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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4250

Issued SEP 2001

Aluminum Alloy, Plate
8.1Zn - 2.3Mg - 1.0Cu - Zr (7449-T7651)
Solution Heat Treated, Stress Relieved, and Overaged

(Composition similar to UNS A97449)

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 structural applications requiring a combination of high tensile strength and compressive properties and good exfoliation corrosion resistance, 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or 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
MAM 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
AMS 2750	Pyrometry

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM B 557	Tension Testing of Wrought and Cast Aluminum and Magnesium Alloy Parts
ASTM B 594	Ultrasonic Inspection of Aluminum Alloy Products for Aerospace Applications
ASTM B 645	Plain Strain Fracture Toughness Testing of Metallic Materials
ASTM B 660	Packing/Packaging of Aluminum Alloy and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum and Magnesium Products
ASTM E 9	Compressive Testing of Metallic Materials at Room Temperature
ASTM E 399	Plain-Strain Fracture Toughness of Metallic Materials
ASTM G 34-72	Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)
ASTM G 47	Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products

2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

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 or MAM 2355.

TABLE 1 - Composition

Element	min	max
Silicon	--	0.12
Iron	--	0.15
Copper	1.4	2.1
Manganese	--	0.20
Magnesium	1.8	2.7
Zinc	7.5	8.7
Titanium + Zirconium	--	0.25
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 T7651 temper.

3.2.1 Heat Treatment: Plate shall be solution heat treated by heating to 870 to 890 °F (465 to 475 °C), holding at heat for a time commensurate with section thickness, and rapid cooling in a suitable quenching medium; overaging shall be performed at a temperature, for a time, and cooling as required to meet requirements of 3.4. Pyrometry shall be in accordance with AMS 2750.

3.3 Properties:

Plate shall conform to the following requirements, determined on the mill produced size in accordance with AMS 2355 or MAM 2355 and as specified herein.

3.3.1 Tensile Properties: Shall be as specified in Table 2, when tested in accordance with ASTM B 557.

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 %
0.250 to 1.500, incl	Longitudinal	84	78	8
	Long-Transverse	84	77	8
Over 1.500 to 2.500, incl	Longitudinal	82	76	7
	Long-Transverse	82	75	6
	Short-Transverse	77	67	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 %
6.35 to 38.10, incl	Longitudinal	579	538	8
	Long-Transverse	579	531	8
Over 38.10 to 63.50, incl	Longitudinal	565	524	7
	Long-Transverse	565	517	6
	Short-Transverse	531	462	3

3.3.2 Compressive Yield Strength: When specified, the compressive and yield strength, determined in accordance with ASTM E 9, shall be as shown in Table 3.

TABLE 3 - Minimum Compressive Yield Strength, Inch/Pound and SI Units

Nominal Thickness Inches	Nominal Thickness Millimeters	Specimen Orientation	Compressive Yield Strength ksi	Compressive Yield Strength MPa
0.250 to 1.500, incl	6.35 to 38.10, incl	Longitudinal	77	531
		Long-Transverse	81	559
Over 1.500 to 2.500, incl	Over 38.10 to 63.5, incl	Longitudinal	75	517
		Long-Transverse	79	545

3.3.3 Corrosion Resistance:

3.3.3.1 Exfoliation-Corrosion Resistance: Specimens from plate shall show exfoliation corrosion at a T/10 plane not greater than EB when tested at the T/10 plane that illustrated by Photo B, Figure 2, of ASTM G 34-72.

3.3.3.2 Stress-Corrosion Cracking:

3.3.3.2.1 Specimens, cut from plate 0.750 inch (19.05 mm) and over in nominal thickness, shall show no evidence of stress-corrosion cracking when stressed in the short transverse direction to 25 ksi (172 MPa).

3.3.3.2.2 Specimens, cut from plate 0.250 inch (6.35 mm) and over in nominal thickness, shall show no evidence of stress-corrosion cracking when stressed in the long transverse direction to 58 ksi (400 MPa).

3.3.4 Fracture Toughness: Plane-strain fracture toughness (K_{IC}) for the L-T and T-L specimen orientations and configurations conforming to ASTM E 399 shall be not lower than the values specified in Table 4 for plate 0.750 to 2.500 inches (19.05 to 63.5 mm) in nominal thickness.

TABLE 4 - Minimum Fracture Toughness Parameters

Nominal Thickness Inches	Nominal Thickness Millimeters	Specimen Orientation	K_{IC} ksi $\sqrt{in}$	K_{IC} MPa $\sqrt{m}$
0.750 to 2.500, incl	19.05 to 63.5, incl	L-T	22.0	24.2
		T-L	20.0	22.0

3.3.5 Electrical Conductivity: Should be not lower than 36.0% IACS (International Annealed Copper Standard) (20.9 MS/m), except that electrical conductivity shall be determined and reported but shall not be cause for rejection of the plate.

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 Each plate 0.500 inch (12.70 mm) and over in nominal thickness shall be ultrasonically inspected in accordance with ASTM B 594 and shall meet ultrasonic Class A requirements.

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 the specified requirements.