

# AEROSPACE MATERIAL SPECIFICATION

**SAE** AMS4252

REV. B

Issued 1989-10  
Revised 2005-03  
Reaffirmed 2012-04

Superseding AMS4252A

Aluminum Alloy, Plate  
6.4Zn - 2.4Mg - 2.2Cu - 0.12Zr (7150-T7751)  
Solution Heat Treated, Stress Relieved, and Overaged  
(Composition Similar to UNS A97150)

## RATIONALE

AMS4252B has been reaffirmed to comply with the SAE five-year review policy.

### 1. SCOPE:

#### 1.1 Form:

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

#### 1.2 Application:

This plate has been used typically for structural applications requiring a combination of high tensile strength and compressive properties and good exfoliation corrosion resistance, but usage is not limited to such applications.

### 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, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or [www.sae.org](http://www.sae.org)

AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings

AMS 2772 Heat Treatment of Aluminum Alloy Raw Materials

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<http://www.sae.org/technical/standards/AMS4252B>**

## 2.2 ASTM Publications:

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

|                   |                                                                                      |
|-------------------|--------------------------------------------------------------------------------------|
| ASTM B 594        | Ultrasonic Examination of Aluminum-Alloy Wrought Products for Aerospace Applications |
| ASTM B 666/B 666M | Identification Marking of Aluminum and Magnesium Products                            |
| ASTM B 660        | Packaging/Packing of Aluminum and Magnesium Products                                 |
| ASTM E 9          | Compression Testing of Metallic Materials at Room Temperature                        |

## 2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036 or [www.ansi.org](http://www.ansi.org).

|             |                                                            |
|-------------|------------------------------------------------------------|
| ANSI H35.2M | Dimensional Tolerances for Aluminum Mill Products (Metric) |
| ANSI H35.2  | Dimensional Tolerances for Aluminum Mill Products          |

## 3. TECHNICAL REQUIREMENTS:

### 3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355:

TABLE 1 - Composition

| Element               | min       | max  |
|-----------------------|-----------|------|
| Silicon               | --        | 0.12 |
| Iron                  | --        | 0.15 |
| Copper                | 1.9       | 2.5  |
| Manganese             | --        | 0.10 |
| Magnesium             | 2.0       | 2.7  |
| Chromium              | --        | 0.04 |
| Zinc                  | 5.9       | 6.9  |
| Titanium              | --        | 0.06 |
| Zirconium             | 0.08      | 0.15 |
| Other Elements, each  | --        | 0.05 |
| Other Elements, total | --        | 0.15 |
| Aluminum              | remainder |      |

### 3.2 Condition:

Solution heat treated, stretched to produce a nominal permanent set of 2% but not less than 1-1/2% nor more than 3%, and overaged.

### 3.3 Heat Treatment:

Plate shall be solution heat treated in accordance with AMS 2772. Overaging shall be performed at a temperature, for a time, and cooling as required to meet requirements of 3.4 (See 8.2).

### 3.4 Properties:

Plate shall conform to the following requirements, determined on the mill product size in accordance with AMS 2355 except as specified in 3.4.2.

#### 3.4.1 Tensile Properties: Shall be as shown in Table 2.

TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

| Nominal Thickness<br>Inches | Specimen Orientation | Tensile Strength<br>ksi | Yield Strength at 0.2% Offset<br>ksi | Elongation in 2 Inches or 4D<br>% |
|-----------------------------|----------------------|-------------------------|--------------------------------------|-----------------------------------|
| 0.250 to 0.500, excl        | Longitudinal         | 80.0                    | 74.0                                 | 8                                 |
|                             | Long-Transverse      | 80.0                    | 74.0                                 | 8                                 |
| 0.500 to 0.750, excl        | Longitudinal         | 83.0                    | 77.0                                 | 8                                 |
|                             | Long-Transverse      | 83.0                    | 76.0                                 | 8                                 |
| 0.750 to 1.500, incl        | Longitudinal         | 84.0                    | 78.0                                 | 8                                 |
|                             | Long-Transverse      | 84.0                    | 77.0                                 | 8                                 |
| Over 1.500 to 3.000, incl   | Longitudinal         | 82.0                    | 76.0                                 | 7                                 |
|                             | Long-Transverse      | 82.0                    | 75.0                                 | 6                                 |
|                             | Short-Transverse     | 77.0                    | 67.0                                 | 1                                 |

TABLE 2B - Minimum Tensile Properties, SI Units

| Nominal Thickness<br>Millimeters | Specimen Orientation | Tensile Strength<br>MPa | Yield Strength at 0.2% Offset<br>MPa | Elongation in 50.8 mm or 4D<br>% |
|----------------------------------|----------------------|-------------------------|--------------------------------------|----------------------------------|
| 6.35 to 12.70, excl              | Longitudinal         | 552                     | 510                                  | 8                                |
|                                  | Long-Transverse      | 552                     | 510                                  | 8                                |
| 12.70 to 19.05, excl             | Longitudinal         | 572                     | 531                                  | 8                                |
|                                  | Long-Transverse      | 572                     | 524                                  | 8                                |
| 19.05 to 38.10, incl             | Longitudinal         | 579                     | 538                                  | 8                                |
|                                  | Long-Transverse      | 579                     | 531                                  | 8                                |
| Over 38.10 to 76.20, incl        | Longitudinal         | 565                     | 524                                  | 7                                |
|                                  | Long-Transverse      | 565                     | 517                                  | 6                                |
|                                  | Short-Transverse     | 531                     | 462                                  | 1                                |

#### 3.4.2 Compressive Yield Strength: When specified, the longitudinal compressive strength, determined in accordance with ASTM E 9, shall be as shown in Table 3.

TABLE 3 - Minimum Compressive Yield Strength

| Nominal Thickness<br>Inches | Nominal Thickness<br>Millimeters | Compressive Yield Strength<br>ksi | Compressive Yield Strength<br>MPa |
|-----------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 0.500 to 0.750, excl        | 12.70 to 19.05, excl             | 76.0                              | 524                               |
| 0.750 to 1.500, incl        | 19.05 to 38.10, incl             | 77.0                              | 531                               |
| Over 1.500 to 3.000, incl   | Over 38.10 to 76.20, incl        | 75.0                              | 517                               |

## 3.4.3 Corrosion Resistance:

3.4.3.1 Exfoliation-Corrosion Resistance: Specimens from plate shall show exfoliation corrosion equal to or less than EB when tested at the T/10 plane.

3.4.3.2 Stress-Corrosion Cracking: Specimens, cut from plate 0.750 inch (19.05 mm) and over in nominal thickness, shall show no evidence of stress-corrosion cracking when stressed in the short-transverse direction to 25.0 ksi (172 MPa).

3.4.4 Fracture Toughness: When specified, plane-strain fracture toughness ( $K_{IC}$ ) for the L-T and T-L specimen orientations shall be not lower than the values shown in Table 4 for plate 0.750 to 3.000 inches (19.05 to 76.20 mm) in nominal thickness. Fracture toughness values for plate 0.500 to 0.749 inch (12.70 to 19.02 mm) in nominal thickness shall be reported.

TABLE 4 - Fracture Toughness Values

| Nominal Thickness<br>Inches | Nominal Thickness<br>Millimeters | Specimen Orientation | $K_{IC}$<br>ksi $\sqrt{\text{in}}$ | $K_{IC}$<br>MPa $\sqrt{\text{m}}$ |
|-----------------------------|----------------------------------|----------------------|------------------------------------|-----------------------------------|
| 0.750 to 1.000, incl        | 19.05 to 25.40, incl             | L-T                  | 20                                 | 22.0                              |
|                             |                                  | T-L                  | 18                                 | 19.8                              |
| Over 1.000 to 1.500, incl   | Over 25.40 to 38.10, incl        | L-T                  | 22                                 | 24.2                              |
|                             |                                  | T-L                  | 20                                 | 22.0                              |
| Over 1.500 to 3.000, incl   | Over 38.10 to 76.20, incl        | L-T                  | 21                                 | 23.1                              |
|                             |                                  | T-L                  | 19                                 | 20.9                              |

## 3.5 Quality:

Plate, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the plate.

3.5.1 Each plate 0.500 inch (12.70 mm) and over in nominal thickness shall be ultrasonically inspected in accordance with ASTM B 594 and shall meet ultrasonic Class A requirements.

## 3.6 Tolerances:

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

#### 4. QUALITY ASSURANCE PROVISIONS:

##### 4.1 Responsibility for Inspection:

The vendor of plate shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the plate conforms to specified requirements.

##### 4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), long-transverse tensile properties (3.4.1), exfoliation corrosion resistance (3.4.3.1), ultrasonic soundness (3.5.1), tolerances (3.6), and, when specified, longitudinal tensile properties (3.4.1), compressive yield strength (3.4.2), and fracture toughness (3.4.4) are acceptance tests and, except for composition, shall be performed on each lot.

4.2.2 Periodic Tests: Stress-corrosion cracking (3.4.3.2) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

##### 4.3 Sampling and Testing:

Shall be in accordance with AMS 2355.

##### 4.4 Reports:

The vendor of the product shall furnish with each shipment a report stating the product conforms to the composition, showing the numerical results of tests on each inspection lot to determine conformance to the acceptance test requirements and stating that the product conforms to any other technical requirements. This report shall include the purchase order number, inspection lot number, AMS 4252B, size, and quantity. The report shall include the identity of the producer, the mill product form and the size of the mill product.

##### 4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355.

#### 5. PREPARATION FOR DELIVERY:

##### 5.1 Identification:

Shall be in accordance with ASTM B 666.