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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4116E

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Submitted for recognition as an American National Standard

Superseding AMS 4116D

ALUMINUM ALLOY BARS, RODS, AND WIRE, COLD FINISHED
1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T4)

UNS A96061

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 requiring moderate ductility, formability, and response to precipitation heat treatment.

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 publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1 Aerospace Material Specifications:

AMS 2201 - Tolerances, Aluminum and Aluminum Alloy Bar, Rod, Wire, and Forging Stock, Rolled or Cold Finished
MAM 2201 - Tolerances, Metric, Aluminum and Aluminum Alloy Bar, Rod, Wire, and Forging Stock, Rolled, Drawn, or Cold Finished
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 2811 - Identification, Aluminum and Magnesium Alloy Wrought Products

REAFFIRMED
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2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 660 - Packaging/Packing of Aluminum and Magnesium Products

2.3 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

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
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: Cold finished 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 or MAM 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, minimum	30.0 ksi (207 MPa)
Yield Strength at 0.2% Offset, minimum	16.0 ksi (110 MPa)
Elongation in 4D, minimum	18%

3.3.1.1.1 Tensile property requirements for rounds over 8.000 inches (203.20 mm) in nominal diameter and for squares, rectangles, hexagons, and octagons having a cross-sectional area over 50 square inches (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 inch (3.18 mm) in nominal diameter or least distance between parallel sides.

3.3.1.2 Hardness: Should be 50 - 80 HB/10/500 or 55 - 85 HB/10/1000 or Ø equivalent 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, minimum	42.0 ksi (290 MPa)
Yield Strength at 0.2% Offset, minimum	35.0 ksi (241 MPa)
Elongation in 4D, minimum	10%

3.3.2.1.1 Tensile property requirements for rounds over 8.000 inches (203.20 mm) in nominal diameter and for squares, rectangles, hexagons, and octagons having a cross-sectional area over 50 square inches (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 inch (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 or 85 HB/10/1000, or Ø equivalent, 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 free from foreign materials and from imperfections detrimental to usage of the product.

3.5 Tolerances: Shall conform to all applicable requirements of AMS 2201 or MAM 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. 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 for composition (3.1), tensile properties as solution heat treated (3.3.1.1), and tolerances (3.5) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for hardness as solution heat treated (3.3.1.2) and tensile properties (3.3.2.1), and hardness (3.3.2.2) after precipitation heat treatment are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing: Shall be in accordance with AMS 2355 or MAM 2355.
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4.4 Reports: The vendor of the product shall furnish with each shipment a report stating that the product conforms to the chemical composition and other technical requirements. This report shall include the purchase order number, lot number, AMS 4116E, size, and quantity.

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

5. PREPARATION FOR DELIVERY:

5.1 Identification: Shall be in accordance with AMS 2811.
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5.2 Packaging:

5.2.1 The product shall be prepared for shipment in accordance with commercial
Ø practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

5.2.2 For direct U.S. Military procurement, packaging shall be in accordance
Ø with ASTM B 660, Commercial Level, unless Level A is specified in the request for procurement.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Product not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: The phi (Ø) symbol is used to indicate technical changes from the previous issue of this specification.

8.2 Dimensions and properties in inch/pound units are primary; dimensions and properties in SI units are shown as the approximate equivalents of the primary units and are presented only for information.

8.3 For direct U.S. Military procurement, purchase documents should specify not less than the following:

Title, number, and date of this specification
Form and size of product desired
Quantity of product desired
Level A packaging, if required (See 5.2.2).