SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4094B

Issued NOV 1969
Revised SEP 1997

Superseding AMS 4094A

Submitted for recognition as an American National Standard

(R)

Aluminum Alloy, Sheet and Plate, Alclad
6.3Cu - 0.30Mn - 0.18Zr - 0.10V - 0.06Ti
Alclad 2219-T81 Sheet
Solution Heat Treated, Cold Worked, and Precipitation Heat Treated
Alclad 2219-T851 Plate
Solution Heat Treated, Stress Relieved and Precipitation Heat Treated

UNS A82219

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of sheet and plate, clad on two sides.

1.2 Application:

These products have been used typically 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; 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.

2.1 SAE Publications:

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

AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-7154 FAX: (412) 776-0243
TO PLACE A DOCUMENT ORDER: (412) 776-4970 FAX: (412) 776-0790

2.1 (Continued):

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 2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress Corrosion Cracking in Wrought Heat Treatable Aluminum Alloy Products

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 666/B 666M Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

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 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	0.8	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:

Product shall be supplied in the following condition; heat treatment shall be performed in accordance with AMS 2772:

3.2.1 Sheet: Solution heat treated, cold worked, and precipitation heat treated to the -T81 temper.

3.2.2 Plate: Solution heat treated, stress relieved by stretching 1-1/2 to 3%, and precipitation heat treated to the -T851 temper.

3.3 Properties:

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

3.3.1 Tensile Properties: Shall be as shown 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 %
0.020 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 3B - Minimum Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	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

3.3.2 Cladding Thickness: After rolling, the average cladding thickness shall be as shown in Table 4.

TABLE 4 - Average Cladding Thickness

Total Thickness of Composite Product Inch	Total Thickness of Composite Product Millimeters	Average Cladding Thickness Per Side, Percent of Thickness minimum	Average Cladding Thickness Per Side, Percent of Thickness maximum
0.020 to 0.039, incl	0.51 to 0.99, incl	8	--
Over 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 ANSI H35.2 or ANSI H35.2M.

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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), tensile properties (3.3.1), and tolerances (3.5) are acceptance tests, and except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests: Cladding thickness (3.3.2) is classified as a periodic test 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.