

AEROSPACE MATERIAL SPECIFICATION



AMS 4153J

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Superseding AMS 4153H

Submitted for recognition as an American National Standard

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

UNS A92014

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of extruded bars, rods, wire, profiles, and tubing.

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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

- AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
- MAM 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
- AMS 2772 Heat Treatment of Aluminum Alloy Raw Materials
- ARP823 Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

- ASTM B 594 Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications
- ASTM B 666/B 666M Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

- 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 AMS 2355 or MAM 2355.

TABLE 1 - Composition

Element	min	max
Copper	3.9	5.0
Silicon	0.50	1.2
Manganese	0.40	1.2
Magnesium	0.20	0.8
Iron	--	0.7
Zinc	--	0.25
Titanium	--	0.15
Chromium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition:

Extruded, and solution and precipitation heat treated to the T6 temper in accordance with AMS 2772.

- 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 AMS 2355 or MAM 2355:

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, inc	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.

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

3.4 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 AMS 2355 or MAM 2355.

4.4 Reports:

The vendor of extrusions shall furnish with each shipment a report stating that the extrusions conform to the chemical composition, ultrasonic inspection when required, and tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, inspection lot number, AMS 4153J, size or section identification number, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355 or MAM 2355.