



AEROSPACE MATERIAL SPECIFICATION

AMS4116

REV. J

Issued 1960-06
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Superseding AMS4116H

Aluminum Alloy, Bars, Rods, and Wire
1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T4)
Cold Finished, Solution Heat Treated and Naturally Aged
(Composition similar to UNS A96061)

RATIONALE

AMS4116J revises Composition (Table 1), Properties (3.3), Classification of Tests (4.2), and Reports (4.4.1), and is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.1.1 This specification covers rounds 8.000 inches (203.20 mm) and under in nominal diameter and squares, rectangles, hexagons, and octagons having a cross-sectional area of 50 square inches (323 cm²) and under (See 8.6).

1.2 Application

These products have been used typically for parts requiring moderate ductility, formability, and response to precipitation heat treatment, 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.

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 of Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings

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AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

AS1990 Aluminum Alloy Tempers

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 Publications

Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, Tel: 212-642-4900, www.ansi.org.

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

Cold finished and solution heat treated in accordance with AMS2772 to the T4 temper (See AS1990).

3.3 Properties

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

3.3.1 As Solution Heat Treated and Naturally Aged to the T4 Temper

3.3.1.1 T4 Temper Tensile Properties

Shall be shown in Table 2, except as specified in 3.3.1.1.1 and 3.3.1.1.2.

Table 2 – T4 Temper minimum tensile properties

Property	Value
Tensile Strength	30.0 ksi (207 Mpa)
Yield Strength at 0.2% Offset	16.0 ksi (110 MPa)
Elongation in 4D	18%

3.3.1.1.1 Tensile property requirements shown in Table 2 apply to rounds 8.000 inches (203.20 mm) and under in nominal diameter and to squares, rectangles, hexagons, and octagons having a cross-sectional area of 50 square inches (323 cm²) and under.

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.

3.3.1.1.3 Mechanical property requirements for product outside the range covered by 1.1 shall be agreed upon between purchaser and producer.

3.3.2 Response to Heat Treatment and Temper Conversion

3.3.2.1 Response to Heat Treatment (T4 to T42 temper)

When specified, product in the T4 temper (without the subsequent imposition of cold working or forming operations) after solution heat treatment and natural aging to the T42 temper (See AS1990) in accordance with AMS2772, shall have the properties shown in 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 Temper Conversion (T4 to T62 temper)

Product in the T4 temper, after precipitation heat treatment to the T62 temper (See AS1990) in accordance with AMS2772, shall have the following properties shown in Table 3.

3.3.2.3 T42 and T62 Temper Tensile Properties

Shall be as shown in Table 3, except as specified in 3.3.2.3.1 and 3.3.2.3.2.

Table 3 – T42 and T62 temper minimum tensile properties

Temper	Tensile Strength ksi	Yield Strength at 0.2%	Elongation in 2 inches or 4D
	(MPa)	Offset ksi (MPa)	
T42	30.0 (207)	14.0 (97)	18
T62	42.0 (290)	35.0 (241)	10

3.3.2.3.1 Tensile property requirements shown in Table 3 apply to rounds 8.000 inches (203.20 mm) and under in nominal diameter and to squares, rectangles, hexagons, and octagons having a cross sectional area of 50 square inches (323 cm²) and under.

3.3.2.3.2 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.

3.4 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 ANSI H35.2 or ANSI H35.2M.

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 solution heat treated and naturally aged (3.3.1.1), response to temper conversion, T4 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, T4 to T42 temper (3.3.2.1) is an acceptance test when specified by the purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The vendor of the product shall furnish with each shipment a report stating that the product conforms to the composition and tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements and to the periodic tests, when performed. This report shall include the purchase order number, inspection lot number(s), AMS4116J, size, and quantity. This report shall also identify the producer, the producer lot number(s) and the size of the mill product.

4.4.1 When the product is outside the range covered by 1.1.1, the report shall contain a statement to that effect.

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B666/B666M.

5.2 Packaging

The product shall be prepared for shipment in accordance with ASTM B660 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.