AEROSPACE MATERIAL SPECIFICATION

AMS4469™	REV. B

Issued 2013-02
Revised 2025-03

Supersedes AMS4469A

Aluminum Alloy Tubing, Seamless, Drawn, 1.8Cu - 1.0Mg - 0.8Si - 0.20Cr, Solution Heat Treated, Stress-Relieved by Stretching, and Aged (2013-T4511) (Composition Similar to UNS A92013)

RATIONALE

AMS4469B results from a Five-Year Review and update of this specification with changes to update wording to prohibit unauthorized exceptions (see 3.4.3, 4.4.1, and 8.4), relocate Definitions (see 2.4), and update Applicable Documents (see Section 2).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of seamless, drawn tubing having a nominal wall thickness of 0.120 to 0.400 inch (3.00 to 10.00 mm), inclusive (see 8.5).

1.2 Application

These tubes have been used typically for parts requiring a high-strength, non-weldable alloy.

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.

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

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4469B/

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 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 https://webstore.ansi.org/.

ANSI H35.1/H35.1M Standard Alloy and Temper Designation System 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 1, determined in accordance with AMS2355.

Table 1 - Composition

Element	Min	Max
Silicon	0.6	1.0
Iron	--	0.40
Copper	1.5	2.0
Manganese	--	0.25
Magnesium	0.8	1.2
Chromium	0.04	0.35
Zinc	--	0.25
Titanium	--	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Product shall be supplied in the following condition and temper: condition T4511, drawn, solution heat treated, and stress relieved by stretching to produce a nominal permanent set of 1.5%, but not less than 1% nor more than 3%, and naturally aged.

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

3.2.2 Product may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.6.

3.3 Heat Treatment

Tubing shall conform to the following requirements, determined on the mill-produced size, in accordance with AMS2355 and as specified herein:

3.3.1 Solution Heat Treatment

Shall be in accordance with AMS2772.

3.4 Properties

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

3.4.1 Tensile Properties

Shall be as shown in Table 2 for tubing having nominal wall thickness of 0.120 to 0.400 inch (3.00 to 10.00 mm), inclusive.

Table 2A - Minimum longitudinal tensile properties, inch/pound units

Nominal Wall Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D % Cutout Specimen	Elongation in 2 Inches or 4D % Full Section Specimen
Over 0.120 to 0.400, incl	40.0	21.0	20	--

Table 2B - Minimum longitudinal tensile properties, SI units

Nominal Wall Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D % Cutout Specimen	Elongation in 50.8 mm or 4D % Full Section Specimen
Over 3.00 to 10.00, incl	275	145	20	--

3.4.2 Response to Precipitation Heat Treatment to T6511 Temper (refer to ANSI H35.1/H35.1M)

Tubing having nominal wall thickness of 0.120 to 0.400 inch (3.00 to 10.00 mm), inclusive, shall have the properties specified in Table 3 after being precipitation heat treated in accordance with AMS2772.

Table 3A - Minimum longitudinal tensile properties, inch/pound units

Nominal Wall Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D % Cutout Specimen	Elongation in 2 Inches or 4D % Full Section Specimen
Over 0.120 to 0.400, incl	60.0	56.0	7	--

Table 3B - Minimum longitudinal tensile properties, SI units

Nominal Wall Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D % Cutout Specimen	Elongation in 50.8 mm or 4D % Full Section Specimen
Over 3.00 to 10.00, incl	415	385	7	--

3.4.3 Mechanical property requirements for product outside the thickness ranges of 1.1 shall be as agreed upon by the purchaser and producer and reported per 4.4.1 (see 8.5).

3.5 Quality

Tubing, 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 tubing.

3.5.1 Detrimental imperfections include, but are not limited to, cracks, splits, seams, inclusions, or severe crosshatching (surface breaks) that cannot be removed by lightly hand-sanding using 180 grit or finer sandpaper.

3.6 Tolerances

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

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

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), tensile properties as solution heat treated and naturally aged to the -T4511 temper (see 3.4.1) and after precipitation heat treatment to the -T6511 temper (see 3.4.2), quality (see 3.4), and tolerances (see 3.5) are acceptance tests and, except for composition, shall be performed on each lot of tubing.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The producer of tubing shall furnish with each shipment a report stating that the tubing conforms to the composition and tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements and periodic test requirements when performed. This report shall include the purchase order number, inspection lot number(s), AMS4469B, size, and quantity. The 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 AMS4469B(EXC) because of the following exceptions:" and the specific exceptions shall be listed.

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.