



AEROSPACE MATERIAL SPECIFICATION

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

AMS 4382A

Superseding AMS 4382

Issued 5-1-69

Revised 7-15-78

MAGNESIUM ALLOY PLATE, EXTRA FLAT
3.0Al - 1.0Zn (AZ31B-0)

1. SCOPE:

1.1 Form: This specification covers a magnesium alloy in the form of plate.

1.2 Application: Primarily for low-density, low-strength parts requiring rigidity and a high degree of flatness, dimensional stability, and weldability.

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, PA 15096.

2.1.1 Aerospace Material Specifications:

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

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

2.2.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

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

	min	max
Aluminum	2.5	3.5
Zinc	0.7	1.3
Manganese	0.20	--
Silicon	--	0.05
Copper	--	0.05
Calcium	--	0.04
Iron	--	0.005
Nickel	--	0.005
Other Impurities, total	--	0.30
Magnesium	remainder	

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3.2 Condition: Annealed.

3.3 Properties: Plate shall conform to the following requirements, determined in accordance with AMS 2355:

3.3.1 Tensile Properties: Shall be as follows for plate 0.250 - 6.000 in. (6.35 - 152.40 mm), incl, in nominal thickness:

Tensile Strength, min	30,000 psi (207 MPa)
Yield Strength at 0.2% Offset, min	10,000 psi (69 MPa)
Elongation in 2 in. (50 mm) or 4D, min	9%

3.3.1.1 Tensile property requirements for plate over 6.000 in. (152.40 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.4 Quality: Plate, 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 plate.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to the following requirements as applicable:

3.5.1 Thickness: Thickness variation within a plate shall not exceed +0.010 in. (+0.25 mm). Allowable thickness variation from plate to plate shall be as specified in Table I.

TABLE I

Nominal Thickness Inches	Tolerance Inch plus and minus
0.250 to 0.750, incl	0.010
Over 0.750 to 1.250, incl	0.017
Over 1.250 to 2.000, incl	0.025
Over 2.000 to 3.000, incl	0.050
Over 3.000 to 3.250, incl	0.065
Over 3.250 to 3.500, incl	0.080
Over 3.500 to 4.000, incl	0.110
Over 4.000 to 5.000, incl	0.125
Over 5.000 to 6.000, incl	0.135

TABLE I (SI)

Nominal Thickness Millimetres	Tolerance Millimetres plus and minus
6.35 to 19.05, incl	0.25
Over 19.05 to 31.75, incl	0.43
Over 31.75 to 50.80, incl	0.64
Over 50.80 to 76.20, incl	1.27
Over 76.20 to 82.55, incl	1.65
Over 82.55 to 88.90, incl	2.03
Over 88.90 to 101.60, incl	2.79
Over 101.60 to 127.00, incl	3.18
Over 127.00 to 152.40, incl	3.43

3.5.2 Width and Length: Shall be as specified in Table II.

TABLE II

Ø	Nominal Width or Length Inches	Tolerance Inch plus only
		Up to 10, incl
	Over 10 to 48, incl	3/8
	Over 48 to 72, incl	1/2
	Over 72	5/8

TABLE II (SI)

Nominal Width or Length Millimetres	Tolerance Millimetres plus only
Up to 254, incl	4.8
Over 254 to 1219, incl	9.5
Over 1219 to 1829, incl	12.7
Over 1829	15.9

3.5.3 Lateral Bow: Shall be as specified in Table III. Lateral bow (camber) is defined as the curvature of the edges of plate in the plane of the surface of the plate, and is measured as the perpendicular distance from the point of maximum departure of the curved edges from a straight line joining the extremities.

TABLE III

Nominal Length Inches	Lateral Bow Tolerance, Inches For Width Ranges Shown, Inches		
	10	Over 10	Over
	and under	to 18, incl	18
Up to 30, incl	1/16	1/32	1/32
Over 30 to 60, incl	1/4	1/16	1/16
Over 60 to 90, incl	1/2	1/8	3/32
Over 90 to 120, incl	1	1/4	1/8
Over 120 to 150, incl	1 1/2	13/32	3/16
Over 150 to 180, incl	2	19/32	5/16
Over 180 to 210, incl	3	25/32	7/16
Over 210 to 240, incl*	4*	1*	9/16*

*Also applicable to any 240 in. increment of longer plate

TABLE III (SI)

Nominal Length Millimetres	Lateral Bow Tolerance, Millimetres For Width Ranges Shown, Millimetres		
	254 and under	Over 254 to 457, incl	Over 457
	Up to 762, incl	1.6	0.8
Over 762 to 1524, incl	6.4	1.6	1.6
Over 1524 to 2286, incl	12.7	3.2	2.4
Over 2286 to 3048, incl	25.4	6.4	3.2
Over 3048 to 3810, incl	38.1	10.3	4.8
Over 3810 to 4572, incl	50.8	15.1	7.9
Over 4572 to 5334, incl	76.2	19.8	11.1
Over 5334 to 6096, incl*	101.6*	25.4*	14.3*

*Also applicable to any 6096 mm increment of longer plate

3.5.4 **Flatness:** Shall be as specified in Table IV. Deviations from flat are measured with the plate resting on a flat surface, concave side upward, using a straight edge and a feeler gauge, dial gauge, or scale.

TABLE IV

Nominal Thickness Inches	Deviation from Flat, Inch	
	In Any 1 ft	In Any 6 ft
0.250 to 1.000, incl	0.005	0.015
Over 1.000 to 6.000, incl	0.010	0.020

TABLE IV (SI)

Nominal Thickness Millimetres	Deviation from Flat, Millimetres	
	In Any 305 mm	In Any 1829 mm
6.35 to 25.40, incl	0.13	0.38
Over 25.40 to 152.40, incl	0.25	0.51

3.5.5 **Squareness:** Allowable difference in diagonal lengths shall be as specified in Table V, determined by comparing the lengths of diagonal measurements taken across opposite corners of the plate.

TABLE V

Nominal Thickness Inches	Maximum Allowable Difference In Length of Diagonals, Inch For Length Ranges Shown, Inches		
	144 and under	Over 144 to 180, incl	Over 180 to 240, incl
	0.250 to 0.500, incl	3/8	7/16
Over 0.500 to 1.000, incl	1/2	9/16	5/8
Over 1.000 to 6.000, incl	5/8	3/4	3/4

TABLE V (SI)

Nominal Thickness Millimetres	Maximum Allowable Difference In Length of Diagonals, Millimetres For Length Ranges Shown, Metres		
	3.66 and under	Over 3.66 to 4.57, incl	Over 4.57 to 6.1, incl
6.35 to 12.70, incl	9.5	11.1	14.3
Over 12.70 to 25.40, incl	12.7	14.3	15.9
Over 25.40 to 152.40, incl	15.9	19.0	19.0

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 ensure that the plate conforms to the requirements of this specification.
- 4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests.
- ∅ 4.3 Sampling: Shall be in accordance with AMS 2355.
- 4.4 Reports:
 - 4.4.1 The vendor of plate 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.
- ∅ 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 4382 or applicable Federal or Military specification designation, 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 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). The inspection lot number may appear in the row marking or may appear at only one location on each piece.