

**LOCTITE**  
**TECHNOMELT**

**BERGQUIST**

Medical Electronic Devices

High Reliable Materials for Medical Electronic Devices



**Henkel**

# CONTENTS

Introduction .....	3
Medical Electrodes.....	4
Glucose Management.....	9
Moisture Sensors .....	16
Smart Health Patch.....	20
General Medical Assembly .....	27



# Introduction

Reliable diagnostics, effective treatment and improved patient comfort have always been primary objectives for the healthcare industry, and the technologies used to enable optimal patient care are central to achieving these goals. For decades, Henkel electronic materials have facilitated the design and manufacture of leading-edge medical devices, all engineered to streamline diagnostics and improve patient outcomes. Greater access to healthcare, more self-monitoring, and a drive toward less invasive devices and procedures are challenging traditional medical electronics. With the increasing healthcare costs innovators in the field of medical electronics are developing new solutions for remote diagnostics and physician reporting – all designed to manage resources more effectively while simultaneously delivering better patient care. With high-reliability materials formulated specifically for fail-safe medical applications, Henkel has electronic materials solutions for a wide range of medical devices – from biological sensors to implantable microelectronic assemblies to advanced diagnostic equipment.





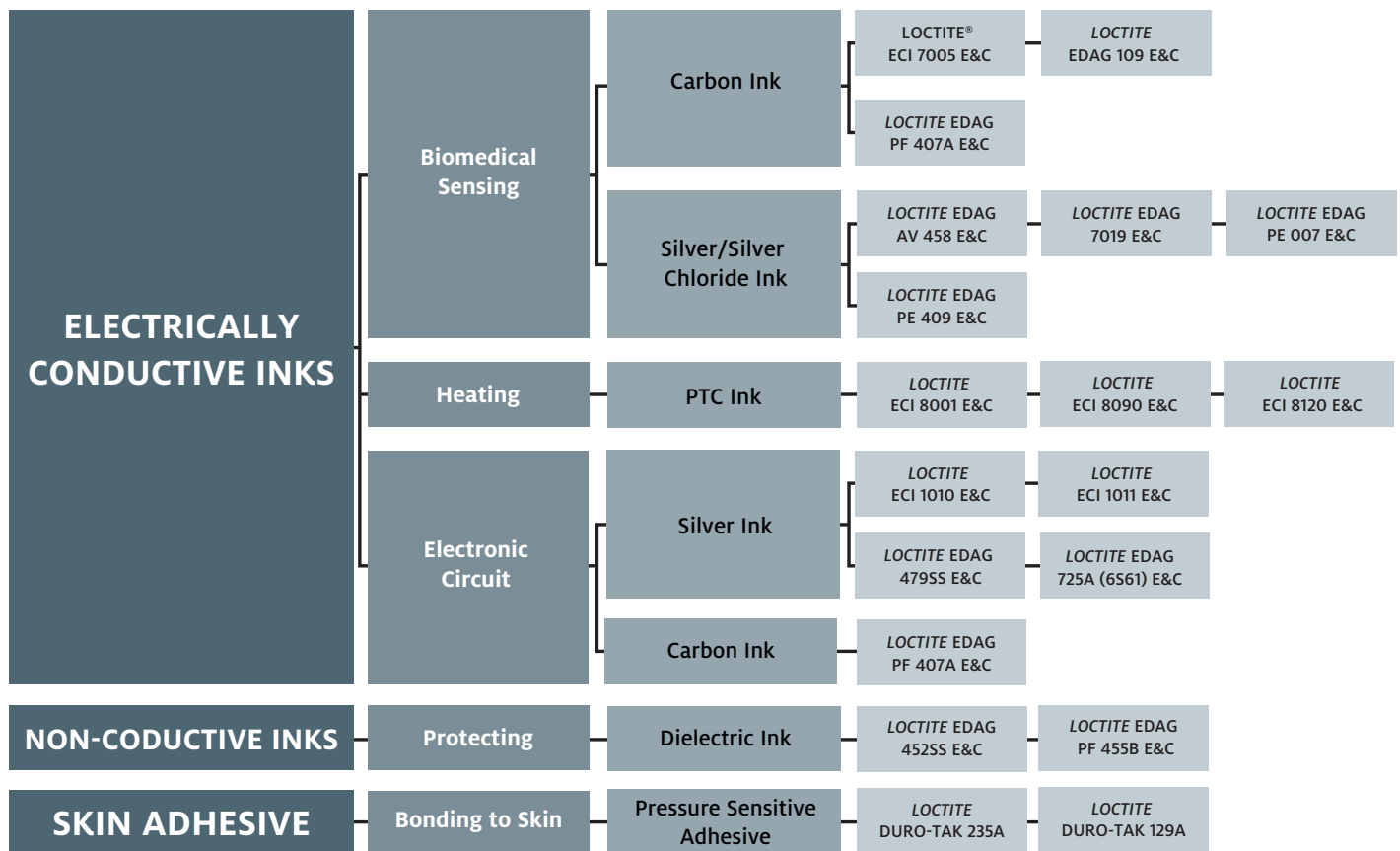
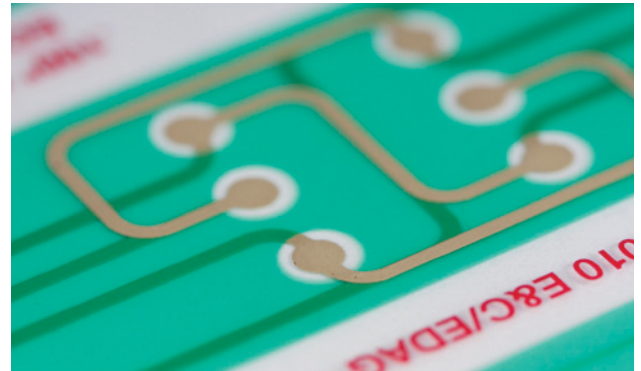
# MATERIAL SOLUTIONS FOR CURRENT AND FUTURE MEDICAL ELECTRONICS AND HEALTHCARE APPLICATIONS

## MEDICAL ELECTRODES

Henkel has developed high-reliability electrically conductive material solutions tailored to the unique requirements of medical electrodes, including TAB ECG, TENS, Grounding, and Defibrillation Electrodes. From the sensing materials to the skin adhesive, Henkel’s medical solutions are the enabling factor for performance, reliability and comfort.

Henkel’s medical electrode materials portfolio helps device manufacturers:

- Improve patient comfort
- Long-term wear and remote monitoring
- Increase reliability and signal quality
- Produce cost-effective electrodes





# ELECTRICALLY CONDUCTIVE INKS

## BIOMEDICAL SENSING

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
Carbon Ink					
LOCTITE ECI 7005 E&C	Water-based, high speed printable carbon ink	< 40	Flexo and rotogravure printing	<ul style="list-style-type: none"><li>• Treated and untreated PET</li><li>• Treated PE and PP</li><li>• Paper</li></ul>	Inline or 2 min. at 120°C
LOCTITE EDAG 109 E&C	Solvent-based, high-speed, printable carbon ink	< 30	Flexo and rotogravure printing	<ul style="list-style-type: none"><li>• Treated and untreated PET</li><li>• Treated PE and PP</li><li>• Paper</li></ul>	15 – 30 min. at 70 – 80°C
LOCTITE EDAG PF 407A E&C	Screen printable carbon ink for bio and medical sensors. Very good electrical conductivity.	$\leq 20$	Screen printing	<ul style="list-style-type: none"><li>• PET and other plastics</li></ul>	15 min. at 120°C



## BIOMEDICAL SENSING – CONTINUED

PRODUCT	DESCRIPTION	Ag / AgCl RATIO	SHEET RESISTANCE ( $\Omega$ /sq/25 $\mu$ m)	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Silver/Silver Chloride Ink</b>						
LOCTITE EDAG AV 458 E&C	Conductive, screen printable ink	3:2	< 0.120	Screen printing	• Treated and untreated PET	15 min. at 120°C
LOCTITE EDAG 7019 E&C	Blend of finely divided silver and silver chloride particles in a thermoplastic resin	4:1	< 0.050	Screen printing	• Treated and untreated PET	10 min. at 107°C
LOCTITE EDAG PE 007 E&C	Conductive, Polyurethane silver ink	4.2:1	< 0.100	Flexo and rotogravure printing	• Treated and untreated PET • Paper	2 min. at 107°C
LOCTITE EDAG PE 409 E&C	Blend of finely divided silver and silver chloride particles in a thermoplastic resin	9:1	$\leq$ 0.050	Screen printing	• Treated and untreated PET	15 min. at 120°C

## HEATING

PRODUCT	DESCRIPTION	PTC TEMPERATURE (°C)	SHEET RESISTANCE (k $\Omega$ /sq/25 $\mu$ m)	PTC RATIO	DRYING SCHEDULE
<b>PTC Ink</b>					
LOCTITE ECI 8001 E&C	Positive Temperature Coefficient (PTC) screen printable ink	60	1.7	> 7	10 min. at 120°C
LOCTITE ECI 8090 E&C	Positive Temperature Coefficient (PTC) screen printable ink	90	1.0	> 7	10 min. at 120°C
LOCTITE ECI 8120 E&C	Positive Temperature Coefficient (PTC) screen printable ink	120	1.7	> 10	10 min. at 140°C

## ELECTRONIC CIRCUIT

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega$ /sq/25 $\mu$ m)	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Silver Ink</b>					
LOCTITE ECI 1010 E&C	Screen printable, conductive ink	< 0.007	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C or 2 min. at 150°C
LOCTITE ECI 1011 E&C	High conductivity, sub-micron size particles	< 0.005	Screen printing and flexo printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	10 min. at 150°C
LOCTITE EDAG 479SS E&C	Conductive, silver-based polymer thick film ink for printing electronic circuits on flexible foil	< 0.020	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 93°C
LOCTITE EDAG 725A (6S61) E&C	Conductive, silver-based polymer thick film ink for printing electronic circuits on flexible foil	0.008 – 0.014	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C
<b>Carbon Ink</b>					
LOCTITE EDAG 407A E&C	Screen printable carbon ink for bio. and medical sensors. Very good electrical conductivity.	$\leq 20$	Screen printing	<ul style="list-style-type: none"> <li>• PET and other plastics</li> </ul>	15 min. at 120°C



# NON-CONDUCTIVE COATINGS

## PROTECTING

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Dielectric Ink</b>					
LOCTITE EDAG 452SS E&C	Screen printable, UV curable dielectric ink with excellent flexibility	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>
LOCTITE EDAG PF 455B E&C	Screen printable, UV curable dielectric ink with excellent humidity resistance	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>

# SKIN ADHESIVE

## BONDING TO SKIN

PRODUCT	DESCRIPTION	TYPE	TYPICAL PROCESSING	ADHESION (180° peel, steel to PET, N/25 mm)	DRYING SCHEDULE
<b>Pressure Sensitive Adhesive</b>					
LOCTITE DURO-TAK 129A	Pressure sensitive adhesive suitable for medical applications like medical tapes, bandages, electrodes	Acrylic	High speed coating (direct or transfer)	36	110°C
LOCTITE DURO-TAK 235A	Pressure sensitive adhesive suitable for medical applications like medical tapes, bandages, electrodes	Acrylic	High speed coating (direct or transfer)	36	110°C

# MATERIAL SOLUTIONS FOR CURRENT AND FUTURE MEDICAL ELECTRONICS AND HEALTHCARE APPLICATIONS



## GLUCOSE MANAGEMENT

Henkel conductive ink materials enable the production of glucose test strips that facilitate self-monitoring of blood glucose (SMBG) levels. The conductive materials are the primary component for glucose sensing functionality, which directly impacts the patient's well-being.

Continuous glucose management (CGM) is the future of blood sugar monitoring and is growing in effectiveness and implementation. Rather than requiring small blood samples several times per day to determine intermittent blood glucose levels, the CGM continuously measures the glucose in blood and displays the data on a reader device. This allows patients to thoroughly monitor glucose levels for more timely insulin injections. Conductive sensing materials and skin-grade adhesives from Henkel are key enablers for reliable CGM skin patches.

# GLUCOSE MANAGEMENT – CONTINUED

<b>SENSOR STRIP</b>	<b>Electrically Conductive Inks</b>	<b>Carbon Ink</b>	LOCTITE ECI 7005 E&C	LOCTITE EDAG 109 E&C	LOCTITE EDAG PF 407A E&C		
		<b>Silver/Silver Chloride Ink</b>	LOCTITE EDAG AV 458 E&C	LOCTITE EDAG 7019 E&C	LOCTITE EDAG PE 007 E&C	LOCTITE EDAG PE 409 E&C	
		<b>Silver Ink</b>	LOCTITE ECI 1010 E&C	LOCTITE ECI 1011 E&C	LOCTITE EDAG 4795S E&C	LOCTITE EDAG 725A (6561) E&C	
	<b>Protecting</b>	<b>Dielectric Ink</b>	LOCTITE EDAG 4525S E&C	LOCTITE EDAG PF 455B E&C			
<b>CONTINUOUS MEASURING PATCH ON SKIN</b>	<b>Component Attach</b>	<b>ECA</b>	LOCTITE® ABLESTIK® 2030SC	LOCTITE ABLESTIK CA 3556HF	LOCTITE ABLESTIK CE 3103WLV		
		<b>Solder Paste</b>	LOCTITE GC 10	LOCTITE LF 318	LOCTITE LM 100		
		<b>Solder Flux</b>	LOCTITE MF 210				
	<b>Bonding to Skin</b>	<b>Pressure Sensitive Adhesive</b>	LOCTITE DURO-TAK 235A	LOCTITE DURO-TAK 129A			
<b>READER</b>	<b>Underfill</b>	<b>Non-reworkable</b>	LOCTITE® ECCOBOND® E 1216M	LOCTITE ECCOBOND FP4526	LOCTITE ECCOBOND FP4531	LOCTITE ECCOBOND UF 1173	
		<b>Reworkable</b>	LOCTITE ECCOBOND UF 3810	LOCTITE ECCOBOND UF 3812			
		<b>Cornerbond</b>	LOCTITE 3508NH				
	<b>PCB Protection Materials</b>	<b>Liquid Encapsulant</b>		LOCTITE ABLESTIK FDA 2 BIPAX	LOCTITE EA 3450	LOCTITE STYCAST EE0079-HD0070	
				LOCTITE ECCOBOND EN 3860T	LOCTITE ECCOBOND EN 3838T	LOCTITE ECCOBOND EO 1072	
				LOCTITE ECCOBOND UV 9060F			
		<b>Overmold</b>	TECHNOMELT® PA 6208 N BLACK				
	<b>Conformal Coating</b>	LOCTITE SI 5293	LOCTITE STYCAST PC 40-UMF	LOCTITE STYCAST PC 62	LOCTITE STYCAST UV 7993		



# SENSOR STRIP

## ELECTRICALLY CONDUCTIVE INKS

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Carbon Ink</b>					
LOCTITE ECI 7005 E&C	Water-based, high speed printable carbon ink	< 40	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Treated PE and PP</li> <li>Paper</li> </ul>	Inline or 2 min. at 120°C
LOCTITE EDAG 109 E&C	Solvent-based, high-speed, printable carbon ink	< 30	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Treated PE and PP</li> <li>Paper</li> </ul>	15 – 30 min. at 70 – 80°C
LOCTITE EDAG PF 407A E&C	Screen printable carbon ink for bio and medical sensors. Very good electrical conductivity.	$\leq 20$	Screen printing	<ul style="list-style-type: none"> <li>PET and other plastics</li> </ul>	15 min. at 120°C

PRODUCT	DESCRIPTION	Ag / AgCl RATIO	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Silver/Silver Chloride Ink</b>						
LOCTITE EDAG AV 458 E&C	Conductive, screen printable ink	3:2	< 0.120	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> </ul>	15 min. at 120°C
LOCTITE EDAG 7019 E&C	Blend of finely divided silver and silver chloride particles in a thermoplastic resin	4:1	< 0.050	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> </ul>	10 min. at 107°C
LOCTITE EDAG PE 007 E&C	Conductive, Polyurethane silver ink	4.2:1	< 0.100	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Paper</li> </ul>	2 min. at 107°C
LOCTITE EDAG PE 409 E&C	Blend of finely divided silver and silver chloride particles in a thermoplastic resin	9:1	< 0.050	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> </ul>	15 min. at 120°C

# CONTINUOUS MEASURING PATCH ON SKIN

## ELECTRICALLY CONDUCTIVE INKS – CONTINUED

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega$ /sq/25 $\mu$ m)	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Silver Ink</b>					
LOCTITE ECI 1010 E&C	Screen printable, conductive ink	< 0.007	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C or 2 min. at 150°C
LOCTITE ECI 1011 E&C	High conductivity, sub-micron size particles	< 0.005	Screen printing and flexo printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	10 min. at 150°C
LOCTITE EDAG 479SS E&C	Conductive, silver-based polymer thick film ink for printing electronic circuits on flexible foil	< 0.020	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 93°C
LOCTITE EDAG 725A (6S61) E&C	Conductive, silver-based polymer thick film ink for printing electronic circuits on flexible foil	0.008 – 0.014	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C

## PROTECTING

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega$ /sq/25 $\mu$ m)	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Dielectric Ink</b>					
LOCTITE EDAG 452SS E&C	Screen printable, UV curable dielectric ink with excellent flexibility	> 2 x 10 <sup>9</sup>	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>
LOCTITE EDAG PF 455B E&C	Screen printable, UV curable dielectric ink with excellent humidity resistance	> 2 x 10 <sup>9</sup>	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>

## COMPONENT ATTACH

PRODUCT	DESCRIPTION	VOLUME RESISTIVITY (Ω.cm)	TYPICAL PROCESSING	STORAGE MODULUS AT 25°C (MPa)	CURING SCHEDULE
<b>Electrically Conductive Adhesive (ECA)</b>					
LOCTITE ABLESTIK CA 3556HF	Acrylic ECA, flexible material	0.0025	Dispensing	650	10 min. at 120°C
LOCTITE ABLESTIK CE 3103WLV	Electrically conductive epoxy adhesive that is a Pb-free alternative to solder	0.0008	Dispensing	4,500	10 min. at 120°C
LOCTITE ABLESTIK ICP 4000	Silicone based, electrically conductive adhesive. Specially designed for applications where both high flexibility and excellent conductivity are required.	0.00006	Dispensing or pin transfer	< 100	60 min. at 130°C

PRODUCT	DESCRIPTION	ALLOY	MELTING POINT (°C)	TYPICAL PROCESSING	PARTICLE SIZE	SHELF LIFE
<b>Solder Paste</b>						
LOCTITE GC 10	Room temperature, stable solder paste	SAC305	217	Stencil printing	Type 3, 4, 4.5 (4A), 5	12 months up to 26.5°C
LOCTITE LF 318	RoHS-compliant solder paste	90iSC, SAC305, SAC387	90iSC: 205 – 218 SAC305, SAC387: 217	Stencil printing	Type 3, 4	6 months at 0 – 10°C
LOCTITE LM 100	Low melting alloy for sensitive substrates	BI58	138	Dispensing and stencil printing	Type 2.5 (2A)	6 months at 0 – 10°C

PRODUCT	DESCRIPTION	SOLID CONTENT (%w)	ACID VALUE (mg KOH/g)	TYPICAL PROCESSING	IPC J-STD-004B CLASSIFICATION
<b>Solder Flux</b>					
LOCTITE MF 210	Resin free flux	2.9	22.5	Spray/Foam	ORMO

## BONDING TO SKIN

PRODUCT	DESCRIPTION	TYPE	TYPICAL PROCESSING	ADHESION (180° peel, steel to PET, N/25 mm)	DRYING SCHEDULE
<b>Pressure Sensitive Adhesive</b>					
LOCTITE DURO-TAK 129A	Pressure sensitive adhesive suitable for medical applications like medical tapes, bandages, electrodes	Acrylic	High speed coating (direct or transfer)	36	110°C
LOCTITE DURO-TAK 235A	Pressure sensitive adhesive suitable for medical applications like medical tapes, bandages, electrodes	Acrylic	High speed coating (direct or transfer)	36	110°C



# READER

## UNDERFILL

PRODUCT	DESCRIPTION	VISCOSITY	COEFFICIENT OF THERMAL EXPANSION, CTE (PPM/°C)		GLASS TRANSITION TEMPERATURE, T <sub>g</sub> (°C)	CURE SCHEDULE
			BELOW T <sub>g</sub>	ABOVE T <sub>g</sub>		
<b>Non-reworkable</b>						
LOCTITE ECCOBOND E 1216M	Very fast flow and cure	4,000 cP at 20 rpm	35	131	125	3 min. at 165°C or 10 min. at 130°C
LOCTITE ECCOBOND FP4526	Capillary flow underfill for flip chip	4,700 cP at 10 rpm	33	101	133	15 min. at 165°C
LOCTITE ECCOBOND FP4531	Capillary flow underfill for flip chip on flex applications	10,000 cP at 20 rpm	28	104	161	7 min. at 160°C
LOCTITE ECCOBOND UF 1173	Uniform void-free encapsulant underfill for CSP and BGA packages	7,500 cP at 10s <sup>-1</sup>	26	103	160	5 min. at 150°C
<b>Reworkable</b>						
LOCTITE ECCOBOND UF 3810	Reworkable capillary underfill	394 cP at 1,000s <sup>-1</sup>	55	171	102	8 min. at 130°C
LOCTITE ECCOBOND UF 3812	Reworkable capillary underfill with high T <sub>g</sub>	350 cP at 1,000s <sup>-1</sup>	48	175	131	10 min. at 130°C
<b>Cornerbond</b>						
LOCTITE 3508NH	Cornerbond underfill designed to cure during Pb-free solder reflow	70,000 cP at 36s <sup>-1</sup>	65	175	118	Lead-free profile at 245°C

## PCB PROTECTION MATERIALS

PRODUCT	DESCRIPTION	MIX RATIO	VISCOSITY (cP)	CURE SCHEDULE
<b>Liquid Encapsulant</b>				
LOCTITE ABLESTIK FDA 2 BIPAX	Heat cure or Room temperature cure epoxy designed for medical device applications	100 : 100	14,000 at 10 rpm	24 hr. at 25°C or 1 to 4 hr. at 65°C
LOCTITE EA 3450	Two-component, epoxy adhesive	1 : 1	30,000 at 10 rpm	24 hr. at 25°C or 1 hr. at 80°C
LOCTITE STYCAST EE0079-HD0070	Two-component, epoxy adhesive suitable for in-body applications	100 : 26	500 – 700 at 10 rpm	2 hr. at 60°C

## PCB PROTECTION MATERIALS – CONTINUED

PRODUCT	DESCRIPTION	VISCOSITY AT 25°C (cP)	GLASS TRANSITION TEMPERATURE, T <sub>g</sub> (°C)	STORAGE MODULUS AT 25°C (MPa)	CURE SCHEDULE
<b>Liquid Encapsulant</b>					
LOCTITE ECCOBOND EN 3860T	CSP/BGA thermal cure encapsulant with low viscosity	1,000	82	1,230	10 min. at 130°C or 5 min. at 150°C
LOCTITE ECCOBOND EN 3838T	Low T <sub>g</sub> thermal cure encapsulant	6,700	2	466	8 min. at 130°C
LOCTITE ECCOBOND EO 1072	High T <sub>g</sub> and hardness thermal cure encapsulant	80,000	135	6,700	5 min. at 150°C
LOCTITE ECCOBOND UV 9060F	UV/Moisture cure encapsulant	11,000	75	2,200	25 sec at 500 mW/cm <sup>2</sup> (365nm)

PRODUCT	DESCRIPTION	COLOR	OPERATING TEMPERATURE (°C)	SHORE HARDNESS	APPLICATION TEMPERATURE RANGE (°C)
<b>Overmold</b>					
TECHNOMELT PA 6208 N BLACK	Moldable polyamide with excellent adhesion to tough substrates. Great flexibility offers incredible strain relief on cables and wires. Ideal for encapsulation of heat-producing components in appliances and consumer electronics.	Black	-40 – 100	82A	180 – 230

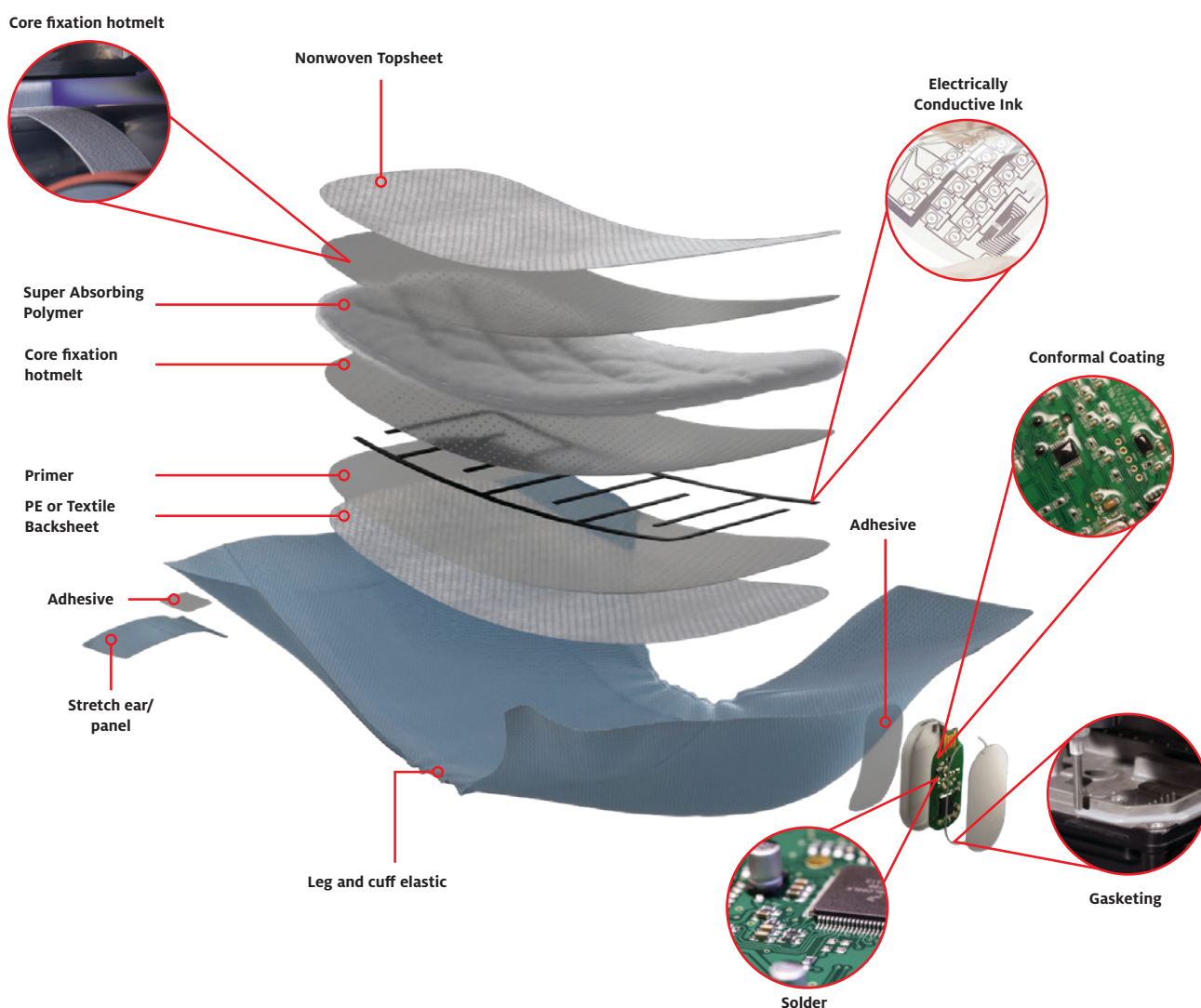
PRODUCT	DESCRIPTION	VISCOSITY AT 25°C (cP)	VOLUME RESISTIVITY (Ω.cm at 25°C)	DIELECTRIC CONSTANT (1 MHz)	CURE SCHEDULE
<b>Conformal Coating</b>					
LOCTITE SI 5293	Repairable, solvent-free, medium-viscosity, UV/moisture-cure silicone, designed for severe temperature environments. High-reliability automotive applications.	400 – 800	1.0 x 10 <sup>14</sup>	4.5	20 sec. UV + 3 days at RT
LOCTITE STYCAST PC 40-UMF	Conformal coating specifically formulated to rapidly gel and immobilize when exposed to UV light and then fully cure when exposed to atmospheric moisture, ensuring optimum performance even in shadowed areas.	250 – 500	3.5 x 10 <sup>16</sup>	2.7	UV and moisture, 10 sec. UV + 3 days at RT
LOCTITE STYCAST PC 62	Conformal coating that provides environmental and mechanical protection. Toluene-free alternative with superior toughness and abrasion resistance.	52	1.04 x 10 <sup>16</sup>	2.2	24 hr. at 25°C or 45 min. at 75°C
LOCTITE STYCAST UV 7993	Conformal coating designed to provide rugged protection from moisture and harsh chemicals. It is compatible with industry-standard solder masks, no-clean fluxes, metallization, components and substrate materials.	120	2.2 x 10 <sup>16</sup>	3.3	UV (150 – 300 mW/cm <sup>2</sup> ) + Ambient Moisture (100 hr.)

# MATERIAL SOLUTIONS FOR CURRENT AND FUTURE MEDICAL ELECTRONICS AND HEALTHCARE APPLICATIONS

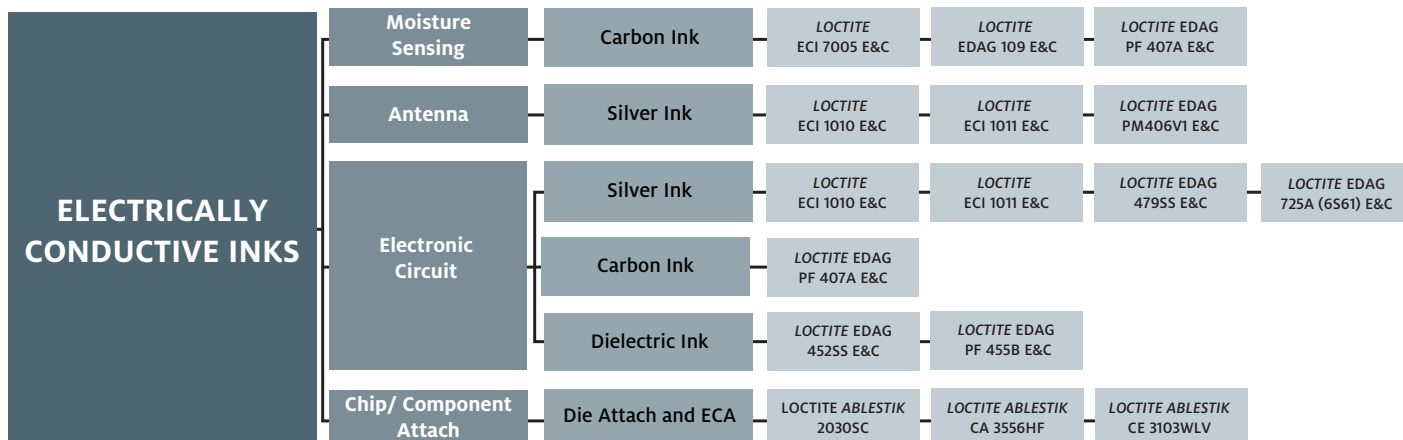
## MOISTURE SENSORS

An increasing geriatric population alongside rising healthcare costs is driving the development of novel monitoring tools to help improve patient comfort and reduce expense. Henkel is answering this call with multiple approaches, one of which is smart incontinence management through the use of cost-effective printable moisture sensors that can be worn comfortably and send real-time communication when replacement supplies are required.

Henkel conductive inks allow for the manufacturing of responsive, disposable healthcare products including smart diapers, smart bed pads and industrial applications. Henkel's electrically conductive materials can be directly applied by high-speed flexographic print processes onto thin, flexible materials used in the assembly of healthcare products, which further reduces cost by increasing throughput.







## ELECTRICALLY CONDUCTIVE INKS

### MOISTURE SENSING

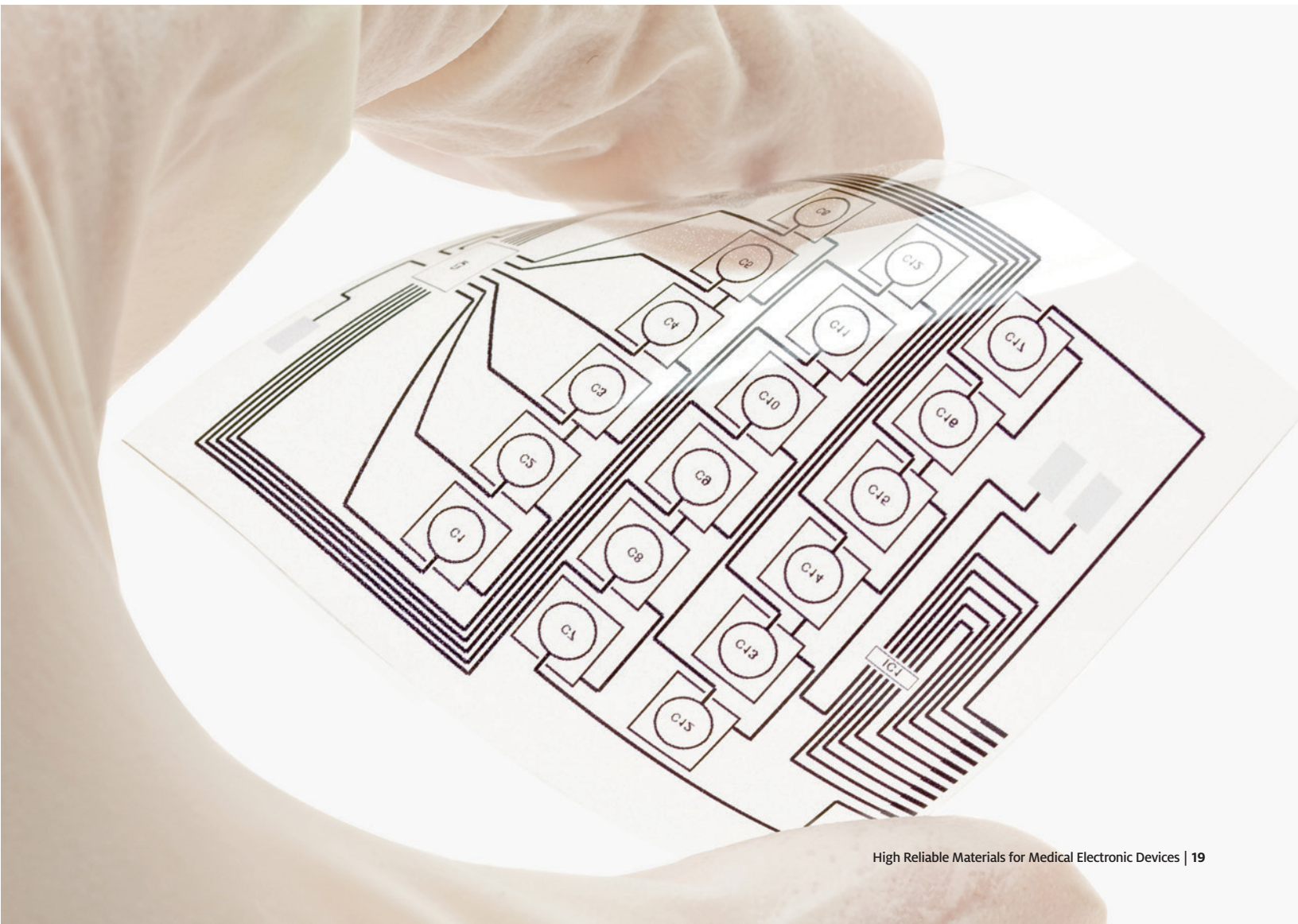
PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Carbon Ink</b>					
LOCTITE ECI 7005 E&C	Water-based, high speed printable carbon ink	< 40	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Treated PE and PP</li> <li>Paper</li> </ul>	Inline or 2 min. at 120°C
LOCTITE EDAG 109 E&C	Solvent-based, high-speed, printable carbon ink	< 30	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Treated PE and PP</li> <li>Paper</li> </ul>	15 – 30 min. at 70 – 80°C
LOCTITE EDAG PF 407A E&C	Screen printable carbon ink for bio and medical sensors. Very good electrical conductivity.	$\leq 20$	Screen printing	<ul style="list-style-type: none"> <li>PET and other plastics</li> </ul>	15 min. at 120°C

## ELECTRONIC CIRCUIT

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25\ \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Silver Ink</b>					
LOCTITE ECI 1010 E&C	Screen printable, conductive ink	< 0.007	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C or 2 min. at 150°C
LOCTITE ECI 1011 E&C	High conductivity, sub-micron size particles	< 0.005	Screen printing and flexo printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	10 min. at 150°C
LOCTITE EDAG PM406V1	Screen printable, conductive ink formulated to have very high conductivity and solids content	< 0.015	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C
LOCTITE EDAG 479SS E&C	Conductive, silver-based polymer thick film ink for printing electronic circuits on flexible foil	< 0.020	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 93°C
LOCTITE EDAG 725A (6S61) E&C	Conductive, silver-based polymer thick film ink for printing electronic circuits on flexible foil	0.008 – 0.014	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C
<b>Carbon Ink</b>					
LOCTITE EDAG 407A E&C	Screen printable carbon ink for bio and medical sensors. Very good electrical conductivity.	$\leq 20$	Screen printing	<ul style="list-style-type: none"> <li>• PET and other plastics</li> </ul>	15 min. at 120°C

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25\ \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Dielectric Ink</b>					
LOCTITE EDAG 452SS E&C	Screen printable, UV curable dielectric ink with excellent flexibility	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>
LOCTITE EDAG PF 455B E&C	Screen printable, UV curable dielectric ink with excellent humidity resistance	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>

PRODUCT	DESCRIPTION	VOLUME RESISTIVITY ( $\Omega \cdot \text{cm}$ )	TYPICAL PROCESSING	STORAGE MODULUS at 25°C (MPa)	CURING SCHEDULE
Die Attach and ECA					
LOCTITE ABLESTIK 2030SC	Die attach adhesive for high throughput die attach applications	0.0002	Dispensing	3,300	90 sec. at 110°C
LOCTITE ABLESTIK CA 3556HF	Electrically conductive adhesive designed for applications that require a very fast cure at low temperatures	0.0025	Dispensing	650	10 min. at 120°C
LOCTITE ABLESTIK CE 3103WLV	Electrically conductive epoxy adhesive that is a Pb-free alternative to solder	0.0008	Dispensing	4,500	10 min. at 120°C

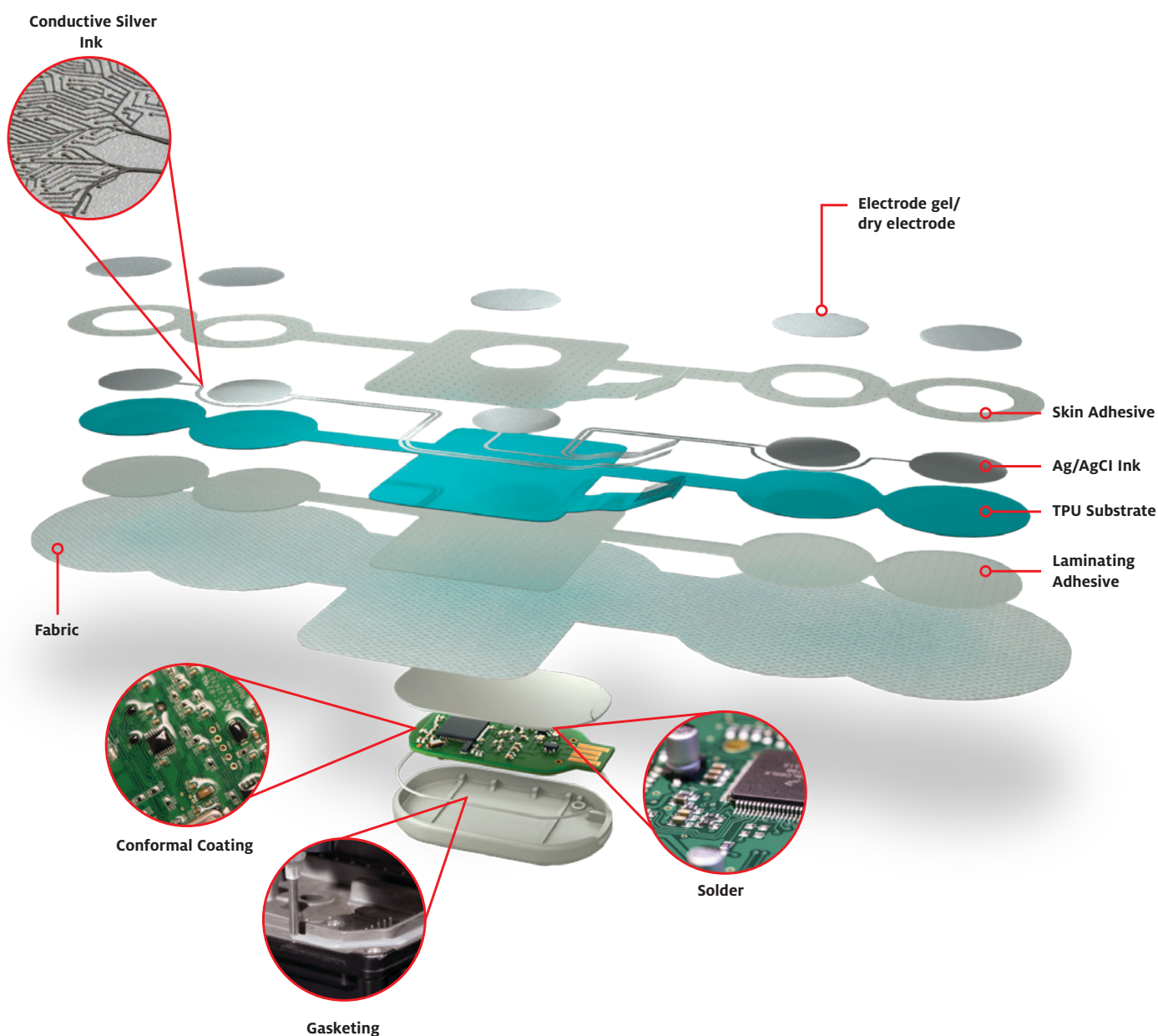


# MATERIAL SOLUTIONS FOR CURRENT AND FUTURE MEDICAL ELECTRONICS AND HEALTHCARE APPLICATIONS

## SMART HEALTH PATCH

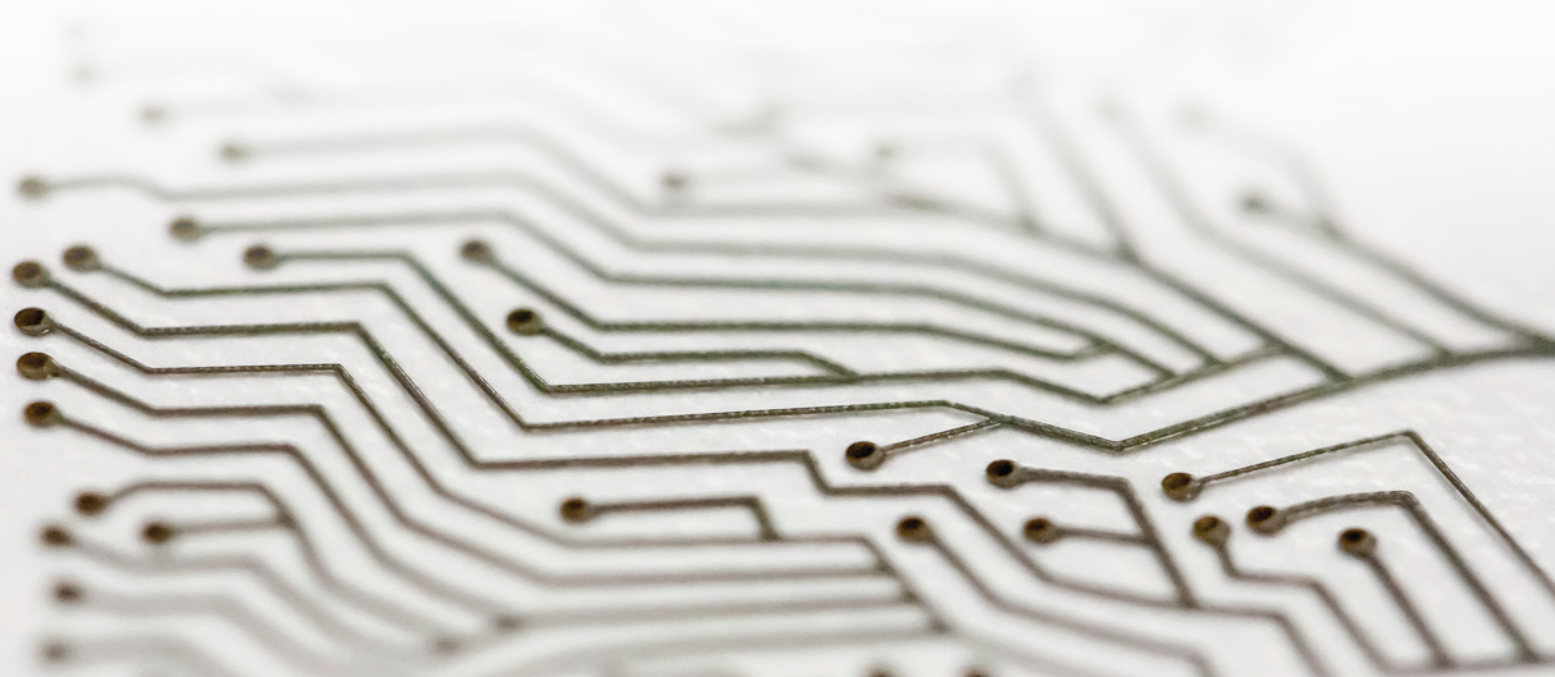
Smart health patches are the latest advance in patient monitoring that can continuously measure heart rate, brain activity, movement and many other human body functions. These patches leverage on-skin sensor technology, miniaturized hardware and data communication to accommodate patient comfort.

Electrode materials, conductive inks, protective coatings and skin-grade adhesives from Henkel allow new smart medical devices and disposable healthcare products to be produced in high volume and deliver reliable in-application functionality.





<b>ELECTRICALLY CONDUCTIVE INKS</b>	<b>Biomedical Sensing</b>	<b>Carbon Ink</b>	LOCTITE ECI 7005 E&C	LOCTITE EDAG 109 E&C	LOCTITE EDAG PF 407A E&C	
		<b>Silver/Silver Chloride Ink</b>	LOCTITE EDAG AV 458 E&C	LOCTITE EDAG 7019 E&C	LOCTITE EDAG PE 007 E&C	LOCTITE EDAG PE 409 E&C
	<b>Electronic Circuit</b>	<b>Silver Ink</b>	LOCTITE ECI 1010 E&C	LOCTITE ECI 1011 E&C	LOCTITE EDAG 4795S E&C	LOCTITE EDAG 725A (6561) E&C
		<b>Carbon Ink</b>	LOCTITE EDAG PF 407A E&C			
		<b>Dielectric Ink</b>	LOCTITE EDAG 452SS E&C	LOCTITE EDAG PF 455B E&C		
	<b>Component Attach</b>	<b>ECA</b>	LOCTITE ABLESTIK ICP 4000	LOCTITE ABLESTIK CA 3556HF	LOCTITE ABLESTIK CE 3103WLV	
		<b>Solder Paste</b>	LOCTITE GC 10	LOCTITE LF 318	LOCTITE LM 100	
		<b>Solder Flux</b>	LOCTITE MF 210			
	<b>SKIN ADHESIVE</b>	<b>Bonding to Skin</b>	<b>Pressure Sensitive Adhesive</b>	LOCTITE DURO-TAK 235A	LOCTITE DURO-TAK 129A	
	<b>NON-ELECTRICALLY CONDUCTIVE MATERIALS</b>	<b>Protecting</b>	<b>Dielectric Ink</b>	LOCTITE EDAG 452SS E&C	LOCTITE EDAG PF 455B E&C	
<b>Conformal Coating</b>			LOCTITE SI 5293	LOCTITE STYCAST PC 40-UMF	LOCTITE STYCAST PC 62	LOCTITE STYCAST UV 7993
<b>Liquid Compression Molding</b>			TECHNOMELT® PA 638	TECHNOMELT® PA 6208 N BLACK		





# ELECTRICALLY CONDUCTIVE INKS

## BIOMEDICAL SENSING

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Carbon Ink</b>					
LOCTITE ECI 7005 E&C	Water-based, high speed printable carbon ink	< 40	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Treated PE and PP</li> <li>Paper</li> </ul>	Inline or 2 min. at 120°C
LOCTITE EDAG 109 E&C	High-speed, printable carbon ink	< 30	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Treated PE and PP</li> <li>Paper</li> </ul>	15 – 30 min. at 70 – 80°C
LOCTITE EDAG PF 407A E&C	Screen printable carbon ink for bio and medical sensors. Very good electrical conductivity.	$\leq 20$	Screen printing	<ul style="list-style-type: none"> <li>PET and other plastics</li> </ul>	15 min. at 120°C

PRODUCT	DESCRIPTION	Ag / AgCl RATIO	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Silver/Silver Chloride Ink</b>						
LOCTITE EDAG AV 458 E&C	Conductive, screen printable ink	3:2	< 0.120	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> </ul>	15 min. at 120°C
LOCTITE EDAG 7019 E&C	Blend of finely divided silver and silver chloride particles in a thermoplastic resin	4:1	< 0.050	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> </ul>	10 min. at 107°C
LOCTITE EDAG PE 007 E&C	Conductive, Polyurethane silver ink	4.2:1	< 0.100	Flexo and rotogravure printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>Paper</li> </ul>	2 min. at 107°C
LOCTITE EDAG PE 409 E&C	Blend of finely divided silver and silver chloride particles in a thermoplastic resin	9:1	< 0.050	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> </ul>	15 min. at 120°C

## ELECTRONIC CIRCUIT

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Silver Ink</b>					
LOCTITE ECI 1010 E&C	Screen printable, conductive ink	< 0.007	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>PEN</li> <li>Kapton</li> <li>ABS</li> <li>Paper</li> </ul>	15 min. at 120°C or 2 min. at 150°C
LOCTITE ECI 1011 E&C	High conductivity, sub-micron size particles	< 0.005	Screen printing and flexo printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>PEN</li> <li>Kapton</li> <li>ABS</li> <li>Paper</li> </ul>	10 min. at 150°C
LOCTITE EDAG 479SS E&C	Conductive, silver-based polymer thick film ink	< 0.020	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>PEN</li> <li>Kapton</li> <li>ABS</li> <li>Paper</li> </ul>	15 min. at 93°C

## ELECTRONIC CIRCUIT – CONTINUED

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega$ /sq/25 $\mu$ m)	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
LOCTITE EDAG 725A (6S61) E&C	Conductive, silver-based polymer thick film ink for printing electronic circuits on flexible foil	0.008 – 0.014	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	15 min. at 120°C
<b>Carbon Ink</b>					
LOCTITE EDAG 407A E&C	Screen printable carbon ink for bio. and medical sensors. Very good electrical conductivity.	$\leq 20$	Screen printing	<ul style="list-style-type: none"> <li>• PET and other plastics</li> </ul>	15 min. at 120°C

## SKIN ADHESIVES

### PROTECTING

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega$ /sq/25 $\mu$ m)	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Dielectric Ink</b>					
LOCTITE EDAG 452SS E&C	Screen printable, UV curable dielectric ink with excellent flexibility	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> <li>• Paper</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>
LOCTITE EDAG PF 455B E&C	Screen printable, UV curable dielectric ink with excellent humidity resistance	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>• Treated and untreated PET</li> <li>• PEN</li> <li>• Kapton</li> <li>• ABS</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>

### COMPONENT ATTACH

PRODUCT	DESCRIPTION	VOLUME RESISTIVITY ( $\Omega$ .cm)	TYPICAL PROCESSING	STORAGE MODULUS AT 25°C (MPa)	CURING SCHEDULE
<b>Electrically Conductive Adhesive (ECA)</b>					
LOCTITE ABLESTIK CA 3556HF	Acrylic ECA, flexible material	0.0025	Dispensing	650	10 min. at 120°C
LOCTITE ABLESTIK CE 3103WLV	Electrically conductive epoxy adhesive that is a Pb-free alternative to solder	0.0008	Dispensing	4,500	10 min. at 120°C
LOCTITE ABLESTIK ICP 4000	Silicone based, electrically conductive adhesive. Specially designed for applications where both high flexibility and excellent conductivity are required.	0.00006	Dispensing or pin transfer	< 100	60 min. at 130°C

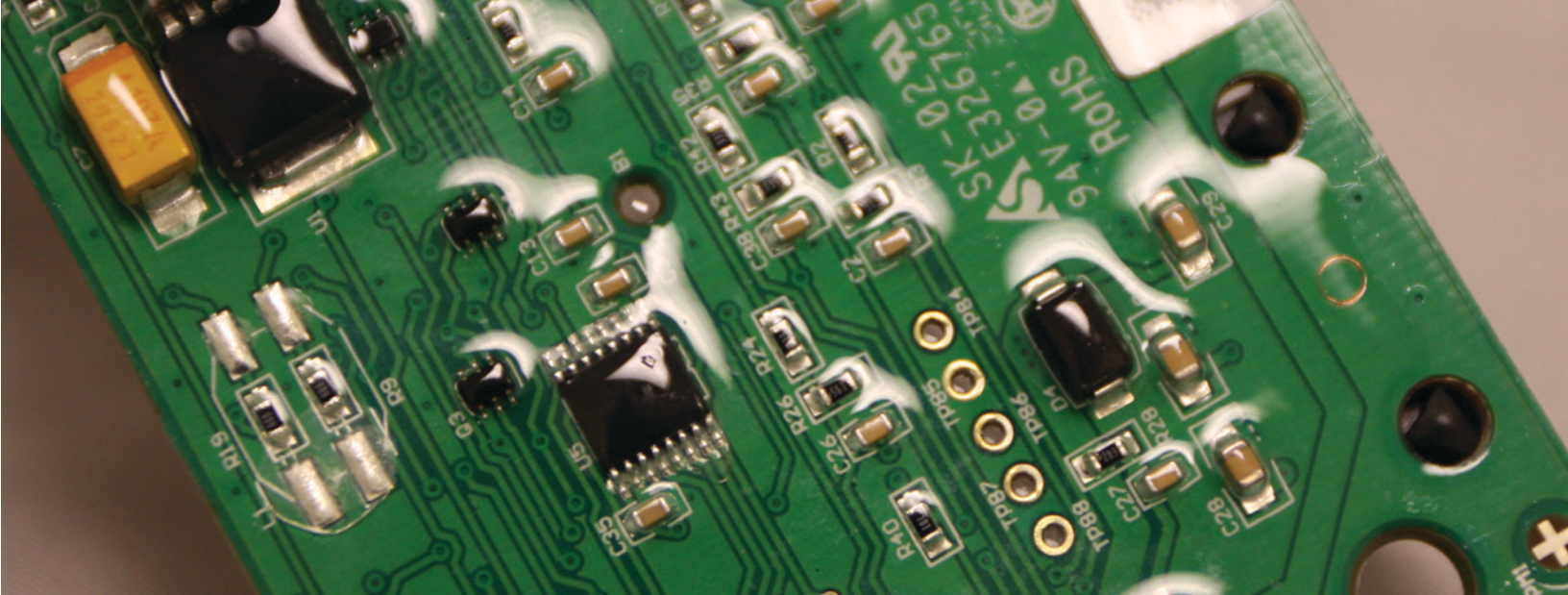
## COMPONENT ATTACH – CONTINUED

PRODUCT	DESCRIPTION	ALLOY	MELTING POINT (°C)	TYPICAL PROCESSING	PARTICLE SIZE	SHELF LIFE
<b>Solder Paste</b>						
LOCTITE GC 10	Room temperature, stable solder paste	SAC305	217	Stencil printing	Type 3, 4, 4.5 (4A), 5	12 months up to 26.5°C
LOCTITE LF 318	RoHS-compliant solder paste	90iSC, SAC305, SAC387	90iSC: 205 – 218 SAC305, SAC387: 217	Stencil printing	Type 3, 4	6 months at 0 – 10°C
LOCTITE LM 100	Low melting alloy for sensitive substrates	BI58	138	Dispensing and stencil printing	Type 2.5 (2A)	6 months at 0 – 10°C

PRODUCT	DESCRIPTION	SOLID CONTENT (%w)	ACID VALUE (mg KOH/g)	TYPICAL PROCESSING	IPC J-STD-004B CLASSIFICATION
<b>Solder Flux</b>					
LOCTITE MF 210	Resin free flux	2.9	22.5	Spray/Foam	ORM0

## BONDING TO SKIN

PRODUCT	DESCRIPTION	TYPE	TYPICAL PROCESSING	ADHESION (180° Peel, steel to PET, N/25 mm)	DRYING SCHEDULE
<b>Pressure Sensitive Adhesive</b>					
LOCTITE DURO-TAK 129A	Pressure sensitive adhesive suitable for medical applications like medical tapes, bandages, electrodes	Acrylic	High speed coating (direct or transfer)	36	110°C
LOCTITE DURO-TAK 235A	Pressure sensitive adhesive suitable for medical applications like medical tapes, bandages, electrodes	Acrylic	High speed coating (direct or transfer)	36	110°C



## NON-ELECTRICALLY CONDUCTIVE MATERIALS

### PROTECTING

PRODUCT	DESCRIPTION	SHEET RESISTANCE ( $\Omega/\text{sq}/25 \mu\text{m}$ )	TYPICAL PROCESSING	TYPICAL SUBSTRATE	DRYING SCHEDULE
<b>Dielectric Ink</b>					
LOCTITE EDAG 452SS E&C	Screen printable, UV curable dielectric ink with excellent flexibility	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>PEN</li> <li>Kapton</li> <li>ABS</li> <li>Paper</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>
LOCTITE EDAG PF 455B E&C	Screen printable, UV curable dielectric ink with excellent humidity resistance	$> 2 \times 10^9$	Screen printing	<ul style="list-style-type: none"> <li>Treated and untreated PET</li> <li>PEN</li> <li>Kapton</li> <li>ABS</li> </ul>	UV at 0.5 Joule/cm <sup>2</sup>

PRODUCT	DESCRIPTION	VISCOSITY AT 25°C (cP)	VOLUME RESISTIVITY ( $\Omega \cdot \text{cm}$ at 25°C)	DIELECTRIC CONSTANT (1 MHz)	CURE SCHEDULE
<b>Conformal Coating</b>					
LOCTITE SI 5293	Repairable, solvent-free, medium-viscosity, UV/ moisture-cure silicone, designed for severe temperature environments. High-reliability automotive applications.	400 – 800	$1.0 \times 10^{14}$	4.5	20 sec. UV + 3 days at RT
LOCTITE STYCAST PC 40-UMF	Conformal coating specifically formulated to rapidly gel and immobilize when exposed to UV light and then fully cure when exposed to atmospheric moisture, ensuring optimum performance even in shadowed areas.	250 – 500	$3.5 \times 10^{16}$	2.7	UV and moisture, 10 sec. UV + 3 days at RT
LOCTITE STYCAST PC 62	Conformal coating that provides environmental and mechanical protection. Toluene-free alternative with superior toughness and abrasion resistance.	52	$1.04 \times 10^{16}$	2.2	24 hr. at 25°C or 45 min. at 75°C
LOCTITE STYCAST UV 7993	Conformal coating designed to provide rugged protection from moisture and harsh chemicals. It is compatible with industry-standard solder masks, no-clean fluxes, metallization, components and substrate materials.	120	$2.2 \times 10^{16}$	3.3	UV (150 – 300 mW/cm <sup>2</sup> ) + Ambient Moisture (100 hr.)



# NON-ELECTRICALLY CONDUCTIVE MATERIALS

## PROTECTING – CONTINUED

PRODUCT	DESCRIPTION	COLOR	OPERATING TEMPERATURE (°C)	SHORE HARDNESS	APPLICATION TEMPERATURE RANGE (°C)
Overmold					
TECHNOMELT PA 638	High-performance thermoplastic polyamide with moderate strength and good adhesion for in-cabin and under-hood applications.	Amber	-40 – 125	67D	232 – 260
TECHNOMELT PA 6208 N BLACK	Moldable polyamide with excellent adhesion to tough substrates. Great flexibility offers incredible strain relief on cables and wires. Ideal for encapsulation of heat-producing components in appliances and consumer electronics.	Black	-40 – 100	82A	180 – 230





# MATERIAL SOLUTIONS FOR CURRENT AND FUTURE MEDICAL ELECTRONICS AND HEALTHCARE APPLICATIONS

## GENERAL MEDICAL ASSEMBLY

Henkel has developed a complete line of general medical assembly materials that facilitate the electrical connection, structural integrity, device protection and thermal control required for small form factor, mission-critical medical products.

The materials portfolio includes encapsulation and underfill materials for protection of hearing aids, medical encapsulants for implantable cardio and neuro devices and thermal management materials and shielding inks for imaging equipment.



<b>UNDERFILL</b>	<b>Capillary Flow</b>	<b>Non-reworkable</b>	LOCTITE ECCOBOND E 1216M	LOCTITE ECCOBOND FP4526	LOCTITE ECCOBOND FP4531	LOCTITE ECCOBOND UF 1173
		<b>Reworkable</b>	LOCTITE ECCOBOND UF 3810	LOCTITE ECCOBOND UF 3812		
	<b>Cornerbond</b>	<b>Reworkable</b>	LOCTITE 3508NH			
<b>PCB PROTECTING MATERIALS</b>	<b>Liquid Encapsulant</b>	<b>One-component</b>	LOCTITE ECCOBOND EN 3860T	LOCTITE ECCOBOND EN 3838T	LOCTITE ECCOBOND EO 1072	
		<b>Two-component</b>	LOCTITE ABLESTIK FDA 2 BIPAX	LOCTITE EA 3450	LOCTITE STYCAST EE0079-HD0070	
		<b>UV/Heat Cure</b>	LOCTITE ECCOBOND UV 9060F			
	<b>Overmold</b>	<b>Low Pressure Molding</b>	TECHNOMELT® PA 6208 N BLACK			
	<b>Coating</b>	<b>Conformal Coating</b>	LOCTITE SI 5293	LOCTITE STYCAST PC 40-UMF	LOCTITE STYCAST PC 62	LOCTITE STYCAST UV 7993
<b>ELECTRICALLY CONDUCTIVE MATERIALS</b>	<b>Solder</b>	<b>Solder Paste</b>	LOCTITE GC 3W	LOCTITE GC 10	LOCTITE HF 2W	LOCTITE LM 100
		<b>Solder Flux</b>	LOCTITE MF 210	LOCTITE MF 390HR		
		<b>Solder Wire</b>	LOCTITE C 400			
	<b>Electrically Conductive Adhesives</b>	<b>One Component Heat Cure</b>	LOCTITE ABLESTIK 84-1 LM1SR4	LOCTITE ABLESTIK CA 3556HF	LOCTITE ABLESTIK CE 3103WLV	LOCTITE ABLESTIK ICP 4000

# PROTECTING SOLUTIONS MEDICAL ASSEMBLY

## UNDERFILL

PRODUCT	DESCRIPTION	VISCOSITY	COEFFICIENT OF THERMAL EXPANSION, CTE (PPM/°C)		GLASS TRANSITION TEMPERATURE, T <sub>g</sub> (°C)	CURE SCHEDULE
			Below T <sub>g</sub>	ABOVE T <sub>g</sub>		
<b>Non-reworkable</b>						
LOCTITE ECCOBOND E 1216M	Very fast flow and cure	4,000 cP at 20 rpm	35	131	125	3 min. at 165°C or 10 min. at 130°C
LOCTITE ECCOBOND FP4526	Capillary flow underfill for flip chip	4,700 cP at 10 rpm	33	101	133	15 min. at 165°C
LOCTITE ECCOBOND FP 4531	Capillary flow underfill for flip chip on flex applications	10,000 cP at 20 rpm	28	104	161	7 min. at 160°C
LOCTITE ECCOBOND UF 1173	Uniform void-free encapsulant underfill for CSP and BGA packages	7,500 cP at 10s <sup>-1</sup>	26	103	160	5 min. at 150°C
<b>Reworkable</b>						
LOCTITE ECCOBOND UF 3810	Reworkable capillary underfill	394 cP at 1,000s <sup>-1</sup>	55	171	102	8 min. at 130°C
LOCTITE ECCOBOND UF 3812	Reworkable capillary underfill with high T <sub>g</sub>	350 cP at 1,000s <sup>-1</sup>	48	175	131	10 min. at 130°C
<b>Cornerbond</b>						
LOCTITE 3508NH	Cornerbond underfill designed to cure during Pb-free solder reflow	70,000 cP at 36s <sup>-1</sup>	65	175	118	Lead-free profile at 245°C

## PCB PROTECTION MATERIALS

PRODUCT	DESCRIPTION	VISCOSITY		THIXOTROPIC INDEX
		Measurement	Test Method	
<b>Liquid Encapsulant – One-component</b>				
LOCTITE ECCOBOND EN 3860T	CSP/BGA encapsulant formulated to have low viscosity and good flow performance. Cures quickly at low temperatures to minimize thermal stress to other components and provide rapid device throughput.	1,000 cP at 1000 s <sup>-1</sup>	Physical CP50-1	1.0 (2/20 rpm)
LOCTITE ECCOBOND EN 3838T	Flexible, low T <sub>g</sub> material for encapsulating components on a circuit board. Material provides physical protection and stable electronic performance and protection in temperature/humidity/bias testing when cured.	6,700 cP at 2 rpm	Brookfield CP51	5.8 (2/20 rpm)
LOCTITE ECCOBOND EO 1072	Unique rheology allows the same product to be used as both a dam and fill encapsulant. For applications requiring excellent handling properties.	100,000 cP at 2 rpm	Brookfield Spindle 7	1.25 (2/20 rpm)

## PCB PROTECTION MATERIALS

PRODUCT	DESCRIPTION	MIX RATIO	VISCOSITY (cP)	CURE SCHEDULE
<b>Liquid Encapsulant – Two-components</b>				
LOCTITE ABLESTIK FDA 2 BIPAX	Heat cure or Room temperature cure epoxy designed for medical device applications	100 : 100	14,000 at 10 rpm	24 hr. at 25°C or 1 – 4 hr. at 65°C
LOCTITE EA 3450	Two component epoxy adhesive	1 : 1	30,000 at 10 rpm	24 hr. at 25°C or 1 hr. at 80°C
LOCTITE STYCAST EE0079-HD0070	Two component epoxy adhesive	100 : 26	500 – 700 at 10 rpm	2 hr. at 60°C
<b>Liquid Encapsulant – UV/heat cure</b>				
LOCTITE ECCOBOND UV 9060F	No flow, UV/moisture cure encapsulant	NA (1-component)	11,000 at 5 s <sup>-1</sup>	25 sec. at 500 mW/cm <sup>2</sup> (365 nm)

PRODUCT	DESCRIPTION	COLOR	OPERATING TEMPERATURE (°C)	SHORE HARDNESS	APPLICATION TEMPERATURE RANGE (°C)
<b>Overmold</b>					
TECHNOMELT PA 6208 N BLACK	Moldable polyamide with excellent adhesion to tough substrates. Great flexibility offers incredible strain relief on cables and wires. Ideal for encapsulation of heat-producing components in appliances and consumer electronics.	Black	-40 – 100	82A	180 – 230

PRODUCT	DESCRIPTION	VISCOSITY AT 25°C (cP)	VOLUME RESISTIVITY (Ω.cm at 25°C)	DIELECTRIC CONSTANT (1 MHz)	CURE SCHEDULE
<b>Conformal Coating</b>					
LOCTITE SI 5293	Repairable, solvent-free, medium-viscosity, UV/moisture-cure silicone, designed for severe temperature environments. High-reliability automotive applications.	400 – 800	1.0 x 10 <sup>14</sup>	4.5	20 sec. UV + 3 days at RT
LOCTITE STYCAST PC 40-UMF	Conformal coating specifically formulated to rapidly gel and immobilize when exposed to UV light and then fully cure when exposed to atmospheric moisture, ensuring optimum performance even in shadowed areas.	250 – 500	3.5 x 10 <sup>16</sup>	2.7	UV and moisture, 10 sec. UV + 3 days at RT
LOCTITE STYCAST PC 62	Conformal coating that provides environmental and mechanical protection. Toluene-free alternative with superior toughness and abrasion resistance.	52	1.04 x 10 <sup>16</sup>	2.2	24 hr. at 25°C or 45 min. at 75°C
LOCTITE STYCAST UV 7993	Conformal coating designed to provide rugged protection from moisture and harsh chemicals. It is compatible with industry-standard solder masks, no-clean fluxes, metallization, components and substrate materials.	120	2.2 x 10 <sup>16</sup>	3.3	UV (150 – 300 mW/cm <sup>2</sup> ) + Ambient Moisture (100 hr.)



## INTERCONNECTING SOLUTIONS MEDICAL ASSEMBLY

### ELECTRICALLY CONDUCTIVE MATERIALS

PRODUCT	DESCRIPTION	ALLOY	MELTING POINT (°C)	TYPICAL PROCESSING	PARTICLE SIZE	SHELF LIFE
<b>Solder Paste</b>						
LOCTITE GC 3W	Pb-free, water wash, RoHS-compliant solder paste	SAC305	217	Stencil printing	Type 3, 4	6 months up to 26.5°C
LOCTITE GC 10	Room temperature, stable solder paste	SAC305	217	Stencil printing	Type 3, 4, 4.5 (4A), 5	12 months up to 26.5°C
LOCTITE LF 318	RoHS-compliant solder paste	90iSC, SAC305, SAC387	90iSC: 205 – 218 SAC305, SAC387: 217	Stencil printing	Type 3, 4	6 months at 0 – 10°C
LOCTITE LM 100	Low melting alloy for sensitive substrates	BI58	138	Dispensing and stencil printing	Type 2.5 (2A)	6 months at 0 – 10°C

PRODUCT	DESCRIPTION	SOLID CONTENT (%w)	ACID VALUE (mg KOH/g)	TYPICAL PROCESSING	IPC J-STD-004B CLASSIFICATION
<b>Solder Flux</b>					
LOCTITE MF 210	Resin-free flux designed to solder onto surfaces known to have poor solderability.	2.9	22.5	Spray/Foam	ORM0
LOCTITE MF 390HR	Liquid flux designed for exceptional through-hole fill and recommended for general electrical soldering applications.	6.0	20 – 25	Spray/Foam	ROLO





PRODUCT	DESCRIPTION	APPROXIMATE FLUX CONTENT (% BY WEIGHT)	DIAMETER RANGE (mm)	ALLOY PB-FREE	ALLOY SnPb	IPC J-STD-004B CLASSIFICATION
<b>Solder Wire</b>						
LOCTITE C 400	Clear residue, cored solder wire with increased flux content for improved wetting on challenging surfaces.	2.2	0.38 – 1.63	90iSC, 99C, SAC 305, SAC 387	Sn60, Sn62, Sn63	ROLO

PRODUCT	DESCRIPTION	VOLUME RESISTIVITY ( $\Omega$ .cm)	TYPICAL PROCESSING	STORAGE MODULUS AT 25°C (MPa)	CURING SCHEDULE
<b>Electrically Conductive Adhesive (ECA)</b>					
LOCTITE ABLESTIK 84-1 LMISR4	Electrically conductive die attach adhesive	$\leq 0.0002$	Dispensing	3,900	1 hr. at 175°C
LOCTITE ABLESTIK CA 3556HF	Acrylic ECA, flexible material	0.0025	Dispensing	650	10 min. at 120°C
LOCTITE ABLESTIK CE 3103WLV	Electrically conductive epoxy adhesive that is a Pb-free alternative to solder	0.0008	Dispensing	4,500	10 min. at 120°C
LOCTITE ABLESTIK ICP 4000	Silicone based, electrically conductive adhesive. Specially designed for applications where both high flexibility and excellent conductivity are required.	0.00006	Dispensing or pin transfer	< 100	60 min. at 130°C

## AMERICAS

### UNITED STATES

Henkel Corporation  
14000 Jamboree Road  
Irvine, CA 92606  
United States  
Tel: +1.888.943.6535  
Fax: +1.714.368.2265

Henkel Corporation  
20021 Susana Road  
Rancho Dominguez, CA 90221  
United States  
Tel: +1.310.764.4600  
Fax: +1.310.605.2274

Henkel Corporation  
18930 W. 78th Street  
Chanhassen, MN 55317  
United States  
Tel: +1.952.835.2322  
Tel: +1.800.347.4572  
Fax: +1.952.835.0430

### BRAZIL

Henkel Brazil  
Av. Prof. Vernon Kriebler, 91  
06690-070 Itapevi, Sao Paulo  
Brazil  
Tel: +55.11.3205.7001  
Fax: +55.11.3205.7100

## ASIA-PACIFIC

### CHINA

Henkel Management Center  
Building 7, No. 99 Jiang Wan Cheng Road  
Shanghai 200438,  
China  
Tel: +86.21.2891.8999  
Fax: +86.21.2891.8952

Ablestik Ltd.  
No. 332 Meigui South Road  
WaiGaoQiao Free Trade Zone, Pu Dong  
Shanghai 200131,  
China  
Tel: +86.21.3898.4800  
Fax: +86.21.5048.4169

### JAPAN

Henkel Japan Ltd.  
27-7, Shin Isogo-cho  
Isogo-ku Yokohama, 235-0017  
Japan  
Tel: +81.45.286.0161  
Email: jp.ae-csdesk@henkel.com

### KOREA

Henkel Korea Co Ltd.  
18th Floor of tower B, BYC High City Bldg  
Gasam Digital 1-ro, Geumcheon-gu,  
Seoul, 08506  
South Korea  
Tel: +82.2.6150.3000  
Fax: +82.2.6947.5203

### SINGAPORE

Henkel Singapore Pte Ltd.  
401, Commonwealth Drive  
#03-01/02 Haw Par Technocentre,  
Singapore 149598  
Tel: +65.6266.0100  
Fax: +65.6472.8738 / +65.6266.1161

### TAIWAN

Henkel Taiwan Ltd.  
10F, No. 866, Zhongzheng Road,  
Zhonghe District, New Taipei City, 23586  
Taiwan  
Tel: +866.2.22271988  
Fax: +866.2.22268699

## EUROPE

### BELGIUM

Henkel Belgium N.V.  
Nijverheidsstraat 7  
B-2260 Westerlo  
Belgium  
Tel: +32.1457.5611  
Fax: +32.1458.5530

### UNITED KINGDOM

Henkel Ltd.  
Adhesives Limited Technologies House  
Wood Lane End  
Hemel Hempstead  
Hertfordshire HP2 4RQ  
United Kingdom  
Tel: +44.1442.278000  
Fax: +44.1442.278071

Across the Board,   
Around the Globe.

[henkel-adhesives.com/electronics](http://henkel-adhesives.com/electronics)  
[henkel-adhesives.com/thermal](http://henkel-adhesives.com/thermal)