AERONAUTICAL
MATERIAL SPECIFICATIONS

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

AMS 4443

Issued 7-1-56
Revised

MAGNESIUM ALLOY CASTINGS, SAND
4.5Zn - 0.7Zr (ZK51A-T5)
Aged

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

2. APPLICATION: Primarily for parts requiring high yield strength and good elongation.

3. COMPOSITION:

Zinc	3.6 - 5.5
Zirconium, total	0.55 min
Zirconium, soluble	0.55 min
Copper, if determined	0.10 max
Nickel, if determined	0.01 max
Other Impurities, total	0.30 max
Magnesium	remainder

3.1 Soluble zirconium is that portion of the zirconium which is soluble in 1:4 hydrochloric acid held below its boiling point. Routine determinations for soluble zirconium are not required.

4. CONDITION: Aged.

5. TECHNICAL REQUIREMENTS:

5.1 Casting:

5.1.1 A melt shall be the metal withdrawn from a batch furnace charge of 2000 lb or less as melted for pouring castings or, when permitted by purchaser, a melt shall be 3000 lb or less of metal withdrawn from one continuous furnace in not more than 4 consecutive hours.

5.2 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.

5.2.1 Tensile Test Specimens: Shall be standard (0.5 in. 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.

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

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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 melt, together with production castings, shall be heated to the proper temperature and for the proper time for aging 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.

5.4 Tensile Properties:

5.4.1 Tensile Test Specimens:

Tensile Strength, psi	34,000 min
Yield Strength at 0.2% Offset or at 0.0102 in. in 2 in. Extension Under Load (E = 6,500,000), psi	20,000 min
Elongation, % in 2 in.	4 min

5.4.2 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 0.0092 in. in 2 in. Extension Under Load (E = 6,500,000), psi	17,000 min
Elongation, % in 4D	2.0 min

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

5.5 Hardness of Castings: Except at sprues and risers, the castings shall have hardness not lower than Brinell 55 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball, or not lower than Brinell 62.5 using 1000 kg load and 10 mm ball.

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.