

BMC 940-13905

Bulk Molding Compound

PRODUCT DESCRIPTION

Vinyl ester BMC suitable for stationary fuel cells. This material was specifically formulated to mold bipolar plates for use in electro-chemical devices capable of generating electricity from oxygen and hydrogen.

GENERAL

| | | | |
|-----------------------------|--|----------------------------------|------------------|
| Material Status | • Commercial: Active | | |
| Availability | • North America • Asia Pacific | • Europe • South America | |
| Filler/Reinforcement | • Conductive fiber and conductive filler | | |
| Features | • High conductivity | • Excellent corrosion resistance | • Cost effective |
| Resin | • Vinyl ester Composite | | |

Processing Method

| | | |
|--|---------|--|
| Mold Temperature | 380-400 | F |
| Cure Time (<3.0mm thick) | 30-60 | Seconds |
| Recommend Press Tonnage | 3-4 | Tons/in ² on Projected Area |
| Final Press Closure Speed (Start of material flow to close) | 1-3 | Seconds |
| Time to Full Press Tonnage (Close to full tonnage) | <1.0 | Second |

| PHYSICAL | Typical | Unit | Test Method |
|---|-----------------|-------------------|--------------------|
| Density | 1.80-1.84 | g/cm ³ | ASTM D792 |
| Mold Shrinkage (RT mold/RT part) | 0.00054-0.00083 | in/in | ASTM D955 |
| Water Absorption, 24 hrs, 23°C | <0.10 | % | ASTM D570 |
| CLTE, X-Y plane | 30 | ppm/°C | ASTM E831 |
| Poisson's Ratio | 0.32 | | ASTM D638 |

BMC 940-13905

Bulk Molding Compound

| MECHANICAL (As molded) | Typical | Unit | Test Method |
|----------------------------|-------------------------------|-----------|-------------|
| Tensile Modulus | 1.6 x 10 ⁶ (11) | psi (GPa) | ASTM D638 |
| Tensile Strength | 4,350 (30) | psi (MPa) | ASTM D638 |
| Flexural Modulus (RT) | 1.5 x 10 ⁶ (10.35) | psi (GPa) | ASTM D790 |
| Flexural Strength | 5,800 (40) | psi (MPa) | ASTM D790 |
| Compressive Strength | 11,000 (75) | psi (MPa) | ASTM D695 |
| Compressive Creep, 200 psi | | | ASTM D2990 |
| 200 hr at 80°C | 0.025 | % | |
| 1000 hr at 80°C | 0.040 | % | |

| IMPACT | Typical | Unit | Test Method |
|-----------------------------|------------|----------------|-------------|
| Unnotched Impact Strength | 0.16 (8.5) | ft-lb/in (J/m) | ASTM D4812 |
| Instrumented Impact at 23°C | | | ASTM D3763 |
| Max Load | 752 | N | |
| Total Energy | 3.57 | N-M | |
| Energy to Max Load | 0.75 | N-M | |

| THERMAL | Typical | Unit | Test Method |
|---------------------------------|-------------|--------------------|-------------|
| Glass Transition T _g | 392 (200) | °F (°C) | ASTM D4065 |
| Thermal Conductivity, 25°C | | W/m-°K | ASTM E1461 |
| In Plane/Through Plane at 25°C | 46.2/19.2 | | |
| In Plane/Through Plane at 85°C | 43.7/18.5 | | |
| Diffusivity | | cm ² /s | ASTM E1461 |
| In Plane/Through Plane at 25°C | 0.302/0.125 | | |
| In Plane/Through Plane at 85°C | 0.231/0.098 | | |
| Specific Heat Capacity | | J/kg-K | ASTM E1461 |
| At 25°C | 0.841 | | |
| At 85°C | 1.04 | | |

BMC 940-13905

Bulk Molding Compound

| ELECTRICAL | Typical | Unit | Test Method |
|-----------------------------|----------------|-------------|--------------------|
| Conductivity | | | Vendor |
| Through Plane (Z direction) | 50 | S/cm | |
| In Plane (X, Y direction) | 100 | S/cm | |

| Typical Process Settings | | | |
|--|---------|--|--|
| Mold Temperature | 380-400 | F | |
| Cure Time (<3.0mm thick) | 30-60 | Seconds | |
| Recommend Press Tonnage | 3-4 | Tons/in ² on Projected Area | |
| Final Press Closure Speed (Start of material flow to close) | 1-3 | Seconds | |
| Time to Full Press Tonnage (Close to full tonnage) | <1.0 | Second | |
| Post Bake Temperature | 180-200 | C | |
| Post Bake Time at Temperature | >20 | Minutes | |

For additional information, please contact:

A. Schulman Inc., Engineered Composites
1600 Powis Ct, West Chicago, IL 60185
p: 630-377-1065
f: 630-377-7395
www.aschulman.com

The information and recommendations contained in this document are based upon data collected by A. Schulman and are believed to be reliable; however, because A. Schulman cannot anticipate or control the many different conditions under which this information and/or product may be used, no representation is made and no warranty is given of any kind, express or implied, for completeness, accuracy, availability, suitability, usefulness, commercial value, or non-violation of intellectual property rights of information, recommendation, and products and services directly or indirectly provided. A. Schulman assumes no responsibility for the results of the use of products and processes described herein and expressly disclaims the implied warranties of merchantability and fitness for a particular use.