

CANCELLED

# AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.  
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Revised

MAGNESIUM ALLOY CASTINGS, SAND  
6C<sub>e</sub>

Solution and Precipitation Treated

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

2. APPLICATION: Primarily for use at elevated temperatures and where ductility at room temperature is not required.

3. COMPOSITION:

|                            |             |
|----------------------------|-------------|
| Cerium (Total Rare Earths) | 4.80 - 7.20 |
| Zirconium                  | 1.00 max    |
| Silicon                    | 0.30 max    |
| Copper                     | 0.10 max    |
| Aluminum                   | 0.05 max    |
| Nickel                     | 0.01 max    |
| Other Impurities, total    | 0.20 max    |
| Magnesium                  | remainder   |

4. CONDITION: Solution and precipitation heat treated.

5. TECHNICAL REQUIREMENTS:

5.1 Castings:

5.1.1 All metal which is poured into castings shall conform in composition to Section 3 above.

5.1.2 A melt shall be the metal withdrawn from a batch furnace charge of 2000 pounds or less as melted for pouring castings, or when permitted by the purchaser, a melt shall be 3000 pounds or less of metal withdrawn from one continuous furnace in not more than 8 consecutive hours.

5.2 Test Specimens: Unless otherwise specified, 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 inch 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.

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 solution

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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 melt, together with production castings, shall, after solution treatment as in paragraph 5.3.1, be heated to the proper temperature and for the proper time for precipitation 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 Physical Properties:

- 5.4.1 Unless otherwise specified, tensile test specimens produced in accordance with paragraphs 5.2 and 5.3 shall conform to the following requirements:

|                                                                                       |            |
|---------------------------------------------------------------------------------------|------------|
| Tensile Strength, psi                                                                 | 15,000 min |
| Yield Strength at 0.2% offset or at<br>0.0080 inch in 2 in. extension under load, psi | 13,000 min |

- 5.4.2 Hardness of castings, except at sprues and risers, shall be Brinell 50-80 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 inch ball, or Brinell 55-85 using 1000 kg load and 10 mm ball.

- 5.4.3 If castings are cut for examination, not less than four, and preferably ten, specimens taken from thick and thin sections of castings shall be tested. Average hardness of such specimens shall be as specified in paragraph 5.4.2 above. Average physical properties shall conform to the following requirements:

|                                                                                       |            |
|---------------------------------------------------------------------------------------|------------|
| Tensile Strength, psi                                                                 | 11,000 min |
| Yield Strength at 0.2% offset or at<br>0.0068 inch in 2 in. extension under load, psi | 9,000 min  |

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

#### 6. QUALITY:

- 6.1 Castings shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts. Castings shall have smooth surfaces and shall be well cleaned.
- 6.2 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 defects, is established for each pattern, and of production castings as necessary to insure maintenance of satisfactory quality.
- 6.3 Radiographic and other quality standards shall be as agreed upon by purchaser and vendor.
- 6.4 Castings shall not be repaired by plugging, welding or other methods, without written permission from the purchaser.