AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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AMS4422C

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MAGNESIUM ALLOY CASTINGS (Sand)
6 Al 3 Zn (Solution)

1. ACKNOWLEDGMENT: A vendor must 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	0.05 max
Nickel	0.01 max
Total Other Impurities	0.30 max
Magnesium	remainder

3. CASTING: (a) All the metal which is melted for castings shall conform to section 2 and the molten metal shall be superheated or given a grain refining treatment.

(b) The metal which is poured into tensile test bars shall be superheated or given a grain refining treatment the same as the metal for the castings. The test bars of the standard size for testing shall be cast in molds made with the regular foundry mix of green sand without using chills.

4. HEAT TREATMENT: (a) Test bars from each melt, together with production castings conforming to this specification, shall be given the solution heat treatment. Cooling after the treatment shall be in air. At least one set of test bars shall be put into a batch type furnace with each load of castings, or into a continuous type furnace at intervals not longer than 3 hours.

(b) Heat treated castings shall have a hardness of Brinell 48-60, using 500 kg load and 10 mm ball, or the equivalent, or Brinell 57 - 72 using 1000 kg load and 10 mm ball. The hardness impression is not to be taken at a sprue or riser. If the hardness of the castings is outside of these limits, one casting may be rejected and examined as in paragraph 6(c); if all requirements of that paragraph are fulfilled, the lot may be accepted.

5. TEST BARS AND ANALYTICAL SAMPLES: (a) Tensile test bars shall be cast with each melt of castings, unless otherwise specified. A melt shall mean one pot (2000 pounds or less) of metal without additions of magnesium or magnesium alloys as melted for superheating and/or casting. Test bars are to be supplied with the castings, when requested. When specified, chemical analysis coupons are to be taken on each melt, identified with melt number and supplied with castings.

(b) Test bars, poured and treated as specified in sections 3 and 4, shall conform to the following physical properties:

Tensile Strength, lb per sq in.	32,000 min
Elongation, % in 2 in.	7 min
Brinell Hardness (500 kg load - 10 mm ball)	48-60

6. QUALITY: (a) Castings must be of uniform quality and condition, free from injurious cracks, blowholes, porosity, hard spots, foreign matter, shrinkage defects and other defects which will adversely affect their serviceability. Castings must not disclose defects during machining and shall be smooth and well cleaned.

(b) Castings when broken for fracture test must show a fine grain and must not show excessive discoloration and must be substantially free from oxides and other defects, particularly in locations subject to stresses in service.

(c) If castings are cut for examination, the average values for physical properties obtained from not less than 4, preferably 10, tensile specimens taken from thick and thin sections of the castings shall be as follows:

Tensile Strength, lb per sq in.	24,000 min
Elongation, % in 2 in.	1-1/2 min
Brinell Hardness (500 kg load - 10 mm ball)	48-60

(d) Unless otherwise specified, castings shall be produced under x-ray control. This shall consist in the examination of castings under x-ray until the proper foundry technique is established which will produce castings free from serious internal defects in all parts of the casting subject to stress in service. Occasional check x-ray examination shall be made.

(e) When specified, castings shall be x-ray examined by the vendor.

(f) Quality, grain size and radiographic standards for the examination of the castings shall be as agreed upon by the purchaser and the vendor.

(g) When specified, castings shall be subject to black light inspection to detect cracks or other discontinuities.

7. PRECAUTIONS: (a) Castings shall not be repaired by plugging, welding, or other methods, without written permission.

(b) Castings shall not be impregnated, chemically treated, or coated to prevent leaking, unless the drawing or written memorandum grants permission, stating the method to be used. Impregnated castings shall be stamped "IMP".

(c) Castings shall be of sufficient size to allow for finishing to blueprint requirements, but excessive size or weight will not be permitted.

8. REPORTS: Unless otherwise specified, the manufacturer of the castings shall supply three copies of a notarized report showing the results of tests made to determine the conformance of the castings to this specification. This report shall show the chemical composition of the melts and the physical properties of the test bars.

9. IDENTIFICATION: Castings shall be identified in accordance with AMS 2804.

10. CORROSION: The manufacturer shall treat all castings in accordance with AMS 2475 to protect the surfaces against corrosion during shipment or storage before machining.