Starting Formulation

**SF 4019 One Package Adhesive**

**EPON™ Resin 828 and 58006**

**Introduction**

This one-package epoxy adhesive, when properly formulated, can yield a shelf life of approximately 6 months at 25°C (77°F) and cures rapidly at temperatures above 116°C (240°F). High bond strengths are maintained at temperatures over the range of -55 to 135°C (-67°F to +275°F). Shear strengths useful in some applications are retained at temperatures as high as 177°C (350°F). A maximum service temperature of 149°C (300°F) is suggested for long term performance.

**Suggested Uses**

- Applications requiring toughness (peel, impact) along with high shear strengths over a wide temperature range. Adhesion is good with metals, ceramics, glass, wood and polar materials.

**Features**

- One Pack
- Rapid cure above 116°C (240°F)
- High bond strengths -55 to 135°C (-67 to 275°F)
- 149°C (300°F) Maximum service temperature

**Formula**

<table>
<thead>
<tr>
<th>Material</th>
<th>Supplier</th>
<th>Pounds</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPON Resin 828</td>
<td>Hexion</td>
<td>85.0</td>
<td>8.76</td>
</tr>
<tr>
<td>EPON Resin 58006</td>
<td>Hexion</td>
<td>25.0</td>
<td>2.81</td>
</tr>
<tr>
<td>Dyhard 100SF (micronized)</td>
<td>Degussa Corp. – Fine Chemicals</td>
<td>10.0</td>
<td>0.86</td>
</tr>
<tr>
<td>Dyhard UR300 (accelerator)</td>
<td>Degussa Corp. – Fine Chemicals</td>
<td>5.2</td>
<td>0.58</td>
</tr>
<tr>
<td>Bentone 27 (thixotropic)</td>
<td>Elementis Specialties, Inc.</td>
<td>5.0</td>
<td>0.35</td>
</tr>
<tr>
<td>Aluminum 120 (powder)</td>
<td>ALCOA – Specialty Metals Division</td>
<td>20.0</td>
<td>0.89</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>150.2</td>
<td>14.25</td>
</tr>
</tbody>
</table>

**Mixing Instructions**

Combine all ingredients and grind to a thixotropic, smooth paste on a three-roll mill or other efficient, low temperature disperser. The powdered components (Dyhard 100SF, Dyhard UR300 and Bentone 27), must be finely dispersed for effective utilization. Adequate dispersion is obtained on a laboratory three-mill mill by passing the blend through three times.

This formulation is a basic starting point and can be modified with a large range of commercial fillers, depending on cost/performance requirements.

**Typical Handling / Handling Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected Working Life</strong></td>
<td>@ 25°C (77°F)</td>
<td>months &gt;6</td>
</tr>
</tbody>
</table>

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@ 38°C (100°F) months >1

Form / Viscosity @ 25°C
Blend Thixotropic Paste

Density @ 25°C
Blend lb/gal 10.5

Application Instructions
Coat surfaces to be bonded with the adhesive and press together lightly; contact pressure is sufficient to develop maximum bond strength. The bond line temperature should be brought to 250°F and maintained for a minimum of 40 minutes to effect a thorough cure. Shorter cure periods at higher temperatures may also be employed. Only surfaces free of dirt, oil, grease, or other contaminants should be bonded. Sandblasting or acid etching are the preferred procedures for preparing metal surfaces. Abrasion of the bonded surfaces in combination with vapor degreasing or solvent wiping are other common preparation methods.

Cure Schedule
40 minutes @ 121°C (250°F) or 30 minutes @ 149°C (300°F) Shorter cure periods at temperatures up to 204°C (400°F) may also be employed.

Typical Cured State

Table 1 / Adhesive Properties – Aluminum to Aluminum

<table>
<thead>
<tr>
<th>Test Property</th>
<th>Type of Break</th>
<th>ASTM</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Shear Strength</td>
<td>Cohesive</td>
<td>D-1002</td>
<td>psi</td>
<td></td>
</tr>
<tr>
<td>@ -55°C (-67°F)</td>
<td>Cohesive</td>
<td></td>
<td></td>
<td>3100</td>
</tr>
<tr>
<td>@ 25°C (77°F)</td>
<td>Cohesive</td>
<td></td>
<td></td>
<td>3500</td>
</tr>
<tr>
<td>@ 82°C (180°F)</td>
<td>Cohesive</td>
<td></td>
<td></td>
<td>4100</td>
</tr>
<tr>
<td>@ 121°C (250°F)</td>
<td>Cohesive</td>
<td></td>
<td></td>
<td>3400</td>
</tr>
<tr>
<td>@ 149°C (300°F)</td>
<td>Cohesive/Adhesive</td>
<td></td>
<td>psi</td>
<td>700</td>
</tr>
<tr>
<td>90° Peel Strength @ 25°C, width</td>
<td>lb/inch</td>
<td></td>
<td></td>
<td>8.1</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.

Safety, Storage & Handling
Please refer to the MSDS for the most current Safety and Handling information.

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