



<b>AEROSPACE MATERIAL SPECIFICATION</b>	<b>AMS7909™</b>	<b>REV. D</b>
	Issued 2005-07 Revised 2015-07 Stabilized 2019-10	
Superseding AMS7909C		
Aluminum Beryllium, NNS Preforms Hot Isostatic Pressed 38Al - 62Be		

RATIONALE

Mature Technology.

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## 1. SCOPE

### 1.1 Form

This specification covers aluminum-beryllium powders consolidated by hot isostatic pressing (HIP) into the form of blocks, blanks or 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: Beryllium Alloy

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.

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## 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](http://www.sae.org).

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

## 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](http://www.astm.org).

ASTM B311 Density of Powder Metallurgy (P/M) Materials Containing Less Than Two Percent Porosity

ASTM E8/E8M Tension Testing of Metallic Materials

## 2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, Tel: 212-642-4900, [www.ansi.org](http://www.ansi.org).

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

## 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 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) (See 8.2).

#### 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 microinches] (3.2 um), determined in accordance with ANSI 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 inch/inch/minute (0.005 mm/mm/minute) and maintained within a tolerance of  $\pm 0.002$  inch/inch/minute (0.002 mm/mm/minute) through the 0.2% offset yield strain and may be increased thereafter to 0.05 in/in/minute (0.05 mm/mm/minute) (See also 8.5).

**Table 2 - Minimum tensile properties**

Property	Value
Tensile Strength	42.0 ksi (289 MPa)
0.2% Offset Yield Strength	28.0 ksi (193 MPa)
Elongation in 4D	3%

#### 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<sup>3</sup>), determined using a water displacement method in accordance with ASTM B311 except that measurement shall be made on the product, not a sample (See also 8.4.1).

### 3.4 Quality

Preforms, as received by 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 purchaser and supplier (See 8.3).

## 4. QUALITY ASSURANCE PROVISIONS

#### 4.1 Responsibility for Inspection

The producer of the product shall supply all samples for producer's tests and shall be responsible for performing all required tests. 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. 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.