Efficiency in Smart Card Manufacturing
Panacol Vitralit® and Structalit®
Hönle UV Curing Systems
UVALINE 1200, LED Powerline

Smart Card Encapsulants
- Low ionic content
- High processing efficiency
- Outstanding mechanical properties
- Variety of different encapsulating solutions

UV Curing Systems
- Different wavelengths available
- High UV intensity
- Low thermal load to the substrates
- Retrofitting of existing machines
- Excellent price/performance ratio

A Perfect Match for Larger Volumes
**Encapsulants for High Throughput Solutions**

As a global supplier of special adhesives, Panacol offers a range of UV and heat curing adhesives for Smart Card encapsulation.

We have developed these materials to maximize efficiency in production throughput with maximum reliability.

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**Vitrailit® 1650**

- UV curing one component epoxy resin
- High flexibility, low T<sub>g</sub>
- Low ionic content
- Good environmental resistance

**Vitrailit® 1680**

- UV and heat curing one component epoxy resin
- High T<sub>g</sub>, low ionic content
- Low water absorption, good acid resistance
- Low coefficient of thermal expansion (α<sub>1</sub>)

**Vitrailit® 1688**

- UV curing one component epoxy resin
- Low water absorption, good chemical resistance
- Outstanding mechanical properties
- Low warpage, low coefficient of thermal expansion

**Vitrailit® 1671**

- One component frame material with good edge stability
- UV and heat curing at low temperature
- Low ionic content, low water absorption
- Good thermal conductivity

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**Modules/Cards encapsulated with Vitrailit® 1688 passed the following qualifications:**

<table>
<thead>
<tr>
<th>Test</th>
<th>Test Conditions</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Cycling (TC), MIL-STD 883/1010</td>
<td>-40°C – +125°C</td>
<td>200 x / 0.5 h</td>
</tr>
<tr>
<td>Temperature and humidity and bias (THB)</td>
<td>85°C / 85% r.h., 5.5 V d.c.</td>
<td>5.5 V 168 h</td>
</tr>
<tr>
<td>Temperature storage</td>
<td>1000 h @+125°C</td>
<td>passed</td>
</tr>
<tr>
<td>Pressure cooker</td>
<td>+121°C, 100% r.h., 2 bar, 24 h</td>
<td>passed</td>
</tr>
<tr>
<td>Bending test</td>
<td>ISO 7816–1 and ISO /IEC 10373–1 / 58</td>
<td>&gt; 1000 cycles</td>
</tr>
<tr>
<td>Torsion test</td>
<td>ISO / IEC 10373–1</td>
<td>&gt; 1000 cycles</td>
</tr>
<tr>
<td>3-wheels-test</td>
<td>ISO / IEC 10373–3 / Annex A and more</td>
<td>&gt; 100 cycles / 15 N</td>
</tr>
<tr>
<td>Line pressure test</td>
<td></td>
<td>very good</td>
</tr>
<tr>
<td>Spot pressure test</td>
<td></td>
<td>very good</td>
</tr>
<tr>
<td>Wrapping test</td>
<td></td>
<td>very good</td>
</tr>
<tr>
<td>Warpage test based on module after curing</td>
<td></td>
<td>very good</td>
</tr>
</tbody>
</table>
**Smart Card Encapsulants**

### Vitralit® UV Curing

**Frame & Fill Encapsulants**

**Advantages**
- Short cycle times, 10 - 60 sec
- Low ionic content
- UV curable, 320 - 405nm wavelength
- Good self-leveling characteristics
- Frame and fill adhesives create a homogeneous composition

### Structalit® Heat Curing

**Frame & Fill Encapsulants**

**Advantages**
- Fast processing time and excellent dispensability
- High Tg level
- Low water absorption and good chemical resistance
- Fast curing time at moderate temperatures, 120°C-150°C
- Frame and fill adhesives create a homogeneous composition

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**UV Curing**

<table>
<thead>
<tr>
<th></th>
<th>Frame</th>
<th>Fill / Glob Top</th>
<th>Fill</th>
<th>Fill</th>
<th>Frame</th>
<th>Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product name</strong></td>
<td>Vitralit® 1671</td>
<td>Vitralit® 1650</td>
<td>Vitralit® 1680</td>
<td>Vitralit® 1688</td>
<td>Structalit® 5071</td>
<td>Structalit® 5088</td>
</tr>
<tr>
<td><strong>Typical applications</strong></td>
<td>Industry standard, frame material, use in combination with all fill materials</td>
<td>Industry standard, Glob Top material, compatible with automated dispensing equipment</td>
<td>Industry standard, fill and Glob Top material, ideal in combination with Vi 1671</td>
<td>Most recent development of fill and Glob Top material, quickly becoming the industry standard, ideal in combination with Vi 1671</td>
<td>High viscosity frame material, excellent chemical resistance, ideal in combination with St 5088</td>
<td>Medium viscosity fill material, excellent chemical resistance, ideal in combination with St 5071</td>
</tr>
<tr>
<td><strong>Curing</strong></td>
<td>UV and heat curing</td>
<td>UV curing</td>
<td>UV curing</td>
<td>UV curing</td>
<td>Heat curing</td>
<td>Heat curing</td>
</tr>
<tr>
<td>Curing with LED 365nm</td>
<td>10 sec possible</td>
<td>10 sec possible</td>
<td>10 sec possible</td>
<td>10 sec possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td>Light grey, translucent</td>
<td>Light grey, translucent</td>
<td>Light grey, translucent</td>
<td>Light grey, translucent</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td><strong>Viscosity [mPas]</strong></td>
<td>250,000 – 300,000</td>
<td>6,000 – 9,000</td>
<td>6,000 – 9,000</td>
<td>3,000 – 4,000</td>
<td>300,000 – 400,000</td>
<td>45,000 – 55,000</td>
</tr>
<tr>
<td><strong>Shore hardness [D]</strong></td>
<td>80 – 90</td>
<td>70 – 80</td>
<td>70 – 80</td>
<td>70 – 80</td>
<td>80 – 90</td>
<td>75 – 90</td>
</tr>
<tr>
<td><strong>Elasticity</strong></td>
<td>Hard</td>
<td>Slightly elastic</td>
<td>Slightly elastic</td>
<td>Slightly elastic</td>
<td>Hard</td>
<td>Hard</td>
</tr>
<tr>
<td><strong>Characteristics</strong></td>
<td>High processing efficiency</td>
<td>High processing efficiency, well established Glob Top</td>
<td>High processing efficiency, excellent mechanical properties</td>
<td>Outstanding mechanical properties, good flow characteristics, fast processing due to fast curing possibility</td>
<td>Like dispensable mold materials</td>
<td>Like dispensable mold materials</td>
</tr>
</tbody>
</table>

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**Heat Curing**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Product name</strong></td>
<td>Structalit® 5071</td>
<td>Structalit® 5088</td>
</tr>
<tr>
<td><strong>Advantages</strong></td>
<td>One component heat curing epoxy resin for frame application</td>
<td>One component heat curing epoxy resin for fill application</td>
</tr>
<tr>
<td></td>
<td>Low water absorption, good chemical resistance</td>
<td>High processing efficiency</td>
</tr>
<tr>
<td></td>
<td>Excellent thermal shock resistance</td>
<td>Outstanding mechanical properties, when cured same performance as mold materials</td>
</tr>
<tr>
<td></td>
<td>Extremely high Tg</td>
<td>Low coefficient of thermal expansion (α₁)</td>
</tr>
</tbody>
</table>
Dr. Hönle AG is one of the world’s leading suppliers of industrial UV technology. Innovative Hönle UV/UV-LED curing systems have been applied in various manufacturing processes where they achieve excellent results worldwide – particularly in adhesive applications.

Hönle and Panacol, both members of the Hönle Group, attach great importance to joint research and development. They have combined their knowledge and extensive experience in chemistry and UV technology which has lead to comprehensive high-tech solutions. This has been applied to the specific needs associated with adhesive applications, frequently used in electronics manufacturing.

**Hönle UV Technology**

**for Smart Card Applications**

The Vitralit® adhesives from Panacol are perfect for chip encapsulation in Smart Card manufacturing. The matching UV equipment to cure these high-tech sealing compounds are the UVALINE 1200 along with the LED Powerline from Hönle:

**UVALINE 1200**

The UVALINE 1200 is a compact, all-purpose and high intensity UV irradiator. It comes with three 450W gas discharge lamps and a 480 x 40 mm irradiation window. The reflector geometry guarantees maximum UVA intensity.

The cooling of UVALINE 1200 is achieved using three integrated, speed-controlled fans. The shutter function with limit stop monitoring has a pneumatic drive.

The ballast box has an interface for the production machine, thus making the UVALINE 1200 ideal for integration into fully-automated production lines.

**LED Powerline**

The LED Powerline is a high-performance array with all the advantages of LED technology: Typical LED lamp life > 10.000 hours and does not require heating up or cooling phases. The LED Powerline is available in wavelengths of 365/375/385/395/405 nm.

This variety allows adjustment of the wavelength to the appropriate application. The LED Powerline is available in different lengths - in 40 mm steps up to a length > 1 m.

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