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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-4154

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Submitted for recognition as an American National Standard

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Superseding AMS-4154K

ALUMINUM ALLOY EXTRUSIONS
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T6)
Solution and Precipitation Heat Treated

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 whose fabrication does not usually involve welding or forming.

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 and Magnesium Alloy Wrought Products

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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.

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

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	2.7	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 and precipitation heat treated 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 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: Shall be as specified in 3.3.1.1, 3.3.1.2, and 3.3.1.3.

3.3.1.1 Longitudinal:

TABLE I

Nominal Dimensions		Cross-Sectional Area Square Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 Inches or 4D %, min
Diameter or Thickness (rods, bars, wire, shapes) or Nominal Wall Thickness (tubing) Inches	Nominal Dimensions				
Up to 0.249, incl	Up to 0.249, incl	All areas	78,000	70,000	7
Over 0.249 to 0.499, incl	Over 0.249 to 0.499, incl	All areas	81,000	73,000	7
Over 0.499 to 2.999, incl	Over 0.499 to 2.999, incl	All areas	81,000	72,000	7
Over 2.999 to 4.499, incl	Over 2.999 to 4.499, incl	Up to 20, incl	81,000	71,000	7
Over 2.999 to 4.499, incl	Over 2.999 to 4.499, incl	Over 20 to 32, incl	78,000	70,000	6
Over 4.499 to 5.000, incl	Over 4.499 to 5.000, incl	Up to 32, incl	78,000	68,000	6

TABLE I (SI)

Nominal Dimensions		Cross-Sectional Area Square Centimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D %, min
Diameter or Thickness (rods, bars, wire, shapes) or Nominal Wall Thickness (tubing) Millimetres	Nominal Dimensions				
Up to 6.32, incl	Up to 6.32, incl	All areas	538	483	7
Over 6.32 to 12.67, incl	Over 6.32 to 12.67, incl	All areas	558	503	7
Over 12.67 to 76.17, incl	Over 12.67 to 76.17, incl	All areas	558	496	7
Over 76.17 to 114.27, incl	Over 76.17 to 114.27, incl	Up to 129, incl	558	490	7
Over 76.17 to 114.27, incl	Over 76.17 to 114.27, incl	Over 129 to 206, incl	538	483	6
Over 114.27 to 127.00, incl	Over 114.27 to 127.00, incl	Up to 206, incl	538	469	6



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3.3.1.2 Long-Transverse; Rods, Bars, and Shapes:

TABLE II

Nominal Dimensions		Cross-Sectional Area Square Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 Inches or 4D %, min
Diameter or Thickness Inches	Area Square Inches				
Up to 0.249, incl	Up to 20, incl		76,000	66,000	5
Over 0.249 to 0.499, incl	Up to 20, incl		78,000	68,000	5
Over 0.499 to 0.749, incl	Up to 20, incl		76,000	66,000	4
Over 0.749 to 1.499, incl	Up to 20, incl		74,000	65,000	3
Over 1.499 to 2.999, incl	Up to 20, incl		70,000	61,000	1
Over 2.999 to 4.499, incl	Up to 20, incl		67,000	56,000	1
Over 2.999 to 4.499, incl	Over 20 to 32, incl		65,000	55,000	1

TABLE II (SI)

Nominal Dimensions		Cross-Sectional Area Square Centimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D %, min
Diameter or Thickness Millimetres	Area Square Centimetres				
Up to 6.32, incl	Up to 129, incl		524	455	5
Over 6.32 to 12.67, incl	Up to 129, incl		538	469	5
Over 12.67 to 19.02, incl	Up to 129, incl		524	455	4
Over 19.02 to 38.07, incl	Up to 129, incl		510	448	3
Over 38.07 to 76.17, incl	Up to 129, incl		483	421	1
Over 76.17 to 114.27, incl	Up to 129, incl		462	386	1
Over 76.17 to 114.27, incl	Over 129 to 206, incl		448	379	1

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- 3.3.1.3 Tensile property requirements for extrusions with nominal dimensions and/or areas outside 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 the 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 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 - 1.499 inches (12.67 - 38.07 mm), inclusive, in nominal thickness, not exceeding 600 pounds (272 kg) per piece, or a 10 to 1 width-to-thickness ratio shall meet ultrasonic class B. Extrusions 1.500 inches (38.07 mm) and over in nominal thickness, not exceeding 600 pounds (272 kg) per piece, or a 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 a 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.
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 performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform to the requirements of this specification.
- 4.2 Classification of Tests:
- 4.2.1 Acceptance Tests: Tests for composition (3.1), longitudinal tensile properties (3.3.1.1), ultrasonic inspection (3.4.1) when specified, and tolerances (3.5) are acceptance tests and shall be performed on each lot.
- 4.2.2 Periodic Tests: Tests for long-transverse tensile properties (3.3.1.2) and hardness (3.3.2) 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 or MAM-2355.