Society of Automotive Engineers, Inc.
485 LEXINGTON AVENUE, NEW YORK, N.Y. 10017

AEROSPACE MATERIAL SPECIFICATION

AMS 4455A
Superseding AMS 4455
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MAGNESIUM ALLOY CASTINGS, INVESTMENT
10Al (AM100A-T6)

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

2. APPLICATION: Primarily for small and intricate parts, operating at temperatures up to 300 F (149 C), cast to approximately final dimensions where the intricacy of the part is such that a high fluidity is required.

3. COMPOSITION: Castings shall conform to the following:

	min	max
Aluminum	9.3	10.7
Manganese	0.10	--
Zinc	--	0.30
Silicon	--	0.30
Copper	--	0.10
Nickel	--	0.01
Other Impurities, total	--	0.30
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 refined metal of a single furnace charge. Gates, sprues, risers, Ø 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 are permissible. If grain refining elements are not added, the molten metal shall be subjected to superheating or other grain refining treatment.

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.

5.2 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, Ø 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. If the metal for castings is given any treatment such as fluxing or cooling and reheating, metal for the specimens shall be so treated.

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 heat 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 heat treatment as in 5.3.1, be heated to the proper temperature and for the proper time for precipitation heat 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 Cast Tensile Test Specimens:

Tensile Strength, psi	34,000 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.	4 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	25,500 min
Yield Strength at 0.2% Offset or at 0.0038 in. in 1 in. Extension Under Load (E = 6,500,000), psi	11,500 min
Elongation, % in 1 in. or 4D	1.0 min

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

Tensile Strength, psi	17,000 min
Yield Strength at 0.2% Offset or at 0.0035 in. in 1 in. Extension Under Load (E = 6,500,000), psi	9,500 min

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

5.4.3 When a dispute occurs between purchaser and vendor over the yield strength values, yield strength determined by the offset method shall apply.

5.5 Hardness of Castings: Except at sprues and risers, castings shall have hardness of Rockwell E 70 - 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.