



## Product Specification Sheet EPS-8001

### Berlox<sup>®</sup> Ceramic Product

#### 1.0 Scope

- 1.1 This specification establishes typical property values and quality which can be expected from beryllium oxide ceramics with the trade name BERLOX<sup>®</sup> manufactured by American Beryllia Inc.

#### 2.0 General Provisions

- 2.1 A customer's specification can supersede this document only if the customer's specification is approved through the Sales Department of American Beryllia Inc.
- 2.2 Unless superseded by approved customer specification, inspection will be performed in accordance with MIL-STD-105, General Level II, 2.5 AQL (non-cumulative).
- 2.3 The typical property values listed in Section 6.0, Typical Material Properties of BERLOX<sup>®</sup>, for reference only as they were obtained from test specimens and not from the specific type of part to be shipped.

#### 3.0 Applicable Documents

- 3.1 ASTM Standards, Part I through 31, Annual Books of ASTM Standards
- 3.2 MIL-STD-105, Sampling Procedures and Tables for Inspection by Attributes.
- 3.3 MIL-1-10B Insulating Materials, Electrical, Ceramic.

#### 4.0 Test Conditions

- 4.1 All physical, mechanical, and electrical test conditions are performed at 25°±5°C, except where noted, and in conformance with acceptable methods as described within referenced test method.

#### 5.0 Chemical Composition

- 5.1 When reference is made to chemical composition or purity, percentage purity will be defined as one hundred percent minus the percentage of total metallic impurity.
- 5.2 Typical Chemical Analysis of BERLOX<sup>®</sup>.

#### Beryllium Oxide 99.5%

<u>Metallic Impurity</u>	<u>Average PPM</u>	<u>Metallic Impurity</u>	<u>Average PPM</u>
Ag	1	Li	2
Al	100	Mg	1000
B	2	Mn	5
Ca	50	Ma	2
Co	1	Na	20
Cr	10	Ni	5
Cu	5	Pb	1
Fe	35	Si	1700
K	30	Ti	10
		Zn	10

## 6.0 Typical Properties of Berlox<sup>®</sup>

<u>Material Property</u>	<u>Qualified Value</u>	<u>Test Method</u>
6.1 Thermal Conductivity	265 W/M °	ASTM-C408
6.2 Specific Heat	0.25 cal/°C gm. (.25° C)	ASTM-C351
6.3 Thermal Expansion	8.0 x 10 <sup>-6</sup> in/in° C (25° to 1000° C)	ASTM-C539
6.4 Density	2.85 gm/cc, min.	ASTM-C373
6.5 Hardness	60 on Rockwell 45N	ASTM-E18
6.6 Permeability, Liquid	Impervious	ASTM-D116
6.7 Permeability, Gas	Impervious	ASTM-D116 Helium Detecting Mass Spectrograph Test At 10 <sup>-8</sup> atm.cc/sec.
6.8 Average Grain Size	20 microns	Linear intercept with factor 1.27
6.9 Flexural Strength	35,000 psi - 242 MPa	ASTM-D2442
6.10 Tensile Strength	20,000 psi - 138 MPa	ASTM-D651
6.11 Compressive Strength	225,000 psi - 1.55 GPa	ASTM-C773
6.12 Young's Modulus	5 x 10 <sup>6</sup> psi - 345 GPa	ASTM-C623
6.13 Shear Modulus	25 x 10 <sup>5</sup> psi - 173 GPa	ASTM-C623
6.14 Poisson's Ratio	0.26	ASTM-C623
6.15 Dielectric Constant	6.6 at 1 MHz 6.7 at 10 MHz	ASTM-D150 ASTM-D2520
6.16 Dissipation Factor	.0003 at 2 MHz .0009 at 10 MHz	ASTM-D150 ASTM-D2520
6.17 Resistivity	10 <sup>15</sup> ohm-cm	ASTM-D257
6.18 Dielectric Strength	300 volts/mil (1/8" thick)	ASTM-D149
6.19 Color	White	Visual
6.20 Impact Resistance	6 in. -lbs.	ASTM-D256-R83
6.21 Maximum Use Temperature	1800°C	
6.22 Surface Finish; As Fired	10-20 micro-inch	Dektak II
As Lapped	5 micro-inches, min.	Dektak II
As Ground	To customer spec.	Dektak II

## 7.0 Specification Conformance

- 7.1 Berlox<sup>®</sup> beryllia ceramic will conform to Type III Requirement — Beryllia Ceramics for Electronics and Electrical Applications ASTM-F356.
- 7.2 Berlox<sup>®</sup> beryllia ceramic was tested and found to conform to L824-X7/02C classification in accordance with MIL-I-10B.

## 8.0 Tolerances

- 8.1 Unless otherwise specified, tolerances for length, width, diameter, thickness, hole diameter and hole location will be ± .005 inch or ± 1% of total dimension, whichever is greater.
- 8.2 Unless otherwise specified, the tolerance for angular dimensions will be ±2.
- 8.3 Unless otherwise specified, the maximum value for the total indicator reading of ellipticity and concentricity will be .010 inch or 1 % of outside diameter, whichever is greater.
- 8.4 Unless otherwise specified, the maximum acceptable for flatness, parallelism and camber will be .004 inch/inch total, but no less than .002 inch/total length.

## Visual Defects 9.0

- 9.1 Unless otherwise specified, visual requirements shall conform to those stated in section 6.3 ASTM-F356 Beryllia Ceramics for Electronic and Electrical Applications.