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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE

AMS 4168G

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Superseding AMS 4168F

ALUMINUM ALLOY EXTRUSIONS
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T6510)
Solution Heat Treated, Stress Relieved by Stretching,
and Precipitation Heat Treated, Unstraightened

UNS A97075

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 products have been used typically for parts subject to excessive warpage during machining and for parts requiring high strength and whose fabrication does not involve welding or forming, but usage is not limited to such applications.

- 1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP823 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 SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2205 Tolerances, Aluminum Alloy and Magnesium Alloy Extrusions
MAM 2205 Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Extrusions
AMS 2355 Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings

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AMS 4168G

SAE

AMS 4168G

2.1 SAE Publications (Continued):

- 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 2811 Identification, Aluminum and Magnesium Alloy Wrought Products
- ARP823 Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

- ASTM B 594 Ultrasonic Inspection of Aluminum-Alloy Products for Aerospace Applications
- ASTM B 660 Packaging/Packing of Aluminum and Magnesium Products

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-H-6088 Heat Treatment of Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition

Element	min	max
Zinc	5.1	6.1
Magnesium	2.1	2.9
Copper	1.2	2.0
Chromium	0.18	0.28
Iron	--	0.50
Silicon	--	0.40
Manganese	--	0.30
Titanium	--	0.20
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

AMS 4168G

SAE

AMS 4168G

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 Extrusions shall receive no straightening after stretching.

3.2.2 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is acceptable 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:

3.3.1.1 Longitudinal: Shall be as specified in Table 2 and 3.3.1.3.

TABLE 2A - Minimum 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 %
Up to 0.250, excl, all areas		78.0	70.0	7
0.250 to 0.499, incl, all areas		81.0	73.0	7
Over 0.499 to 2.999, incl, all areas		81.0	72.0	7
Over 2.999 to 4.499, incl				
Area up to 20 sq in., incl		81.0	71.0	7
Area over 20 to 32 sq in., incl		78.0	70.0	6
Over 4.499 to 5.000, incl				
Area up to 32 sq in., incl		78.0	68.0	6

AMS 4168G

SAE

AMS 4168G

TABLE 2B - Minimum 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 %
Up to 6.35, excl, all areas	538	483	7
6.35 to 12.67, incl, all areas	558	503	7
Over 12.67 to 76.17, incl, all areas	558	496	7
Over 76.17 to 114.27, incl			
Area up to 129 cm ² , incl	558	490	7
Area over 129 to 206 cm ² , incl	538	483	6
Over 114.27 to 127.00, incl			
Area up to 206 cm ² , incl	538	469	6

3.3.1.2 Long-Transverse: Bars, rods, and shapes, tested in the long-transverse (R) direction, shall meet the requirements of Table 3 and 3.3.1.3.

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

Nominal Diameter or Thickness and Area Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
Up to 0.250, excl			
Area up to 20 sq in., incl	76.0	66.0	5
0.250 to 0.499, incl			
Area up to 20 sq in., incl	78.0	68.0	5
Over 0.499 to 0.749, incl			
Area up to 20 sq in., incl	76.0	66.0	4
Over 0.749 to 1.499, incl			
Area up to 20 sq in., incl	74.0	65.0	3
Over 1.499 to 2.999, incl			
Area up to 20 sq in., incl	70.0	61.0	1
Over 2.999 to 4.499, incl			
Area up to 20 sq in., incl	67.0	57.0	1
Area over 20 to 32 sq in., incl	65.0	55.0	1

AMS 4168G

SAE

AMS 4168G

(R) TABLE 3B - Minimum Tensile Properties, SI Units

Nominal Diameter or Thickness and Area Millimeters		Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
	Up to 6.35, excl			
	Area up to 129 cm ² , incl	524	455	5
	6.35 to 12.67, incl			
	Area up to 129 cm ² , incl	538	469	5
Over	12.67 to 19.02, incl			
	Area up to 129 cm ² , incl	524	455	4
Over	19.02 to 38.07, incl			
	Area up to 129 cm ² , incl	510	448	3
Over	38.07 to 76.17, incl			
	Area up to 129 cm ² , incl	483	421	1
Over	76.17 to 114.27, incl			
	Area up to 129 cm ² , incl	462	386	1
	Area over 129 to 206 cm ² , incl	448	379	1

3.3.1.3 Tensile property requirements for product exceeding the size limits of 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 135 HB/10/500 or 140 HB/10/1000 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 ASTM B 594.

3.4.1.1 Extrusions 0.500 to 1.499 inches (12.70 to 38.07 mm) inclusive, in nominal thickness, not exceeding 600 pounds (272 kg) per piece, or 10 to 1 width-to-thickness ratio shall meet ultrasonic Class B. Extrusions 1.500 inches (38.1 mm) and over in nominal thickness, not exceeding 600 pounds (272 kg) per piece, or 10 to 1 width-to-thickness ratio shall meet ultrasonic Class A. The ultrasonic class for extrusions exceeding 600 pounds (272 kg) per piece or 10 to 1 width-to-thickness ratio shall be as agreed upon by purchaser and vendor.

3.5 Tolerances:

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