ADOPTION NOTICE

SAE-AMS4310, "ALUMINUM ALLOY, ROLLED OR FORGED RINGS 5.6ZN - 2.5MG - 1.6CU - 0.23CR (7075-T651, 7075-T652) SOLUTION HEAT TREATED, MECHANICALLY STRESS RELIEVED, AND PRECIPITATION HEAT TREATED", was adopted on 25-APR-88 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Commander, Naval Air Warfare Center, Aircraft Division, Code 414100B120-3, Highway 547, Lakehurst, NJ 08733-5100. Copies of this document may be purchased from the Society of Automotive Engineers 400 Commonwealth Drive Warrendale, Pennsylvania, United States, 15096-0001. http://www.sae.org/

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4310C

Issued JUL 1976
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Superseding AMS 4310B

Submitted for recognition as an American National Standard

ALUMINUM ALLOY, ROLLED OR FORGED RINGS
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T651, 7075-T652)
Solution Heat Treated, Mechanically Stress Relieved, and Precipitation Heat Treated

UNS A97075

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of rolled or forged rings.

1.2 Application:

These rings have been used typically for machined parts where good stability is required during machining, but usage is not limited to such applications. These rings are not recommended for fusion welding.

1.2.1 Certain design and fabricating procedures may cause these rings to become susceptible to stress-corrosion cracking; ARP823 recommends practices to minimize such conditions.

1.3 Classification:

Rings are classified by type of mechanical stress relief as follows:

Type 1 - Stress-relieved by stretching (7075-T651)
Type 2 - Stress-relieved by compression (7075-T652)

1.3.1 Either type may be supplied, unless a specific type is ordered.

2. 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.

2.1 SAE Publications:

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

AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
MAM 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
AMS 2808 Identification, Forgings

ARP823 Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 594 Ultrasonic Inspection of Aluminum-Alloy Products for Aerospace Applications
ASTM B 660 Packaging/Packing of Aluminum and Magnesium Products

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-H-6088 Heat Treatment of Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

(R)

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition

Element	min	max
Zinc	5.1	6.1
Magnesium	2.1	2.9
Copper	1.2	2.0
Chromium	0.18	0.28
Iron	--	0.50
Silicon	--	0.40
Manganese	--	0.30
Titanium	--	0.20
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition:

Rings shall be supplied in the following condition; heat treatments shall be performed in accordance with MIL-H-6088:

3.2.1 Type 1: Solution heat treated, stress-relieved by stretching to produce a permanent set of 1 to 5%, and precipitation heat treated.

3.2.2 Type 2: Solution heat treated, stress-relieved by compression to produce a permanent set of 1 to 5%, and precipitation heat treated. During compression, primary forces shall be applied in the axial direction and on individual rings approximating final dimensions.

3.3 Properties:

(R)

Rings shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355.

3.3.1 Tensile Properties:

3.3.1.1 Rings with OD to Wall Thickness Ratio Less Than 10: Shall be as agreed upon by purchaser and vendor.

3.3.1.2 Rings with OD to Wall Thickness Ratio of 10 or Greater: Shall be in accordance with Table 2. Tensile tests are not required in any direction from which a specimen at least 2.375 inches (60.32 mm) in length cannot be obtained.

TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

Nominal Thickness at Time of Heat Treatment Inches (See 3.3.1.2.1)	Specimen Orientation (See 3.3.1.2.2)	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
Up to 2, incl	Tangential	74.0	63.0	9
	Axial	73.0	61.0	4
Over 2 to 3, incl	Tangential	73.0	61.0	9
	Axial	71.0	59.0	4
	Radial	69.0	57.0	2
Over 3 to 4, incl	Tangential	71.0	60.0	8
	Axial	70.0	58.0	3
	Radial	68.0	56.0	1
Over 4 to 5, incl	Tangential	69.0	58.0	7
	Axial	68.0	56.0	3
	Radial	66.0	55.0	1
Over 5 to 6, incl	Tangential	68.0	56.0	6
	Axial	66.0	55.0	3
	Radial	65.0	54.0	1

TABLE 2B - Minimum Tensile Properties, SI Units

Nominal Thickness at Time of Heat Treatment Millimeters (See 3.3.1.2.1)	Specimen Orientation (See 3.3.1.2.2)	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
Up to 51, incl	Tangential	510	434	9
	Axial	503	421	4
Over 51 to 76, incl	Tangential	503	421	9
	Axial	490	407	4
	Radial	476	393	2
Over 76 to 102, incl	Tangential	490	414	8
	Axial	483	400	3
	Radial	469	386	1
Over 102 to 127, incl	Tangential	476	400	7
	Axial	469	386	3
	Radial	455	379	1
Over 127 to 152, incl	Tangential	469	386	6
	Axial	455	379	3
	Radial	448	372	1

3.3.1.2.1 Thickness shall be the smaller of the wall thickness (one-half the difference between nominal OD and nominal ID) and height (axial) dimensions.

3.3.1.2.2 Tangential requirements apply to specimens machined with axis of specimen tangential to the ring OD (parallel to the direction of rolling). Axial requirements apply to specimens machined with axis of specimen parallel to the ring axis (long transverse to the direction of rolling). Radial requirements apply to specimens machined with axis of specimen parallel to the radius of the ring (short transverse to the direction of rolling). All specimens shall be machined from the core of the ring.

3.3.1.2.3 Elongation requirements do not apply to test specimens having a gage-length diameter under 0.250 inch (6.35 mm), or located in immediate proximity to an abrupt change in section thickness, or located so that any part of the specimen gage length is located within 0.125 inch (3.18 mm) of the trimmed flash line.

3.3.2 Hardness: Shall be not lower than 135 HB/10/500 or 140 HB/10/1000. (R)

3.4 Quality:

Rings, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign material and from imperfections detrimental to usage of the rings.

3.4.1 Each ring shall be ultrasonically inspected in accordance with ASTM B 594 and shall meet Class A acceptance limits of that specification.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

(R)

The vendor of rings shall supply all samples for vendor's tests 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 rings conform to the requirements of this specification.

4.2 Classification of Tests:

(R)

Tests for all technical requirements are acceptance tests and, except for composition, shall be performed on each lot.

4.3 Sampling and Testing:

(R)

Shall be in accordance with AMS 2355 or MAM 2355 and the following:

4.3.1 Except when testing in one or more directions is not required by 3.3.1, tensile specimens in the tangential, axial, and radial directions shall be taken from a ring or ring segment representing the lot. When ring segments are used for testing, the segments shall be cut from a ring which has been solution heat treated and stress-relieved with the production rings. Solution heat treated and stress-relieved ring segments shall be included in each precipitation heat treatment furnaceload.