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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4095B

Issued NOV 1969
Revised OCT 1993
Reaffirmed SEP 2000

Superseding AMS 4095A

Aluminum Alloy, Alclad Sheet and Plate
6.3Cu - 0.30Mn - 0.18Zr - 0.10V - 0.06Ti
Alclad 2219-T31; Sheet, Solution Heat Treated and Cold Worked
Alclad 2219-T351; Plate, Solution Heat Treated and Stress Relieved

UNS A82219

1. SCOPE:

1.1 Form:

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

1.2 Application:

These products have been used typically for parts requiring high strength up to 600 °F (316 °C) and are also well suited for cryogenic applications and where welding and maximum corrosion resistance are required, but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking after heat treatment; ARP823 recommends practices to minimize such conditions.

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.

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

2.1 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 2770	Heat Treatment of Wrought Aluminum Alloy Parts
AMS 2811	Identification, Aluminum and Magnesium Alloy Wrought Products
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products

2.2 ASTM Publications:

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

ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services 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 and Table 2, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition Core (2219)

Element	Min	Max
Copper	5.8	6.8
Manganese	0.20	0.40
Zirconium	0.10	0.25
Vanadium	0.05	0.15
Titanium	0.02	0.10
Iron	--	0.30
Silicon	--	0.20
Zinc	--	0.10
Magnesium	--	0.02
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

TABLE 2 - Composition Cladding (7072)

Element	Min	Max
Zinc	0.08	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:

The product shall be supplied in the following condition; heat treatment shall be performed in accordance with MIL-H-6088.

3.2.1 Sheet: Solution heat treated and cold worked.

3.2.2 Plate: Solution heat treated and stress relieved by stretching to produce a permanent set of 1-1/2 to 3%.

3.3 Properties:

The product shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355:

3.3.1 As Solution Heat Treated and Cold Worked or Stress Relieved:

3.3.1.1 Tensile Properties: Shall be as specified in Table 3.

TABLE 3A - Minimum Tensile Properties, Inch/Pound Units

Nominal Thickness Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.040 to 0.099, incl	42.0	25.0	10
Over 0.099 to 0.499, incl	44.0	26.0	10

TABLE 3B - Minimum Tensile Properties, SI Units

Nominal Thickness mm	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D, %
1.02 to 2.51, incl	290	172	10
Over 2.51 to 12.67, incl	303	179	10

3.3.1.2 Bending: Product shall withstand, without cracking, bending at room temperature through an angle of 180 degrees around a diameter equal to the bend factor shown in Table 4 times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

TABLE 4 - Bending Parameters

Nominal Thickness Inch	Nominal Thickness mm	Bend Factor
0.006 to 0.020, incl	0.15 to 0.51, incl	8
Over 0.020 to 0.249, incl	Over 0.51 to 6.32, incl	12
Over 0.249 to 0.500, excl	Over 6.32 to 12.70, excl	16

3.3.2 After Precipitation Heat Treatment: Product 0.020 to 0.499 inch (0.57 to 12.67 mm), inclusive, in nominal thickness shall have the following properties after being precipitation heat treated in accordance with AMS 2770.

3.3.2.1 Tensile Properties: The product shall have the properties shown in Table 5.

TABLE 5A - Minimum Tensile Properties, Inch/Pound Units

Nominal Thickness Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.020 to 0.039, incl	49.0	37.0	6
Over 0.039 to 0.099, incl	55.0	41.0	7
Over 0.099 to 0.249, incl	58.0	43.0	7
Over 0.249 to 0.499, incl	58.0	42.0	8

TABLE 5B - Minimum Tensile Properties, SI Units

Nominal Thickness mm	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 50.8 mm or 4D %
0.51 to 0.99, incl	338	255	6
Over 0.99 to 2.51, incl	379	283	7
Over 2.51 to 6.32, incl	400	296	7
Over 6.32 to 12.67, incl	400	290	8

3.3.3 Cladding Thickness: After rolling, the average cladding thickness shall conform to the requirements shown in Table 5.

TABLE 6 - Average Cladding Thickness

Nominal Thickness Inch	Nominal Thickness mm	Cladding Thickness Per Side, % of Total Thickness Min	Cladding Thickness Per Side, % of Total Thickness Max
0.020 to 0.039, incl	0.51 to 0.99, incl	8	--
0.039 to 0.099, incl	Over 0.99 to 2.51, incl	4	--
Over 0.099 to 0.499, incl	Over 2.51 to 12.67, incl	2	--
Over 0.499	Over 12.67	2	3

3.4 Quality:

The product, 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 product.

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 product 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 product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for composition (3.1), tensile properties as solution heat treated and cold worked or stress relieved (3.3.1.1), and tolerances (3.5) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for bending as solution heat treated and cold worked or stress relieved (3.3.1.2), tensile properties after precipitation heat treatment (3.3.2.1) and cladding thickness (3.3.3) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2355 or MAM 2355.

4.4 Reports:

The vendor of the product shall furnish with each shipment a report stating that the product conforms to the chemical composition and showing the results of tests on each lot to determine conformance to the other acceptance test requirements and, when performed, to the periodic test requirements. This report shall include the purchase order number, lot number, AMS 4095B, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355 or MAM 2355.