AERONAUTICAL
MATERIAL SPECIFICATIONS
SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

AMS 4453

Issued 1-15-60
Revised

MAGNESIUM ALLOY CASTINGS, INVESTMENT
9Al - 2Zn (AZ92A-T6)
Solution and Precipitation Treated

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. APPLICATION: Primarily for small and intricate parts cast to approximately final dimensions.

3. COMPOSITION: Castings shall conform to the following:

Aluminum	8.3 - 9.7
Zinc	1.6 - 2.4
Silicon	0.30 max
Manganese	0.10 min
Copper	0.10 max
Nickel	0.01 max
Other Impurities, total	0.30 max
Magnesium	remainder

4. CONDITION: Solution and precipitation heat treated.

5. TECHNICAL REQUIREMENTS:

5.1 Casting: Castings shall be poured either from remelted master heat metal or directly from a master heat. A master heat is previously refined metal of a single furnace charge. Gates, sprues, risers, and rejected castings shall not be remelted directly, without refining, for pouring of castings; they may be used in preparation of master heats.

5.1.1 A lot shall consist of not more than 600 lb of cast metal (including gates, sprues, and risers) produced in a period of not more than 8 consecutive hr from a single master heat.

5.1.2 The molten metal may be subjected to super heating or other grain refining treatment.

5.2 Test Specimens:

5.2.1 Tensile Test Specimens: Unless otherwise specified, tensile test specimens shall be cast to represent each lot of castings and, when requested, shall be supplied with the castings. The specimens shall be of standard proportions with 0.25 in. diameter at the reduced parallel section, shall be cast to size in molds made of the same refractory and heated to the same temperature as the molds for castings, and shall be cooled at approximately the same rate as the castings. Metal for the specimens shall receive the same treatment as metal for the castings.

Printed in U. S. A.

5.2.2 Chemical Analysis Specimens: When required by purchaser, shall be of size and shape agreed upon by purchaser and vendor.

5.3 Heat Treatment: All castings and tensile test specimens representing them shall be heat treated as follows:

5.3.1 Tensile test specimens from each lot, together with production castings, shall be heated to the proper temperature and for the proper time for solution treatment and cooled in air. At least one set of tensile test specimens shall 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.

5.3.2 Tensile test specimens from each lot, together with production castings, shall, after solution treatment as in 5.3.1, be heated to the proper temperature and for the proper time for precipitation treatment. At least one set of tensile test specimens shall 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.

5.4 Tensile Properties:

5.4.1 Tensile Test Specimens:

Tensile Strength, psi	37,000	min
Yield Strength at 0.2% Offset or at 0.0051 in. in 1 in. Extension Under Load (E = 6,500,000), psi	20,000	min
Elongation, % in 1 in.	1.0	min

5.4.2 Specimens Cut from Castings:

5.4.2.1 When tensile properties of actual castings are determined for acceptance, not less than 4, and preferably 10, tensile test specimens shall be cut from thick and thin sections. The average value of all specimens selected shall conform to the following:

Tensile Strength, psi	27,500	min
Yield Strength at 0.2% Offset or at 0.0047 in. in 1 in. Extension Under Load (E = 6,500,000), psi	17,500	min
Elongation, % in 4D	0.7	min

5.4.2.1.1 Any specimen cut from a casting shall conform to the following:

Tensile Strength, psi	19,000	min
Yield Strength at 0.2% Offset or at 0.0043 in. in 1 in. Extension Under Load (E = 6,500,000), psi	15,000	min

5.4.2.1.2 Conformance to these requirements may be used as basis for acceptance of castings.

5.5 Hardness of Castings: Except at sprues and risers, the castings shall have hardness of Rockwell E 75 - 95 or equivalent.

6. QUALITY:

6.1 Castings shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts. Castings shall have smooth surfaces and shall be well cleaned.

6.2 Radiographic and other quality standards shall be as agreed upon by purchaser and vendor.

6.3 Unless otherwise specified, castings shall be produced under radiographic control. This shall consist of radiographic examination of castings until proper foundry technique, which will produce castings free from harmful internal imperfections, is established for each part number, and of production castings as necessary to ensure maintenance of satisfactory quality.

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

6.5 Castings shall not be impregnated, chemically treated, or coated to prevent leaking, unless specified or allowed by written permission which states the method to be used. Impregnated castings shall be marked IMP.

7. REPORTS:

7.1 Unless otherwise specified, the vendor of castings shall furnish with each shipment three copies of a report of the results of tensile tests on test specimens from each lot and a statement that the chemical composition of the castings conforms to the requirements of this specification. This report shall include the purchase order number, master heat number (and code symbol if used), material specification number, part number, and quantity from each heat.

7.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of castings, part number, and quantity. When castings for making parts are produced or purchased by the parts vendor, that vendor shall inspect castings from each master heat represented to determine conformance to the requirements of this specification, and shall include in the report a statement that the castings conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.

8. IDENTIFICATION: Unless otherwise specified, each casting shall be plainly marked with the part number, master heat number, and lot number. Marking materials shall have no deleterious effects on the castings or their performance.

9. PROTECTIVE TREATMENT: Unless otherwise specified, castings shall be given a chrome pickle treatment to protect against corrosion during shipment and storage.

10. APPROVAL:

10.1 To assure uniformity of quality, sample castings from new or reworked master patterns shall be approved by purchaser, unless such approval be waived.