



# AEROSPACE MATERIAL SPECIFICATION

**AMS4172™****REV. H**

Issued 1969-11  
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Revised 2024-09

Superseding AMS4172G

Aluminum Alloy, Extrusions,  
1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-T4511 or T4510),  
Solution Heat Treated and Stress Relieved by Stretching  
(Composition similar to UNS A96061)

## RATIONALE

AMS4172H results from a Five-Year Review and update of this specification with changes to update wording to prohibit unauthorized exceptions (see 4.4.1 and 8.5), relocate Definitions (see 2.4), and update Applicable Documents (see Section 2) and Hardness (see 8.2).

### 1. SCOPE

#### 1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, wire, profiles, and tubing (see 8.6).

##### 1.1.1 Tubing

Tubing shall be additionally classified as follows:

**Table 1**

Type	Description
I	Seamless tubing extruded from hollow billets using die and mandrel
II	Tubing extruded from solid billets using porthole or spider die or similar tooling

When no type is specified, Type I shall apply (see 8.6).

#### 1.2 Application

These products have been used typically for parts requiring moderate strength, especially where such parts require brazing or welding and where distortion during machining must be minimized, 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.

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## 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).

AMS2355      Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings

AMS2772      Heat Treatment of Aluminum Alloy Raw Materials

AS7766      Terms Used in Aerospace Metals Specifications

## 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 B594      Ultrasonic Inspection of Aluminum-Alloy Wrought Products

ASTM B660      Packaging/Packing of Aluminum and Magnesium Products

ASTM B666/B666M      Identification Marking of Aluminum and Magnesium Products

ASTM B807/B807M      Extrusion Press Solution Heat Treatment for Aluminum Alloys

ASTM E10      Brinell Hardness of Metallic Materials

## 2.3 ANSI Accredited Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ANSI H35.1/H35.1M      Alloy and Temper Designation Systems for Aluminum

ANSI H35.2      Dimensional Tolerances for Aluminum Mill Products

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

## 2.4 Definitions

Terms used in AMS are defined in AS7766.

## 3. TECHNICAL REQUIREMENTS

### 3.1 Composition

Shall conform to the percentages by weight shown in Table 2, determined in accordance with AMS2355.

**Table 2 - Composition**

Element	Min	Max
Silicon	0.40	0.8
Iron	--	0.7
Copper	0.15	0.40
Manganese	--	0.15
Magnesium	0.8	1.2
Chromium	0.04	0.35
Zinc	--	0.25
Titanium	--	0.15
Other Elements	--	0.05
Other Elements	--	0.15
Aluminum	remainder	

### 3.2 Condition

Material shall be produced in one of the following tempers; if no temper is specified, Temper T4511 (refer to ANSI H35.1/H35.1M) shall be supplied (see 8.6):

#### 3.2.1 Temper T4511

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

3.2.1.1 Extrusions may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.5.

3.2.1.2 Extrusions shall be supplied with the as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within specified dimensional tolerances.

#### 3.2.2 Temper T4510

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

3.2.2.1 Extrusions shall receive no additional straightening or stretching to meet the requirements of 3.5.

3.2.2.2 Extrusions shall be supplied with the as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within specified dimensional tolerances.

3.2.3 Heat Treatment shall be classified as follows:

**Table 3**

Class	Description
1	Furnace solution heat treated in accordance with AMS2772
2	Extruded and press solution heat treated in accordance with ASTM B807/B807M

If no class is specified, either class may be provided (see 8.6).

### 3.3 Properties

Extrusions shall conform to the following requirements, determined in accordance with AMS2355:

#### 3.3.1 As Solution Heat Treated and Stress Relieved

##### 3.3.1.1 Tensile Properties

Shall be as shown in Table 4.

**Table 4 - Minimum tensile properties**

Property	Value
Tensile Strength	26.0 ksi (179 MPa)
Yield Strength at 0.2% Offset	16.0 ksi (110 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	16%

#### 3.3.2 Response to Temper Conversion

Extrusions in the T4510 or T4511 temper, after precipitation heat treatment in accordance with AMS2772 to the T62 temper (refer to ANSI H35.1/H35.1M), shall have the following properties:

##### 3.3.2.1 Tensile Properties

Shall be as shown in Table 5.

**Table 5A - Minimum tensile properties, inch/pound units**

Nominal Diameter or Least Thickness (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness (Tubing) Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.250, excl	38.0	35.0	8
0.250 and over	38.0	35.0	10

**Table 5B - Minimum tensile properties, SI units**

Nominal Diameter or Least Thickness (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness (Tubing) Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 6.35, excl	262	241	8
6.35 and over	262	241	10

### 3.4 Quality

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