SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

AMS 4483D

Issued JUN 1960
Reaffirmed SEP 2000
Revised JUL 2007

Superseding AMS 4483C

Magnesium Alloy Castings, Permanent Mold
10Al (AM100A-T6)
Solution and Precipitation Heat Treated

(Composition similar to UNS M10100)

RATIONALE

AMS 4483D results from Five Year Review and update of this Specification.

1. SCOPE

1.1 Form

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

1.2 Application

These castings have been used typically for parts operating in service up to 300 °F (149 °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 724-776-4970 (outside USA), www.sae.org.

AMS 2175	Castings, Classification and Inspection
AMS 2360	Room Temperature Tensile Properties of Castings
AMS 2475	Protective Treatment, Magnesium Alloys
AMS 2694	Repair Welding of Aerospace Castings
AMS 2768	Heat Treatment of Magnesium Alloy Casting
AMS 2804	Identification, Castings

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

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 B 557	Tension Testing Wrought and Cast Aluminum and Magnesium-Alloy Products
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM E 10	Brinell Hardness of Metallic Materials
ASTM E 35	Chemical Analysis of Magnesium and Magnesium Alloys
ASTM E1417	Standard Practice for Liquid Penetrant Testing
ASTM E1742	Standard Practice for Radiographic Examination

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 35, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - COMPOSITION

Element	min	max
Aluminum	9.3	10.7
Manganese	0.10	--
Zinc	--	0.30
Silicon	--	0.30
Copper	--	0.10
Nickel	--	0.01
Other Elements, each (3.1.1)	--	0.10
Other Elements, total (3.1.1)	--	0.30
Magnesium	remainder	

3.1.1 Determination not required for routine acceptance.

3.2 Condition

Solution and precipitation heat treated.

3.3 Casting

Castings shall be produced from metal conforming to 3.1. Furnace or ladle additions of grain-refining elements or alloys are permissible. 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, solution and precipitation heat treated as a single heat treatment batch, and presented for vendor's inspection at one time.

3.4 Cast Test Specimens

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

3.4.1 Chemical Analysis Specimens

Shall be of convenient size, shape, and form.

3.4.2 Tensile Specimens

Shall be cast with each lot of castings, shall be of standard proportions conforming to ASTM B 557 with 0.500 inch (12.70 mm) diameter at the reduced parallel gage section, and shall be cast to size in permanent molds. Metal for the specimens shall be part of the same melt which is used for the castings and shall be subjected to the same grain-refining or alloying treatment given the 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.

3.5 Heat Treatment

Castings and representative tensile specimens shall be solution and precipitation heat treated in accordance with AMS 2768. 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 three hours.

3.6 Properties

Castings and separately-cast tensile specimens produced in accordance with 3.4.2 shall conform to the following requirements:

3.6.1 Tensile Properties

Shall be as follows, determined in accordance with ASTM B 557; conformance to requirements of 3.6.1.1 shall be used as basis for acceptance of castings except when purchaser specifies that requirements of 3.6.1.2 apply.

3.6.1.1 Separately-Cast Specimens

Shall meet the requirements shown in Table 2.

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	34.0 ksi (234 MPa)
Yield Strength at 0.2% Offset	15.0 ksi (103 MPa)
Elongation in 2 inches or 4D	2%

3.6.1.2 Specimens Cut From Castings or From Integrally-Cast Coupons

Specimens as in 4.3.4 shall meet the requirements of Table 3.

TABLE 3 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	17.0 ksi (117 MPa)
Yield Strength at 0.2% Offset	10.0 ksi (69 MPa)

3.6.1.3 When properties other than as specified in Table 3 are required, tensile specimens as in 4.3.4 taken from locations indicated on the drawing, from a casting or castings chosen at random to represent the lot, shall have the properties indicated on the drawing for such specimens. Property requirements for such specimens may be designated in accordance with AMS 2360.

3.7 Quality

3.7.1 Castings, 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 castings.

3.7.1.1 Castings shall have smooth surfaces and shall be sufficiently cleaned to permit fluorescent penetrant inspection.

3.7.1.2 Castings cleaned by blasting shall be pickled in a sulfuric or sulfuric-nitric acid solution to remove not less than 0.002 inch (0.05 mm) of metal before protective treatment as in 5.2.

3.7.2 Castings shall be produced under radiographic control. This control shall consist of radiographic examination of castings in accordance with ASTM E1742, or other radiographic procedure acceptable to purchaser, until proper foundry technique, which will produce castings free from harmful imperfections, is established for each part number and of production castings as necessary to ensure maintenance of satisfactory quality.

3.7.3 When specified, castings shall be subjected to fluorescent penetrant inspection in accordance with ASTM E1417.

3.7.4 Fluorescent penetrant, and other quality standards shall be as established by purchaser. Unless otherwise specified, radiographic acceptance standards shall meet the requirements of AMS 2175, Grade D.

3.7.5 Castings shall not be repaired by peening, plugging, welding, or other methods without written permission from purchaser.

3.7.5.1 When permitted in writing by purchaser, defects in castings may be repaired by welding in accordance with AMS 2694.

3.7.6 Castings shall not be impregnated, chemically treated, or coated to prevent leakage unless specified or allowed by written permission of purchaser designating the method to be used.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of castings shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the castings conform to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Except as specified in 4.2.1.1, tests for composition (3.1), tensile properties (3.6.1), and quality (3.7) are acceptance tests and shall be performed to represent each melt or lot as applicable.

4.2.1.1 Tensile properties of specimens cut from castings or from integrally cast coupons shall be determined only when specified by purchaser or when separately-cast specimens are not available. Tensile properties of separately-cast specimens need not be determined when tensile properties of specimens cut from castings or from integrally cast coupons are determined.

4.2.2 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the first-article shipment of a casting to a purchaser, when a change in material and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing

Shall be in accordance with the following:

4.3.1 At least one chemical analysis specimen in accordance with 3.4.1 from each melt or a casting from each lot.

4.3.2 One or more separately-cast tensile specimen in accordance with 3.4.2 representing each lot, except when properties of specimens cut from castings or from integrally cast coupons are required.

4.3.3 Two preproduction castings in accordance with 4.4.1 of each part number.