AEROSPACE MATERIAL SPECIFICATION

AMS4152™	REV. P

Issued 1941-11
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Superseding AMS4152N

Aluminum Alloy Extrusions, 4.4Cu - 1.5Mg - 0.60Mn (2024-T3), Solution Heat Treated and Cold Worked

(Composition similar to UNS A92024)

RATIONALE

AMS4152P results from a Five-Year Review and update of this specification with changes to update wording to prohibit unauthorized exceptions (see 3.3.2, 3.4.1.1, and 8.5), relocate Definitions (see 2.4), and update Applicable Documents (see Section 2) and Hardness (see 8.2).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, wire, shapes, and tubing produced with cross-sectional area of 32 square inches (206 cm^2), maximum (see 8.6).

1.1.1 Tubing shall be additionally classified as follows:

Table 1

Type	Description
I	Tubing extruded from hollow billets using die and mandrel
II	Tubing extruded from solid billets using porthole or spider die or similar tooling

When no type is specified, Type I shall apply (see 8.6).

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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
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For more information on this standard, visit
https://www.sae.org/standards/content/AMS4152P/

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 +1 724-776-4970 (outside USA), www.sae.org.

AMS2355	Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings
AMS2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought High-Strength Aluminum Alloy Products
AS7766	Terms Used in Aerospace Metals Specifications

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 B594	Ultrasonic Examination of Aluminum-Alloy Wrought Products
ASTM B660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B666/B666M	Identification Marking of Aluminum and Magnesium Products
ASTM E10	Brinell Hardness of Metallic Materials

2.3 ANSI Accredited Publications

Copies of these documents are available online at https://webstore.ansi.org/.

ANSI H35.1/H35.1M	Standard Alloy and Temper Designation System For Aluminum
ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M	Dimensional Tolerances for Aluminum Mill Products (Metric)

2.4 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 2, determined in accordance with AMS2355.

Table 2 - 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

Solution heat treated, cold worked, and naturally aged to the T3 temper (refer to ANSI H35.1/H35.1M). Heat treatment shall be performed 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 the 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

Shall be as shown in Tables 3 or 4, as applicable.

3.3.1.1 Bars, Rods, Wire, and Shapes

Table 3A - 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 in^2, incl	70.0	52.0	10
Area over 25 to 32 in^2, incl	68.0	48.0	8

Table 3B - 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 4A - 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 in^2, incl	70.0	48.0	10
Area over 25 to 32 in^2, incl	68.0	46.0	8

Table 4B - 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

3.3.2 Mechanical property requirements for extrusions outside the cross-sectional area limit of 1.1 shall be as agreed upon by the purchaser and producer and reported per 4.4.1 (see 8.6).

3.4 Quality

Extrusions, as received by the 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 B594. Extrusions, 0.50 inch (12.7 mm) and over in nominal diameter (wall thickness for tubes) or least distance between parallel sides, not exceeding a 10:1 width-to-thickness ratio, shall meet ultrasonic Class B.

3.4.1.1 Acceptance criteria for extrusions exceeding the limitations of 3.4.1 shall be as agreed upon by the purchaser and producer and reported per 4.4.1 (see 8.6).

3.5 Tolerances

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of extrusions shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform to specified requirements.