



AEROSPACE MATERIAL SPECIFICATION

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AMS 4261A

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ALUMINUM ALLOY CASTINGS, INVESTMENT 7.0Si - 0.3Mg (356-T51) Precipitation Heat Treated

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 intricate parts cast to approximately final dimensions.
3. **COMPOSITION:** Castings shall conform to the following:

	min	max
Silicon	6.5	- 7.5
Magnesium	0.20	- 0.40
Iron	--	0.50
Manganese	--	0.30
Zinc	--	0.30
Copper	--	0.20
Titanium	--	0.20
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

4. **CONDITION:** 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, and rejected castings shall be used only in the preparation of master heats; they shall not be remelted directly, without refining, for pouring of castings. Ladle additions of small amounts of grain refining elements or alloys are permissible.
 - 5.1.1 A lot shall consist of not more than 800 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, 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:

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5.3.1 Tensile test specimens from each heat, together with production castings, shall be heated uniformly to $440\text{ F} \pm 10$ ($226.7\text{ C} \pm 5.6$), held at heat for 6 - 12 hr, 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 Test Specimens:

Tensile Strength, psi	23,000 min
Yield Strength at 0.2% Offset or at 0.0036 in. in	
1 in. Extension Under Load (E = 10,300,000), psi	16,000 min
Elongation, % in 1 in.	3 min

5.4.2 Specimens Cut from 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	17,500 min
Yield Strength at 0.2% Offset or at 0.0032 in. in	
1 in. Extension Under Load (E = 10,300,000), psi	12,000 min
Elongation, % in 4D	1 min

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

5.4.2.2 Tensile test specimens taken in locations indicated on the drawing, from a casting chosen at random to represent the lot, shall have the tensile 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.

5.5 Hardness of Castings: Except at sprues and risers, the castings shall have hardness not lower than ∅ Brinell 50 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball, or Brinell 55 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.

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.

6.5 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.