hoenle

# BIOCOMPATIBLE ADHESIVES
## FOR MEDICAL DEVICES


System solutions: CMR- and TPO-free adhesives
in compliance with USP Class VI and/or ISO-10993,
together with aligned UV curing equipment



www.hoenle.com

# **MEDICAL GRADE** ADHESIVES

Hoenle provides comprehensive processing solutions for the medical industry, including adhesives and coatings, as well as UV- and LED-UV curing equipment. Our portfolio includes a wide range of CMR- and TPO-free adhesives for needle bonding and the assembly of plastic housings. We also offer adhesives for PCB and flex PCB assembly, including encapsulants, protective coatings and conductive materials for chip, connector and wire bonding.

Find the right adhesives for your entire medical device with help from our technical support team. They possess an incredible amount of hands-on experience with medical device applications.

## WEARABLES & MEDICAL DEVICES

Hoenle offers complete adhesive and curing solutions for structural housing bonding, needle bonding or bonding to PCBs in medical wearables or other medical electronic devices.
**more information on page 6**

## NEEDLE BONDING
**more information on page 4**

## LENS BONDING AND STACKING FOR ENDOSCOPE
**more information on page 4**

## ELECTRONIC PACKAGING SENSORS
**more information on page 5**

## CONDUCTIVE BONDING
**more information on page 6**

## PLASTIC BONDING
**more information on page 5**

## TUBE AND CONNECTOR BONDING
**more information on page 4**

## CATHETERS | TUBES | DIAGNOSTICS
**more information on page 5**

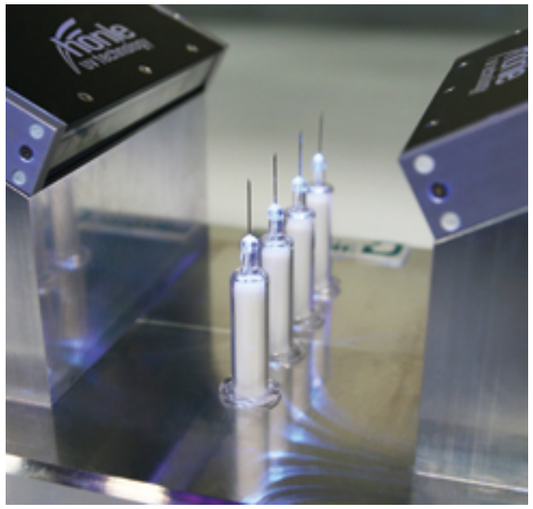
## UV CURING EQUIPMENT
**more information on page 8**

## MEDICAL GRADE ADHESIVES SELECTION GUIDE
**more information on page 7**

# APPLICATIONS
# IN DETAIL

## NEEDLE BONDING

UV adhesives for bonding stainless steel needles or cannulas in glass or plastic syringes are solvent-free and fluorescent for a better process control. Suitable for USP Class VI and/or ISO 10993 certification, they offer the ability to bond PC, PVC, PP or ABS to stainless steel and other metals. Fully cured, they withstand high needlepull-out forces even after several sterilization cycles. UV blocked plastics can still be bonded and cured with long-wave light.



## TUBE AND CONNECTOR BONDING

Vitralit® UV- and LED-UV-curing acrylate-based adhesives are suitable for connecting infusion lines or catheter tubing to stopcock valves, filters and adapters. They enable fast cycle times and process-reliable production. They are biocompatible and extremely resistant to chemicals and liquids. Depending on the application, they can be adjusted in viscosity to meet the required flexibility or strength for reliable bonding.

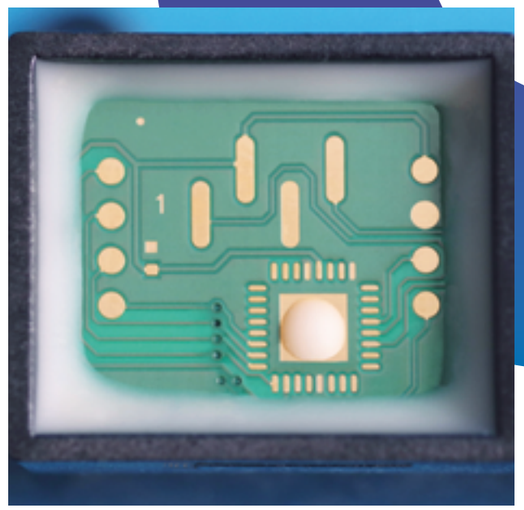
## LENS BONDING AND STACKING FOR ENDOSCOPES

Dual curing Vitralit® adhesives are ideal for bonding lens stacks as well as attaching glass and rod lenses in endoscopes.  High strength bonds are formed between glass and metal components that offer biocompatibility, good chemical resistance, and minimal shrinkage.
Their high glass transition temperatures ensure operating stability and reliability.  These adhesives are compatible with all common sterilization processes.



## ELECTRONIC PACKAGING/SENSORS

Adhesives for sensors in medical technology are used for environmental protection, shielding, electrical connection and heat dissipation. These products meet ISO 10993 and/or USP Class IV standards, are solvent-free and withstand common sterilization processes. Vitralit® adhesives can be cured with UV or visible light for a precise, process-reliable and fast production. Shadowed areas of components can be safely cured with dual-cure adhesives.

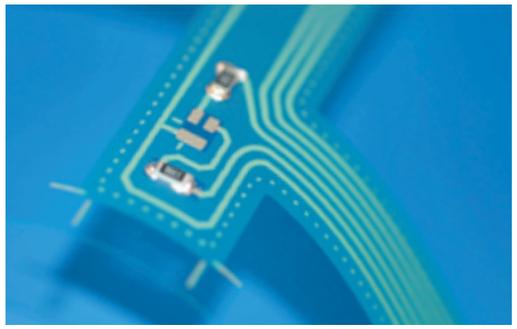


## PLASTIC BONDING

For bonding and sealing transparent polycarbonate or acrylic housing halves, such as dialysis filters or blood oxygenators, Hoenle offers Vitralit® brand light-curing one component adhesives. Multiple viscosity ranges are available to fill the smallest channels as well as larger bond line gaps. Components are joined within seconds using LED-UV or LED visible light curing systems. Structalit® 2-component adhesives are suitable for materials not transparent to UV and visible light. All adhesives are solvent-free and compatible with gamma, EtO and e-beam sterilization processes.

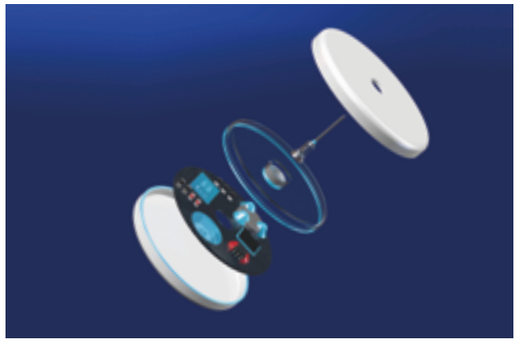
## CATHETERS | TUBES | DIAGNOSTICS

Bonding of respiratory materials, catheters and other diagnostic products can be accomplished quickly and reliably using UV adhesives from Hoenle. The adhesives meet the requirements of ISO 10993 and/or USP Class VI and bond not only the common plastics such as polycarbonate, PVC or ABS, but also substrates that are difficult to bond, including PEEK, PE and PP. They are solvent-free and highly resistant to moisture. Due to the products fluorescing under UV light, fast, efficient and cost-saving assembly processes can be realized.



## CONDUCTIVE BONDING

Elecolit® electrically conductive adhesives are a suitable alternative to soldering processes. Their lower curing temperatures permit these conductive adhesives to be used for attaching temperature-sensitive chips and flexible conductors. In addition to forming electrical connections these mostly silver-filled adhesives offer heat dissipation, which reduces thermal stress on electronic components.



## WEARABLES

Hoenles broad line of medical device adhesives enables manufacturers to select the exact adhesive properties required for their designs. For medical wearables, Panacol provides solutions for the complete device, including needle bonding, SMD packaging, protective coating, and housing assembly, Devices such as glucose monitors can be assembled quickly and reliably in high volume production processes. Our experienced technical team is ready to assist with recommendations for adhesives, curing systems, and dispensing options.

**Adhesion properties of adhesives on different substrates**

| Substrate \ Adhesive | Structalit® 8801 | Vitralit® 1605 | Vitralit® 1655 | Vitralit® 1702 | Vitralit® UD 6572 | Vitralit® E- 4731 /F/T | Vitralit® UV E- 4050 | Vitralit® E- 5140 /VT F | Vitralit® UV E- 7030 /LV | Vitralit® E- 7041 (F)/T | Vitralit® E- 7090 VHS F | Vitralit® E- 7311 FO/T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ABS | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| Aluminium | ● | | ● | | ● | ● | ● | ● | ● | | | ● |
| Stainl. Steel | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● |
| Glass | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| PA6 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| PC | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| PEEK | ● | ● | ● | ● | | ● | ● | ● | ● | | ● | ● |
| PET-A | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| PMMA | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| PS | ● | ● | ● | | | ● | | ● | ● | ● | ● | ● |
| PU/PUR | | ● | | ● | | | | | ● | ● | ● | ● |
| PVC | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| SAN | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| PP/PE | Surface treatment recommended | | | | | | | | | | | |
| Silicone | Surface treatment recommended | | | | | | | | | | | |

● very good ● application-related

# MEDICAL GRADE ADHESIVES
# SELECTION GUIDE

| Adhesive | Base | Viscosity [mPas] | Curing* | Compli-ance | Color | Characteristics |
|---|---|---|---|---|---|---|
| Vitralit® 1605 | 1-part epoxy | 200 - 400 LVT, Sp. 2/30 rpm | UV/thermal | ISO 10993-5 | Transparent | Low shrinkage, low CTE, high glass transition temperature, excellent chemical resistance, dual cure |
| Vitralit® 1655 | 1-part epoxy | 150 - 300 LVT, Sp. 2/30 rpm | UV/thermal | USP Class VI ISO 10993-5 | Transparent | Flexible, low viscosity, excellent adhesion to plastics and metals, dual cure, resistant to sterilization |
| Vitralit® 1702 | Acrylate | 10 - 100 LVT, Sp. 2/60 rpm | UV | USP Class VI | Transparent, slightly yellow | High adhesion to plastics, capillary flow, high E-modulus, high material strength, low oxygen inhibition, perfect solution for bonding hose connections, back-pressure valves or blood filters |
| Vitralit® 1703 | Acrylate | 85,000 - 130,000 LVT, Sp. 4/3 rpm | UV/VIS | USP Class VI | Transparent, slightly yellow | Excellent adhesion to plastics, gap-filling, high E-modulus, specially formulated to bond hose connections, back-pressure valves and blood filters, shape retaining, shear thinning |
| Vitralit® E-4731<br>Vitralit® E-4731 F<br>Vitralit® E-4731 T | Acrylate | 900 – 1,200 Rheometer, $10s^{-1}$<br>2,000 – 5,000 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Transparent | Flexible, excellent adhesion to glass and plastics, dry surface |
| Vitralit® E-5140<br>Vitralit® E-5140/VT F | Acrylate | 2,100<br>11,000 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Transparent slightly yellow | Soft, flexible with dry surface cure, excellent resistance to thermal cycling, used in tube sets and breathing circuits or as coatings of electronic devices |
| Vitralit® E-7041 (F)<br>Vitralit® E-7041 (F)T | Acrylate | 70<br>2,200 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Transparent, slightly yellow | Capillary flow, very good adhesion to many plastics, suitable for needle bonding and joining connectors/tubes/ housings or dialysis filters, fluorescent markers for in-line inspection |
| Vitralit®E-7090 VHS F | Acrylate | 50 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Transparent, slightly yellow | Capillary flow, very high adhesion to plastics, very fast curing at low intensities, high crosslinking. Well suited for sealing hollow fiber filters, needles and endoscopes |
| Vitralit® E-7311 (FO)<br>Vitralit® E-7311 (FO) T | Acrylate | 85<br>2,200 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Transparent | Very good adhesion to many plastics, available in various viscosities, creates high strength bonds in the assembly of tube sets, connectors and housings, all adhesive variations are also available with orange flourescence (FO) |
| Vitralit® UD 6572 | Epoxy-acrylate | 23,000-33,000 Rheometer, $10s^{-1}$ | UV/VIS/ thermal | ISO 10993-5 | Black | Endoscope/Lens-Bonding, protection of sensitive parts from mechanical and natural stress, UV-prefixation, sencondary heat cure necessairy |
| Vitralit® UV E-4050 | Acrylate | 170 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Transparent, slightly yellow | Very good adhesion to many plastics, glass and metal, specially formulated for bonding needles, impact resistant |
| Vitralit® UV E-7030<br>Vitralit® UV E-7030/LV | Acrylate | 20,000<br>720 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Transparent | Flexible, high elongation at break, good shear strength, bonding plastics with low surface energy. Dry surface after UV-curing |
| Vitralit® MASK E-20102 G | Urethane acrylate | 8,000-15,000 Rheometer, $10s^{-1}$ | UV/VIS | ISO 10993-5 | Translucent, green | Masking, protective coating of highly ploshed surfaces, orthopedic implants, removable with hot water at 80°C |
| Structalit® 5893 | 1-part epoxy | 6,000 - 10,000 Rheometer, $10s^{-1}$ | thermal | ISO 10993-5 | Black | Fast curing at low temperatures, good shock resistance, specially formulated to bond medical disposables |
| Structalit® 8801 | 1-part epoxy | 30,000 - 45,000 LVT, Sp. 4/6 rpm | thermal | ISO 10993-5 | Beige | Suited for encapsulation of electronic devices and for potting of sensors, very good oil- and media resistance, low ion content, solvent free |
| Elecolit® 323 | 2-part-epoxy | Paste-like | thermal | ISO 10993-5/ -12 | Grey | Thermally and electrically conductive, solvent-free, suitable for semiconductors (Na+, K+, Cl- <10ppm), autoclavable (1000h) |
| Cyanolit®203 TX | Cyano-acrylate | 5,000 - 1,000 LVT, Sp. 3/6 rpm | RT | USP Class VI | Transparent | Gap-filling, high adhesion to plastics (PA, PC, ABS, PVC, EPDM), metal and elastomers, ideally suited for bonding of hose connections and porous substrates, resistant to moisture, shear thinning |
| Cyanolit® 241 F | Cyano-acrylate | 30 - 50 | RT | USP Class VI | Transparent | Capillary flow, very good wetting properties, ideally suited for bonding of plastics (PVC, PMMA), copper, aluminum and steel |
| Cyanolit® 290 WR | Cyano-acrylate | 400 LVT, Sp. 2/60 rpm | RT | ISO 10993-5 | Transparent | Water resistant, fast curing, good adhesion to plastic and metal |
| Cyanolit® 732 F | Cyano-acrylate | 230 - 350 LVT, Sp. 2/60 rpm | RT | USP Class VI | Transparent | Short curing time, wide range of applications, very good adhesion to plastics (PVC, PMMA, ABS, EPDM) & stainless steel, film-forming |

*UV = 320 - 390 nm, VIS = 405 nm

# **UV CURING** SYSTEMS

Hoenle offers a broad range of UV curing equipment for curing UV adhesives, which are perfectly aligned in terms of wavelength. Our sales engineers and application technicians will assist you in selecting the right UV Equipment in combination with the appropriate adhesive. Thanks to our extensive experience in both areas, we can offer you a system solution that is perfectly tailored to your individual requirements, ensuring maximum productivity and efficiency in your bonding processes.

## LED SPOTLIGHTS

High intensity small area UV irradiation

BLUEPOINT

## LED LINE EMITTERS

High-power arrays with individual length

LED POWERLINE

## LED FLOODLIGHTS

Homogeneous light distribution with high intensity

LED SPOT

## LED CURING CHAMBER

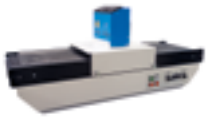
Reliable protection against UV radiation

LED CUBE

## LED CONVEYOR BELTS

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

CONVEY LED



## UV-MEASUREMENT

Measurement of intensity and dose for reliable process monitoring

UV METER

| UV Sources | Dimension in mm | Available Wavelength in nm | Intensity in W/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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