SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4095 | REV. C

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

Superseding AMS4095B

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
(Composition similar to UNS A82219)

RATIONALE

AMS4095C 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 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 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 cancelled 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)
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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/AMS4095C

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 Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products
AS1990	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 666	Identification Marking of Aluminum 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:

The 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 and cold worked to the T31 temper (see AS1990).

3.2.2 Plate: Solution heat treated and stress relieved by stretching to produce a permanent set of 1-1/2 to 3% to the T351 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 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 Wall Thickness Inches	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 Wall Thickness Millimeters	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 Millimeters	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 Response to Precipitation Heat Treatment: Product shall have the following properties after being precipitation heat treated in accordance with AMS 2772.

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 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

3.3.3 Cladding Thickness: After rolling, the average cladding thickness shall conform to the requirements shown in Table 6.

TABLE 6 - Average Cladding Thickness

Nominal Thickness Inch	Nominal Thickness Millimeters	Average Cladding Thickness Per Side, % of Total Thickness min	Average Cladding Thickness Per Side, % of Total Thickness max
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 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 as solution heat treated and cold worked or stress relieved (3.3.1.1), and tolerances (3.5) are acceptance tests and except for composition, shall be performed on each lot.

4.2.2 Periodic Tests: 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.