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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4205B

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Superseding AMS 4205A

Submitted for recognition as an American National Standard

ALUMINUM ALLOY, PLATE
6.2Zn - 1.8Cu - 2.4Mg - 0.1 3Zr (7010-T73651) or (7010-T7451)
Solution Heat Treated, Stress Relieved, and Precipitation Heat Treated

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 higher tensile strength than 7010-T7351 and good resistance to stress-corrosion cracking, exfoliation corrosion, and fracture toughness, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2202	Tolerances, Aluminum Alloy and Magnesium Alloy Sheet and Plate
MAM 2202	Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Sheet and Plate
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 2811	Identification, Aluminum and Magnesium Alloy Wrought Products

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 594	Ultrasonic Examination of Aluminum-Alloy Wrought 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 G 34	Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)

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
Zinc	5.7	6.7
Copper	1.5	2.0
Magnesium	2.1	2.6
Zirconium	0.10	0.16
Iron	--	0.15
Silicon	--	0.12
Manganese	--	0.10
Titanium	--	0.06
Nickel	--	0.05
Chromium	--	0.05
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition:
(R)

Solution heat-treated, stress relieved by stretching to produce a nominal permanent set of 2% but not less than 1-1/2% nor more than 3%, and precipitation heat treated.

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 AMS 2355 or MAM 2355 and as specified herein.

3.3.1 Tensile Properties: Shall be as shown in Table 2.
(R)

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 %
Up to 2.000, incl	Longitudinal	71.0	62.0	9
	Long-Trans.	72.0	62.0	6
Over 2.000 to 2.500, incl	Longitudinal	71.0	62.0	9
	Long-Trans.	72.0	62.0	6
	Short-Trans.	67.0	57.0	2.5
Over 2.500 to 4.000, incl	Longitudinal	70.0	61.0	9
	Long-Trans.	71.0	61.0	6
	Short-Trans.	66.0	56.0	2
Over 4.000 to 5.000, incl	Longitudinal	68.0	59.0	9
	Long-Trans.	69.0	59.0	5
	Short-Trans.	65.0	54.0	2
Over 5.000 to 5.500, incl	Longitudinal	66.0	57.0	8
	Long-Trans.	67.0	57.0	5
	Short-Trans.	63.0	53.0	2

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 %
Up to 50.80, incl	Longitudinal	490	427	9
	Long-Trans.	496	427	6
Over 50.80 to 63.50, incl	Longitudinal	490	427	9
	Long-Trans.	496	427	6
	Short-Trans.	462	393	2.5
Over 63.50 to 101.60, incl	Longitudinal	483	421	9
	Long-Trans.	490	421	6
	Short-Trans.	455	386	2
Over 101.60 to 127.00, incl	Longitudinal	469	407	9
	Long-Trans.	476	407	5
	Short-Trans.	448	372	2
Over 127.00 to 139.70, incl	Longitudinal	455	393	8
	Long-Trans.	462	393	5
	Short-Trans.	434	365	2

3.3.2 Conductivity: Shall be not lower than 40.0% IACS (International Annealed Copper Standard) (23.2 MS/m), determined on specimens as in 4.3.1.

3.3.2.1 If the conductivity is below 40.0% IACS (23.2 MS/m), the plate is not acceptable.

3.3.2.2 Plate found to be unacceptable may be given additional precipitation heat treatment and if, upon completion of such treatment, plate develops conductivity/property relationships conforming to 3.3.1 and 3.3.2, plate shall be acceptable.

3.3.3 Fracture Toughness: When specified, specimens as in 4.3.1 from plate shall meet the values of K_{ic} specified in Table 3, determined in accordance with ASTM B 645. The required test direction shall be specified by purchaser.

TABLE 3A - Minimum K_{ic} Values, Inch/Pound Units

Nominal Thickness Inches	Test Direction	ksi $\sqrt{\text{inch}}$
2.000 to 5.500, incl	L-T	24.0
	T-L	22.0
	S-L	20.0

TABLE 3B - Minimum K_{ic} Values, Sl Units

Nominal Thickness Millimeters	Test Direction	MPa $\sqrt{m}$
50.80 to 139.70	L-T	26.4
	T-L	24.2
	S-L	22.0

3.3.4 (R) Exfoliation Resistance: Plate shall achieve an exfoliation rating of EA or better, as illustrated in ASTM G 34 at the T/10 plane.

3.3.5 Stress-Corrosion Cracking Resistance: Specimens 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 50% of the specified minimum long-transverse yield strength for plate 3 inches (76 mm) and under in nominal thickness and to 35.0 ksi (241 MPa) for plate over 3 inches (76 mm) in nominal thickness.

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 When specified, plate weighing 2000 pounds (907 kg) and under, inspected in accordance with ASTM B 594, shall meet the requirements shown in Table 4 for ultrasonic class.

TABLE 4 - Ultrasonic Class

Nominal Thickness Inches	Nominal Thickness Millimeters	Class
0.500 to 1.500, excl	12.70 to 38.10, excl	B
Over 1.500 to 3.000, incl	38.10 to 76.20, incl	A
Over 3.000 to 4.500, incl	Over 76.20 to 114.30, incl	B

3.5 Tolerances:

Shall conform to all applicable requirements of AMS 2202 or MAM 2202.

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 performing 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 requirements of this specification.