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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 7912

Issued MAY 1996

Submitted for recognition as an American National Standard

ALUMINUM-BERYLLIUM ALLOY, EXTRUSIONS
38Al - 62Be
Annealed

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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 which 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: Inhalation of dust or fumes may cause serious chronic lung disease. Potential cancer hazard based principally on animal tests.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2806 Identification, Bars, Wire, Mechanical Tubing and Extrusions, Carbon and Alloy Steel and Corrosion and Heat Resistant Steels and Alloys

2.2 ASTM Publications

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 311 Density Determination for Powder Metallurgy (P/M) Materials Containing Less Than Two Percent Porosity
ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

2.4 MPIF Publications:

Available from Metal Powder Industries Federation, 105 College Road East, Princeton, NJ 08540.

MPIF Standard 01 Method for Sampling Finished Lots of Metal Powders

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

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TABLE 1 – Composition

Element	min	max
Aluminum (3.1.1)	36.0	40.0
Beryllium	60.0	64.0
Oxygen	--	1.0
Carbon	--	0.1
Residual Metallic Impurities, each (3.1.2)	--	0.2

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3.1.1 Aluminum content by difference.

3.1.2 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 ± 45 (593 °C ± 25), holding at heat for 24 hours ± 2, 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 E 8 or ASTM E 8M.

TABLE 2 - Minimum Tensile Properties

Property	Value Longitudinal	Value Transverse
Tensile Strength	58.0 ksi (400 MPa)	50.0 ksi (345 MPa)
Yield Strength, 0.2% Offset	40.0 ksi (276 MPa)	40.0 ksi (276 MPa)
Elongation in 1 inch (25.4 mm)	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 2.071 to 2.122 g/cm^3 (0.0748 to 0.0767 lb/in ^{3}), determined using a water displacement method in accordance with ASTM B 311 (See 8.1).

3.5 Quality:

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

3.6 Tolerances: (See 8.2):

Shall conform to the following:

3.6.1 Diameter, Width, or Thickness: Shall be as shown in Table 3.

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TABLE 3A - Dimensional Tolerances, Inch/Pound Units

Diameter, Width, or Thickness Inches	Tolerance Inch Plus Only
0.150 to 3, Incl	0.125
3 and Over	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
76.2 and Over	6.35

3.6.2 Length: Shall be as shown in Table 4.

TABLE 4A - Dimensional Tolerances, Inch/Pound Units

Length, Inches	Tolerance Inch 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 inch per foot (±10.42 mm/m).

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4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The supplier of the product shall supply all samples for supplier'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 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 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. Chemical analysis shall be performed on a powder blend of representative powder sample(s) obtained in accordance with MPIF 01 or other procedure acceptable to purchaser.

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.

4.3.4 Tolerances: Each extrusion (See 8.2), unless a sampling plan has been agreed upon by purchaser and supplier.

4.3.5 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3.3 and 4.3.4.

4.4 Reports:

The supplier of the product shall furnish with each shipment a report showing the results of tests for chemical composition, tensile properties, and density of each lot. This report shall include the purchase order number, powder blend number, AMS 7912, serial numbers, and quantity.

4.5 Resampling and Retesting:

If a valid test on any specimen used in the above tests fails to meet 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 specified requirements shall be cause for rejection of the product represented. Results of all tests shall be reported.

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