



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 4078B

Superseding AMS 4078A

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ALUMINUM ALLOY PLATE 5.6Zn - 2.5Mg - 1.6Cu - 0.26Cr (7075-T7351)

1. SCOPE:

- 1.1 Form: This specification covers an aluminum alloy in the form of plate.
- 1.2 Application: Primarily for machined parts subject to excessive warpage during machining due to residual stresses and for parts requiring high strength and resistance to stress-corrosion cracking.

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) 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, Pennsylvania 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 and Magnesium Alloys, Wrought Products (Except Forgings and Forging Stock) and Flash Welded Rings

- 2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM B117 - Salt Spray (Fog) Testing

- 2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

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

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Ø	min	max
Zinc	5.1	- 6.1
Magnesium	2.1	- 2.9
Copper	1.2	- 2.0
Chromium	0.18	- 0.35
Iron	--	0.50
Silicon	--	0.40
Manganese	--	0.30
Zirconium plus Titanium	--	0.25
Titanium	--	0.20
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: 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 to develop the required mechanical properties and resistance to stress-corrosion cracking; heat treatments shall be performed in accordance with MIL-H-6088.

3.2.1 Plate shall receive no 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
0.250 to 1.000, incl	69,000	57,000	7
Over 1.000 to 2.000, incl	69,000	57,000	6
Over 2.000 to 2.500, incl	66,000	52,000	6
Over 2.500 to 3.000, incl	64,000	49,000	6

TABLE I (SI)

Nominal Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D %, min
6.35 to 25.40, incl	476	393	7
Over 25.40 to 50.80, incl	476	393	6
Over 50.80 to 63.50, incl	455	359	6
Over 63.50 to 76.20, incl	441	338	6

3.3.1.1 Tensile properties of plate over 3.000 in. (76.20 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.2 Bending: Plate 0.500 in. (12.70 mm) and under in thickness shall be capable of withstanding, without cracking, bending at room temperature through an angle of 180 deg (3.14 rad) around a diameter equal to 14 times the nominal thickness of the plate, with axis of bend parallel to direction of rolling.

3.3.3 Conductivity: Shall be as follows, determined on the surface of the tensile test specimens:

3.3.3.1 If the conductivity is 40% IACS (International Annealed Copper Standard) or higher and tensile properties meet specified requirements, the plate is acceptable.

3.3.3.2 If the conductivity is 38 - 39.9% IACS, incl, if the tensile properties meet specified requirements, and if the yield strength does not exceed the specified minimum by more than 11,900 psi (82 MPa), the plate is acceptable.

3.3.3.3 If the conductivity is below 40% IACS and the yield strength exceeds the specified minimum value by more than 11,900 psi (82 MPa), the plate is suspect.

3.3.3.3.1 When plate is suspect, it may be reprocessed or a sample of the plate may be heated for not less than 30 min. at $870^{\circ}\text{F} \pm 10$ ($465.6^{\circ}\text{C} \pm 5.6$) and quenched in cold water. Conductivity shall be measured within 15 min. of quenching. If the difference between this measurement and the original measurement on the plate is 6% IACS or more, the plate is acceptable. If the difference is less than 6% IACS, the plate shall be reprocessed.

3.3.3.4 If the conductivity is below 38% IACS, the plate is not acceptable and must be reprocessed, regardless of mechanical property level.

3.3.4 Resistance to Stress-Corrosion Cracking: A test specimen, cut from the plate so that the axis of loading of the specimen is parallel to the short transverse direction of the plate shall be stressed to 75% of the yield strength value given in 3.3.1 and held at constant strain in a suitable fixture, shall be capable of showing no evidence of stress-corrosion cracking when subjected to cyclic immersion at room temperature for 30 days in a 3-1/2% solution of sodium chloride conforming to the purity and pH requirements of ASTM B117; each cycle shall consist of 10 min. immersion in the solution and 50 min. out of the solution. Specimens shall be dry prior to each immersion.

3.4 Quality: Plate shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

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 plate 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 assure that the plate conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to composition (3.1), tensile property (3.3.1), conductivity (3.3.3), and tolerance (3.5) requirements are classified as acceptance or routine control tests.

4.2.2 Qualification Tests: Tests to determine conformance to bending (3.3.2) and stress-corrosion resistance (3.3.4) requirements are classified as qualification or periodic control tests.

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 plate 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 plate, part number, and quantity. When plate for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of plate to determine conformance to the requirements of this specification, and shall include in the report a statement that the plate 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 plate shall be marked on one face, in the respective location indicated below, with the alloy number and temper, AMS 4078 or applicable Federal or Military specification designation, 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 plate or its performance.
- 5.1.1 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).
- 5.1.2 Plate 0.375 In. (9.52 mm) and Under Thick, 6 - 60 In. (152 mm - 1.52 m), Incl, Wide, and 36 - 200 In. (914 mm - 5.08 m), 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 4078 or applicable Federal or Military specification designation.
- 5.1.3 Plate Over 0.375 In. (9.52 mm) Thick, or Over 60 In. (1.52 m) Wide, or Over 200 In. (5.08 m) Long: Shall be marked as in 5.1.2 above 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. If two rows are used, one row shall show the alloy number and temper and AMS 4078 or applicable Federal or Military specification designation; the second row shall show the manufacturer's identification and nominal thickness.
- 5.1.3.1 If peripheral marking is applied to the full piece as produced but partial plates are supplied, an arrow shall also be applied near one corner indicating the direction of rolling.
- 5.1.4 Circles: Shall be marked with the information of 5.1 if the circle is 24 in. (610 mm) or more in diameter. Circles less than 24 in. (610 mm) in diameter shall be identified as agreed upon by purchaser and vendor.
- 5.2 Protective Treatment: Plate shall be oiled, prior to shipment, with a light corrosion-inhibiting oil.
- 5.3 Packaging: Plate shall be prepared for shipment in accordance with commercial practice to assure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.
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6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase order.
7. REJECTIONS: Plate not conforming to this specification or to authorized modifications will be subject to rejection.