AEROSPACE MATERIAL SPECIFICATION

AMS4452™	REV. G

Issued 1972-11
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Superseding AMS4452F

Magnesium Alloy, Investment Castings,
8.7Al - 0.70Zn - 0.22Mn (AZ91C-T6),
Solution and Precipitation Heat Treated
(Composition similar to UNS M11914)

RATIONALE

AMS4452G results from a Five-Year Review and update of this specification with changes to clarify that casting approval and reapproval actions are to be carried out by the cognizant engineering organization (see 4.2.3 and 4.4), update wording to prohibit unauthorized exceptions (see 8.5), relocate Definitions (see 2.3), and update Applicable Documents (see Section 2) and Ordering Information (see 8.6).

1. SCOPE

1.1 Form

This specification covers a magnesium alloy in the form of investment castings (see 8.6).

1.2 Application

These castings have been used typically for small, intricate parts requiring good strength with good ductility and weldability, 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 (U.S. and Canada only) or +1 724-776-4970 (outside U.S. and Canada), www.sae.org.

AMS2175 Castings, Classification and Inspection of

AMS2360 Room Temperature Tensile Properties of Castings

AMS2475 Protective Treatments, Magnesium Alloys

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Documents
Document Sharing Hub
Full document details: SAE AMS4452G

AMS2694 In-Process Welding of Castings

AMS2768 Heat Treatment of Magnesium Alloy Castings

AMS2804 Identification, Castings

AS7766 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 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 E18 Standard Test Methods for Rockwell Hardness of Metallic Materials

ASTM E1417/E1417M Liquid Penetrant Testing

ASTM E1742/E1742M Radiographic Examination

2.3 Definitions

Terms used in AMS are defined in AS7766.

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 the purchaser.

Table 1 - Composition

Element	Min	Max
Aluminum	8.1	9.3
Zinc	0.40	1.0
Manganese	0.13	0.30
Copper	--	0.10
Nickel	--	0.01
Silicon	--	0.30
Other Elements, each (see 3.1.1)	--	0.10
Other Elements, total (see 3.1.1)	--	0.30
Magnesium	remainder	

3.1.1 Determination not required for routine acceptance.

3.2 Condition

Solution and precipitation heat treated.

Documents
Document Sharing Hub

Full document details: SAE AMS4452G

3.3 Casting

Castings shall be poured either from remelted metal from a master heat or directly from a master heat. In either case, metal for casting shall be qualified as in 3.4.

3.3.1 A master heat is refined metal of a single furnace charge or is metal blended as in 3.3.2. Gates, sprues, risers, and rejected castings shall be used only in preparation of master heats; they shall not be remelted directly, without refining, for pouring of castings. Furnace or ladle additions of grain-refining elements or alloys are permissible.

3.3.2 Metal from two or more master heats may be blended provided the composition of each master heat to be blended is within the limits of 3.1 and the total weight of metal blended does not exceed 15000 pounds (6804 kg). When two or more master heats are blended, the resultant blend shall be considered a master heat.

3.4 Master Heat Qualification

Each master heat shall be qualified by evaluation of chemical analysis and tensile specimens conforming to 3.4.1 and 3.4.2, respectively. A master heat may be considered conditionally qualified if the producer's test results show conformance to all applicable requirements of this specification. However, except when the purchaser waives confirmatory testing, final qualification shall be based on the purchaser's test results. Conditional qualification of a master heat shall not be construed as a guarantee of acceptance of castings poured therefrom.

3.4.1 Chemical Analysis Specimens

Shall be of any suitable size, shape, and form.

3.4.2 Tensile Specimens

Shall be cast from remelted metal from each master heat except that when castings are poured directly from a master heat, the specimens shall also be poured directly from the master heat. Specimens shall be of standard proportions in accordance with ASTM B557 with 0.250-inch (6.35-mm) diameter at the reduced parallel gauge section. They shall be cast to size or shall be cast oversize and subsequently machined to 0.250-inch (6.35-mm) diameter. Center gating may be used.

3.5 Heat Treatment

Castings and representative separately cast tensile specimens shall be solution and precipitation heat treated in accordance with AMS2768. At least one set of tensile specimens shall, during each stage of heat treatment, be placed 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 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 B557; conformance to the requirements of 3.6.1.1 shall be used as basis for acceptance of castings except when the purchaser specifies that the requirements of 3.6.1.2 apply:

3.6.1.1 Separately Cast Specimens

Shall be as shown in Table 2.

Table 2 - Minimum tensile properties

Property	Value
Tensile Strength	34.0 ksi (234 MPa)
Yield Strength at 0.2% Offset	16.0 ksi (110 MPa)
Elongation in 4D	3%

Documents
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Full document details: SAE AMS4452G