# AEROSPACE MATERIAL SPECIFICATION

| AMS4115™ | REV. K |
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Issued 1960-01
Reaffirmed 2007-04
Revised 2021-04

Superseding AMS4115J

Aluminum Alloy, Rolled or Cold-Finished,
Bars, Rods, Wire, and Flash Welded Rings and Stock for Flash Welded Rings
Annealed
1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-O)
(Composition similar to UNS A96061)

RATIONALE

AMS4115K is the result of a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (3.6, 8.6), add 5D elongation for SI unit testing (Table 2, Table 3, 8.4) and allow use of immediate prior revision (8.5) and updates to References (2.1, 2.3), Condition (3.2), Response to Heat Treatment (3.3.2.1, 3.3.2.2), Reporting (3.3.2.4, 4.4.1), and Identification (5.1.1.1).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of rolled or cold-finished bars, rods, and wire, of flash welded rings, and of stock for flash welded rings.

1.1.1 This specification covers products 8 inches (203 mm) and under in nominal diameter or least distance between parallel sides and for flash welded rings 8 inches (203 mm) and under in radial thickness, and stock of any size (see 8.7).

1.2 Application

These products have been used typically for parts requiring moderate strength, especially where such parts require brazing or welding during fabrication, 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.





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https://www.sae.org/standards/content/AMS4115K/

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

AMS7488 Rings, Flash Welded, Aluminum and Aluminum Alloys

ARP1917 Clarification of 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

ASTM B666/B666M Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Accredited Publications

Copies of these documents are available online at http://webstore.ansi.org/.

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

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products

ANSI H35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

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 | 0.8 |
| Iron | -- | 0.7 |
| Copper | 0.15 | 0.40 |
| Manganese | -- | 0.15 |
| Magnesium | 0.8 | 1.2 |
| Chromium | 0.04 | 0.35 |
| Zinc | -- | 0.25 |
| Titanium | -- | 0.15 |
| Other Elements, each | -- | 0.05 |
| Other Elements, total | -- | 0.15 |
| Aluminum | remainder | |

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Bars, Rods, and Wire

Rolled or cold-finished, as ordered, and annealed in accordance with AMS2772 to the O temper (refer to ANSI H35.1/H35.1M).

3.2.2 Flash Welded Rings

Shall be manufactured in accordance with AMS7488 and annealed in accordance with AMS2772 to the O temper (refer to ANSI H35.1/H35.1M).

3.2.3 Stock for Flash Welded Rings

As ordered by the flash welded ring manufacturer.

3.3 Properties

The product shall conform to the following requirements, determined in accordance with AMS2355 on the mill produced size.

3.3.1 Bars, Rods, Wire, and Flash Welded Rings

3.3.1.1 As Annealed (O) Condition Tensile Properties

Shall be as shown in Table 2 for bars, rods, and wire 8 inches (203 mm) and under in nominal diameter or least distance between parallel sides and for flash welded rings 8 inches (203 mm) and under in radial thickness.

***Table 2 - O temper tensile properties***

| Property | Value |
|---|---|
| Tensile Strength, maximum | 22.0 ksi (152 MPa) |
| Yield Strength at 0.2% Offset, minimum | 6.0 ksi ( 41 MPa) |
| Elongation in 4D (5D or 5.65√A), minimum | 18% ( 16%) |

3.3.2 Response to Heat Treatment

3.3.2.1 Response to Heat Treatment (O to T42 Temper)

When specified, product in the O temper (without the subsequent imposition of cold working or forming operations), after solution heat treatment and natural aging to the T42 temper (refer to ANSI H35.1/H35.1M) in accordance with AMS2772, shall have the properties of Table 3.

3.3.2.1.1 Natural Aging before Testing

Specimens in the T42 tempers will not be required to be tested within 4 days after completion of the solution heat treatment. If, within this period, the manufacturer elects to test specimens, which thereupon fail to meet the requirements, they can discard these original test results and test additional specimens selected after four days of aging. These specimens shall be selected from the same location in the production lot or sample as those tested previously in accordance with AMS2355.

3.3.2.2 Response to Heat Treatment (O to T62 Temper)

Product in the O temper (without the subsequent imposition of cold working or forming operations), after solution and precipitation heat treatment to the T62 temper (refer to ANSI H35.1/H35.1M) in accordance with AMS2772, shall have the properties of Table 3.

3.3.2.3 T42 and T62 Temper Tensile Properties

Shall be as shown in Table 3 for rounds 8 inches (203 mm) and under in nominal diameter, for rectangular, square, hexagonal, and octagonal bar 8 inches (203 mm) and under in least distance between parallel sides and 50 square inches (322 $cm^2$) and under in cross-sectional area, and for flash welded rings 8 inches (203 mm) and under in radial thickness and 50 square inches (322 $cm^2$) and under in cross-sectional area.

***Table 3 - T42 and T62 temper minimum tensile properties***

| Temper | Tensile Strength ksi (MPa) | Yield Strength at 0.2% Offset ksi (MPa) | Elongation % in 2 Inches or 4D (5D or 5.65√A) |
|---|---|---|---|
| T42 | 30.0 (207) | 14.0 ( 97) | 18 (16) |
| T62 | 42.0 (290) | 35.0 (241) | 10 ( 9) |

3.3.2.4 Mechanical property requirements for product outside of the range covered by 1111 shall be agreed upon between purchaser and producer and reported per 4.4.1.

3.3.3 Stock for Flash Welded Rings

Specimens taken from the stock after solution and precipitation heat treatment as in 3.3.2.2 shall conform to the requirements of 3.3.2.3.

3.4 Quality

The product, 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 product.

3.5 Tolerances

Bars, rods, and wire shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), tensile properties as annealed (3.3.1.1), after response to heat treatment, O to T62 temper (3.3.2.2), and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot. Response to heat treatment, O to T42 temper (3.3.2.1) is an acceptance test when specified by the purchaser.

4.2.2 Periodic Tests

Tests of stock for flash welded rings to demonstrate ability to develop required properties (3.3.2.3) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by the purchaser.