SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4167 REV. J

Issued 1967-04
Revised 2005-01
Cancelled 2012-01

Superseded by AMS4617

Aluminum Alloy, Extrusions
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73511)
Solution Heat Treated, Stress Relieved by Stretching, and Overaged

(Composition similar to UNS A97075)

RATIONALE

AMS4167J has been designated Cancelled and Superseded because equivalent technical requirements are provided by other specifications.

CANCELLATION NOTICE

This specification has been declared “CANCELLED” by the Aerospace Materials Division, SAE, as of January 2012 and has been superseded by the specification listed beow. The requirements of the latest issue of the specification listed below shall be fulfilled whenever reference is made to the cancelled AMS4167. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by the specification listed below.

Cancelled specifications are available from SAE.

Temper	Superseding Material and Specification
T73511	7075-T73511 in accordance with AMS4617 Aluminum Alloy, Extrusions, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73, 7075-T73511, 7075-T73510) Solution Heat Treated, Stress Relieved by Stretching When Required, and Overaged

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4167J

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 extrusions have been used typically for parts subject to excessive warpage during machining and for parts requiring high strength and resistance to stress-corrosion cracking, but usage is not limited to such applications.

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, 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

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM B 594	Ultrasonic Inspection of Aluminum-Alloy 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

2.3 ANSI Publications:

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

ANSI H 35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H 35.2M	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	--	0.40
Iron	--	0.50
Copper	1.2	2.0
Manganese	--	0.30
Magnesium	2.1	2.9
Chromium	0.18	0.28
Zinc	5.1	6.1
Titanium	--	0.20
Other Elements, each	--	0.05
Other Elements, 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 to the T73511 temper (See AS 1990). 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 the 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:

3.3.1.1 Longitudinal: Shall be as shown in Table 2.

TABLE 2A - Minimum Longitudinal Tensile Properties, Inch/Pound Units

Nominal Diameter or Least Thickness and Area (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness and Area (Tubing) Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.062 to 0.249, incl			
Area up to 20 square inches, incl	68.0	58.0	7
Over 0.249 to 1.499, incl			
Area up to 25 square inches, incl	70.0	61.0	8
Over 1.499 to 2.999, incl			
Area up to 25 square inches, incl	69.0	59.0	8
Over 2.999 to 4.499, incl			
Area up to 20 square inches, incl	68.0	57.0	7
Area over 20 to 32 square inches, incl	65.0	55.0	7

TABLE 2B - Minimum Longitudinal Tensile Properties, SI Units

Nominal Diameter or Least Thickness and Area (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness and Area (Tubing) Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
1.57 to 6.32, incl			
Area up to 129 cm^2, incl	469	400	7
Over 6.32 to 38.07, incl			
Area up to 161 cm^2, incl	483	421	8
Over 38.07 to 76.17, incl			
Area up to 161 cm^2, incl	476	407	8
Over 76.17 to 114.27, incl			
Area up to 129 cm^2, incl	469	393	7
Area over 129 to 206 cm^2, incl	448	379	7

3.3.1.2 Long-Transverse: Rectangular bars and shapes, tested in the long-transverse direction, shall meet the requirements of Table 3.

TABLE 3A - Minimum Long-Transverse Tensile Properties, Inch/Pound Units

Nominal Thickness and Area Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.062 to 0.249, incl			
Area up to 20 square inches, incl	63.0	55.0	3
Over 0.249 to 0.499, incl			
Area up to 20 square inches, incl	66.0	58.0	4
Over 0.499 to 0.749, incl			
Area up to 25 square inches, incl	66.0	57.0	4
Over 0.749 to 1.499, incl			
Area up to 25 square inches, incl	66.0	56.0	4
Over 1.499 to 2.999, incl			
Area up to 25 square inches, incl	63.0	51.0	4
Over 2.999 to 4.499, incl			
Area up to 20 square inches, incl	60.0	47.0	3
Area over 20 to 32 square inches, incl	57.0	44.0	3

TABLE 3B - Minimum Long-Transverse Tensile Properties, SI Units

Nominal Thickness and Area Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
1.57 to 6.32, incl			
Area up to 129 cm^2, incl	434	379	3
Over 6.32 to 12.67, incl			
Area up to 129 cm^2, incl	455	400	4
Over 12.67 to 19.02, incl			
Area up to 161 cm^2, incl	455	393	4
Over 19.02 to 38.07, incl			
Area up to 161 cm^2, incl	455	386	4
Over 38.07 to 76.17, incl			
Area up to 161 cm^2, incl	434	352	4
Over 76.17 to 114.27, incl			
Area up to 129 cm^2, incl	414	324	3
Area over 129 to 206 cm^2, incl	393	303	3

3.3.1.3 Short-Transverse: Bars, rods, and shapes, tested in the short-transverse direction, shall meet the requirements of Table 4.

TABLE 4A - Minimum Short-Transverse Tensile Properties, Inch/Pound Units

Nominal Diameter or Least Thickness, and Area Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
1.500 to 2.999, incl			
Area up to 25 square inches, incl	60.0	48.0	2
Over 2.999 to 4.499, incl			
Area up to 20 square inches, incl	57.0	44.0	2
Area over 20 to 32 square inches, incl	54.0	41.0	2

TABLE 4B - Minimum Short-Transverse Tensile Properties, SI Units

Nominal Thickness and Area Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
38.10 to 76.17, incl			
Area up to 161 cm^2, incl	414	331	2
Over 76.17 to 114.27, incl			
Area up to 161 cm^2, incl	393	303	2
Area over 129 to 206 cm^2, incl	372	283	2

3.3.2 Conductivity: Shall be as follows, determined on the surface of the sample:

3.3.2.1 If the conductivity is 40.0% IACS (International Annealed Copper Standard) (23.2 MS/m) or higher and the longitudinal tensile properties meet specified requirements, the product is acceptable.

3.3.2.2 If the conductivity is 38.0 to 39.9% IACS (22.0 to 23.1 MS/m), if the longitudinal tensile properties meet specified requirements, and if the longitudinal yield strength does not exceed the specified minimum by more than 11.9 ksi (82 MPa), the product is acceptable.

3.3.2.3 If the conductivity is below 40.0% IACS (23.2 MS/m) and the longitudinal yield strength exceeds the specified minimum by more than 11.9 ksi (82 MPa), the product shall be given additional overaging heat treatment. If, after such treatment, the product meets the requirements of 3.3.1 and 3.3.2.1 or 3.3.2.2, the product is acceptable.

3.3.2.4 If the conductivity is below 38.0% IACS (22.0 MS/m), the product is not acceptable and shall be reprocessed regardless of property level.

3.3.3 Stress-Corrosion Cracking Resistance: Specimens, cut from product 0.750 inch (19.05 mm) and over in nominal thickness, shall show no evidence of stress-corrosion cracking when stressed in the short-transverse (perpendicular to grain flow) direction to 75% of the specified minimum longitudinal (parallel to grain flow) yield strength.

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 and shall meet the following requirements.

3.4.1.1 Extrusions 0.500 to 1.499 inches (12.70 to 38.07 mm), inclusive, in nominal thickness, and weighing not over 600 pounds (272 kg) per piece and with a maximum width-to-thickness ratio of 10 to 1 shall meet discontinuity Class B.

3.4.1.2 Extrusions over 1.499 inches (38.07 mm) in nominal thickness, weighing not over 600 pounds (272 kg) per piece, and with a maximum width-to-thickness ratio of 10 to 1, shall meet discontinuity Class A.

3.5 Tolerances:

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

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), conductivity (3.3.2), ultrasonic inspection (3.4.1) when specified, and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each lot.

4.2.2 Periodic Tests: Transverse tensile properties (3.3.1.2 and 3.3.1.3), and stress-corrosion cracking resistance (3.3.3) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2355.