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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4031E

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Superseding AMS 4031D

Submitted for recognition as an American National Standard

ALUMINUM ALLOY SHEET AND PLATE
6.3Cu - 0.30Mn - 0.18Zr - 0.10V - 0.06Ti (2219-0)
Annealed

UNS A92219

1. SCOPE:

1.1 Form:

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

1.2 Application:

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

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 2770 Heat Treatment of Aluminum and Aluminum Alloys
AMS 2811 Identification, Aluminum and Magnesium Alloy Wrought Products

2.2 ASTM Publications:

(R)

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, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition

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	

3.2 Condition:

Annealed in accordance with MIL-H-6088.

3.3 Properties:

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

3.3.1 As Annealed:

3.3.1.1 (R) Tensile Properties: Shall be as specified in Table 2 for product 0.020 to 2.000 inches (0.51 to 50.80 mm), inclusive, in nominal thickness.

TABLE 2 - Tensile Properties

Property	Value
Tensile Strength, max	32.0 ksi (221 MPa)
Yield Strength at 0.2% Offset, max	16.0 ksi (110 MPa)
Elongation in 2 Inches (50.8 mm) or 4D, min	12%

3.3.1.2 (R) Bending: Product 0.020 to 1.000 inch (0.51 to 25.40 mm), inclusive, 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 3 times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

TABLE 3 - Bending Parameters

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Factor
0.020 to 0.250, incl	0.51 to 6.35, incl	4
Over 0.250 to 0.750, incl	Over 6.35 to 19.05, incl	6
Over 0.750 to 1.000, incl	Over 19.05 to 25.40, incl	8

3.3.2 (R) After Solution and Precipitation Heat Treatment: The product, as received by purchaser, shall have the following properties after solution and precipitation heat treatment to the -T62 condition in accordance with AMS 2770:

3.3.2.1 Tensile Properties: Shall be as specified in Table 4.

TABLE 4A - 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 %
0.020 to 0.039, incl	54.0	36.0	6
Over 0.039 to 0.249, incl	54.0	36.0	7
Over 0.249 to 1.000, incl	54.0	36.0	8
Over 1.000 to 2.000, incl	54.0	36.0	7

TABLE 4B - 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	372	248	6
Over 0.99 to 6.32, incl	372	248	7
Over 6.32 to 25.40, incl	372	248	8
Over 25.40 to 50.80, incl	372	248	7

3.3.2.2 Bending: Product 0.020 to 0.499 inch (0.51 to 12.67 mm), inclusive, 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 5 times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

TABLE 5 - Bending Parameters

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Factor
0.020 to 0.062, incl	0.51 to 1.57, incl	8
Over 0.062 to 0.250, incl	Over 1.57 to 6.35, incl	12
Over 0.250 to 0.499, incl	Over 6.35 to 12.67, incl	16

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:
(R)

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
(R) annealed (3.3.1.1), properties after solution and precipitation heat treatment (3.3.2), and tolerances (3.5) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for bending as annealed (3.3.1.2) are periodic tests
(R) and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:
(R)

Shall be in accordance with AMS 2355 or MAM 2355.

4.4 Reports:
(R)

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 to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, lot number, AMS 4031E, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355 or MAM 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification:
(R)

Shall be in accordance with AMS 2811.

