



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 4173A

Superseding AMS 4173

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ALUMINUM ALLOY EXTRUSIONS
1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T6511)
Stress Relief Stretched and Straightened

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 moderate strength and where distortion during machining must be minimized.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2205 - Tolerances, Aluminum-Base and Magnesium-Base Alloy Extrusions
AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum-Base and Magnesium-Base Alloys, Wrought Products (Except Forgings and Forging Stock) and Flash Welded Rings

2.2 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
MIL-I-8950 - Inspection, Ultrasonic, Wrought Metals, Process for

2.2.2 Military Standards:

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

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3. TECHNICAL REQUIREMENTS:

3.1 **Composition:** Shall conform to the following percentages by weight, determined in accordance with AMS 2355:

Ø	min	max
Magnesium	0.8	1.2
Silicon	0.40	0.8
Copper	0.15	0.40
Chromium	0.04	0.35
Iron	--	0.7
Zinc	--	0.25
Manganese	--	0.15
Titanium	--	0.15
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 **Condition:** Solution heat treated, stress relieved by stretching to produce a nominal permanent set of 1.5%, but not less than 1% nor more than 3%, and precipitation heat treated. Heat treatments shall be performed in accordance with MIL-H-6088.

3.2.1 The product may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.5.

3.2.2 Unless otherwise specified, 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 I.

TABLE I

Nominal Diameter or Least Thickness (bars, rods, wire, shapes) or Nominal Wall Thickness (tubing), inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 4D %, min
Up to 0.250, excl	38,000	35,000	8
0.250 and over	38,000	35,000	10

TABLE I (SI)

Nominal Diameter or Least Thickness (bars, rods, wire, shapes) or Nominal Wall Thickness (tubing), Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 4D %, min
Up to 6.35, excl	262	241	8
6.35 and over	262	241	10

3.3.2 Hardness: Should be not lower than 80 HB/10/500, 80 HB/14.3/1000, or 85 HB/10/1000, but extrusions shall not be rejected on the basis of hardness if the 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 internal and external imperfections detrimental to usage of the extrusions.

3.4.1 When specified, extrusions shall be subjected to ultrasonic inspection in accordance with MIL-I-8950. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2205.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of extrusions shall supply all samples 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 perform such confirmatory testing as he deems 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.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for hardness (3.3.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355.

4.4 Reports:

4.4.1 The vendor of extrusions shall furnish with each shipment three copies of a report stating that the extrusions conform to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, size or section identification number, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of extrusions, part number, and quantity. When extrusions for making parts are produced or purchased by the parts vendor, that vendor shall inspect each lot of extrusions to determine conformance to the requirements of this specification and shall include in the report a statement that the extrusions conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Extrusions shall be identified as follows: