

NATIONAL STOCKPILE
PURCHASE SPECIFICATION
FOR
BERYLLIUM METAL

P-110
June 1, 1964

1. DESCRIPTION

This specification covers vacuum cast beryllium metal produced by means of the magnesium reduction of beryllium fluoride or the electrolytic reduction of beryllium chloride and the subsequent vacuum casting of the resulting beryllium metal into billets. Billet metal must be derived exclusively from virgin metal: beryllium metal scrap shall not be used in production of metal under this specification.

2. CHEMICAL, IMPURITY COEFFICIENT, AND PHYSICAL REQUIREMENTS

All beryllium metal purchased under this specification shall be in lots of ten billets and shall conform to the following chemical, impurity concentration, and physical requirements.

a. Chemical and Impurity Coefficient Requirements:

I. Each billet shall conform to the following chemical and impurity coefficient requirements:

		Grade A	
		Percent	1/ Impurity
		(By Weight)	Coefficient
Beryllium (By Assay)	(Be)	Min. 99.0	-
Beryllium Oxide plus Beryllium Nitride	(BeO+Be ₃ N ₂)	Max. 1.0	-
Aluminum	(Al)	Max. 0.14	7.7
Iron	(Fe)	Max. 0.13	41.
Carbon Total	(C)	Max. 0.12	-
Magnesium	(Mg)	Max. 0.12	2.2
Titanium	(Ti)	Max. 0.05	-
Nickel	(Ni)	Max. 0.04	71.
Chromium	(Cr)	Max. 0.03	49.
Manganese	(Mn)	Max. 0.02	217.
Sodium	(Na)	Max. 0.02	-
Lithium	(Li)	Max. 0.0003	9,200.
Cadmium	(Cd)	Max. 0.0002	24,000.
Boron	(B)	Max. 0.00020	62,900.

1/ The total impurity concentration (TIC) is the sum of the products of the percent by weight of each element and its corresponding impurity coefficient. The TIC for the elements listed above with an impurity coefficient shall not exceed 24.0.

II. A composite sample of ten billets whose content is proportionate to the weight of each billet shall conform to the following chemical requirements:

			Percent (By Weight)
Beryllium Oxide	(BeO)	Maximum	1/ 0.5
Iron	(Fe)	Maximum	1/ 0.11
Carbon	(C)	Maximum	1/ 0.10
Aluminum	(Al)	Maximum	1/ 0.08
Magnesium	(Mg)	Maximum	1/ 0.07
Silicon	(Si)	Maximum	0.06
Nitrogen	(N)	Maximum	0.03
Calcium	(Ca)	Maximum	0.02
Zinc	(Zn)	Maximum	0.02
Copper	(Cu)	Maximum	0.015
Chlorine	(Cl)	Maximum	0.005
Fluorine	(F)	Maximum	0.005
Lead	(Pb)	Maximum	0.002
Molybdenum	(Mo)	Maximum	0.002
Silver	(Ag)	Maximum	0.001
Cobalt	(Co)	Maximum	0.0005

1/ The percentages for these elements may be computed as a weighted average of the results of the tests in Section a. I. above.

Any metallic impurity not listed above shall not exceed 0.04 percent by weight.

The total of the following impurities in the composite sample shall not exceed 0.15 percent by weight: cobalt, nickel, copper, germanium, strontium, zirconium, molybdenum, silver, tin, barium, hafnium, tantalum, tungsten, gold, thallium, lead, thorium, uranium, gallium, and columbium.

The seller shall meet the (a) minimum assay limit for beryllium and (b) maximum impurity limits for all other items listed in Section 2. a. I. and II. of this specification.

b. Physical Requirements:

All beryllium metal shall be in the form of cylindrical vacuum cast billets nominally nine inches in diameter (not more than nine and one-half inches nor less than seven and one-half inches) and nominally eighteen inches in length (not more than twenty inches nor less than seventeen inches). The top surface shall not extend beyond the cylindrical surface of the billet (cauliflower head). Billets shall be cropped to remove the slag top. The top surface of the billet shall be parallel with the bottom surface (maximum allowable slope one inch from the horizontal). All surfaces of each billet shall be cleaned by mechanical or chemical methods to leave the surface of the billet free of slag, carbides, etc. Before adopting a technique it must be shown by the seller that the treatment used does not alter the chemical composition of the surface so that a sample taken from the treated surface will fail to meet the chemical requirements set forth in section 2.a.I. above. In the case of chemical treatment particular care must be taken to avoid the entrapment of reagents in cracks, fissures,

3. PACKAGING, MARKING, AND SHIPPING

a. Packaging:

Each beryllium billet shall be placed in a polyethylene bag not less than 0.004-inch in thickness which shall be heat sealed.

Each lot of ten beryllium billets shall be packed in one, or five billets each in two, new wooden boxes which shall be equal to the requirements for Style B, Type III, Federal Specification PPP-B-601a: Boxes, Wood, Cleated-plywood, except the plywood shall be not less than 1/2-inch thick and 2" x 4" material shall be used for the skids.

The boxes should not exceed approximately 500 pounds gross weight but may be somewhat heavier when it is possible to pack a lot of ten small billets in one box. Sufficient cushioning or internal bracing shall be used to prevent shifting of the billets in a box. Each box shall be strapped with five steel bands, three crosswise and two lengthwise. The bands shall be not less than 3/4-inch wide and 0.020-inch thick. All boxes under the same contract shall be of the same nominal size and shape.

b. Marking:

Each billet shall have the manufacturer's identification, Mg for magnesium reduced, or E for electrolytic reduced metal, and billet serial number stamped on one end. Letter A shall also be stamped on the billet end to indicate the grade.

One side and one end of each box shall be permanently and legibly marked with capital letters. The letters shall be not less than 3/4-inch and of equal height. The marking shall include the following:

Name and Type of Product (Type: Magnesium Reduced or Electrolytic
Reduced Beryllium Metal)

Identification as Grade A

Name of Producer

Gross and Net Weights

Government Contract Number

Manufacturers Lot Number

Box Serial Number (Box 1/1 or 1/2, 2/2)

Handle with Care

Appropriate identifying documents shall accompany each shipment which shall include a cross-reference between the manufacturers lot numbers and the serial numbers of the billets in each lot.

c. Reporting:

As an enclosure with each shipment the seller shall include material certifications in duplicate reporting complete results of all tests. Two additional sets of the materials certifications shall also be

d. Shipping:

Boxes containing beryllium billets shall be loaded and braced in a manner satisfactory to the carrier concerned.

4. SAMPLING, INSPECTION, AND TESTING

Each billet of beryllium metal shall be subject to sampling, inspection, and testing by the purchaser or his designee.