



AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.

400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

SPECIFICATION

AMS 4119E

Superseding AMS 4119D

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UNS A92024

ALUMINUM ALLOY BARS, ROLLED, DRAWN, OR COLD FINISHED

4.4Cu - 1.5Mg - 0.60Mn (2024-T351)

Stress-Relief Stretched

1. SCOPE:

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

1.2 Application: Primarily for machined parts subject to excessive warpage during machining due to residual stresses and for parts requiring good strength and whose fabrication does not involve welding. Certain design and processing procedures may cause these products to be susceptible to stress-corrosion cracking; ARP 823 recommends practices to minimize such conditions.

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) and Aerospace Recommended Practices (ARP) 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

2.1.2 Aerospace Recommended Practices:

ARP 823 - Minimizing Stress Corrosion Cracking in Wrought Heat Treatable Aluminum Alloy Products

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

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3. TECHNICAL REQUIREMENTS:

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

	min	max
Copper	3.8	- 4.9
Magnesium	1.2	- 1.8
Manganese	0.30	- 0.9
Iron	--	0.50
Silicon	--	0.50
Zinc	--	0.25
Titanium	--	0.15
Chromium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

- 3.2 Condition: Rolled, drawn, or cold finished, as ordered, solution heat treated in accordance with MIL-H-6088, and stress-relieved by stretching to produce a nominal permanent set of 1-1/2%, but not less than 1% nor more than 3%.

- 3.2.1 Product shall receive no further straightening operations after stretching, unless specifically authorized by purchaser.

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

- 3.3.1 Tensile Properties: Shall be as follows, except as specified in 3.3.1.1 and 3.3.1.2:

Tensile Strength, min	62,000 psi (427 MPa)
Yield Strength at 0.2% Offset, min	45,000 psi (310 MPa)
Elongation in 4D, min	10%

- 3.3.1.1 Tensile property requirements for product under 0.500 in. (12.5 mm) in nominal diameter or distance between parallel sides, for rounds over 6.500 in. (165 mm) in nominal diameter, and for squares, hexagons, octagons, and rectangles over 4.000 in. (100 mm) in least dimension and having cross-sectional area over 36 sq in. (230 cm²) shall be as agreed upon by purchaser and vendor.

- 3.3.1.2 Yield strength and elongation requirements do not apply to product under 0.125 in. (3 mm) in nominal diameter or least distance between parallel sides.

- 3.3.2 Hardness: Should be not lower than 100 HB/10/500, 100 HB/14.3/1000, or 106 HB/10/1000 but the product shall not be rejected on the basis of hardness if the tensile property requirements 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 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 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 requirements for composition (3.1), tensile properties (3.3.1), and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for hardness (3.3.2) 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 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.

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:

5.1.1 Each straight bar and rod 0.500 in. (12.70 mm) and over in nominal diameter or least width of flat surface shall be marked in a row of characters recurring at intervals not greater than 3 ft (914 mm) with the alloy number and temper, AMS 4119 or applicable Federal or Military specification designation, and manufacturer's identification. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling. The markings shall have no deleterious effect on the product or its performance.