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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-4166 REV D

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Superseding AMS-4166C

Submitted for recognition as an American National Standard

EXTRUSIONS, ALUMINUM ALLOY
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73)
Solution Heat Treated and Overaged

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: Primarily for parts requiring high strength and resistance to stress-corrosion cracking.

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.

2.1.1 Aerospace Material Specifications:

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
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 Alloy Wrought Products

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

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.

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

2.3.2 Military Standards:

MIL-STD-1537 - Electrical Conductivity Test for Measurement of Heat Treatment of Aluminum Alloys, Eddy Current Method

3. TECHNICAL REQUIREMENTS:

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

	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	

3.2 Condition: Solution heat treated and overaged; heat treatment shall be in accordance with MIL-H-6088.

3.2.1 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is permitted provided such imperfections can be removed within 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 I:

TABLE I

Nominal Diameter or Least Thickness and Area (bars, rods, wire, and shapes) or Nominal Wall Thickness and Area (tubing) inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 Inches or 4D %, min
0.062 to 0.249, incl			
Area up to 20 sq in., incl	68,000	58,000	7
Over 0.249 to 1.499, incl			
Area up to 25 sq in., incl	70,000	61,000	8
Over 1.499 to 2.999, incl			
Area up to 25 sq in., incl	69,000	59,000	8
Over 2.999 to 4.499, incl			
Area up to 20 sq in., incl	68,000	57,000	7
Area over 20 to 32 sq in., incl	65,000	55,000	7

TABLE I (SI)

Nominal Diameter or Least Thickness and Area (bars, rods, wire, and shapes) or Nominal Wall Thickness and Area (tubing) Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation %, min in 50.8 mm	Elongation %, min in 5D
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	7
Over 38.07 to 76.17, incl				
Area up to 161 cm^2, incl	476	407	8	7
Over 76.17 to 126.97, incl				
Area up to 129 cm^2, incl	469	393	7	6
Area over 129 to 206 cm^2, incl	448	379	7	6

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

TABLE II

Nominal Diameter or Least Thickness and Area (bars, rods, wire, and shapes) or Nominal Wall Thickness and Area (tubing) Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 Inches or 4D %, min
0.062 to 0.249, incl			
Area up to 20 sq in., incl	65,000	55,000	3
Over 0.249 to 0.499, incl			
Area up to 25 sq in., incl	67,000	58,000	4
Over 0.499 to 0.749, incl			
Area up to 25 sq in., incl	66,000	57,000	4
Over 0.749 to 1.499, incl			
Area up to 25 sq in., incl	66,000	56,000	4
Over 1.499 to 2.999, incl			
Area up to 25 sq in., incl	63,000	52,000	4
Over 2.999 to 4.499, incl			
Area up to 20 sq in., incl	60,000	48,000	3
Area over 20 to 32 sq in., incl	57,000	46,000	3

TABLE II (SI)

Nominal Diameter or Least Thickness and Area (bars, rods, wire, and shapes) or Nominal Wall Thickness and Area (tubing) Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation %, min	
			in 50.8 mm	in 5D
1.57 to 6.32, incl				
Area up to 129 cm^2, incl	448	379	3	
Over 6.32 to 12.67, incl				
Area up to 161 cm^2, incl	462	400	4	3
Over 12.67 to 19.02, incl				
Area up to 161 cm^2, incl	455	393	4	3
Over 19.02 to 38.07, incl				
Area up to 161 cm^2, incl	455	386	4	3
Over 38.07 to 76.17, incl				
Area up to 161 cm^2, incl	434	358	4	3
Over 76.17 to 126.97, incl				
Area up to 129 sq mm, incl	414	331	3	2
Area over 129 to 206 cm^2, incl	393	317	3	2

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

TABLE III

Nominal Diameter or Least Thickness and Area (bars, rods, wire, and shapes) or Nominal Wall Thickness and Area (tubing) Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 Inches or 4D %, min
1.500 to 2.999, incl Area up to 25 sq in., incl	60,000	48,000	2
Over 2.999 to 4.499, incl Area up to 20 sq in., incl	57,000	44,000	2
Area over 20 to 32 sq in., incl	54,000	41,000	2

TABLE III (SI)

Nominal Diameter or Least Thickness and Area (bars, rods, wire, and shapes) or Nominal Wall Thickness and Area (tubing) Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D %, min
Over 38.16 to 76.17, incl Area up to 161 cm^2, incl	414	331	2
Over 76.17 to 114.27, incl Area up to 129 cm^2, incl	393	303	2
Area over 129 to 206 cm^2, incl	372	283	2

3.3.1.4 Tensile property requirements for product exceeding the size limits of 3.3.1.1, 3.3.1.2, and 3.3.1.3 shall be as agreed upon by purchaser and vendor.

3.3.2 Hardness: Should be not lower than 125 HB/10/500 or 130 HB/10/1000 but the extrusions shall not be rejected on the basis of hardness if the longitudinal tensile property requirements are met.

3.3.3 Conductivity: Shall be as follows, determined in accordance with MIL-STD-1537 on the sample used for tensile testing:

3.3.3.1 Electrical conductivity shall be not lower than 38.0% IACS (International Annealed Copper Standard) (22.0 MS/m).

3.3.3.1.1 If the conductivity is 40.0% IACS (23.2 MS/m) or higher and longitudinal tensile properties meet the requirements of 3.3.1.1, the extrusions are acceptable.