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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4041N

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Superseding AMS 4041M

Submitted for recognition as an American National Standard

ALUMINUM ALLOY, ALCLAD SHEET AND PLATE
4.4Cu - 1.5Mg - 0.60Mn
Alclad 2024 and 1-1/2% Alclad 2024, -T3 Flat Sheet; 1-1/2% Alclad 2024-T351 Plate

UNS A82024

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of sheet and plate clad on both sides with a different aluminum alloy.

1.2 Application:

These products have been used typically for structural components requiring good strength and maximum corrosion resistance, but usage is not limited to such applications. Plate is also suitable for structural machined parts where warpage, during machining, due to residual stresses must be minimized.

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 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 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 Tables 1 and 2, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition, Core (2024)

Element	Min	Max
Copper	3.8	4.9
Magnesium	1.2	1.8
Manganese	0.30	0.9
Iron	--	0.50
Silicon	--	0.50
Zinc	--	0.25
Titanium	--	0.15
Chromium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

TABLE 2 - Composition, Cladding (1230)

Element	Min	Max
Iron + Silicon	--	0.70
Copper	--	0.10
Zinc	--	0.10
Manganese	--	0.05
Magnesium	--	0.05
Vanadium	--	0.05
Titanium	--	0.03
Other Impurities, each	--	0.03
Aluminum, by difference	99.30	--

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Sheet: Solution heat treated in accordance with MIL-H-6088 and cold worked.

3.2.2 Plate: Solution heat treated in accordance with MIL-H-6088 and stretched to produce a nominal permanent set of 2% but not less than 1-1/2% nor more than 3%.

3.2.2.1 Plate shall receive no further straightening operations after stretching.

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 specified in Table 2.

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

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.008 to 0.009, incl	58.0	39.0	10
Over 0.009 to 0.020, incl	59.0	39.0	12
Over 0.020 to 0.062, incl	59.0	39.0	15
Over 0.062 to 0.128, incl	61.0	40.0	15
Over 0.128 to 0.187, incl	62.0	40.0	15
Over 0.187 to 0.249, incl	63.0	41.0	15
Over 0.249 to 0.499, incl	63.0	41.0	12
Over 0.499 to 1.000, incl	63.0	42.0	8
Over 1.000 to 1.500, incl	62.0	42.0	7
Over 1.500 to 2.000, incl	62.0	42.0	6
Over 2.000 to 3.000, incl	60.0	42.0	4
Over 3.000 to 4.000, incl	57.0	41.0	4

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 %
0.20 to 0.23, incl	400	269	10
Over 0.23 to 0.51, incl	407	269	12
Over 0.51 to 1.57, incl	407	269	15
Over 1.57 to 3.25, incl	421	278	15
Over 3.25 to 4.75, incl	428	278	15
Over 4.75 to 6.32, incl	434	283	15
Over 6.32 to 12.67, incl	434	283	12
Over 12.67 to 25.40, incl	434	290	8
Over 25.40 to 38.10, incl	428	290	7
Over 38.10 to 50.80, incl	428	290	6
Over 50.80 to 76.20, incl	414	290	4
Over 76.20 to 101.60, incl	393	283	4

3.3.2 Bending: Product 0.008 to 0.499 inch (0.20 to 12.67 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 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
0.008 to 0.040, incl	0.20 to 1.02, incl	4
Over 0.040 to 0.128, incl	Over 1.02 to 3.25, incl	5
Over 0.128 to 0.249, incl	Over 3.25 to 6.32, incl	8
Over 0.249 to 0.499, incl	Over 6.32 to 12.67, incl	10

3.3.3 Cladding Thickness: After rolling, the average cladding thickness shall be as specified in Table 5.

TABLE 5 - Cladding Thickness

Nominal Thickness Inch	Nominal Thickness mm	Cladding Thickness Per Side % of Thickness Min	Cladding Thickness Per Side % of Thickness Max
0.008 to 0.062, incl	0.20 to 1.57, incl	4.0	--
Over 0.062 to 0.187, incl	Over 1.57 to 4.75, incl	2.0	--
Over 0.187 to 0.499, incl	Over 4.75 to 12.67, incl	1.2	--
Over 0.499	Over 12.67	1.2	3.0

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:
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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.