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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 4069B

Issued 6-15-59
Revised 10-1-86

Superseding AMS 4069A

ALUMINUM ALLOY TUBING, SEAMLESS, DRAWN, ROUND CLOSE TOLERANCE 2.5Mg - 0.25Cr (5052-0) Annealed

UNS A95052

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of seamless, drawn, round tubing.

1.2 Application: Primarily for ducts requiring small radius bends.

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

REAFFIRMED 10/91

2.2.1 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

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
Magnesium	2.2	2.8
Chromium	0.15	0.35
Iron	--	0.40
Silicon	--	0.25
Zinc	--	0.10
Manganese	--	0.10
Copper	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: Annealed.

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 follows for tubing 0.010 - 0.450 in. Ø (0.75 - 11.25 mm), incl, in specified wall thickness:

Tensile Strength	25,000 - 35,000 psi (170 - 240 MPa)
Yield Strength at 0.2% Offset	10,000 - 20,000 psi (70 - 140 MPa)
Elongation in 2 in. (50 mm), min	
Strip	10%
Full Section	12%

3.3.1.1 Tubing with specified wall thickness over 0.450 in. (11.25 mm) shall Ø have tensile properties as agreed upon by purchaser and vendor.

3.3.2 Flattening: Tubing having nominal wall thickness less than 10% of the nominal OD shall withstand, without cracking, flattening sideways under a load applied gradually at room temperature until the outside dimension under load is equal to 3 times the nominal wall thickness.

3.3.2.1 If tubing does not pass the flattening test of 3.3.2, a section of tube not less than 1/2 in. (12 mm) in length and embracing one-third to one-half the circumference of the tube shall withstand, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to the nominal wall thickness of the tubing with axis of bend parallel to axis of tube and with inside of tube on inside of bend.

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: Except as specified in 3.5.1 for mean diameter, tolerances shall conform to all applicable requirements of AMS 2203 or MAM 2203.

3.5.1 Mean Diameter:

TABLE I

Nominal OD Inches	Tolerance, Inch Plus and Minus
0.500 to 1.000, incl	0.002
Over 1.000 to 3.000, incl	0.003
Over 3.000 to 5.000, incl	0.004
Over 5.000 to 6.000, incl	0.005
Over 6.000 to 8.000, incl	0.008
Over 8.000 to 10.000, incl	0.010
Over 10.000 to 12.000, incl	0.013

TABLE I (SI)

Nominal OD Millimetres	Tolerance, Millimetre Plus and Minus
12.50 to 25.00, incl	0.04
Over 25.00 to 75.00, incl	0.08
Over 75.00 to 125.00, incl	0.10
Over 125.00 to 150.00, incl	0.12
Over 150.00 to 200.00, incl	0.20
Over 200.00 to 250.00, incl	0.25
Over 250.00 to 300.00, incl	0.32

3.5.1.1 Mean diameter is the average of two measurements taken at right angles to each other at the same longitudinal location on the tube.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of tubing shall supply all Ø samples for vendor's tests and shall be responsible for performing all required tests. Results of such test 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 Classifiction of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.3.1), and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for flattening (3.3.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355 or MAM 2355 and as specified herein.

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 4069B, size, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 4069B, 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: Tubing shall be identified as follows:

5.1.1 Straight Tubes 0.029 In. (0.75 mm) and Over in Nominal Wall Thickness and 0.500 In. (12.50 mm) and Over in Nominal OD: Shall be marked in a row of characters recurring at intervals not greater than 3 ft (900 mm) with the alloy number and temper, AMS 4069 or applicable Federal specification designation, and manufacturer's identification. 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.

5.1.2 Straight Tubes Under 0.029 In. (0.75 mm) in Nominal Wall Thickness or Under 0.500 In. (12.50 mm) in Nominal OD: Shall be securely bundled, boxed, or secured on lifts and identified by two durable tags marked with the information of 5.1.1 and attached, not farther than 2 ft (600 mm) from each end, to the tubes in each bundle, box, or lift.

5.1.3 Coiled Tubing: Shall be securely bundled and identified with the information of 5.1.1 by a durable tag attached to each coil or on the tape used to bind the coil.

5.2 Protective Treatment: Tubing shall be oiled, prior to shipment, with a light corrosion-inhibiting oil.