Vipel Corrosion Resistant Epoxy Novolac, Vinyl Ester Resin

DESCRIPTION
The Vipel F086 series is an epoxy novolac vinyl ester resin dissolved in styrene and designed for high temperature resistance.

The Vipel F086 series is ideally suited for use in hand lay-up, spray-up, and filament winding processes where outstanding mechanical properties and resistance to chemicals, oxidation and heat are required.

TYPICAL LIQUID RESIN PROPERTIES * (2) see back page

<table>
<thead>
<tr>
<th>Versions</th>
<th>Viscosity, cps</th>
<th>Thix Index</th>
<th>Gel Time, min</th>
<th>Gel to Peak, min</th>
<th>Peak Exotherm, °F/°C</th>
<th>Specific Gravity</th>
<th>Styrene Content %</th>
</tr>
</thead>
<tbody>
<tr>
<td>F086-AAA-00</td>
<td>400 1</td>
<td>NA</td>
<td>25 2</td>
<td>15</td>
<td>390/199</td>
<td>1.08</td>
<td>37 1</td>
</tr>
<tr>
<td>F086-HHH-00</td>
<td>2800 3</td>
<td>NA</td>
<td>12 4</td>
<td>5</td>
<td>367/186</td>
<td>1.12</td>
<td>25 4</td>
</tr>
</tbody>
</table>

NA- Not applicable
1) 25°C Brookfield RV viscosity spindle #2 at 20 rpm
2) 25°C Gel time with 0.3% Cobalt 6%, 0.05% DMA and 2.0% CHP** (90% active)
3) 25°C Brookfield RV viscosity spindle #3 at 20 rpm
4) 25°C Gel time with 0.25% Cobalt 6%, 0.05% DMA and 1.25% MEKP

*Typical properties are not to be construed as specifications.
** Cumyl hydroperoxide (also known as cumene hydroperoxide)

BENEFITS

Corrosion resistance
Vipel F086 is designed for high temperature resistance. The epoxy novolac backbone provides resistance to acids and has superior resistance to many organic solvents. Vipel F086 series is generally resistant to liquids and vapors at higher temperatures than standard bisphenol-A epoxy vinyl ester resins or standard novolacs.

Refer to AOC’s “Corrosion Resistant Resin Guide” for corrosion resistance information or for questions regarding suitability of a resin to any particular chemical environment contact AOC.

Mechanical Properties
The Vipel F086 series is suitable for moldings that are subjected to particularly high temperature applications.

Versatile
Suitable for various fabricating methods such as hand lay-up, filament winding, etc.
Novolac Vinyl Ester Resin
F086 Series
Vipel®

fiberglass content and resin puddling. Laminate with 16-24 grit to insure good secondary bonding, problems. After 48 hours of cure, it may be necessary to abrade the laminate to sunlight will result in severe secondary bonding complete all secondary bonding as soon as possible. Exposing the fabricator make a high quality part.

Due to the excellent curing characteristics of Vipel F086 resin, catalysts can be used.

Cumyl hydroperoxide is suggested as a catalyst because Vipel F086 is a reactive resin. Finished part surfaces that have been cured at room temperature in contact with air should be relatively tack free. They may not, however, be fully cured and are thus not as resistant to chemicals as a fully cured part. If no further laminating is planned, a 10% solution of 5% paraffin wax solution (MP 46-48°C) may be added to the last resin layer to provide a tack free surface.

The use of cumene hydroperoxide catalyst is suggested since the resin cures quickly. If the composite is thin, high dimer MEKP (MP 115-118°F/46-48°C) in styrene may be added to the last resin layer to accelerate the product viscosity and gel time.

After extended storage, some drift may occur in the product viscosity and gel time.

Typical properties of cured resin® processing
Finished part surfaces that have been cured at room temperature in contact with air should be relatively tack free. They may not, however, be fully cured and are thus not as resistant to chemicals as a fully cured part. If no further laminating is planned, a 10% solution of 5% paraffin wax solution (MP 46-48°C) in styrene may be added to the last resin layer to assure a tack free surface. Optimum cure and performance may be obtained by post curing room-temperature cured laminates for three to six hours at 194-212°F/90-100°C.

STORAGE STABILITY
This product is stable for six months from the date of manufacture when stored in the original containers, away from direct sunlight or other UV light sources and at or below 77°F/25°C.

After extended storage, some drift may occur in the product viscosity and gel time.

Typical properties of cured resin® processing
Finished part surfaces that have been cured at room temperature in contact with air should be relatively tack free. They may not, however, be fully cured and are thus not as resistant to chemicals as a fully cured part. If no further laminating is planned, a 10% solution of 5% paraffin wax solution (MP 46-48°C) in styrene may be added to the last resin layer to assure a tack free surface. Optimum cure and performance may be obtained by post curing room-temperature cured laminates for three to six hours at 194-212°F/90-100°C.

SAFETY
See appropriate Material Safety Data Sheet for guidelines.

ISO 9001:2000 CERTIFIED
The Quality Management Systems at every AOC manufacturing facility have been certified as meeting ISO 9001:2000 standards. This certification recognizes that each AOC facility has an internationally accepted model in place for managing and assuring quality. We follow the practices set forth in this model to add value to the resins we make for our customers.

FOOTNOTES
(1) Based on tests of Vipel F086-AAA-00 at 77°F/25°C and 50% relative humidity. All thixotropic resins should be mixed well prior to use. The use of thixotropy degrades the corrosion performance of a resin in some chemical environments such as sodium chloride. All tests on unreinforced cured resin. Castings were post cured.

(2) The gel times shown are typical but may be affected by catalyst, promoter, inhibitor concentration, resin, mold, and shop temperature. Variations in gelling characteristics can be expected between different lots of catalysts and at extremely high humidities. Pigment-and/or filler can retard or accelerate gelation. It is recommended that the fabricator check the gelling characteristics of a small quantity of resin under actual operating conditions prior to use.

HIGH TEMPERATURE TENSILE PROPERTIES

<table>
<thead>
<tr>
<th>Temperature, °F/°C</th>
<th>Tensile Strength, psi/MPa</th>
<th>Tensile Modulus, psi/GPa</th>
<th>ASME RTP-1 LAMINATE PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>77/25</td>
<td>12,300/85</td>
<td>550,000/5.8</td>
<td>22,600/156</td>
</tr>
<tr>
<td>150/65.6</td>
<td>10,000/69</td>
<td>460,000/3.2</td>
<td>21,000/145</td>
</tr>
<tr>
<td>200/93</td>
<td>11,000/65</td>
<td>400,000/2.8</td>
<td>20,000/138</td>
</tr>
<tr>
<td>250/121</td>
<td>6,000/41</td>
<td>360,000/2.5</td>
<td>19,000/131</td>
</tr>
<tr>
<td>275/135</td>
<td>4,000/28</td>
<td>260,000/1.8</td>
<td>19,000/131</td>
</tr>
<tr>
<td>300/149</td>
<td>2,600/17</td>
<td>177,000/1.2</td>
<td>21,000/145</td>
</tr>
<tr>
<td>325/163</td>
<td>1,700/12</td>
<td>144,000/0.23</td>
<td>19,000/131</td>
</tr>
<tr>
<td>350/177</td>
<td>900/6.2</td>
<td>12,600/0.90</td>
<td>15,000/103</td>
</tr>
</tbody>
</table>

ASME RTP-1 Laminate construction: VMM MRMRM V-glass veil, M-chopped strand glass mat 1.5 oz per square foot (450 grams per square meter) R-Woven Roving 24 oz per square yard (814 grams per square meter). Laminates were 0.250 inches (6.4 mm) thick and post cured at 350°F/149°C for 2 hours. Glass content is 38.2%.

PERFORMANCE GUIDELINES

A. Keep full strength catalyst levels between 1.0% - 2.0% of the total resin weight.

B. Maintain shop temperatures between 65°F/18°C and 90°F/32°C and humidity between 40% and 90%. Consistent shop conditions contribute to consistent gel times and will help the fabricator make a high quality part.

C. Cumyl hydroperoxide is suggested as a catalyst because Vipel F086 is a reactive resin. Finished part surfaces that have been cured at room temperature in contact with air should be relatively tack free. They may not, however, be fully cured and are thus not as resistant to chemicals as a fully cured part. If no further laminating is planned, a 10% solution of 5% paraffin wax solution (MP 46-48°C) may be added to the last resin layer to provide a tack free surface.

D. The use of cumene hydroperoxide catalyst is suggested since the resin cures quickly. If the composite is thin, high dimer MEKP catalysts can be used.

E. Optimum cure and performance may be obtained by post curing room temperature cured laminates for two hours at 158-212°F/70-100°C.

APPLICATION GUIDELINES

Due to the excellent curing characteristics of Vipel F086 resin, complete all secondary bonding as soon as possible. Exposing the laminate to sunlight will result in severe secondary bonding problems. After 48 hours of cure, it may be necessary to abrade the laminate with 16-24 grit to insure good secondary bonding, especially if the surface of the laminate is resin rich. Avoid low fiberglass content and resin puddling.

FOOTNOTES
(1) Cumyl hydroperoxide (also known as cumene hydroperoxide)

(2) N,N-Dimethylaniline