# AEROSPACE MATERIAL SPECIFICATION

| AMS4156™ | REV. L |
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Revised 2021-06

Superseding AMS4156K

## Aluminum Alloy, Extrusions
## 0.68Mg - 0.40Si (6063-T6)
## Solution and Precipitation Heat Treated

(Composition similar to A96063)

RATIONALE

AMS4156L is the result of a Five-Year Review and update of this specification with changes to address product outside specified size range (1.1, 3.3.2, 4.4.1, 8.7), prohibit unauthorized exceptions (3.6, 4.4.1, 5.1.1, 8.6), allow use of prior revision (8.5), and condition (3.2).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, wire, profiles, and tubing up to and including 1.000 inch (25.4 mm) in diameter, least thickness, or tube wall thickness (see 8.7).

1.2 Application

These extrusions have been used typically for parts requiring good surface finish and for hollow, partially enclosed, and intricate profiles for which an alloy having good extruding characteristics is required, 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.





**TO PLACE A DOCUMENT ORDER:** **Tel: 877-606-7323 (inside USA and Canada)**
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**For more information on this standard, visit**
https://www.sae.org/standards/content/AMS4156L/

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.

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

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

ARP1917 Clarification of 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.

ASTM B594 Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications

ASTM B660 Packaging/Packing of Aluminum and Magnesium Products

ASTM B666/B666M Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Accredited Publications

Copies of these documents are available online at http://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)

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

***Table 1 - Composition***

| Element | Min | Max |
|---|---|---|
| Silicon | 0.20 | 0.6 |
| Iron | -- | 0.35 |
| Copper | -- | 0.10 |
| Manganese | -- | 0.10 |
| Magnesium | 0.45 | 0.9 |
| Chromium | -- | 0.10 |
| Zinc | -- | 0.10 |
| Titanium | -- | 0.10 |
| Other Elements, each | -- | 0.05 |
| Other Elements, total | -- | 0.15 |
| Aluminum | remainder | |

3.2 Condition

Solution and precipitation heat treated to the T6 temper (refer to ANSI H35.1/H35.1M) in accordance with AMS2772.

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

3.3 Properties

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

3.3.1 Tensile Properties

Shall be as shown in Table 2.

***Table 2A - Minimum tensile properties, inch/pound units (see 8.4)***

| Nominal Diameter or Least Thickness (Rods, Bars, Wire, Profiles) or Nominal Wall Thickness (Tubing) Inches | Tensile Strength ksi | Yield Strength at 0.2% Offset ksi | Elongation in 2 Inches or 4D % |
|---|---|---|---|
| Up to 0.125, excl | 30.0 | 25.0 | 8 |
| 0.125 to 1.000, incl | 30.0 | 25.0 | 10 |

***Table 2B - Minimum tensile properties, SI units (see 8.4)***

| Nominal Diameter or Least Thickness (Rods, Bars, Wire, Profiles) 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 3.18, excl | 207 | 172 | 8 |
| 3.18 to 25.40, incl | 207 | 172 | 10 |

3.3.2 Mechanical property requirements for product outside the size range covered by Table 2 shall be agreed upon between purchaser and producer and reported per 4.4.1.

3.4 Quality

Extrusions, 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 extrusions.

3.4.1 When specified by purchaser, extrusions shall be subjected to ultrasonic inspection in accordance with ASTM B594. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.5 Tolerances

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

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of extrusions 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 extrusions conform to specified requirements.

4.2 Classification of Tests

Composition (3.1), tensile properties (3.3.1), ultrasonic inspection when specified (3.4.1), and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The vendor of product shall furnish with each shipment a report stating that the product conforms to the chemical composition, ultrasonic inspection when specified, and tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, inspection lot number(s), AMS4156L, size, and quantity. This report shall also identify the producer, the product form, and the size of the mill product.

4.4.1 When material produced to this specification is beyond the sizes allowed in the scope or tables, or other exceptions are taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS4156L(EXC) because of the following exceptions:" and the specific exceptions shall be listed (also see 5.1.1).

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B666/B666M.

5.1.1 When technical exceptions are taken (see 4.4.1), the material shall be identified with AMS4156(EXC).

5.2 Packaging

Extrusions shall be prepared for shipment in accordance with ASTM B660 and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the extrusions to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Extrusions not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES

8.1 Revision Indicator

A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.