



# AEROSPACE MATERIAL SPECIFICATION

AMS4223™

REV. E

Issued 1974-12  
Reaffirmed 2007-04  
Revised 2015-08

Superseding AMS4223D

Aluminum Alloy, Castings  
4.5Cu - 0.70Ag - 0.30Mn - 0.25Mg - 0.25Ti (A201.0-T4)  
Solution Heat Treated and Naturally Aged  
(Composition similar to UNS A12010)

## RATIONALE

AMS4223E revises heat treatment requirements (Section 3.5) as a result of Limited Scope Ballot.

### 1. SCOPE

#### 1.1 Form

This specification covers an aluminum alloy in the form of castings.

#### 1.2 Application

These castings have been used typically for components requiring moderate strength combined with good ductility and impact strength, but usage is not limited to such applications. Certain design and processing procedures (see 8.2) may cause these castings to become susceptible to stress-corrosion cracking.

### 2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

#### 2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

AMS2360 Room Temperature Tensile Properties of Castings

AMS2694 In-Process Welding of Castings

AMS2771 Heat Treatment of Aluminum Alloy Castings

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|         |   |
|---------|---|
| AMS2804 | Identification Castings                   |
| AMS2175 | Casting, Classification and Inspection of |
| AS1990  | Aluminum Alloy Tempers                    |

## 2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, [www.astm.org](http://www.astm.org).

|                   |   |
|-------------------|---|
| ASTM B557         | Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products   |
| ASTM B557M        | Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)  |
| ASTM B660         | Packaging/Packing of Aluminum and Magnesium Products  |
| ASTM E10          | Brinell Hardness of Metallic Materials  |
| ASTM E29          | Using Significant Digits in Test Data to Determine Conformance with Specifications  |
| ASTM E34          | Chemical Analysis of Aluminum and Aluminum-Base Alloys  |
| ASTM E101         | Spectrographic Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique   |
| ASTM E227         | Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique   |
| ASTM E607         | Atomic Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere                               |
| ASTM E716         | Sampling of Aluminum and Its Alloys for Spectrochemical Analysis  |
| ASTM E1251        | Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by Argon Atmosphere, Point-to-Plane, Unipolar Self-Initiating Capacitor Discharge |
| ASTM E1417/E1417M | Liquid Penetrant Testing  |
| ASTM E742/E1742M  | Radiographic Examination  |
| ASTM G44          | Exposure of Metals and Alloys by Alternate Immersion in Neutral 3.5% Sodium Chloride Solution   |

## 3. TECHNICAL REQUIREMENTS

### 3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E34, by spectrochemical methods in accordance with ASTM E101, ASTM E227, ASTM E607, or ASTM E1251, or by other analytical methods acceptable to purchaser (see 3.4.1).

**Table 1 – Composition**

| Element               | min       | max  |
|-----------------------|-----------|------|
| Silicon               | --        | 0.05 |
| Iron                  | --        | 0.10 |
| Copper                | 4.0       | 5.00 |
| Manganese             | 0.20      | 0.40 |
| Magnesium             | 0.15      | 0.35 |
| Titanium              | 0.15      | 0.35 |
| Silver                | 0.40      | 1.0  |
| Other Elements, each  | --        | 0.03 |
| Other Elements, total | --        | 0.10 |
| Aluminum              | remainder |      |

3.1.1 Test results may be rounded in accordance with the “rounding off” method of ASTM E29.

### 3.2 Condition

Solution heat treated and naturally aged to the T4 temper (see AS1990).

### 3.3 Casting

Castings shall be produced from metal conforming to 3.1, determined by analysis of a specimen (3.4.1) cast after the last melt addition.

### 3.4 Test Specimens

Chemical analysis specimens, and tensile specimens shall be cast as follows:

#### 3.4.1 Chemical Analysis Specimens

Shall be cast from each melt after the last melt addition and shall be tested to qualify the melt lot as in 3.1. Spectrochemical sample shall be prepared in accordance with ASTM E716.

#### 3.4.2 Tensile Specimens

Shall be produced as follows:

##### 3.4.2.1 Specimens Cut from Castings

Shall be removed after heat treatment and machined to conform to ASTM B557 or ASTM B557M, and shall be either 0.500 inch (12.70 mm) diameter at the reduced parallel gage section, subsize specimens proportional to the standard, or standard sheet-type specimens, as required by 3.6.1.1.

##### 3.4.2.2 Separately-Cast Specimens

Shall conform to ASTM B557 or ASTM B557M and shall be cast from each melt, after the last melt addition. Specimens shall be cast in molds representing the mold formulation used for castings. Chills are not permitted on test specimen cavity except on the end face of the specimen when approved in accordance with 4.4.2.

### 3.5 Heat Treatment

3.5.1 Castings and representative tensile specimens shall be solution heat treated and naturally aged in accordance with AMS2771, except as required by 3.5.2 and 3.5.2.1, to produce the properties specified in 3.6.1 and 3.6.2 (see 8.5 and 8.6). For specific castings, in lieu of the changes introduced by AMS4223E, it is permissible to continue using heat treating process parameters which were previously approved as in 4.4. When separately-cast or integral specimens are permitted, at least one set of tensile specimens shall, during each stage of heat treatment, be put into a batch-type furnace with each load of castings represented or put into a continuous furnace at intervals of not longer than 3 hours.