



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15098

AMS 4029F

Superseding AMS 4029E

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ALUMINUM ALLOY SHEET AND PLATE

4.5Cu - 0.85Si - 0.80Mn - 0.50Mg (2014; -T6 Sheet, -T651 Plate)

1. SCOPE:

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

1.2 Application: Primarily for structural parts of good strength. Certain design and processing procedures may cause these products to be susceptible to stress-corrosion cracking; ARP 823 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 Aerospace Material Specifications (AMS) and Aerospace Recommended Practices (ARP) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2202 - Tolerances, Aluminum-Base and Magnesium-Base
Alloy Sheet and Plate

AMS 2350 - Standards and Test Methods

AMS 2355 - Quality Assurance Sampling and Testing of Aluminum-
Base and Magnesium-Base Alloys, Wrought Products
(Except Forgings and Forging Stock) and Flash
Welded Rings

2.1.2 Aerospace Recommended Practices:

ARP 823 - Minimizing Stress Corrosion Cracking in Wrought Heat
Treatable Aluminum Alloy Products

2.2 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

2.2.2 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment
and Storage

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3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355:

	min	max
Copper	3.9	5.0
Silicon	0.50	1.2
Manganese	0.40	1.2
Magnesium	0.20	0.8
Iron	--	0.7
Zinc	--	0.25
Titanium	--	0.15
Chromium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: The product shall be supplied in the following condition; heat treatments shall be performed in accordance with MIL-H-6088:

3.2.1 Sheet: Solution and precipitation heat treated.

3.2.2 Plate: Solution heat treated, stretched to produce a nominal permanent set of 2% but not less than 1-1/2% nor more than 3%, and precipitation heat treated.

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:

3.3.1 Tensile Properties: Shall be as specified in Table I and 3.3.1.1.

TABLE I

Nominal Thickness Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
0.020 to 0.039, incl	64,000	57,000	6
Over 0.039 to 0.249, incl	66,000	58,000	7
Over 0.249 to 0.499, incl	67,000	59,000	7
Over 0.499 to 1.000, incl	67,000	59,000	6
Over 1.000 to 2.000, incl	67,000	59,000	4
Over 2.000 to 2.500, incl	65,000	58,000	2
Over 2.500 to 3.000, incl	63,000	57,000	2
Over 3.000 to 4.000, incl	59,000	55,000	1

TABLE I (SI)

Nominal Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50 mm or 4D %, min
0.51 to 0.99, incl	441	393	6
Over 0.99 to 6.32, incl	455	400	7
Over 6.32 to 12.67, incl	462	407	7
Over 12.67 to 25.40, incl	462	407	6
Over 25.40 to 50.80, incl	462	407	4
Over 50.80 to 63.50, incl	448	400	2
Over 63.50 to 76.20, incl	434	393	2
Over 76.20 to 101.60, incl	407	379	1

3.3.1.1 Tensile property requirements for product under 0.020 in. (0.51 mm) or over 4.000 in. (101.60 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.2 Bending: Product 0.020 to 0.499 in. (0.51 to 12.67 mm), incl, in nominal thickness shall withstand, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to the bend factor times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

Nominal Thickness		Bend Factor
Inch	(Millimetres)	
0.020 to 0.039, incl	(0.51 to 0.99, incl)	5
Over 0.039 to 0.050, incl	(Over 0.99 to 1.27, incl)	6
Over 0.050 to 0.124, incl	(Over 1.27 to 3.15, incl)	8
Over 0.124 to 0.249, incl	(Over 3.15 to 6.32, incl)	10
Over 0.249 to 0.499, incl	(Over 6.32 to 12.67, incl)	12

3.3.2.1 Bending requirements for product under 0.020 in. (0.51 mm) or over 0.499 in. (12.67 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the product.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2202.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.3.1), and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot.

- 4.2.2 Periodic Tests: Tests to determine conformance to requirements for bending (3.3.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

Ø 4.3 Sampling: Shall be in accordance with AMS 2355.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of a report stating that the product conforms to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, size, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

Ø 4.5 Resampling and Retesting: Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Each sheet and plate shall be marked on one face, in the respective location indicated below, with the alloy number and temper, AMS 4029, inspection lot number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling. The markings shall have no deleterious effect on the product or its performance.

5.1.1 Flat Sheet and Plate Under 6 In. (152 mm) Wide: Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 ft (914 mm). The inspection lot number may appear in the row marking or may appear at only one location on each piece.

5.1.2 Flat Sheet and Plate 0.375 In. (9.52 mm) and Under Thick, 6 - 60 In. (152 - 1524 mm), Incl. Wide, and 36 - 200 In. (914 - 5080 mm), Incl. Long: Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 ft (914 mm), the rows being spaced approximately 6 in. (152 mm) on centers across the width and staggered. Every third row shall show the manufacturer's identification and nominal thickness. The other rows shall show the alloy number and temper and AMS 4029. The inspection lot number may be included in the rows with the alloy, temper, and specification designations or may appear at only one location on each piece.

5.1.3 Flat Sheet and Plate Over 0.375 In. (9.52 mm) Thick, or Over 60 In. (1524 mm) Wide, or Over 200 In. (5080 mm) Long: Shall be marked as in 5.1.2 or, at vendor's discretion, shall be marked in one or two rows of characters recurring at intervals not greater than 3 ft (914 mm) and running around the periphery of the piece. If one row is used, it shall show all information of 5.1 except that the inspection lot number may be omitted. If two rows are used, one row shall show the alloy number and temper and AMS 4029; the second row shall show the manufacturer's identification and nominal thickness. The inspection lot number may be included in the line with the manufacturer's identification and nominal thickness or may appear at only one location on each piece.