AEROSPACE MATERIAL SPECIFICATION

AMS4404	REV. A

Issued 2006-06
Revised 2008-12
Reaffirmed 2014-12

Superseding AMS4404

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

AMS4404A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Form

This specification covers an aluminum alloy procured in the form of extruded profiles (shapes) with cross-sections up to 7.75 in^2 (5 000 mm^2).

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 canceled 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 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

AS1990 Aluminum Alloy Tempers

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**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4404A

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 B 660 Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B666M Identification Marking of Aluminum and Magnesium Products
ASTM G 110 Evaluating Intergranular Corrosion Resistance of Heat Treatable Aluminum Alloys by Immersion in Sodium Chloride + Hydrogen Peroxide Solution

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036, Tel: 212-642-4900, www.ansi.org.

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	0.7	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 (See AS1990).

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 3.5.

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 %
1.00 to 9.5 mm, incl.	Longitudinal	352	248	15

3.4.2 Response to Heat Treatment

The product, as received by purchaser, shall have the properties shown in Table 3 after being aged 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 362 to 372°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	1.00 to 9.5 mm, incl	Longitudinal	393	372	10
T72	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 X500 after being tested in accordance with ASTM G 110 with 6 hours exposure. Criteria for evaluation shall be as agreed upon between purchaser and vendor.

3.5 Quality

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

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 the product 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 products conform to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), tensile properties as solution heat treated and naturally aged (3.4.1), response to heat treatment (3.4.2) and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests

Intergranular Corrosion Resistance (3.4.3) is a periodic test and shall be performed at a frequency selected by the vendor unless the frequency of testing is specified by purchaser.

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 composition 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), AMS4404A, size or section identification number, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B 666/B 666M.

5.2 Packaging

Extrusions shall be prepared for shipment in accordance with ASTM B 660 and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT

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