Starting Formulation

SF 7010
Flexible Electrical Potting Compound
EPON™ Resin 828

Introduction

This general purpose electrical potting compound illustrates the use of polyethylene glycol to improve flexibility with minimal sacrifices in mechanical, thermal and electrical properties. The converter presented is a eutectic mixture of hexahydrophthalic anhydride and chlorendic anhydride which provides easier processing than solid anhydrides such as phthalic.

Suggested Uses

- Molded parts such as sand-core boxes for foundry work, pipe fitting, cases, and housings
- Electrical insulation such as transformer bushings for interior service

<table>
<thead>
<tr>
<th>Formula</th>
<th>Material</th>
<th>Supplier</th>
<th>Pounds</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A</td>
<td>EPON Resin 828</td>
<td>Hexion</td>
<td>65.0</td>
<td>6.72</td>
</tr>
<tr>
<td></td>
<td>Carbowax 600</td>
<td>Union Carbide Corp.</td>
<td>35.0</td>
<td>3.73</td>
</tr>
<tr>
<td></td>
<td>Total Part A</td>
<td></td>
<td>100.0</td>
<td>10.45</td>
</tr>
<tr>
<td>Part B</td>
<td>Hexahydrophthalic Anhydride /</td>
<td>Anhydrides &amp; Chemicals, Inc.</td>
<td>75.00</td>
<td>6.06</td>
</tr>
<tr>
<td></td>
<td>Chlorendic Anhydride</td>
<td>Jonas Chemical Corp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DMP-10</td>
<td>Rohm &amp; Haas Co.</td>
<td>0.25</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Total Part B</td>
<td></td>
<td>75.25</td>
<td>6.09</td>
</tr>
</tbody>
</table>

Typical Handling

Table 1 / Handling and Reactivity Properties

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resin/Converter Combining Ratio</td>
<td>by weight</td>
<td>4 : 3</td>
</tr>
<tr>
<td></td>
<td>by volume</td>
<td>1.72 : 1</td>
</tr>
<tr>
<td>Viscosity at 25 °C</td>
<td>cP</td>
<td>2,600</td>
</tr>
<tr>
<td>Density</td>
<td>lbs/gal</td>
<td>10.6</td>
</tr>
<tr>
<td>Pot Life at 25 °C</td>
<td>hrs</td>
<td>1-2</td>
</tr>
</tbody>
</table>

Compounding

Resin Portion – Blend the Carbowax 600 and EPON Resin 828. If necessary, fillers such as silica or alumina may be incorporated into the resin portion.

Converter Portion – A blend of 70 parts hexahydrophthalic anhydride (HHPA) and 30 parts chlorendic anhydride should be heated to 82 °C and agitated until a clear solution is
Chlorendi anhydride should be heated to 82 °C and agitated until a clear solution is attained. Sparging with dry inert gas minimizes anhydride hydrolysis. This solution is stable indefinitely at room temperature.

Composite Blend – Add the HHPA chlorendic anhydride eutectic and DMP-10 to the resin portion and mix until a homogenous solution is attained.

**Application Instructions**

A typical cure schedule is 3 hours at 120 °C. Acceptable cures are also achieved overnight at 90 °C or in one hour at 150 °C. Large castings should be cured at the lowest temperature. Increasing or decreasing the amount of DMP-10 will shorten or lengthen, respectively, the time necessary for complete cure. Adjustments of the DMP-10 level will also affect the pot life.

The material to be potted is placed in the mold and heated to the cure temperature. The potting compound is then poured into the mold and vacuum deaired, if necessary, to eliminate voids. Silicone mold releases such as Dow-Corning Compound Number 7 are the most effective.

**Table 2 / Cured State Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>psi</td>
<td>7,200</td>
</tr>
<tr>
<td>Tensile Elongation at Break</td>
<td>%</td>
<td>8.7</td>
</tr>
<tr>
<td>Izod Impact, notch</td>
<td>ft•lbs/inch</td>
<td>0.51</td>
</tr>
<tr>
<td>Hardness</td>
<td>Shore D</td>
<td>80</td>
</tr>
<tr>
<td>Water Absorption, 24 hours</td>
<td>%</td>
<td>0.58</td>
</tr>
<tr>
<td>Weight Loss, after 24 hours at 150 °C</td>
<td>%</td>
<td>2.24</td>
</tr>
</tbody>
</table>

**Electrical Properties**

- **Dielectric Constant**
  - 2
  - Measured at 25 °C, 50% R.H. and 106 Hertz.

- **Dissipation Factor**
  - 0.027

- **Volume Resistivity**
  - at 25 °C
    - ohm•cm
    - $6.9 \times 10^{14}$
  - at 66 °C
    - ohm•cm
    - $1.2 \times 10^{12}$
  - at 92 °C
    - ohm•cm
    - $1.1 \times 10^{10}$

- **Surface Resistivity at 25 °C**
  - 5.42 x $10^{14}$

1 Cured for 3 hours at 120 °C.
2 Measured at 25 °C, 50% R.H. and 106 Hertz.
3 Measured at 50% R.H., 500 volts for 1 minute.

**Storage**

Recommendations regarding storage conditions can be obtained by visiting our web site at [www.hexion.com](http://www.hexion.com)

**General Information**

These are starting formulations and are not proven in the user’s particular application but are simply meant to demonstrate the efficacy of the products and to assist in the development of the user’s own formulation. It is the user’s responsibility to fully-test and qualify the formulation.

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