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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 4174B

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Superseding AMS 4174A

ALUMINUM ALLOY FLASH WELDED RINGS
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73)
Solution and Precipitation Heat Treated

UNS A97075

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of flash welded rings.

1.2 Application: Primarily for parts requiring high strength and resistance to stress-corrosion cracking.

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 documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings
MAM 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings Metric (SI) Units
AMS 2770 - Heat Treatment of Wrought Aluminum Alloy Parts
AMS 7488 - Rings, Flash Welded, Aluminum and Aluminum Alloys

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM B660 - Packaging/Packing of Aluminum and Magnesium Products

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3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355 or MAM 2355:

	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 manufactured in accordance with AMS 7488 and solution and precipitation heat treated in accordance with AMS 2770.

3.3 Properties: The product shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355:

3.3.1 Tensile Properties: Shall be as follows (See 8.2):

3.3.1.1 Longitudinal (See 8.2): Shall be as specified in Table I.

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TABLE I

Nominal Dimensions		Tensile Strength	Yield Strength at 0.2% Offset	Elongation in 4D
Radial Thickness Inches	Cross-Sectional Area Square Inches	psi, min	psi, minimum	% minimum
0.062 to 0.249, incl	Up to 20, incl	68,000	58,000	7
Over 0.249 to 1.499, incl	Up to 25, incl	70,000	61,000	8
Over 1.499 to 2.999, incl	Up to 25, incl	69,000	59,000	8
Over 2.999 to 4.499, incl	Up to 20, incl	68,000	57,000	7
Over 2.999 to 4.499, incl	Over 20 to 32, incl	65,000	55,000	7

TABLE I (SI)

Nominal Dimensions		Tensile Strength	Yield Strength at 0.2% Offset	Elongation in 4D
Radial Thickness Millimetres	Cross-Sectional Area Square Centimetres	MPa, min	MPa, minimum	%, minimum
1.57 to 6.32, incl	Up to 129, incl	469	400	7
Over 6.32 to 38.07, incl	Up to 161, incl	483	421	8
Over 38.07 to 76.17, incl	Up to 161, incl	476	407	8
Over 76.17 to 114.27, incl	Up to 129, incl	469	393	7
Over 76.17 to 114.27, incl	Over 129 to 206, incl	448	379	7

3.3.1.2 Long-Transverse (See 8.2): Shall be as specified in Table II.

TABLE II

Nominal Dimensions		Tensile Strength	Yield Strength at 0.2% Offset	Elongation in 4D
Radial Thickness Inches	Cross-Sectional Area Square Inches	psi, min	MPa, minimum	%, minimum
0.062 to 0.249, incl	Up to 20, incl	66,000	55,000	3
Over 0.249 to 0.499, incl	Up to 20, incl	67,000	56,000	4
Over 0.499 to 0.749, incl	Up to 25, incl	67,000	56,000	4
Over 0.749 to 1.499, incl	Up to 25, incl	66,000	55,000	4
Over 1.499 to 2.999, incl	Up to 25, incl	65,000	54,000	4
Over 2.999 to 4.499, incl	Up to 20, incl	60,000	49,000	3
Over 2.999 to 4.499, incl	Over 20 to 32, incl	60,000	47,000	3

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TABLE II (SI)

Nominal Dimensions		Tensile Strength	Yield Strength at 0.2% Offset	Elongation in 4D
Radial Thickness Millimetres	Cross-Sectional Area Square Centimetres	MPa, minimum	MPa, minimum	%, minimum
1.57 to 6.32, incl	Up to 129, incl	455	379	3
Over 6.32 to 12.67, incl	Up to 129, incl	462	386	4
Over 12.67 to 19.02, incl	Up to 161, incl	462	386	4
Over 19.02 to 38.07, incl	Up to 161, incl	455	379	4
Over 38.07 to 76.17, incl	Up to 161, incl	448	372	4
Over 76.17 to 114.27, incl	Up to 129, incl	414	338	3
Over 76.17 to 114.27, incl	Over 129 to 206, incl	414	324	3

3.3.1.3 Short-Transverse (See 8.2): Shall be as specified in Table III.

TABLE III

Nominal Dimensions		Tensile Strength	Yield Strength at 0.2% Offset	Elongation in 4D
Radial Thickness Inches	Cross-Sectional Area Square Inches	psi, min	MPa, minimum	%, minimum
1.500 to 2.999, incl	Up to 25, incl	60,000	48,000	2
Over 2.999 to 4.499, incl	Up to 20, incl	57,000	44,000	2
Over 2.999 to 4.499, incl	Over 20 to 32, incl	54,000	41,000	2

TABLE III (SI)

Nominal Dimensions		Tensile Strength	Yield Strength at 0.2% Offset	Elongation in 4D
Radial Thickness Millimetres	Cross-Sectional Area Square Centimetres	MPa, min	MPa, minimum	%, minimum
38.10 to 76.17, incl	Up to 161, incl	414	331	2
Over 76.17 to 114.27, incl	Up to 129, incl	393	303	2
Over 76.17 to 114.27, incl	Over 129 to 206, incl	372	283	2

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3.3.1.4 Tensile property requirements for rings with dimensions exceeding the size limits of 3.3.1.1, 3.3.1.2, and 3.3.1.3 shall be as agreed upon by purchaser and vendor.

3.3.2 Hardness: Should be not lower than 125 HB/10/500 or 130 HB/10/1000 but rings shall not be rejected on the basis of hardness if the tensile property requirements are met.

3.3.3 Conductivity: Shall be as follows, determined on the surface of test specimens:

3.3.3.1 Ø If the conductivity is 40.0% IACS (International Annealed Copper Standard) (23.2 MS/m) or higher and longitudinal tensile properties meet specified requirements, rings are acceptable.

3.3.3.2 If the conductivity is 38.0% - 39.9% IACS (22.0 - 23.1 MS/m), if the longitudinal tensile properties meet specified requirements, and if the longitudinal yield strength does not exceed the specified minimum by more than 11,900 psi (82 MPa), rings are acceptable.

3.3.3.3 Ø If the conductivity is below 40.0% IACS and the longitudinal yield strength exceeds the specified minimum value by more than 11,900 psi (82 MPa), rings shall be given additional precipitation heat treatment. If after such treatment, rings meet the requirements of 3.3.1.1 and 3.3.3.1 or 3.3.3.2, rings are acceptable.

3.3.3.4 Ø If the conductivity is below 38.0% IACS (22.0 MS/m) rings are not acceptable but may be re-heat treated or given additional precipitation heat treatment to meet the requirements of 3.3.1.1 and 3.3.3.1 or 3.3.3.2.

3.3.4 Ø Stress-Corrosion Resistance: Specimens, cut from a ring so that the axis of loading of the specimen is parallel to the short-transverse direction of the ring, shall show no evidence of stress-corrosion cracking when stressed to 75% of the specified minimum longitudinal yield strength.

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

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of rings shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. 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.

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