



AEROSPACE MATERIAL SPECIFICATION

AMS7913™

REV. E

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Superseding AMS7913D

Aluminum-Beryllium Alloy, Sheet and Plate,
38Al - 62Be

RATIONALE

AMS7913E 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 2.5); update Applicable Documents (see Section 2 and 2.5), Surface Finish (see 3.2.1), Thickness Tolerances (see 3.6.2, 3.6.2.2, and Table 4), Flatness (see 3.6.3), Sampling and Testing (see 4.3), and Ordering Information (see 8.5); 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 sheet and plate consolidated from powder by extrusion and then rolled (see 8.5).

1.2 Application

These products 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.

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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.

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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.

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 ANSI Accredited Publications

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

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products

2.4 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

ASME Y14.5M Dimensioning and Tolerancing

2.5 Definitions

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

2.5.1 THICKNESS OF SHEET

0.020 to 0.250 inch (0.51 to 6.35 mm), inclusive.

2.5.2 THICKNESS OF PLATE

Over 0.250 inch (6.35 mm).

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

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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 by other analytical methods acceptable to the purchaser.

Table 1 - Composition

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

3.1.1 Aluminum content by balance.

3.1.2 Determination is not required for routine analysis.

3.2 Condition

Extruded, hot rolled, stress relieved, and ground.

3.2.1 Surface Finish

The product shall be furnished with an as-ground surface. The standard surface finish shall be no greater than 125 microinches Ra (3.2 μ m), determined in accordance with ASME B46.1.

3.3 Heat Treatment

Product shall be stress relieved by heating to $1100^{\circ}\text{F} \pm 45^{\circ}\text{F}$ ($593^{\circ}\text{C} \pm 25^{\circ}\text{C}$), holding at heat for 24 hours ± 2 hours, and cooling to room temperature.

3.4 Properties

The product shall conform to the following requirements:

3.4.1 Tensile Properties

In-plane transverse and longitudinal tensile properties for product up to and including 0.250-inch (6.35-mm) thick 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 in-plane tensile properties

Property	Value
Tensile Strength	56 ksi (386 MPa)
2% Offset Yield Strength	40.0 ksi (276 MPa)
Elongation (in 1 Inch)	5.0%

3.4.1.1 Properties for plate shall be as agreed upon between the purchaser and producer.

3.4.2 Density

Starting stock for rolling shall be within the range 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

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

3.6 Tolerances

Shall conform to the following dimensional tolerances in accordance with ASME Y14.5M, unless otherwise specified by agreement between the purchaser and producer.

3.6.1 Width and/or Length

Shall be as shown in Table 3.

Table 3A - Width and/or length tolerances, inch/pound units

Width and/or Length Inches	Tolerances Inch
Up to 20, incl	+0.125, -0
Over 20	+0.250, -0

Table 3B - Width and/or length tolerances, SI units

Width and/or Length Millimeters	Tolerances Millimeters
Up to 508, incl	+3.175, -0
Over 508	+6.350, -0

3.6.2 Thickness Tolerances

Shall be as shown in Table 4.

Table 4A - Thickness tolerances, inch/pound units

Thickness Inch	Tolerances Inch
0.020 to 0.025, incl	±0.003
Over 0.025 to 0.034, incl	±0.004
Over 0.034 to 0.056, incl	±0.005
Over 0.056 to 0.070, incl	±0.006
Over 0.070 to 0.078, incl	±0.007
Over 0.078 to 0.093, incl	±0.008
Over 0.093 to 0.109, incl	±0.009
Over 0.109 to 0.250, incl	±0.010

Table 4B - Thickness tolerances, SI units

Thickness Millimeters	Tolerances Millimeter
0.508 to 0.635, incl	± 0.076
Over 0.635 to 0.864, incl	± 0.102
Over 0.864 to 1.422, incl	± 0.127
Over 1.422 to 1.778, incl	± 0.152
Over 1.778 to 1.981, incl	± 0.178
Over 1.981 to 2.362, incl	± 0.203
Over 2.362 to 2.769, incl	± 0.229
Over 2.769 to 6.350, incl	± 0.254

3.6.2.1 Thickness measurements on any plate 1.0 inch (25 mm) and over in width shall not be conducted within 0.250 inch (6.35 mm) from any edge. There shall be no restriction of thickness measurement location for sheet or plate under 1.0-inch (25.4-mm) wide.

3.6.2.2 Thickness tolerances for plate shall be as agreed upon by the purchaser and producer (see 8.5).

3.6.3 Flatness

Shall be as shown in Table 5, determined at room temperature in accordance with methods described in ANSI H35.2. Measurements will not be made within 0.250 inch (6.35 mm) from any edge on sheets or plates under 12 x 12 inches (305 x 305 mm).

Table 5A - Flatness tolerances, inch/pound units

	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves
Specified Thickness 0.020 to 0.064 inch, incl Over 0.064 to 0.250 inch, incl Over 0.250 inch	Up to 2 feet, incl 0.1875 inch 0.1875 inch 0.1875 inch 0.250 inch in any 6 feet or less	Over 2 to 3 feet, incl 0.1875 inch 0.3125 inch 0.3125 inch 0.250 inch in any 6 feet or less	Over 3 to 4 feet, incl 0.3125 inch 0.375 inch 0.375 inch 0.250 inch in any 6 feet or less	Over 4 to 6 feet, incl 0.375 inch 0.500 inch 0.500 inch 0.250 inch in any 6 feet or less	Over 6 feet 0.500 inch 0.5625 inch 0.250 inch in any 6 feet or less

Table 5B - Flatness tolerances, SI units

	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves	Tolerances Ranges of Distance from Center to Center of Buckles or Edgewaves
Specified Thickness 0.508 to 1.626 mm, incl Over 1.626 to 6.35 mm, incl Over 6.35 mm	Up to 0.61 m, incl 4.76 mm 6.35 mm in any 1.83 m or less	Over 0.61 to 0.91 m, incl 4.76 mm 7.94 mm 6.35 mm in any 1.83 m or less	Over 0.91 to 1.22 m, incl 7.94 mm 9.53 mm 6.35 mm in any 1.83 m or less	Over 1.22 to 1.83 m, incl 9.53 mm 12.70 mm 6.35 mm in any 1.83 m or less	Over 1.83 m 12.70 mm 14.29 mm 6.35 mm in any 1.83 m or less

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 lot.

4.3 Sampling and Testing

Shall be in accordance with the following; a lot shall be all sheet or plate manufactured from a specific powder blend and rolling session in the same condition.

4.3.1 Composition

One or more samples from each powder blend (see 2.5.3).

4.3.2 Tensile Properties

Not less than one longitudinal and one transverse sheet specimen from each lot at any location.

4.3.3 Dimensions

Each part, 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 and tensile properties of each lot and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, powder blend number, AMS7913E, serial numbers, and quantity.