



AEROSPACE MATERIAL SPECIFICATION

AMS4080™**REV. R**

Issued 1940-10
Reaffirmed 2007-04
Revised 2023-08

Superseding AMS4080P

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

(Composition similar to UNS A96061)

RATIONALE

AMS4080R is the result of a Five-Year Review and update of this specification with changes to update wording to prohibit unauthorized exceptions (see 3.3.1, 3.6, 4.4.1, 5.1.1, and 8.4), relocate Definitions (see 2.4) update Applicable Documents (see Section 2, 3.3.3, and 3.3.4), Hardness (see 8.2), and allow the use of the immediate prior revision of this specification (see 8.5).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of drawn seamless tubing in the annealed (O) condition. This specification covers products from 0.018 to 0.500 inch (0.46 to 12.70 mm) in wall thickness (see 8.6).

1.2 Application

This tubing has been used typically for parts, such as conduits and low-pressure fluid lines, where moderate strength, ductility, and good weldability are required, 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 +1 724-776-4970 (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

AMS2770 Heat Treatment of Wrought Aluminum Alloy Parts

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

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<https://www.sae.org/standards/content/AMS4080R/>

Documents

Document Sharing Hub

AS7766 Terms Used in Aerospace Metals Specifications

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 B660 Packaging/Packing of Aluminum and Magnesium Products

ASTM B666/B666M Identification Marking of Aluminum and Magnesium Products

2.3 ANSI Accredited Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ANSI H35.1/H35.1M Standard Alloy and Temper Designation System for Aluminum

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products

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

2.4 Definitions

Terms used in AMS are defined in AS7766 and as follows:

2.4.1 A double flare is similar to a standard single flare except that the flare is folded back on itself such that the cut edge is inside the flare near the ID of the tube. Definition and illustration of single flaring is shown in AS4430; double flaring is defined and illustrated in AS33583.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

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

3.2.1 Annealed in accordance with AMS2772.

3.3 Properties

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

3.3.1 Mechanical property requirements for product outside of the range covered by Table 2, Table 6, and Table 7 shall be agreed upon between the purchaser and producer and reported as in 4.4.1 (see 8.6).

3.3.2 As Annealed

3.3.2.1 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, maximum	22.0 ksi (152 MPa)
Yield Strength at 0.2% Offset, maximum	14.0 ksi (97 MPa)
Elongation in 2 Inches (50.8 mm), minimum	15%

3.3.2.2 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 parameters

Nominal Wall Thickness Inches	Nominal Wall Thickness Millimeters	Flattening 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

3.3.2.2.1 If tubing does not pass the flattening test of 3.3.2.2, 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 Inches	Nominal Wall Thickness Millimeters	Bend 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

3.3.2.3 Flareability

Specimens as in 4.3.1, from tubing 0.375 inch (9.52 mm) and under in nominal OD, shall withstand being double-flared (see 2.4.1) and, from tubing over 0.375 inch (9.52 mm) in nominal OD, shall withstand being single-flared (see 2.4.1) without formation of cracks or other visible defects by being forced axially, at room temperature, with steady pressure over a hardened and polished tapered steel pin having a 74 degree included angle to produce a flare having a permanent expanded OD not less than shown in Table 5.