AEROSPACE MATERIAL SPECIFICATION

AMS4153	REV. L

Issued 1946-11
Reaffirmed 2008-05
Revised 2015-01

Superseding AMS4153K

Aluminum Alloy, Extrusions
4.5Cu - 0.85Si - 0.80Mn - 0.50Mg (2014-T6)
Solution and Precipitation Heat Treated
(Composition similar to A92014)

RATIONALE

AMS4153L revises Composition (Table 1), Properties (3.3.1.2.1, 3.3.1.3), and Reports (4.4.1), and is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, wire, profiles, and tubing up to 32 square inches (206 square cm) in area. (See 8.5).

1.2 Application

These products have been used typically for parts requiring good strength where fabrication does not usually involve welding, but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these extrusions to become susceptible to stress-corrosion cracking; ARP823 recommends practices to minimize such conditions.

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 supplied 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- (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

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/AMS4153L

AS1990 Aluminum Alloy Tempers

ARP823 Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products

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 594 Ultrasonic Inspection of Aluminum-Alloy Wrought Products

ASTM B 660 Packaging/Packing of Aluminum and Magnesium Products

ASTM B 666/B 666M Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, Tel: 212-642-4900, www.ansi.org.

ANSI H 35.2 Dimensional Tolerances for Aluminum Mill Products

ANSI H 35.2M 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	0.50	1.2
Iron	--	0.7
Copper	3.9	5.0
Manganese	0.40	1.2
Magnesium	0.20	0.8
Chromium	--	0.10
Zinc	--	0.25
Titanium	--	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Extruded, and solution and precipitation heat treated to the T6 temper (See AS1900) 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 in accordance with AMS2355 on the mill product.

3.3.1 Tensile Properties

3.3.1.1 Longitudinal

Shall be as shown in Table 2.

TABLE 2A - Minimum Longitudinal Tensile Properties, Inch/Pound Units

Nominal Diameter or Least Thickness (rods, bars, wire, profiles) or Nominal Wall Thickness (tubing) Inches	Area Square Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D %
Up to 0.499, incl	All	60.0	53.0	7
Over 0.499 to 0.749, incl	All	64.0	58.0	7
Over 0.749	Up to 25, incl	68.0	60.0	7
	Over 25 to 32, incl	68.0	58.0	6

TABLE 2B - Minimum Longitudinal Tensile Properties, SI Units

Nominal Diameter or Least Thickness (rods, bars, wire, profiles) or Nominal Wall Thickness (tubing) Millimeters	Area Square Centimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 12.67, incl	All	414	365	7
Over 12.67 to 19.02, incl	All	441	400	7
Over 19.02	Up to 161, incl	469	414	7
	Over 161 to 206, incl	469	400	6

3.3.1.2 Long-Transverse

Shall be as shown in Table 3 for bars, rods, and profiles.

3.3.1.2.1 Long-transverse tensile requirements apply only to extrusions from which a test specimen not less than 2.50 inches (63.5 mm) in length can be taken.

TABLE 3A - Minimum Long-Transverse Tensile Properties, Inch/Pound Units

Nominal Diameter or Thickness Inches	Area Square Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.125 to 0.375, incl	Up to 25, incl	60.0	53.0	--
Over 0.375 to 0.499, incl	Up to 25, incl	60.0	53.0	5
Over 0.499 to 0.749, incl	Up to 25, incl	64.0	55.0	5
Over 0.749 to 1.499, incl	Up to 25, incl	63.0	54.0	2
Over 0.749 to 4.499, incl	Over 25 to 32, incl	56.0	47.0	1
Over 1.499 to 2.999, incl	Up to 25, incl	61.0	52.0	2
Over 2.999 to 4.499, incl	Up to 25, incl	58.0	49.0	1

TABLE 3B - Minimum Long-Transverse Tensile Properties, SI Units

Nominal Diameter or Thickness Millimeters	Area Square Centimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
3.18 to 9.52, incl	Up to 161, incl	414	365	--
Over 9.52 to 12.67, incl	Up to 161, incl	414	365	5
Over 12.67 to 19.02, incl	Up to 161, incl	441	379	5
Over 19.02 to 38.07, incl	Up to 161, incl	434	372	2
Over 19.02 to 114.27, incl	Over 161 to 206, incl	386	324	1
Over 38.07 to 76.17, incl	Up to 161, incl	421	359	2
Over 76.17 to 114.27, incl	Up to 161, incl	400	338	1

3.3.1.3 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between purchaser and producer.

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, extrusions shall be subjected to ultrasonic inspection in accordance with ASTM B 594. Extrusions 0.500 inches (12.70 mm) and over in thickness, not exceeding 600 pounds (272 kg) per piece, or a 10 to 1 width-to-thickness ratio shall meet ultrasonic class B.

3.5 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 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

4.2.1 Acceptance Tests

Composition (3.1), longitudinal tensile properties (3.3.1.1), 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.

4.2.2 Periodic Tests

Long-transverse tensile properties (3.3.1.2) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.