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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 4066A

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Superseding AMS 4066

ALUMINUM ALLOY TUBING, SEAMLESS, DRAWN
6.3Cu - 0.30Mn - 0.18Zr - 0.10V - 0.06Ti (2219-T8511) (See 8.2)
Solution Heat Treated, Stress Relieved by Stretching, and Precipitation Heat Treated

UNS A92219

THIS REVISION CONTAINS ONLY EDITORIAL CHANGES.

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of seamless, drawn, round tubing 0.500 inches (12.70 mm) and over in OD with wall thickness of 0.029 - 0.500 inch (0.74 - 12.70 mm).

1.2 Application: Primarily for structures requiring good fusion weldability and a combination of good 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 Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2203 - Tolerances, Aluminum Alloy Drawn Tubing
MAM 2203 - Tolerances, Metric, Aluminum Alloy Drawn Tubing
AMS 2350 - Standards and Test Methods
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

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B660 - Packaging/Packing of Aluminum and Magnesium Products

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

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
Copper	5.8	6.8
Manganese	0.20	0.40
Zirconium	0.10	0.25
Vanadium	0.05	0.15
Titanium	0.02	0.10
Iron	--	0.30
Silicon	--	0.20
Zinc	--	0.10
Magnesium	--	0.02
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: Solution heat treated, stress relieved by stretching to produce a permanent set of 1/2 - 3%, and precipitation heat treated (See 8.2); solution and precipitation heat treatments shall be performed in accordance with MIL-H-6088.

3.3 Properties: Tubing 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 Table I.

TABLE I

Nominal Wall Thickness Inch	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 inches %, min	
			Strip	Full Section
0.029 to 0.049, incl	60,000	42,000	--	6
Over 0.049 to 0.500, incl	60,000	42,000	6	8

TABLE I (SI)

Nominal Wall Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50 mm %, min	
			Strip	Full Section
0.74 to 1.24, incl	415	290	--	6
Over 1.24 to 12.70, incl	415	290	6	8

3.4 Quality: Tubing, 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 tubing.

3.5 Tolerances: Shall conform to all applicable requirements of AMS 2203 or MAM 2203.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of tubing shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the tubing conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each lot.

4.3 Sampling: Shall be in accordance with AMS 2355 or MAM 2355.

4.4 Reports:

4.4.1 The vendor of tubing shall furnish with each shipment a report stating that the tubing conforms to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, AMS 4066A, lot number, size, and quantity.

4.4.1 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 4066A, contractor or other direct supplier of tubing, part number, and quantity. When tubing for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of tubing to determine conformance to the requirements of this specification and shall include in the report either a statement that the tubing conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2355 or MAM 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Straight tubes shall be marked in a row of characters recurring at intervals not greater than 3 feet (914 mm) with the alloy number and temper, AMS 4066A, and manufacturer's identification. The inspection lot number shall be included in the row marking or shall be marked near one end. The characters shall be of such size as to be legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling. The markings shall have no deleterious effect on the tubing or its performance.

5.2 Packaging:

5.2.1 Tubing shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the tubing to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.2.2 For direct U.S. Military procurement, packaging shall be in accordance with ASTM B660, Commercial Level, unless Level A is specified in the request for procurement.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Tubing not conforming to this specification or to modifications authorized by purchaser will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: This revision contains only editorial changes from the previous issue of this specification and, therefore, no phi (Ø) symbols indicating technical changes from the previous issue of this specification are required.

8.2 The prior issue of this specification inappropriately specified the temper as T851. Material fabricated according to AMS 4066A including stress relieval by stretching at least 1/2 but not more than 3% permanent set and already identified as T851 temper is acceptable.