SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS4306 | REV. B

Issued 1988-10
Revised 2007-05
Reaffirmed 2012-09

Superseding AMS4306A

Aluminum Alloy, Plate
6.4Zn - 2.4Mg - 2.2Cu - 0.12Zr (7150-T6151)
Solution Heat Treated, Stress Relieved, and Aged
(Composition similar to UNS A97150)

RATIONALE

AMS4306B has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of plate.

1.2 Application

This plate has been used typically for parts requiring a high level of mechanical properties and moderate resistance to exfoliation corrosion (see 8.2), but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause this plate to become susceptible to stress-corrosion cracking; ARP823 recommends practices to minimize such conditions.

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

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.

AMS 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products
AS1990	Aluminum Alloy Tempers

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4306B

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 594	Ultrasonic Inspection of Aluminum-Alloy Products for Aerospace Applications
ASTM B 645	Plane Strain Fracture Toughness Testing of Aluminum Alloys
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum Products
ASTM E 602	Sharp-Notch Tension Testing with Cylindrical Specimens
ASTM E 1304	Plain-Strain (Chevron Notch) Fracture Toughness of Metallic Materials

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 AMS 2355.

TABLE 1 - Composition

Element	min	max
Silicon	--	0.12
Iron	--	0.15
Copper	1.9	2.5
Manganese	--	0.10
Magnesium	2.0	2.7
Chromium	--	0.04
Zinc	5.9	6.9
Titanium	--	0.06
Zirconium	0.08	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Solution heat treated, stretched to produce a nominal permanent set of 2% but not less than 1-1/2% nor more than 3%, and aged to T6151 (See AS 1990). Solution heat treatment shall be performed in accordance with AMS 2772.

3.2.1 Plate shall receive no further straightening operations after stretching.

3.3 Properties

Plate shall conform to the following requirements, determined on the mill produced size in accordance with AMS 2355 except as specified in 3.3.3.1.1 and 3.3.3.1.2.

3.3.1 Tensile Properties

Shall be as specified in Table 2. Tensile requirements apply in the long-transverse direction except when purchaser specifies that both longitudinal and long-transverse properties apply.

TABLE 2A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inches	Specimen Orientation	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D %
0.750 to 1.000, incl	Longitudinal	85.0	79.0	9
	Long-Trans.	84.0	78.0	9
Over 1.000 to 1.500, incl	Longitudinal	86.0	80.0	9
	Long-Trans.	85.0	77.0	9

TABLE 2B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Thickness mm	Specimen Orientation	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
19.05 to 25.40, incl	Longitudinal	586	545	9
	Long-Trans.	579	538	9
Over 25.40 to 38.10, incl	Longitudinal	593	552	9
	Long-Trans.	586	531	9

3.3.2 Corrosion Resistance

Electrical conductivity, determined on the surface of the plate, shall be 29.0 to 33.5% IACS (International Annealed Copper Standard) (16.8 to 19.4 MS/m). (See 8.3).

3.3.3 Fracture Toughness

When tested, plate 0.750 to 1.500 inch (19.05 to 38.10 mm), inclusive, in nominal thickness shall have K_{Ic} not lower than 22 ksi $\sqrt{\text{inch}}$ (24 MPa $\sqrt{\text{m}}$), determined in the LT direction using full thickness specimens and specimen configurations conforming to ASTM B 645.

3.3.3.1 Notch Tensile Strength/Tensile Yield Strength (NTS/TYS) Ratios

The producer may guarantee that plate meets the fracture toughness (K_{Ic}) requirements based on correlation with notch tensile strength/tensile yield strength (NTS/TYS) ratio, determined in accordance with 3.3.3.1.1, or correlation with the short-bar fracture toughness results, determined in accordance with 3.3.3.1.2 in lieu of determining fracture toughness (3.3.3), provided that correlation between the two tests for the plate has been established.

3.3.3.1.1 For plate 0.750 to 1.500 inch (19.05 to 38.10 mm), inclusive, in nominal thickness, notch tensile strength shall be determined in accordance with ASTM E 602 on specimens taken in the longitudinal direction. The longitudinal notch tensile strength shall be divided by the tensile yield strength, determined for the same direction, to obtain the NTS/TYS ratio.

3.3.3.1.2 Short-Bar Fracture Toughness

Shall be not lower than 22 ksi $\sqrt{\text{inch}}$ (24 MPa $\sqrt{\text{m}}$), determined in accordance with ASTM E 1304.

3.4 Quality

Plate, 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 plate.

3.4.1 Plate 0.750 to 1.500 inches (19.05 to 38.10 mm), inclusive, in nominal thickness and weighing 2000 pounds (907 kg) and under shall be ultrasonically inspected in accordance with ASTM B 594 and shall meet ultrasonic class A.

3.4.1.1 The ultrasonic class for plate under 0.750 inch (19.05 mm) or over 1.500 inches (38.10 mm) in nominal thickness or weighing over 2000 pounds (907 kg) may be as agreed upon by purchaser and vendor.

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 plate 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 plate conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), long-transverse tensile properties (3.3.1) and, when specified, longitudinal tensile properties (3.3.1), ultrasonic soundness (3.4.1), and tolerances (3.5) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests

Corrosion resistance (3.3.2) and fracture toughness (3.3.3) 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 and the following:

4.3.1 Tensile specimens shall be taken with the axis of specimens in the long-transverse direction and, when specified, in the longitudinal direction.

4.3.2 Specimens for corrosion resistance testing (3.3.2) shall be taken from the samples used for long-transverse tensile testing.

4.4 Reports

The vendor of plate shall furnish with each shipment a report stating that the plate conforms to the composition and showing the numerical results of tests to determine conformance to the other acceptance tests requirements and, when performed, to the periodic test requirements. This report shall include the purchase order number, lot number, AMS 4306B, size, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.

4.5 Resampling and Retesting

Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

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