

**AEROSPACE  
MATERIAL  
SPECIFICATION**

AMS 4152K

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Superseding AMS 4152J

Submitted for recognition as an American National Standard

ALUMINUM ALLOY EXTRUSIONS  
4.4Cu - 1.5Mg - 0.60Mn (2024-T3)  
Solution Heat Treated

UNS A92024

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: Primarily for parts requiring good strength and whose fabrication does not involve welding. Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP 823 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 Aerospace Material Specifications and Aerospace Recommended Practices shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2205 - Tolerances, Aluminum Alloy and Magnesium Alloy Extrusions

MAM 2205 - Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Extrusions

AMS 2350 - Standards and Test Methods

AMS 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings

MAM 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units

AMS 2630 - Ultrasonic Inspection

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### 2.1.2 Aerospace Recommended Practices:

ARP 823 - Minimizing Stress Corrosion Cracking in Wrought Heat Treatable Aluminum Alloy Products

2.2 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

### 2.2.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

### 2.2.2 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

## 3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight,  $\emptyset$  determined in accordance with AMS 2355 or MAM 2355:

	min	max
Copper	3.8	4.9
Magnesium	1.2	1.8
Manganese	0.30	0.9
Iron	--	0.50
Silicon	--	0.50
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 heat treated in accordance with MIL-H-6088.

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 or MAM 2355:

3.3.1 Tensile Properties: Shall be as specified in 3.3.1.1, 3.3.1.2, and 3.3.1.3.

3.3.1.1 Bars, Rods, Wire, and Shapes:

TABLE I

Nominal Diameter or Thickness, and Area Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 4D %, min
Up to 0.249, incl, all areas	57,000	42,000	12
Over 0.249 to 0.749, incl, all areas	60,000	44,000	12
Over 0.749 to 1.499, incl, all areas	65,000	46,000	10
Over 1.499			
Area up to 25 sq in., incl	70,000	52,000	10
Area over 25 to 30 sq in., incl	68,000	48,000	8

TABLE I (SI)

Nominal Diameter or Thickness, and Area Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 4D %, min
Up to 6.25, incl, all areas	395	290	12
Over 6.25 to 18.75, incl, all areas	415	305	12
Over 18.75 to 37.50, incl, all areas	450	315	10
Over 37.50			
Area up to 160 cm <sup>2</sup> , incl	485	360	10
Area over 160 to 195 cm <sup>2</sup> , incl	470	330	8

3.3.1.2 Tubing:

TABLE II

Nominal Wall Thickness, and Area Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
Up to 0.249, incl, all areas	57,000	42,000	10
Over 0.249 to 0.749, incl, all areas	60,000	44,000	10
Over 0.749 to 1.499, incl, all areas	65,000	46,000	10
Over 1.499			
Area up to 25 sq in., incl	70,000	48,000	10
Area over 25 to 32 sq in., incl	68,000	46,000	8

TABLE II (SI)

Nominal Wall Thickness, and Area Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50 mm or 4D %, min
Up to 6.25, incl, all areas	395	290	10
Over 6.25 to 18.75, incl, all areas	415	305	10
Over 18.75 to 37.50, incl, all areas	450	315	10
Over 37.50			
Area up to 160 cm <sup>2</sup> , incl	485	330	10
Area over 160 to 205 cm <sup>2</sup> , incl	470	315	8

3.3.1.3 Tensile property requirements for sizes other than those shown in 3.3.1.1 and 3.3.1.2 shall be as agreed upon by purchaser and vendor.

3.3.2 Hardness: Should be not lower than 100 HB/10/500 or 106 HB/10/1000, or equivalent, but extrusions shall not be rejected on the basis of hardness if the applicable tensile property requirements are met.

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 AMS 2630. Extrusions 0.50 in. (12.5 mm) and over in nominal thickness, having a maximum thickness to width ratio of 10:1, and weighing not over 600 lb (270 kg) shall meet Class B. Acceptance criteria for extrusions exceeding the above limits shall be as agreed upon by purchaser and vendor.

3.5 Tolerance: Shall conform to all applicable requirements of AMS 2205 or MAM 2205.

#### 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 performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform to the requirements of this specification.

#### 4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.3.1), ultrasonic inspection (3.4.1) when specified, and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot.