AEROSPACE MATERIAL SPECIFICATION

AMS4404™	REV. C

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Superseding AMS4404B

Aluminum Alloy, Extruded Profiles (6056-T4511), 1.0Si - 0.90Mg - 0.80Cu - 0.60Mn - 0.40Zn, Solution Heat Treated and Stress-Relieved by Stretching (Composition similar to UNS A96056)

RATIONALE

AMS4404C results from a Five-Year Review and update of this specification with changes to update standard language related to unauthorized exceptions (see 3.4.4, 4.4.1, and 8.4), relocate Definitions (see 2.4), and update Form (see 1.1), Applicable Documents (see Section 2), Intergranular Corrosion, T72 Temper (see 3.4.3), and Ordering Information (see 8.5).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy procured in the form of extruded profiles (shapes) with nominal thickness of over 0.040 to 0.375 inch (over 1.00 to 9.5 mm), inclusive, and cross sections up to 7.75 square inches (5000 mm^2) and circle sizes as indicated (see 8.5).

1.2 Application

These extrusions have been used typically for structural applications requiring moderate tensile and good formability, 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)**
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/AMS4404C/

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

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

ASTM G110 Evaluating Intergranular Corrosion Resistance of Heat Treatable Aluminum Alloys by Immersion in Sodium Chloride + Hydrogen Peroxide Solution

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	0.7	1.3
Iron	--	0.5
Copper	0.50	1.1
Manganese	0.40	1.0
Magnesium	0.6	1.2
Chromium	--	0.25
Zinc	0.10	0.7
Zirconium + Titanium	--	0.20
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Solution heat treated, 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 to the -T4511 temper (refer to ANSI H35.1/H35.1M).

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

Shall be performed in accordance with AMS2772 and as follows:

3.3.1 Solution Heat Treatment

1012 to 1032 °F (544 to 557 °C).

3.4 Properties

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

3.4.1 As Solution Heat Treated and Naturally Aged

Shall be as shown in Table 2.

Table 2A - T4511 minimum tensile properties, inch/pound units

Nominal Thickness Inches	Specimen Orientation	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Over 0.040 to 0.375, incl	Longitudinal	51.0	36.0	15

Table 2B - T4511 minimum tensile properties, SI units

Nominal Thickness Millimeters	Specimen Orientation	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Over 1.00 to 9.5 mm, incl	Longitudinal	352	248	15

3.4.2 Response to Temper Conversion

The product, as received by the purchaser, shall have the properties shown in Table 3 after being aged to the following tempers (refer to ANSI H35.1/H35.1M) in accordance with AMS2772 and as follows:

T62: Age for 2 to 6 hours at 369 to 379 °F (187 to 193 °C).

T72: Age for 4 to 8 hours at 342 to 352 °F (172 to 178 °C) followed by 11 to 15 hours at 369 to 379 °F (187 to 193 °C).

Table 3A - T62 and T72 minimum tensile properties, inch/pound units

Temper	Nominal Thickness Inches	Specimen Orientation	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
T62	Over 0.040 to 0.375, incl	Longitudinal	57.0	54.0	10
T72	Over 0.040 to 0.375, incl	Longitudinal	53.0	48.0	10

Table 3B - T62 and T72 minimum tensile properties, SI units

Temper	Nominal Thickness Millimeters	Specimen Orientation	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
T62	Over 1.00 to 9.5 mm, incl	Longitudinal	393	372	10
T72	Over 1.00 to 9.5 mm, incl	Longitudinal	365	331	10

3.4.3 Intergranular Corrosion, T72 Temper

No visible intergranular corrosion shall be present on the etched metallographic samples examined at 500X after being tested in accordance with ASTM G110 with 6 hours exposure. Criteria for evaluation shall be as agreed upon between the purchaser and producer and reported per 4.4 (see 8.5).

3.4.4 Mechanical property requirements for product outside the range covered by 1.1 or tables shall be agreed upon between the purchaser and producer and reported per 4.4.1 (see 8.5).

3.5 Quality

Product, 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.

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 the product 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 products conform 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 (see 3.4.1), response to temper conversion (see 3.4.2), and tolerances (see 3.6) are acceptance tests and, except for composition, shall be performed on each inspection lot.