

# AEROSPACE

## MATERIAL SPECIFICATIONS

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

# AMS 4261

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Revised

### ALUMINUM ALLOY CASTINGS, INVESTMENT

7.0Si - 0.3Mg (356-T51)

Precipitation Heat Treated

1. ACKNOWLEDGMENT: A vendor shall mention this specification number 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:

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 Tensile 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 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                                | 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 when agreed upon by purchaser and vendor.

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.

- 5.5 Hardness of Castings: Except at sprues and risers, the castings shall have hardness not lower than Brinell 60 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball, or Brinell 65 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.

7. REPORTS:

- 7.1 Unless otherwise specified, the vendor of castings shall furnish with each shipment three copies of a report of the results of tensile tests on test specimens from each lot and a statement that the chemical composition of the castings conforms to the requirements of this specification. This report shall include the purchase order number, master heat number (and code symbol if used), material specification number, part number, and quantity from each heat.
- 7.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of castings, part number, and quantity. When castings for making parts are produced or purchased by the parts vendor, that vendor shall inspect castings from each master heat represented to determine conformance to the requirements of this specification, and shall include in the report a statement that the castings conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.

8. IDENTIFICATION: Unless otherwise specified, each casting shall be plainly marked with the part number, master heat number, and lot number. Marking materials shall have no deleterious effect on the castings or their performance.