
LOCTITE®
TECHNOMELT®
HENKEL SOLUTIONS FOR
MEDICAL
WEARABLES
Henkel
Henkel Adhesive Technologies

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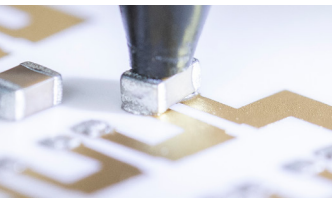
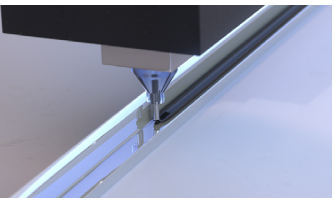




MEDICAL WEARABLES OVERVIEW

From smart health patches to continuous glucose monitors to smart glasses, the use of medical wearables and consumer wearables for remote monitoring has increased dramatically. The shift from hospital care to remote home care has led to a demand in remote tracking and diagnostics. Devices are smaller, require better environmental protection and reliable diagnostics, while maintaining patient safety and comfort.

The advancements in medical device design call for innovative approaches to elevate devices and processes beyond the existing standards of care. Leveraging Henkel's industry experience and expertise in adhesive technologies, companies are now empowered to develop next-generation devices that enhance patient safety, improve the quality of care, and make it easier for caregivers to use them effectively.

FOR CONSUMER WEARABLES
CLICK HERE

BIOCOMPATIBILITY

Henkel's Medical Device Adhesives are tested to the industry's most comprehensive ISO 10993 biocompatibility standards. In addition, Henkel employs strict manufacturing and quality controls to ensure continuity of compliance.

TESTS INCLUDED:

- Intracutaneous injection
- Systemic injection
- Muscle implantation
- Cytotoxicity (MEM elution)
- Hemolysis
- Skin sentization (for select products)

FREQUENTLY ASKED QUESTIONS AND ANSWERS:

What is ISO 10993?

ISO 10993 is an international standard created to facilitate international harmonization of test methods for biological evaluation of medical devices.

Why did Henkel move from a USP Class VI to ISO 10993 test program?

ISO 10993 standards offer compliance at a global level. Therefore, device manufacturers outside the U.S. have globally accepted standards, as opposed to the USP Program used in the U.S..

Is there a regulation requiring Henkel to revalidate its medical device adhesives to ISO 10993 on a regular basis?

There is no specific regulatory requirement regarding revalidation of our medical device adhesives. Henkel, as the industry leader, believes the revalidation is an important service to our customers in assuring continuity of compliance.

What controls does Henkel have in place after the product has been tested to ISO 10993?

While Henkel has no specific regulatory obligations under ISO 10993, we perform the following:

- Each batch of LOCTITE® medical device adhesive is validated by Henkel's Quality Control Department to include all raw material inputs, intermediates and raw material manufacturers, as well as compliance to the product formulation.
- Ensure that no changes will be made to our products, whether it be raw materials or significant changes to our processes, without notifying customers who have a specification on file requesting such notification.

WHAT MAKES HENKEL UNIQUE IN *WEARABLES?*

PRODUCTS AND SAFE SOLUTIONS

- Unique capabilities for wearables leveraging Henkel's expertise and broad portfolio
- Active in several wearable application types across the full Value Chain
  - » Low Pressure Molding
  - » Skin Bonding
  - » Assembly Adhesive
  - » Electronics & Printed Electronics

MARKET AND CUSTOMER INTIMACY

- Partner with leading global companies to develop the future of wearables
- Recognized as a trusted quality partner and high performing company

INNOVATION AND CO-CREATION

- Strong experience in biocompatible solutions (ISO 10993) across applications
- High application engineering support and capability to co-develop customized solutions
- Successful delivery of multiple solutions to the market

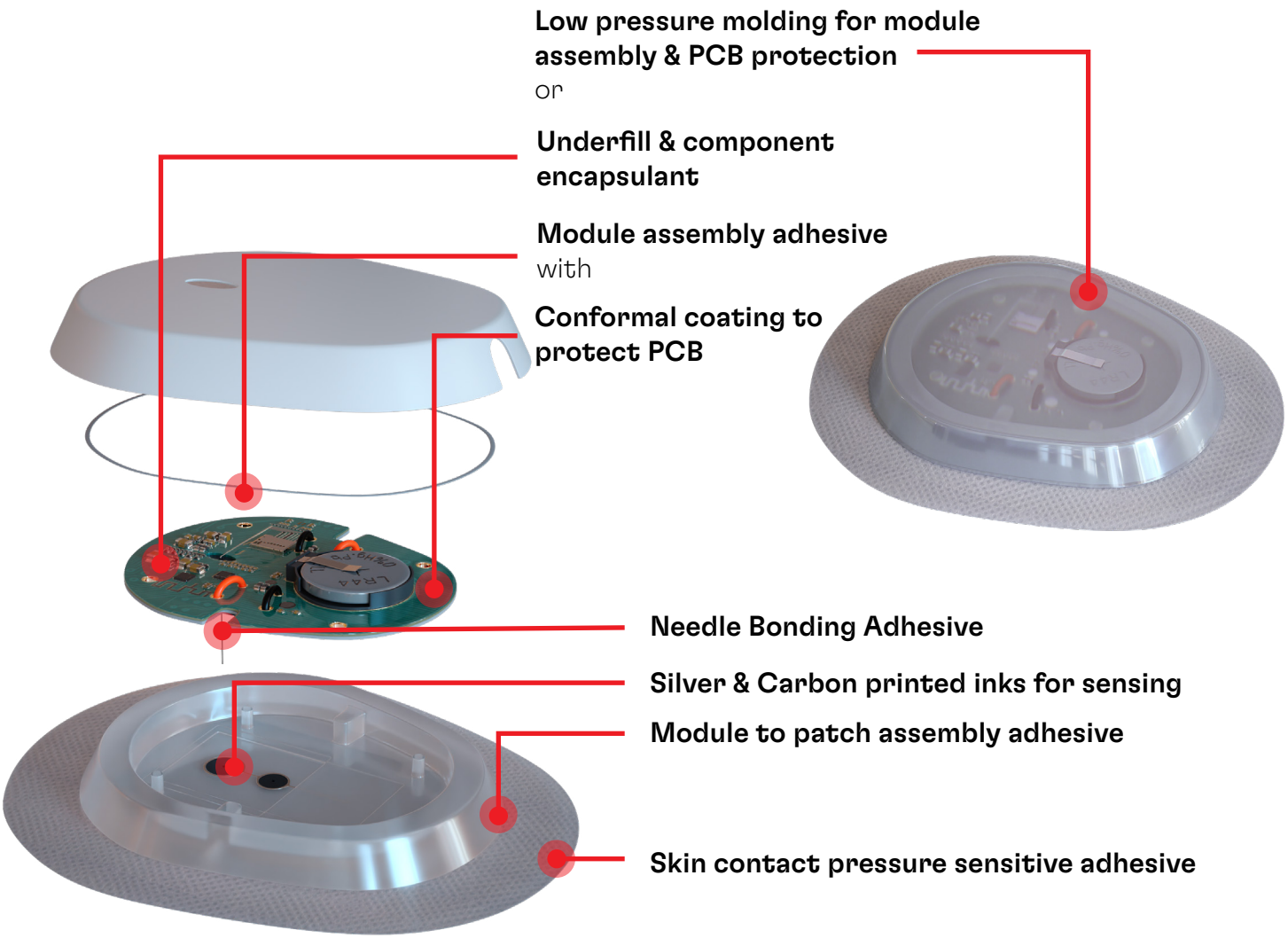
GLOBAL TEAM AND FOOTPRINT

- Agile, dedicated global team working closely together to support your teams globally
- Global footprint of innovation centers, technical services and redundant manufacturing facilities provide agility, cost efficiencies and reduce supply chain risk

DEEP-DIVE ON HENKEL SOLUTIONS

CGM devices enable diabetes patients to closely monitor their blood sugar levels. With each passing generation, these devices become smaller and more durable. Henkel offers a wide range of solutions that allow these devices to push the limits of form and function. Some key technologies include needle, housing, and skin bonding, as well as biochemical sensor inks and circuit board protection products.

CONTINUOUS GLUCOSE MONITOR (CGM)



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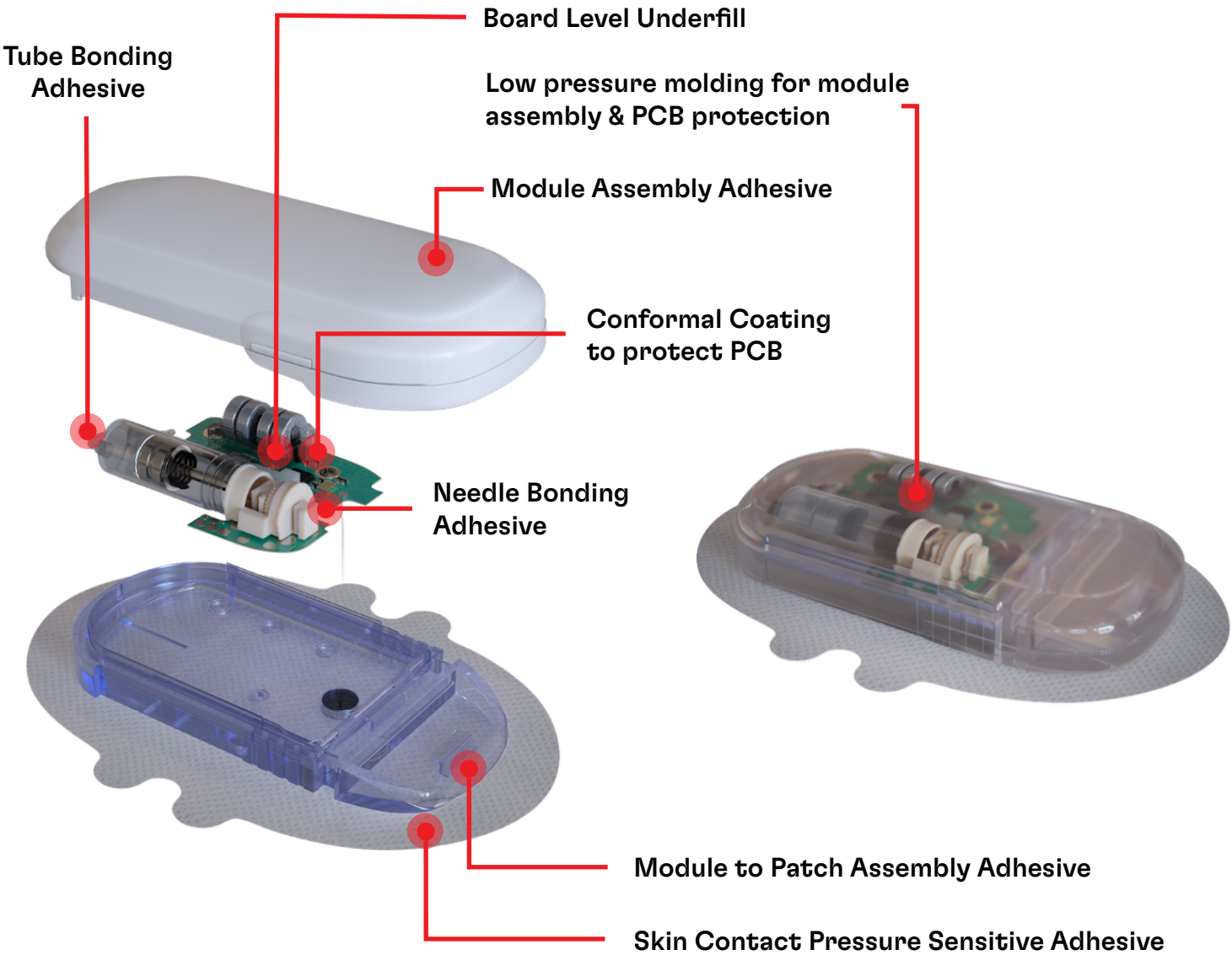
Maintaining proper blood sugar level stability is crucial for enhancing the quality of life for diabetes patients, and insulin delivery devices play a vital role in achieving this. These devices are available in various forms, such as traditional insulin pumps with infusion sets, compact disposable pump patches, or convenient insulin pens. Regardless of the type, Henkel offers a diverse range of solutions, including tube, needle, housing, and skin bonding, as well as circuit board protection products.

INSULIN PATCH PUMP



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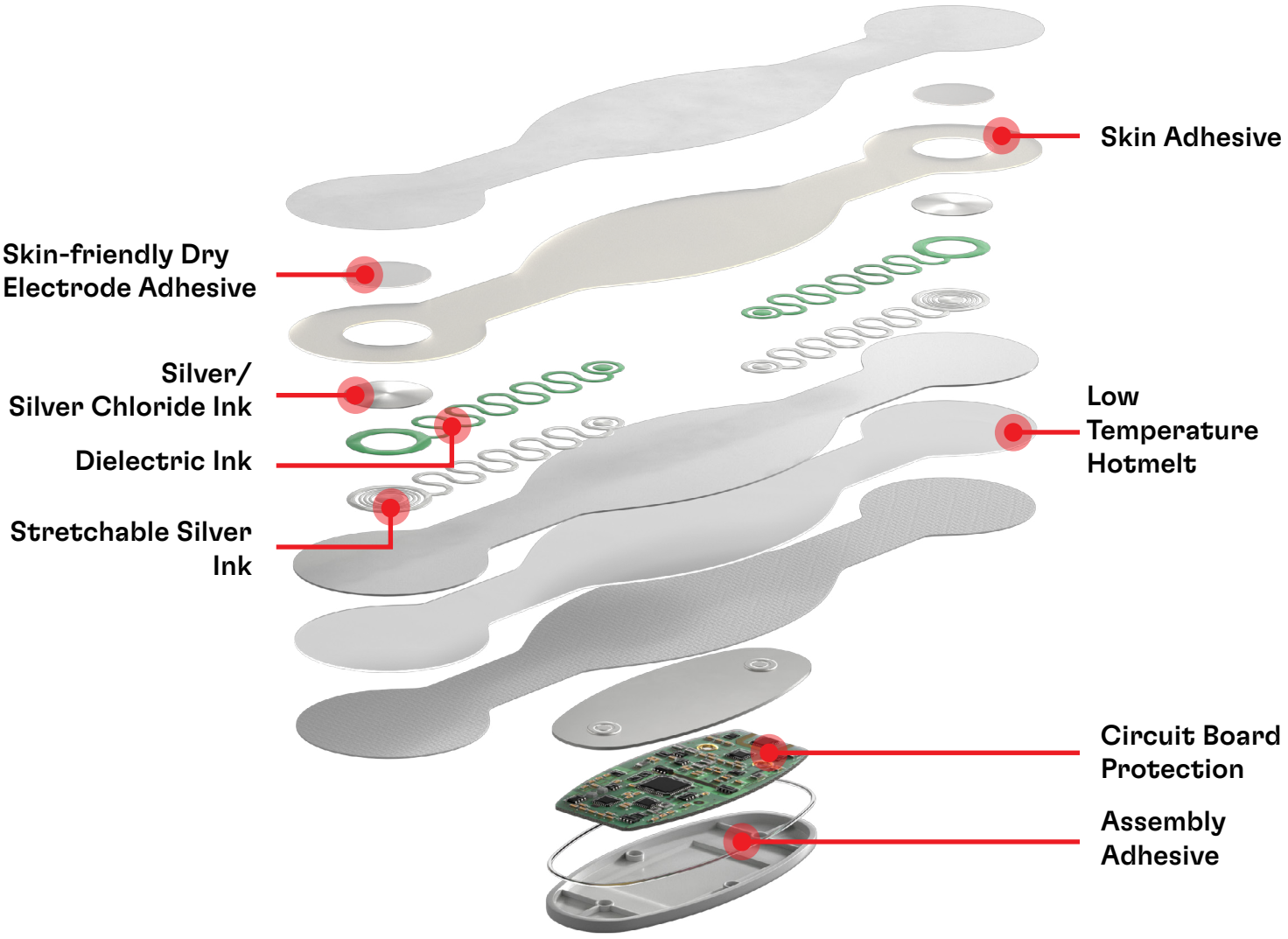
Electrocardiogram (ECG) type devices are used to measure the electrical activity of the heart. Depending on the use case, an ECG may have a varying number of leads and degrees of portability. Wearable ECG devices are typically small and worn on the chest with two leads. Henkel offers a wide range of solutions, including various printable inks for the disposable electrode patch and assembly solutions for the transmitter.

CARDIO HEALTH PATCH



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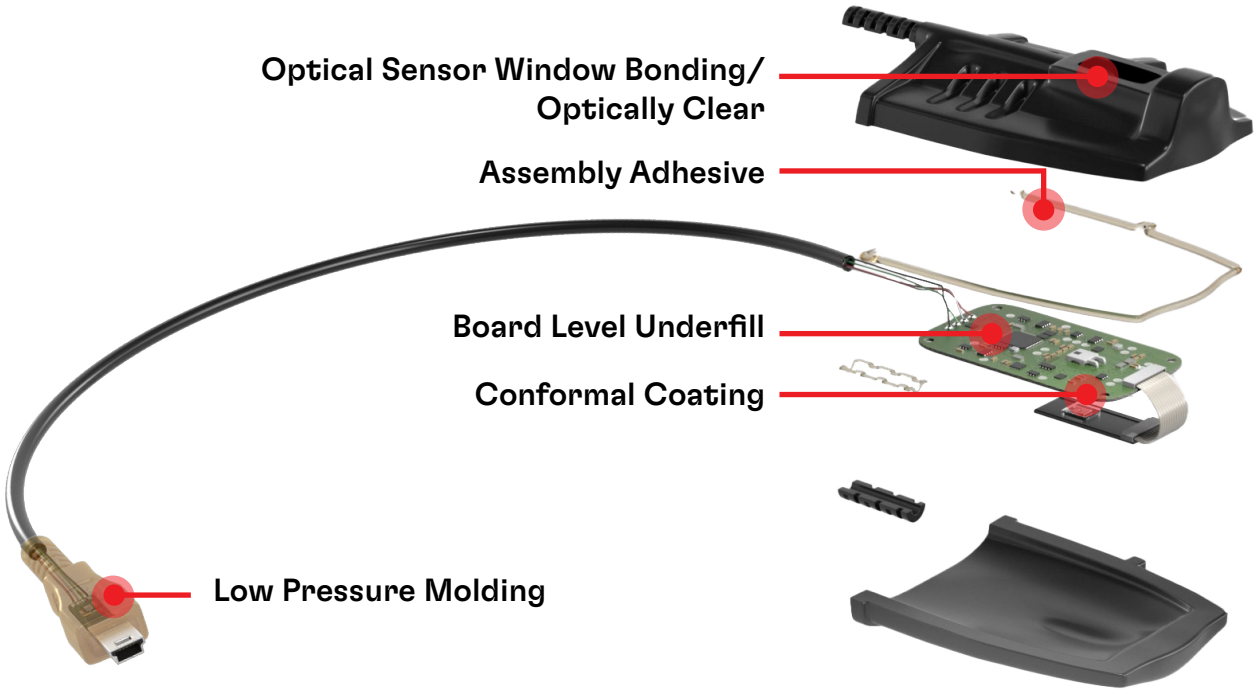
Blood oxygen sensors typically use optical sensor technology that operates with various wavelengths of light. These devices can measure the oxygen concentration in the blood, heart rate, respiration rate, and even blood pressure. They come in the form of chest patches, watches, and fingertip sensors. These sensors are often coupled with an ECG sensor in a single device. Regardless of the design, Henkel offers a wide range of solutions, including window, housing, and skin bonding products, as well as circuit board protection.

PULSE OXIMETRY



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KEY SOLUTIONS FOR WEARABLES

Device Assembly

Instant Bonding

Adhesives in the instant bonding category are designed for high-speed bonding applications, which allow for high throughput. They are the go-to technology for assembling wearable medical devices as they can bond a wide variety of substrates and provide great environmental resistance in many applications.

Product Name	Chemistry	Viscosity 25°C (cP)	Tensile Modulus (psi)	Tensile Modulus, MPa	Substrate Compatibility					Long Term Skin Contact	Product Features
					Thermoplastic	Glass	Metal	Elastomers	Ceramics		
LOCTITE® 4011*	Cyanoacrylate adhesive (CA)	100	200,000	1,380	✔	–	✔	✔	–	✔	Low viscosity, ideal for acidic substrates and in dry environments
LOCTITE® 435*	Cyanoacrylate adhesive (CA)	200	180,000	1,240	✔	–	✔	✔	–	✔	Low viscosity, impact resistant
LOCTITE® 431*	Cyanoacrylate adhesive (CA)	1,000	200,000	1,380	✔	–	✔	✔	–	✔	High viscosity, ideal for acidic substrates and in dry environments
LOCTITE® 4203	Cyanoacrylate adhesive (CA)	375	120,000	827	✔	–	✔	✔	–	✔	Impact resistant, withstands 121°C continuous for 2,000 hours
LOCTITE® 4204	Cyanoacrylate adhesive (CA)	4,000	120,000	827	✔	–	✔	✔	–	✔	Non-sag, impact resistant, withstands 121°C continuous for 2,000 hours
LOCTITE® 4310*	Light cure cyanoacrylate adhesive (CA)	175	283,000	1,951	✔	–	✔	✔	–	✔	Toughened, rapid tack-free surface and shadow curing
LOCTITE® 4311*	Light cure cyanoacrylate adhesive (CA)	1,050	270,000	1,862	✔	–	✔	✔	–	✔	Toughened, rapid tack-free surface and shadow curing
LOCTITE® 4314*	Light cure cyanoacrylate adhesive (CA)	120	225,000	1,551	✔	–	✔	✔	–	✔	More flexible, toughened, rapid tack-free surface and shadow curing
LOCTITE® SF 7701*	Cyanoacrylate adhesive (CA) primer	3	–	–	✔	–	–	✔	–	–	Adhesion promoter for cyanoacrylates, for use on low-energy plastics

*ISO 10993 Tested

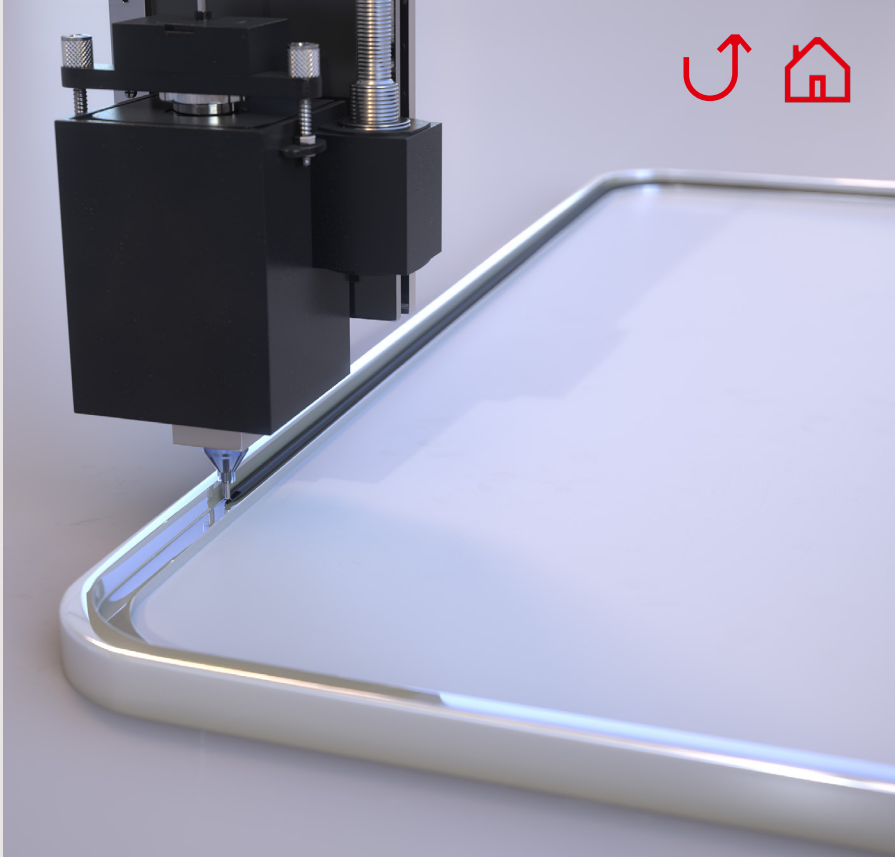
Instant Bonding – Continued

Product Name	Application	Chemistry	Viscosity 25°C (cP)	Tensile Modulus, MPa	Substrate Compatibility					Long Term Skin Contact	Product Features
					Thermoplastic	Glass	Metal	Elastomers	Ceramics		
LOCTITE® WT 3001*	Housing bonding, sealing	Light cure acrylates	300	1,350	✔	✔	–	–	–	✔	IBOA Free , self-leveling, jet-able material for bonding plastics & select elastomers
LOCTITE® WT 3003*	Housing bonding, sealing	Light cure acrylates	Thixotropic	680	✔	✔	–	–	✔	✔	IBOA free, non-sag, jet-able, material for bonding plastics & select elastomers
LOCTITE® AA 3554*	Housing bonding, needle bonding	Light cure acrylates	300	1,520	✔	–	✔	✔	–	✔	IBOA free, self-leveling, LED cure adhesive with great plastic & metal bonding capability
LOCTITE® AA 3556*	Housing bonding, needle bonding	Light cure acrylates	5,000	1,060	✔	–	✔	✔	✔	✔	IBOA free, high viscosity, LED cure adhesive with great plastic & metal bonding capability
LOCTITE® AA 3539*	Housing bonding, sealing, shadow bonding	Light cure acrylates/ Moisture cure	15,000	–	✔	✔	✔	–	–	✔	IBOA free, shadow cure, LED cure adhesive with great plastic & metal bonding capability
LOCTITE® AA 3961*†	Needle bonding CGM applicator, insulin pen	Light cure acrylates	80	1,241	✔	✔	✔	–	–	–	Wicking viscosity, fast LED curing, ideal for rigid bonding applications
LOCTITE® AA 3922*†	General bonding & sealing, needle bonding	Light cure acrylates	300	631	✔	✔	✔	✔	✔	–	Low viscosity, fast LED curing, excellent humidity & accelerated aging resistance
LOCTITE® AA 3953*†	Tube/ elastomer bonding, plastic bonding	Light cure acrylates	300	25	✔	✔	–	✔	✔	–	Excellent on highly flexible PVC and other difficult-to-bond substrates

*ISO 10993 Tested
† Not for use with long term exposure to skin

Structural Bonding

Structural bonding technologies are often used in applications where increased impact, fatigue, or chemical resistance is necessary. They typically require longer cure times compared to the instant bonding category and are employed in the most demanding applications that cannot be met by other technologies.



Product Name	Application	Chemistry	Open Time (min.)	Tensile Strength (MPa)	Tensile Modulus (MPa)	Shear Strength Anodized Al	Description
LOCTITE® HHD 3542	Cover/ housing bond	PU hotmelt	< 4	> 8	91	7 MPa shear strength	One-component polyurethane hot-melt adhesive that provides a strong bond and shock and impact resistance. Very effective on metal, ink-coated glass and engineered plastics.
LOCTITE® UR 7223	Cover/ housing bond	PU hotmelt	1 – 2	> 5	> 80	5 MPa tensile strength**	One-component polyurethane hot-melt adhesive is solvent free and more sustainable with fast fixture and outstanding reliability. Resistant to thermal cycling and sebum. Fluorescent for high speed camera detection.
LOCTITE® HHD 8190R	Cover/ housing bond	Acrylate - 2 part	3 – 7	23	1,150	15 MPa shear strength	Two-part acrylic adhesive with a fast cure and excellent moisture resistance. Cured bond has consistent strength over a wide range of temperature and excellent adhesion to multiple substrates, including metals and composites.
LOCTITE® EA M-31CL™*	Bonding, sealing	Epoxy - 2 part	30	55	2,500	21 MPa shear strength	LOCTITE® EA M-31CL™ bonds most materials including glass, optical fibers, ceramics, metals, and many rigid plastics. Suitable for use in the assembly of disposable medical devices. The fully cured epoxy is resistant to a wide range of chemicals and solvents and has excellent dimensional stability over a wide temperature range.
LOCTITE® EA M-21HP™*	Bonding, sealing	Epoxy - 2 part	20	39	1,500	17 MPa shear strength	LOCTITE® EA M-21HP™ cures at room temperature once mixed, to form a tough, off-white bond line which provides high peel resistance and high shear strengths. LOCTITE® EA M-21HP™ has excellent bond strengths to a wide variety of substrates including glass, plastics and metals. Suitable for use in the assembly of disposable medical devices.

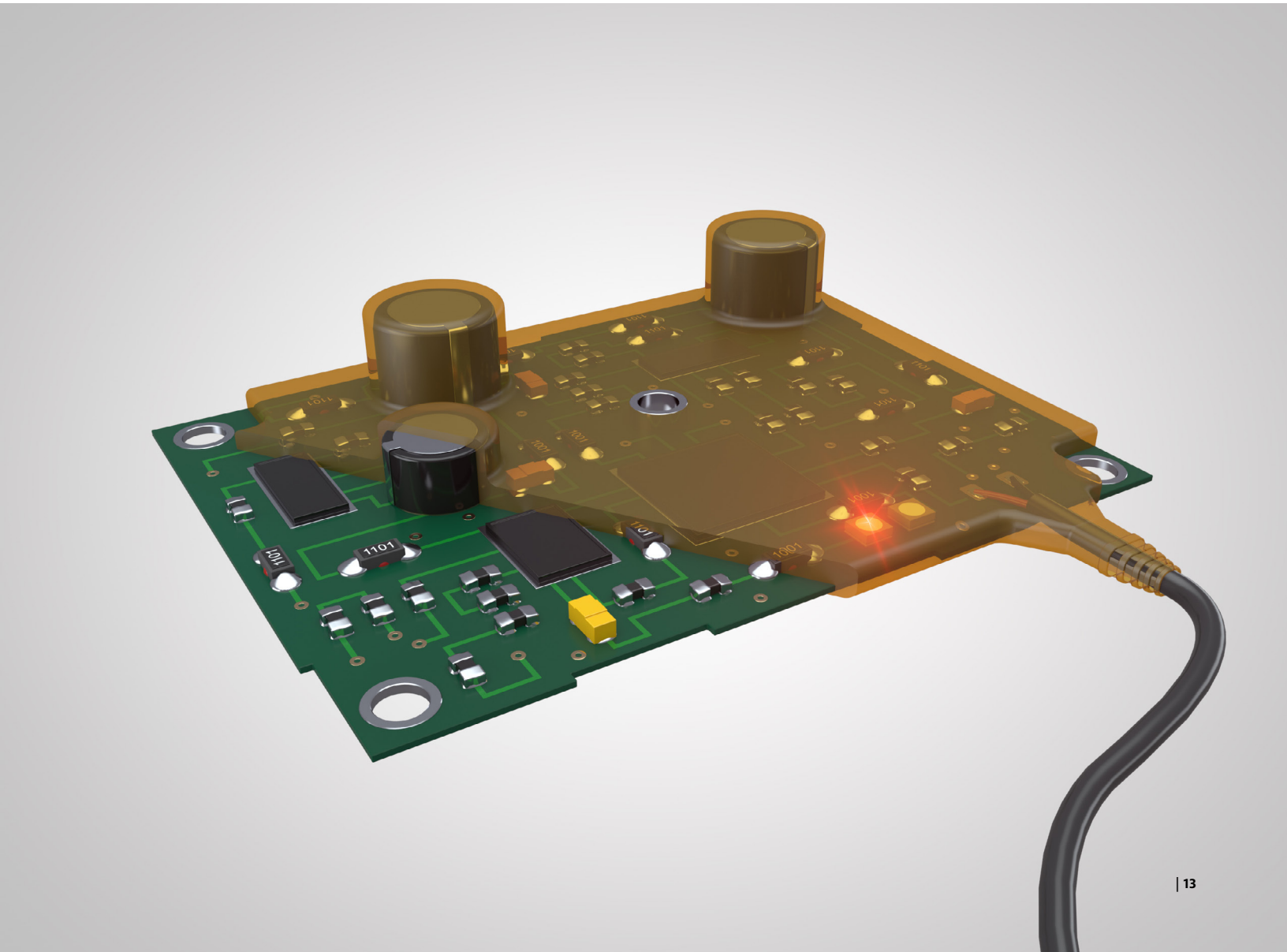
*ISO 10993 Tested
** Data available only on PC/ABS

Low-Pressure Molding

Low-pressure molding offers a unique alternative to bonded clamshell housings for wearable electronics. In a single molding step, devices can have an aesthetically pleasing and protective exterior. The low pressures and low temperatures used in this unique molding process ensure that the circuits and components remain unharmed. Our materials are ISO 10993 tested for long-term skin contact. We continue to innovate in low-pressure molding, so stay tuned for our latest releases.

Product Name	Application	Chemistry	Color	Service Temperature (°C)	Viscosity at 210°C (cP)	Shore Hardness	Tensile Strength (MPa)	Elongation at Break (%)	Description
LOCTITE® PA 6732*	Low pressure molding	Polyamide hotmelt	Amber	-40 – 140	3,200	90A	6	400	Easy processing
LOCTITE® PA 6682*	Low pressure molding	Polyamide hotmelt	Clear	-25 – 105	3,200	90A	7	600	For optically clear applications

*ISO 10993 Tested



Skin Bonding/Pressure Sensitive Adhesives (PSA)

We deliver quality adhesive solutions for medical applications. Our skin-friendly adhesives are designed to keep your products in place under any conditions. Henkel offers a competitive edge by providing innovative solutions to address your PSA application challenges. We deliver this value by developing customized business solutions, which include the right products, technical support, and coating partners. Our coating partners combine our adhesives with various carriers and designs to work in various applications, such as long-term skin bonding and double-sided tie layers.

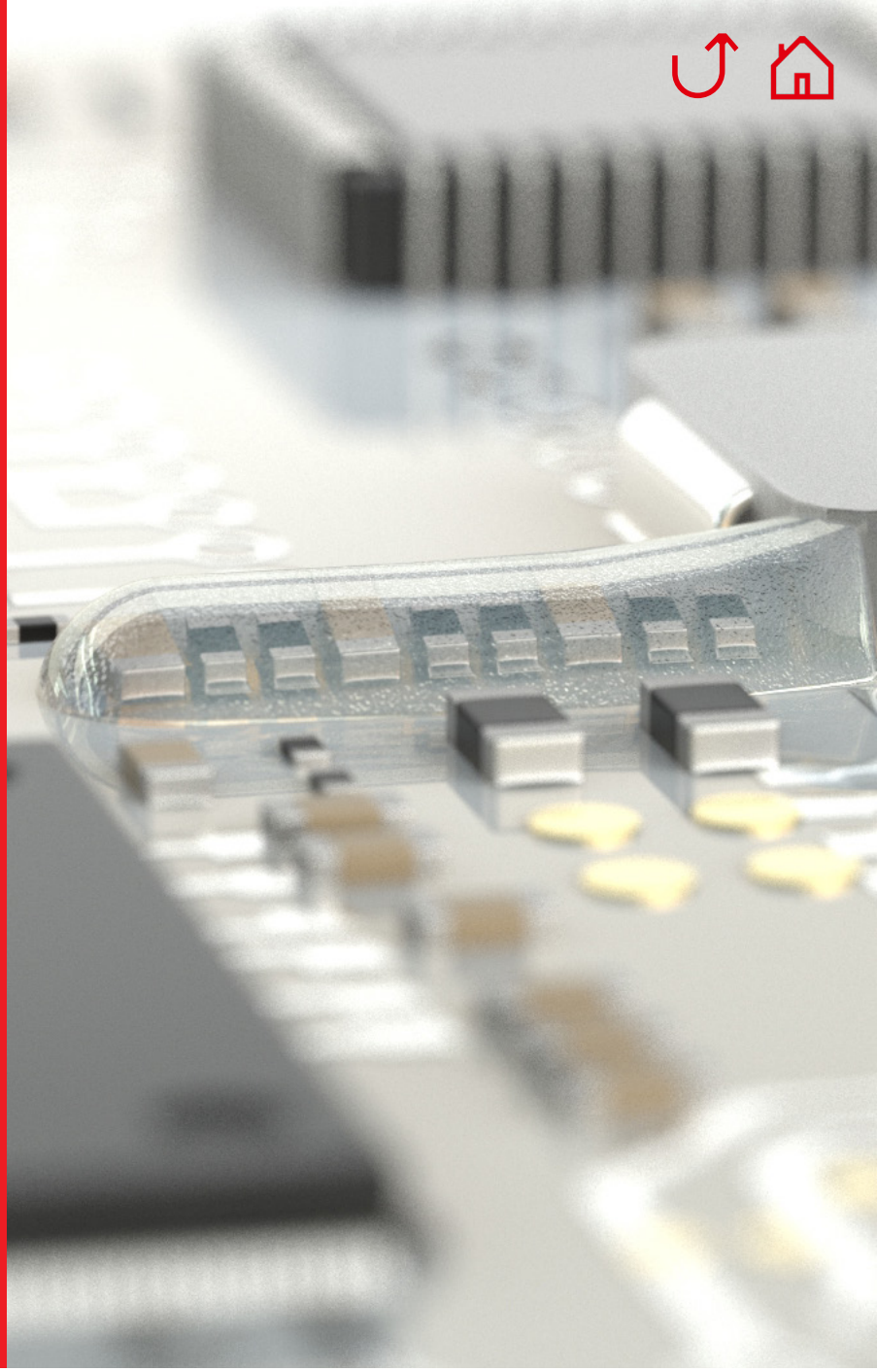
Product Name	Product Type	Typical Processing	Adhesion**	Drying Schedule	Description
LOCTITE® DURO-TAK 129NA*	Acrylate	High speed coating (direct or transfer)	24	Multi-zone with multiple temperatures	Pressure sensitive adhesive suitable for medical applications including electrodes, foot care, device securement, medical tapes, surgical drapes and wound care. Excellent extended wear, excellent skin adhesion, strong adhesion to high surface energy materials including fabrics and non-wovens.
LOCTITE® DURO-TAK 235A*	Acrylate	High speed coating (direct or transfer)	36 (measured at 30 gsm)	Multi-zone with multiple temperatures	Pressure sensitive adhesive suitable for medical applications like medical tapes, bandages, electrodes, extended wear, excellent skin adhesion.
LOCTITE® DURO-TAK 194B*	Acrylate	High speed coating (direct or transfer)	27	Multi-zone with multiple temperatures	Pressure sensitive adhesive suitable for medical applications including foot care, device securement, medical tapes, wound care and electrodes. Long wear for skin contact, excellent skin adhesion, superb adhesion to foam, excellent adhesion to high surface energy materials, acceptable adhesion to low surface energy materials.
LOCTITE® DURO-TAK AH 115*	Acrylate/ rubber	High speed coating (direct or transfer)	33	Multi-zone with multiple temperatures	Pressure sensitive adhesive suitable for medical applications including electrodes, device assembly, device securement, medical tapes and surgical drapes. Longest wear of the extended wear adhesives, excellent skin adhesion, superb adhesion to a wide range of high and low surface energy materials including plastics, fabrics, non-wovens, films and foams.

*Tested to ISO 10993
** (180° peel, 2 mil PET facestock, stainless steel panels, N/25 mm, 24 hour bond, 50 gsm cwt.)

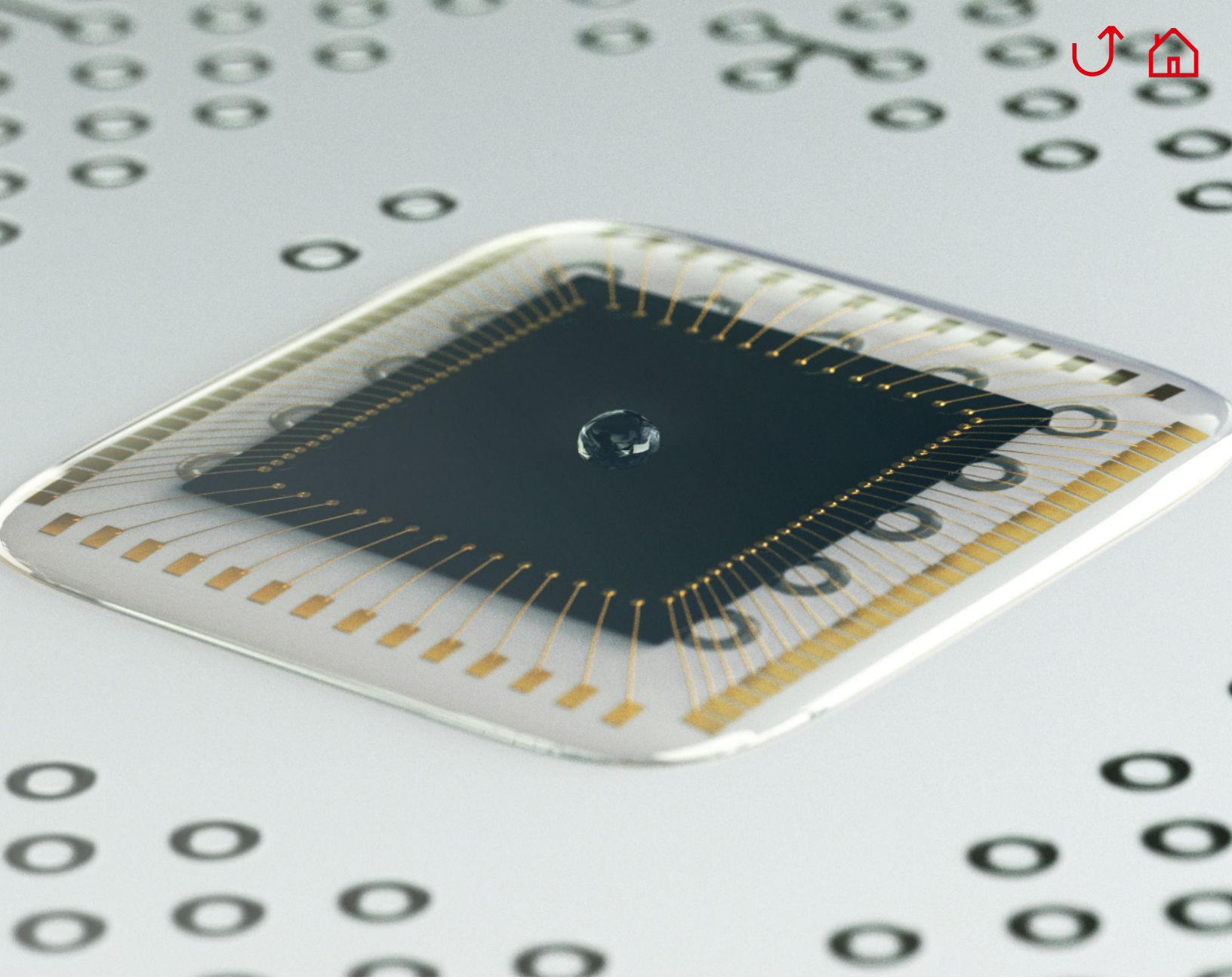
Circuit Board Materials

Encapsulation

Henkel has developed a complete line of circuit board encapsulants for wearable medical devices that facilitate increased moisture protection, structural integrity, and IR blocking for sensitive components. Bluetooth chips, RFID chips, sensor interconnects, antenna connections, and battery connections are critical components that must work together to ensure the continuous flow of critical patient data. LOCTITE® encapsulants enhance the durability of these components and ensure patient protection.



Product Name	Application	Chemistry	Viscosity at 25°C (cP)	Mix Ratio (Volume)	Dielectric Strength (Volts/Mil)	Cure Schedule	Description
LOCTITE® ABLESTIK FDA 2 BIPAX	Encapsulant	Epoxy - 2 part	14,000 at 10 rpm	1:1	420	24 hr. at 25°C or 1 – 4 hr. at 65°C	Heat cure or room temperature cure epoxy designed for medical device applications
LOCTITE® EA 3450	Encapsulant	Epoxy - 2 part	30,000 at 10 rpm	1:1	n/a	24 hr. at 25°C or 1 hr. at 80°C	Two-component, epoxy
LOCTITE® STYCAST E0079-HD0070	Encapsulant	Epoxy - 2 part	600 at 10 rpm	100:26	2,150	2 hr. at 60°C	Two-component, epoxy



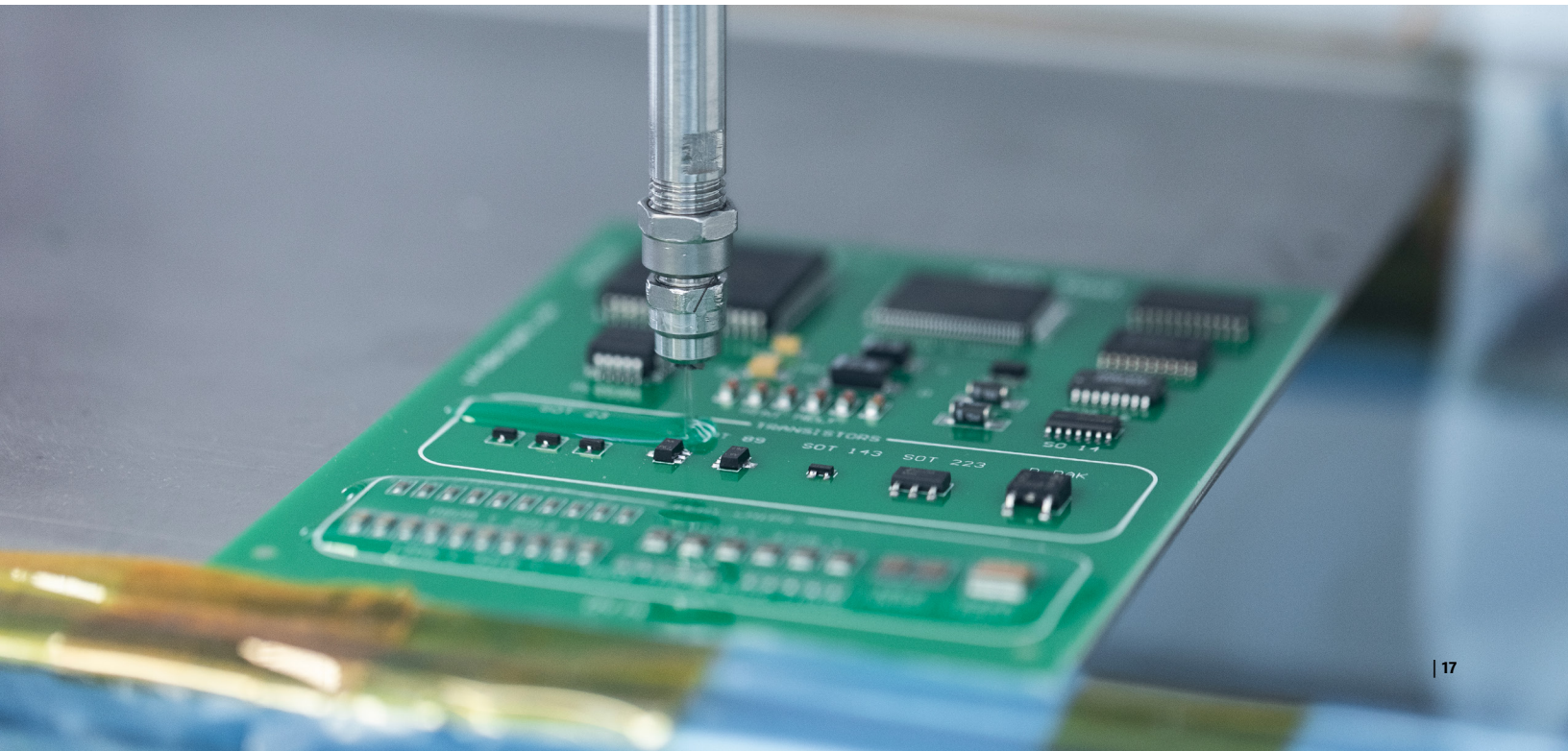
Product Name	Application	Chemistry	Viscosity at 25°C (cP)	Glass Transition Temperature, Tg (°C)	Storage Modulus at 25°C (MPa)	Cure Schedule	Description
LOCTITE® ECCOBOND EN 3860T	Encapsulant	Epoxy - 1 part	1,000	82	1,230	10 min. at 130°C or 5 min. at 150°C	CSP/BGA thermal cure encapsulant with low viscosity
LOCTITE® ECCOBOND EN 3838T	Encapsulant	Epoxy - 1 part	6,700	2	466	8 min. at 130°C	Low T_g thermal cure encapsulant
LOCTITE® ECCOBOND EO1072	Encapsulant	Epoxy - 1 part	80,000	135	6,700	5 min. at 150°C	High T_g and hardness thermal cure encapsulant
LOCTITE® ECCOBOND UV 9060F	Encapsulant	UV Acrylate/ Moisture Cure	11,000	75	2,200	25 sec. at 500 mW/cm² (365 nm) + 7 day moisture at 50% RH	UV/Moisture cure encapsulant

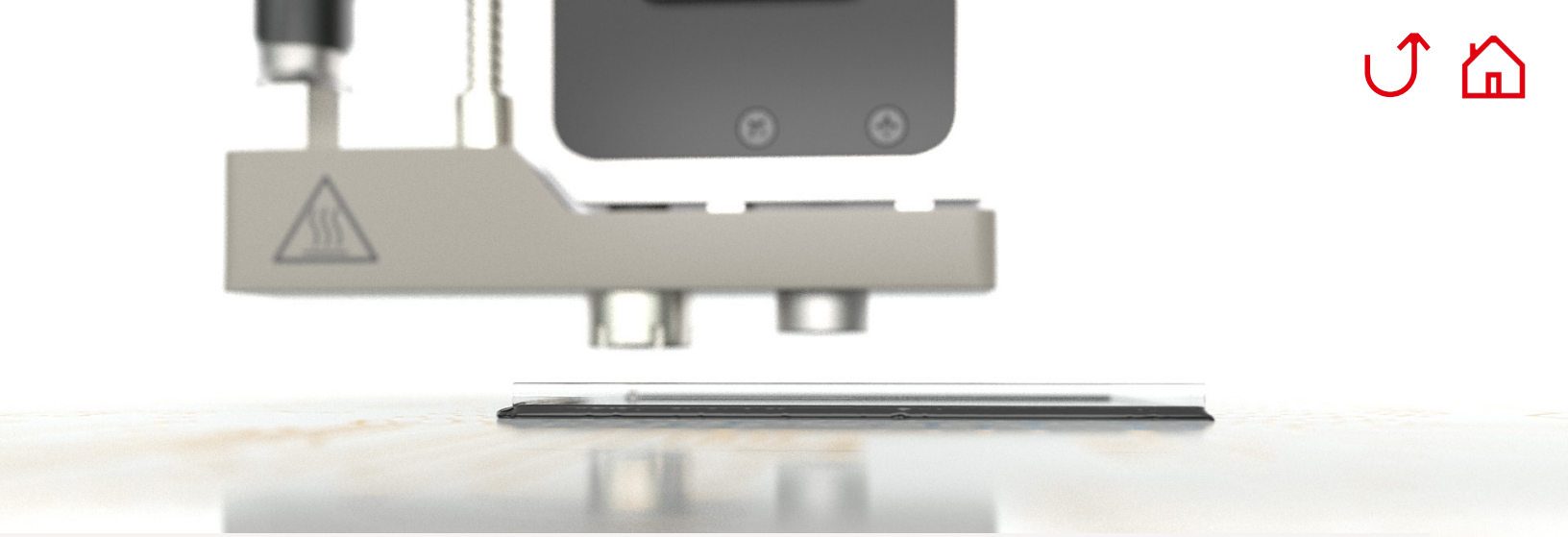
Conformal Coating

Conformal coatings add an extra layer of moisture protection while maintaining a smaller footprint for your body-worn wearables. You can forgo the use of a bulkier housing as a means to achieve the necessary device protection.

Product Name	Application	Chemistry	Viscosity at 25°C (cP)	Volume Resistivity (Ω.cm at 25°C)	Dielectric Constant (1 MHz)	Cure Schedule	Description
LOCTITE® STYCAST PC 62*	Conformal coating	Acrylate	52	1.04×10^{16}	2.2	24 hr. at 25°C or 45 min. at 75°C	Provides environmental & mechanical protection. Toluene-free alternative with superior toughness & abrasion resistance.
LOCTITE® STYCAST PC 40-UMF*	Conformal coating	UV Acrylate	250 – 500	3.5×10^{16}	2.7	UV and moisture, 10 sec. UV + 3 days at RT	Specifically formulated to rapidly gel & immobilize when exposed to UV light & then fully cure when exposed to atmospheric moisture, ensuring optimum performance even in shadowed areas.
LOCTITE® STYCAST UV 7993*	Conformal coating	UV Acrylate	120	2.2×10^{16}	3.3	UV (150 – 300 mW/cm^2) + Ambient moisture (100 hr.)	Designed to provide rugged protection from moisture & harsh chemicals. It is compatible with industry-standard solder masks, no-clean fluxes, metallization, components and substrate materials.
LOCTITE® SI 5293*	Conformal coating	UV Silicone	400 – 800	1.0×10^{14}	4.5	20 sec. UV + 3 days at RT	Repairable, solvent-free, medium-viscosity, UV/ moisture-cure silicone, designed for severe temperature environments. High-reliability automotive applications.

*Only for use in sealed housing





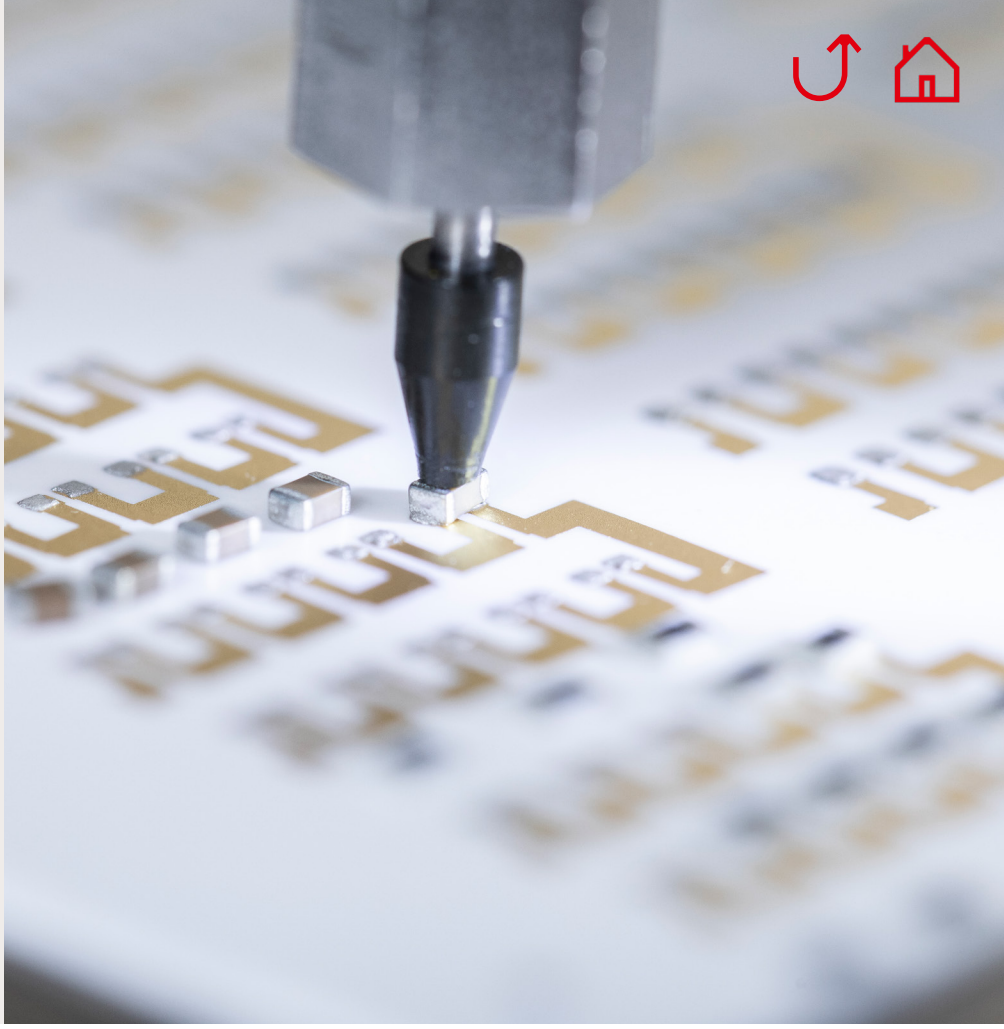
Board Level Underfill

Henkel has developed a complete line of circuit board underfill for wearable medical devices that facilitates increased moisture protection, structural integrity, and IR blocking for sensitive components. Bluetooth chips and RFID chips are critical components that must all work together to keep critical patient data flowing. LOCTITE® underfill increases the durability of these components during impact, water immersion, and IR exposure from the sun.

Product Name	Application	Chemistry	Viscosity	CTE Below Tg/ Above Tg (PPM/°C)	Glass Transition Temperature, Tg (°C)	Cure Schedule	Description
LOCTITE® ECCOBOND E 1216M	Underfill	Epoxy	4,000 cP at 20 rpm	35/131	125	3 min. at 165°C or 10 min. at 130°C	Very fast flow and cure
LOCTITE® ECCOBOND FP 4526	Underfill	Epoxy	4,700 cP at 10 rpm	33/101	133	15 min. at 165°C	Capillary flow underfill for flip chip
LOCTITE® ECCOBOND FP 4531	Underfill	Epoxy	10,000 cP at 20 rpm	28/104	161	7 min. at 160°C	Capillary flow underfill for flip chip on flex applications
LOCTITE® ECCOBOND UF 1173	Underfill	Epoxy	7,500 cP at 10s-1	26/103	160	5 min. at 150°C	Uniform void-free encapsulant underfill for CSP and BGA packages
LOCTITE® ECCOBOND UF 3810	Underfill	Epoxy	394 cP at 1,000s-1	55/171	102	8 min. at 130°C	Reworkable capillary underfill
LOCTITE® ECCOBOND UF 3812	Underfill	Epoxy	350 cP at 1,000s-1	48/175	131	10 min. at 130°C	Reworkable capillary underfill with high T_g
LOCTITE® ECCOBOND EN 3839	Underfill	UV Epoxy	7,800 at 5 rpm	108/211	26	2,000 mJ/cm² at 365 nm and > 10 min. at 130°C	For edgebond applications it provides physical protection & protection in temperature/ humidity/bias testing

Electrically Conductive Adhesive (ECA)

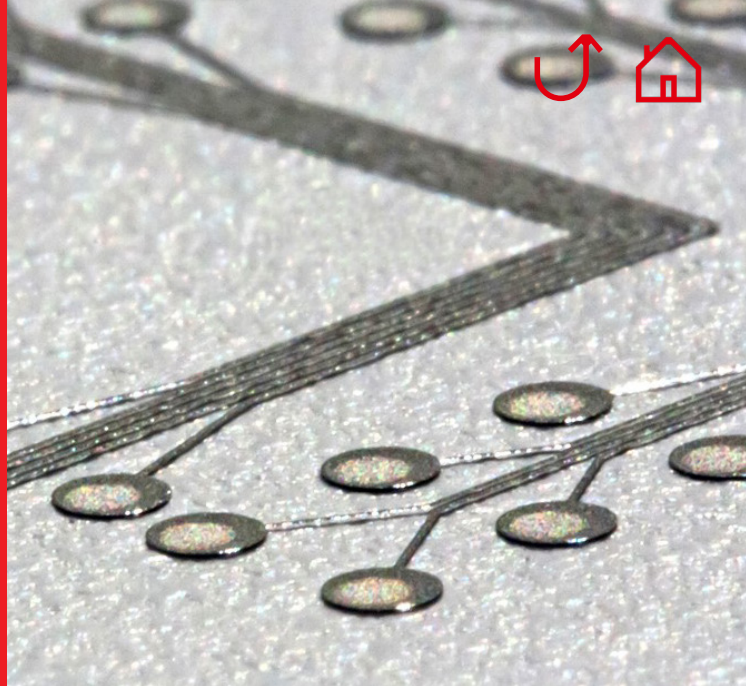
ECAs come in a variety of chemistries and offer a reliable solution for creating an electrical interconnect with high adhesion to various substrates. ECAs also offer the ability to cure at lower temperatures for sensitive or flexible circuits.



Product Name	Application	Chemistry	Volume Resistivity (Ω.cm)	Typical Processing	Storage Modulus at 25°C (MPa)	Cure Schedule	Description
LOCTITE® ABLESTIK 2030SC	ECA	Hybrid	0.0002	Dispensing	3,300	90 sec. at 110°C	ECA with fast, low-temp. cure to minimize stress & resulting warpage between dissimilar surfaces. Good adhesion to inks and metals.
LOCTITE® ABLESTIK 84-1 LMISR4	ECA	Epoxy	≤ 0.0002	Dispensing	3,900	1 hr. at 175°C	Electrically conductive die attach adhesive
LOCTITE® ABLESTIK CA 3556HF	ECA	Acrylate	0.0025	Dispensing	650	10 min. at 120°C	Acrylic ECA, flexible material
LOCTITE® ABLESTIK CE 3103WLV	ECA	Epoxy	0.0008	Dispensing	4,500	10 min. at 120°C	Electrically conductive epoxy adhesive that is a Pb-free alternative to solder
LOCTITE® ABLESTIK ICP 4000	ECA	Silicone	0.00006	Dispensing	< 100	60 min. at 130°C	Silicone based, ECA. Specially designed for applications where both high flexibility and excellent conductivity are required.

Printed Inks

Henkel has developed specialized printable ink solutions that meet the unique requirements of medical devices, ensuring high reliability. These electronic materials are specifically designed for various medical applications, including electrodes for ECG, EEG, and EMG, defibrillator pads, biosensing applications such as CGM, lactate, and pH monitoring, heater pads for POC diagnostics and heating blankets, as well as force and moisture sensing for applications like smart insoles and bed sensors.



Product Name	Ink Type	Sheet Resistance (Ω/sq/25 µm)	Printing Process	Curing Process	Typical Substrate	Description	Typical Applications
LOCTITE® ECI 1014	Silver Ink	< 0.010	Screen printing	15 min. at 120°C	Treated and untreated PET, PEN, Kapton®, TPU and ABS	Low temp. curing with good thermal forming properties. Can be cured as low as 60°C	Wearables, health patches, conductive stretchable tracks
LOCTITE® ECI 1010	Silver Ink	< 0.008	Screen printing	15 min. at 120°C	Treated and untreated PET, treated PE and PP, and paper	General purpose high conductive silver ink	Printed heaters, membrane switches, touch panels, printed sensors, printed antennas
LOCTITE® EDAG 456 E&C	Dielectric Inks	Dielectric	Screen printing	UV at 1 Joule/cm^2	TPU, treated and untreated polyester	Most flexible dielectric, good adhesion to the ECI 1014 silver	Membrane switches, touch panels, printed sensors thermal forming
LOCTITE® EDAG PF 455B E&C	Dielectric Inks	Dielectric	Screen printing	UV at 0.5 Joule/ cm^2	Treated and untreated PET, treated PE and PP, and paper	Dielectric with best environmental performance and highest dielectric strength	Membrane switches, touch panels, printed sensors, printed heaters, cross-overs
LOCTITE® EDAG 452SS E&C	Dielectric Inks	Dielectric	Screen printing	UV at 0.5 Joule/ cm^2	Treated and untreated PET, PEN, Kapton®, and ABS	Screen printable, UV curable dielectric ink with excellent flexibility	Membrane switches, touch panels, printed sensors
LOCTITE® EDAG PE 409 E&C	Silver/Silver Chloride	< 0.050	Screen printing	15 min. at 120°C	Treated and untreated PET	A blend of finely divided silver and silver chloride particles in a thermoplastic resin	Wearable patches, electrodes, defibrillator pads
LOCTITE® EDAG 7019 E&C	Silver Chloride	< 0.050	Screen printing	15 min. at 120°C	Treated and untreated PET, paper	Conductive, polyurethane silver silver/chloride ink	Wearable patches, electrodes, defibrillator pads
LOCTITE® EDAG PE 007 E&C	Silver/Silver Chloride	< 0.100	Flexo and rotogravure printing	2 min. at 107°C	Treated and untreated PET, paper	Conductive, polyurethane silver silver/chloride ink	Wearable patches, electrodes, defibrillator pads
LOCTITE® EDAG PE 428E E&C	Silver/Silver Chloride	< 0.03	Slot die, rotogravure, or flexographic printing	15 min. at 95°C	Treated and untreated PET	Water based high speed silver silver/chloride (can be cured at room temperature)	Wearable patches, electrodes, defibrillator pads

Inks – Continued

Product Name	Ink Type	Sheet Resistance (Ω/sq/25 µm)	Printing Process	Curing Process	Typical Substrate	Description	Typical Applications
LOCTITE® ECI 7005 E&C	Carbon Inks	< 40	Flexo and rotogravure printing	2 min. at 120°C	Treated and untreated PET, treated PE and PP, paper	Water-based, high speed printable carbon ink.	Biosensors, printed resistors
LOCTITE® ECI 7007 E&C	Carbon Inks	< 10	Flexo and rotogravure printing	2 min. at 60°C	Polypropylene, polyethylene, PET TPU	High speed carbon developed for smart diapers.	Biosensors, printed resistors
LOCTITE® EDAG 109 E&C	Carbon Inks	< 30	Flexo and rotogravure printing	20 min. at 80°C	Treated and untreated PET, treated PE and PP, paper	Solvent-based, high- speed, printable, fast drying carbon ink. After dilution, this ink can also be used as sprayable EMI shielding coating onto plastic and metal substrates, with attenuation up to 40 dB.	Flexible circuits, biosensors, printed antenna, heating elements
LOCTITE® EDAG PF 407A E&C	Carbon Inks	≤ 20	Screen printing	15 min. at 120°C	PET and other plastics, polycarbonate	Screen printable carbon ink for bio and medical sensor, very good electrical conductivity.	Membrane switches, touch panels, printed sensors, medical electrodes
LOCTITE® EDAG 407C	Carbon Inks	≤ 20	Screen printing	15 min. at 120°C	Treated and untreated PET, treated PE and PP, paper	Solvent based screen printable carbon. Most conductive screen printable carbon comercially available.	General purpose carbon, NOT Polycarbonate friendly
LOCTITE® ECI 8000 SERIES	PTC Carbon Inks	Variable with heat	Screen printing	10 min. at 110°C	Treated and untreated PET, treated PE and PP, paper	PTC heater ink with shutoff temp of 40°C – 120°C. High-voltage.	Printed heating elements

Anti-Microbial Coatings

Henkel offers two types of anti-microbial coatings: LOCTITE® InvisiPrint MBED and LOCTITE® RepelFlex MBED. InvisiPrint is designed for use on glass and metal surfaces found in consumer electronics, such as mobile phone covers, laptop screens, automotive displays, and AR/VR headsets. It is also suitable for applications where hiding fingerprints may be desirable, such as architectural glass, faucets, and reusable medical devices. RepelFlex is a transparent coating that provides excellent anti-scratch and anti-stain protection for both hard and soft plastic surfaces. It is ideal for various applications, including plastic wearable device transmitters, textile-based wearable devices for stain protection, applications requiring soft-touch haptics, smart footwear or prosthetics, high-touch/public surfaces, and any surface requiring microbial defense.

Product Name	Application	Thickness	Hardness	ASTM D3359 - Cross Cut Adhesion - PC Substrate	Water Contact Angle	MI Contact Angle	Light Transmission	ISO 22196 Antimicrobial Test S. Aureus & E. Coli	Cure Schedule	Description
LOCTITE® INVISI-PRINT MBED	Anti-finger print, anti-microbial coating	2 – 10 nm	9H	N/A	> 77	< 40	> 99%	99.999% Reduction	120 to 160°C for 20 to 40 min.	2K oligomeric siloxane with copper material that bonds to glass, anti-reflective coatings and certain metal oxides such as anodized aluminum or chrome to create an ultra thin coating (2 – 5 nm) that is able to hide fingerprint smudges and provide antimicrobial properties. The coating creates a durable bond to the surface that is able to pass 3,000 cycles of eraser abrasion testing.
LOCTITE® Repel-flex MBED	Scratch & stain resistant, anti-microbial coating	0.3 – 1.5 um	N/A	5B – Excellent adhesion	85 to 90	50 to 55	> 97%	99.999% Reduction	1 to 1.3 J/cm^2 at 365 nm "H" bulb	UV curable acrylic, flexible, hard coating that is designed for a variety of substrates. LOCTITE® RepelFlex MBED Thin Coat is designed specifically for the prevention of microbial growth, while at the same time providing a highly transparent, durable, scratch and stain resistant surface. The coating is extremely transparent, flexible and thin, and thus preserves the look and feel of original article.

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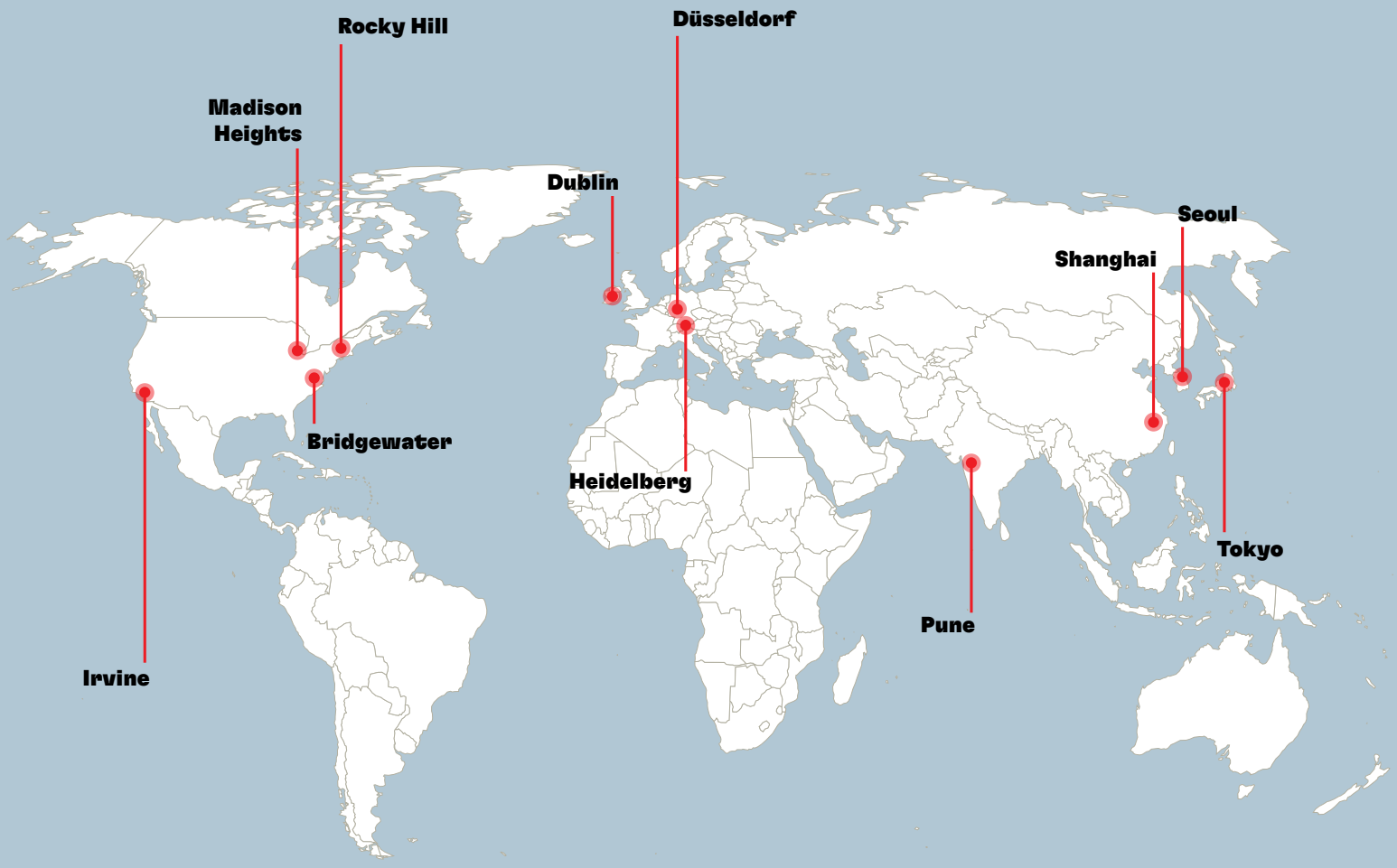

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Henkel Medical Device Adhesives: Not intended for implants nor invasive protheses.

The provided product and technical information should serve as a first indication for your product selection. For further details, please refer to the technical documentation on the product-specific Henkel website and consult a Henkel representative or the technical support group.

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