

AEROSPACE MATERIAL SPECIFICATION

AMS 4065J

Issued JUN 1942
Revised MAY 2006

Superseding AMS 4065H

Aluminum Alloy, Drawn Seamless Tubing
1.2Mn - 0.12Cu (3003-0)
Annealed

(Composition similar to UNS A93003)

RATIONALE

AMS 4065J is 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 seamless tubing.

1.2 Application

This tubing has been used typically for parts requiring low strength and good formability, 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.

AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings

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/B666M Identification Marking of Aluminum Products

SAE Technical Standards Board 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 reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2006 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: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: <http://www.sae.org>

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036, 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	--	0.6
Iron	--	0.7
Copper	0.05	0.20
Manganese	1.0	1.5
Zinc	--	0.10
Other Elements, each	--	0.05
Other Elements, 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:

3.3.1 Tensile Properties

Shall be as shown in Table 2:

TABLE 2 - TENSILE PROPERTIES

Property	Value
Tensile Strength	14.0 to 19.0 ksi (96 to 131 MPa)

3.3.2 Flattening (Round Tubing Only)

Round 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 flat upon itself while under load.

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 inch (12.7 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 degrees 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.

3.3.3 Flarability (Round Tubing Only)

Tubing with nominal OD of 0.375 inch (9.52 mm) and under shall withstand double-flaring and tubing with nominal OD over 0.375 inch (9.52 mm) shall withstand single-flaring (See 8.2) without formation of cracks or other visible defects by being forced, at room temperature, axially 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 specified in Table 3.

TABLE 3A - FLARABILITY PARAMETERS, INCH/POUND UNITS

Nominal OD Inches	Expanded OD Inches	Nominal OD Inches	Expanded OD Inches
0.125	0.200	1.000	1.187
0.188	0.302	1.250	1.500
0.250	0.359	1.500	1.721
0.312	0.421	1.750	2.106
0.375	0.484	2.000	2.356
0.500	0.656	2.500	2.856
0.625	0.781	3.000	3.356
0.750	0.937		

TABLE 3B - FLARABILITY PARAMETERS, SI UNITS

Nominal OD Millimeters	Expanded OD Millimeters	Nominal OD Millimeters	Expanded OD Millimeters
3.18	5.00	25.40	30.15
4.77	7.67	31.75	38.10
6.35	9.12	38.10	43.71
7.92	10.69	44.45	53.49
9.52	12.29	50.80	59.84
12.70	16.66	63.50	72.54
15.88	19.83	76.20	85.24
19.05	23.80		

3.3.3.1 Tubing with nominal OD between any two standard sizes shown in Table 3 shall take the same percentage flare as shown for the larger of the two sizes.

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.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of tubing shall supply all samples for vendor'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), and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each lot.

4.2.2 Periodic Tests

Flattening (3.3.2) and flarability (3.3.3) are periodic tests and shall be performed at a frequency selected by the manufacturer unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS 2355 and the following:

- 4.3.1 Specimens for flarability test shall be full tubes or sections cut from tubes. The end of the specimen to be flared shall be cut square, with the cut end smooth and free from burrs but, except for sizes 0.375 inch (9.52 mm) and under, not rounded.

4.4 Reports

The vendor of tubing shall furnish with each shipment a report stating that the tubing conforms to the composition and tolerances, and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test and stating that the product conforms to the other technical requirements. This report shall include the purchaser order number, inspection lot number, AMS 4065J, size, and quantity.

4.5 Resampling and Retesting

Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B 666/B666M.

5.2 Packaging

5.2.1 Tubing shall be oiled, prior to shipment, with a light corrosion-inhibiting oil.

5.2.2 Tubing shall be prepared for shipment in accordance with ASTM B 660 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 vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Tubing not conforming to this specification number, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES

8.1 The change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this specification. An (R) symbol to the left of the document title indicates a complete revision of the specification.

8.2 Terms used in AMS are clarified in ARP1917 and as follows:

8.2.1 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. Definitions and illustrations of single flaring are shown in MS 33584; double flaring is defined and illustrated in MS 33883.