SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4299

Issued 2005-01
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Superseding

Aluminum Alloy, Plate (7449-T7951)
8.1Zn - 1.8Cu - 2.3Mg
Solution Heat Treated, Stress Relieved, and Overaged
(Composition similar to UNS A97449)

RATIONALE

AMS4299 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 product has been used typically for parts requiring high mechanical properties and moderate fracture toughness, 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
AMS 2772	Heat Treatment of Aluminum Allow Raw Materials
AS1990	Aluminum Alloy Tempers

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http://www.sae.org/technical/standards/AMS4299

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM B 557	Tension Testing of Wrought and Cast Aluminum and Magnesium Alloy Products
ASTM B 594	Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications
ASTM B 645	Plane Strain Fracture Toughness Testing of Aluminum Alloys
ASTM T 660	Packaging/Packaging of Aluminum and Magnesium Products
ASTM B 666/666M	Identification Marking of Aluminum and Magnesium Products
ASTM E 9	Compressive Testing of Metallic Materials at Room Temperature
ASTM E 399	Plane Strain Fracture Toughness of Metallic Materials
ASTM E 561	Practice for R-Curve Determination
ASTM G 47	Determining Susceptibility to Stress-Corrosion cracking of High-Strength Aluminum Alloy Products

2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036 or 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	1.4	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	

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3.2 Condition:

Solution heat treated, stress relieved by stretching to produce a nominal permanent set of 1.5%, but not less than 1% nor more than 3%, and overaged to the T7951 temper. (See AS1990).

3.2.1 Product shall receive no further straightening operations after stretching.

3.3 Heat Treatment:

Shall be in accordance with AMS 2772 and as follows:

3.3.1 Solution Heat Treatment: Heat to 860 to 890 °F (460 to 477 °C), hold at heat for a time commensurate with product thickness, rapidly cool in a suitable quenching medium.

3.3.2 Overaging Heat Treatment: Overaging shall be performed at a specific temperature and time as required to meet requirements of 3.4. (See 8.2).

3.4 Properties:

The product shall conform to the following requirements, determined in accordance with AMS 2355 on the mill product.

3.4.1 Tensile Properties: Shall be as specified in Table 2.

TABLE 2A – Minimum Tensile Properties, Inch/Pound Units

Nominal Thickness Inch(es)	Specimen Orientation	Tensile Strength ksi	Yield Strength At 0.2% Offset ksi	Elongation in 2 inches or 4D %
0.500 to 1.000, incl	Longitudinal Long-Transverse	88.0 88.0	84.0 84.0	8 7
1.000 to1.500, incl	Longitudinal Long-Transverse	87.0 87.0	84.0 82.0	8 7
1.501 to 2.000, incl	Longitudinal Long-Transverse Short-Transverse	84.0 86.0 84.0	82.0 81.0 74.0	6 6 2
2.001 to 2.500, incl	Longitudinal Long-Transverse Short-Transverse	81.0 84.0 84.0	80.0 80.0 73.0	6 6 2

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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 %
Over 12.7 to 25.4, incl	Longitudinal	607	579	8
	Long-Transverse	607	579	7
Over 25.4 to 38.1, incl	Longitudinal	600	579	8
	Long-Transverse	600	565	7
Over 38.1 to 50.8, incl	Longitudinal	579	565	6
	Long-Transverse	593	558	6
	Short-Transverse	579	510	2
Over 50.8 to 63.5, incl	Longitudinal	558	552	6
	Long-Transverse	579	552	6
	Short-Transverse	579	503	2

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

TABLE 3 – Minimum Longitudinal Compressive Yield Strength

Nominal Thickness Inches	Nominal Thickness Millimeters	Compressive Yield Strength ksi	Compressive Yield Strength MPa
0.500 to 1.000, incl	12.7 to 25.4, incl	83.0	572
Over 1.000 to 1.500, incl	Over 25.4 to 38.1, incl	82.0	565
Over 1.500 to 2.500, incl	Over 38.1 to 63.5, incl	78.0	534

3.4.3 Corrosion Resistance:

3.4.3.1 Stress-Corrosion Cracking: 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 16.0 ksi (110 Mpa) in accordance with ASTM G 47.

3.4.4 Fracture Toughness: Plain-strain fracture toughness (K_{IC}) for the L-T and T-L specimen orientations and configurations conforming to ASTM E 399 and ASTM B 645 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.

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TABLE 4 - Minimum Fracture Toughness Parameters

Nominal Thickness Inches	Nominal Thickness Millimeters	Specimen Orientation	K_{IC} ksi √inch	K_{IC} MPa √m
0.750 to 1.000, incl	19.07 to 25.4, incl	L-T	21	23
		T-L	19	21
Over 1.000 to 1.500, incl	Over 25.4 to 38.1, incl	L-T	21	23
		T-L	19	21
Over 1.500 to 2.500, incl	Over 38.1 to 63.5, incl	L-T	20	22
		T-L	18	20