

## Materion E40 Beryllium/BeO Composite, 40 Volume% BeO

Category : Metal , Metal Matrix Composite , Nonferrous Metal , Beryllium Alloy

### Material Notes:

Metal matrix composite made up principally of beryllium and crystal BeO platelets. Produced by blending the beryllium and beryllium oxide powders into a homogeneous mixture to create isotropic properties. This mix is hot isostatically pressed (HIP'd) into fully dense blocks for further processing into finished blanks and subsequent machining into components. These materials are used in electronic packaging heat sinks for MCM-L, SEM-E, BGA's, and RF/Microwave applications. The CTE can be controlled by varying the BeO content to match with die materials like GaAs or silicon in RF/microwave applications or match AuSn or AuGe over brazing/soldering temperatures, Kovar, Alloy 46 or 48, and other packaging materials. Can be machined by conventional processes. Corrosion resistance similar to aluminum. For protection in severe environments such as salt fog, the composite may be coated in a number of ways such as electroless or electrolytic nickel plating, chrome plating, and gold or silver plating for brazing or soldering operations. Please note that there are health hazards associated with beryllium, especially when present as airborne particles generated during processing. As with any material, be aware of hazards and take steps to reduce exposure to a safe level. Information provided by Brush Wellman. Brush Engineered Materials Inc. changed its name to Materion Corporation in March 2011.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Materion-E40-BerylliumBeO-Composite-40-Volume-BeO.php](http://www.lookpolymers.com/polymer_Materion-E40-BerylliumBeO-Composite-40-Volume-BeO.php)

Physical Properties	Metric	English	Comments
Density	2.30 g/cc	0.0831 lb/in <sup>3</sup>	2.3 g/cc Average. Minimum bulk density is 2.277 g/cc.

Mechanical Properties	Metric	English	Comments
Modulus of Elasticity	>= 317 GPa	>= 46000 ksi	Typical minimum.
Fracture Toughness	10.7 MPa-m <sup>1/2</sup>	9.74 ksi-in <sup>1/2</sup>	Average K <sub>IC</sub> .

Thermal Properties	Metric	English	Comments
CTE, linear	8.00 - 9.50 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	4.44 - 5.28 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 25.0 - 100 $\text{Å}^\circ\text{C}$	@Temperature 77.0 - 212 $\text{Å}^\circ\text{F}$	
	10.1 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	5.61 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	upon cooling
	@Temperature 250 $\text{Å}^\circ\text{C}$	@Temperature 482 $\text{Å}^\circ\text{F}$	
	10.4 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	5.78 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	upon cooling
	@Temperature 500 $\text{Å}^\circ\text{C}$	@Temperature 932 $\text{Å}^\circ\text{F}$	
	13.8 $\mu\text{m/m}\cdot\text{Å}^\circ\text{C}$	7.67 $\mu\text{in/in}\cdot\text{Å}^\circ\text{F}$	
	@Temperature 1000 $\text{Å}^\circ\text{C}$	@Temperature 1830 $\text{Å}^\circ\text{F}$	
Specific Heat Capacity	1.407 J/g- $\text{Å}^\circ\text{C}$	0.3363 BTU/lb- $\text{Å}^\circ\text{F}$	

Thermal Properties	Metric	English	Comments
Thermal Conductivity	$\geq 205 \text{ W/m-K}$	$\geq 420 \text{ BTU-in/hr-ft}^2\text{-}^{\circ}\text{F}$	Minimum
	220 W/m-K	1530 BTU-in/hr-ft <sup>2</sup> - <sup>o</sup> F	Typical

Component Elements Properties	Metric	English	Comments
BeO	49.5 - 54.8 %	49.5 - 54.8 %	
Beryllium, Be	64.94 - 68.33 %	64.94 - 68.33 %	as remainder; includes content from BeO
Oxygen, O	31.67 - 35.06 %	31.67 - 35.06 %	

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