<table>
<thead>
<tr>
<th>UV-LED-Curing Epoxy Adhesives</th>
<th>Epoxies</th>
<th>UV LED Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Advanced reliability</td>
<td>• High energy efficiency</td>
</tr>
<tr>
<td></td>
<td>• High temperature resistance</td>
<td>• Less thermal radiation</td>
</tr>
<tr>
<td></td>
<td>• Low shrinkage</td>
<td>• Long operating life</td>
</tr>
<tr>
<td></td>
<td>• Low ionic content</td>
<td>• No stand-by times</td>
</tr>
<tr>
<td></td>
<td>• High glass transition temperatures</td>
<td>• No warm up or cool down phases</td>
</tr>
</tbody>
</table>
Advantages of LED Technology

- High energy efficiency
- Less maintenance and significant reductions in energy costs
- Long operating life (typical lifetime of LEDs > 20,000 hrs)
- Less thermal radiation and thus lower thermal stress on heat-sensitive substrates
- No stand-by times
- No warm up or cool down phases needed

Advantages of Epoxies

- Proven reliability against environmental effects
- Withstand effects of wide temperature excursions
- High glass transition temperature
- Hardened epoxy adhesives feature dry and tack-free surfaces, making them the ultimate protective surface coating
- Excellent optical characteristics with high refractive indices – ideal for applications in precision optics and lens bonding
- Low shrinkage for better positioning and minimal movement
- Low ionic and alkali contents, with halogenide contents as low as < 10 ppm
- Wide range of compositions to achieve the desired properties: they can vary from flexible and soft with high breaking strains, to hard and scratch-free with extremely high adhesion

Equipment manufacturers are now offering a new generation of UV-LED equipment with higher output intensities, significantly reducing curing time for adhesives and coatings. Epoxy based resins can now be cured as fast as light curable acrylates.

The combination of new UV-LED equipment and newly developed epoxies cure as quickly as with broad spectrum UV light with added benefits.

All Panacol LED-cure epoxy adhesives and sealants may also be cured using traditional broad spectrum UV curing equipment.

Thus the new generation of epoxies can be incorporated into existing UV bonding processes.

Customized Solutions for Unique Applications

Panacol provides innovative solutions for your needs. All adhesives can be individually tailored and tuned to your special requirements. For further information please contact us at info@panacol.de
Small dots of adhesive in the cavities of a tube-shaped housing fix a magnetic ring. A pink bead of fluorescing adhesive is applied as corner bonding to protect the wire contacts on a PCB.

At a wavelength of 365nm epoxies cure at low intensities. The higher the intensity of the LED light source, the faster the adhesives cure.

The following table shows the different epoxy adhesives in an overview:

<table>
<thead>
<tr>
<th>All adhesives were cured with LED equipment from Hönle AG at a wavelength of 365nm</th>
<th>Typical curing times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical intensities</td>
<td>100mW/cm²</td>
</tr>
<tr>
<td>Vitralit® 1508</td>
<td>90sec</td>
</tr>
<tr>
<td>Vitralit® 1605</td>
<td>120sec</td>
</tr>
<tr>
<td>Vitralit® 1688</td>
<td>75sec</td>
</tr>
<tr>
<td>Vitralit® UC 1619</td>
<td>60sec</td>
</tr>
<tr>
<td>Vitralit® 2004 F</td>
<td>45sec</td>
</tr>
<tr>
<td>Vitralit® UC 6684</td>
<td>45sec</td>
</tr>
</tbody>
</table>

The adhesives used in this table had a layer thickness of 2mm and were applied on glass substrates. After the indicated time period a handling stability is achieved, which allows further treatment and processing of the bonded product. Generally, epoxies are fully cured after 24 hours.

Dr. Hönle AG is one of the world’s leading suppliers of industrial UV technology. Innovative Hönle UV and UV-LED systems have been integrated into manufacturing processes worldwide.

Hönle und Panacol attach great importance to joint research and development. They have combined their knowledge and extensive experience, which has led to comprehensive high-tech solutions for adhesive bonding applications.

**Hönle UV-LED Curing Technology for UV Curing Epoxy Adhesives**

UV-LED lamps by Hönle are the perfect choice for UV curing epoxy adhesives.

Hönle’s LED options are accurately correlated to the peak absorption of UV curing Vitralit® adhesives and coatings from Panacol.
Point source bluepoint LED eco

Compact and powerful LED point source, with four LED heads that can be independently driven.

Flood lamp LED Spot 100

Light emitting aperture: 100 x 100mm. For larger irradiation areas, several LED Spot 100 can be joined together without gaps to create a large field.

High-performance array LED Powerline LC

Irradiated area / output window: 76 x 10mm. Longer lengths attainable in increments of 40mm.

All LED systems shown are available in several wavelengths. The Dr. Hönle AG offers a wide range of emitters, which are perfectly adapted to Panacol adhesives.

For more information visit www.hoenle.de