

AEROSPACE MATERIAL SPECIFICATION

SAE AMS4116

REV. H

Issued 1960-06
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Revised 2009-07

Superseding AMS4116G

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

AMS4116H results from a Five Year Review and update of this specification in order to permit supersession of AMS-QQ-A-225/8A by this specification.

1. SCOPE

1.1 Form

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

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 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
AMS2772	Heat Treatment of Aluminum Alloy Raw Materials
AS1990	Aluminum Alloy Tempers

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SAE WEB ADDRESS:

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 B 660 Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, 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	0.80
Iron	--	0.70
Copper	0.15	0.40
Manganese	--	0.15
Magnesium	0.80	1.20
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.

3.3.1.1 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 - 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.

3.3.2 Response to Heat Treatment

3.3.2.1 Response to Re-heat Treatment (T4 to T42)

When specified, the product, as received by purchaser, without the subsequent imposition of cold working or forming operations, shall have the properties of Table 3, after proper solution heat treatment and natural aging to the T42 condition (See AS1990) in accordance with AMS2772.

3.3.2.1.1 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 Heat Treatment to –T62 Condition

The product shall have the following properties (Table 3) after being aged in accordance with AMS2772 to the –T62 condition (See AS1990).

3.3.2.3 Tensile Properties

Shall be as shown in Table 3, except as specified in 3.3.2.1.1 and 3.3.2.1.2.

TABLE 3 - MINIMUM TENSILE PROPERTIES

Temper	Tensile Strength ksi (MPa)	Yield Strength at 0.2% Offset ksi (MPa)	Elongation in 2 inches or 4D
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 heat treatment to – T62 condition (3.3.2.2) and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot. Response to re-heat treatment (3.3.2.1) is an acceptance test when specified by the purchaser.

4.2.2 Periodic Tests

Tensile properties (3.3.2.1) 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 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), AMS4116H, size, and quantity. This report shall also identify the producer, the producer lot number(s) and the size of the mill product.

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B 666/B 666M.

5.2 Packaging

The product shall be prepared for shipment in accordance with ASTM B 660 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.

6. ACKNOWLEDGMENT

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