



AEROSPACE MATERIAL SPECIFICATION	AMS4068™	REV. G
	Issued	1997-07
	Revised	2021-12
Superseding AMS4068F		
Aluminum Alloy, Drawn Seamless Tubing 6.3Cu - 0.30Mn - 0.18Zr - 0.10V - 0.06Ti (2219-T3511) Solution Heat Treated and Stress Relieved by Stretching (Composition similar to UNS A92219)		

RATIONALE

AMS4068G is the result of a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (3.3.3, 3.6, 4.4.1, 5.1.1, 8.5), update references (Section 2, 3.2, 3.3.2), and to allow the use of the immediate prior specification revision (8.4).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of drawn seamless tubing 0.029 to 0.500 inch (0.74 to 12.70 mm) in nominal wall thickness (see 8.6).

1.2 Application

This tubing has been used primarily for structures requiring good fusion weldability and a combination of good strength and resistance to stress-corrosion cracking after 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 +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

ARP1917 Clarification of Terms Used in Aerospace Metals Specifications

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 © 2021 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
SAE WEB ADDRESS: http://www.sae.org

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS4068G>

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 of Aluminum and Magnesium Alloy Products

2.3 ANSI Accredited Publications

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

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

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 AMS2355:

Table 1 - Composition

Element	Min	Max
Silicon	--	0.20
Iron	--	0.30
Copper	5.8	6.8
Manganese	0.20	0.40
Magnesium	--	0.02
Zinc	--	0.10
Titanium	0.02	0.10
Vanadium	0.05	0.15
Zirconium	0.10	0.25
Other Elements, each	--	0.05
Other Elements, total	--	0.15

3.2 Condition

Solution heat treated and stress relieved by stretching to produce a permanent set of 1/2 to 3%; solution heat treatment shall be performed in accordance with AMS2772 to the T3511 temper (refer to ANSI H35.1/H35.1M).

3.3 Properties

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

3.3.1 Tensile Properties

3.3.1.1 As Solution Heat Treated and Stress-Relieved

Shall be as shown in Table 2.

Table 2A - 2219-T3511 temper minimum tensile properties, inch/pound units

Nominal Wall Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches % Strip	Elongation in 2 Inches % Full Section
0.029 to 0.049, incl	45.0	26.0	--	12
Over 0.049 to 0.500, incl	45.0	26.0	12	14

Table 2B - 2219-T3511 temper minimum tensile properties, SI units

Nominal Wall Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm % Strip	Elongation in 50.8 mm % Full Section
0.74 to 1.24, incl	310	179	--	12
Over 1.24 to 12.70, incl	310	179	12	14

3.3.2 Response to Temper Conversion (T3511 to T82 Temper)

Product in the T3511 temper, after precipitation heat treatment to the T82 temper (refer to ANSI H35.1/H35.1M) in accordance with AMS2772, shall have the properties shown in Table 3.

3.3.3 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between purchaser and producer and reported per 4.4.1.

Table 3A - 2219-T82 temper minimum tensile properties, inch/pound units

Nominal Wall Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches % Strip	Elongation in 2 Inches % Full Section
0.029 to 0.049, incl	60.0	42.0	--	6
Over 0.049 to 0.500, incl	60.0	42.0	6	8

Table 3B - 2219-T82 temper minimum tensile properties, SI units

Nominal Wall Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm % Strip	Elongation in 50.8 mm % Full Section
0.74 to 1.24, incl	414	290	--	6
Over 1.24 to 12.70, incl	414	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 ANSI H35.2 or ANSI H35.2M.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of tubing shall supply all samples for producer's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the tubing conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), tensile properties (3.3.1.1), and tolerances (3.5) are acceptance tests and except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests

Response to temper conversion (3.3.2) shall be performed at a frequency selected by the producer unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The producer of tubing shall furnish with each shipment a report stating that the tubing conforms to the chemical composition and tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, inspection lot number, AMS4068G, size, and quantity. The report shall also identify the producer and the size of the mill product.

4.4.1 When material produced to this specification is beyond the sizes allowed in the scope or tables, or other exceptions are taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS4068G(EXC) because of the following exceptions:" and the specific exceptions shall be listed (see 5.1.1).

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B666/B666M.

5.1.1 When technical exceptions are taken (see 4.4.1), the material shall be identified with AMS4068(EXC).

5.2 Packaging

Tubing shall be prepared for shipment in accordance with ASTM B660 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.

6. ACKNOWLEDGMENT

A producer shall mention this specification number and its revision letter in all quotations and when acknowledging purchaser orders.