AEROSPACE MATERIAL SPECIFICATION

AMS7918™	REV. A

Issued 2003-01
Revised 2008-01
Reaffirmed 2020-09

Superseding AMS7918

Beryllium Aluminum Alloy Investment Castings
64.9Be - 30Al - 3Ag - 1Co - 0.75Ge
As Cast

RATIONALE

AMS7918A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Form

This specification covers a beryllium aluminum alloy in the form of investment castings.

1.2 Application

These castings have been used typically for optical support structures and other parts requiring higher stiffness, damping capability, and lighter weight than cast aluminum alloys with similar strength levels, 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 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.

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/AMS7918A

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS 2175	Castings, Classification and Inspection of
AMS 2360	Room Temperature Tensile Properties of Castings
AMS 2694	Repair Welding of Aerospace Castings
AMS 2804	Identification, Castings

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 E 8	Tension Testing of Metallic Materials
ASTM E 155	Reference Radiographs for Inspection of Aluminum and Magnesium Castings
ASTM E 439	Chemical Analysis of Beryllium
ASTM E 1417	Liquid Penetrant Testing
ASTM E 1742	Radiographic Examination

3. TECHNICAL REQUIREMENTS

3.1 Composition

Castings shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 439, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - COMPOSITION

Element	min	max
Beryllium	61.1	68.6
Silver	2.65	3.35
Cobalt	0.65	1.35
Geranium	0.55	0.95
Iron	--	0.20
Silicon	--	0.25
Other Elements (total)	--	0.30
Aluminum (3.1.1)	remainder	

3.1.1 Determination not required for routine acceptance.

3.2 Melting Practice

Castings and specimens shall be poured at casting vendor's facility either from a melt of a master heat, or directly from a master heat.

3.2.1 Revert (gates, sprues, risers, and rejected castings) may be used only in the preparation of master heats; revert shall not be remelted directly without refining for pouring of castings. Melting of revert creates a new master heat.

3.2.1.1 The metal for castings and specimens shall be melted and poured under vacuum without loss of vacuum between melting and pouring. When authorized by purchaser, protective atmosphere may be used in lieu of vacuum for pouring of castings.

3.2.2 Portions of two or more qualified master heats (See 3.4.2) may be melted together and poured into castings using a procedure authorized by purchaser.

3.2.3 If modifications, such as alloy additions or replenishments, are made by the vendor at remelt, vendor shall have a written procedure acceptable to purchaser which defines the controls, test, and traceability criteria for both castings and separately-cast specimens. Control factors of 4.4.2.2 shall apply.

3.2.4 When authorized by purchaser, a master heat may be one or more melts made to a standard practice using raw materials from the same lots, revert, or mixtures of revert and raw materials from the same lots. If revert is used, it shall be traceable to an originating melt or melts of raw material only, from the same lots.

3.3 Condition

Castings shall be delivered in the as cast condition.

3.4 Test Specimens

Specimens shall be either separately-cast, integrally-cast, or machined from a casting, and shall conform to 3.2.

3.4.1 If specimens are separately-cast, vendor shall have a written procedure acceptable to purchaser. Control factors of 4.4.2.2 shall apply.

3.4.2 Each master heat shall be qualified by evaluation of chemical and tensile specimens.

3.4.2.1 If alloy additions or replenishments are made at remelt as in 3.2.3, the frequency of sampling and testing used by the vendor for qualification to 3.4.2 shall be acceptable to purchaser.

3.4.2.2 Tensile tests of 3.4.2 are not required if these tests are conducted using integrally-cast specimens (4.3.3.2) or specimens from a casting (4.3.3.3).

3.4.3 Chemical Analysis Specimens

Shall be of any convenient size and shape.

3.4.4 Tensile Specimens

Shall be of standard proportions in accordance with ASTM E 8.

3.4.4.1 Separately-cast and integrally-cast specimens may be ether cast to size, or cast oversize and subsequently machined to 0.250 inch (6.35 mm) diameter at the reduced parallel gage section.

3.4.4.2 When integrally-cast specimens and specimens machined from a casting are specified, specimen size and location shall be agreed upon by purchaser and vendor.

3.5 Properties

Conformance shall be based upon testing of integrally-cast specimens unless purchaser specifies specimens machined from a casting.

3.5.1 Room Temperature Tensile Properties

Shall be as specified in Table 2, determined in accordance with ASTM E 8. Properties other than those listed may be defined as specified in AMS 2360.

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	35.0 ksi (241 MPa)
Yield Strength at 0.2% Offset	25.0 ksi (172 MPa)
Elongation in 2 Inches (50.8 mm), min	1%

3.6 Quality

3.6.1 Castings, as received by purchaser, shall be uniform in quality and condition. Castings shall, to the extent defined in subsequent paragraphs or in supplemental standards specified by purchaser, be free from porosity, foreign materials, and imperfections detrimental to their performance. Castings shall be free of cracks, laps, hot tears, and cold shuts, and free of scale and other surface contamination which would obscure defects.

3.6.2 Castings shall be produced under radiographic control. This control shall consist of radiographic examination of each casting part number until foundry manufacturing controls in accordance with 4.4.2 have been established. Additional radiography shall be conducted in accordance with the frequency of inspection specified by purchaser, or as necessary to ensure continued maintenance of internal quality.

3.6.2.1 Radiographic inspection shall be conducted in accordance with ASTM E 1742 or other method specified by purchaser.

3.6.3 When specified, additional nondestructive testing shall be performed as follows:

3.6.3.1 Fluorescent penetrant inspection in accordance with ASTM E 1417 or other method specified by purchaser.

3.6.4 Acceptance standards for radiographic, fluorescent penetrant, visual, and other inspection methods shall be agreed upon by purchaser and vendor. AMS 2175 may be used to specify acceptance standards (casting grade) and frequency of inspection (casting class). If ASTM E 155 is used as an acceptance standard, the use of supplemental plates as agreed upon by purchaser and vendor is required to control discontinuities unique to beryllium-aluminum eutectic alloys.

3.6.5 Castings shall not be peened, plugged, impregnated, or welded unless authorized by purchaser.

3.6.5.1 When authorized by purchaser, welding in accordance with AMS 2694 or other welding program acceptable to purchaser may be used.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor'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 castings conform to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), tensile properties (3.5.1), and quality (3.6) are acceptance tests and shall be performed as specified in 4.3.

4.2.2 Periodic Tests

Radiographic soundness (3.6.2) is a periodic test and shall be performed at a frequency selected by vendor, unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests

All technical requirements are preproduction tests and shall be performed on specimens or sample castings (4.2.3), when a change in control factors occurs (4.4.2.2), or when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing

The minimum testing performed by vendor shall be in accordance with the following:

4.3.1 One chemical analysis specimen or a casting from each master heat shall be tested for conformance with Table 1; if 3.4.2.1 applies, test frequency shall be acceptable to purchaser.

4.3.2 One preproduction casting in accordance with 4.4 shall be tested to the requirements of the casting drawing and to all applicable technical requirements.

4.3.2.1 Dimensional inspection sample quantity shall be as specified by purchaser.

4.3.3 Tensile tests shall be conducted to determine conformance with Table 2. Sampling and test frequency is dependent upon the type and origin of specimen specified by purchaser (See 3.4.4) or selected by vendor (See 4.3.3.4). When 3.4.2.1 applies, test frequency shall be acceptable to purchaser.

4.3.3.1 For separately-cast specimens, at least one specimen from each master heat shall be tested for conformance to properties specified by purchaser.

4.3.3.2 For integrally-cast specimens, at least two specimens from each master heat shall be randomly selected and tested to 3.5.1.1.

4.3.3.3 For specimens machined from a casting, at least one casting shall be randomly selected from each master heat and tested at each location shown on the engineering drawing to 3.5.1.2.

4.3.3.3.1 When size and location of specimens are not shown, at least two test specimens shall be tested, one from the thickest section and one from the thinnest section. Once established under 4.4.2.2, test locations may be changed only as agreed upon by purchaser and vendor.

4.3.3.4 When acceptable to purchaser, specimens machined from a casting may be used in lieu of both separately-cast and integrally-cast specimens, and integrally-cast specimens may be used in lieu of separately-cast specimens. In each case, the resultant properties shall conform to the requirements of 3.5.1 or to alternative requirements specified by purchaser.

4.3.3.4.1 When specimens are selected for test as in 4.3.3.4 from an origin other than that specified by purchaser, vendor shall include in the report of 4.5 a description of the origin of the specimen that was tested.

4.3.3.5 When casting size, section thickness, gating method, or other factors do not permit conformance with 4.3.3.2 or 4.3.3.3, sampling, testing, and properties shall be agreed upon by purchaser and vendor.

4.3.4 Castings shall be inspected in accordance with 3.6 to the methods, frequency, and acceptance standards specified by purchaser.

4.4 Approval

4.4.1 Sample casting(s) from new or reworked tooling (i.e., patterns, molds, dies, etc.) and the casting procedure of 4.4.2 shall be approved by purchaser before castings for production use are supplied, unless such approval is waived by purchaser.

4.4.2 For each casting part number, vendor shall establish parameters for process control factors that will consistently produce castings and test specimens meeting the requirements of the casting drawing and this specification. These parameters shall constitute the approved casting procedure and shall be used for production of subsequent castings and test specimens. If necessary to make any change to these parameters, vendor shall submit a statement of the proposed change for purchaser reapproval. When requested, vendor shall also submit test specimens, sample castings, or both to purchaser for reapproval.

4.4.2.1 Production castings produced prior to receipt of purchaser's approval shall be at vendor's risk.