

High-tech Adhesives for E-Mobility and Automotive Electronics



State-of-the-art adhesive systems for
applications in the automotive industry:

Electric Motors
Cell Contacting Systems
Thermal Management
Automotive Electronics
Charging Stations
Interior

Adhesives have become an indispensable bonding technology in motor vehicle production. Components in the chassis, engine or interior that previously had to be soldered, screwed or welded, can now be bonded securely with long-term stability and the added benefit of reduced weight. Panacol adhesives are primarily used in vehicle electronics and sensors. The technical, mechanical and physical demands placed on adhesives in terms of durability, chemical and temperature resistance are continuously increasing. Panacol develops customized adhesive solutions that meet the high requirements of the automotive industry. Panacol offers proven standard products as well as innovative new introductions for the best possible assembly solutions.

E-Mobility

Adapted to the special requirements of electromobility, Panacol adhesives contribute to faster and more efficient processes for the production of cell contact systems, battery packs, and charging systems. Our products are also used for thermal management, anti-corrosion coating, and vibration protection. Unique adhesive, potting and sealing systems are available for a wide range of applications.

more information on page 4 + 5

Cell Contacting Systems

High-performance battery packs and cell contacting systems for electric and hybrid vehicles require high-performance adhesives. Panacol offers specialized adhesives for electrical connection and sealing of welded joints.

more information on page 4

Charging Infrastructure for Electric Vehicles

Panacol adhesives are suitable for a wide range of EV assembly applications. They include ruggedizing PCB components for vibration resistance and the temperature-resistant attachment of electronic components to circuit boards in charging stations. Our adhesives can also protect the sensitive contacts in charging cables from moisture and contamination.

more information on page 5

UV-Curing Systems

Suitable UV and UV LED devices for curing Panacol UV adhesives can be found on

page 12

Magnet Bonding for E-Motors

Performance, weight, and space saving are crucial for electronic drives. Adhesives are the perfect solution for their manufacture, as they not only optimize magnet bonding assembly, but are also able to protect and insulate the coil windings.

more information on page 4

Sensors

Sensors must function without failure under harsh environmental conditions. Panacol offers a broad portfolio of adhesives for heat dissipation, electrical connection and shielding, fixturing, and environmental protection of the sensors.

more information on page 4 - 8

Thermal Management

Wherever electricity is present wasted heat is generated. This includes battery packs, electric drives and electronic components. Efficient cooling is essential, and heat-dissipating adhesives can provide the most effective solutions.

more information on page 4

Automotive Electronics

From conductive adhesives to products for attaching surface mounted devices (SMDs) on printed circuit boards: The Panacol portfolio offers numerous options for bonding and securing electronic components.

more information on page 6 - 8

CIPG Sealing Systems

Adhesives can be used in the automotive sector as Cured in Place Gaskets (CIPG). CIPGs are applied in liquid form to complex geometries and then cured with UV light.

more information on page 11

Camera Systems/ADAS, Lidar

Many components in Advanced Driver Assistance Systems (ADAS) are bonded. Our special adhesives are tailored to the respective materials and are used for bonding plastic housings or for affixing lenses.

more information on page 9

Interior/Dashboard

Components in the dashboard or decorative elements and displays can be reliably bonded and sealed with Panacol products. They also contribute to the refinement of Human Machine Interfaces (HMI) and In-Mold Electronics (IME).

more information on page 11

Light Management

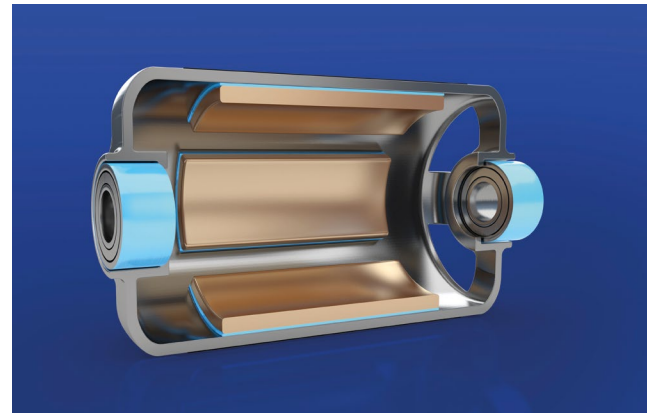
Adhesives for interior and exterior lighting typically bond plastic housings, attach LEDs to chips, and can be formed as lenses to create the scattered light of light carpets.

more information on page 10



E-Motors

Electric drives are becoming more powerful and efficient. At the same time, the component volume is decreasing. This has increased demands for materials to provide higher mechanical, chemical, and thermal resistance in order to ensure long-lasting operation. Panacol's new adhesives meet these requirements. They adhere particularly well to various metals, ferrites and copper coils, and are suitable for a wide range of applications such as magnet bonding, stator pack assembly, and potting bar magnets.

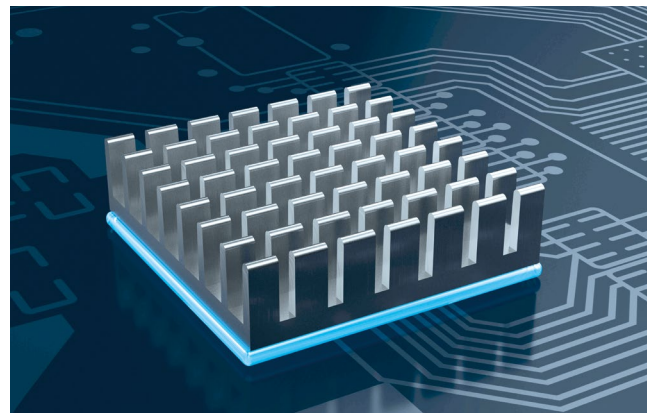


Cell Contacting Systems

Efficient connecting of cell systems in batteries with simultaneous flexibility can only be achieved with adhesives. Adhesives compensate for the different thermal expansion coefficients of the bonded materials. Specially developed UV glob tops and coatings protect against corrosion and at the same time offer high adhesion to the surfaces to be protected. Panacol adhesive solutions are not only suitable for battery cells, but also for modules and battery packs.

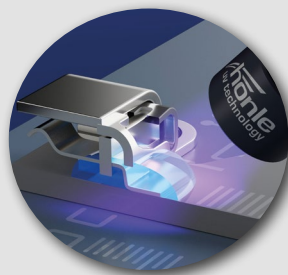
Thermal Management

There are components throughout the vehicle that generate heat during operation. In addition, these components are becoming smaller and more powerful, which also increases the thermal load. This not only shortens the lifespan, but also reduces performance. Panacol developed a high-performance line of adhesives that offer efficient heat dissipation and enable a form-fit, mechanically stable lightweight construction. They are used in the production of batteries, electric motors, control units, sensors and headlights.



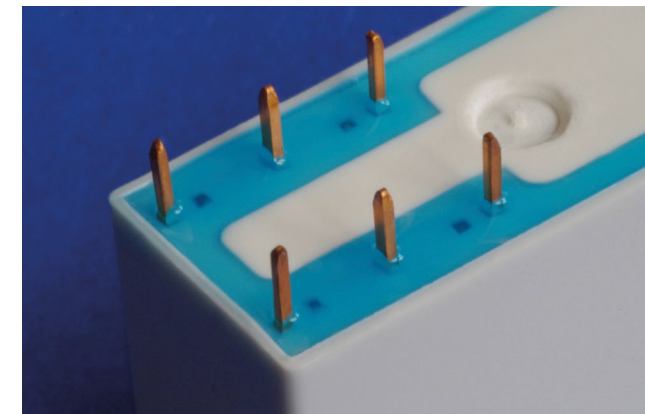
Dual-Curing Adhesives

Panacol offers adhesives that cure using UV light and moisture. They are used for components whose substrates are only partially translucent and have areas that are shadowed from the curing light. The adhesives' polymerization process is initiated by exposure to UV light and continues in shadowed areas through contact with the humidity in the air and the moisture present on the substrates.



Charging Infrastructure for Electric Vehicles

Adhesives and sealants have many applications in charging stations for electric vehicles. Various SMD components are bonded or encapsulated on the circuit board to make them resistant to shock and vibration. These components can also be reliably protected against temperature fluctuations, moisture, and other climatic influences by applying a conformal coating on the entire circuit board. Cured-in-place gaskets (CIPG) are used to enclose the electronic components and seal the housing from the infiltration of chemicals, moisture, and other contaminants.



Connector Sealing

When potting connectors, switches and relays, room temperature-curing, two-component or thermally curing (one-part) adhesives are mainly used. Panacol also offers UV light-curing products, which are characterized by their ability to cure quickly, even in thick layers. This results in shorter production cycle times. Our products are developed with low halogen content to meet the highest standards of the electronics industry.

| Typical Adhesives for E-Mobility | | | | | |
|----------------------------------|---|---|--------------|-------------------|---|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitralit® UV E-2113 | Cell contacting systems, Wire rope corrosion protection | 25,000 - 35,000 Rheometer 10s ⁻¹ | Acrylate | UV/VIS | Fast curing, high chemical resistance |
| Vitralit® UV E-2115 | Cell block spacer, Battery packs | 80,000 - 120,000 Rheometer 10s ⁻¹ | Acrylate | UV/VIS | High thixotropy index |
| Vitralit® UD 5180 | Encapsulation of the soldering & welding joints of connectors | 4,000 - 6,000 Rheometer 10s ⁻¹ | 1-part Epoxy | UV/thermal | High adhesion to flexible conductors, low halogen content |
| Vitralit® UD 4292 F | Ball bearing e-motors | 40 - 70 LVT, Sp.2/30 rpm | Acrylate | UV/VIS/ anaerobic | Capillary flow, anaerobic post-curing |
| Vitralit® UD 8050 | Weld joint potting, Cell contacting systems | 8,000 - 11,000 Rheometer 5s ⁻¹ | Acrylate | UV/VIS/ humidity | Jettable, moisture post-curing, low halogen content |
| Vitralit® UD 8055 | Battery packs, Cell contacting systems | 4,000 - 7,000 Rheometer 10s ⁻¹ | Acrylate | UV/VIS/ humidity | High Tg, moisture post-curing, deep through-curing |
| Vitralit® E-VBB-1 | Connector sealing | 1,300 - 1,600 Rheometer 10s ⁻¹ | Acrylate | UV/VIS | Very flexible, stress equalizing |
| Elecolit® 6207 | Thermal management, potting | 9,000 - 12,000 | 2-part Epoxy | RT/thermal | UL94 V-0, thermally conductive |
| Elecolit® 6603 | Thermal management | 20,000 - 40,000 Rheometer 10s ⁻¹ | 1-part Epoxy | thermal | UL94 HB, good metal adhesion, thermally conductive |
| Structalit® 5802 | Condensator bonding Cornerbond | 40,000 - 65,000 Rheometer 10s ⁻¹ | 2-part Epoxy | RT/thermal | General structural bonding, very good dielectric properties |
| Structalit® 5803 | Magnet bonding | 100,000 - 160,000 Rheometer 10s ⁻¹ | 2-part Epoxy | RT/thermal | High Tg, impact resistant |
| Structalit® 5858 | Magnet bonding | 82,000 - 100,000 Rheometer 10s ⁻¹ | 1-part Epoxy | thermal | High Tg, impact resistant, high strength |
| Structalit® 8801 | Structural bonding, magnet bonding, potting | 30,000 - 45,000 LVT, Sp.4/6 rpm | 1-part Epoxy | thermal | Good oil resistance, low outgassing, high Tg |

*UV = 320 - 390 nm; VIS = 405 nm, RT = Room temperature

Bonding Electronic Components and Securing Components

Adhesives have a wide range of applications in automotive electronics. They not only fulfill the purpose of mechanical fastening, but they also protect the sensitive components from environmental influences or can be used for electrical shielding.

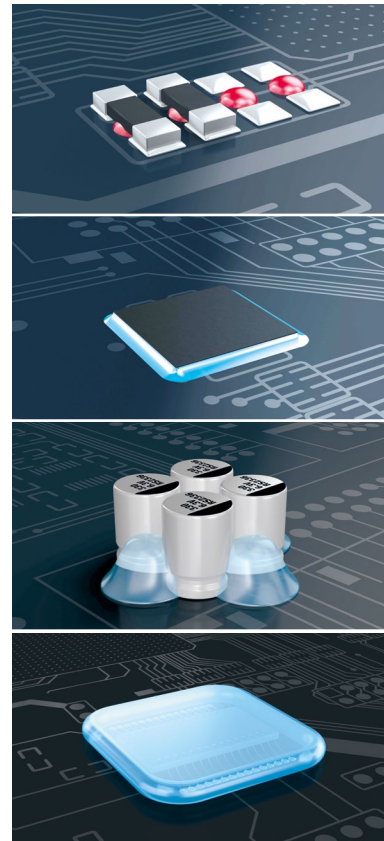
UV and structural adhesives are suitable for attaching electronic components (SMDs) on printed circuit boards.

In flip-chip processes, capillary-flowing adhesives are required for the underfilling of semiconductor chips (ball grid arrays - BGA) in order to provide reliable and fast attachment.

An alternative to classic underfilling is edge and corner bonding. The adhesive is only applied to the corners and not over the entire surface of the component. This allows components to be fixed before reflow soldering, and prevents them from slipping during the soldering process.

Frame and fill is a process in which two adhesives of different viscosities are applied wet-on-wet. First, a perimeter "frame" is drawn using a higher viscosity adhesive. The interior area is then filled quickly with a low-viscosity adhesive, (the "fill"). These adhesives are available as single-component, thermally curing systems (usually dyed black), or as transparent UV-curable systems, which permit very short cycle times. These adhesives are designed to minimize stress on the component connections pre and post curing.

All Panacol adhesives developed for electronics applications have a high level of ionic purity and meet the rigid requirements of the automotive sector in terms of adhesion, temperature, chemical, vibration, and climate resistance. In addition, many adhesives can be individually adapted to the specific application. For example, many adhesive viscosities can be adjusted to optimize dispensing and flow properties. Color or fluorescence can be added to the adhesive to optimize process control in production. The rheological properties of Panacol's (SMD) adhesives are suitable for high volume applications that utilize screen printing or jet dispensing.

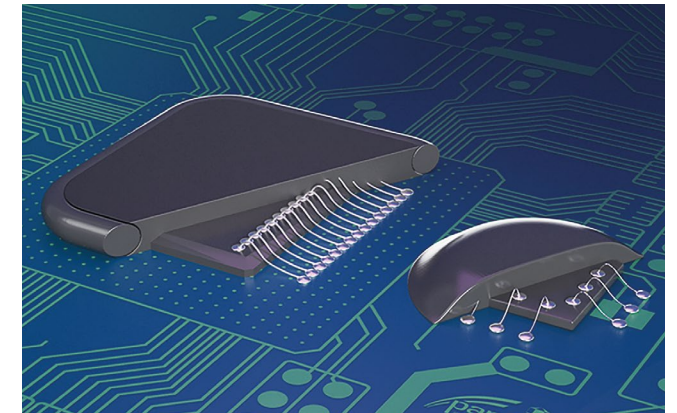


| Typical Adhesives for Fixing Electronic Components | | | | | | |
|--|------------------------------|---|--------------|------------|------------|---|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Ion purity | Characteristics |
| Structalit® 3060-1 | Fixing electrical components | 4,000 - 8,000 Rheometer, 10s ⁻¹ | 1-part Epoxy | thermal | ● | Very fast curing, high flexibility |
| Structalit® 5604 | Component protection SMD | 25,000 - 40,000 Rheometer, 10s ⁻¹ | 1-part Epoxy | thermal | ● | Red color, resistant to soldering temperatures up to 270 °C |
| Structalit® 8202 | Underfill | 300 - 400 Rheometer, 10s ⁻¹ | 1-part Epoxy | thermal | ● | Capillary flow behavior, high Tg |
| Vitalit® E-1671 | NTC Glob Top, Frame | 9,000 - 14,000 Rheometer, 10s ⁻¹ | 1-part Epoxy | UV/thermal | ● | Stable, low water absorption, high Tg |
| Vitalit® 1605 | Fill | 200 - 400 LVT, Sp.2/30 rpm | 1-part Epoxy | UV/thermal | ● | Ion purity, high Tg |
| Vitalit® 6104 VT | Condensator fixing | 8,000 - 17,000 Rheometer, 10s ⁻¹ | Acrylate | UV/thermal | ● | Stable, high temperature resistance |
| Structalit® 5704 | Frame | 60,000 - 100,000 Rheometer, 10s ⁻¹ | 1-part Epoxy | thermal | ● | Black color, stable, high Tg |
| Structalit® 5720 | Fill | 10,000 - 15,000 Rheometer, 5s ⁻¹ | 1-part Epoxy | thermal | ● | High Tg |

*UV = 320 - 390 nm; VIS = 405 nm; RT = Room temperature ● = Semicon-grade: DIN-EN ISO 10304-1 (D20) ● = Electronic-grade: (IEC 61249-2-21)

Encapsulation of High-Power Electronics (Powertrain)

Adhesives are used as encapsulants (glob tops) to protect sensitive electronic components from mechanical, thermal, and chemical influences. Good dielectric properties are important here, such as high dielectric strength, tracking resistance (CTI) and a high specific resistance in order to shield closely spaced electrical contacts from each other. In addition, encapsulation protects sensitive components from direct access and manipulation.



| Typical Adhesives for Encapsulation | | | | | | |
|-------------------------------------|---------------------------------------|---|--------------|------------|------------|--|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Ion purity | Characteristics |
| Vitalit® UD 5180 | Encapsulation on flex conductors | 4,000 - 6,000 Rheometer 10s ⁻¹ | 1-part Epoxy | UV/thermal | ● | High adhesion to PI |
| Structalit® 5891 | Glob Top | 25,000 - 50,000 Rheometer 10s ⁻¹ | 1-part Epoxy | thermal | ● | High shock resistance, good chemical resistance |
| Structalit® 5894 M | Encapsulation of PCB in level sensors | 20,000 - 30,000 Rheometer 20s ⁻¹ | 1-part Epoxy | thermal | ● | Black, high resistance to chemicals |
| Structalit® 8801 | Glob Top, Potting/ Encapsulation | 30,000 - 45,000 LVT, Sp.4/6 rpm | 1-part Epoxy | thermal | ● | High oil resistance, high adhesion to FPCB and PCB |

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Potting Compounds

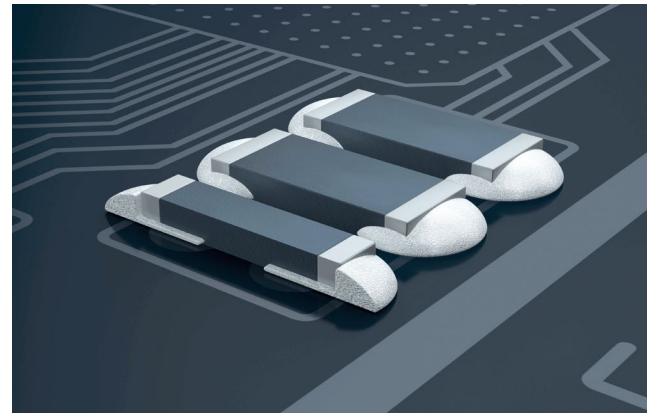
Selection of an appropriate potting material must take into consideration many factors. They can include component geometry, component substrates, potting depth, and the coefficient of thermal expansion (CTE) of each substrate. In addition, curing requirements such as vacuum, temperature, and light transmission will influence product selection. Having many years of applications experience, our team of engineers can help to select the best potting solutions from our broad line of product options.

| Typical Adhesives for Potting | | | | | |
|-------------------------------|------------------------------|--|--------------|------------|--|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitalit® 1605 | Partial potting/coating | 200 - 400 LVT, Sp. 2/30 rpm | 1-part Epoxy | UV/thermal | Ionic purity, high Tg |
| Elecolit® 6601 | Thermally conductive potting | 12,000 - 20,000 LVT, Sp. 4/6 rpm | 1-part Epoxy | thermal | High Tg, excellent flow properties |
| Elecolit® 6608 | High temperature potting | 10,000 - 15,000 Rheometer 10s ⁻¹ 40°C | 1-part Epoxy | thermal | Low CTE, high Tg, UL94 V-0 |
| Structalit® 5801 | Potting of PCB | 12,000 - 22,000 Rheometer 10s ⁻¹ | 2-part Epoxy | RT/thermal | High chemical resistance, good dielectric properties |

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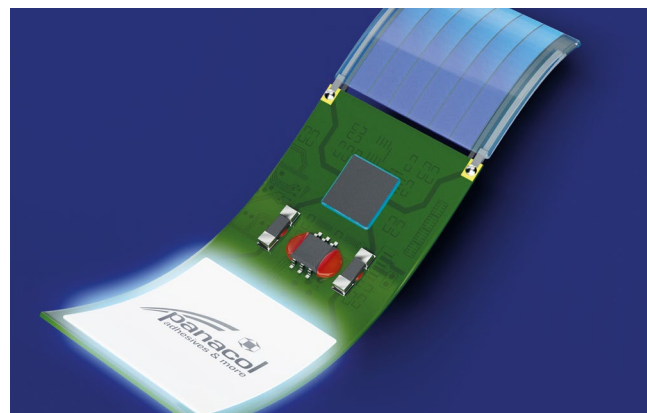
Electrical Connections or Shielding

There is hardly any other area where miniaturization and power density are as advanced and relevant as in automotive electronics. Material requirements are demanding! Precise adhesive deposits must be made in complex component geometries. Fast curing is essential, and a form-fit and long-lasting material connection must be achieved to replace traditional solder applications. This market also demands lower thermal curing temperatures, low electrical contact resistance, and consistent performance.



| Typical Electrically Conductive Adhesives | | | | | | |
|---|---------------------------------------|---|--------------|---|------------|--|
| Adhesive | Application | Viscosity [mPas] | Base | Volume resistivity ($\Omega \cdot \text{cm}$) | Curing* | Characteristics |
| Elecolit® 3025 | Heat-sensitive components | 80,000 - 90,000 Rheometer 10s^{-1} | 2-part Epoxy | 10^{-3} | RT/thermal | Cures at room temperature |
| Elecolit® 3653 | Potting for PCB | 4,000 - 8,000 Rheometer 10s^{-1} | 1-part Epoxy | 10^{-3} | thermal | Vibration resistant |
| Elecolit® 3655 | SMD Packaging, LED Die Attach | 5,000 - 15,000 Rheometer 10s^{-1} | 1-part Epoxy | 10^{-4} | thermal | High Tg, high ionic purity |
| Elecolit® 3656 | SMD Packaging, LED Die Attach | 50,000 - 70,000 Rheometer 10s^{-1} | 1-part Epoxy | 10^{-3} | thermal | Stable, high dimensional stability, suitable for jetting |
| Elecolit® 3661 | Flexible circuit carriers, Die Attach | 20,000 - 40,000 Rheometer 10s^{-1} | 1-part Epoxy | 10^{-3} | thermal | Stable, high dimensional stability |

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Flexible and Printed Electronics

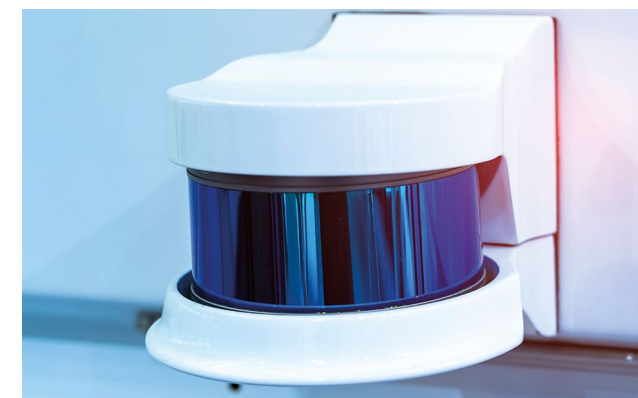
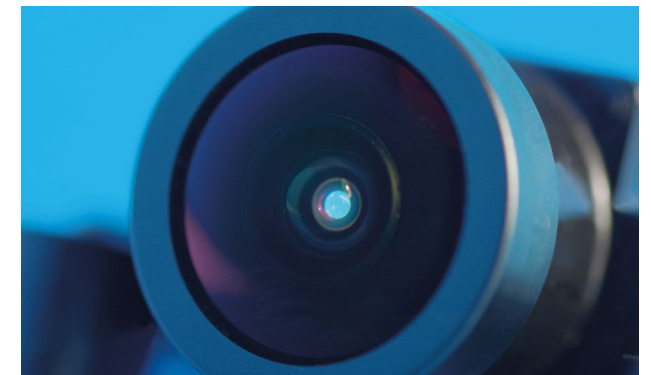
To produce design elements on curved surfaces, flexible substrates (Flex PCB) are increasingly being used in automotive electronics. For such applications, Panacol offers particularly flexible adhesives with low curing temperatures, good electrical conductivity and high chemical, mechanical and thermal resistance (e.g. to reflow processes). Some of the adhesives offer very fast curing times (snap cure) or curing by thermode or hot press.

| Typical Flexible Adhesives | | | | | |
|-----------------------------|------------------------------|---|--------------|----------------|--|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitalit® E-4451 MV F | Coating on FPCB | 2,000 - 3,000 Rheometer 10s^{-1} | Acrylate | UV/VIS/thermal | Elastic, dry surface |
| Elecolit® 3647-1 | Conductor contacting on FPCB | 7,000 - 12,000 Rheometer 10s^{-1} | 1-part Epoxy | thermal | Electrically conductive |
| Elecolit® 3648 | Conductor contacting on FPCB | 10,000 - 15,000 Rheometer 10s^{-1} | 1-part Epoxy | thermal | Electrically conductive, curing from 80 °C |

*UV = 320 - 390 nm; VIS = 405 nm, RT = Room temperature

Camera Systems / ADAS

Modern vehicles have a variety of optical sensors: cameras to assist with parking and reversing, as well as driver assistance systems and cameras to help with sign recognition, lane management, turning, and impact avoidance. These cameras are so small that mechanical fasteners cannot be used for attachment. Special adhesives, specifically matched to each substrate's properties, are utilized to bond camera housings and affix camera lenses and filters. Panacol's unique adhesives for active alignment provide high reliability and dimensional stability. They are low-shrink adhesives with no detrimental outgassing.



Lidar Systems

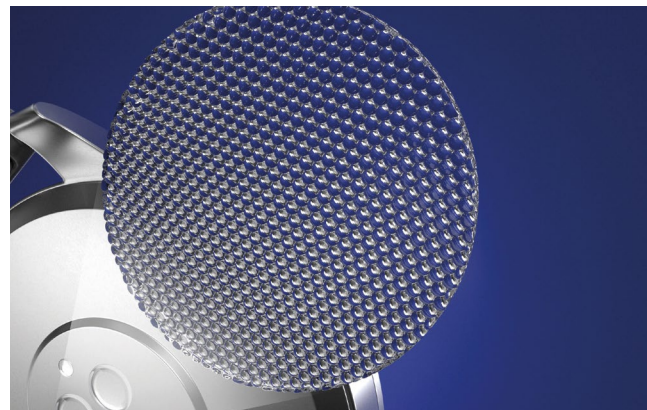
Other optical sensors used for driver assistance systems are lidar sensors. The high-performance demands placed on these systems can be enhanced with Panacol adhesives. Stress-free, high strength bonds are required to ensure consistent sensor performance. The adhesive bonds must be highly resistant to temperature fluctuations, changes in weather, as well as salt and chemical contact. Panacol offers an extensive line of adhesives, both acrylate and epoxy based, to meet these extreme challenges.

| Typical Adhesives for Camera and Lens Systems | | | | | |
|---|--|---|--------------|-----------------|---|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitalit® 1860 | Active Alignment, Glass Adhesive | 35,000 - 50,000 Rheometer 10s^{-1} | Acrylate | UV/VIS | Low coefficient of thermal expansion (CTE), low shrinkage |
| Vitalit® E-1671 T | Lidar & Radar | 40,000 - 55,000 Rheometer 10s^{-1} | 1-part Epoxy | UV/thermal | Stable, very low water absorption |
| Vitalit® E-4731 | Lidar & Radar, Flexible System | 900 - 1,500 LVT Sp. 3/30 rpm | Acrylate | UV/VIS | Stress equalizing, excellent adhesion to polymer materials |
| Vitalit® E-VBB 1 | Housing sealing, especially radar | 300 - 1,600 Rheometer 10s^{-1} | Acrylate | UV/VIS | High mechanical flexibility, stress equalizing |
| Vitalit® UC 1535 | Bonding of glass lenses and cameras | 28,000 - 38,000 Rheometer | 1-part Epoxy | UV | Transparent, low ion content (semicon grade), hard and scratch-resistant |
| Vitalit® UC 1536 | Bonding of glass lenses and cameras | 55,000 - 70,000 Rheometer 10s^{-1} | 1-part Epoxy | UV | Transparent, highly viscous variant of Vitalit® 1535 |
| Vitalit® UC 1658 | Diffraction optical elements | 75 - 200 LVT Sp. 2/30 rpm | 1-part Epoxy | UV | Mechanical flexibility, excellent adhesion to polymer materials |
| Vitalit® UD 5134 | Bonding of lenses to the housing | 15,000 - 25,000 Rheometer 10s^{-1} | Acrylate | UV/VIS/thermal | Low coefficient of thermal expansion (CTE), low shrinkage, suitable for plastics that are difficult to bond |
| Vitalit® UD 8057 | Optical potting, bonding of optical components | 2,000 - 4,000 Rheometer 5s^{-1} | Acrylate | UV/VIS/humidity | Moisture post-curing, highly transparent, low yellowing |

*UV = 320 - 390 nm; VIS = 405 nm, RT = Room temperature

Micro Lens Arrays (MLA) for Light Carpets

Light carpets are a special feature that project the car brand or other designs onto the ground below the doors. This is achieved with special MLA adhesives that can diffuse the light over a large area. Uniquely formulated refractive indices are used to produce individual lens systems. Panacol MLA adhesives are characterized by their long-term stability which provides resistance to yellowing during aging. Adhesive flow properties have also been optimized to produce customer-specific lens designs using the imprint process.



| Typical Adhesives for MLA & Light Carpets | | | | | |
|---|--------------------------------------|--|--------------|---------|--|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitralit® UC 1632 | MLAs and Light Carpets | 80 - 100 LVT Sp. 2/30 rpm | 1-part Epoxy | UV | Excellent glass adhesion, dimensionally stable, reflow-resistant, resistant to yellowing |
| Vitralit® UC 1633 | MLAs and Light Carpets | 170 - 230 Rheometer 10s ⁻¹ | 1-part Epoxy | UV | Excellent glass adhesion, dimensionally stable, reflow resistant, high yellowing stability |
| Vitralit® UC 1658 | Diffractional diffusers, MLA Imprint | 75 - 200 LVT Sp. 2/30 rpm | 1-part Epoxy | UV | Mechanical flexibility, excellent adhesion to polymers, low antimony content |

*UV = 320 - 390 nm; VIS = 405 nm, RT = Room temperature



Black & Light

Black adhesives are particularly in demand for optical and optoelectronic systems where a high optical density is required. In these applications, adhesives must minimize reflections (light shielding), or secure specific transmission values for sensors. Conventional black adhesives absorb a high percentage of the light intensity and therefore cannot be cured in thicker layers using UV light. With the new „Black & Light“ technology from Panacol, black adhesives can now be cured in deeper layers using UV light.

| Black & Light Adhesives | | | | | |
|-----------------------------|---------------------------------|--|--------------|---------|----------------------------------|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitralit® BL UC 1101 | Lens bonding Light shielding | 3,500 - 7,000 Rheometer 10s ⁻¹ | 1-part Epoxy | UV | Deep curing up to 1.3 mm |
| Vitralit® BL UC 1102 | Lens bonding Light shielding | 3,500 - 7,000 Rheometer 10s ⁻¹ | 1-part Epoxy | UV | OD value 4 with 0.45 mm Glop Top |
| Vitralit® BL UC 1103 | Lens bonding Light shielding | 3,500 - 7,000 Rheometer 10s ⁻¹ | 1-part Epoxy | UV | High OD values up to 6 |

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Interior Design

Customers who buy a car pay particular attention to the appearance and quality of the interior. The design of the dashboard must be convincing and attractive. But it is not just the visual appearance that plays a role here. Mechanical functionality, resistance to “spills”, and cabin quietness are also important points of consideration. Adhesive bonding provides more flexibility to design engineers, allowing them to be more imaginative with attachments, positioning, and soundproofing.



| Typical Adhesives for Interior Design | | | | | |
|---------------------------------------|--|--|--------------|---------------------|--------------------------------|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitralit® 1655 | Optical potting | 150 - 300 LVT Sp. 2/30 rpm | 1-part Epoxy | UV/thermal | Flexible, moisture-resistant |
| Vitralit® UC 6684 | Potting of cavities in interior lighting | 1,500 - 2,500 LVT Sp. 3/30 rpm | 1-part Epoxy | UV/VIS | Transparent, scratch-resistant |
| Vitralit® UD 8051 | Edge sealing of control elements | 11,000 - 14,000 Rheometer 10s ⁻¹ | Acrylate | UV/VIS/ moisture | Dual curing, black color |

*UV = 320 - 390 nm; VIS = 405 nm, RT = Room temperature



Cured-In-Place-Gaskets (CIPG)

CIPGs protect housed electronic components from contaminants and moisture. CIPG applications include electronic control units (ECU), cameras, sensors, on-board chargers (OBC) and battery disconnect units (BDU). Panacol CIPG materials are dispensed as high viscosity (gel) liquids. They can be applied to simple or complex component geometries, and then cured in seconds with UV/visible light. This can be an in-line process, as the cured CIPG is immediately ready for the next phase of the assembly process. With the adhesion of an adhesive, the CIPG will bond to one surface, preventing it from shifting or falling off during travel to the next process.

| Typical Adhesives for Liquid Seals and CIPGs | | | | | |
|--|--------------|--|----------|---------|---|
| Adhesive | Application | Viscosity [mPas] | Base | Curing* | Characteristics |
| Vitralit® CIPG 60102 | Housing seal | 15,000 - 40,000 Rheometer 10s ⁻¹ | Acrylate | UV/VIS | Flexible, low compression set |
| Vitralit® 5140 VT | Sealing | 5,000 - 10,000 Rheometer 10s ⁻¹ | Acrylate | UV/VIS | Flexible, high resistance to climate changes and moisture |

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Process Solutions with Hönle UV Technologies

Dr. Hönle AG is an international supplier of UV technology and offers curing units with UV LEDs and conventional medium-pressure lamps. Hönle and Panacol attach great importance to joint research and development. The combination of decades of experience leads to optimally coordinated high-tech system products for bonding applications.

LED Spotlights
High-intensity punctiform UV irradiation



LED Curing Chambers
Reliable protection against UV radiation

LED Line Emitters
High-power arrays with individual length



LED Conveyor Belts
Can be combined with LED Powerline or LED Spot for high output

LED Floodlights
Homogeneous light distribution with high intensity



UV-Measurement
Measurement of intensity and dose for reliable process monitoring

| UV Sources | Dimension in mm | Available Wavelength in nm | Intensity in mW/cm ² | Cooling |
|---------------------|---|----------------------------|---------------------------------|----------------------|
| LED Spotlights | Light emission up to Ø 20 | 365/385/405 | up to 20.000 | air-cooled |
| LED Line Emitters | Light emission width 10/20/40, length variable | 365/385/395/405/460 | up to 25.000 | air and water-cooled |
| LED Floodlights | Light emission 20x20 / 40x40 / 100x100 / 200x50 | 365/385/395/405/460 | up to 30.000 | air and water-cooled |
| LED Curing Chambers | Inner dimension 180x180 / 350x350 | 365/385/395/405/460 | up to 5.000 | air-cooled |
| LED Conveyor Belts | Belt width 110 - 520 | 365/385/395/405/460 | up to 25.000 | air and water-cooled |



Panacol-Elosol GmbH
Stierstädter Straße 4
61449 Steinbach
GERMANY
Phone: +49 6171 6202-0
info@panacol.de
www.panacol.com

Dr. Hönle AG
Nicolaus-Otto-Straße 2
82205 Gilching
GERMANY
Phone: +49 8105 2083-0
uv@hoenle.de
www.hoenle.com

Panacol-USA, Inc.
142 Industrial Lane
Torrington CT 06790
USA
Phone: +1 860 738 7449
info@panacol-usa.com
www.panacol-usa.com

Eleco Panacol – EFD
125, av Louis Roche
Z.A. des Basses Noëls
92238 Gennevilliers Cedex
FRANCE
Phone: +33 1 47 92 41 80
eleco@eleco-panacol.fr
www.eleco-panacol.fr

Panacol-Korea Co., Ltd.
#707, Kranz Techno
388 Dunchon-daero
Junwon-gu, Seongnam
Gyeonggi-do, 13403 KOREA
Phone: +82 31 749 1701
moon@panacol-korea.com
www.panacol-korea.com

Hoenle UV Technology Trading (Shanghai) Co., Ltd
Room 821, No. 800
Cimic Building Pudong
Shanghai 200120, CHINA
Phone: +86 21 64 73 02 00
info@hoenle.cn
www.panacol.cn