

INCH-POUND
MIL-G-21610C(SH)
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SUPERSEDING
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(See 6.6)

MILITARY SPECIFICATION

GASKETS, HEAT EXCHANGER, VARIOUS CROSS SECTION RINGS, SYNTHETIC RUBBER

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available 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 gaskets for use in heat exchangers.

1.2 Classification. Synthetic rubber gaskets shall be furnished in the following types, as specified (see 6.2):

Type I - Compound utilizing a copolymer of butadiene and acrylonitrile as a basic material.

Type II - Compound utilizing elastomeric polysiloxanes as a basic material.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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SPECIFICATIONS

FEDERAL

- TT-T-656 - Tricresyl Phosphate.
- PPP-F-320 - Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

MILITARY

- MIL-P-4861 - Packing, Preformed, Rubber, Packing; Packaging of.
- MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.

STANDARDS

MILITARY

- MIL-STD-190 - Identification Marking of Rubber Products.
- MIL-STD-407 - Visual Inspection Guide for Rubber Molded Items.
- MIL-STD-413 - Visual Inspection Guide for Elastomeric O-Rings.
- MIL-STD-758 - Packaging Procedures for Submarine Repair Parts.
- MIL-STD-2073-1 - DoD Materiel Procedures for Development and Application of Packaging Requirements.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 395 - Standard Test Methods for Rubber Property - Compression Set. (DoD adopted)
- D 412 - Standard Test Methods for Rubber Properties in Tension. (DoD adopted)
- D 471 - Standard Test Method for Rubber Property - Effect of Liquids. (DoD adopted)
- D 573 - Standard Test Method for Rubber Deterioration in an Air Oven. (DoD adopted)
- D 2240 - Standard Test Method for Rubber Property - Durometer Hardness. (DoD adopted)
- D 3767 - Standard Practice for Rubber-Measurement of Dimensions. (DoD adopted)
- D 3951 - Standard Practice for Commercial Packaging. (DoD adopted)

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

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SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)
AS 568 - Aerospace Size Standard for O-Rings.

(Application for copies should be addressed to the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. 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), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.4.

3.2 Material. The material shall be vulcanized synthetic rubber which meets all applicable requirements specified herein. Natural rubber shall not be used (see 1.2).

3.3 Form. The material shall be furnished in the form of solid or joined O-rings, or other cross-section rings of the dimensions and within the tolerances specified (see 6.2).

3.4 Physical requirements. The synthetic rubber used in the gaskets, after vulcanizing, shall conform to requirements specified in table I (see 4.8).

TABLE I. Physical requirements of rubber.

Requirement Initial properties	Type I	Type II	Test method
Tensile strength, lb/in ² , minimum	1200	600	4.8.1
Ultimate elongation, percent (minimum)	300	150	4.8.1
Hardness, durometer points	60-75	60-75	4.8.2
Properties after oven aging:			4.8.3
Tensile strength, percent of initial (minimum)	80	80	4.8.3.1
Ultimate elongation, percent of initial (minimum)	60	80	4.8.3.1
Hardness, change from initial reading, durometer points (maximum)	10	10	4.8.3.2
Volume change, percent (maximum)	5	3	4.8.3.3
Compression set, percent (maximum)	35	40	4.8.3.4

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TABLE I. Physical requirements of rubber - Continued.

Requirement Initial properties	Type I	Type II	Test method
Properties after immersion in medium no. 1 oil:			4.8.4
Tensile strength, percent of initial (minimum)	80	75	4.8.4.1
Ultimate elongation, percent of initial (minimum)	70	75	4.8.4.1
Hardness, change from initial reading, durometer points (maximum)	10	10	4.8.4.2
Volume change, percent (maximum) (no shrinkage allowed)	+5	+15	4.8.4.3
Properties after immersion in medium no. 3 oil with 1 percent tricresyl phosphate	(Type I only)		4.8.5
Tensile strength, percent of initial (minimum)	90		4.8.5.1
Ultimate elongation, percent of initial (minimum)	70		4.8.5.1
Hardness, change from initial reading, durometer points (maximum)	15		4.8.5.2
Volume change, percent (maximum) (no shrinkage allowed)	+25		4.8.5.3
Properties after immersion in hot distilled water:	(Type I only)		4.8.6
Tensile strength, percent of initial (minimum)	85		4.8.6.1
Ultimate elongation, percent of initial (minimum)	70		4.8.6.1
Hardness, change from initial reading, durometer points (maximum)	10		4.8.6.2
Volume change, percent (maximum) (no shrinkage allowed)	+10		4.8.6.3
Properties after exposure to steam:	(Type I only)		4.8.7
Tensile strength, percent of initial (minimum)	85		4.8.7.1
Ultimate elongation, percent of initial (minimum)	70		4.8.7.1
Hardness, change from initial reading, durometer points (maximum)	10		4.8.7.2
Volume change, percent (maximum) (no shrinkage allowed)	+10		4.8.7.3

3.5 Identification marking. Material supplied under this specification shall be properly identified in accordance with MIL-STD-190 (see 5.4).

3.6 Workmanship. The workmanship shall be uniform in quality and condition. The surface shall be clean and free from all foreign materials and irregularities (such as perforations, seams, and cracks) that will impair material use, serviceability, and safety.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of section 3 and 5. The inspections set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

- (a) First article inspection (see 4.4).
- (b) Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be performed in accordance with the test conditions specified herein.

4.4 First article inspection. First article inspection shall consist of the examination and tests specified in table II (see 6.3).

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TABLE II. First article inspection.

Property inspection	Requirement	Initially	Test method				
			After oven aging	After oil immersion		After distilled hot water immersion	After steam exposure
				medium no. 1 oil	medium no. 3 oil		
Tensile strength	Table I	4.8.1	4.8.3.1	4.8.4.1	4.8.5.1	4.8.6.1	4.8.7.1
Ultimate elongation	Table I	4.8.1	4.8.3.1	4.8.4.1	4.8.5.1	4.8.6.1	4.8.7.1
Hardness	Table I	4.8.2	4.8.3.2	4.8.4.2	4.8.5.2	4.8.6.2	4.8.7.2
Volume change	Table I	---	4.8.3.3	4.8.4.3	4.8.5.3	4.8.6.3	4.8.7.3
Compression set	Table I	---	4.8.3.4	---	---	---	---
Identification marking	3.5	4.9	---	---	---	---	---
Workmanship	3.6	4.7.1	---	---	---	---	---

4.5 Quality conformance inspection. Quality conformance inspection shall be as specified in table III (see 6.3). Tests shall be conducted on samples selected in accordance with 4.6.3 from intermediate lots on which first article tests were not performed.

TABLE III. Quality conformance inspection.

Property inspection	Requirement	Initially	Test method				
			After oven aging	After oil immersion		After distilled hot water immersion	After steam exposure
				medium no. 1 oil	medium no. 3 oil		
Tensile strength	Table I	4.8.1	4.8.3.1	4.8.4.1	4.8.5.1	4.8.6.1	4.8.7.1
Ultimate elongation	Table I	4.8.1	4.8.3.1	4.8.4.1	4.8.5.1	4.8.6.1	4.8.7.1
Hardness	Table I	4.8.2	4.8.3.2	4.8.4.2	4.8.5.2	4.8.6.2	4.8.7.2
Volume change	Table I	---	4.8.3.3	4.8.4.3	4.8.5.3	4.8.6.3	4.8.7.3
Compression set	Table I	---	4.8.3.4	---	---	---	---
Identification marking	3.5	4.9	---	---	---	---	---
Workmanship	3.6	4.7.1	---	---	---	---	---

4.6 Sampling. Sampling shall be as specified in 4.6.1 through 4.6.3.

4.6.1 Lot. For purposes of sampling, examinations, and tests, a lot shall consist of all material of the same type, form, and dimensions produced under essentially the same conditions, and offered for delivery at one time.

4.6.2 Sampling for visual and dimensional examinations. For the examination specified in 4.7.1, representative samples shall be selected at random from each lot in accordance with table IV.

TABLE IV. Sampling for visual and dimensional examinations.

Lot size	Sample size	Accept	Reject 1/ 2/ 3/
Major defects			
2 - 8	2	0	1
9 - 90	8	0	1
91 - 280	32	1	2
281 - 500	50	2	3
501 - 1200	80	3	4
1201 - 3200	125	5	6
3201 - 10000	200	10	11
10001 - 35000	315	14	15
35001 - over	500	21	22
Minor defects			
2 - 8	2	0	1
9 - 15	3	0	1
16 - 25	5	0	1
26 - 50	8	1	2
51 - 90	13	2	3
91 - 150	20	3	4
151 - 500	32	5	6
501 - 1200	50	8	9
1201 - 3200	80	14	15
3201 - over	125	21	22

- 1/ All defective items must be replaced with acceptable items prior to lot acceptance.
- 2/ Inspect sample size until reject criteria is reached.
- 3/ Rejected lots may be screened and resubmitted for inspection and retest.

4.6.2.1 Defects defined. A major defect shall be a defect that is likely to: result in failure; or, reduce materially the usability of the unit of product for its intended purpose. A minor defect shall be a defect that is not likely to: 1) reduce materially the usability of the unit of product for its intended purpose; or, 2) depart from established standards having little bearing on the effective use or operation of the unit. Total defects shall be major and minor defects combined.

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4.6.3 Sampling for tests. Representative samples shall be selected at random from each lot that passes the examinations of 4.7.1 in accordance with table V for the first article tests or the quality conformance tests specified in 4.4 or 4.5, as applicable.

TABLE V. Sampling for tests.

Lot size number of gaskets in lot	Sample size, number of specimens required for each lot ^{1/}
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/} 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 have an equivalent cure and be selected from the same material used to make up the lot of material offered for delivery (see 6.3).

4.7 Examinations.

4.7.1 Visual and dimensional examinations. Each of the samples taken in accordance with 4.6.2 shall be subjected to surface examinations for workmanship, dimensions, and tolerances. MIL-STD-407 and MIL-STD-413 shall be used to determine and evaluate visual defects. The dimensions shall be determined in accordance with ASTM D 3767. Any gasket having one or more defects shall be rejected and if the number of defective or nonconforming gaskets exceeds the applicable acceptance number of table IV, the entire lot represented by the sample shall be rejected.

4.7.2 Nonconformance. If any of the samples in the first article inspection or quality conformance tests are found not to be in conformance with the requirements of this specification, the lot which it represents shall be rejected. Furthermore, additional samples shall be taken from each subsequent lot and shall be subjected to the test or tests wherein the failure occurred until four successive lots have passed the failed test or tests (see table V for number of samples to be tested to represent each lot). Each lot shall be accepted only after satisfactory results are obtained on the failed test or tests by all the samples taken to represent the lot.

4.8 Tests. Tests shall be as specified in 4.8.1 through 4.8.7.

4.8.1 Tensile properties. The tensile strength and ultimate elongation shall be determined in accordance with ASTM D 412. Die C specimens that are 0.080 \pm 0.010 inch thick shall be used for determinations of tensile properties, except when O-rings are being tested, the test specimens shall be O-rings of suitable dimensions (such as AS 568 or equal) and the mean values shall be determined.

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4.8.1.1 Joined (spliced) rings. Rings which are not molded and cured in a ring configuration, but 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 first article tests (see 4.4) or quality conformance tests (see 4.5) as appropriate, shall be conducted on spliced ring specimens. If dimensions of the ring being acquired precludes a specimen being tested on a tensile test machine, appropriate size spliced rings shall be used to represent the actual rings (see table V, footnote 1). These substitute rings shall be spliced in a manner identical to those rings offered for delivery (see 6.3).

4.8.2 Hardness. Hardness shall be determined with a Shore A durometer on molded specimens at least 1/4-inch thick in accordance with ASTM D 2240. The hardness readings shall be taken 3 seconds after firm contact is made between the rubber and the presser foot of the durometer.

4.8.3 Oven aging. Oven aging shall be conducted in accordance with ASTM D 573 with the following exceptions:

- (a) Type I material shall be aged for 168 ± 1 hours at 100 ± 2 degrees Celsius ($^{\circ}\text{C}$) (212 ± 3.6 degrees Fahrenheit ($^{\circ}\text{F}$)) and
- (b) Type II material shall be aged for 168 ± 1 hours at $150 \pm 2^{\circ}\text{C}$ ($302 \pm 3.6^{\circ}\text{F}$).

4.8.3.1 Tensile properties after oven aging. The tensile properties after oven aging shall be determined by the procedure specified in 4.8.1.

4.8.3.2 Hardness after oven aging. The hardness after oven aging shall be determined by the procedure specified in 4.8.2.

4.8.3.3 Volume change after oven aging. Volume change after oven aging shall be determined in accordance with ASTM D 471. Three specimens, 1 by 2 by 0.080 ± 0.010 inches or three small O-rings (such as AS 568 or equal), shall be used.

4.8.3.4 Compression set after oven aging. Compression set shall be determined in accordance with ASTM D 395, except that three 0.500 ± 0.010 -inch thick specimens shall be tested, and the specimens shall be deflected 25 percent during oven aging as specified in 4.8.3.

4.8.4 Immersion in medium no. 1 oil. Test specimens for the individual tests shall be immersed in medium no. 1 oil conforming to ASTM D 471 as follows:

- (a) Type I material 168 ± 1 hours at $100 \pm 2^{\circ}\text{C}$ ($212 \pm 3.6^{\circ}\text{F}$) and
- (b) Type II material 168 ± 1 hours at $150 \pm 2^{\circ}\text{C}$ ($302 \pm 3.6^{\circ}\text{F}$).

4.8.4.1 Tensile properties after immersion. Tensile properties after immersion in medium no. 1 oil shall be determined in accordance with ASTM D 471 and as described in 4.8.1. Tensile strength shall be based on the swollen cross-sectional area.

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4.8.4.2 Hardness after immersion. Hardness shall be determined after immersion in medium no. 1 oil. Before testing as described in 4.8.2, the specimens shall be removed from the hot fluid and cooled in the test fluid at room temperature for 30 minutes and then removed from the fluid and wiped dry.

4.8.4.3 Volume change after immersion. Volume change after the immersion of 4.8.4 shall be determined in accordance with ASTM D 471. Specimens shall be as described in 4.8.3.3.

4.8.5 Immersion in medium no. 3 oil with 1 percent tricresyl phosphate. Test specimens (type I material only) for the individual tests shall be immersed in medium no. 3 oil conforming to ASTM D 471 and containing 1 percent by volume of tricresyl phosphate conforming to TT-T-656 for 168 ± 1 hours at $110 \pm 2^\circ\text{C}$ ($230 \pm 3.6^\circ\text{F}$).

4.8.5.1 Tensile properties after immersion. The tensile properties after the immersion of 4.8.5 shall be determined as specified in 4.8.4.1.

4.8.5.2 Hardness after immersion. Hardness after the immersion of 4.8.5 shall be determined as specified in 4.8.4.2.

4.8.5.3 Volume change after immersion. Volume change after the immersion of 4.8.5 shall be determined as specified in 4.8.4.3.

4.8.6 Immersion in hot distilled water. Test specimens (type I material only) for the individual tests shall be immersed in distilled water at $100 \pm 2^\circ\text{C}$ ($212 \pm 3.6^\circ\text{F}$) for 168 ± 1 hours in accordance with ASTM D 471.

4.8.6.1 Tensile properties after immersion. The tensile properties after immersion in hot distilled water shall be determined as specified in 4.8.4.1.

4.8.6.2 Hardness after immersion. Hardness after immersion in hot distilled water shall be determined as specified in 4.8.4.2.

4.8.6.3 Volume change after immersion. Volume change after immersion in hot distilled water shall be determined as specified in 4.8.4.3.

4.8.7 Exposure to steam. Test specimens (type I material only) for the individual tests shall be subjected to 50 ± 2 pounds per square inch gauge dry saturated steam for $24 \pm 1/2$ hours. After exposure, the material shall be set aside, out of direct light, to rest at 20°C (68°F) for not less than 16 hours and not more than 96 hours before determining the required property.

4.8.7.1 Tensile properties after exposure. The tensile properties after exposure to steam shall be determined as specified in 4.8.1.

4.8.7.2 Hardness after exposure. Hardness after exposure to steam shall be determined as specified in 4.8.2.

4.8.7.3 Volume change after exposure. Volume change after exposure to steam shall be determined as specified in 4.8.3.3.

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4.9 Examination of markings. The material shall be visually examined to determine compliance with 3.5.

4.10 Inspection of packaging. Sample packs, and the inspection of the preservation, packing, and marking for shipment, stowage, and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 General. General requirements for packaging shall be as specified in 5.1.1 through 5.1.3.

5.1.1 Navy fire-retardant requirements.

- (a) Lumber and plywood - When specified (see 6.2), all lumber and plywood (including laminated veneer material used in shipping container and pallet construction members, blocking, bracing, and reinforcing) shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

Levels A and B - Type II - weather resistant.

Category 1 - general use.

Level C - Type I - non-weather resistant.

Category 1 - general use.

- (b) Fiberboard - Unless otherwise specified (see 6.2), fiberboard used in the construction of class-domestic, non-weather resistant fiberboard and cleated fiberboard boxes (including interior packing forms) shall be in accordance with the flame spread and the specific optic density requirements of PPP-F-320.

5.1.2 Submarine applications. For submarine applications, the level A preservation requirements shall be in accordance with MIL-STD-758.

5.1.3 Asbestos. Asbestos or material and items containing asbestos shall not be used in the packaging of gaskets. Talc and talcum shall be asbestos-free when used in the packaging process, as in dusting (see 6.3). Packages shall contain the asbestos caution markings as specified in 5.4.

5.2 Preservation. Preservation shall be level A, C, or commercial as specified (see 6.2).

5.2.1 Level A. Level A preservation shall be as specified in 5.2.1.1 and 5.2.1.2.

5.2.1.1 O-rings. O-rings shall be unit protected in accordance with the level A unit packaging requirements of MIL-P-4861.

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5.2.1.2 Other cross-section rings. Rings shall be dusted (see 5.1.3) and unit-protected as follows:

- (a) Small rings - Rings that require no folding, looping, or bending shall be contained in greaseproof, heat-sealed bags, pouches, or envelopes, with intermediate packaging in accordance with MIL-P-4861, except that the containers (boxes) shall be of the weather-resistant class, variety, or construction. Closure of fiberboard containers shall be in accordance with method V of the appendix to the applicable box specification.
- (b) Large rings - Rings that require folding, bending, or looping shall be individually unit-protected in accordance with the requirements for small rings (see 5.2.1.2(a)). Folding, bending, or looping shall be kept to a minimum to avoid creating stress in the ring material (see 1.2).

5.2.2 Level C. Level C preservation shall be as specified in 5.2.2.1 and 5.2.2.2.

5.2.2.1 O-rings. O-rings shall be unit-protected in accordance with the level C unit packaging requirements of MIL-P-4861.

5.2.2.2 Other cross section rings. Rings shall be processed in accordance with the level A requirements (see 5.2.1.2), except that paperboard containers shall be of the non-weather resistant class, variety, or construction. Fiberboard containers shall be of the class-domestic and fire-retardant (see 5.1.1(b)) variety, with closure in accordance with method I of the applicable box specification, using pressure-sensitive adhesive tape.

5.2.3 Commercial. Commercial preservation of rings shall be in accordance with ASTM D 3951.

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

5.3.1 General requirements for levels A, B, and C. Containers selected (see 5.3.2) shall be of minimum weight and cube consistent with the protection required, of uniform size, and contain identical quantities of identical gasket types (see 1.2).

5.3.2 Levels A, B, and C containers. Gaskets (rings) preserved as specified (see 5.2) shall be packed in exterior shipping containers for the level of packing specified (see 5.3), in accordance with table VII (exterior shipping container requirements) of MIL-STD-2073-1, appendix C, and herein. Unless otherwise specified (see 6.2), container selection shall be at the contractor's option.

5.3.2.1 Caseliners. Unless otherwise specified (see 6.2), level A shipping containers containing rings preserved at level C or commercial shall be provided with waterproof caseliners in accordance with MIL-STD-2073-1.

5.3.2.2 Closure. Container closure, reinforcing, or banding shall be in accordance with the applicable container specification, except that weather-resistant fiberboard boxes shall be closed in accordance with method V and reinforced with non-metallic or tape banding, and domestic or fire-retardant fiberboard boxes shall be closed in accordance with method I of the applicable box specification using pressure-sensitive tape.

5.3.2.3 Weight. Wood, plywood, and cleated type containers exceeding 200 pounds gross weight shall be modified by the addition of skids in accordance with MIL-STD-2073-1 and the applicable container specification.

5.3.3 Commercial. Rings preserved as specified (see 5.2) shall be packed for shipment in accordance with ASTM D 3951 and as stated herein.

5.3.3.1 Container modification. Shipping containers exceeding 200 pounds gross weight shall be provided with a minimum of two, 3- by 4-inch (nominal) wood skids, laid flat, or a skid- or sill-type base which will support the material and facilitate handling by mechanical handling equipment during shipment and storage.

5.4 Marking. In addition to any special marking required (see 6.2 and 3.5), interior (unit) packs and shipping containers shall be marked with asbestos caution markings and bar coding for shipment, stowage, and storage in accordance with MIL-STD-2073-1, appendix F and MIL-P-4861.

6. NOTES

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

6.1 Intended use. Gaskets are intended for use in shipboard heat exchangers.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2).
- (c) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- (d) When first article inspection is required (see 3.1).
- (e) Form, dimensions, and tolerances of gasket required (see 3.3).
- (f) Inspection conditions, if other than as specified (see 4.3).
- (g) Fire-retardant packaging requirements (see 5.1.1).
- (h) Level of preservation and level of packing required (see 5.2 and 5.3).
- (i) Container selection, if other than contractor's option (see 5.3.2).
- (j) When caseliners are not required (see 5.3.2.1).
- (k) Special marking required (see 5.4).

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6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
4.4	DI-T-4902	First article inspection report	----
4.5	DI-T-5329	Inspection and test reports	----
4.6.3 (table V, footnote 1), 4.8.1.1 and 5.1.3	DI-E-2121	Certificate of compliance	----

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.4. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.5 Subject term (key word) listing.

Compression set
Hardness
Joined (spliced) rings
O-rings
Tensile strength
Ultimate elongation
Volume change

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

Preparing activity:
Navy - SH
(Project 5330-N110)

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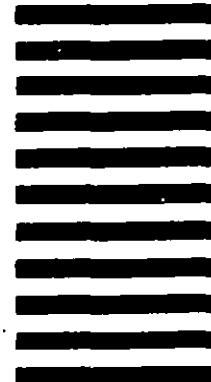
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)*1. DOCUMENT NUMBER
MIL-G-21610C(SH)2. DOCUMENT TITLE GASKETS, HEAT EXCHANGER, VARIOUS CROSS SECTION
RINGS, SYNTHETIC RUBBER

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

☐ VENDOR☐ USER☐ MANUFACTURER☐ OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

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8. DATE OF SUBMISSION (YYMMDD)