SAE Aerospace
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AEROSPACE STANDARD

SAE AS7325 | REV. B

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Superseding AS7325A

Gasket, Metal O-Ring
Corrosion and Heat Resistant Steel
Procurement Specification For

FSC 5330

RATIONALE

AS7325B has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Type:

This procurement specification covers tubular sealing rings, commonly named METAL O-RING GASKETS, made from a corrosion and heat resistant steel tubing of the type identified under the Unified Numbering System as UNS S32100.

1.2 Application:

Primarily for sealing fluid systems, such as air, at temperatures where the operating conditions are too severe for conventional elastomeric O-ring seals.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this specification and references cited herein, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AS7325B

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2410	Plating, Silver, Nickel Strike, High Bake
AMS 5570	Steel, Corrosion and Heat Resistant, Seamless Tubing, 18Cr 11Ni 0.40Ti Solution Heat Treated
AMS 5576	Steel, Corrosion and Heat Resistant, Welded Tubing, 18Cr 10.5Ni 0.40Ti Solution Heat Treated
ARP674	Groove Design, Metal O-Ring Gasket
AS9141	Gasket, Metal O-Ring, .035 Tube x .006 Wall, Cres - UNS S32100
AS9142	Gasket, Metal O-Ring, .062 Tube x .006 Wall, Cres - UNS S32100
AS9202	Gasket, Metal O-Ring, .062 Tube x .010 Wall, Cres - UNS S32100
AS9203	Gasket, Metal O-Ring, .094 Tube x .006 Wall, Cres - UNS S32100
AS9204	Gasket, Metal O-Ring, .094 Tube x .010 Wall, Cres - UNS S32100
AS9205	Gasket, Metal O-Ring, .125 Tube x .010 Wall, Cres - UNS S32100
AS9371	Gasket, Metal O-Ring, .035 Tube x .006 Wall, Silver Plated, Cres - UNS S32100
AS9372	Gasket, Metal O-Ring, .062 Tube x .006 Wall, Silver Plated, Cres - UNS S32100
AS9373	Gasket, Metal O-Ring, .062 Tube x .010 Wall, Silver Plated, Cres - UNS S32100
AS9374	Gasket, Metal O-Ring, .094 Tube x .006 Wall, Silver Plated, Cres - UNS S32100
AS9375	Gasket, Metal O-Ring, .094 Tube x .010 Wall, Silver Plated, Cres - UNS S32100
AS9376	Gasket, Metal O-Ring, .125 Tube x .010 Wall, Silver Plated, Cres - UNS S32100

2.1.2 ASTM Publications: Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 1417	Liquid Penetrant Examination
ASTM D 3951	Commercial Packaging

2.2 Definitions:

DEFECTIVE: A unit of product which contains one or more defects.

LOT: A lot shall be all gaskets of one size of tubing of the same heat of steel welded under the same conditions in a period of not longer than 8 hours.

2.3 Unit Symbols:

%	percent (1% = 1/100)
°F	degree Fahrenheit
°	degree, angular
sp gr	specific gravity

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be AMS 5570 or AMS 5576 steel tubing, unless otherwise specified on the part drawing.

3.2 Design:

Unless otherwise specified on the drawing, dimensions shall conform to the applicable standard listed in 2.1.1 and 2.1.2.

3.2.1 Plating: Gaskets requiring silver plating in accordance with AMS 2410 shall have plating thickness of 0.0010 to 0.0015 inch. Unless otherwise specified on the part drawing, dimensions apply before plating.

3.3 Fabrication:

3.3.1 Forming: Tubing shall be formed into rings by a suitable rolling or forming process.

3.3.2 Preparation for Welding: Formed rings shall be clean and free from foreign materials at the tubing ends to be butt welded.

3.3.3 Welding: The ends of the formed rings shall be welded by flash butt welding or resistance welding. The weld process shall be so performed and controlled as to prevent misalignment of tubing ends and formation of excessive internal weld flash.

3.3.4 Removal of Weld Flash: The outer diameter welding flash shall be removed with a smooth blend to adjacent surfaces within 0.125 inch of weld. For 0.035 nominal tube gaskets, diametral measurements at the blend shall not be more than 0.003 inch below the diametral measurements of surfaces away from the blend; for 0.062 nominal tube gaskets and larger, the diametral measurements at the blend shall not be more than 0.004 inch below the diametral measurements of surfaces away from the blend.

3.3.5 Final Forming: After weld flash removal as in 3.3.4, the welded rings may be formed by coining to meet the axial dimension of the cross-section outside diameter, and by rolling to meet the roundness requirement of the gasket OD, specified on the part drawing.

3.3.6 Cleaning: Finished parts (except vented O-ring gaskets) that are to remain unplated shall be degreased and then immersed in one of the following solutions for the time and temperature shown; vented O-ring gaskets shall be cleaned in accordance with manufacturer's procedures.

a. One volume of nitric acid (sp gr 1.42) and 9 volumes of water for not less than 20 minutes at room temperature.

b. One volume of nitric acid (sp gr 1.42) and 4 volumes of water for 30 to 40 minutes at room temperature.

c. One volume of nitric acid (sp gr 1.42) and 4 volumes of water for 10 to 15 minutes at 140 to 160 °F.

3.4 Properties:

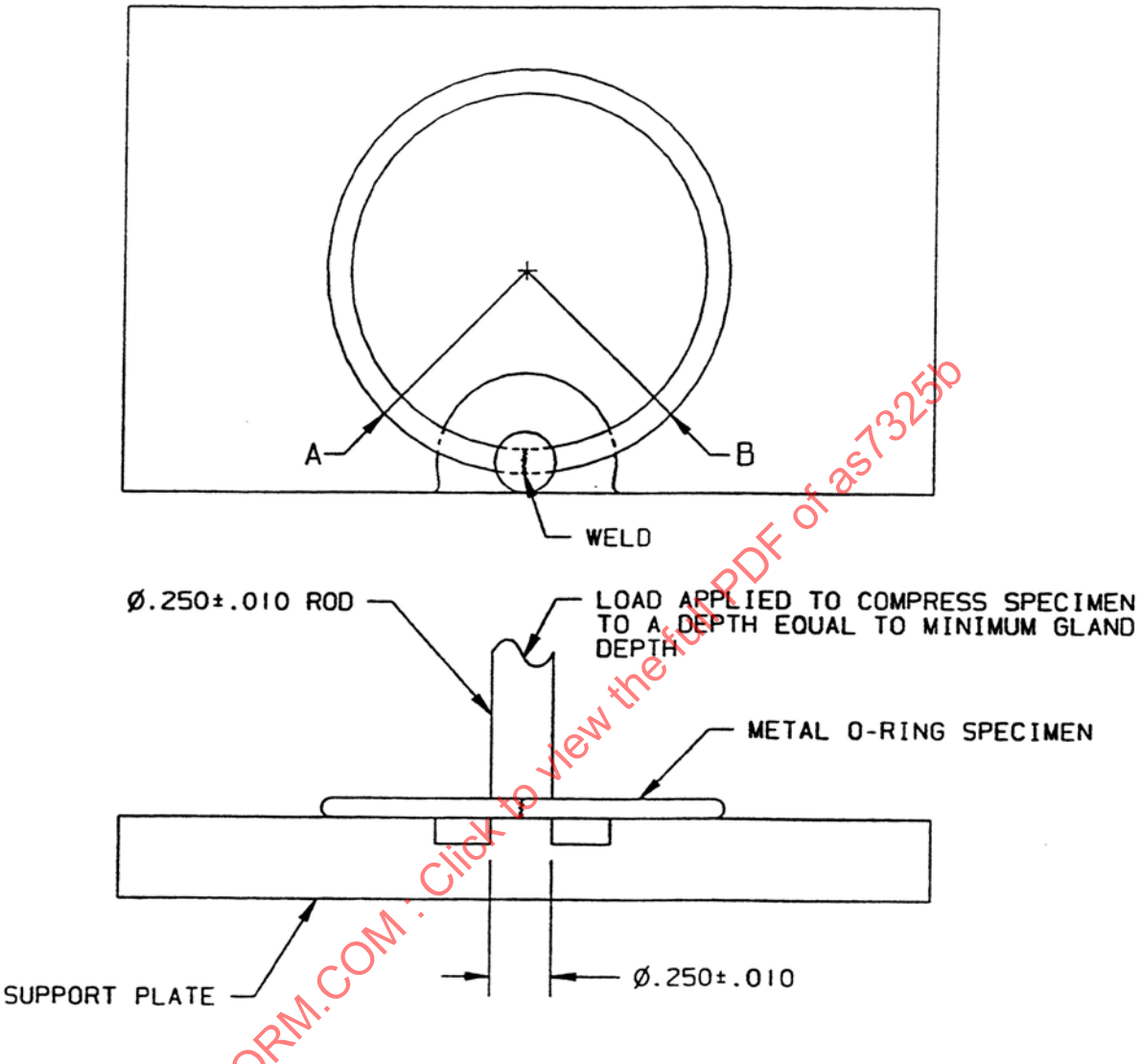
Gaskets shall conform to the following requirements:

3.4.1 Compression Deflection: The load required to compress the gasket at the weld to the minimum gland depth as specified in Table 1 shall not exceed the average of the loads required to compress to the same gland depth at two points away from the weld by more than the specified maximum load increase. Only one determination of load away from the weld shall be made on rings under 4 inches in circumference. Determinations shall be as in 3.4.1.1.

TABLE 1 - Compression Load Increase

Nominal Tube OD inch	Nominal Wall Thickness inch	Gland Depth Minimum inch	Load Increase % Maximum
0.035	0.006	0.023	50
0.062	0.006	0.045	40
0.062	0.010	0.045	50
0.094	0.006	0.074	35
0.094	0.010	0.074	40
0.125	0.010	0.100	35

3.4.1.1 A specimen of at least 4 inches of the circumference shall be cut from a gasket or an entire ring shall be used as the specimen. The specimen shall be held flat on the support plate while being compressed. The support plate shall be so designed that the area of the ring being compressed rests on a 0.250 inch ± 0.010 inch diameter surface (see Figure 1). The specimen shall be compressed to the minimum gland depth at two points, when size permits, at least 1 inch on either side of the weld, and the average load determined. The specimen shall then be compressed to the minimum gland depth at the weld. Load shall be applied through the flat end of a 0.250 inch ± 0.010 inch diameter rod. In accordance with ARP674, the minimum gland depth as specified in Table 1 shall be the same for the plated gaskets and unplated gaskets.



RECORD LOAD TO COMPRESS METAL O-RING SPECIMEN TO A DEPTH EQUAL TO MINIMUM GLAND DEPTH (SEE TABLE 1) AT POINTS A AND B, AND THEN AT THE WELD. POINTS A AND B ARE ABOUT 1.00 INCH AWAY FROM THE WELD.

FIGURE 1 - Compression Deflection Test

3.5 Identification Marking:

No marking is permitted on the part, except as required in 3.6.1.1. The part number and lot number shall be marked on an adhesive label and applied to the inner package (see 5.1).

3.6 Quality:

Gaskets, as received by purchaser, shall be uniform in quality and condition, clean, sound, smooth, and free from foreign materials and from imperfections detrimental to usage of the gaskets. Weld shall show complete fusion through the joint.

3.6.1 The weld joint of each gasket shall be fluorescent penetrant inspected in accordance with ASTM E 1417, Type I, Sensitivity 2 prior to plating. The finished ring shall show no indications. The manufacturer has the option to polish out any indications provided that the dimensional limits are not exceeded and a smooth blend is obtained.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of parts shall supply all samples for vendor's test and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the parts conform to the requirements of this specification.

4.2 Responsibility for Compliance:

The manufacturer's system for parts production shall be based on preventing product defects, rather than detecting the defects at final inspection and then requiring corrective action to be invoked. An effective manufacturing in-process control system shall be established, subject to the approval of the purchaser, and used during the production of parts.

4.3 Production Acceptance Tests:

The purpose of production acceptance tests is to check, as simply as possible, using a method which is inexpensive and representative of the part usage, with the uncertainty inherent in random sampling, that the parts comprising a production inspection lot satisfy the requirements of this specification.

4.4 Classification of Tests:

4.4.1 Acceptance Tests: Tests to determine conformance to requirements for material (3.1), dimensions (3.2), plating (3.2.1), compression deflection (3.4.1), and weld quality (3.6.1) are acceptance tests and shall be required on each lot. See Table 2 for summary of acceptance tests.

4.4.2 Periodic Tests: Tests for excessive flash (3.3.3) are periodic tests. These tests shall be performed at a frequency selected by the vendor unless frequency of testing is specified by the purchaser.

TABLE 2 - Summary of Acceptance Tests

TABLE 2A - Nondestructive Tests

Characteristic	Req. Para.	Sample Size	Test Method
Design & Dimensions	3.2	Tables 3 & 4	Conventional measuring methods
Quality	3.6	Tables 3 & 4	Visual
Fluorescent Penetrant Inspection	3.6.1	100%	Per ASTM E 1417
Packaging and Identification	5.1	None	Visual

TABLE 2B - Destructive Tests

Material Composition	3.1	4.5.1	Per material specification
Plating	3.2.1	Table 5	Per AMS 2410
Compression Deflection	3.4.1	Table 5	Per 3.4.1

4.5 Acceptance Tests Sampling:

4.5.1 Material: Sampling for material composition on each heat shall be in accordance with AMS 5570 and AMS 5576.

4.5.2 Nondestructive Tests - Visual and Dimensional: A random sample shall be selected from each lot; the size of the sample shall be as specified in Table 3. Classification of inspection characteristics shall be as specified in Table 4. All dimensional characteristics are considered defective when out of tolerance.

CAUTION: Use extra care not to damage the seals in handling. Clean, lint-free gloves should be used during handling to prevent any residue from adhering to the gaskets. Micrometers which have a broad flat anvil to distribute the load should be used to measure the parts rather than verniers which would be apt to dig into the plating.

4.5.3 Fluorescent Penetrant Inspection of Weld Joint: All gaskets in the lot shall be subjected to fluorescent penetrant inspection of the weld joint.

TABLE 3 - Sampling Data (Nondestructive Tests
Visual and Dimensional Characteristics
For Classes Major A, Major B, Minor A, and Minor B)

Production Inspection Lot	Major A Sample Size	Major B Sample Size	Minor A Sample Size	Minor B Sample Size
2 to 8	All	All	5	3
9 to 15	All	13	5	3
16 to 25	All	13	5	3
26 to 50	All	13	5	5
51 to 90	80	13	7	6
91 to 150	80	13	11	7
151 to 280	80	20	13	10
281 to 500	80	29	16	11
501 to 1200	80	34	19	15
1201 to 3200	120	42	23	18
3201 to 10000	189	50	29	22
10001 to 35000	189	60	35	29
35001 to 150000	218	74	40	29
150001 to 500000	270	90	40	29
500001 & over	303	102	40	29

TABLE 4 - Classification of Visual and
Dimensional Characteristics

Class	Characteristic
Major A	
101	Surface discontinuities revealed by fluorescent penetrant inspection
102	Surface texture, sealing surface
103	Face thickness after coining
Major B	
201	Face thickness in weld blend area
202	Flatness
203	Free state roundness of gasket OD
204	Quality of weld fusion
205	Plating thickness, if applicable
Minor A	
301	Compression load increase in weld area
302	Tube wall thickness
303	Gasket outside diameter limits
Minor B	
401	Other dimensional characteristics not listed