



Product Specification Sheet EPS-8001

Berlox[®] 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[®] 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- 2.2 Unless superseded by approved customer specification, inspection will be performed in accordance with MIL-STD-105, General Level II, 2.5 AQL (non-cumulative).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, are 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[®].

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[®]

<u>Material Property</u>	<u>Qualified Value</u>	<u>Test Method</u>
6.1 Thermal Conductivity	265 W/M °K	ASTM-C408
6.2 Specific Heat	0.25 cal/°C gm. (25° C)	ASTM-C351
6.3 Thermal Expansion	8.0 x 10 ⁻⁶ 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 Set At 10 ⁻⁸ 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	50 x 10 ⁶ psi - 345 GPa	ASTM-C623
6.13 Shear Modulus	25 x 10 ⁶ 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 GHz	ASTM-D150 ASTM-D2520
6.16 Dissipation Factor	.0003 at 2 MHz .0009 at 10 GHz	ASTM-D150 ASTM-D2520
6.17 Resistivity	10 ¹⁵ 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[®] beryllia ceramic will conform to Type III Requirement — Beryllia Ceramics for Electronics and Electrical Applications ASTM-F356.
- 7.2 Berlox[®] beryllia ceramic was tested and found to conform to L824-X7/07C 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 value 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.