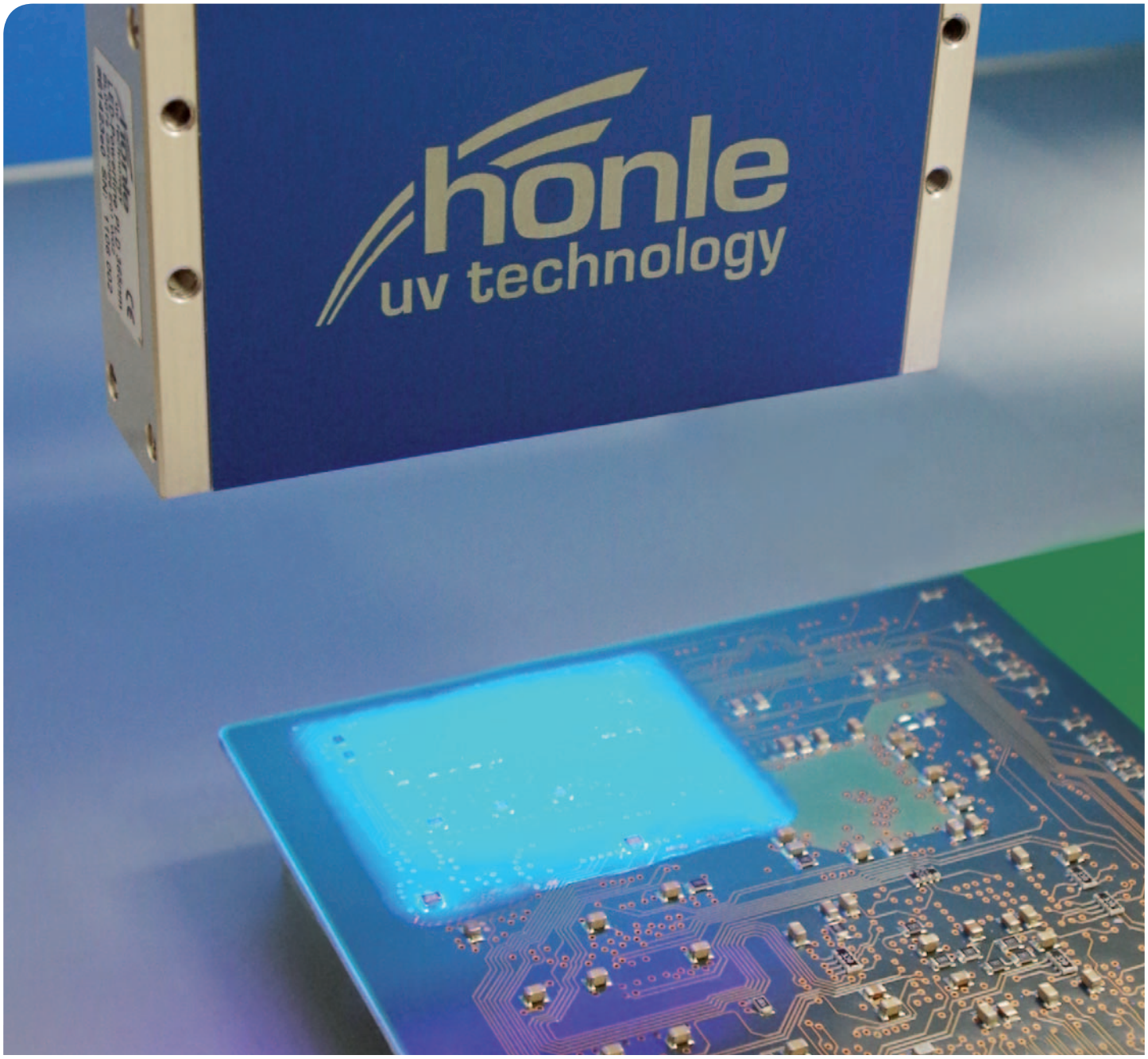


UV-LED-Curing Epoxy Adhesives

Epoxies

- Advanced reliability
- High temperature resistance
- Low shrinkage
- Low ionic content
- High glass transition temperatures

UV LED Equipment

- High energy efficiency
- Less thermal radiation
- Long operating life
- No stand-by times
- No warm up or cool down phases

UV-LED-Curing Epoxy Adhesives

Curing with UV-LED-light has helped to elevate light curable adhesive bonding to new levels of advancement.

Until recently UV-LED-hardening adhesives were limited to free-radical curing acrylates. With the recent development of new and innovative photoinitiators, cationic curing epoxy systems can now also be hardened in seconds.

Advantages of Epoxies

- Proven reliabilty 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

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.

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

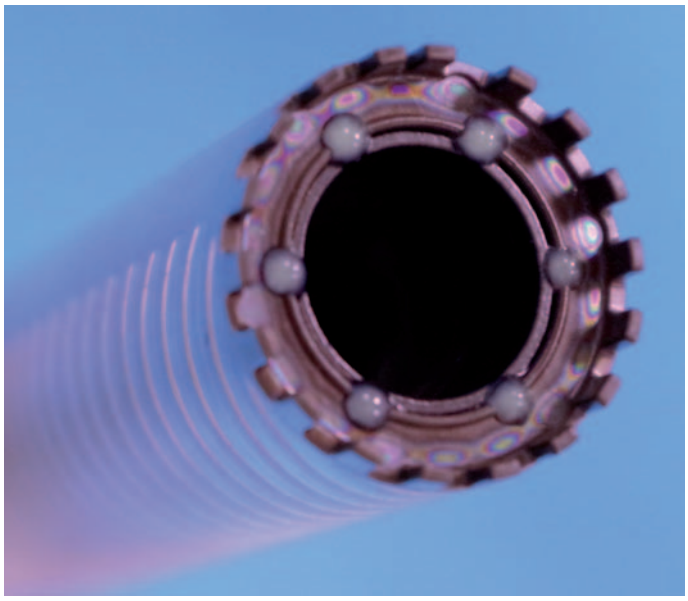
Equipment manufacturers are now offering a new generation of UV-LED-equipment with higher output intensities, significantly reducing curing time for adhesives and coatings. Epoxy based resins can now be cured as fast as light curable acrylates.

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

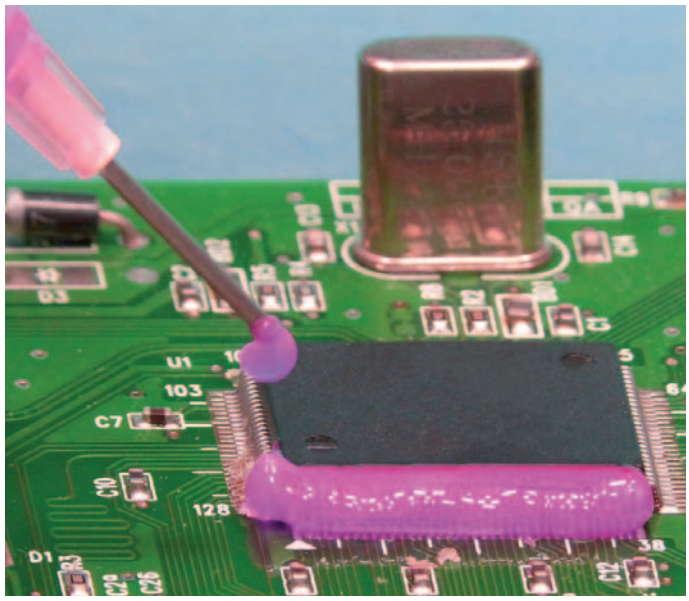
Transparent epoxy adhesive is applied as dome coating on a keyring pendant

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 wavelenght 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:

All adhesives were cured with LED equipment from Hönle AG at a wavelength of 365nm
Typical curing times

Typical intensities	100mW/cm^2	300mW/cm^2	1,000mW/cm^2	6,000mW/cm^2	10,000mW/cm^2
Vitralit® 1508	90sec	35sec	15sec	2sec	< 1sec
Vitralit® 1605	120sec	60sec	50sec	2sec	< 1sec
Vitralit® 1688	75sec	35sec	25sec	1sec	< 1sec
Vitralit® UC 1609	60sec	30sec	25sec	2sec	< 1sec
Vitralit® 1728 HTG	20sec	7sec	5sec	1sec	< 1sec
Vitralit® 2004 F	45sec	12sec	8sec	1sec	< 1sec
Vitralit® UC 6684	45sec	20sec	16sec	2sec	< 1sec

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.

Absolute Curing of Adhesives and Sealing Compounds with High Performance UV Equipment from Hönle

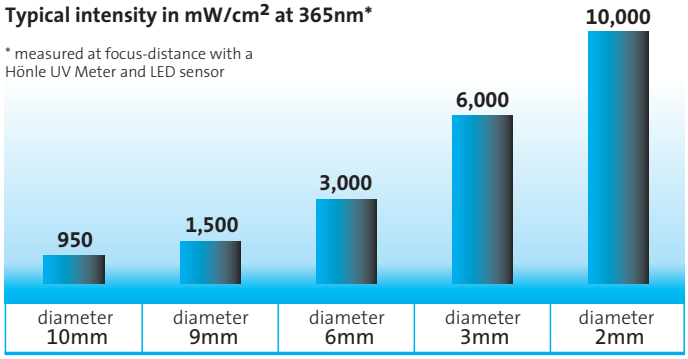
Point source bluepoint LED eco

bluepoint LED eco

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

Typical intensity in mW/cm² at 365nm*

* measured at focus-distance with a Hönle UV Meter and LED sensor

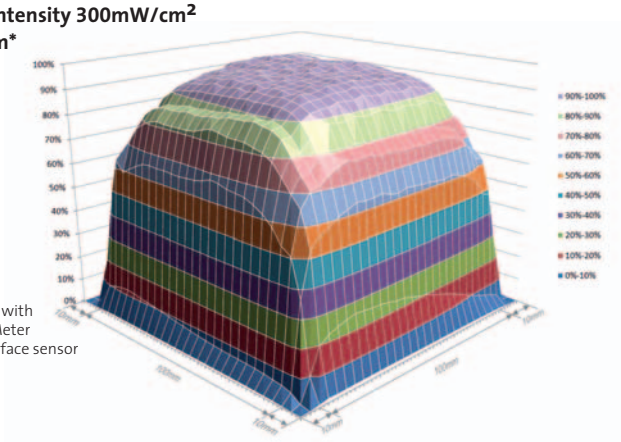


Flood lamp LED Spot 100

LED Spot 100

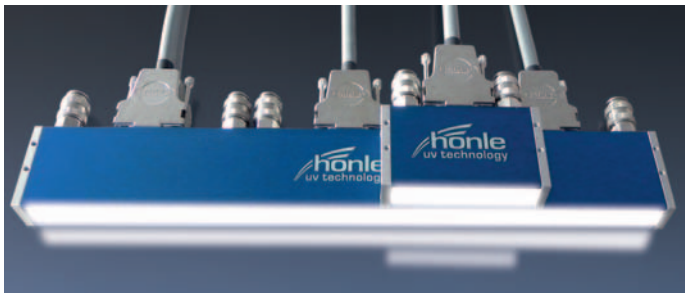
Light emitting aperture: 100 x 100mm. For larger irradiation areas, several LED Spot 100 can be joined together without gaps to create a large field.

Typical intensity 300mW/cm² at 365nm*



* measured with Hönle UV Meter and LED surface sensor

High-performance array LED Powerline LC



LED Powerline LC

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

Typical intensitiy 12,000mW/cm² at 365nm*

* measured with Hönle UV Meter and LED surface sensor

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**

panacol adhesives & more

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