



AEROSPACE MATERIAL SPECIFICATION

AMS4081™**REV. K**

Issued 1952-06
Reaffirmed 2014-04
Revised 2023-08

Superseding AMS4081J

Aluminum Alloy Tubing, Hydraulic, Seamless, Drawn, Round
1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-T4)
Solution Heat Treated and Naturally Aged
(Composition similar to UNS A96061)

RATIONALE

AMS4081K results from a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (see 3.3.3, 3.6, 4.4.1, 5.1.1, and 8.5), relocate Definitions (see 2.4), update Form (see 1.1), Applicable Documents (see Section 2, 3.2, and 3.3.2), Cleanliness (see 3.4.4), Ordering Information (see 8.6), add note regarding corrosion protection (see 8.3), and allow use of the immediate prior revision of this specification (see 8.4).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of seamless, round tubing with wall thickness of 0.025 to 0.500 inch (0.64 to 12.70 mm) (see 8.6).

1.2 Application

This tubing has been used typically for aircraft hydraulic systems and fuel and oil lines to be formed in the solution heat-treated condition and subsequently precipitation heat-treated, 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.

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2023 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

Full document details: SAE AMS4081K

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS4081K>

Documents

Document Sharing Hub

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

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

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 Identification Marking of Aluminum Products

ASTM E215 Standardizing Equipment for Electromagnetic Testing of Seamless Aluminum-Alloy Tube

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 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 AS4330; double flaring is defined and illustrated in AS33583.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight as 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

Solution heat treated in accordance with AMS2772 and naturally aged to the T4 temper (refer to ANSI H35.1/H35/1M).

3.2.1 Tubing shall be supplied unground with an as-drawn surface finish, unless otherwise specified by the purchaser.

3.3 Properties

Tubing shall conform to the following requirements, determined in accordance with AMS2355 on the mill produced size, except as specified in 3.4.3.2:

3.3.1 As Solution Heat Treated and Naturally Aged

3.3.1.1 Tensile Properties

Shall be as specified in Table 2:

Table 2A - 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 Cut Out Specimen %	Elongation in 2 Inches or 4D Full Section Specimen %
0.025 to 0.049, incl	30.0	16.0	14	16
Over 0.049 to 0.259, incl	30.0	16.0	16	18
Over 0.259 to 0.500, incl	30.0	16.0	18	20

Table 2B - 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 Cut Out Specimen %	Elongation in 50.8 mm or 4D Full Section Specimen %
0.64 to 1.24, incl	207	110	14	16
Over 1.24 to 6.58, incl	207	110	16	18
Over 6.58 to 12.70, incl	207	110	18	20

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 six times the nominal wall thickness. Tubing having nominal wall thickness 10% or more of the nominal OD shall withstand, without cracking, flattening sideways under a load applied gradually at room temperature until the outside dimension under load equals 90% of the nominal OD.