Over 1	$\frac{1}{16}$ Inch
Over 2	3%		

3.2.2.2 Strip. Strip rubber of rectangular cross section shall have a smooth surface and shall have the cross sectional dimensions specified (see 6.2). Unless otherwise specified (see 6.2), the tolerances in thickness and width specified in [table I](#) shall apply. Unless otherwise specified (see 6.2), strip rubber shall be furnished in lengths of 11 feet.

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

3.3 Physical requirements. The rubber gasket materials shall conform to the requirements specified in [table II](#).

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TABLE II. Physical requirements of rubber.

Material Condition	First Article	Conformance	Class I	Class II	Class III	Test Method
<b>Initial properties:</b>						
Tensile strength, psi, minimum	X	X	1500	1000	1500	4.6.1
Ultimate elongation, percent, minimum	X	X	400	300	400	4.6.1
Hardness, durometer points, maximum	X	X	50	50	50	4.6.2
Specific gravity, maximum	X	X	1.60	1.40	1.40	4.6.3
Tensile stress (modulus) psi at 100% elongation	X	X	As determined	As determined	As determined	4.6.1
Sealing pressure, psi, minimum	X		95	95	95	4.6.4
<b>Properties after oven aging:</b>						
Tensile strength, percent of initial, minimum	X		75	75	75	4.6.5.1
Ultimate elongation, percent of initial, minimum	X		70	70	70	4.6.5.1
Hardness, durometer points, maximum	X		65	65	65	4.6.5.2
Tensile stress (modulus) psi at 100% elongation	X		As determined	As determined	As determined	4.6.1
Compression set, percent, maximum	X		30	30	30	4.6.5.3
Sealing pressure, psi, minimum	X		70	70	70	4.6.5.4
<b>Properties after light aging:</b>						
Tensile strength, percent of initial, minimum	X		75	75	75	4.6.6
Ultimate elongation, percent of initial, minimum	X		70	70	70	4.6.6
<b>Properties after low temperature aging:</b>						
Flexibility	X		No cracks, tears, or separation	No cracks, tears, or separation	No cracks, tears, or separation	4.6.7
<b>Properties after liquid immersions:</b>						
Volume change, after water immersion, percent	X		0 to 5	N/A	N/A	4.6.8
Extraction, percent, maximum	X		0.5	N/A	N/A	4.6.9
Volume change, after immersion in ASTM No. 1 oil, percent	X		0 to 10	N/A	N/A	4.6.10
Volume change, after immersion in Reference Fuel B, percent	X		N/A	N/A	0 to 30	4.6.11

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3.4 Workmanship. The workmanship shall meet the requirements of this specification and gasket surfaces shall be free of surface voids, tears, rips, cuts, and free from all foreign matter that may affect the use of the finished product.

3.5 Toxicity. When evaluated in accordance with 4.7, the gasket material shall have no adverse effect on the health of personnel when used for its intended purpose and shall not cause any environmental problems during waste disposal (see 4.7 and 6.4).

3.6 Off-gassing. The gasket material shall be certified for and assigned a usage category of either "Permitted" or "Limited" in accordance with NAVSEA S9510-AB-ATM-010 chapter titled "Material Control Program" (see 4.8 and 6.5).

3.7 Identification. Material supplied under this specification shall be identified in accordance with MIL-STD-190. Class I material shall be marked with a yellow color and Class III material with a red color. No environmental color identification is necessary for Class II material. Marking shall be done with a permanent marking material.

#### 4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. When required (see 6.2 and 3.1.1), all tests and examinations listed in 4.5 and 4.6 through 4.8 shall be conducted on samples from (or representing) the first lot of material.

4.2.1 Rejection for nonconformance. If any of the first article examinations or tests do not conform to the applicable requirements, this shall be cause for denial to proceed with the production of gaskets.

4.3 Conformance inspections. Conformance inspections shall include the examinations specified in 4.5, and the conformance tests specified in [table II](#). Conformance inspections shall be conducted on samples from (or representing) all lots.

4.4 Sampling.

4.4.1 Lot. For the purposes of sampling, examinations, and tests, a lot shall consist of not more than one class of material of the same form and dimensions, produced in one plant under the same conditions, not exceeding 2500 pounds, and offered for delivery at one time.

4.4.2 Sampling for examination. Random samples shall be taken from each lot in accordance with MIL-STD-1916 for the examination specified in 4.5. A unit area of material is defined as one square foot, regardless of thickness.

4.4.3 Classification of defects. (see 6.6.1 and 6.6.2) Refer to MIL-STD-289, MIL-STD-298, and MIL-STD-407 for classification of defects in rubber sheet material, rubber extruded goods, and rubber molded items, respectively.

4.4.4 Sampling for tests. Representative samples shall be taken at random from each lot that passes the requirements of 4.5 in sufficient quantity to conduct the first article inspection or the conformance tests specified in 4.2 and 4.3. If the items are of such size or shape that test specimens cannot be prepared from them, a substitute sample shall be provided in the form of a piece or pieces of rubber having dimensions appropriate to the tests required. The substitute sample shall be certified to be of the same material and equivalent cure as that used in the lot of finished material offered for delivery.

4.5 Examination. Each of the samples taken in accordance with 4.4.2 shall be subjected to surface examination for workmanship, marking, dimensions, and tolerances. MIL-STD-289, MIL-STD-298, and MIL-STD-407 shall be used to determine and evaluate visual defects in rubber sheet material, rubber extruded goods, and rubber molded items, respectively. Acceptance criteria shall be as specified (see 6.2).

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4.6 Test methods. 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 room temperature  $73.4\pm 3.6$  °F ( $23\pm 2$  °C). Sample preparation may be undertaken without regard to this time interval.

4.6.1 Tensile properties. Tensile strength, ultimate elongation, and tensile stress (modulus) at 100 percent elongation shall be determined in accordance with ASTM D412, Test Method A, using Die C specimens  $0.080\pm 0.010$  inch thick.

4.6.2 Hardness. The hardness shall be determined in accordance with ASTM D2240 using a Type A durometer.

4.6.3 Specific gravity. The specific gravity shall be in accordance with ASTM D792.

4.6.4 Sealing pressure. The sealing pressure shall be determined in accordance with A.4 of Appendix A.

4.6.5 Oven aging. ASTM D573 shall be used for oven aging. The aging conditions shall be  $46\pm 1/4$  hours at  $194\pm 1.8$  °F ( $90\pm 1$  °C).

4.6.5.1 Tensile properties after oven aging. The tensile strength, ultimate elongation and tensile stress (modulus) at 100 percent elongation after oven aging shall be determined by the procedure in 4.6.1.

4.6.5.2 Hardness after oven aging. The hardness after oven aging shall be determined by the procedure in 4.6.2.

4.6.5.3 Compression set after oven aging. Hot compression set after oven aging shall be determined in accordance with ASTM D395, Test Method B except that specimens shall be clamped to 40 percent deflection during the oven aging and the time and temperature of aging shall be as specified in 4.6.5.

4.6.5.4 Sealing pressure after oven aging. Sealing pressure after oven aging shall be determined in accordance with A.4 of Appendix A.

4.6.6 Tensile properties after light aging. Specimens shall be light-aged in accordance with ASTM D2565, except the specimens shall be  $0.080\pm 0.010$  inch thick, black panel temperature shall be  $113\pm 5.4$  °F ( $45\pm 3$  °C) and the exposure time shall be  $100\pm 1/2$  hour. After light aging, the tensile strength and ultimate elongation shall be determined as specified in 4.6.1.

4.6.7 Flexibility. Specimens shall be low temperature flexibility tested as follows: Specimens shall be cleanly die-cut to provide sharp edges, free of cracks, tears or abraded particles. Steel die shall be 0.5 inch by 6 inches (12.7 mm by 154.4 mm). Specimens shall not exceed 0.080 inch thickness and shall be uniform to within  $\pm 0.010$  inch. Expose the specimens and a 1-inch diameter mandrel for 6 hours at  $-20\pm 3.6$  °F ( $-29\pm 2$  °C) in a cold chamber. Without removing the specimens from the cold chamber, firmly hold each cooled specimen at one point on the 1-inch diameter mandrel, and using finger pressure, force the specimen around the mandrel within  $5\pm 1$  second so that a 180-degree contact is achieved between the specimen and mandrel. The specimen shall not exhibit cracks, tears, or surface separation from being forced around the mandrel.

4.6.8 Volume change in distilled water (class I only). The volume change after immersion in distilled water shall be in accordance with ASTM D471 except that the immersion time shall be  $24\pm 1/4$  hour.

4.6.9 Extraction in distilled water (class I only). The percent extraction shall be in accordance with ASTM D471 using distilled water at boiling point for one hour. The ASTM D471 procedure used shall be "Procedure for Determining Mass of Soluble Matter Extracted by Liquid" and determining the percent extract by evaporating the water after specimen removal and weighing the non-volatile residue.

4.6.10 Volume change after immersion in oil (class I only). The volume change shall be in accordance with ASTM D471 after immersion in ASTM No. 1 oil for  $70\pm 1/2$  hour at  $212\pm 2$  °F ( $100\pm 1$  °C).

4.6.11 Volume change after immersion in Reference Fuel B (class III only). The volume change shall be in accordance with ASTM D471 after immersion in Reference Fuel B for  $168\pm 2$  hours at  $75\pm 9$  °F ( $24\pm 5$  °C).

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4.7 Toxicity. The gasket material shall be evaluated by the Navy and Marine Corps Public Health Center (NMCPHC) using the administrative Health Hazard Assessment (HHA). Sufficient data to permit a HHA of the product shall be provided by the manufacturer/distributor to the NMCPHC. To obtain current technical information requirements specified by the NMCPHC, see 6.4.

4.8 Off-gassing. The gasket material shall be tested by a Government approved testing facility in accordance with NAVSEA S9510-AB-ATM-010 chapter titled "Material Control Program." The results shall be submitted to the Government for evaluation and approval for use (see 3.6 and 6.5).

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. This material is intended for general gasket use.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. Class required (see 1.2).
- c. First article, when required (see 3.1, 3.1.1, and 4.2).
- d. Form of material required (see 3.2.2).
- e. Dimensions and tolerances required (see 3.2.2.1, 3.2.2.2, and 3.2.2.3).
- f. Shape of gaskets required (see 3.2.2.3).
- g. Toxicity conformance (see 3.5 and 6.4).
- h. Off-gas testing conformance (see 3.6).
- i. Type of identification marking required, marking material, and color(s) for environmental resistance (see 3.7).
- j. Acceptance criteria for surface examination (see 4.5).
- k. Packaging requirements (see 5.1).
- l. Material Safety Data Sheet, when required (see 6.3).

6.3 Material safety data sheets. When required (see 6.2), contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. In order to obtain the MSDS, FAR clause 52.223-3 must be in the contract.

6.4 Toxicity evaluation. The NMCPHC requires sufficient information to permit an HHA of the product. Any questions concerning toxicity and requests for HHA should be addressed to the Commanding Officer, Navy and Marine Corps Public Health Center (NMCPHC), ATTN: Industrial Hygiene Department/HHA, 620 John Paul Jones Circle, Suite 1100, Portsmouth, VA 20378-2103. Upon receipt of the HHA, a copy should be provided to the Naval Sea Systems Command, ATTN: SEA 05M2, 1333 Isaac Hull Ave., SE, Stop 5160, Washington Navy Yard, DC 20376-5160 or emailed to [CommandStandards@navy.mil](mailto:CommandStandards@navy.mil).

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6.5 Material certification. Materials to be installed in submarines are to be controlled to prevent off-gassing, which contaminates the atmosphere and can result in health hazards to personnel or deleterious effects on machinery. These controls are accomplished through the Submarine Material Control Program, which is described in the Nuclear Powered Submarine Atmosphere Control Manual, NAVSEA S9510-AB-ATM-010 chapter titled "Material Control Program." Under the Submarine Material Control Program, all materials considered for use on submarines require certification and assignment of a usage category. Under the certification process, candidate materials are selected by Navy activities or contractors, and a request for certification is submitted to the Naval Sea Systems Command, SEA 05M2, 1333 Isaac Hull Ave., SE, Stop 5160, Washington Navy Yard, DC 20376-5160 or emailed to [CommandStandards@navy.mil](mailto:CommandStandards@navy.mil). The certification request is accompanied by detailed information, including descriptions of the material, method of application, usage, and storage. A chemical analysis is conducted, which is normally accomplished through off-gas testing. The off-gas test is required to be conducted in a Government approved laboratory designated by the preparing activity. Information pertaining to this test requirement may be obtained from the Naval Sea Systems Command, SEA 05M2, 1333 Isaac Hull Ave., SE, Stop 5160, Washington Navy Yard, DC 20376-5160 or emailed to [CommandStandards@navy.mil](mailto:CommandStandards@navy.mil). Based on the chemical analysis results, a usage category is assigned to the material defining whether, and to what extent, the material may be used on submarines.

6.6 Definitions.

6.6.1 Major defect. A major defect is a defect that is likely to result in failure, or to materially reduce the usability of the rubber material for its intended purpose.

6.6.2 Minor defect. A minor defect is a defect that is not likely to materially reduce the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

6.7 Shelf-life. This specification covers items where the assignment of a Federal shelf-life code is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order, and should include, as a minimum, shelf-life code, shelf-life package markings in accordance with MIL-STD-129 or FED-STD-123, preparation of a materiel quality storage standard for Type II (extendible) shelf-life items, and a minimum of 85 percent shelf-life remaining at time of receipt by the Government. These and other requirements, if necessary, are in DoD 4140.27-M, *Shelf-life Management Manual*. The shelf-life codes are in the Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoD 4140.27-M, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order: (1) the Inventory Control Points that manage the item and (2) the DoD Service and Agency administrators for the DoD Shelf-Life Program. Appropriate POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: <https://www.shelflife.hq.dla.mil/>.

6.8 Subject term (key word) listing.

Molded shapes

Sheets

Strips

Vulcanized synthetic

6.9 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.



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APPENDIX A

METHOD FOR EVALUATING RUBBER PROPERTY - SEALING PRESSURE

A.1 SCOPE

A.1.1 Scope. This method is intended for use in determining the sealing pressure of soft, vulcanized rubber intended particularly for gaskets used for sealing against low air pressure. This Appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

A.2 APPARATUS

A.2.1 Indenting device. The indenting device shall be of a design capable of indenting the specimen a specified amount with an accuracy of  $\pm 0.0005$  inch ( $\pm 0.01$  mm). A suitable type is illustrated on [figure A-1](#). Specimen and indenter may or may not be rotated relative to each other during the indenting operation.

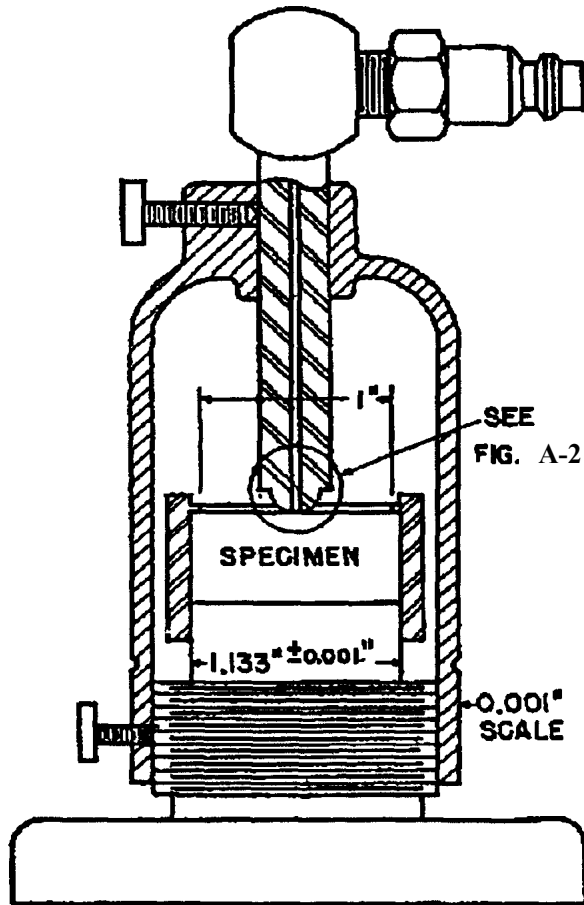
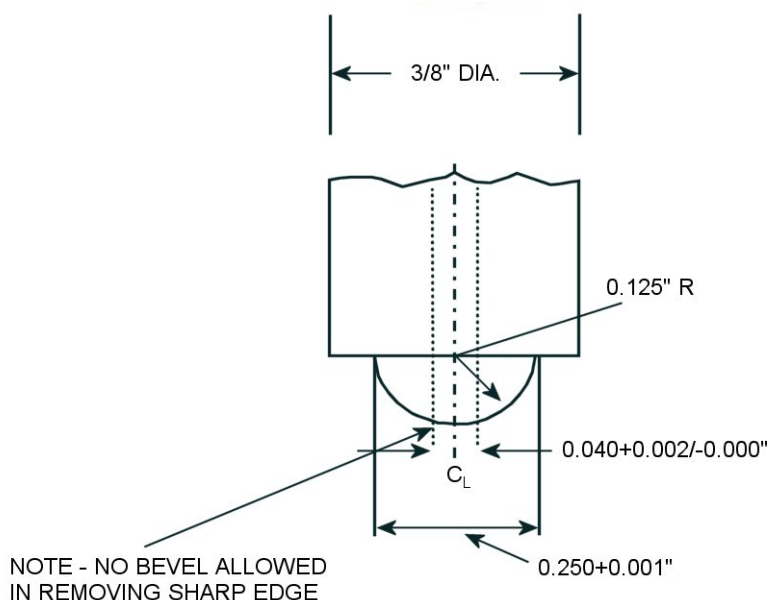


FIGURE A-1. Typical indenting apparatus.

A.2.2 Indenter. The indenter tip shall be hemispherical in shape having a diameter of 0.250,  $+0.001/-0.000$  inch (6.32 to 6.35 mm) and an orifice 0.040 to 0.042 inch (1.00 to 1.05 mm) in diameter located as illustrated on [figure A-2](#). The material shall be corrosion resisting steel. The surface of the hemispherical tip shall be free of scratches or surface defects.

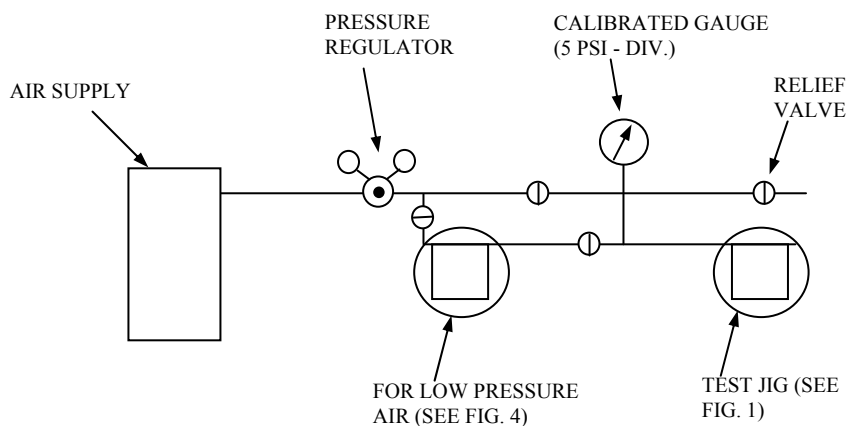
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APPENDIX AFIGURE A-2. Indenter tip.

A.2.3 Specimen holder. The test specimen holder shall consist of two parts, the holder proper and the base.

A.2.3.1 Base. The base may screw or slide into the holder as indicated on [figure A-1](#).

A.2.3.2 Holder. The holder, of a suitable design as illustrated on [figure A-1](#), shall be 1.132 to 1.134 inch (28.75 to 28.80 mm) in internal diameter and shall have an opening  $1 \pm 0.002$  inch ( $25 \pm 0.05$  mm) in its upper end. The opening provides a cavity above the specimen that retains fluid on the specimen surface to submerge the indenter tip.

A.2.4 Air supply apparatus. An air supply apparatus, which consists of a source of compressed air, a compressed air line, a pressure-regulator valve, pressure gage, and a vent to release the air after the test, shall be provided as shown on [figure A-3](#). The pressure gage used to determine the sealing pressure shall be capable of measuring the pressure with an accuracy of  $\pm 2$  pounds per square inch (psi) ( $\pm 10$  kilopascals (kPa)). NOTE: If a suitable air supply is not available, compressed gas cylinders containing nitrogen or carbon dioxide may be used.

FIGURE A-3. Air supply apparatus.

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APPENDIX A

A.2.5 Initial leakage point apparatus. An apparatus to determine the initial leakage point of the specimen shall consist of a 1 psi (7 kPa) air supply such as illustrated on [figure A-4](#), which can be taken from the main air supply.

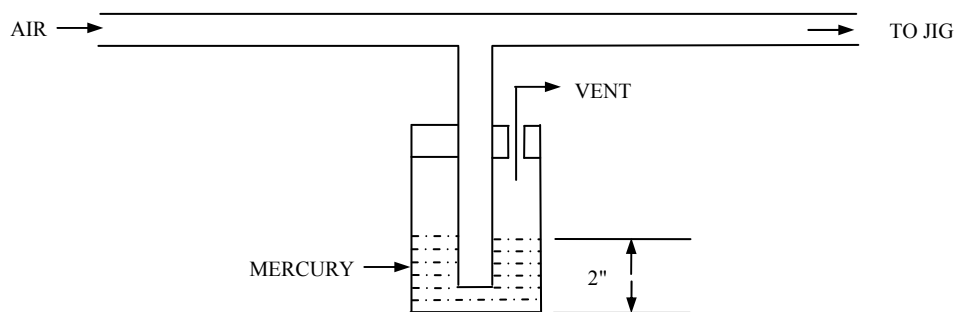


FIGURE A-4. Initial leakage point apparatus.

A.2.6 Air oven. A conditioning air oven capable of maintaining the specified temperature and of sufficient size to hold the indenting device will be required. The air oven shall be provided with proper temperature control to maintain the specified temperature within a permissible variation of  $\pm 3.6$  °F ( $\pm 2$  °C). Satisfactory circulation of the air shall be secured by means of a fan.

### A.3 TEST SPECIMEN

A.3.1 Preparation. The test specimen shall be a cylindrical disk  $0.485 \pm 0.015$  inch ( $12.5 \pm 0.5$  mm) in thickness, cut from the vulcanized rubber part or from a test sample if the part is unsuitable. A sharp, circular die having an inside diameter of  $1.129 \pm 0.001$  inch ( $28.68 \pm 0.02$  mm) shall be used. In cutting the specimen, the die shall be suitably rotated in a drill press or similar device and lubricated by means of soapy water, so that a smooth cut surface having square edges is obtained. The cutting pressure shall be kept sufficiently small to avoid “cupping” of the cut surface.

A.3.1.1 Thickness. When necessary, the specimen thickness shall be reduced to the required thickness by cutting with a sharp knife and carefully buffing to size within the permissible tolerance. The buffing shall be done lightly to avoid overheating and care shall be taken to keep the circular faces parallel and at right angles to the axis of the cylinder.

A.3.1.2 Combining. If necessary, the test specimen may be made of two pieces essentially equal in thickness.

### A.4 PROCEDURE FOR INITIAL PRESSURE SEALING

#### A.4.1 Zero sealing point.

- a. Make the zero point measurement after inserting the test specimen all the way into the specimen holder and placing the latter in the indenting device.
- b. Adjust the indenting device until the test specimen just contacts the indenter.
- c. Cover the surface of the specimen with water or alcohol, and connect the indenter to the 1 psi (7 kPa) air supply.
- d. Further adjust the indenting device until the initial leakage point is that point at which a leakage occurs at a rate of one bubble in 10 seconds at 1 psi (7 kPa) air pressure. Record the initial indentation reading.
- e. Back the indenter off and repeat the procedure. If a second adjustment falls within 0.01 mm (0.0005 inch) of the first, it shall be considered satisfactory. If not, repeat the operation until two successive adjustments check within 0.01 mm (0.005 inch).

A.4.2 Indentation of test specimen. Indent the test specimen to  $0.0625 \pm 0.0005$  inch ( $1.59 \pm 0.01$  mm), by adjusting the indenting device. After the indentation, allow the specimen to rest for 30 minutes prior to the determination of the initial sealing pressure.

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APPENDIX A

A.4.3 Initial sealing pressure.

A.4.3.1 Determine initial pressure. To determine the initial sealing pressure, since material is initially indented 1.59 mm, the pressure should be increased incrementally from 0 psi in 10 psi intervals until the maximum leakage rate is achieved. The hold period between intervals shall be 30 seconds to allow the material to respond. If the specimen is over-pressured, the pressure shall be backed-off by 10 psi. Pressure shall then be applied in 2 psi intervals to ensure that the sealing pressure measured is accurate. The hold period between intervals shall also be 30 seconds for the 2 psi intervals to allow the material to respond. Continue until the maximum leakage rate is achieved. Make the initial leakage point, indentation of test specimen, and initial sealing pressure determinations at a temperature of  $73.4 \pm 3.6$  °F ( $23 \pm 2$  °C).

A.4.3.1.1 Number of tests. Test a minimum of two specimens from each sample. Test an additional specimen if the sealing pressure deviates 5 percent from the average pressure.

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Custodians:

Army – MR  
Navy – SH  
Air Force – 11  
DLA – IS

Preparing Activity:

Navy – SH  
(Project 5330-2008-013)

Review Activities:

Army – GL  
Navy – AS, MC, OS

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.