

## AIBeCast® Aerospace Material Specification

Effective: June 4, 2018

Revision A

### 1.0 SCOPE

#### 1.1 Form

This specification defines material requirements for **AIBeCast® 910**, **AIBeCast® 920** investment castings, produced for Aerospace compliant hardware.

**1.1.1** Cast products produced from rapid prototype manufacturing methods and commercial grade castings are not covered by this procedure. For rapid prototype manufacturing, reference Materion Inc. document **AIBeCast®** Prototype Material Specification. For commercial casting manufacturing, reference Materion Inc. document **AIBeCast®** Commercial Material Specification.

#### 1.2 Safety / Environmental

Handling Beryllium Containing Material in solid form poses no special health risk. Like many industrial materials, beryllium-containing materials may pose a health risk if recommended safe handling practices are not followed. Inhalation of airborne beryllium may cause a serious lung disorder in susceptible individuals. The Occupational Safety and Health Administration (OSHA) has set mandatory limits on occupational respiratory exposures. Read and follow the guidance in the Safety Data Sheet (SDS) before working with this material. For additional information on safe handling practices or technical data on Beryllium Containing Material, contact Materion Inc. EH&S Hotline @ USA: 800-862-4118, International: 216-383-4019.

### 2.0 APPLICABLE DOCUMENTS

The following documents form part of this specification to the extent specified herein. The applicable issue of these documents shall be the issue in effect on the date of the purchase order.

#### 2.1 Government

MIL-STD-129 Marking for Shipment and Storage

#### 2.2 ASTM Publications

ASTM E8 Standard Test Methods for Tension Testing of Metallic Materials  
ASTM E155 Standard Reference Radiographs for Inspection of Aluminum and Magnesium Castings  
ASTM E1417 Standard Practice for Liquid Penetrant Examination  
ASTM E1742 Standard Practice for Radiographic Examination

#### 2.3 SAE Publications

AMS 2175 Castings, Classification and Inspection of

## 2.4 Materion Inc. Documents

Radiographic Specification for Al-Be Castings

BW-ELM-IN-3523 Method A for Liquid Penetrant Testing

BW-ELM-IN-0255 Method B for Liquid Penetrant Testing

BW-ELM-XR-3369 Computed Radiographic Testing

BW-ELM-IC-3439 Straightening and Weld Repair of Investment Castings

Safety Data Sheet (SDS) for the beryllium containing material being used or produced.

## 2.5 Definitions

Casting: The resulting metal hardware from a melt.

Melt: A single batch of molten metal on which all processing has been completed to yield a lot

Lot: All castings poured from a single melt.

## 3.0 TECHNICAL REQUIREMENTS

### 3.1 Material Requirements

#### 3.1.1 Composition

**AIBeCast®** material shall conform to the percentages by weight, unless otherwise stated, shown in Table 1.

**TABLE 1**  
**Composition**

Element	Alloy 910		Alloy 920	
	Min.	Max.	Min.	Max.
Beryllium	56.0	68.0	61.1	68.6
Aluminum (3.1.1.1)	Bal.	Bal.	Bal.	Bal.
Nickel	2.4	3.5	N/A	2000 ppm
Silicon	N/A	2000 ppm	N/A	2000 ppm
Silver	N/A	2000 ppm	2.65	3.35
Cobalt	N/A	2000 ppm	0.65	1.35
Germanium	N/A	2000 ppm	0.55	0.95
Iron	N/A	4500 ppm	N/A	4500 ppm

#### 3.1.1.1 Aluminum content by balance

#### 3.1.2 Properties

**AIBeCast®** material shall conform to the mechanical properties shown in Table 2, determined by testing in accordance with ASTM E-8.

**TABLE 2**  
**Minimum Ambient Temperature Tensile Properties of**  
**Integrally and Separately Cast Test Specimens**

Alloy	910	920
Ultimate Tensile Strength (ksi)	26.0	35.0
0.2% Offset Yield Strength (ksi)	18.0	28.0
% Elongation	2.0	2.5

- 3.1.2.1 All test specimens, whether integrally cast or sacrificially machined, shall be from the same lot of material.
- 3.1.2.2 As requested by the purchase order (contract), all test specimens shall undergo the same post cast condition processing (heat treat, stress relief, etc.) as the castings they represent.

**3.2 Casting Requirements**

- 3.2.1 Castings, as received by purchaser, as a minimum, shall meet the requirements of this specification.
- 3.2.2 Radiographic inspection shall be performed in accordance with Radiographic Testing Procedure BW-ELM-XR-3369.
- 3.2.3 The radiographic acceptance standard for areas not otherwise specified shall be Grade D as defined per Radiographic Specification for Al-Be Castings
- 3.2.4 Castings shall be subject to fluorescent penetrant inspection in accordance with Liquid Penetrant Testing, per BW-ELM-IN-3523 or BW-ELM-IN-0255 unless otherwise specified. Liquid Penetrant Testing shall be Type I, Method A or B, at a sensitivity level of 2, unless otherwise specified. Developer form is optional.
- 3.2.5 The penetrant acceptance standard shall be AMS 2175, Grade D, unless otherwise specified.
- 3.2.6 Castings may be repaired by welding in accordance with BW-ELM-IC-3439, when not restricted by the customer.
- 3.2.7 Castings may be straightened in accordance with BW-ELM-IC-3439, when not restricted by the customer.

**4.0 QUALITY ASSURANCE PROVISIONS**

- 4.1 Materion Inc. shall be responsible for coordinating all acceptance testing unless otherwise specified.
- 4.2 Acceptance Tests: Tests for composition, tensile properties, radiography, and liquid penetrant shall be performed in accordance with Table 3 on each casting, melt, or lot as applicable per paragraph 4.3.

**TABLE 3  
Test Specifications**

Test	Specification(s)
Tensile	ASTM E8
Radiography	Radiographic Testing, Reference Radiographs for AlBeCast Castings (ASTM E155, ASTM E1742, AMS 2175)
Fluorescent Penetrant	Liquid penetrant Testing (ASTM E1417, AMS 2175)
Chemical Composition	Table 1 of this document

Specifications contained within parentheses are referenced within the governing specification.

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**4.3** The minimum sampling requirements shall be in accordance with the following:

**4.3.1** One chemical analysis specimen in accordance with paragraph 3.1.1 from each melt.

**4.3.2** One tensile test shall be performed in accordance with 3.1.2 on each lot.

**4.3.3** Radiographic and fluorescent penetrant testing shall provide full coverage of every casting, unless otherwise specified by the customer.

**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 casting by serial number and stating that the product conforms to the other technical requirements. These reports shall include the purchase order number, lot number, specification number, part number, and quantity.

## **5.0 PREPARATION FOR DELIVERY**

**5.1** Part Identification shall be in accordance with MIL-STD-129.

**5.1.1** All parts from a casting shall be identified with a part number and a serial number.

**5.2** Packaging: Castings 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 casting to ensure carrier acceptance and safe delivery.

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