ADOPTION NOTICE

SAE-AMS4389, "MAGNESIUM ALLOY EXTRUSIONS 3.0TH - 1.5MN (HM31A-T5) PRECIPITATION HEAT TREATED", was adopted on 05-MAR-92 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Commander, Defense Supply Center Philadelphia, ATTN: DSCP-ILEA, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Copies of this document may be purchased from the Society of Automotive Engineers 400 Commonwealth Drive Warrendale, Pennsylvania, United States, 15096-0001. http://www.sae.org/

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4389G

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Superseding AMS 4389F

Submitted for recognition as an American National Standard

Magnesium Alloy, Extrusions
3.0Th - 1.5Mn (HM31A-T5)
Precipitation Heat Treated

UNS M13312

CANCELLATION NOTICE

This specification has been “CANCELLED” by the Aerospace Materials Division, SAE, as of October 1998. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications.

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1. SCOPE:

1.1 Form:

This specification covers a magnesium alloy in the form of extruded bars, rods, wire, and shapes.

1.2 Application:

Primarily for parts requiring weldability and good strength-to-weight ratio up to 600°F (315 °C).

1.3 Precautions:

Alloy covered by this specification is radioactive. All applicable rules and regulations, including those of the Nuclear Regulatory Agency, pertaining to handling of radioactive material and all licensing provisions for use of such material should be observed.

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 2205	Tolerances, Aluminum Alloy and Magnesium Alloy Extrusions
MAM 2205	Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Extrusions
AMS 2350	Standards and Test Methods
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

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 9	Compression Testing of Metallic Materials at Room Temperature
ASTM E 21	Elevated Temperature Tension Tests of Metallic Materials

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-M-6857 Magnesium Alloy Castings, Heat Treatment of
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 or MAM 2355:

	min	max
Thorium	2.5	3.5
Manganese	1.2	--
Other impurities, each	--	0.10
Other impurities, total	--	0.30
Magnesium	remainder	

3.2 Condition:

Precipitation heat treated.

3.2.1 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within the dimensional tolerances.

3.3 Heat Treatment:

Extrusions shall be precipitation heat treated by heating to 425 °F ± 10 (220 °C ± 5), holding at heat for 16 hr ± 0.5, and cooling in air. Furnace surveys and calibration of temperature controllers and recorders shall be in accordance with MIL-M-6857.

3.4 Properties:

Extrusions up to 4 sq in. (25 cm^2), excl, in cross-sectional area shall conform to the following requirements; property requirements for extrusions 4 sq in. (25 cm^2) and over in cross-sectional area shall be as agreed upon by purchaser and vendor:

3.4.1 Tensile Properties: Shall conform to 3.4.1.1 and, when specified, to 3.4.1.2, determined on specimens from bars, rods, wire, and solid shapes in either the longitudinal or transverse direction except that testing in the transverse direction applies only to product from which a tensile specimen not less than 2.50 in (62.5 mm) in length can be obtained; testing in the longitudinal direction is not required on product tested in the transverse direction.

3.4.1.1 At Room Temperature: Shall be as follows, determined in accordance with AMS 2355 or MAM 2355:

Tensile Strength, min	37,000 psi (255 MPa)
Yield Strength at 0.2% Offset, min	26,000 psi (180 MPa)
Elongation in 4D, min	4%

3.4.1.2 At 600 °F (315 °C): Shall be as follows, determined in accordance with ASTM E 21 on specimens heated to 600 °F ± 5 (315 °C ± 2), held at heat for 20 – 30 min., and tested at 600 °F ± 5 (315 °C ± 2):

Tensile Strength, min	12,000 psi (80 MPa)
Elongation in 4D, min	10%

3.4.2 Compressive Properties: Shall be as follows, determined in accordance with ASTM E 9 on specimens taken in the longitudinal direction from bars, rods, and solid shapes:

Compressive Yield Strength at 0.2% Offset, min	19,000 psi (130 MPa)

3.5 Quality:

Extrusions, 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 extrusions.

3.6 Tolerances:

Shall conform to all applicable requirements of AMS 2205 or MAM 2205.

4. QUALITY INSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of extrusions shall supply all samples for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform 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 at room temperature (3.4.1.1) and at 600 °F (315 °C) when specified (3.4.1.2), and tolerances (3.6) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for tensile properties at 600 °F (315 °C) when not specified as an acceptance test and for compressive properties (3.4.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling:

Shall be in accordance with AMS 2355 or MAM 2355.

4.4 Reports:

4.4.1 The vendor of extrusions shall furnish with each shipment a report stating that the extrusions conform to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, AMS 4389E, lot number, size or section identification number, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 4389E, contractor or other direct supplier of extrusions, part number, and quantity. When extrusions for making parts are produced or purchased by the parts vendor, that vendor shall inspect each lot of extrusions to determine conformance to the requirements of this specification and shall include in the report either a statement that the extrusions conform or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355 or MAM 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

Extrusions shall be identified as follows: