



AEROSPACE MATERIAL SPECIFICATION

AMS7912™**REV. E**

Issued 1996-05
Reaffirmed 2018-12
Revised 2023-06

Superseding AMS7912D

Aluminum-Beryllium Alloy, Extrusions
38Al - 62Be
Annealed

RATIONALE

AMS7912E results from a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (see 3.7, 4.4.1, 5.1.1, and 8.4), relocate Definitions (see 2.4), update Applicable Documents (see Section 2 and 2.4), and allow the use of the immediate prior specification revision (see 8.3).

1. SCOPE

1.1 Form

This specification covers an aluminum-beryllium alloy in the form of bars, rods, tubing, and shapes consolidated from powder by extrusion.

1.2 Application

These extrusions have been used typically for parts requiring high thermal conductivity, low density, and high modulus of elasticity, but usage is not limited to such applications.

1.3 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards that may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

1.3.1 WARNING

Inhaling dust or fumes containing beryllium may cause chronic beryllium disease, a serious chronic lung disease, in some individuals. Over time, lung disease can be fatal. Read the product specific Material Safety Data Sheet (MSDS) for additional environmental, health, and safety information before working with beryllium or beryllium-containing materials.

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:

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS7912E/>

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.

AMS2806 Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels, and Corrosion and Heat-Resistant Steels and Alloys

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 B311 Density of Powder Metallurgy (PM) Materials Containing Less Than Two Percent Porosity

ASTM E8/E8M Tension Testing of Metallic Materials

2.3 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

ASME Y14.5M Dimensioning and Tolerancing

2.4 Definitions

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

2.4.1 A powder blend is comprised of thoroughly intermingled powders of the same nominal composition.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1; beryllium shall be determined by wet analysis (titration) or optical emission spectroscopy, oxygen by inert gas fusion, and other elements by spectrochemical methods or other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Aluminum (3.1.1)	--	--
Beryllium	60.0	64.0
Oxygen	--	1.0
Carbon	--	0.1
Other Elements, each (3.1.2)	--	0.2

3.1.1 Aluminum reported as balance.

3.1.2 Determination is not required for routine analysis.

3.2 Condition

As extruded and annealed.

3.3 Heat Treatment

Product shall be annealed by heating to 1100 °F $\pm$ 45 °F (593 °C $\pm$ 25 °C), holding at heat for 24 hours $\pm$ 2 hours, and cooling to room temperature.

3.4 Properties

The product shall conform to the following requirements:

3.4.1 Tensile Properties

Shall be as shown in Table 2, determined in accordance with ASTM E8/E8M with the rate of strain set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ± 0.002 in/in/min (± 0.002 mm/mm/min) through the 0.2% offset yield strain and may be increased thereafter to 0.05 in/in/min (0.05 mm/mm/min).

Table 2 - Minimum tensile properties

Property	Value Longitudinal	Value Transverse
Tensile Strength	58 ksi (400 MPa)	50 ksi (345 MPa)
Yield Strength, 0.2% Offset	40.0 ksi (276 MPa)	40.0 ksi (276 MPa)
Elongation in 4D	7%	2%

3.4.1.1 Transverse properties apply only to product from which specimens not less than 2.50 inches (63.5 mm) in length can be obtained.

3.4.2 Density

Shall be within the range of 0.0748 to 0.0767 lb/in³ (2.071 to 2.122 g/cm³), determined using a water displacement method in accordance with ASTM B311.

3.5 Quality

Extrusions, as received by the purchaser, shall be uniform in quality and condition and free from imperfections detrimental to usage.

3.6 Tolerances

Shall conform to the following, in accordance with ASME Y14.5M:

3.6.1 Diameter, Width, or Thickness

Shall be as shown in Table 3.

Table 3A - Dimensional tolerances, inch/pound units

Diameter, Width, or Thickness Inches	Tolerance Inch Plus Only
0.150 to 3, incl	0.125
Over 3	0.250

Table 3B - Dimensional tolerances, SI units

Diameter, Width, or Thickness Millimeters	Tolerance Millimeters Plus Only
3.81 to 76.2, incl	3.18
Over 76.2	6.35

3.6.2 Length

Shall be as shown in Table 4.

Table 4A - Dimensional tolerances, inch/pound units

Length, Inches	Tolerance Inches Plus Only
Up to 20, incl	0.125
Over 20	0.250

Table 4B - Dimensional tolerances, SI units

Length, Millimeters	Tolerance Millimeters Plus Only
Up to 508, incl	3.18
Over 508	6.35

3.6.3 Straightness

Straightness of extruded bar shall be ± 0.125 in/ft (± 10.42 mm/m).

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

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each powder blend or lot as applicable.

4.3 Sampling and Testing

Shall be in accordance with the following; a lot shall be all extrusions fabricated from the same powder blend and each combination of extrusion session, reduction ratio, and annealing heat treatment:

4.3.1 Composition

One or more samples from each powder blend (see 2.4.1).

4.3.2 Tensile Properties

One or more round tensile specimens from each lot at any location.

4.3.3 Density

One specimen from each lot (see 3.4.2).