hönle group

panacol adhesives & more

Smart Adhesive Solutions for PCBs

Innovative Adhesives and Potting Compounds for Automotive, Consumer Electronics and Medical Devices

Conductive Adhesives
Flip Chip Underfills
SMD Bonding
UV Coatings
Glob Tops

Adhesive Applications on The Printed Circuit Board

Adhesives are commonly used to attach surface-mounted components to printed circuit boards (PCBs). When formulated to be Glob Tops, coatings, and underfills, adhesives provide protection for chips and sensitive components. Electrically conductive adhesives offer greater flexibility and impact resistance for delicate wire connections.
Panacol provides a broad portfolio of adhesives that possess the necessary properties for PCB assembly, including strong adhesion, halogen purity and high resistance to chemicals, thermal shock and vibration.

Curing Systems

System solutions for your bonding applications from a single source: As a member of the Hönle Group, Panacol offers LED UV and UV curing equipment to match our UV-curing adhesives via our partner Dr. Hönle.

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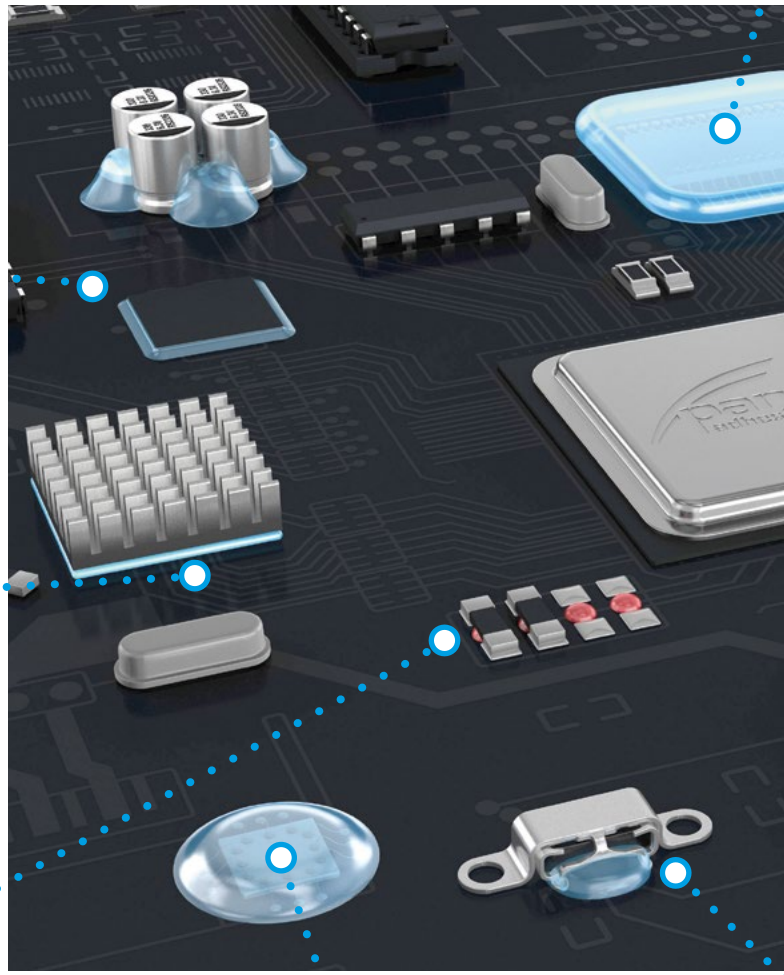

Underfill

Underfills are used in electronic assemblies for mechanical stabilization of flip chips, which is of critical importance in BGA (Ball Grid Assembly) packaging.

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Thermally Conductive Adhesives for Power Electronics

Adhesives with thermal conductivity are used to dissipate heat on power electronics. To optimize their performance and lifetime in every application, adhesives with metallic, inorganic, ceramic or mineral fillers are available to provide the highest level of thermal conductivity.

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SMD and Component Protection

UV and structural adhesives are suitable for securing SMDs and other components before reflow soldering. The components remain secured in place during the soldering process and provide additional stability afterwards.

more info on page 7

Glob Top Encapsulants

Epoxy resin based materials are used in electronics assembly as Glob Tops to protect electronic components. The Glob Top material protects the components from moisture, dust, dirt, solvents, and physical impact. Opaque Glob Tops can also hide sensitive information from being easily viewed. Sensitive components are optimally protected by Glob Tops under heavy mechanical loads.

more info on page 6

Frame & Fill

Protecting highly sensitive areas or sensitive information with adhesives? The combination of high and low viscosity Frame & Fill adhesives makes it possible.

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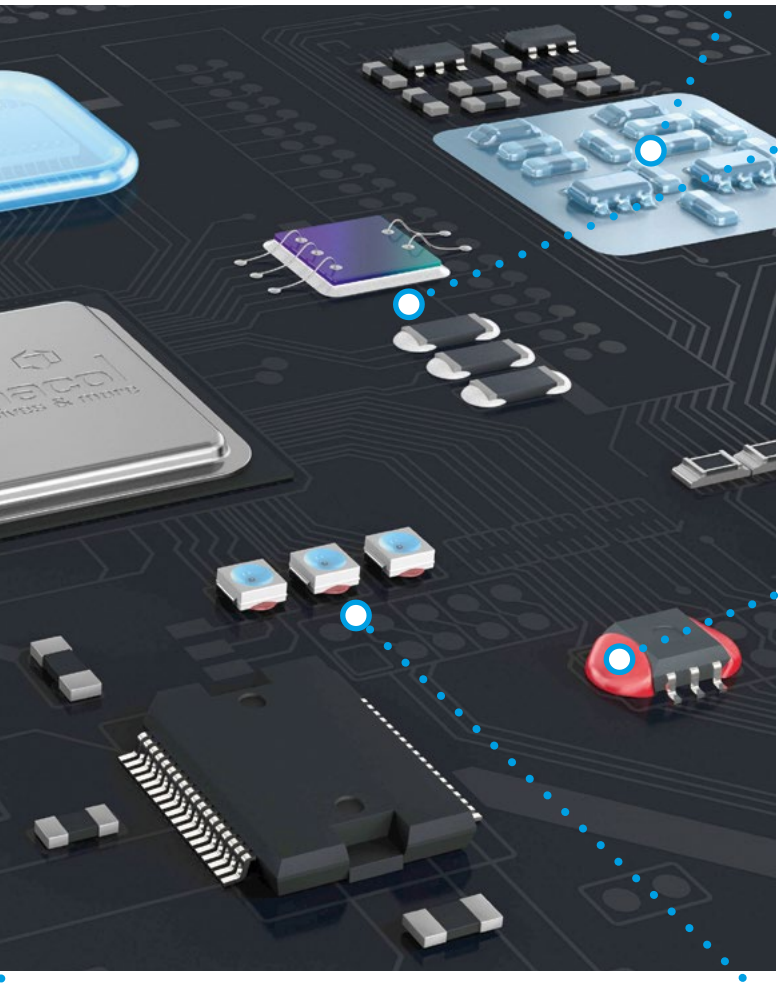
Conformal Coating

Panacol UV acrylates and epoxy-based adhesives are used to coat electronic components for the purpose of environmental protection. These adhesives are silicone and solvent-free, and can be spray dispensed to selectively coat various size areas.

more info on page 8



Electrically Conductive Adhesives (Die Attach)

Electrically conductive adhesives are the perfect solution for electrical contacting on printed circuit boards and other temperature-sensitive or flexible materials. Unlike solder pastes, these adhesives offer the ability to attach and contact components in one step. They are solvent and lead-free, and cure at low temperatures.

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Edge Bonding

Panacol also offers various adhesives for mechanically securing components to PCB's. Securing capacitors, chips and many other elements on PCBs by means of edge bonding creates mechanical robustness and reliability, even under high thermal and mechanical stress.

more info on page 10

Connector Bonding

Connector attachment can involve a wide variety of materials including metals and plastics, some of which possess low surface energy and can be difficult to bond. Panacol offers several adhesives for potting and bonding that successfully address these challenges. Dual cure adhesive options allow them to be applied to surfaces with shadowed areas.

more info on page 8

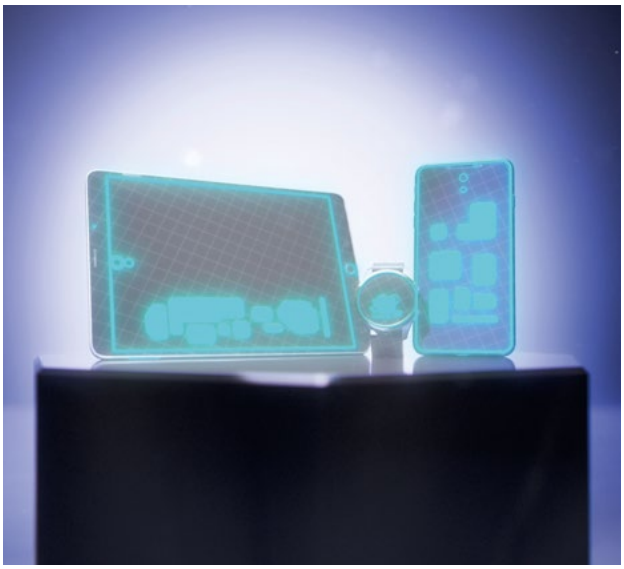
Bonding of Optoelectronic Components

Special optically transparent and non-yellowing UV-curing adhesives for optics, fiber optics, and optoelectronics facilitate reliable attachment of diodes, LEDs, and camera modules. Collector photodiodes and optical fibers for recording optical signals or lenses, and other camera segments, can be aligned and bonded with these low-shrinkage adhesives.

more info on page 9

Automotive

Panacol supports the advancement of automotive technology with innovative adhesives, protective coatings, and conductive materials. Vitralit®, Structalit® and Elecolit® brand adhesives make it possible to design and manufacture reliable electrical circuits, responsive interior lighting, environmentally protected sensors, and durable camera systems for e-mobility. Panacol adhesives meet the rigorous requirements assigned to automotive components. All adhesives deliver high adhesion and excellent resistance to temperature variation, chemicals, vibration, and environmental stress. Adhesive performance can be customized for each specific application.



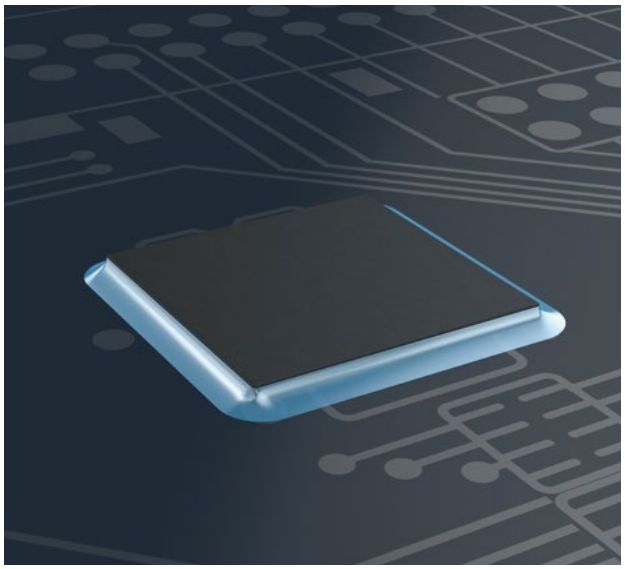
Consumer Electronics

Our adhesives for consumer electronics enable production of lightweight designs with higher performance. Panacol's Vitralit®. Elecolit® and Structalit® brand adhesives produce high strength bonds with materials and components typically used in PCB and flex circuit assembly. This results in improved impact resistance, more secure wire bond connections, and optimized thermal management for long-life performance. Panacol offers adhesives that are low-ion, halogen-free, and RohS compliant. Many Vitralit® UV adhesives contain secondary curing capability initiated by heat or moisture. These adhesives are suited for fully automated, large-scale production as well as lower volume, manual assembly operations.

Medical Technology

Panacol formulates state-of-the-art adhesive technology to support the continuous innovation within the medical device industry. Advancements in wearables and minimally invasive devices demand higher performance adhesives. All of Panacol's medical grade adhesives are certified according to ISO-10993 and/or USP Class VI standards and are compatible with all common sterilization processes. Fast curing UV adhesives are suitable for precise production with fast cycle times. They are transparent, non-yellowing, and possess improved bond strength to low energy surfaces, including polyimide, Pebax®[1] and PEEK. Fluorescing adhesives are available for automated quality control.

1 Pebax® is a registered trademark of Arkema.



Underfills

Epoxy resin-based underfill adhesives can be used to mechanically stabilize and equalize stresses in electronic assemblies. They are specifically designed to support flip-chip soldering. To reduce the coefficient of thermal expansion (CTE), some of the adhesives are filled with nanofillers. Their capillary flow behavior enables fast and easy application, even in the smallest gaps. In addition to traditional epoxy systems, dual-curing UV adhesive systems can be utilized underfillers. Dual-cure adhesives provide fast fixturing from UV curing. Post-curing with heat ensures a complete cure under components and in areas shadowed from UV light.

Adhesives for Flip Chip Underfills

Adhesive	Viscosity [mPas]	Thermal expansion below Tg [ppm/K]	Base	Curing*	Ionic purity	Characteristics
Vitralit® 2655	150 - 300 LVT, Sp. 2/30 rpm	<100	Epoxy	UV/thermal	●	Flexible, low viscosity
Structalit® 5751	200 - 500 Rheometer, $10s^{-1}$	30 - 60	Epoxy	5 min/150°C 40 min/100°C	●	Reworkable above 150°C, black color with yellow fluorescence, jettable, compatible with Edge Bonder Structalit® 5705
Structalit® 8202	300 - 400 Rheometer, $10s^{-1}$	30 - 60	Epoxy	5 min/150°C 10 min/130°C	●	Very fast curing, capillary flow behavior, low CTE, high glass transition temperature

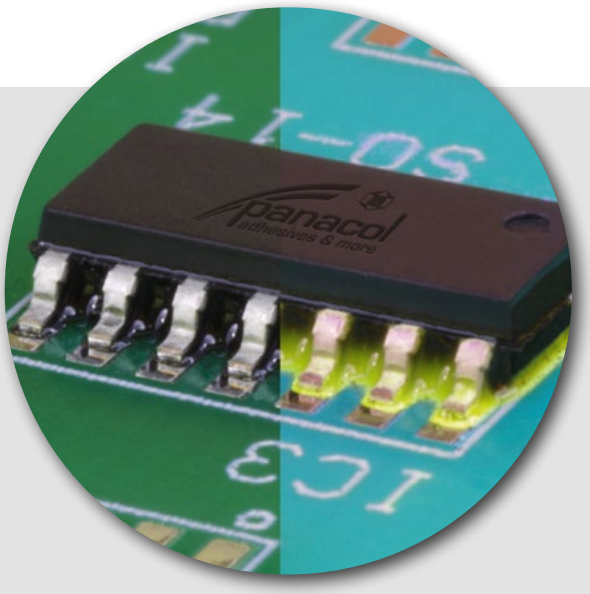
*UV = 320 - 390 nm; ● Semicon grade: DIN-EN ISO 10304-1 (D20); ● Electronic grade: (IEC 61249-2-21)

Reworkability

makes it possible to process, repair or recycle electronic products after assembly. This point is becoming increasingly important as legislation and environmental associations continue to drive forward the minimization of electronic waste.

Several Panacol underfills (see above) and edge-bonding adhesives (see p. 10) are designed for this „reworkability“: they can be removed again when exposed to temperatures above the glass transition range of 150°C.

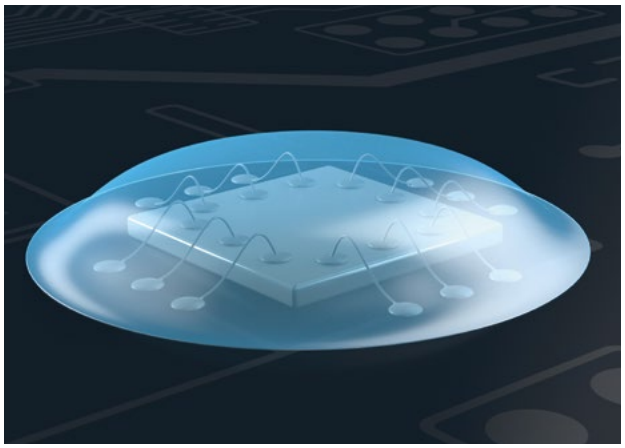
The epoxy resins adhere reliably up to this temperature and application range. Only above this critical temperature threshold is it possible to process the product.



To make the adhesives easily recognizable, the black adhesives (left) fluoresce yellow (right) when excited with short-wave light.

Glob Top Encapsulants

Glob Tops from Panacol are solvent-free and many have a high ion purity. UV-curing Glob Tops enable high cycle times for automated production.For components shielded from UV light, UV Glob Tops with secondary moisture or thermal cure are available. If UV curing is not an option, a selection of fast curing Glob Top materials with primary thermal cure are offered. These adhesives have high peel and shear strength, are easy to process, and withstand reflow processes without any problems.



Adhesives for Glob Tops						
Adhesive	**Viscosity [mPas]**	**Tg DSC [°C]**	**Curing***	**Resistance [°C]**	**Ionic purity**	**Characteristics**
Structalit® 5891	25 000 - 50 000 Rheometer, $10s^{-1}$	110 - 130	5 min/150°C 60 min/100°C	-40 to +180	●	Fast curing at low temperatures, excellent shock resistance, very high chemical resistance
Structalit® 8801	30 000 - 45 000 LVT, Sp. 4/6 rpm	125 - 140	1 min/180°C 3 hrs/80°C	-40 to +200	●	Short curing times at low temperatures, very good resistance to grease, oil and media
Structalit® 8838	6 500 - 7 500 Rheometer, $20s^{-1}$	15 - 25	5 min/150°C 30 min/80°C	-40 to +200	●	Jettable, low glass transition temperature, flexible, shear-thinning, compatible with flux materials, resistant to temperature changes and moisture
Vitralit® BL UC 1101	3 500 - 7 000 Rheometer, $10s^{-1}$	130 - 150	UV	40 to +180	●	Black&Light technology, low shrinkage
Vitralit® E-1671	9 000 - 14 000 Rheometer, $10s^{-1}$	110 - 120	UV/thermal	-40 to +180	●	Stable, dispensable wet-in-wet with fill materials, very high ion purity
Vitralit® UD 8050	8 000 - 11 000 Rheometer, $5s^{-1}$	50 - 65	UV/VIS + moisture	-40 to +130	●	Easy to dispense, fast curing, compatible with flux materials, shear-thinning

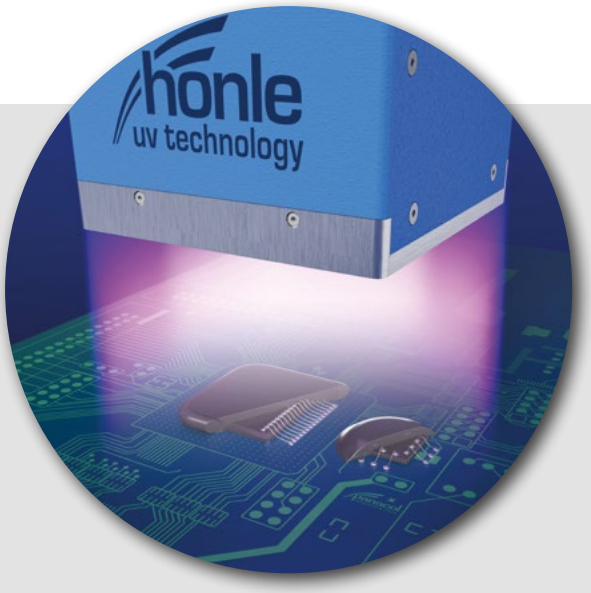
*UV = 320 - 390 nm, VIS = 405 nm; ● Semicon grade: DIN-EN ISO 10304-1 (D20); ● Electronic grade: (IEC 61249-2-21)

Black&Light

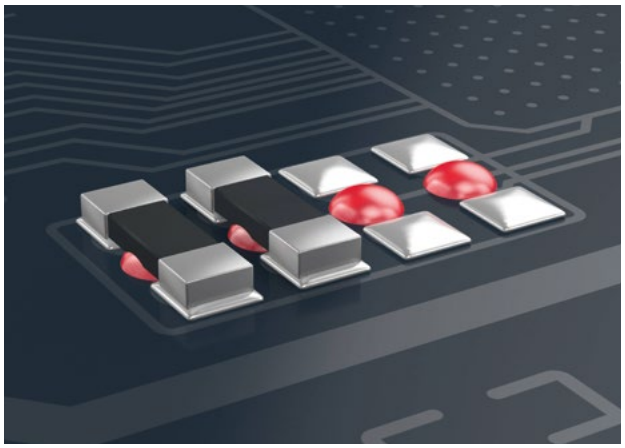
Conventional black adhesives absorb a high percentage of light intensity which limits the adhesives' depth of cure. With the new "Black&Light" technology from Panacol, black adhesives can be cured in deeper layers (up to a few millimeters) using uv light.

During the curing process, the "Black&Light" technology within the adhesive enables the UV rays to penetrate and complete a full cure.

Once the adhesive polymerization is complete, the structure of the adhesive prohibits light transmission again.



Black adhesives with high optical density can be cured in a single curing step with uv light only.



SMD and Component Protection

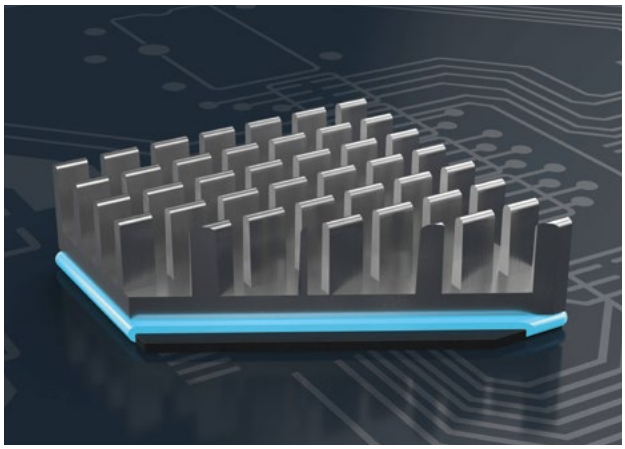
For attaching SMDs, both UV-curing and purely thermal curing adhesives are available. They are optimized to cure in the shortest possible time to enable fast cycle times. Due to their high temperature resistance, they are also suitable for reflow processes. For optimum quality control during production, the adhesives are available in red coloration or with fluorescence upon request. Their rheological properties make Panacol's SMD adhesives suitable for precise dispensing processes including jetting.

Adhesives for Protecting Components and SMDs

Adhesive	Viscosity [mPas]	Curing*	Resistance [°C]	Shore hardness	Ionic purity	Characteristics
Structalit® 3060-1	4 000 - 8 000 Rheometer, $10s^{-1}$	<1 Min./180°C 5 Min./120°C	-40 to +180	D 40 - 60	●	High flexibiliy, fast curing
Structalit® 5604	25 000 - 40 000 Rheometer, $10s^{-1}$	4 min/150°C 50 min/100°C	-40 to +180	D 75 - 90	●	Fast curing, red color, resistant to solder temperatures up to 270°C (max. 5 minutes)
Structalit® 5606 F	22 000 - 30 000 LVT, Sp. 4/6 rpm	7 min/150°C 55 min/100°C	-40 to +180	D 67	●	Fast curing at low temperatures, easy to dispense, screen printable, pin transferable
Structalit® 5610	20 000 - 40 000 Rheometer, $10s^{-1}$	1 min/150°C 5 min/110°C	-40 to +180	D 55 - 65	●	Extremely fast curing at low temperatures, high temperature resistance, red color
Vitralit® UV 2115	20 000 - 30 000 Rheometer, $33s^{-1}$	UV/VIS	-40 to +150	D 55 - 65	●	Low shrinkage, low thermal expansion, hard and dry surface, fast curing, resistant to moisture

Thermally Conductive Adhesives for Power Electronics

Thermally conductive adhesives dissipate heat while ensuring strong adhesion, protecting electronic components. They bond seamlessly to heat sinks and can be both thermally and electrically conductive or electrically insulating. Panacol offers UV-curing adhesives with secondary thermal cure for fast fixturing, as well as single- and two-component materials with heat-accelerated curing. These epoxy-based adhesives withstand temperatures up to 200°C after curing.



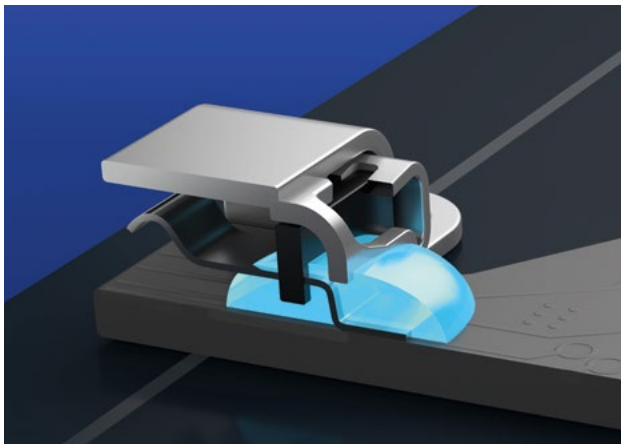
Thermally Conductive Adhesives

Adhesive	Typical application	Viscosity [mPas]	Thixo-Index	Base	Curing	[W/mK] Values	Ionic purity	Properties
Elecolit® 6601	Heat sinks, sensor	12 000 - 20 000 LVT, Sp. 4/6 rpm	1.3 - 1.5	1-part epoxy	5 min/150°C 70 min/100°C	0.7 - 0.9		Very high adhesion to metals, easy to dispense
Elecolit® 6603	Bonding of heat sinks and magnetse	20 000 - 40 000 Rheometer, $10s^{-1}$	1.4 - 2.4	1-part epoxy	4 min/150°C 50 min/100°C	1.2 - 1.4		Very high adhesion to metals, very good vibration and temperature resistance
Elecolit® 6607	Flexible interconnect devices, die attach	50 000 - 65 000 Rheometer, $5s^{-1}$	1.6 - 1.7	1-part epoxy	10 min/150°C 60 min/80°C	0.8 - 1.0	●	Low coefficient of thermal expansion (CTE), curing from 80°C
Elecolit® 6616	Heat-sensitive components	50 000 - 120 000 Rheometer, $10s^{-1}$	2 - 3	2-part epoxy	24 hrs/RT 120 min/80°C	0.9 - 1.1	●	Curing at RT possible, short cycle times at high temperatures, screen printable, stamp printable, very high dielectric strength (> 30 kV/mm)

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

Connector Bonding

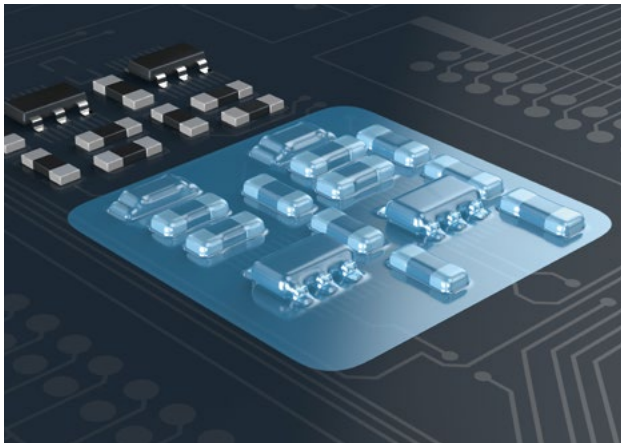
Panacol's latest generation of structural and UV-curing adhesives developed for connector bonding possess very low halogen content. They have been developed to meet the bonding requirements associated with consumer and automotive electronics assembly. Adhesives for connector bonding are ideal for temperature-sensitive materials, as they can be cured at temperatures as low as 60°C. Panacol adhesives produce high strength bonds with materials typically used in electronic component assembly. This reliably secures components through shock and vibration.



Adhesives for Connector Bonding						
Adhesive	**Viscosity [mPas]**	**Curing***	**Resistance [°C]**	**Shore hardness**	**Ionic purity**	**Characteristics**
Structalit® 5511	800 - 1 200 Rheometer, $10s^{-1}$	10 min/120°C 40 min/60°C	-40 to +150	D 50 - 65	●	Low ion content, high E-Modulus, high elongation at break, resistant to vibrations & shock, excellent adhesion to LCP and PBT
Structalit® 5521	1 200 - 2 000 Rheometer, $10s^{-1}$	10 min/120°C 40 min/60°C	-40 to +150	D 60 - 80	●	Flexible, low E-Modulus, excellent adhesion to LCP and PBT, ideally suited for temperature-sensitive substrates
Structalit® 5531	5 000 - 10 000 Rheometer, $10s^{-1}$	5 min/150°C 40 min/60°C	-40 to +180	D 55 - 70	●	Low CTE, excellent adhesion to LCP and PBT, resistant to chemicals and vibrations, for temperature-sensitive substrates
Vitralit® UD 5180 / Vitralit® UD 5180 MV	4 000 - 6 000 / 6 000 - 11 000 Rheometer, $10s^{-1}$	UV/thermal	-40 to +200	D 20 - 35	●	High adhesion to flexible conductive paths and metals, low ion content
Vitralit® UD 8055	4 000 - 7 000 Rheometer, $10s^{-1}$	UV/VIS + moisture	-40 to +150	D 65 - 75	●	High Tg, fast curing, compatible with flux, low ion content
Vitralit® UD 8056	3 000 - 6 000 Rheometer, $10s^{-1}$	UV/VIS + moisture	-40 to +150	D 60 - 80	●	Passed UL94 HB test, high Tg, fast curing, compatible with flux, low ion content

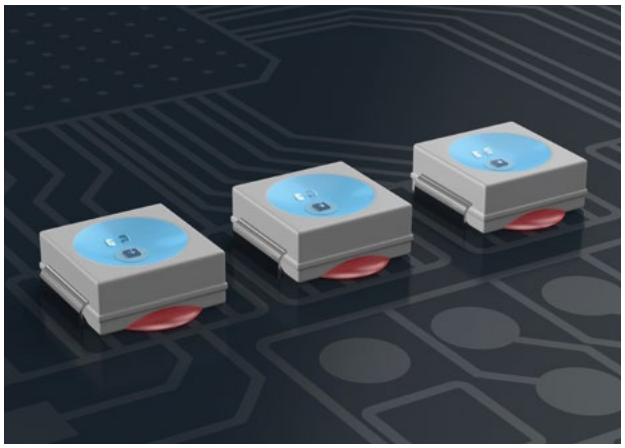
Conformal Coating

To protect component groups and PCBs from environmental influences such as moisture, dust, dirt or chemicals, Panacol offers a series of UV curable coating materials. They can be applied quickly over large areas using spray valves that ensure precise placement and uniform thickness. These UV curable coatings are suitable for fast processing, as dispensing and curing can be performed in-line with no waiting period. Panacol provides both acrylate and epoxy-based UV coatings in multiple viscosities and performance properties permitting application-specific optimization.



Adhesives for Conformal Coatings						
Adhesive	**Viscosity [mPas]**	**Curing***	**Resistance [°C]**	**Shore hardness**	**Ionic purity**	**Characteristics**
Vitralit® 2004 F	60 - 100 LVT, Sp. 2/30 rpm	UV/thermal	-40 to +180	D 15 - 25	●	Post-curable in shadowed areas, fluorescent, high resistance to chemicals, sprayable, optimized low-viscous flow behavior, flexible, autoclavable
Vitralit® 2009 F	100 - 200 LVT, Sp. 2/30 rpm	UV/thermal	-40 to +180	D 20 - 40	●	Flexible, very high resistance to chemicals, autoclavable, fluorescent
Vitralit® E-4451 MV F	2 000 - 3 000 Rheometer, $10s^{-1}$	UV/VIS	-40 to +130	A 20 - 40		Soft and elastic, fast curing, dry and tack-free surface after curing, flourescent
Vitralit® UD 8050 LV	200 - 400 Rheometer, $5s^{-1}$	UV/VIS + moisture	-40 to +120	A 70 - 90	●	Tack-free surface, compatible with flux, short-term stable up to 150 °C, fast curing

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



Bonding Optoelectronic Components

Panacol's light-curing adhesives for opto-electronics offer low shrinkage, high Tg values, and reliable impact resistance. They are well suited for bonding applications involving optics, fiber optics, and optical alignment. Their physical properties enable very low-stress, durable bonding. They are extremely resistant to temperature, moisture and chemicals. Non-yellowing, optically transparent adhesives are also available for bonding in the light path.

Adhesives for Bonding on Optoelectronic Components

Adhesive	Viscosity [mPas]	Curing*	Resistance [°C]	Shore hardness	Ionic purity	Characteristics
Vitralit® UC 1618	500 - 1 000 LVT, Sp. 3/30 rpm	UV/VIS	-40 to +175	D 70 - 90	●	High transmission, high glass transition temperature, low shrinkage, outstanding chemical resistance
Vitralit® UD 5134	15 000 - 25 000 Rheometer, $10s^{-1}$	UV/VIS/ thermal	-40 to +150	D 70 - 85	●	Low thermal expansion, low shrinkage, impact resistant, dry surface, grey color, ideally suited for dissimilar substrates
Vitralit® UV 2113 **Vitralit® UV 2115**	19 000 - 32 000 Rheometer, $10s^{-1}$ 20 000 - 30 000 Rheometer, $50s^{-1}$	UV/VIS	-40 to +150	D 70 - 80	●	Acrylate, very stable, highly filled, low thermal expansion, low shrinkage, impact resistant, resistant to solder processes, dry surface
Vitralit® UV 2121	30 000 - 70 000 Rheometer, $10s^{-1}$	UV/VIS	-40 to +150	D 55 - 65	●	Low shrinkage, low thermal expansion, hard and dry surface, fast curing, resistant to moisture

Potting

Potting materials from Panacol provide fast curing solutions to challenging potting applications. They achieve excellent results with their high media resistance after tests. Whether epoxy resin-based or acrylate, Panacol potting materials, are solvent-free and fast curing, making them ideal for large-volume, fully automated production. UV curable materials are available for shallow potting, and UV/thermal and UV/ moisture curing materials overcome the challanges of deep potting and shadows.

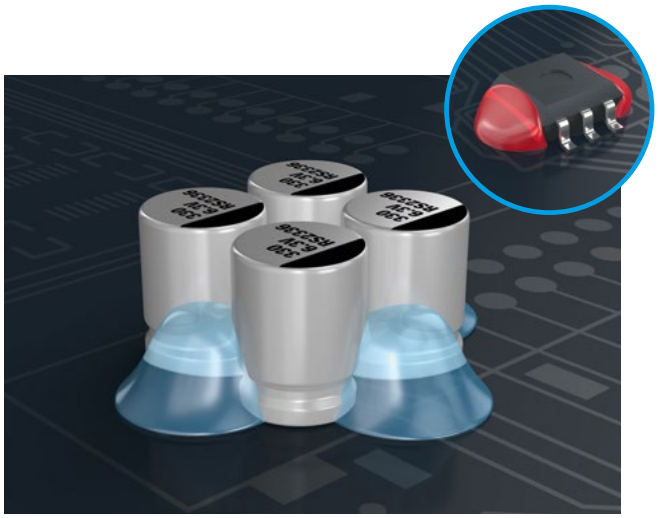
Adhesives for Potting

Adhesive	Viscosity [mPas]	Curing*	Resistance [°C]	Shore hardness	Ionic purity	Characteristics
Structalit® 5801	12 000 - 15 000 LVT, Sp. 4/30 rpm	30 min/80°C 12 hrs/RT	-40 to +180	D 70 - 80	●	2-part epoxy with high resistance to grease, oil, chemicals and moisture, low shrinkage, low water absorption, high adhesion to metals, glass and plastics
Structalit® 5802	40 000 - 60 000 Rheometer, 10s-1	15 min/80°C 7hrs/25°C	-40 to +180	D 65 - 85	●	Good oil, chemical and moisture resistance, low shrinkage, low water absorption,
Structalit® 5810-1	3 000 - 4 000 LVT, Sp. 4/30 rpm	3 min/150°C 14 hrs/RT	-40 to +180	D 60 - 80	●	2-part epoxy with high resistance to moisture and chemicals
Structalit® 8801	30 000 - 45 000 LVT, Sp. 4/6 rpm	1 min/180°C 3 hrs/80°C	-40 to +200	D 80 - 90	●	Short curing cycles at low temperatures, very high resistance to grease, oil and media, biocompatability certified according to ISO 10993-5
Vitralit® 8050 MV F	2 500 - 4 000 Rheometer, $5s^{-1}$	UV/VIS + moisture	-40 to +120	D 55 - 70	●	Fluorescing, easy to dispense, fast curing, compatible with flux materials, shear-thinning

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

Edge Bonding

Adhesives for edge bonding ensure reliable stability of the mounted components by relieving stresses in sensitive joints. The increased bonded surface area around the component enables them to better maintain their functionality during fatigue cycling, vibration, and impact shock. These adhesives offer excellent bond strength, high temperature and chemical resistance, and exhibit low shrinkage behavior after curing. Several viscosity ranges are available to accommodate unique component configurations and dispensing methods.



Adhesives for Edge Bonding

Adhesive	Viscosity [mPas]	Curing*	Resistance [°C]	Shore hardness	Ionic purity	Characteristics
Structalit® 5705	7 000 - 12 000 Rheometer, $10s^{-1}$	15 min/150°C 60 min/100°C	-40 to +180	75 - 90	●	Fluorescing, jettable, halogen-free, compatible with underfiller Structalit® 5751, re-workable above 150°C
Vitralit® 1671	9 000 - 14 000 Rheometer, $10s^{-1}$	UV/thermal	-40 to +180	80 - 90	●	Stable, appliable wet-in-wet with filling material, high ion purity, high thermal conductivity, low water absorption, passed UL94 HB test
Vitralit® 4731 VT	4 000 - 8 000 Rheometer, $10s^{-1}$	UV/VIS	-40 to +120	20 - 40	●	Dry surface, flexible and tear-resistant, high adhesion on many plastics and dissimilar substrates
Vitralit® 6104 VT	8 000 - 17 000 Rheometer, $10s^{-1}$	UV/thermal	-40 to +200	45 - 60	●	Stable filled material for attaching large components, high adhesion to metals and sintered substrates

Electrically Conductive Adhesives (Die Attach)

Panacol's Elecolit® series is ideal for die attach and semiconductor bonding, enabling electrical connections on flexible and temperature-sensitive substrates. Adhesive curing temperatures are far below soldering temperatures as well as the tolerances of most temperature-sensitive components. Except for a few selections, the adhesives are single-component and can be applied by manual dispense, stencil printing, or jet printing. They are characterized by low shrinkage, excellent adhesion to FR4 and metals, and high chemical, mechanical and thermal resistance.

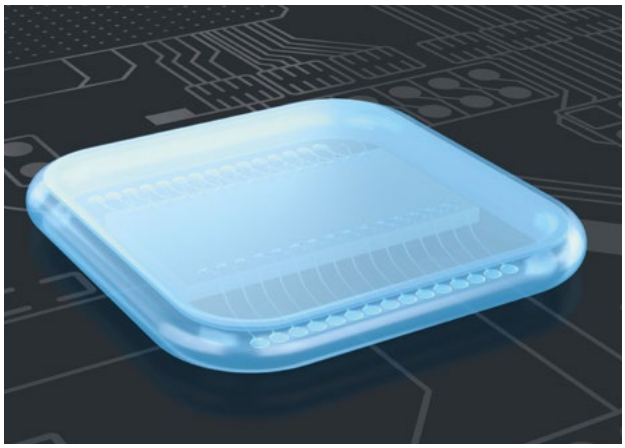
Electrically Conductive Adhesives (Die Attach)

Adhesive	Application	Viscosity [mPas]	Base	Curing	[W/mK] Values	Volumen-resistance in Ω • cm	Ionic purity	Properties
Elecolit® 3025	Temperature-sensitive components	80 000 - 90 000 Rheometer, $10s^{-1}$	2-part epoxy	24 hrs/RT 15 min/120°C	> 1.6	10^{-3}		Curing at RT
Elecolit® 3648	Contacting on Flex PCBs & OPV	10 000 - 15 000 Rheometer, $10s^{-1}$	1-part epoxy	< 1 min / 115°C 30 min/80°C	3 - 4	10^{-4}	●	Very flexible, snap cure, curing with thermode possible
Elecolit® 3653	Flexible bonding of components	4 000 - 8 000 Rheometer, $10s^{-1}$	1-part epoxy	5 min/150°C 4 hrs/80°C	1.8 - 2.2	10^{-3}	●	Ideal for parts subjected to high vibrations
Elecolit® 3655	Bonding components, semiconductors	5 000 - 15 000 Rheometer, $10s^{-1}$	1-part epoxy	30 min/150°C 60 min/120°C	8.5 - 9.5	10^{-4}	●	High Tg (- 150°C), low ion content (Na+, K+, Cl- <10ppm)
Elecolit® 3661	Flexible interconnect devices	20 000 - 40 000 Rheometer, $10s^{-1}$	1-part epoxy	10 min/150°C 6 hrs/80°C	1.8 - 2.2	10^{-3}	●	Stable, shape retaining

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

Frame and Fill

Components can be protected through an encapsulation process known as „frame and fill“. Two adhesives of different viscosities are dispensed wet-on-wet. First, a bead of high viscosity adhesive is dispensed on the PCB that encircles the component (Frame). Second, the area within the bead, is filled with a low viscosity adhesive (Fill). Their properties are matched to the component configuration and the performance required from the assembled PCB. Structalit® series adhesives are single-component, thermally curing materials with low ionic content.



They are available in black color for technology protection. Black UV adhesives from the Vitralit® series are available with Panacol‘s Black&Light technology for low heat stress and fast UV curing.

Frame and Fill Adhesives for Semiconductor Applications

Adhesive	Application	Viscosity [mPas]	Base	Curing*	Ionic purity	Characteristics
Structalit® 5704	Frame-Material	60 000 - 100 000 Rheometer, $10s^{-1}$	Epoxy	30 min/120°C + 45 min/150°C	●	Black color, stable, suited as frame material in combination with Structalit® 5717-5722 fill materials, no bleeding, high glass transition temperature
Structalit® 5717	Fill-Material	3 000 - 8 000 Rheometer, $5s^{-1}$	Epoxy	30 min/120°C + 30 min/150°C	●	Very good flow properties, high glass transition temperature, no bleeding
Structalit® 5719	Fill-Material	7 000 - 11 000 Rheometer, $5s^{-1}$	Epoxy	30 min/120°C + 30 min/150°C	●	Very good flow properties, high glass transition temperature, no bleeding
Structalit® 5720	Fill-Material	10 000 - 15 000 Rheometer, $5s^{-1}$	Epoxy	30 min/120°C + 30 min/150°C	●	Very good flow properties, high glass transition temperature, no bleeding
Structalit® 5721	Fill-Material	15 000 - 20 000 Rheometer, $5s^{-1}$	Epoxy	30 min/120°C + 30 min/150°C	●	Very good flow properties, high glass transition temperature, no bleeding

Frame and Fill Adhesives for Electronics Applications

Adhesive	Application	Viscosity [mPas]	Base	Curing*	Ionic purity	Characteristics
Structalit® 5791	Frame-Material	45 000 - 65 000 Rheometer, $10s^{-1}$	Epoxy	5 min/150°C 60 min/100°C	●	Black color, resistant to vibration, impact resistant, low ion content (<900 ppm)
Structalit® 5891 T	Frame-Material	80 000 - 150 000 Rheometer, $10s^{-1}$	Epoxy	5 min/150°C 50 min/100°C	●	Black color, stable, can be applied wet-on-wet with fill material, dispensible in several stacks of frames, stable edges, very high shock resistance
Structalit® 5893	Fill-Material	6 000 - 10 000 Rheometer, $10s^{-1}$	Epoxy	10 min/150°C 80 min/100°C		Black color, very good flow properties, can be applied wet-on-wet with frame material, high shock resistance, very high resistance to heat and chemicals, biocompatability certified according to ISO 10993-5
Structalit® 5894 M	Fill-Material	20 000 - 30 000 Rheometer, $20s^{-1}$	Epoxy	5 min/150°C 60 min/100°C		Black color, excellent flow properties, very high resistance to heat and chemicals, high shock and heat resistance

UV-Curing Frame and Fill Adhesives

Adhesive	Application	Viscosity [mPas]	Base	Curing*	Ionic purity	Characteristics
Vitralit® 1650	Fill-Material	3 000 - 5 000 Rheometer, $10s^{-1}$	Epoxy	UV	●	Low ion content, coating for semiconductors, ideally suited for small semiconductor chips, flexible, low water absorption, passed UL94 HB test
Vitralit® 1657	Fill-Material	5 000 - 15 000 Rheometer, $10s^{-1}$	Epoxy	UV	●	Excellent chemical resistance, low water absorption, ideal as a coating for tall components, thixotropic, filled with quartzite but remains flexible
Vitralit® 1671	Frame-Material	9 000 - 14 000 Rheometer, $10s^{-1}$	Epoxy	UV/thermal	●	Stable Frame material, appliable wet-in-wet with fill material, excellent thermal conductivity, low water absorption, passes UL94 HB test
Vitralit® 1680	Fill-Material	5 000 - 8 000 Rheometer, $10s^{-1}$	Epoxy	UV	●	Climate resistant, coating for semiconductors

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

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

Bluepoint

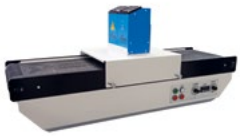
LED Cube

LED Curing Chambers
Reliable protection against UV radiation

LED Line Emitters
High-power arrays with individual length

LED Powerline

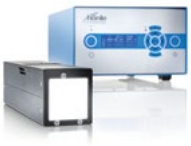
Convey LED



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

LED Floodlights
Homogeneous light distribution with high intensity

LED Spot



UV Meter

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

UV Sources	Dimension in mm	Available Wavelength in nm	Intensity in mW/cm²	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

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