Starting Formulation

SF 4025

Dicyandimide One-Package Adhesive

EPON™ Resin 828 / Dicyandiamide

Introduction
This is general purpose, filled one-package epoxy adhesive especially suited for metal – metal bonding which will yield a shelf life of at least 6 months at 25°C (77°F).

Suggested Uses
- Cost sensitive applications where a one-component adhesive is desired and the substrates to be bonded are capable of withstanding the high temperature cure conditions. Typical substrates are metals, ceramics, glass and carbon fiber composites.

Features
- One Pack
- Economical
- Good shelf life at room temperature
- Service temperatures up to 150°C (302°F)

Formula

<table>
<thead>
<tr>
<th>Material</th>
<th>Supplier</th>
<th>pbw</th>
<th>Pounds</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPON Resin 828</td>
<td>Hexion</td>
<td>100</td>
<td>64.13</td>
<td>6.61</td>
</tr>
<tr>
<td>Bentone 34 (ground bentonite clay - thixotrope)</td>
<td>Elementis Specialties, Inc.</td>
<td>25</td>
<td>16.02</td>
<td>1.13</td>
</tr>
<tr>
<td>Alumina T60/64 (ground tabular alumina – filler)</td>
<td>Alcoa World Chemical</td>
<td>25</td>
<td>16.02</td>
<td>0.55</td>
</tr>
<tr>
<td>Dyhard 100SF (micronized dicyandiamide)</td>
<td>Degussa Corporation – Fine Chemicals Division</td>
<td>6</td>
<td>3.83</td>
<td>0.33</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>156</td>
<td>100.00</td>
<td>8.62</td>
</tr>
</tbody>
</table>

Mixing Instructions
A high speed mixer (such as Cowles) can be used; however, care should be taken to keep temperature as low as possible. Temperatures should be kept below 45°C (115°F).
Alternatively, a planetary mixer or three-roll mill can be used.
Load EPON Resin 828, Bentone 34 and Dyhard 100SF then blend until all powders are dispersed.
Add Alumina T60/64 and continue dispersing until a smooth, uniform paste is achieved.

This formulation is a basic starting point and can be modified with other types, such as talc, ground silica, wollastonite, or calcium carbonate.

Typical Handling

Table 1 / Handling Properties

<table>
<thead>
<tr>
<th>Properties</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Working Life @ 25°C (77°F), 100 grams</td>
<td>months</td>
<td>6</td>
</tr>
</tbody>
</table>

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Application Instructions

All surfaces to be bonded should be clean and free of dust, dirt, grease, oil or other contaminants. For optimum adhesion it is recommended to roughen bonding surfaces. This can be accomplished with abrasive media appropriate for the materials being bonded (such as medium grit emery paper, abrasive disks, grit blasting, wire brushes, etc.). Abrasion should always be followed by degreasing to remove contaminants and loose particles. Chemical etching is another method to provide a rough surface for improved adhesion.

Apply by spreading a thin film approximately 0.005 inch thick over the surface to be bonded. Maintain light pressure during cure for optimum bonding.

Cure Schedule 1 hour @ 177°C (350°F); Not less than 50 minutes @ 177°C.

Table 1 / Adhesive Properties – Aluminum to Aluminum

<table>
<thead>
<tr>
<th>Test Property</th>
<th>Substrate</th>
<th>ASTM</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Shear Strength @ 25°C</td>
<td>Aluminum to Aluminum</td>
<td>D-1002</td>
<td>psi</td>
<td>3,500</td>
</tr>
<tr>
<td>(77°F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Storage Recommendations regarding storage conditions can be obtained by visiting our web site at 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, along with the ingredients, methods, applications or equipment identified herein (“Information”), by the user’s knowledgeable formulator or scientist, and to determine the appropriate use conditions and legal restrictions, prior to use of any Information.

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