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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 4115D
Superseding AMS 4115C

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UNS A96061

ALUMINUM ALLOY BARS, RODS, AND WIRE, ROLLED or COLD-FINISHED, AND RINGS
1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-0)
Annealed

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.

1.2 Application: Primarily for parts requiring moderate strength, especially where such parts require brazing or welding during fabrication.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) 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 2201 - Tolerances, Aluminum and Aluminum Alloy Bar, Rod, Wire, and Forging Stock, Rolled or Drawn
AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum-Base and Magnesium-Base Alloys, Wrought Products, (Except Forgings and Forging Stock) and Flash Welded Rings
AMS 2770 - Heat Treatment of Aluminum Alloy Parts
AMS 7488 - Rings, Flash Welded, Aluminum and Aluminum Alloys

2.2 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

2.2.2 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

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

	min	max
Magnesium	0.8	1.2
Silicon	0.40	0.8
Copper	0.15	0.40
Chromium	0.04	0.35
Iron	--	0.7
Zinc	--	0.25
Manganese	--	0.15
Titanium	--	0.15
Other Impurities, each	--	0.05
Other Impurities, 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 Ø in accordance with MIL-H-6088.

3.2.2 Flash Welded Rings: Shall be manufactured in accordance with AMS 7488 and Ø annealed in accordance with MIL-H-6088.

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 AMS 2355:

3.3.1 Bars, Rods, Wire, and Flash Welded Rings:

3.3.1.1 As Annealed:

3.3.1.1.1 Tensile Properties: Shall be as follows for bars, rods, and wire 8.000 in. (200.00 mm) and under in nominal diameter or least distance between parallel sides and for flash welded rings 8.000 in. (200.00 mm) and under in radial thickness; tensile properties for bars and rods over 8.000 in. (200.00 mm) in nominal diameter or least distance between parallel sides and for flash welded rings over 8.000 in. (200.00 mm) in radial thickness shall be as agreed upon by purchaser and vendor:

Tensile Strength, max	22,000 psi (150 MPa)
Elongation in 4D, min	18%

3.3.1.1.2 Hardness: Should be not higher than 40 HB/10/500, 40 HB/ 14.3/1000, or 45 HB/ 10/1000 but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.3.1.1.1 are met.

3.3.1.2 After Solution and Precipitation Heat Treatment: The product shall have Ø the following properties after being solution and precipitation heat treated in accordance with AMS 2770:

3.3.1.2.1 Tensile Properties: Shall be as follows for rounds 8.000 in. (200.00 mm) and under in nominal diameter, for rectangular, square, hexagonal, and octagonal bar 8.000 in. (200.00 mm) and under in least distance between parallel sides and 50 sq in. (325 cm^2) and under in cross-sectional area, and for flash welded rings 8.000 in. (200.00 mm) and under in radial thickness and 50 sq in. (325 cm^2) in Ø cross-sectional area; tensile property requirements for rounds over 8.000 in. (200.00 mm) in nominal diameter, for rectangular, square, hexagonal, and octagonal bar over 8.000 in. (200.00 mm) in least distance between parallel sides and 50 sq in. (325 cm^2) in cross-sectional area, and for flash welded rings over 8.000 in. (200.00 mm) in radial thickness and 50 sq in. (325 cm^2) in cross-sectional area shall be as agreed upon by purchaser and vendor:

Tensile Strength, min	42,000 psi (290 MPa)
Yield Strength at 0.2% Offset, min	35,000 psi (240 MPa)
Elongation in 4D, min	10%

3.3.1.2.2 Hardness: Should be not lower than 80 HB/10/500 or 85/HB/10/1000 but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.3.1.2.1 are met.

3.3.2 Stock for Flash Welded Rings: Specimens taken from the stock after solution and precipitation heat treatment as in 3.3.1.2 shall conform to the requirements of 3.3.1.2.1 and 3.3.1.2.2.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality Ø and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the product.

3.5 Tolerances: Unless otherwise specified, tolerances for bars, rods, and wire shall conform to all applicable requirements of AMS 2201.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all Ø 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 product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to the following Ø requirements are classified as acceptance tests and shall be performed on each lot:

4.2.1.1 Composition (3.1) of the product.

4.2.1.2 Tensile properties (3.3.1.1.1 and 3.3.1.2.1) of each lot of bars, rods, wire, and flash welded rings.

4.2.1.3 Tolerances (3.5) of bars, rods, and wire.

4.2.2 Periodic Tests: Tests of bars, rods, wire, and flash welded rings to determine conformance to requirements for hardness (3.3.1.1.2) and of stock for flash welded rings to demonstrate ability to develop required Ø properties are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355.

4.4 Reports:

4.4.1 The vendor of bars, rods, wire, and stock for flash welded rings shall furnish with each shipment three copies of a report stating that the product conforms to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, AMS 4115D, size, and quantity.

4.4.2 The vendor of flash welded rings shall furnish with each shipment three copies of a report stating that the rings conform to the chemical composition of this specification and showing the results of tests for Ø tensile properties of each lot. This report shall include the purchase order number, AMS 4115D, contractor or other direct supplier of material, size or part number, and quantity from each lot.