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MILITARY SPECIFICATION

GASKETS, METALLIC-ASBESTOS, SPIRAL WOUND (FOR ASA COMMERCIAL FLANGED JOINTS IN PIPING SYSTEMS) (IDENTIFICATION SYMBOL 2410)

1. SCOPE

1.1 Scope. - This specification covers spiral wound metallic asbestos gaskets for special applications and for pipe line gaskets complete with outer metal retaining rings, to be used with ASA commercial flanges. The application pressures cover a range from 150 pounds per square inch (p. s. i.) to and including 2500 p. s. i., with maximum temperature rating of 1050°F. on the 900 p. s. i., 1500 p. s. i., and 2500 p. s. i. series.

1.2 Classification. - Gaskets shall be of the following types and series as specified (see 6. 2):

Type I - Gaskets for special applications such as valve bonnets, pumps and other equipment applications (other than boiler manholes and handholes).
Type II - Gaskets for American standard (B16. 5) pipeline flanged joints; with outer metal ring:
- Series 150.
- Series 300.
- Series 400.
- Series 600.
- Series 900.
- Series 1500.
- Series 2500.

2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

FEDERAL

QQ-S-763 - Steel Bars, Shapes, and Forgings——Corrosion-Resisting.
PPP-B-566 - Boxes, Folding, Paperboard.
PPP-B-585 - Boxes, Wood, Wirebound.
PPP-B-591 - Boxes, Fiberboard, Wood-Cleated.
PPP-B-601 - Boxes, Wood, Cleated-Plywood.
PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636 - Boxes, Fiber.
PPP-B-676 - Boxes, Set-Up, Paperboard.
PPP-T-76 - Tape, Pressure-Sensitive Adhesive, Paper, Water Resistant.
PPP-T-97 - Tape, Pressure-Sensitive Adhesive, Filament Reinforced.

*See 6. 4.

FSC 5330

MILITARY
MIL-P-116 - Preservation, Methods of.
MIL-B-10377 - Boxes, Wood-Cleated, Veneer, Paper Overlaid.
MIL-L-10547 - Liners, Case, Waterproof.

NAVY DEPARTMENT
General Specifications for Inspection of Material.

STANDARDS

MILITARY
MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

2.2 Other publications. - The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

OFFICIAL CLASSIFICATION COMMITTEE
Uniform Freight Classification Rules.

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York 16, N.Y.)

AMERICAN SOCIETY FOR TESTING MATERIALS
A-276-55 - Hot-Rolled and Cold Finished Corrosion-Resisting Steel Bars.

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

3. REQUIREMENTS

3.1 Qualification. - Type II gaskets furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein (see 6.3).

3.2 Design. -

3.2.1 Type I gaskets. - Type I gaskets for special applications such as valve bonnets, pumps and other equipment applications (other than boiler manholes and handholes) shall conform to the dimensions required for the application intended and specified (see 6.2), and shall be either 0.125 inch ± 0.005 inch or 0.175 inch ± 0.005 inch initial thickness, as specified (see 6.2). The design shall be such that when the gasket is compressed by a load equivalent to a bolt stress of 30,000 p.s.i., based on cross sectional area at the root of the thread, the thickness shall be as follows:

Initial thickness Inch	Compressed thickness under 30,000 p.s.i. bolt stress Inch
0.125 ± 0.005	0.100 ± 0.005
.175 ± .005	.130 ± .005

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3.2.2 Type II, pipe line flange gaskets with outer metal rings. - Type II, gaskets shall consist of a refill snapped in a solid metal outer ring with a sliding fit. The ring shall have a thickness of 3/32 ± 0.006 inch. The ring shall have a V-shaped groove or other satisfactory retaining feature machined on the inside periphery to fit the outside periphery of the refill. The design shall be such that the gasket can be compressed without damage to 0.120 thickness. Gaskets shall conform to tables I through IV.

Table I - Gasket characteristics for series 150 p.s.i. ASA flanges.

I.p.s.	Pipe o.d.	Gasket refills		Minimum number of plies				Metal outer ring o.d.	Test[3] load
				Metal[2]			Asbestos		
		I.d.	O.d.	Inside periphery	Outside periphery	Total	Total		
Inches	Inches	Inches[1]	Inches[1]					Inches	Pounds
1/4	0.540	1/2	7/8	-	-	--	--	1-3/4	12,600
1/2	.840	3/4	1-1/4	6	3	12	4	1-7/8	12,600
3/4	1.050	1	1-9/16	6	3	14	6	2-1/4	12,600
1	1.315	1-1/4	1-7/8	3	3	9	4	2-5/8	12,600
1-1/4	1.660	1-11/16	2-3/8	3	3	10	5	3	15,100
1-1/2	1.900	2	2-3/4	3	3	11	6	3-3/8	15,100
2	2.375	2-9/16	3-3/8	3	3	11	6	4-1/8	24,200
2-1/2	2.875	3-1/16	3-7/8	3	3	12	7	4-7/8	24,200
3	3.500	3-3/4	4-3/4	3	3	12	7	5-3/8	24,200
3-1/2	4.000	4-1/8	5-1/4	3	3	14	9	6-3/8	48,500
4	4.500	4-3/4	5-7/8	3	3	14	9	6-7/8	48,500
5	5.563	5-13/16	7	3	3	15	10	7-3/4	72,500
6	6.625	6-7/8	8-1/4	3	3	15	10	8-3/4	72,500
8	8.625	8-7/8	10-3/8	3	3	17	12	11	72,500
10	10.750	10-13/16	12-1/2	3	3	18	13	13-3/8	151,000
12	12.750	12-7/8	14-3/4	3	3	21	16	16-1/8	151,000
14 o.d.	14.000	14-1/4	16	3	3	17	12	17-3/4	198,000
16 o.d.	16.000	16-1/4	18-1/4	3	3	21	16	20-1/4	264,000

[1]Tolerance plus or minus 1/64 inch on the inside diameter and plus or minus 1/32 inch on the outside diameter.

[2]There shall be no asbestos plies between the metal plies on the inside and on the outside periphery.

[3]Corresponds to bolting loads of 30,000 p.s.i. unit stress, except for gasket sizes 1 inch and smaller, which are based upon unit bolt stress of 25,000 p.s.i. at thread root area. Bolts smaller than 1 inch diameter use coarse thread series; bolts 1 inch and larger diameters, use 8 thread series. When under this compressive test load, the gasket thickness shall be 0.130 inch plus or minus 0.005 inch.

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Table II - Type II gasket characteristics for series 300, 400 and 600 ASA flanges.

I.p.s.	Pipe o.d.	Gasket refills		Minimum number of plies				Metal outer ring o.d., inches			Test load[3]
				Metal[2]			Asbestos				
		I.d. inch[1]	O.d. inch[1]	Inside periphery	Outside periphery	Total	Total	Series 300	Series 400	Series 600	
Inches	Inches										Pounds
1/4	0.540	1/2	27/32	4	3	9	3	1-3/4	1-3/4	1-3/4	12,600
1/2	.840	3/4	1- 7/32	6	3	12	4	2-1/8	2-1/8	2-1/8	12,600
3/4	1.050	1	1-17/32	6	3	14	6	2-5/8	2-5/8	2-5/8	20,200
1	1.315	1- 1/4	1-27/32	6	3	15	7	2-7/8	2-7/8	2-7/8	20,200
1-1/4	1.660	1-11/16	2-11/32	6	3	15	7	3-1/4	3-1/4	3-1/4	24,200
1-1/2	1.900	2	2-23/32	6	3	17	9	3-3/4	3-3/4	3-3/4	36,200
2	2.375	2- 9/16	3-11/32	6	3	17	9	4-3/8	4-3/8	4-3/8	48,400
2-1/2	2.875	3- 1/16	3-27/32	6	3	18	10	5-1/8	5-1/8	5-1/8	72,500
3	3.500	3- 3/4	4-11/16	6	3	20	12	5-7/8	5-7/8	5-7/8	72,500
3-1/2	4.000	4- 1/8	5- 3/16	6	3	22	14	6-1/2	6-3/8	6-3/8	101,000
4	4.500	4- 3/4	5-13/16	6	3	22	14	7-1/8	7	7-5/8	101,000
4-1/2	5.000	5- 5/16	6- 7/16	6	3	24	16	7-3/4	7-5/8	-----	132,000
5	5.563	5-13/16	6-15/16	6	3	24	16	8-1/2	8-3/8	9-1/2	132,000
6	6.625	6- 7/8	8- 3/16	6	3	27	19	9-7/8	9-3/4	10-1/2	198,000
8	8.625	8- 7/8	10- 5/16	6	3	30	22	12-1/8	12	12-5/8	262,000
10	10.750	10-13/16	12- 7/16	6	3	35	27	14-1/4	14-1/8	15-3/4	446,000
12	12.750	12- 7/8	14-11/16	6	3	35	27	16-5/8	16-1/2	18	557,000
14 o.d.	14.000	14- 1/4	16	6	3	32	24	19-1/8	19	19-3/8	693,000
16 o.d.	16.000	16- 1/4	18- 1/4	6	3	36	28	21-1/4	21-1/8	22-1/4	[4]840,000
18 o.d.	18.000	18- 1/2	20- 3/4	--	--	--	--	23-1/2	23-3/8	24-1/8	[4]1,008,000

[1]Tolerance plus or minus 1/64 inch on the inside diameter and plus or minus 1/32 inch on the outside diameter.
[2]There shall be no asbestos plies between the metal plies on the inside and on the outside periphery.
[3]Corresponds to bolting load of 30,000 p.s.i. unit stress, except for gasket sizes 1 inch and smaller, which are based upon unit bolt stress of 25,000 p.s.i. at the thread root area. Bolts smaller than 1 inch diameter use coarse thread series; bolts 1 inch and larger use 8 thread series. When under this compressive test load, the gasket thickness shall be 0.130 inch plus or minus 0.005 inch.
[4]Exceeds present load capacity of 600,000 pound testing machine at Engineering Experiment Station, Annapolis, Md.

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Table III - Type II gasket characteristics for series 900 and 1500 p.s.i. ASA flanges.

I.p.s.	Pipe o.d.	Gasket refills series 900 and 1500 ASA flanges		Minimum number of plies				Metal outer ring o.d. inch		Test load[3] pounds	
				Metal[2]		Asbestos					
		I.d.	O.d.	Inside periphery	Outside periphery	Total	Total	900	1500	Series 900	Series 1500
Inches	Inches	Inches[1]	Inches[1]					P.s.i.	P.s.i.		
1/4	0.540	-----	-----	--	--	--	---	----	----	-----	-----
1/2	.840	3/4	1-1/4	6	3	16	6	2-1/2	2-1/2	30,200	30,200
3/4	1.050	1	1-9/16	6	3	17	7	2-3/4	2-3/4	30,200	30,200
1	1.315	1- 1/4	1-7/8	6	3	18	8	3-1/8	3-1/8	41,900	41,900
1-1/4	1.660	1-11/16	2-3/8	6	3	21	11	3-1/2	3-1/2	50,300	50,300
1-1/2	1.900	2	2-3/4	6	3	22	12	3-7/8	3-7/8	66,100	66,100
2	2.375	2- 9/16	3-3/8	6	3	24	14	5-5/8	5-5/8	101,000	101,000
2-1/2	2.875	3- 1/16	3-7/8	6	3	27	17	6-1/2	6-1/2	132,000	132,000
3	3.500	3- 3/4	4-3/4	6	3	27	17	6-5/8	6-7/8	101,000	175,000
4	4.500	4- 3/4	5-7/8	6	3	30	20	8-1/8	8-1/4	175,000	223,000
5	5.563	5-13/16	7	6	3	33	23	9-3/4	10	223,000	337,000
6	6.625	6- 7/8	8-1/4	6	3	34	24	11-3/8	11-1/8	262,000	416,000
8	8.625	8- 7/8	10-3/8	6	3	38	28	14-1/8	13-7/8	416,000	605,000
10	10.725	10-13/16	12-1/2	6	3	40	30	17-1/8	17-1/8	554,000	[4]829,000
12	12.750	12- 7/8	14-3/4	6	3	42	32	19-5/8	20-1/2	[4]693,000	[4]1,273,000

[1]Tolerance plus or minus 1/64 inch on the inside diameter and plus or minus 1/32 inch on the outside diameter.
[2]There shall be no asbestos plies between the metal plies on the inside and on the outside periphery.
[3]Corresponds to bolting load of 30,000 p.s.i. unit stress, except for gasket sizes 1 inch and smaller, which are based upon unit bolt stress of 25,000 p.s.i. at the thread root area. Bolts smaller than 1 inch use coarse thread series; bolt diameters 1 inch and larger use 8 thread series. When under this compressive test load, the gasket thickness shall be 0.130 inch plus or minus 0.005 inch.
[4]Exceeds present load capacity of 600,000 pounds testing machine available at Engineering Experiment Station, Annapolis, Md.

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Table IV - Type II gasket characteristics for series 2500 p. s. i. ASA flanges.

I. p. s.	Pipe o. d.	Gasket refills		Minimum number of plies				Metal outer ring o. d.	Test load[3]
				Metal[2]			Asbestos		
		I. d.	O. d.	Inside periphery	Outside periphery	Total	Total		
Inches	Inches	Inches[1]	Inches[1]					Inches	Pounds
1/2	0.840	3/4	1-1/4	6	3	21	11	2-3/4	30,200
3/4	1.050	1	1-9/16	6	3	24	14	3	30,200
1	1.315	1-1/4	1-7/8	6	3	25	15	3-3/8	41,900
1-1/4	1.660	1-9/16	2-3/8	6	3	24	14	4-1/8	55,100
1-1/2	1.900	1-7/8	2-3/4	6	3	25	15	4-5/8	72,800
2	2.375	2-5/16	3-3/8	6	3	25	15	5-3/4	110,000
2-1/2	2.875	2-3/4	3-7/8	6	3	28	18	6-5/8	146,000
3	3.500	3-5/8	4-3/4	6	3	33	23	7-3/4	188,000
4	4.500	4-5/8	5-7/8	6	3	37	27	9-1/4	281,000
5	5.563	5-7/8	7	6	3	38	28	11	396,000
6	6.625	6-3/4	8-1/4	6	3	41	31	12-1/2	[4]636,000
8	8.625	8-1/2	10-3/8	6	3	41	31	15-1/4	[4]955,000
10	10.750	10-5/8	12-1/2	6	3	47	37	18-3/4	[4]1,545,000
12	12.750	12-3/4	14-3/4	6	3	51	41	21-5/8	[4]1,893,000

[1]Tolerance plus or minus 1/64 inch on the inside diameter and plus or minus 1/32 inch on the outside diameter.
[2]There shall be no asbestos plies between the metal plies on the inside and on the outside periphery.
[3]Corresponds to bolting load on 25,000 p. s. i. unit stress. Bolts smaller than 1 inch diameter use coarse thread series; bolts diameters 1 inch and larger use 8 thread series. When under this compressive test load, the gasket thickness shall be 0.130 inch plus or minus 0.005 inch.
[4]Exceeds present load capacity of 600,000 pound testing machine available at Engineering Experiment Station, Annapolis, Md.

3.2.2.1 Refills for all series of type II gaskets. - Refills shall be of the inside and outside dimensions specified in tables I through IV inclisive.

3.3 Materials. -

3.3.1 Metal strip. - The metal strip used in the manufacture of the gasket refill for gaskets constructed as specified in table II shall conform to class 304 of Specification QQ-S-763. The metal strip used in the manufacture of the gasket refill for gaskets constructed as specified in tables I, III and IV shall conform to class 316L with extremely low carbon (0.03 max.) or 309S in accordance with Publication ASTM-A276-55, except that the type 309S shall be stabilized with columbium (and tantalum), their combination to be at least 10 times the carbon content and the tantalum not to exceed 0.10 percent.

3.3.2 Metal outer ring. - The metal outer ring shall be of soft carbon steel.

3.4 Construction. - The gaskets shall be composed of a single strip of metal wound in spiral dovetail shape, starting on the inside and working outward ply by ply to the desired size. Between some of the plies shall be a cushion of asbestos paper (see tables I through IV) either a continuous single length or in two lengths depending upon the design. The asbestos paper may be either a single strip or in two strips. Spot welds on the gasket inside diameter shall be not less than three in number and equally spaced at 2 inches maximum spacing. The outside weld shall consist of not less than three spot welds.

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3.4.1 Pressure. - Complete gaskets and refills specified in table I through IV shall be suitable for the nominal steam pressures specified herein. Gaskets constructed as specified in tables I and II for series 150, 300, 400 and 600 shall be suitable for temperatures up to 850°F. Gaskets constructed as specified in tables III and IV for series 900, 1,500, and 2,500 shall be suitable for temperatures up to 1050°F.

3.4.2 Metal strip. - The metal strip shall be not less than 0.007 and not more than 0.009 inch in thickness.

3.4.3 Gasket thickness. - The thickness of the finished gasket (before compression) shall be 0.175 ± 0.005 inch for type II gaskets. The thickness of the type I gaskets shall be as specified in 3.2.1.

3.4.4 Plies. - A ply shall consist of one 360 degree turn of metal strip. Plies shall be counted adjacent to a terminal weld. An asbestos ply shall consist of one 360 degree turn of asbestos strip(s) depending upon the design.

3.4.5 Gaskets shall be capable of passing the physical tests (line thermal shock and compression load tests) indicated in table V.

3.5 Marking. -

3.5.1 Type I gaskets. - Each type I gasket shall be marked with a sturdy paper tag (of tag stock) securely attached thereto, which shall contain thereon as much of the following information as possible: the equipment manufacturer's name, type of equipment and model number, and gasket part number; gasket manufacturer's name, customer's order number and any other data required to clearly identify the end use of the gasket.

3.5.2 Type II gaskets. - Each type II gasket shall be steel-stamped clearly on one side of the outer ring to show the manufacturer's name, pipe side, the pressure series and "ASA-MIL" to indicate that the gasket is for ASA flanges and also meets the requirements of this specification (example - "2-600 ASA-MIL").

3.5.3 Refills. - When refills are purchased separate from the rings, each refill shall be marked using a piece of pressure sensitive tape, or other means approved by the bureau or agency concerned, having the manufacturer's name, pipe size and pressure series and "ASA-MIL" printed thereon. In applying the pressure sensitive tape, the tape shall be looped through the refill and brought back upon itself for firm retention.

3.6 Workmanship. - The workmship shall be first class in every respect.

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified herein the supplier is responsible for the performance of all inspection requirements prior to submission for Government inspection and acceptance. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government as specified in the contract or order.

4.2 Inspection and tests. -

4.2.1 Qualification tests at a Government laboratory. - Inspections and tests to determine conformance of type II gaskets for qualification purposes shall be conducted at the U.S. Naval Engineering Experiment Station, Annapolis, Maryland. A supplier may have his gaskets qualified in any pressure series by passing the specified tests for the series concerned. These tests consist of those indicated in table V.

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4.2.1.1 Sampling for qualification tests. - For purposes of qualification (see 3.1 and 4.2.1) three gaskets of each of the following series and sizes shall be furnished for inspections and compression tests:

Pressure series	Sample sizes required
150	2 inch, 8 inch, 12 inch
[1]300, 400 and 600	3 inch, 6 inch, 10 inch
900	[2] 6 inch, 10 inch
1500	2 inch, 4 inch, 6 inch
2500	2 inch, 3 inch, 5 inch

[1]Since the gasket body (or refill) is identical for series 300, 400 and 600, only one set of samples for these series is required.
[2]Qualification of the series 1500, 2 inch size sample will also constitute conformance of the series 900, 2 inch size.

Note. - In addition, 2 gaskets, 6 inch size shall be furnished for pipe line thermal shock tests, for series 600 and higher only.

4.2.2 Lot acceptance inspection and tests. - Lot acceptance inspection and tests as indicated in table V shall be performed at the place of manufacture or at a commercial laboratory convenient to the place of manufacture. If facilities for such inspection and tests are not available the cognizant Government inspector should seek to make arrangements for use of the facilities of the U.S. Naval Engineering Experiment Station, Annapolis, Md.

4.2.3 Comparison inspection and tests (for type II gaskets only). - Comparison inspection and tests (for type II gaskets only) shall be conducted to verify continuing quality of the approved product and compliance with the specification requirements. These tests will be on samples representing those series and sizes which were tested for qualification and approved and will be conducted on samples supplied by the manufacturer, at no cost to the Government. Work will be at the manufacturer's facilities and be performed by or under the supervision of the Government inspector. Comparison inspection and tests are not required more often than every two years unless the Government inspector has reason to consider it necessary. Comparison inspection and tests shall be those indicated in table V plus any others specifically requested by the Government inspector.

4.3 Sampling. -

4.3.1 Sampling for lot acceptance. - For purposes of lot acceptance, a lot shall consist of not more than 5000 gaskets of one type, series and size offered for delivery at one time. A random sample of gasket shall be selected from each lot offered for Government examination in accordance with Standard MIL-STD-105 at inspection level III for lots of 40 and under, inspection level II for lots of 41 to 300 and inspection level I for lots of 301 and over. The acceptable quality level (AQL) shall be 1.5 percent defective. However, the smallest sample size shall be 15. This sample shall be used for the lot acceptance inspection indicated in table V

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4.3.2 Sampling for comparison inspection and tests. - For each series and size previously tested for qualification, and approved, the manufacturer shall furnish 2 production sample gaskets for tests (see 4.2.3 and table V).

Table V - Summary of qualification and lot acceptance inspection and tests for gaskets.

Nature of test	Specification requirement	Test method	Number of samples required		
			Qualification tests	Lot acceptance tests	Comparison tests
Visual and dimensional inspection	3.2, 3.4, 3.5, 3.6 table I to IV	4.4.1 and as applicable	(1)	4.3.2	(1)
Check on materials	3.3	4.4.2.3	[1]4.3.1	[1]4.3.2	[1]4.3.3
Pipe line thermal shock characteristics	3.4.6	4.4.2.1	4.3.1	(2)	(2)
Compression load	3.4.6	4.4.2.2	4.3.1	(2)	4.3.3
For type II gaskets, all tests, as specified to determine specification compliance	As specified in contract or order	As specified	-----	4.3.2	-----

[1]Samples submitted for destructive tests may be used for nondestructive inspections.
[2]This test not required.

4.4 Examination. -

4.4.1 Visual and dimensional examination. - Each of the sample gaskets selected for visual and dimensional examination shall be visually and dimensionally examined to verify compliance with the requirements of this specification (not involving tests).

4.4.1.1 Ply count. - The Government inspector shall count the plies of the sample gaskets selected. A magnifying glass or other suitable device shall be used to insure accuracy of the count.

4.4.2 Test methods. -

4.4.2.1 Line thermal shock test. - The apparatus used for this test shall consist of 6 inch pipe sections flanged together with welding-neck flanges to provide two joints. The center or spool-piece section shall consist of two flanges butt welded together. The end sections shall consist of 6 inch size pipe flanged at one end and blanked off at the other. One end section shall be provided with steam and boiler feedwater inlet connections and the other with an exhaust connection. Two nozzles for directing a spray of boiler feedwater on the inner periphery of the test joints shall be centrally located within the apparatus, one at the centerline of each joint. Each nozzle shall consist of a one 6 inch size pipe with 6 holes of 1/8 inch diameter drilled radially at 60 degree intervals around the pine. Thermocouples shall be placed approximately for measurement of temperatures at outer surface of pipe, at the raised faces of the test joints, of inlet steam and boiler feedwater, and at the exhaust connection. The test shall consist of 20 cycles of thermal shock obtained by changing conditions from steam at 600 p.s.i.g. and 850°F. to boiler feedwater at 750 p.s.i.g. and 250°F. for series 300, 400 and 600, from 1500 pounds gage pressure and 1050°F. to boiler feedwater at 1875 pounds gage pressure and 430°F. for series 900 and 1500, and steam from 2500 gage pressure and 1050°F. to boiler feedwater at 2900 pounds gage pressure and 430°F. for series 2500. The shocks shall continue for 20 cycles.

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4. 4. 2. 2 Compression load test. -

4. 4. 2. 2. 1 The test shall consist of subjecting the gaskets to compression in a Baldwin Southwark, or equal, hydraulic compression machine of suitable capacity and measuring the thickness of the gaskets while under the tests loads specified in 3. 2. 1 for type I gaskets and tables I through IV, as applicable, for type II gaskets.

4. 4. 2. 2. 2 The gaskets shall be tested between steel test plates, the surfaces of which shall have a smooth finish machined with a circular lay (concentric or spiral) having 60 to 100 serrations per inch of face width with depth of serrations not exceeding 0. 003 inch of an RHR finish of 63 to 1000. For special installations involving radioactive service or hazardous fluids where a finer finish is required, and so indicated in the contract or order, a maximum RHR of 500 shall be used. The test plates shall be centrally located under the ball and socket head of the test machine. The ball and socket head shall be used to equally distribute the load applied to the gasket. By means of inverted T straps, the upper compression plate shall be suspended and held in place when inserting a gasket. Four dial indicators graduated in 1/1000 inch divisions, located 90 degrees apart and mounted on the upper compression plate are employed for measuring the thickness of the gasket.

4. 4. 2. 2. 3 During the test, the increment of load shall be applied until a load corresponding to the test load in accordance with 3. 2. 1 for type I gaskets and 3. 2. 2 for type II gaskets is obtained for the gasket under test. The maximum rate of loading allowed will be 2, 000 pounds per second.

4. 4. 2. 2. 4 The steel test plates shall be placed in contact with each other and under an applied load of 3, 000 pounds, the dial indicators shall be set so that a zero reading is obtained with the maximum travel of the indicator plunger. The plates shall then be separated, a gasket centrally located between plates and the upper plate brought into contact with the gasket but no load applied. The dial indicators shall then be read, and the average of the four readings should closely check the original micrometer thickness of the gasket. The load shall then be applied and the rate of loading depends on the size of gasket and the maximum load to be applied. At each interval, the specified load shall be maintained only for a sufficient time, 5 to 10 seconds, to obtain the dial indicator readings. By means of reading the dial indicator scales counter clockwise instead of clockwise the actual thickness of the gasket shall be directly obtained. The average of the four dial indicator readings shall be considered to be the thickness of the gasket. After completion of the test, the load shall be released but the upper compression plate shall be left in contact with the gasket for approximately 10 seconds and the dial indicator readings shall be taken to determine the recovery of the gaskets. The test plates shall then be separated, the gasket removed from the test machine, measured for thickness by micrometers, examined for buckling on the inner periphery, condition of welds, and binding of the gasket filler in the outer metal ring. It may be noted that the final micrometer thickness and the released average dial indicator thickness of the gasket will be approximately the same providing the dial indicators are in proper adjustment. Occasionally between test runs the zero setting of the dial indicators shall be checked with the test plates in contact with one another. No buckling on the inner edge of the gasket shall be allowed. Gaskets shall at least recover 0. 010 inch over the compressed value obtained in the compression test specified in 4. 4. 2. 2. 3.

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4.4.2.2.5 In order to test the gaskets ranging in size from 1/2 to 8 inches inclusive, approximately the size plates shall be used as specified in table VI.

Table VI- Plate sizes used for testing series 150, 300, 400, 600, 900, 1500, and 2500 gaskets.

Compression plate Dimensions[2,3]		Maximum gasket size tested on plates (ASA gaskets)						
Diameter	Thickness	Series 150	Series 300	Series 400	Series 600	Series 900	Series 1500	Series 2500
Inches	Inches							
Upper 4-1/2 Lower 4-1/2	3 2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2
Upper 9 Lower 9	3 2-1/2	6	6	6	6	6	6	5
Upper 14-1/2 Lower 14-1/2	3 2-1/2	10	10	10	10	10	10	8
Upper 19 Lower 19	3 2-1/2	16 o.d.	16 o.d.	16 o.d.	14 o.d.	12	12	10
Upper 21-1/2[1] Lower 21-1/2[1]	3 2-1/2	16 o.d.	18 o.d	18 o.d.	18 o.d.	12	12	12

[1]Not currently available at Engineering Experiment Station, Annapolis, Md.
[2]An additional small ball and socket test head shall be used to distribute the load equally over the test plates.
[3]Gaskets may be tested on plates having dimensions which differ from those specified, provided the loading and deflections are within the limits of table I through IV and provided that sample gaskets so tested will meet the requirements of this specification when tested at the Naval Engineering Experimental Station, Annapolis, Md.

4.4.2.3 Chemical analysis. - Mill certification of materials may be accepted by the Government inspector in lieu of performing chemical and physical tests. Such certification should contain the results of the chemical check analysis of the heat from the steel obtained, the heat number and date to indicate that the stock is not over 1 year old. When considered necessary by the inspector, the samples selected in accordance with 4.2.1.1 and 4.3 shall be subjected to a chemical analysis to determine conformance with 3.3.1.

4.5 Inspection procedures. - For Naval purchases, the general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. - (See 6.2.)

5.1.1 Level A. - Gaskets shall be packaged in accordance with method III of Specification MIL-P-116.

5.1.1.1 Intermediate packaging. - Gaskets shall be packaged in quantities as specified (see 6.2) in containers conforming to Specification PPP-B-566, PPP-B-636, or PPP-B-676, at the option of the contractor. Box closures shall conform to the applicable box specification and the appendix thereto. Gross weight shall not exceed the limitations of the applicable box specification.

5.1.2 Level C. - Gaskets shall be preserved and packaged in accordance with the manufacturer's commercial practice.

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5.2 Packing. - (See 6.2.)

5.2.1 Level A. - Gaskets of like types, series and size packaged as specified (see 6.2) shall be packed in overseas type wood cleated fiberboard, nailed wood, fiber, wirebound wood, wood cleated veneer paper overlaid, or wood cleated plywood boxes conforming to Specification PPP-B-591, PPP-B-621, PPP-B-636, class 3, PPP-B-585, MIL-B-10377 or PPP-B-601, respectively, at the option of the contractor. Shipping containers shall have case liners conforming to Specification MIL-L-10547. Case liners for boxes conforming to Specification PPP-B-636 may be omitted provided all joints and corners of the boxes are sealed with minimum 1-1/2 inch tape conforming to Specification PPP-T-76. Boxes shall be closed and strapped in accordance with the applicable box specification or appendix thereto, except fiber boxes shall be banded with tape conforming to type III of Specification PPP-T-97 and the appendix thereto. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds; fiber boxes shall not exceed the weight limitations of the applicable box specification. Intermediate fiber boxes conforming to class 2 or 3 of Specification PPP-B-636, closed, sealed and banded as specified herein, and used as the shipping container need not be overpacked.

5.2.2 Level B. - Gaskets of like types, series and size packaged as specified (see 6.2) shall be packed in domestic type wood cleated fiberboard, nailed wood, wirebound wood, cleated plywood or wood cleated veneer paper overlaid boxes or class 2 fiber boxes conforming to Specification PPP-B-591, PPP-B-621, PPP-B-585, PPP-B-601, MIL-B-10377 or PPP-B-636, respectively at the option of the contractor. Box closure shall be as specified in the applicable box specification or appendix thereto. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds; fiber boxes shall not exceed the weight limitations of the applicable box specification. Intermediate fiber boxes conforming to Specification PPP-B-636, closed as specified herein, and used as the shipping container need not be overpacked.

5.2.3 Level C. - Gaskets of like types, series and size packaged as specified (see 6.2) shall be packed in containers which will insure acceptance by common carrier and safe delivery at destination. Shipping containers shall comply to the Uniform Freight Classification Rules or other regulations as applicable to the mode of transportation.

5.3 Marking. - In addition to any special marking specified in the contract or order or herein, interior and exterior shipping containers shall be marked in accordance with Standard MIL-STD-129.

6. NOTES

6.1 Intended use. - Refills are intended to be used with existing rings on board ships and type II gaskets are not to be ordered except where rings are not available.

6.2 Ordering data. - Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Type, series and size of gaskets required.
(c) For type II gaskets specify whether refills or complete gaskets are required. If refills are required, specify type, series and size required.
(d) Quantity per unit and intermediate package (see 5.1.1 and 5.1.1.1).
(e) Selection of applicable level of preservation, packaging and packing (see 5.1 and 5.2).
(f) For type I gaskets, specify the type and model of equipment on which used, the equipment manufacturer, the initial equipment manufacturer's part number for the gasket, the gasket thickness (see 3.2.1) and any other pertinent information.

6.3 Qualification. - With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in Qualified Products List QPL-21032, whether or not such products have actually been so listed by that date.

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6.3.1 The attention of suppliers is called to this requirement and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government, tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products covered by this specification may be obtained from the Chief of the Bureau of Ships, Department of the Navy, Washington 25, D. C.

6.4 Superseding data. - This specification supersedes Specification MIL-G-21032(SHIPS) which replaced that part of Specification MIL-G-16265A covering class a and b (in part) gaskets, as follows:

MIL-G-16265A	MIL-G-21032
Class a	Type I
Class b (in part)	Type II

Classes b (in part) and c of Specification MIL-G-16265A have been replaced by types I and II of Specification MIL-G-0016265B(SHIPS) and gaskets for Navy flanges should be purchased under Specification MIL-G-0016265B(SHIPS).

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Preparing activity:
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