AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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AMS 4424E

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MAGNESIUM ALLOY CASTINGS, SAND
AZ63
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	5.3 - 6.7
Zinc	2.5 - 3.5
Manganese	0.15 min
Silicon	0.30 max
Copper	0.10 max
Nickel	0.005 max
Other Impurities, each	0.07 max
Magnesium	remainder

3. CONDITION: Solution and precipitation heat treated.

4. TECHNICAL REQUIREMENTS:

4.1 Casting:

4.1.1 The molten metal shall be subjected to superheating or other grain-refining treatment.

4.1.2 A melt shall be the metal withdrawn from a batch furnace charge of 2000 pounds or less as melted for pouring castings, or when permitted by purchaser, a melt shall be 3000 pounds or less of metal withdrawn from one continuous furnace in not more than 4 consecutive hours.

4.2 Test Specimens: Tensile test specimens, and chemical analysis specimens when required, shall be cast with each melt of metal for 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 molds made with the regular foundry mix of green sand, without using chills. Metal for the specimens shall be part of the melt which is used for the castings and shall be subjected to the same superheating or other grain-refining treatment given the metal 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 melt, 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.

4.3.2 Tensile test specimens from each melt, 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 Physical Properties:

4.4.1 Tensile Test Specimens:

Tensile Strength, psi	34,000 min
Yield Strength at 0.2% Offset or at 0.0089 in. in 2 in. Extension Under Load (E=6,500,000), psi	16,000 min
Elongation, % in 2 in.	3 min

4.4.1.1 Hardness: Tensile test specimens shall have hardness of Brinell 65-85 using 500 kg load and 10 mm ball.

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	25,000 min
Yield Strength at 0.2% Offset or at 0.0077 in. in 2 in. Extension Under Load (E=6,500,000), psi	12,000 min
Elongation, % in 2 in.	0.75 min

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

4.4.2.2 Hardness: Average hardness of all specimens selected shall conform to 4.5.

4.5 Hardness of Castings: Except at sprues and risers the castings shall have hardness of Brinell 65-85 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball, or Brinell 75-95 using 1000 kg load and 10 mm ball.

4.6 Grain Size: Shall be as agreed upon by purchaser and vendor.

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 pattern, 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.

6. REPORTS:

6.1 Unless otherwise specified, the vendor of castings shall furnish with each shipment three copies of a report of the results of tests to determine conformance of the castings to the requirements of this specification. This report shall show the chemical composition of the castings, properties of the tensile test specimens, melt numbers, material specification number, purchase order number, part number, and quantity. If the accuracy of control is adequate, each melt need not be analyzed, but the frequency of analysis shall be as agreed upon by purchaser and vendor.

6.2 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 each shipment or melt of castings 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.

7. IDENTIFICATION: Castings shall be identified in accordance with the latest issue of AMS 2804.

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