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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 4100B

Issued 16 JUL 1979
Revised 1 APR 1993
Superseding AMS 4100A

Submitted for recognition as an American National Standard

ALUMINUM ALLOY SHEET, ALCLAD
5.7Zn - 2.2Mg - 1.6Cu - 0.22Cr (ALC 7475-T761)
Solution and Precipitation Heat Treated

UNS A87475

1. SCOPE:

1.1 Form:

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

1.2 Application:

This sheet has been used typically for structural applications requiring material with high strength and resistance to exfoliation-corrosion, moderate fatigue strength, and high 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

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2.2 ASTM Publications:

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

ASTM B 660 Packaging/Packing of Aluminum and Magnesium Products
 ASTM E 338 Sharp-Notch Tension Testing of High-Strength Sheet Materials
 ASTM G 34 Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series
 Aluminum Alloys (EXCO Test)

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-H-6088 Heat Treatment of Aluminum Alloys

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 1A - Composition, Core (7475)

Element	min	max
Zinc	5.2	6.2
Magnesium	1.9	2.6
Copper	1.2	1.9
Chromium	0.18	0.25
Iron	--	0.12
Silicon	--	0.10
Manganese	--	0.06
Titanium	--	0.06
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

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TABLE 1B - Composition, Cladding (7072)

Element	min	max
Zinc	0.8	1.3
Silicon + Iron	--	0.7
Magnesium	--	0.10
Copper	--	0.10
Manganese	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: (R)

Solution and precipitation heat treated in accordance with MIL-H-6088.

3.3 Properties:

Sheet 0.040 inch (1.02 mm) and over in nominal thickness shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355 except that notch tensile testing shall be performed as in 3.3.3.1. Tensile properties, notch tensile strength/tensile yield strength ratio, and critical-stress-intensity factor requirements for sheet under 0.040 inch (1.02 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

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

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

Nominal Thickness Inch	Tensile Strength ksi	Yield Strength at 2% Offset ksi	Elongation in in 2 Inches or 4D
0.040 to 0.062, incl	66.0	55.0	9
Over 0.062 to 0.187, incl	68.0	57.0	9
Over 0.187 to 0.249, incl	70.0	60.0	9

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TABLE 2B - Minimum Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 2% Offset MPa	Elongation in 50.8 mm or 4D
1.02 to 1.57, incl	455	379	9
Over 1.57 to 4.75, incl	469	393	9
Over 4.75 to 6.32, incl	483	414	9

3.3.2 Fracture Toughness: Plane-strain fracture toughness, K_{Qc} , shall be as shown in Table 3.

TABLE 3 - Minimum Fracture Toughness Properties

Nominal Thickness Inch	Nominal Thickness Millimeters	Specimen Orientation	K_{Qc} ksi $\sqrt{\text{inch}}$	K_{Qc} MPa $\sqrt{\text{m}}$
0.040 to 0.125, incl	1.02 to 3.18, incl	T-L	87.0	95.6
0.040 to 0.125, incl	1.02 to 3.18, incl	L-T	100	110
Over 0.125 to 0.249, incl	Over 3.18 to 6.32, incl	T-L	80.0	87.9

3.3.3 Notch Tensile Strength/Tensile Yield Strength Ratio (NTS/TYS): The producer may indicate that the sheet meets the fracture toughness, K_{Qc} requirements based on correlation with notch tensile strength/tensile yield strength (NTS/TYS) ratio in lieu of determining fracture toughness provided that correlation has been established between the two tests.

3.3.3.1 Notch tensile strength in the long-transverse direction shall be determined in accordance with ASTM E 338. The values shall be divided by the long-transverse tensile yield strength to obtain the NTS/TYS ratio.

3.3.4 Corrosion Resistance Indicator Test:

3.3.4.1 If the electrical conductivity is 39.0% IACS (International Annealed Copper Standard) (22.6 MS/m) or higher and the yield strength does not exceed the specified minimum by 9000 psi (62 MPa) or more, the plate is acceptable.

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3.3.4.2 If the electrical conductivity is 39.0% IACS (22.6 MS/m) or higher and the yield strength exceeds the specified minimum by 9000 psi (62 MPa) or more or if the conductivity is at least 38.0% IACS (22.0 MS/m) but less than 39.0% IACS (22.6 MS/m) and tensile properties meet specified requirements, sheet shall be given additional precipitation heat treatment and then retested.

3.3.4.3 If the electrical conductivity is lower than 38.0% IACS (22.0 MS/m), sheet shall be reheat treated and retested.

3.3.5 Exfoliation Resistance: Sheet shall not exhibit exfoliation corrosion at any plane greater than that illustrated by Photo B, Figure 2, of ASTM G 34. The cladding shall be removed from the test surface. For sheet 0.100 inch (2.54 mm) or thicker, 10% of the thickness shall be removed by machining one surface. The cladding present on the surface opposite the test surface shall also be removed or masked off.

3.3.6 Cladding Thickness Per Side: Shall be as shown in Table 4.

TABLE 4 - Cladding Thickness

Nominal Sheet Thickness Inch	Nominal Sheet Thickness Millimeters	Cladding Thickness % of Sheet Thickness Nominal	Cladding Thickness % of Sheet Thickness Minimum Average
Up to 0.062, incl	Up to 1.57, incl	4	3.2
Over 0.062 to 0.187, incl	Over 1.57 to 4.75, incl	2.5	2.0
Over 0.187 to 0.249, incl	Over 4.75 to 6.32, incl	1.5	1.2

3.4 Quality:

Sheet, 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 sheet.

3.5 Tolerances:

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

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

(R)

The vendor of sheet 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 sheet conforms to the requirements of this specification.