Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 4116D
Superseding AMS 4116C
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UNS A96061

ALUMINUM ALLOY BARS, ROLLED, DRAWN, OR COLD FINISHED
1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T4)

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of bars, rods, and wire.

1.2 Application: Primarily for parts where moderate ductility and formability, and response to precipitation heat treatment are required.

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 Society of Automotive Engineers, Inc., 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 and Aluminum Alloys

2.2 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: Rolled, drawn, or cold finished, as ordered, and solution heat treated in accordance with MIL-H-6088.

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

3.3.1 As Solution Heat Treated:

3.3.1.1 Tensile Properties: Shall be as follows, except as specified in 3.3.1.1.1 and 3.3.1.1.2:

Tensile Strength, min	30,000 psi (207 MPa)
Yield Strength at 0.2% Offset, min	16,000 psi (110 MPa)
Elongation in 4D, min	18%

3.3.1.1.1 Tensile property requirements for rounds over 8.000 in. (203.20 mm) in nominal diameter and for squares, rectangles, hexagons, and octagons having a cross-sectional area over 50 sq in. (323 cm^2) shall be as agreed upon by purchaser and vendor.

3.3.1.1.2 Yield strength and elongation requirements do not apply to product under 0.125 in. (3.18 mm) in nominal diameter or least distance between parallel sides.

3.3.1.2 Hardness: Should be 50 - 80 HB/10/500, 50 - 80 HB/14.3/1000, or 55 - 85 HB/10/1000 but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.3.1.1 are met.

3.3.2 After Precipitation Heat Treatment: The product shall, after precipitation heat treatment in accordance with AMS 2770, have the following properties:

3.3.2.1 Tensile Properties: Shall be as follows, except as specified in 3.3.2.1.1 and 3.3.2.1.2.

Tensile Strength, min	42,000 psi (290 MPa)
Yield Strength at 0.2% Offset, min	35,000 psi (241 MPa)
Elongation in 4D, min	10%

3.3.2.1.1 Tensile property requirements for rounds over 8.000 in. (203.20 mm) in nominal diameter and for squares, rectangles, hexagons, and octagons having a cross-sectional area over 50 sq in. (323 cm^2) shall be as agreed upon by purchaser and vendor.

3.3.2.1.2 Yield strength and elongation requirements do not apply to product under 0.125 in. (3.18 mm) in nominal diameter or least distance between parallel sides.

3.3.2.2 Hardness: Should be not lower than 80 HB/10/500, 80 HB/14.3/1000, or 85 HB/10/1000 but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.3.2.1 are met.

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

3.5 Tolerances: Unless otherwise specified, tolerances 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 samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as Ø required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems 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 composition (3.1), tensile properties as solu- Ø tion heat treated (3.3.1.1), and tolerance (3.5) requirements are classified as acceptance tests.

4.2.2 Periodic Tests: Tests to determine conformance to hardness as solution heat treated (3.3.1.2), ten- Ø sile properties after precipitation heat treatment (3.3.2.1), and hardness after precipitation heat treatment (3.3.2.2) requirements are classified as periodic tests.

4.3 Sampling: Shall be in accordance with AMS 2355. Frequency and extent of sampling for periodic tests Ø shall be as agreed upon by purchaser and vendor.

4.4 Reports:

4.4.1 The vendor of the product 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, material specification number and its revision letter, size, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

Ø 4.5 Resampling and Retesting: Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification: The product shall be identified as follows: