

# AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.  
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### MAGNESIUM ALLOY CASTINGS, PERMANENT MOLD AZ92 Solution and Precipitation Treated

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

2. COMPOSITION:

Aluminum	8.3 - 9.7
Zinc	1.6 - 2.4
Manganese	0.10 min
Silicon	0.3 max
Copper	0.25 max
Nickel	0.01 max
Other Impurities, total	0.3 max
Magnesium	remainder

3. CONDITION: Solution and precipitation heat treated.

4. TECHNICAL REQUIREMENTS:

4.1 Casting:

4.1.1 A lot of castings shall consist of not more than 1000 pounds of cleaned castings of the same part number, produced in a pouring period of not more than 8 consecutive hours.

4.1.2 Castings, after removal from molds, shall be cooled at rates which will be as uniform as practicable for castings of each part number.

4.2 Test Specimens: Tensile test specimens, and chemical analysis specimens when required, shall be cast with each lot of castings, and, when requested, shall be supplied with the castings.

4.2.1 Tensile Test Specimens: Shall be standard (0.5-inch diameter at the reduced parallel section) and shall be cast to size in permanent molds. Metal for the specimens shall be part of the melt which is used for the castings.

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

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

4.3.1 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.

Section 7C of the SAE Technical Board rules provides that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report, in formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

4.3.2 Tensile test specimens from each lot, together with production castings, shall, after solution treatment as in 4.3.1, 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.

4.4 Tensile Properties:

4.4.1 Tensile Test Specimens:

Tensile Strength, psi	34,000	min
Yield Strength at 0.2% offset or at 0.0096 in. in 2 in. extension under load (E=6,500,000), psi	18,000	min
Elongation, % in 2 in.		1.0 min

4.4.2 Tensile Properties of Castings: 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	25,500	min
Yield Strength at 0.2% offset or at 0.0082 in. in 2 in. extension under load (E=6,500,000), psi	13,500	min

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

4.5 Hardness of Castings: Except at sprues and risers the castings shall have hardness of Brinell 70-95 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball, or Brinell 80-105 using 1000 kg load and 10 mm ball.

5. QUALITY:

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

5.2 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 defects, is established for each mold, and of production castings as necessary to ensure maintenance of satisfactory quality.

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

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

5.5 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.