SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4079G

Issued 1959-06
Reaffirmed 2007-04
Revised 2009-10

Superseding AMS4079F

Aluminum Alloy, Drawn, Round, Seamless, Tubing
1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-O)
Close Tolerance, Annealed

(Composition similar to UNS A96061)

RATIONALE

AMS4079G results from a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.2 Application

This tubing has been used typically for ducts requiring small radius bends and moderate strength after solution and precipitation heat treatment, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2355 Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

AS1990 Aluminum Alloy Tempers

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4079G

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Publications

Available from American National Standards Institute, Inc., 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M	Dimensional Tolerances for Aluminum Mill Products (Metric)

3. TECHNICAL REQUIREMENTS

3.1 Composition

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

TABLE 1 - COMPOSITION

Element	min	max
Silicon	0.40	0.8
Iron	--	0.7
Copper	0.15	0.40
Manganese	--	0.15
Magnesium	0.8	1.2
Chromium	0.04	0.35
Zinc	--	0.25
Titanium	--	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Annealed in accordance with AMS2772, and drawn to meet dimensional tolerances of 3.5.

3.3 Properties

Tubing shall conform to the following requirements, determined in accordance with AMS2355 on the mill produced size.

3.3.1 As Annealed

3.3.1.1 Tensile Properties

Shall be shown in Table 2 for tubing having nominal wall thickness of 0.018 to 0.500 inch (0.46 to 12.70 mm), inclusive.

TABLE 2 - TENSILE PROPERTIES

Property	Value
Tensile Strength, max	22.0 ksi (152 MPa)
Yield Strength at 0.2% Offset, max	14.0 ksi (97 MPa)
Elongation in 2 inches (50.8 mm) or 4D, min	
Strip	15%
Full Section	15%

3.3.1.2 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 the flattening factor shown in Table 3 times the nominal wall thickness.

TABLE 3 - FLATTENING FACTOR

Nominal Wall Thickness Inch	Nominal Wall Thickness Millimeters	Factor
Up to 0.120, incl	Up to 3.05, incl	3
Over 0.120 to 0.238, incl	Over 3.05 to 6.05, incl	4
Over 0.238 to 0.500, incl	Over 6.05 to 12.70, incl	6

3.3.1.2.1 If tubing does not pass the flattening test of 3.3.1.2, a section of tube not less than 1/2 inch (12.7 mm) in length and including one-third to one-half the circumference of the tube shall withstand, without cracking, bending at room temperature through an angle of 180 degrees around a diameter equal to the bend factor shown in Table 4 times 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.

TABLE 4 - BENDING PARAMETERS

Nominal Wall Thickness Inch	Nominal Wall Thickness Millimeters	Factor
Up to 0.120, incl	Up to 3.05, incl	1
Over 0.120 to 0.238, incl	Over 3.05 to 6.05, incl	2
Over 0.238 to 0.500, incl	Over 6.05 to 12.70, incl	4

3.3.2 Response to Heat Treatment

Tubing shall have the properties shown in Table 5 after being solution and precipitation heat treated in accordance with AMS2772 to the -T62 temper (See AS1990).

TABLE 5A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Wall Thickness Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D % Strip	Elongation in 2 inches or 4D % Full Section
0.025 to 0.049, incl	42.0	35.0	8	10
Over 0.049 to 0.259, incl	42.0	35.0	10	12
Over 0.259 to 0.500, incl	42.0	35.0	12	14

TABLE 5B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Wall Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D % Strip	Elongation in 50.8 mm or 4D % Full Section
0.64 to 1.24, incl	290	241	8	10
Over 1.24 to 6.58, incl	290	241	10	12
Over 6.58 to 12.70, incl	290	241	12	14

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. Detrimental imperfections include, but are not limited to, cracks, splits, seams, inclusions, or severe cross-hatching (surface breaks) that cannot be removed by lightly hand-sanding using 180 grit or finer sandpaper.

3.5 Tolerances

Except as specified in 3.5.1 for mean diameter and 3.5.2 for wall thickness, tolerances shall conform to all applicable requirements of ANSI H35.2 or ANSI H.35.2M.

3.5.1 Mean Diameter

Shall be shown in Table 6.

TABLE 6A - TOLERANCES, MEAN DIAMETER, INCH/POUND UNITS

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 6B - TOLERANCES, MEAN DIAMETER, SI UNITS

Nominal OD Millimeters	Tolerance, Millimeters Plus and Minus
12.70 to 25.40, incl	0.05
Over 25.40 to 76.20, incl	0.08
Over 76.20 to 127.00, incl	0.10
Over 127.00 to 152.40, incl	0.13
Over 152.40 to 203.20, incl	0.20
Over 203.20 to 254.00, incl	0.25
Over 254.00 to 304.80, incl	0.33

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.

3.5.2 Wall Thickness

±7% or ±0.002 inch (±0.05 mm), whichever is greater, for wall thicknesses under 0.035 inch (0.89 mm); ±7% or ±0.003 inch (±0.08 mm), whichever is greater, for wall thicknesses of 0.035 inch (0.89 mm) and over.