AEROSPACE MATERIAL SPECIFICATION

AMS7911™	REV. E

Issued 1995-04
Reaffirm 2018-12
Revised 2023-08

Superseding AMS7911D

Aluminum Beryllium, Preforms Hot Isostatic Pressed and Heat Treated 38Al - 62Be

RATIONALE

AMS7911E results from a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (3.6, 4.4.1, 5.1.1, and 8.7), relocate Definitions (2.4), update Applicable Documents (Section 2, 3.2.1), and allow the use of the immediate prior specification revision (8.6).

1. SCOPE

1.1 Form

This specification covers aluminum-beryllium powders consolidated by hot isostatic pressing (HIP) into the form of bar, rod, tubing, and shapes.

1.2 Application

These preforms 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 Safety Data Sheet (SDS) 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.

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/AMS7911E

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 B46.1 Surface Texture, Surface Roughness, Waviness and Lay

2.4 Definitions

Terms used in AMS are defined in AS7766.

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 spectrometry, oxygen by inert gas fusion, and other elements by spectrochemical methods or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

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

3.1.1 Aluminum may be reported as “remainder,” or as the difference between the sum of results for all elements and 100%, or as the result of direct analysis.

3.1.2 Determination is not required for routine acceptance of each lot.

3.2 Condition

Hot isostatically pressed (HIP) with subsequent heat treatment (see 8.2 and 8.2.1).

3.2.1 Surface Finish

If no surface finish is specified, the material shall be furnished with an as sawed, as HIP, and/or machined surface. Machined surfaces shall have surface finish no greater than 110 Ra (125 µin [3.2 µm]), determined in accordance with ASME B46.1.

3.3 Properties

The product shall conform to the following requirements:

3.3.1 Tensile Properties

Shall be as shown in Table 2, determined at room temperature 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
Tensile Strength	38.0 ksi (262 MPa)
0.2% Offset Yield Strength	28.0 ksi (193 MPa)
Elongation in 4D	2%

3.3.2 Density

Shall be within the range of 0.0748 to 0.0767 pounds per cubic inch (2.071 to 2.122 g/cm^3), determined using a water displacement method in accordance with ASTM B311 except that measurement shall be made on the product, not a sample, after HIP and heat treatment (see 8.3).

3.4 Quality

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

3.5 Tolerances

Shall conform to +0.250/-0.000 inch (+6.35/-0.00 mm) unless specified by agreement between the purchaser and supplier (see 8.4).

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 the product shall supply all samples for the producer's tests and shall be responsible for performing 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 the requirements of this specification.

4.2 Classification of the Tests

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

4.3 Sampling and Testing

Shall be in accordance with the following: a lot shall consist of all preforms manufactured from a specific powder blend and HIP cycle and heat-treatment batch. Mechanical properties may be determined from a sample shape (component) or from material produced as an integral part (prolongation) of a shape (component) from the lot.

4.3.1 Composition

One or more samples from each powder blend. A powder blend is comprised of thoroughly intermingled powders of the same nominal composition.

4.3.2 Tensile Properties

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

4.3.3 Density

One sample from each lot (see 3.3.2), unless a sampling plan has been agreed upon by the purchaser and producer.

4.3.4 Dimensions

Each piece, unless a sampling plan has been agreed upon by the purchaser and producer.

4.4 Reports

The producer of the product shall furnish with each shipment a report showing the results of tests for composition, tensile properties, and density of each lot. This report shall include the purchase order number, lot number, AMS7911E, serial numbers, and quantity.

4.4.1 When material produced to this specification has exceptions taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS7911E (EXC) because of the following exceptions:" and the specific exceptions shall be listed (see 5.1.1).

4.5 Resampling and Retesting

If a valid test on any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing two additional specimens for each original nonconforming specimen, except as permitted by 4.5.1. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented. Results of all tests shall be reported.

4.5.1 Resubmittal of Rejected Lots

Lots rejected for failure to meet the technical requirements may be submitted for retesting provided the producer has reworked the lots, as necessary, to correct the deficiencies or when 100% inspection confirms removal of nonconforming details.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with AMS2806.

5.1.1 When technical exceptions are taken (see 4.4.1), the material shall be identified with AMS7911E(EXC).

5.2 Packaging

The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT

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