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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4207A

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Reaffirmed APR 1994

Submitted for recognition as an American National Standard

Superseding AMS 4207

Aluminum Alloy Sheet, Alclad
5.7Zn - 2.2Mg - 1.6Cu - 0.22Cr (7475-T61)
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:

Primarily for structural applications requiring a combination of high strength, moderate fatigue strength, and high fracture toughness.

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 documents shall be as specified in AMS 2350.

2.1 SAE Publications:

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

2.1.1 Aerospace Material Specifications:

AMS 2202	Tolerances, Aluminum Alloy and Magnesium Alloy Sheet and Plate
MAM 2202	Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Sheet and Plate
AMS 2350	Standards and Test Methods
AMS 2355	Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings
MAM 2355	Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
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SAE WEB ADDRESS: http://www.sae.org

2.2 ASTM Publications:

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

ASTM B646	Fracture Toughness Testing of Aluminum Alloys
ASTM B660	Packaging/Packing of Aluminum and Magnesium Products
ASTM E338	Sharp-Notch Tension Testing of High-Strength Sheet Materials
ASTM E561	R-Curve Determination

2.3 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Specifications:

MIL-H-6088 Heat Treatment of Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the following percentages by weight, determined in accordance with AMS 2355 or MAM 2355.

Core (7475)

	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	

Cladding (7072)

	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:

Solution and precipitation heat treated. Furnace surveys and calibration of temperature controllers and recorders shall be 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 Tensile Properties: Shall be as specified in Table I, determined in the long-transverse direction.

TABLE I

Nominal Thickness Inch	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, minimum	Elongation in 2 inches %, minimum
0.040 to 0.062, incl	69,000	59,000	9
Over 0.062 to 0.187, incl	70,000	60,000	9
Over 0.187 to 0.249, incl	72,000	61,000	9

TABLE I (SI)

Nominal Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, minimum	Elongation in 50.8 mm %, minimum
1.02 to 1.57, incl	476	407	9
Over 1.57 to 4.75, incl	483	414	9
Over 4.75 to 6.32, incl	496	421	9

3.3.2 Critical-Stress-Intensity Factor: Critical-stress-intensity factor (K_c), determined in accordance with ASTM B646 and ASTM E561, or by other method agreed upon by purchaser and vendor, shall be as follows:

Nominal Thickness Inch	Nominal Thickness Millimetres	K_c, minimum $ksi\sqrt{inch}$	K_c, minimum $MPa\sqrt{m}$
0.040 to 0.125, incl	1.02 to 3.18, incl	75	82.4
Over 0.125 to 0.249, incl	Over 3.18 to 6.32, incl	60	66.0

3.3.3 Notch Tensile Strength/Tensile Yield Strength Ratio (NTS/TYS): The producer may guarantee that sheet meets the critical-stress-intensity factor (K_c) requirements based on correlation with notch tensile strength/tensile yield strength (NTS/TYS) ratio in lieu of determining critical-stress-intensity factor (3.3.2) provided that he has established correlation between the two tests for his sheet and the correlation is approved by purchaser.

3.3.3.1 Notch tensile strength in the long-transverse direction shall be determined in accordance with ASTM E338. The values shall be divided by the long-transverse tensile yield strength to obtain the NTS/TYS ratio.

3.3.4 Bending: Sheet 0.008 to 0.249 inch (0.20 to 6.32 mm), incl, in nominal thickness shall withstand, without cracking, bending at room temperature through an angle of 180 degrees around a diameter equal to the bend factor times the nominal thickness of the sheet with axis of bend parallel to the direction of rolling.

Nominal Thickness Inch	Nominal Thickness Millimetres	Bend Factor
0.008 to 0.020, incl	0.20 to 0.51, incl	6
Over 0.020 to 0.063, incl	Over 0.51 to 1.60, incl	7
Over 0.063 to 0.091, incl	Over 1.60 to 2.31, incl	8
Over 0.091 to 0.125, incl	Over 2.31 to 3.18, incl	9
Over 0.125 to 0.249, incl	Over 3.18 to 6.32, incl	10

3.3.5 Cladding Thickness Per Side: Shall be as follows:

Nominal Sheet Thickness Inch	Nominal Sheet Thickness Millimetres	Cladding Thickness % of Sheet Thickness Nominal	Cladding Thickness % of Sheet Thickness Min Average
Up to 0.062, incl	Up to 1.57, incl	4	3.3
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:

The vendor of the sheet shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. 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.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.3.1), critical-stress-intensity factor (3.3.2), notch tensile strength/tensile yield strength ratio (3.3.3), and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot, except that the critical-stress-intensity factor need not be determined if the notch tensile strength/tensile yield strength ratio requirements are met.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for bending (3.3.4) and cladding thickness (3.3.5) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling:

Shall be in accordance with AMS 2355 or MAM 2355 and the following.

4.3.1 Sampling for critical-stress-intensity factor (3.3.2) and for notch-tensile testing (3.3.3) shall be as agreed upon by purchaser and vendor.

4.4 Reports:

4.4.1 The vendor of sheet shall furnish with each shipment a report stating that the sheet conforms to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, inspection lot number, AMS 4207A, size and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 4207A, contractor or other direct supplier of sheet, part number, and quantity. When sheet for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of sheet to determine conformance to the requirements of this specification and shall include in the report either a statement that the sheet conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355 or MAM 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

Each sheet shall be marked on one face, in the respective location indicated below, with the alloy number and temper, AMS 4207A, inspection lot number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling. The markings shall have no deleterious effect on the sheet or its performance.