



AEROSPACE MATERIAL SPECIFICATION	AMS4174™	REV. F
	Issued 1976-01 Reaffirmed 2010-10 Revised 2024-12 Superseding AMS4174E	
Aluminum Alloy, Flash-Welded Rings 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73) Solution and Precipitation Heat Treated (Composition similar to UNS A97075)		

RATIONALE

AMS4174F results from a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (see 3.3.1.4, 3.5, 4.4.2, and 8.5); update Applicable Documents (see Section 2), Tensile Properties (see 3.3.1), Conductivity (see 3.3.2), Hardness (see 8.2.1), and Ordering Information (see 8.6); and allow the use of the immediate prior specification revision (see 8.4).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of flash-welded rings 0.062 to 4.499 inches (1.57 to 114.27 mm), inclusive, in radial thickness with cross-sectional areas up to 32 square inches (206 cm²) (see 8.6).

1.2 Application

These rings have been used typically for parts requiring high strength and resistance to stress-corrosion cracking, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2355 Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS4174F/>

AMS7488 Rings, Flash Welded, Aluminum and Aluminum Alloys

AS7766 Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B660 Packaging/Packing of Aluminum and Magnesium Products

2.3 ANSI Accredited Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ANSI H35.1/H35.1M Alloy and Temper Designation Systems for Aluminum

2.4 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

Table 1 - Composition

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

3.2 Condition

Rings shall be manufactured in accordance with AMS7488 and solution and precipitation heat treated to the T73 temper in accordance with AMS2772 (refer to ANSI H35.1/H35.1M).

3.3 Properties

Rings shall conform to the following requirements, determined on the mill-produced size in accordance with AMS2355:

3.3.1 Tensile Properties

Shall be as follows; longitudinal tensile properties apply to specimens taken in the circumferential direction. Long-transverse and short-transverse properties apply to specimens taken in the greater and lesser, respectively, of the axial and radial directions. Strength properties are not required for test directions that provide a coupon of less than 2 inches.

3.3.1.1 Longitudinal

Shall be as specified in Table 2.

Table 2A - Minimum longitudinal tensile properties, inch/pound units

Nominal Radial Thickness Inches	Nominal Cross-Sectional Area Square Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.062 to 0.249, incl	Up to 20, incl	68.0	58.0	7
Over 0.249 to 1.499, incl	Up to 25, incl	70.0	61.0	8
Over 1.499 to 2.999, incl	Up to 25, incl	69.0	59.0	8
Over 2.999 to 4.499, incl	Up to 20, incl	68.0	57.0	7
Over 2.999 to 4.499, incl	Over 20 to 32, incl	65.0	55.0	7

Table 2B - Minimum longitudinal tensile properties, SI units

Nominal Radial Thickness Millimeters	Nominal Cross-Sectional Area Square Centimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
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

Shall be as specified in Table 3.

Table 3A - Minimum long-transverse tensile properties, inch/pound units

Nominal Radial Thickness Inches	Nominal Cross-Sectional Area Square Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.062 to 0.249, incl	Up to 20, incl	66.0	55.0	3
Over 0.249 to 0.499, incl	Up to 20, incl	67.0	56.0	4
Over 0.499 to 0.749, incl	Up to 25, incl	67.0	56.0	4
Over 0.749 to 1.499, incl	Up to 25, incl	66.0	55.0	4
Over 1.499 to 2.999, incl	Up to 25, incl	65.0	54.0	4
Over 2.999 to 4.499, incl	Up to 20, incl	60.0	49.0	3
Over 2.999 to 4.499, incl	Over 20 to 32, incl	60.0	47.0	3

Table 3B - Minimum long-transverse tensile properties, SI units

Nominal Radial Thickness Millimeters	Nominal Cross-Sectional Area Square Centimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
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

Shall be as specified in Table 4.

Table 4A - Minimum short-transverse tensile properties, inch/pound units

Nominal Radial Thickness Inches	Nominal Cross-Sectional Area Square Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
1.500 to 2.999, incl	Up to 25, incl	60.0	48.0	2
Over 2.999 to 4.499, incl	Up to 20, incl	57.0	44.0	2
Over 2.999 to 4.499, incl	Over 20 to 32, incl	54.0	41.0	2

Table 4B - Minimum short-transverse tensile properties, SI units

Nominal Radial Thickness Millimeters	Nominal Cross-Sectional Area Square Centimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
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

3.3.1.4 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between the purchaser and producer and reported per 4.4.2.

3.3.2 Conductivity

Shall be as follows, determined on the surface of test specimens.

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

3.3.2.2 If the conductivity is 38.0 to 39.9% IACS (22.0 to 23.1 MS/m), and if the longitudinal yield strength does not exceed the specified minimum by more than 11.9 ksi (82 MPa), rings are acceptable.

3.3.2.3 If the conductivity is below 40.0% IACS and the longitudinal yield strength exceeds the specified minimum value by more than 11.9 ksi (82 MPa), rings shall be given additional precipitation heat treatment. If after such treatment rings meet the requirements of 3.3.1.1 and 3.3.2.1 or 3.3.2.2, rings are acceptable.

3.3.2.4 If the conductivity is below 38.0% IACS (22.0 MS/m), rings are not acceptable but may be reheat treated or given additional precipitation heat treatment to meet the requirements of 3.3.1.1 and 3.3.2.1 or 3.3.2.2.

3.3.3 Stress-Corrosion Cracking 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 the purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the rings.

3.5 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.2.