

AEROSPACE MATERIAL SPECIFICATION



AMS 4441E

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Superseding	AMS 4441D

Magnesium Alloy Castings, Sand
3.5Ce - 0.70Zr (EK41A-T6)
Solution and Precipitation Heat Treated

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1. SCOPE:

1.1 Form:

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

1.2 Application:

Primarily for parts operating in service up to 300° - 500°F (150° - 260°C).

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350	Standards and Test Methods
AMS 2360	Room Temperature Tensile Properties of Castings
AMS 2361	Elevated Temperature Tensile Properties of Castings
AMS 2475	Protective Treatments, Magnesium Castings
AMS 2635	Radiographic Inspection
AMS 2645	Fluorescent Penetrant Inspection
AMS 2646	Contrast Dye Penetrant Inspection
AMS 2694	Repair Welding of Aerospace Castings
AMS 2804	Identification, Castings

2.2 ASTM Publications:

Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B557	Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Castings
ASTM E10	Brinell Hardness of Metallic Materials
ASTM E21	Elevated Temperature Tension Tests of Metallic Materials
ASTM E35	Chemical Analysis of Magnesium and Magnesium Alloys
ASTM E155	Reference Radiographs for Inspection of Aluminum and Magnesium Castings, Series III

2.3 U.S. Government Publications:

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

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 Metals; Test Methods

2.3.2 Military Specifications:

MIL-M-6857 Magnesium Alloy Castings, Heat Treatment of

2.3.3 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 by wet chemical methods in accordance with ASTM E35, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Cerium (Total Rare Earths)	2.5	4.5
Zirconium, total	0.40	1.0
Zirconium, soluble (3.1.1)	0.40	--
Zinc	--	0.30
Copper (3.1.2)	--	0.10
Nickel (3.1.2)	--	0.01
Other impurities, each (3.1.2)	--	0.10
Other Impurities, total	--	0.30
Magnesium	remainder	

3.1.1 Soluble zirconium is that portion of the zirconium which is soluble in 1:4 hydrochloric acid held below its boiling point.

3.1.2 Determination not required for routine acceptance.

3.2 Condition:

Solution and precipitation heat treatment.

3.3 Casting:

Castings shall be produced in lots from metal conforming to 3.1. Metal remelted from previously analyzed ingot may be poured directly into castings. Furnace or ladle additions of grain-refining elements or alloys are permissible. Unless otherwise agreed upon by purchaser and vendor, molten metal taken from alloying furnaces, with or without additions of foundry operating scrap (gates, sprues, risers, and rejected castings), shall not be poured into castings unless first converted to ingot, analyzed, and remelted or unless the composition of a sample taken after the last addition to the melt conforms to 3.1.

3.3.1 A melt shall be the metal withdrawn from a batch-furnace charge of 2000 lb (900 kg) or less as melted for pouring castings or, when permitted by purchaser, a melt shall be 4000 lb (1800 kg) or less of metal withdrawn from one continuous furnace in not more than eight consecutive hours.

3.3.2 A lot shall be all castings poured from a single melt in not more than eight consecutive hours and solution and precipitation heat treated in the same heat treat batch.

3.4 Cast Test Specimens:

Chemical analysis specimens and tensile specimens shall be cast as follows and, when requested by purchaser, shall be supplied with the castings:

3.4.1 Chemical Analysis Specimens: Shall be cast from each melt and shall be of a size and shape agreed upon by purchaser and vendor.

3.4.2 Tensile Specimen: Shall be cast with each lot of castings, shall be of standard proportions conforming to ASTM B557 with 0.500 in. (12.50 mm) diameter at the reduced parallel gage section, and shall be cast to size in molds made of the regular foundry mix of green sand without using chills. Metal for the specimens shall be part of the melt which is used for the castings. If the metal is given any treatment, such as fluxing or cooling and reheating, the metal for the specimens shall be a portion of the metal so treated and, during such treatment, shall be heated to the same maximum temperature and held for approximately the same time as the molten metal for the castings. The temperature of the metal during pouring of the specimens shall be not lower than that during pouring of the castings