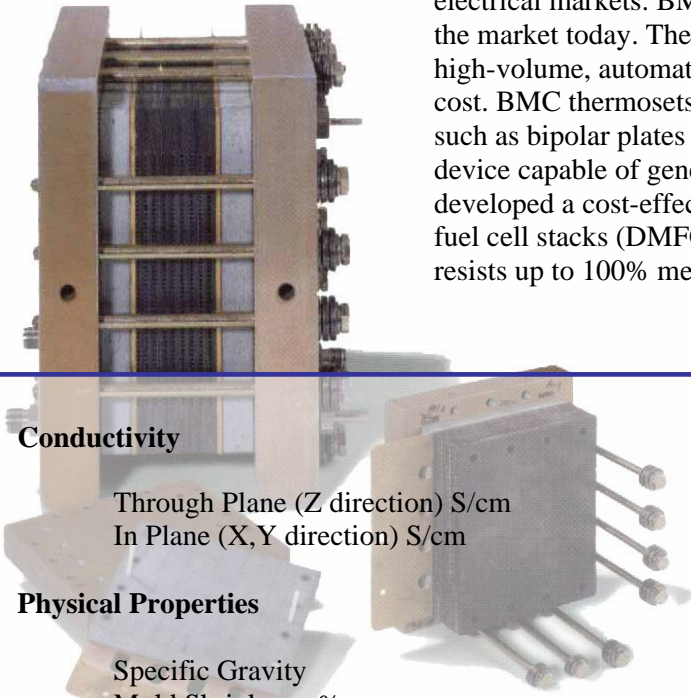


BMC 940 Vinyl Ester Bipolar Plate Material

COMPRESSION MOLDING GRADE

Product Introduction

Bulk Molding Compounds, Inc. is the largest manufacturer of thermoset bulk molding compounds in North America, serving the automotive, appliance, and electrical markets. BMC thermosets are the most cost-effective plastic products on the market today. The process of manufacturing BMC thermosets is geared toward high-volume, automated systems to ensure the highest quality at the lowest possible cost. BMC thermosets can be designed to conduct electricity for use in applications such as bipolar plates that are used in fuel cells. A fuel cell is an electro-chemical device capable of generating electricity from oxygen and hydrogen. BMC has developed a cost-effective product for use in bipolar plates within direct methanol fuel cell stacks (DMFC). This material utilizes a special vinyl ester resin that is resists up to 100% methanol immersion at 65°C.



Preliminary Technical Data

	<u>BMC 940-14868</u>	<u>Test Method</u>
Conductivity		
Through Plane (Z direction) S/cm	32	Vendor
In Plane (X,Y direction) S/cm	70	Vendor
Physical Properties		
Specific Gravity	1.89	ASTM D792
Mold Shrinkage, %	0.08	ASTM D955
Water Absorption – 24 hr/23°C, %	<0.06	ASTM D570
Flowability, cm ²	270	Vendor
Tensile Strength, MPa	28	ASTM D638
Tensile Modulus, GPa	9.5	ASTM D638
Flexural Strength, MPa	38	ASTM D790
% Retention after 2250 hr @ 50% MeOH reflux	>90	ASTM D790
% Retention after 2250 hr @ 100% MeOH reflux	>80	ASTM D790
Flexural Modulus, GPa	10.5	ASTM D790
Izod Impact, unnotched, N-M/cm	0.15	ASTM D256
Instrumented Impact, 23°C		ASTM D3763
Max Load, lbs.	TBD	
Total energy, ft-lb	TBD	
Energy to Max Load, ft-lb	TBD	
Compressive Creep		ASTM D2990
200 hr @ 80°C, %	TBD	
1000 hr @ 80°C, %	TBD	



	<u>Value</u>	<u>Test Method</u>
Thermal		
DMA-Modulus, GPa @		
25°C	13.8	ASTM D4065
100°C	9.6	
150°C	6.8	
175°C	5.4	
200°C	3.1	
Glass Transition Temp (T _g), °C	189	
Flammability (@ 0.140" thickness)	94V0	UL94
Thermal Expansion, μm/m °C	TBD	E831
Thermal Conductivity @ 25°C		
Specific Heat, J/g-K	0.846	E1461-92
Diffusivity, cm ² /s	0.0889	
Conductivity, W/m-K	13.4	
Processing Information		
Cure time	30-60 seconds	
Mold temperature	300°-320°F	
Recommended tonnage	> 40 MPa on projected part area	
Press close speed	<2 seconds after material begins flowing	
Post bake, 350°F	15 minutes (after reaching 350°F)	

Important Notice:

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