

AEROSPACE MATERIAL SPECIFICATION



AMS 4162D

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Revised	JUL 2003
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Superseding AMS 4162C

Aluminum Alloy, Extrusions
6.3Cu - 0.30Mn - 0.18Zr - 0.10V - 0.06Ti (2219-T8511)
Solution Treated, Stress Relief Stretched, Straightened, and Precipitation Heat Treated
(Composition similar to A92219)

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 extrusions have been used typically for structural parts requiring high strength up to 500 °F (260 °C), but usage is not limited to such applications. May be welded in the specified condition but properties are improved by reheat treatment after welding. Reheat treatment after welding, however, may reduce resistance to stress-corrosion cracking.

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys,
Wrought Products, Except Forging Stock, and Rolled, Forged or Flash Welded Rings
AMS 2772 Heat Treatment of Aluminum Alloy Raw Materials

AS1990 Aluminum Alloy Tempers

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM B 594 Ultrasonic Inspection 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 and Magnesium Products
ASTM G 47 Determining Susceptibility to Stress Corrosion Cracking of 2XXX and 7XXX
Aluminum Alloys

2.3 ANSI Publications:

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

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M 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.

TABLE 1 - Composition

Element	min	max
Silicon	--	0.20
Iron	--	0.30
Copper	5.8	6.8
Manganese	0.20	0.40
Magnesium	--	0.02
Zinc	--	0.10
Titanium	0.02	0.10
Vanadium	0.05	0.15
Zirconium	0.10	0.25
Other Elements, each	--	0.05
Other Elements, total	--	0.15

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 to the T8511 temper (see AS1990). Heat treatments shall be performed in accordance with AMS 2772.

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

3.2.2 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 on the mill produced size in accordance with AMS 2355:

3.3.1 Tensile Properties: Shall be as shown in Table 2 and Table 3 for extrusions under 3.00 inches (76.2 mm) in nominal diameter or least thickness (bars, rods, wire, profiles) or nominal wall thickness (tubing) and 25 square inches (161 cm²) and under in cross-sectional area.

3.3.1.1 Longitudinal: Shall be as shown in Table 2.

TABLE 2 - Minimum Longitudinal Tensile Properties

Property	Value
Tensile Strength	58.0 ksi (400 MPa)
Yield Strength at 0.2% Offset	42.0 ksi (290 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	6%

3.3.1.2 Long-Transverse: Shall be as shown in Table 3.

TABLE 3 - Minimum Long-Transverse Tensile Properties

Property	Value
Tensile Strength	56.0 ksi (386 MPa)
Yield Strength at 0.2% Offset	39.0 ksi (269 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	4%

3.3.1.2.1 Long-transverse tensile requirements apply only to extrusions from which a test specimen not less than 2.50 inches (63.5 mm) in length can be taken.

3.3.2 Stress-Corrosion Resistance: Specimens, cut from extrusions 0.750 inch (19.05 mm) and over in nominal diameter or least thickness, shall exhibit no evidence of stress-corrosion cracking when stressed in the short-transverse (perpendicular to grain flow) direction to 30.0 ksi (207 MPa) when tested in accordance with ASTM G 47.

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 inch (12.70 mm) and over in nominal thickness, not exceeding 600 pounds (272 kg) per piece in weight, 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 except that surface roughness tolerances shall be double those specified therein.

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.