SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS4094 | REV. C

Issued 1969-11
Revised 2004-11
Reaffirmed 2012-04

Superseding AMS4094B

(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

(Composition similar to UNS A822190)

RATIONALE

AMS4094C has been reaffirmed to comply with the SAE five-year review policy.

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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4094C

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress Corrosion Cracking in Wrought Heat Treatable Aluminum Alloy Products
AS 1990	Aluminum Alloy Tempers

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036 or www.ansi.org.

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.

TABLE 1 - Composition, Core (2219)

Element	min	max
Silicon	--	0.20
Iron	--	0.30
Copper	5.8	6.8
Manganese	0.20	0.40
Magnesium	--	0.02
Zinc	--	0.10
Titanium	0.02	0.10
Vanadium	0.05	0.15
Zirconium	0.10	0.25
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	Remainder	

TABLE 2 - Composition, Cladding (7072)

Element	min	max
Silicon + iron	--	0.7
Copper	--	0.10
Manganese	--	0.10
Magnesium	--	0.10
Zinc	0.8	1.3
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	Remainder	

3.2 Condition:

Product shall be supplied in the following condition (See AS-1990). Solution and precipitation 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 (see AS1990).

3.2.2 Plate: Solution heat treated, stress relieved by stretching 1-1/2 to 3%, and precipitation heat treated to the T851 temper (see AS1990).

3.3 Properties:

The product shall conform to the following requirements, determined in accordance with AMS 2355 on the mill produced size.

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.