



AEROSPACE MATERIAL SPECIFICATION

AMS4417™**REV. C**Issued 1989-10
Revised 2018-03

Superseding AMS4417B

Castings, Sand, Magnesium Alloy
1.5Ag - 2.1Di - 0.08Cu - 0.70Zr (EQ21A - T6)
Solution and Precipitation Heat Treated
(Composition similar to UNS M18330)

RATIONALE

AMS4417C revises the title to correct the alloy designation, analytical methods (3.1), Chemical analysis specimens (3.4.1), Reports (4.4.1), Identification (5.1.2) and Protective Treatment (5.2) and is a Five-Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.2 Application

These castings have been used typically for parts requiring retention of yield strength up to 400 °F (204 °C), 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.

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.

AMS2360 Room Temperature Tensile Properties of Castings

AMS2361 Elevated Temperature Tensile Properties of Castings

AMS2475 Protective Treatments Magnesium Alloys

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Documents

Document Sharing Hub

AMS2694	In-Process Welding of Castings
AMS2750	Pyrometry
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 B557M	Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)
ASTM B660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B953	Sampling Magnesium and Magnesium Alloys for Spectrochemical Analysis
ASTM B954	Analysis of Magnesium and Magnesium Alloys by Atomic Emission Spectrometry
ASTM E10	Brinell Hardness of Metallic Materials
ASTM E21	Elevated Temperature Tension Tests of Metallic Materials
ASTM E155	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:

Table 1 - Composition

Element	Min	Max
Didymium (Total Rare Earths) (3.1.1)	1.75	2.5
Silver	1.3	1.7
Zirconium	0.40	1.0
Copper	0.05	0.10
Nickel	--	0.01
Other Elements, total	--	0.30
Magnesium	remainder	

3.1.1 Didymium consists of neodymium (not less than 70% of the total) plus praseodymium, along with lesser amounts of other rare earth elements. Producer shall analyze and report neodymium and praseodymium in order to determine composition for routine acceptance. When analyzed, the total of all rare earth elements shall not exceed 2.5%.

3.2 Condition

Solution and precipitation heat treated in accordance with AMS2768.

3.3 Casting

Castings shall be produced in lots from metal conforming to 3.1. Furnace or ladle additions of grain refining elements or alloys shall be added to the melt. 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 pounds (907 kg) or less as melted for pouring castings or, when permitted by purchaser, a melt shall be 4000 pounds (1814 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:

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 cast with each lot of castings, shall be of standard proportions conforming to ASTM B557 or ASTM B557M with 0.500 inch (12.70 mm) diameter at the reduced parallel gage section and shall be cast to size in molds made with the regular foundry mix of sand without using chills. Metal for the specimens shall be part of the melt which is used for the castings. If the metal for castings 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. Temperature of the metal during pouring of the specimens shall be not lower than that during pouring of the castings.

3.5 Heat Treatment

Castings, integrally-cast coupons, and separately-cast tensile specimens shall be heated to a temperature not exceeding 975 °F (524 °C) and held at heat for the proper time for solution heat treatment and quenched as required, reheated to a temperature between 380 to 400 °F (193 to 204 °C) and held at heat for the proper time for precipitation heat treatment; 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. Pyrometry shall be in accordance with AMS2750.