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

AEROSPACE MATERIAL SPECIFICATION

AMS 4447B
Superseding AMS 4447A
Issued 7-1-57
Revised 5-1-68

MAGNESIUM ALLOY CASTINGS, SAND
3.3Th - 2.1Zn - 0.8Zr (HZ32A-T5)

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 parts operating at 400 - 600 F (204 - 316 C).

3. COMPOSITION: Castings shall conform to the following:

	min	max
Thorium	2.5	4.0
Zinc	1.7	2.5
Zirconium, total	0.50	1.0
Zirconium, soluble (1)	0.50	--
Copper (1)	--	0.10
Rare Earth Metals (1)	--	0.10
Nickel (1)	--	0.01
Other Impurities, total	--	0.20
Magnesium	remainder	

(1) Determination not required for routine acceptance.

3.1 Soluble zirconium is that portion of the zirconium which is soluble in 1:4 hydrochloric acid held below its boiling point.

4. CONDITION: Precipitation heat treated.

5. TECHNICAL REQUIREMENTS:

5.1 Casting: Castings shall be produced in lots from metal conforming to section 3. Metal remelted from previously analyzed ingot may be poured directly into castings. Furnace or ladle additions of grain refining elements are permissible. Unless otherwise agreed upon by purchaser and vendor, molten metal taken from alloying furnaces, with or without additions of foundry operating scrap (gates, sprues, risers, and rejected castings), shall not be poured into castings unless first converted to ingot, analyzed, and remelted or until the composition of a sample taken after the last addition to the melt has been found to conform to section 3.

5.1.1 A melt shall be the metal withdrawn from a batch furnace charge of 2000 lb or less as melted for pouring castings or, when permitted by purchaser, a melt shall be 4000 lb or less of metal withdrawn from one continuous furnace in not more than 8 consecutive hours.

5.1.2 A lot shall consist of castings poured from a single melt in not more than 8 consecutive hours.

5.2 Cast Test Specimens: Tensile test specimens, and chemical analysis specimens when required, shall be cast as follows and, when requested shall be supplied with the castings.

5.2.1 Tensile Test Specimens: Shall be cast with each lot of castings, 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 and shall be given the same grain-refining or alloying treatment given the metal for the castings.

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

5.3 Heat Treatment: Unless otherwise specified, all castings and tensile test specimens shall be heat treated as follows:

5.3.1 Tensile test specimens from each lot, together with production castings, shall be heated to a temperature not higher than 600 F (316 C) for the proper time for precipitation 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.

5.4 Tensile Properties:

5.4.1 Cast Tensile Test Specimens:

Tensile Strength, psi	27,000 min
Yield Strength at 0.2% Offset or at 0.0080 in. in 2 in. Extension Under Load (E = 6,500,000), psi	13,000 min
Elongation, % in 2 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	23,000 min
Yield Strength at 0.2% Offset or at 0.0076 in. in 2 in. Extension Under Load (E = 6,500,000), psi	11,700 min
Elongation, % in 2 in. or 4D	2 min

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

Yield Strength at 0.2% Offset or at 0.0072 in. in 2 in. Extension Under Load (E = 6,500,000), psi	10,500 min

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

5.4.2.3 When specified on the order, tensile test specimens taken in locations indicated on the drawing, from a casting chosen at random to represent the lot, shall have properties indicated on the drawing for each specimen.

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.

5.4 Hardness of Castings: Except at sprues and risers, castings shall have hardness of Brinell 45 - 70 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball, or Brinell 50 - 75 using 1000 kg load and 10 mm ball.