



AEROSPACE MATERIAL SPECIFICATION

AMS4439™**REV. H**Issued 1970-11
Revised 2018-12

Superseding AMS4439G

Magnesium Alloy, Sand Castings
4.2Zn - 1.2 Rare Earths - 0.7Zr (ZE41A-T5)
Precipitation Heat Treated

(Composition similar to UNS M16410)

RATIONALE

AMS4439H prohibits unauthorized exceptions (3.8), revises quality (3.7.4), reports (4.5.1), and packaging (5.2.1), and results from a Five-Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a magnesium alloy in the form of castings.

1.2 Application

These castings have been used typically for components requiring uniform medium strength up to 320 °F (160 °C), pressure tightness, good fatigue and creep characteristics, and that may require welding during fabrication, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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Documents
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2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2175	Castings, Classification and Inspection of
AMS2360	Room Temperature Tensile Properties of Castings
AMS2475	Protective Treatments, Magnesium Alloys
AMS2694	In-Process Welding of Castings
AMS2768	Heat Treatment of Magnesium Alloy Castings
AMS2804	Identification Castings
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B557	Tension Testing Wrought and Cast Aluminum and Magnesium-Alloy Products
ASTM B953	Sampling Magnesium and Magnesium Alloys for Spectrochemical Analysis
ASTM B954	Analysis of Magnesium and Magnesium Alloys by Atomic Emission Spectrometry
ASTM B660	Packaging/Packing of Aluminum and Magnesium Products
ASTM E10	Brinell Hardness of Metallic Materials
ASTM E155	Standard Reference Radiographs for Inspection of Aluminum and Magnesium Castings
ASTM E1417/E1417M	Liquid Penetrant Testing
ASTM E1742/E1742M	Radiographic Examination

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by spectrochemical methods in accordance with ASTM B954, or by other analytical methods acceptable to purchaser (see 3.4.1).

Table 1 - Composition

Element	Min	Max
Zinc	3.5	5.0
Total Rare Earths (3.1.1)	0.75	1.75
Zirconium, total	0.40	1.0
Manganese (3.1.2)	--	0.15
Copper (3.1.2)	--	0.10
Nickel (3.1.2)	--	0.01
Other Elements, each (3.1.2)	--	0.10
Other Elements, total (3.1.2)	--	0.30
Magnesium	remainder	



3.1.1 Total Rare Earths (TRE) are principally a mixture of cerium, lanthanum, neodymium, and praseodymium. The cerium content shall not be less than 45% of TRE.

3.1.2 Determination not required for routine acceptance.

3.2 Condition

Precipitation heat treated.

3.3 Casting

Castings shall be produced from metal conforming to 3.1, determined by analysis of a specimen (3.4.1) cast after the last melt addition.

3.4 Test Specimens

Chemical analysis specimens and tensile specimens shall be cast as follows:

3.4.1 Chemical Analysis Specimens

Shall be cast from each melt after the last melt addition and shall be tested to qualify the melt lot as in 3.1.

3.4.2 Tensile Specimens

Shall be prepared as follows and tested for conformance to 3.6.1:

3.4.2.1 Unless specimens cut from castings are specified by the purchaser, separately cast specimens, conforming to ASTM B557, shall be cast from each melt after the last melt addition. Specimens shall be cast in molds representing the mold used for castings. Chills are not permitted on test specimen cavity except on the end face of the specimen when approved in accordance with 4.4.2. Tensile specimens shall be processed with each heat treat lot.

3.4.2.2 When purchaser specifies specimens cut from castings or from integrally cast coupons, such specimens shall be removed after heat treatment, shall be machined to conform to ASTM B557, and shall be either 0.500-inch (12.70-mm) diameter at the reduced parallel gage section, subsize specimens proportional to the standard, or standard sheet-type specimens.

3.5 Heat Treatment

Shall be in accordance with AMS2768. Unless specimens cut from castings or from integrally cast coupons are specified, at least one set of tensile specimens shall, during each stage of heat treatment, be put into a batch-type furnace with each load of castings or into a continuous furnace at intervals of not longer than 3 hours.

3.6 Properties

Castings, integrally cast coupons, and representative separately cast tensile specimens shall conform to the following requirements:

3.6.1 Tensile Properties

Shall be as follows, determined in accordance with ASTM B557: Conformance to the requirements of 3.6.1.1 shall be used as the basis for acceptance of castings except when purchaser specifies that specimens shall be cut from castings (see 3.6.1.2) or from integrally cast coupons (see 3.6.1.2).