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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4384G

Issued 1 AUG 1957
Revised 1 JAN 1992
Superseding AMS 4384F

Submitted for recognition as an American National Standard

SHEET AND PLATE, MAGNESIUM ALLOY 3.2Th - 0.70Zr (HK31A-O) Annealed, Recrystallized

UNS M13310

1. SCOPE:

1.1 Form:

This specification covers a magnesium alloy in the form of sheet and plate.

1.2 Application:

These products have been used typically for parts requiring good weldability and formability, but usage is not limited to such applications.

1.3 Precautions:

Product covered by this specification is radioactive. All applicable rules and regulations pertaining to the handling of radioactive material and all licensing provisions for use of such material should be observed.

1.4 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

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.

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91-0942/ EG

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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 of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings
MAM 2355 Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units
AMS 2811 Identification, Aluminum and Magnesium Alloy Wrought 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
ASTM E 9 Compression Testing of Metallic Materials at Room Temperature

3. TECHNICAL REQUIREMENTS:

3.1 Composition:
(R)

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
Thorium	2.45	4.0
Zirconium	0.45	1.0
Other Impurities, each (3.1.1)	--	0.10
Other Impurities, total (3.1.1)	--	0.30
Magnesium	remainder	

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3.1.1 Determination not required for routine acceptance.
(R)

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Product 0.500 inch (12.70 mm) and Under in Nominal Thickness: Annealed recrystallized, and pickled.

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3.2.2 Product Over 0.500 inch (12.70 mm) in Nominal Thickness: Annealed and recrystallized.

3.3 Properties:

The product shall conform to the following requirements; tensile and bend testing shall be performed in accordance with AMS 2355 or MAM 2355:

3.3.1 Tensile Properties: Shall be as specified in Table 2 and 3.3.1.1.

TABLE 2A - 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 %
0.016 to 0.250, incl	30.0	18.0	12
Over 0.250 to 0.500, incl	30.0	16.0	12
Over 0.500 to 1.000, incl	30.0	15.0	12
Over 1.000 to 3.000, incl	29.0	14.0	12

TABLE 2B - 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 %
0.41 to 6.35, incl	207	124	12
Over 6.35 to 12.70, incl	207	110	12
Over 12.70 to 25.40, incl	207	103	12
Over 25.40 to 76.20, incl	200	97	12

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3.3.1.1 Tensile property requirements for product under 0.016 inch (0.41 mm) or over 3.000 inches (76.20 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.2 Compressive Properties: Shall be as specified in Table 3 and 3.3.2.1, determined in accordance with ASTM E 9 on specimens taken in the longitudinal direction.

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

Nominal Thickness Inches	Compressive Yield Strength at 0.2% Offset ksi
0.063 to 0.250, incl	12.0
Over 0.250 to 3.000, incl	10.0

TABLE 3B - Minimum Compressive Properties, SI Units

Nominal Thickness Millimeters	Compressive Yield Strength at 0.2% Offset MPa
1.60 to 6.35, incl	83
Over 6.35 to 76.20, incl	69

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3.3.2.1 Compressive property requirements for product under 0.063 inch (1.60 mm) or over 3.000 inches (76.20 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.3 Bending: Specimens as in 4.3.1 from product 0.016 to 0.125 inch (0.41 to 3.18 mm), inclusive, in nominal thickness shall withstand, without evidence of cracking when examined at 20X magnification, bending at room temperature through an angle of 90 degrees around a diameter equal to the bend factor times the nominal thickness of the product, using either V-block, U-channel, or free bend procedure, with axis of bend perpendicular to the direction of rolling. Only one of these tests will be required in routine inspection. In case of dispute, results of bend tests using the V-block procedure shall govern (See Table 4):

TABLE 4 - Bending Properties

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Factor
0.016 to 0.063, incl	0.41 to 1.60, incl	8
Over 0.063 to 0.082, incl	Over 1.60 to 2.08, incl	10
Over 0.082 to 0.125, incl	Over 2.08 to 3.18, incl	12

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3.3.3.1 Bending requirements for product under 0.016 inch (0.41 mm) or over 0.125 inch (3.18 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.4 Quality:

(R)

The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from segregation and foreign materials detrimental to usage of the product.

3.4.1 Acceptance limits for imperfections shall be as agreed upon by purchaser and vendor.

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:

Tests for all technical requirements are acceptance tests and shall be performed on each lot.

4.3 Sampling and Testing:

(R)

Shall be in accordance with AMS 2355 or MAM 2355 and the following:

4.3.1 Specimens for bend testing shall be approximately 1 inch (25 mm) wide and 4 inches (102 mm) long, with the edges smooth and free from rough, sheared surfaces.

4.4 Reports:

The vendor of the product shall furnish with each shipment a report stating that the product conforms to the chemical composition and other technical requirements. The report shall include the purchase order number, lot number, AMS 4384G, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355 or MAM 2355.

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