

SAE Aerospace An SAE International Group	AEROSPACE MATERIAL SPECIFICATION	AMS 4152M	
		Issued NOV 1941 Reaffirmed AUG 2000 Revised FEB 2007	
		Superseding AMS 4152L	
Aluminum Alloy Extrusions 4.4Cu - 1.5Mg - 0.60Mn (2024-T3) Solution Heat Treated			
(Composition similar to UNS A92024)			

RATIONALE

AMS 4152M has been revised to eliminate the non-mandatory hardness requirement, moving it to the notes section consistent with similar AMS, 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, shapes, and tubing.

1.2 Application

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

- 1.2.1 Certain processing procedures may cause these products 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 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 724-776-4970 (outside USA), www.sae.org.

AMS 2355	Quality Assurance Sampling and Testing, Aluminum and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products
AS1990	Aluminum Alloy Tempers

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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 Examination of Aluminum-Alloy Wrought Products for Aerospace Applications
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum & Magnesium Products

2.3 ANSI Publications

Available from ANSI, 25 West 43rd Street, New York, NY 10036, www.ansi.org

ANSI H 35.2	Dimensional Tolerances for Aluminum Mill Products
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3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355.

TABLE 1 - COMPOSITION

Element	min	max
Silicon	--	0.50
Iron	--	0.50
Copper	3.8	4.9
Manganese	0.30	0.9
Magnesium	1.2	1.8
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, solution heat treated in accordance with AMS 2772, stretch straightened, and naturally aged to the T3 temper (See AS1990).

- 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 the dimensional tolerances.

3.3 Properties

Extrusions shall conform to the following requirements, determined in accordance with AMS 2355:

3.3.1 Tensile Properties

Shall be as specified in Table 2, Table 3, and 3.3.1.3.

3.3.1.1 Bars, Rods, Wire, and Shapes

TABLE 2A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Diameter or Thickness, Inches and Area	Tensile Strength ksi	Yield Strength at 2% Offset ksi	Elongation in 2 inches or 4D %
Up to 0.249, incl, all areas	57.0	42.0	12
Over 0.249 to 0.749, incl, all areas	60.0	44.0	12
Over 0.749 to 1.499, incl, all areas	65.0	46.0	10
Over 1.499			
Area up to 25 sq in., incl	70.0	52.0	10
Area over 25 to 32 sq in., incl	68.0	48.0	8

TABLE 2B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Diameter or Thickness, Millimeters and Area	Tensile Strength MPa	Yield Strength at 2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 6.32, incl, all areas	393	290	12
Over 6.32 to 19.02, incl, all areas	414	303	12
Over 19.02 to 38.07, incl, all areas	448	317	10
Over 38.07			
Area up to 161 cm ² , incl	483	359	10
Area over 161 to 206 cm ² , incl	469	331	8

3.3.1.2 Tubing

TABLE 3A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Wall Thickness, Inches and Area	Tensile Strength ksi	Yield Strength at 2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.249, incl, all areas	57.0	42.0	10
Over 0.249 to 0.749, incl, all areas	60.0	44.0	10
Over 0.749 to 1.499, incl, all areas	65.0	46.0	10
Over 1.499			
Area up to 25 sq in., incl	70.0	48.0	10
Area over 25 to 32 sq in., incl	68.0	46.0	8

TABLE 3B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Wall Thickness, Millimeters and Area	Tensile Strength MPa	Yield Strength at 2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 6.32, incl, all areas	393	290	10
Over 6.32 to 19.02, incl, all areas	414	303	10
Over 19.02 to 38.07, incl, all areas	448	317	10
Over 38.07			
Area up to 161 cm ² , incl	483	331	10
Area over 161 to 206 cm ² , incl	469	317	8

3.3.1.3 Tensile property requirements for sizes other than those shown in Tables 2 and 3 shall be as agreed upon by purchaser and vendor.

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 0.50 inch (12.7 mm) and over in nominal thickness, having a maximum thickness to width ratio of 10:1, and weighing not over 600 pounds (272 kg) per piece, shall meet Class B.

3.4.1.1 Acceptance criteria for extrusions exceeding the limitations of 3.4.1 shall be as agreed upon by purchaser and vendor.

3.5 Tolerances

Shall conform to all applicable requirements of ANSI H 35.2.

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), tensile properties (3.3.1), ultrasonic inspection (3.4.1) when specified, and tolerances (3.5) are acceptance tests and shall be performed on each lot.

4.3 Sampling and Testing

Shall be in accordance with AMS 2355.

4.4 Reports

The vendor of extrusions shall furnish with each shipment a report stating that the extrusions conform to the composition and showing the results of tests to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, lot number, AMS 4152M, size or section identification number, and quantity.

4.5 Resampling and Retesting

Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

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