AEROSPACE MATERIAL SPECIFICATION

AMS4354™	REV. B
Issued 2016-01 Revised 2024-12 Superseding AMS4354A	

Aluminum Alloy, Plate,
7.9Zn - 1.8Cu - 2.0Mg - 0.10Zr (7099-T7451)
Solution Heat Treated, Stress Relieved, and Overaged

RATIONALE

AMS4354B is a limited scope revision to correct a reference value for Electrical Conductivity (see 3.3.2.1) and relocate Definitions (see 2.4).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of plate from 1.000 to 6.000 inches (25.40 to 152.40 mm) in thickness (see 8.6).

1.2 Application

This plate has been used typically for parts requiring a high level of mechanical properties and good resistance to stress-corrosion cracking, 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, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

AS7766 Terms Used in Aerospace Metals Specifications

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**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4354B/

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 B594	Ultrasonic Inspection of Aluminum-Alloy Wrought Products
ASTM B660	Packing/Packaging of Aluminum and Magnesium Products
ASTM B666/B666M	Identification Marking of Aluminum and Magnesium Products
ASTM E466	Conducting Force Controlled Constant Amplitude Axial Fatigue Tests of Metallic Materials
ASTM G34	Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)
ASTM G47	Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products

2.3 ANSI Accredited Publications

Copies of these documents are available online at https://webstore.ansi.org/.

ANSI H35.1/H35.1M	Standard Alloy and Temper Designation System for Aluminum
ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M	Dimensional Tolerances for Aluminum Mill Products (Metric)

2.4 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

Table 1 - Composition

Element	Min	Max
Silicon	--	0.12
Iron	--	0.15
Copper	1.4	2.1
Manganese	--	0.04
Magnesium	1.6	2.3
Chromium	--	0.04
Zinc	7.4	8.4
Titanium	--	0.06
Zirconium	0.05	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 precipitation heat treated to the T7451 temper (refer to ANSI H35.1/H35.1M). Solution and precipitation heat treatment shall be performed in accordance with AMS2772 as applicable to 7XXX alloys. The actual practices are considered proprietary.

3.2.1 Plate shall receive no further straightening operations after stretching.

3.3 Properties

Plate shall conform to the following requirements, determined in accordance with AMS2355 on the mill-produced size and as specified herein:

3.3.1 Tensile Properties

Shall be as specified in Table 2.

3.3.1.1 Mechanical property requirements for product outside the range covered by Table 2 shall be agreed upon between the purchaser and producer and reported in 4.4.1.

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 %
1.000 to 1.500, incl	Longitudinal	77.0	71.0	11
	Long-Trans.	77.0	70.0	10
1.501 to 2.000, incl	Longitudinal	76.0	71.0	11
	Long-Trans.	77.0	69.0	9
	Short-Trans.	76.0	65.0	6
2.001 to 3.000, incl	Longitudinal	76.0	70.0	10
	Long-Trans.	76.0	68.0	8
	Short-Trans.	74.0	64.0	5
3.001 to 4.000, incl	Longitudinal	75.0	69.0	9
	Long-Trans.	76.0	68.0	7
	Short-Trans.	74.0	63.0	4
4.001 to 5.000, incl	Longitudinal	75.0	69.0	9
	Long-Trans.	75.0	68.0	6
	Short-Trans.	74.0	63.0	3
5.001 to 6.000, incl	Longitudinal	74.0	68.0	8
	Long-Trans.	75.0	67.0	5
	Short-Trans.	73.0	62.0	3

Table 2B - Minimum tensile properties, SI units

Nominal Thickness Millimeters	Specimen Orientation	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
25.40 to 38.10, incl	Longitudinal	531	490	11
	Long-Trans.	531	483	10
Over 38.10 to 50.80, incl	Longitudinal	524	490	11
	Long-Trans.	531	476	9
	Short-Trans.	524	448	6
Over 50.80 to 76.20, incl	Longitudinal	524	483	10
	Long Trans.	524	469	8
	Short-Trans.	510	441	5
Over 76.20 to 101.60, incl	Longitudinal	517	476	9
	Long-Trans.	524	469	7
	Short-Trans.	510	434	4
Over 101.60 to 127.00, incl	Longitudinal	517	476	9
	Long-Trans.	517	469	6
	Short-Trans.	510	434	3
Over 127.00 to 152.40, incl	Longitudinal	510	469	8
	Long-Trans.	517	462	5
	Short-Trans.	503	427	3

3.3.2 Corrosion Resistance

Resistance to stress-corrosion cracking and to exfoliation corrosion shall be acceptable if the plate conforms to the requirements of 3.3.2.1 and 3.3.2.2.

3.3.2.1 Electrical Conductivity

Shall be not lower than 39.0% IACS (International Annealed Copper Standard) (22.6 MS/m), determined on the surface of the plate.

3.3.2.2 Plate not meeting the requirements of 3.3.2.1 may be given additional precipitation heat treatment or reheat treated. After such treatment, if all specified properties are met, the plate is acceptable.

3.3.3 Exfoliation-Corrosion Resistance

Plate shall not exhibit exfoliation corrosion greater than that illustrated by Photo A, Figure 2, of ASTM G34.

3.3.4 Stress-Corrosion Cracking

Specimens shall be tested in accordance with ASTM G47 and shall show no evidence of stress-corrosion cracking when stressed in the short-transverse direction to 35 ksi (240 MPa).

3.3.5 Fatigue Resistance

When specified, 4.001- to 6.000-inch (over 101.60- to 152.40-mm) thick plate shall be tested in accordance with ASTM E466. When tested at a stress ratio of R = 0.1 at a maximum stress of 35.0 ksi (241 MPa), the fatigue life shall meet the requirements of Table 3 (see 8.6).

Table 3 - Fatigue life requirements

Minimum Cycles per Test	90000 cycles
Lot Log Average of Four Tests, Min	120000 cycles
Runout	200000 cycles

3.4 Quality

Plate, as received by the 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 When specified, each plate 1.000 to 6.000 inches (25.40 to 152.40 mm) in nominal thickness shall be ultrasonically inspected in accordance with ASTM B594 and shall meet the requirements of 3.4.1.1 (see 8.6).

3.4.1.1 Plates shall meet the requirements for ultrasonic class A for plate 1.000 to 6.000 inches (25.40 to 152.40 mm) in nominal thickness.

3.5 Tolerances

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of plate shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the plate conforms to the specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), tensile properties (see 3.3.1), corrosion resistance (see 3.3.2), tolerances (when specified) (see 3.5), fatigue resistance (see 3.3.5), and ultrasonic soundness (when specified) (see 3.4.1) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests

Exfoliation-corrosion resistance (see 3.3.3) and stress-corrosion cracking (see 3.3.4) are periodic tests and shall be performed at a frequency selected by the producer unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355 and the following:

4.3.1 Tensile Testing

Tensile specimens shall be taken with axis of specimens parallel to each applicable grain flow direction specified in Table 2.

4.3.2 Fatigue Resistance Testing

Two specimens for fatigue testing shall be taken from each end of the parent plate in the long-transverse grain direction. These specimens are to be removed from the T/2, W/2 location. Fatigue testing shall be conducted in air at 70 °F ± 5 °F (21 °C ± 3 °C) with a relative humidity of 30 to 50% using a frequency of 10 to 50 Hz. The test specimens shall meet the following requirements: