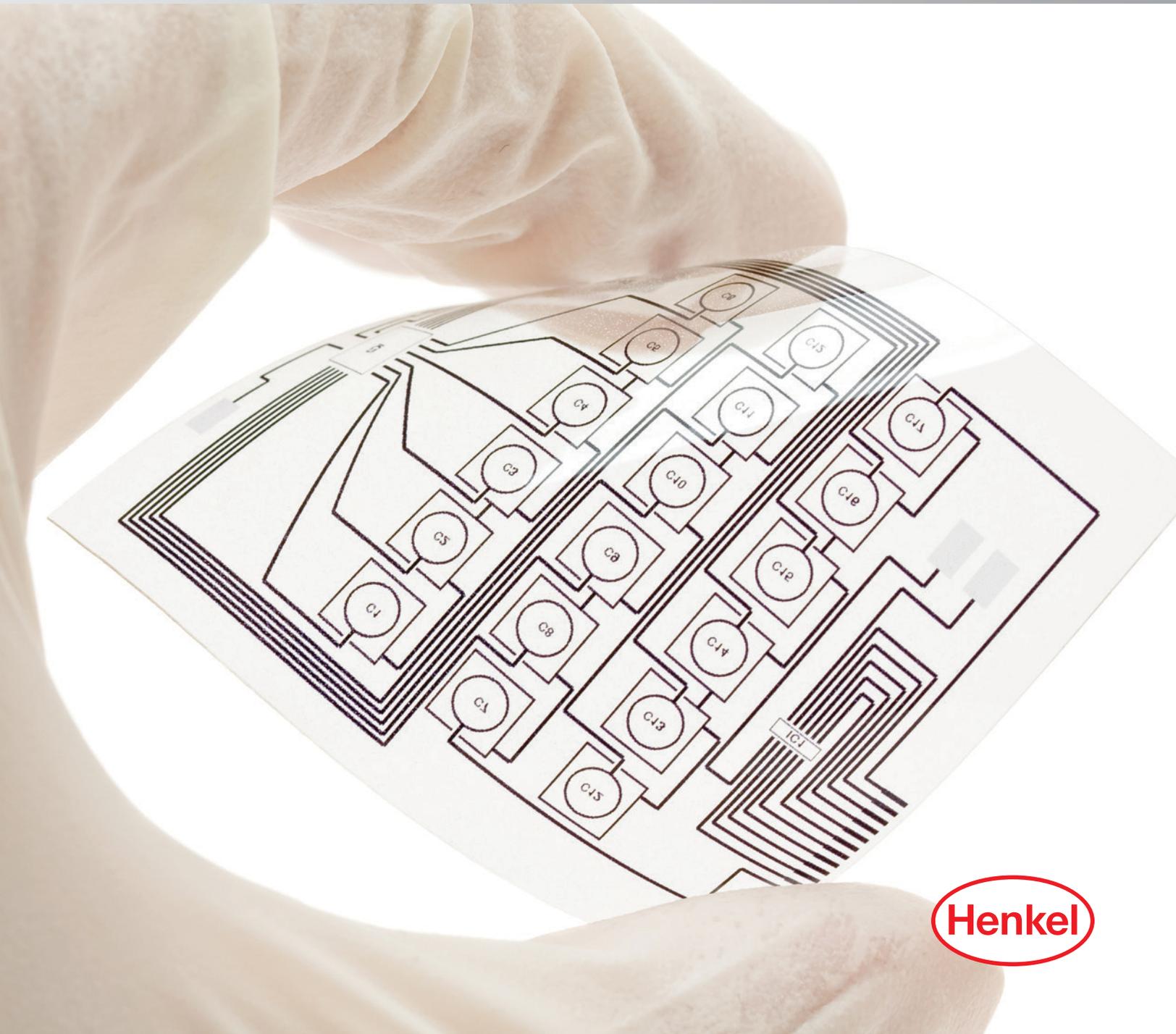


LOCTITE[®]

PRINTED ELECTRONICS

INKS AND COATINGS



Henkel



INTRODUCTION

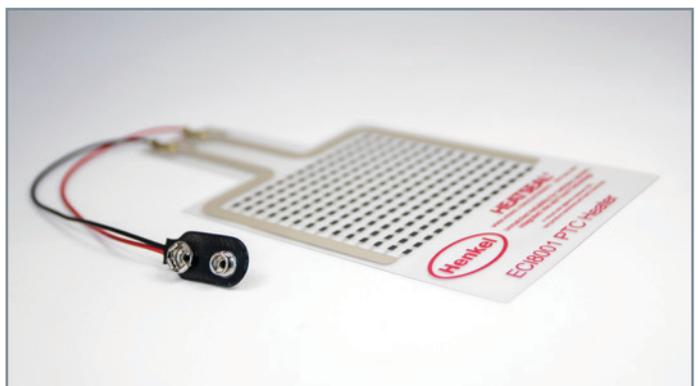
Countless devices rely on printed electronic technologies for function, form and flexibility. One of the most efficient production methods, printed electronics, allows for high-volume, high-throughput, cost-effective manufacturing for many of the products we rely on every day. Henkel is a leader in specialized and cross-functional ink formulations for printed electronics and its line of LOCTITE brand electronic inks has been enabling leading-edge printed electronics for well over three decades.

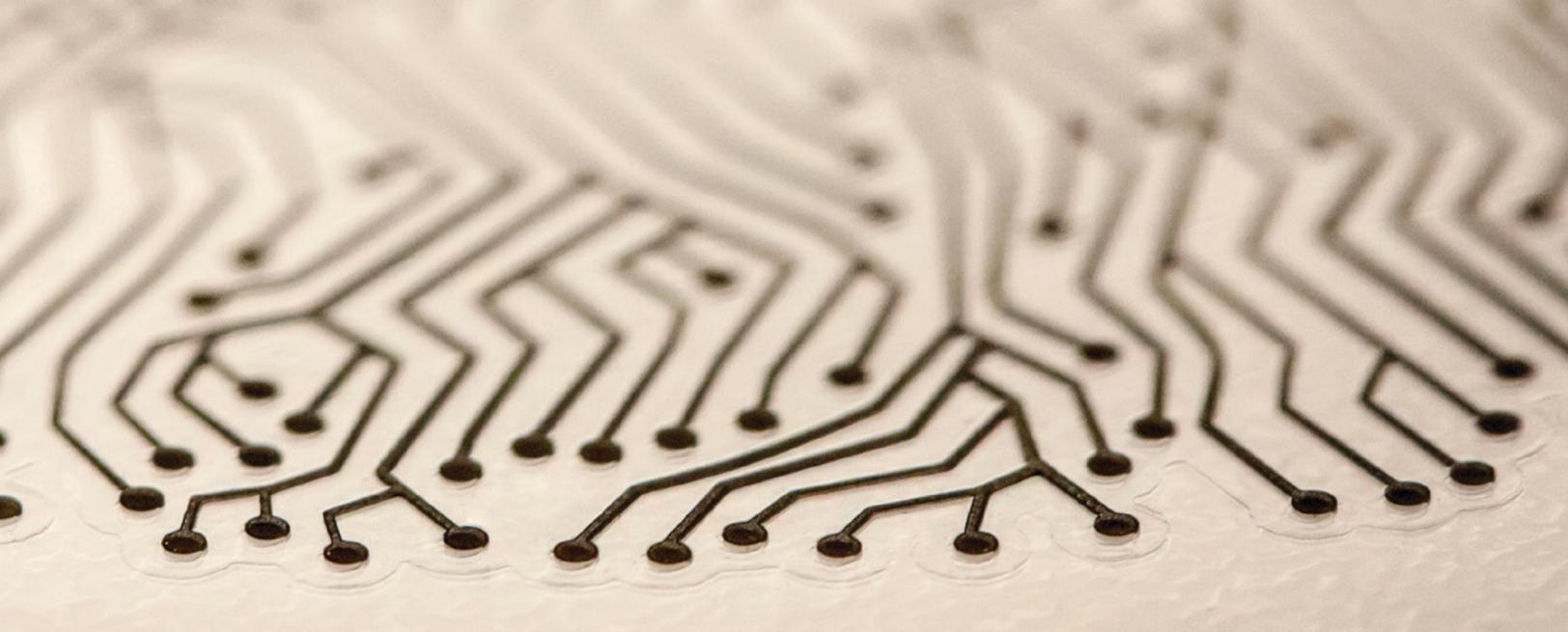
With a broad portfolio of silver, carbon, dielectric and clear conductive inks, Henkel is making today's medical solutions, in-home conveniences, handheld connectivity and automotive advances reliable and effective. Our inks serve multiple markets including consumer, displays, medical, automotive and RFID. They are also used in the manufacture of:

- Flexible circuits for membrane touch switches
- Keyboards
- Heating elements
- Automotive sensors
- Biosensors, EKG/ECG electrodes, TENS pads and Iontophoresis pads
- Antennas for contactless SmartCards and RFID labels

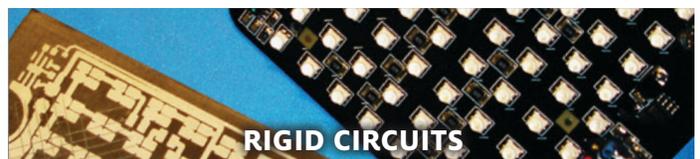
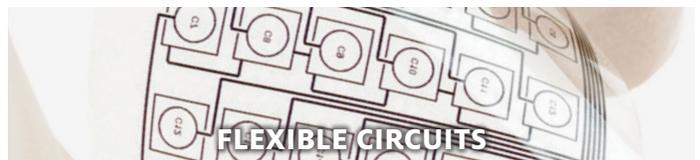
- Touch screens
- Lighting
- Printed circuit boards and potentiometers
- Household appliances

Like most things in electronics, the majority of applications that incorporate printed electronics are getting finer in dimension and more complex in functionality. Henkel's ability to formulate inks that address the demands of fine-line printing, while maintaining robust conductive and other functional properties, sets us apart from the competition, and has led to technology leadership within our comprehensive portfolio of inks for printed electronics.





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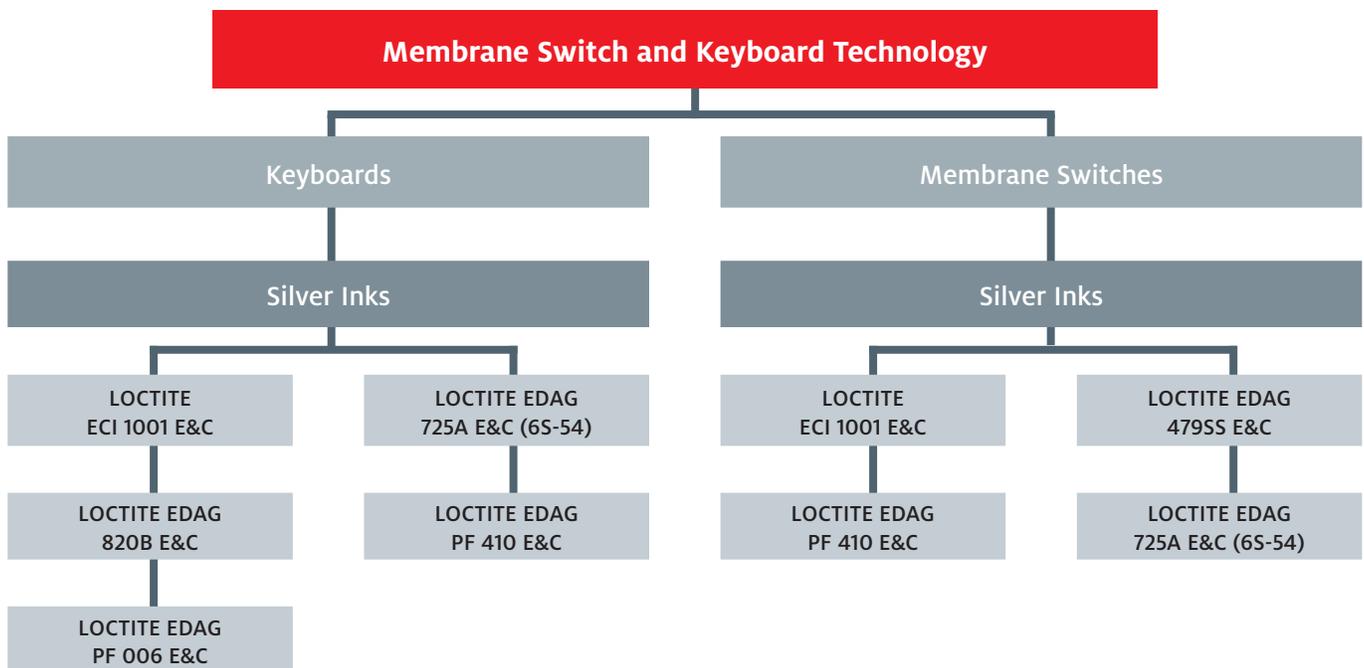


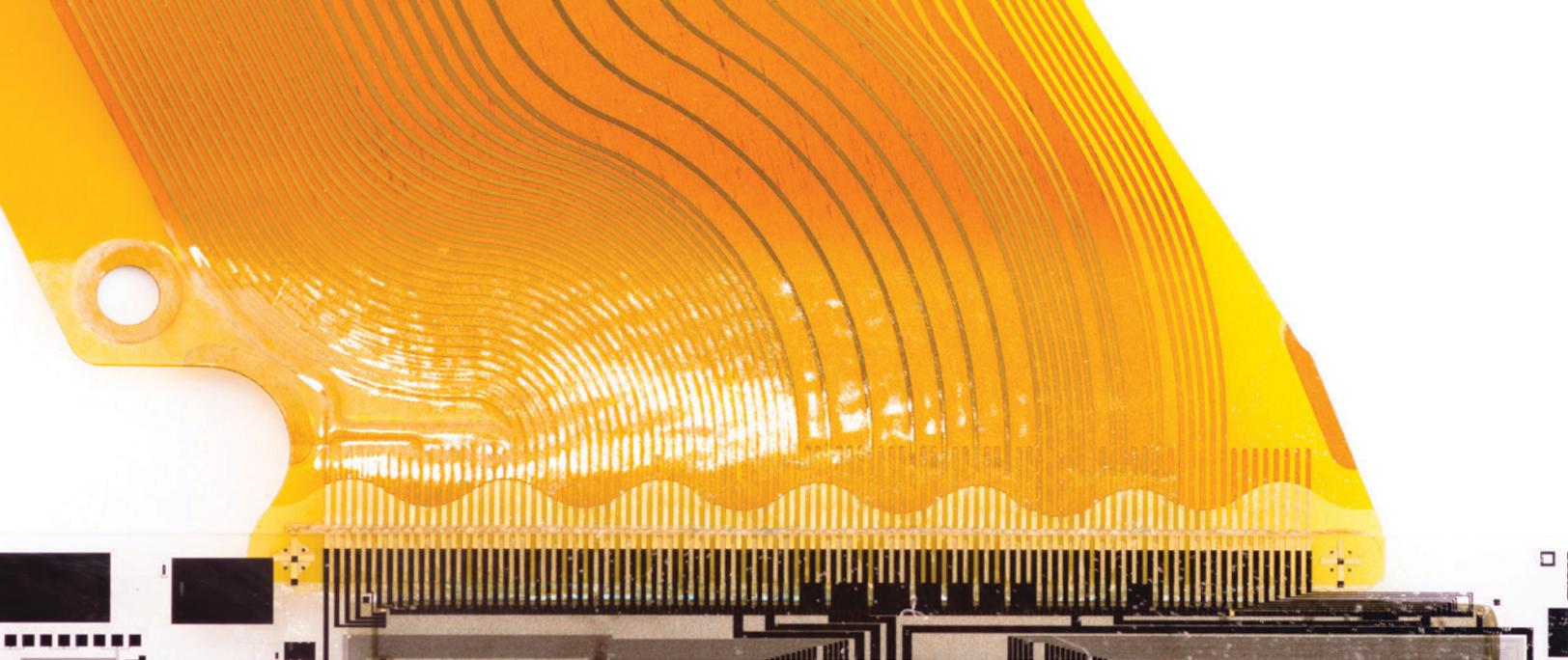


PRINTED ELECTRONIC INKS AND COATINGS APPLICATIONS

As consumers demand smaller and less expensive products, manufacturers must incorporate high-volume, low-cost solutions. Printing is one of the most cost-effective production methods for certain applications and printed electronics is helping to address this high throughput, reduced cost scenario. For current applications in printed electronics, Henkel has developed ink solutions for the three most commonly used technologies: flatbed (screen/stencil), flexographic and rotogravure printing.

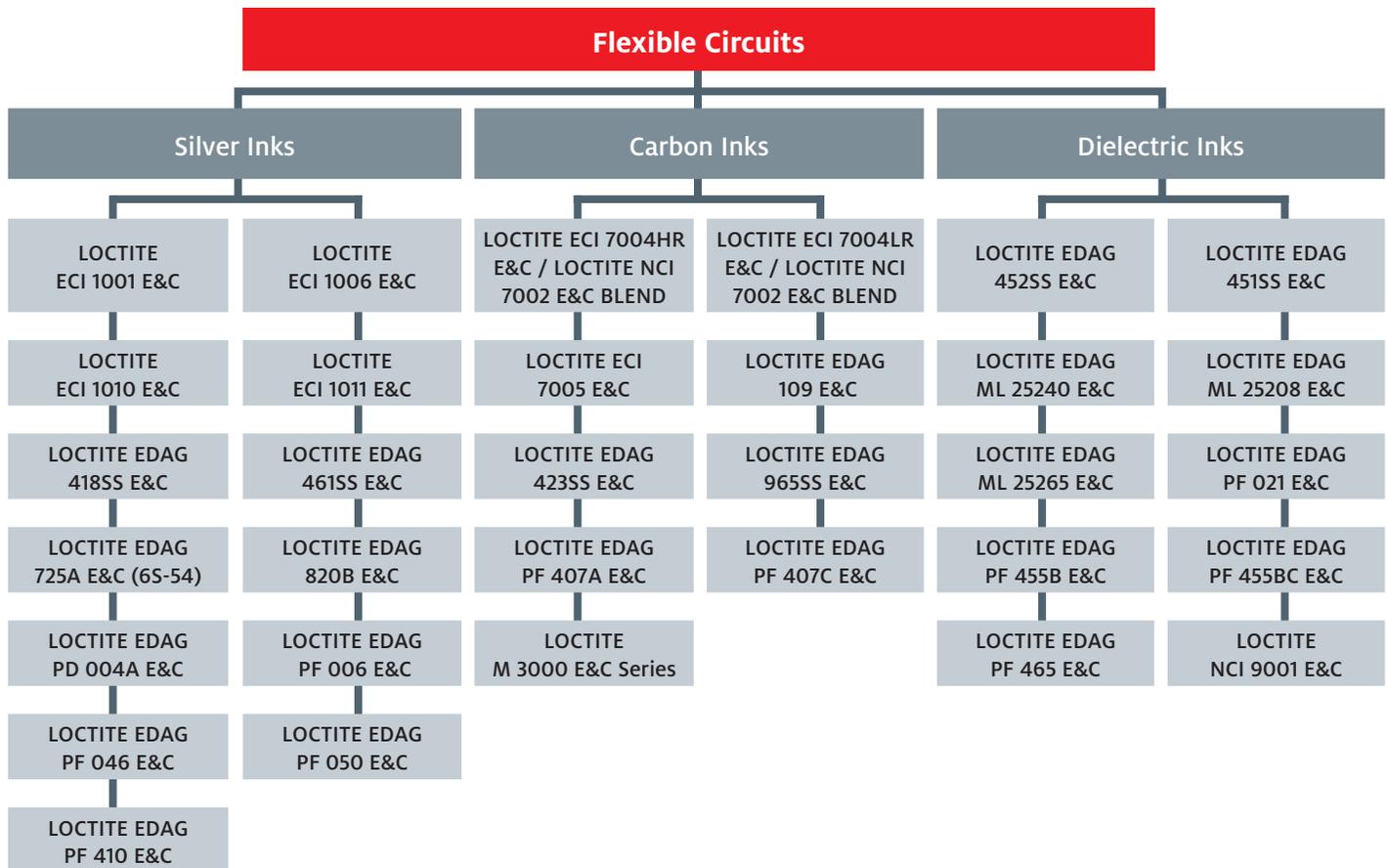
Taking a total solutions approach, Henkel formulates ink sets that work together to provide customers completed systems with the functionality and environmental robustness for today's demanding applications.





FLEXIBLE CIRCUITS

One of the largest and most diverse areas for conductive ink use is flex circuitry. The ability to easily construct circuits or change form factor through printing makes flex circuitry an ideal application for conductive inks. Henkel offers a wide selection of inks formulated for specific applications, cure requirements and substrates. Some of the latest ink technologies incorporate new functionality such as thermal forming capabilities and ink sets designed to measure forces applied to them.

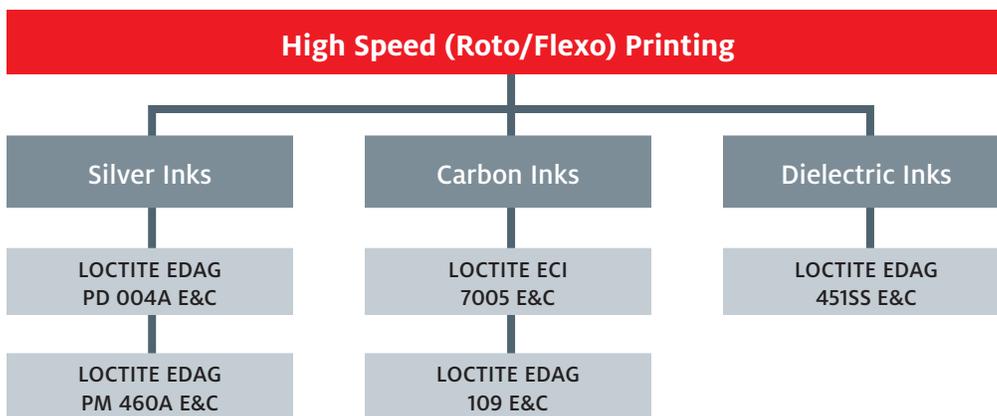




HIGH SPEED (ROTO/FLEXO) PRINTING

Flexo and Gravure printing technologies have seen many advances in ink development, process changes and press designs. Over the last ten years, these techniques have advanced high speed printing capabilities for printed electronics and circuitry. Developments range from changes in flexo plate designs and materials to improved anilox designs, drying capabilities and the press platforms themselves.

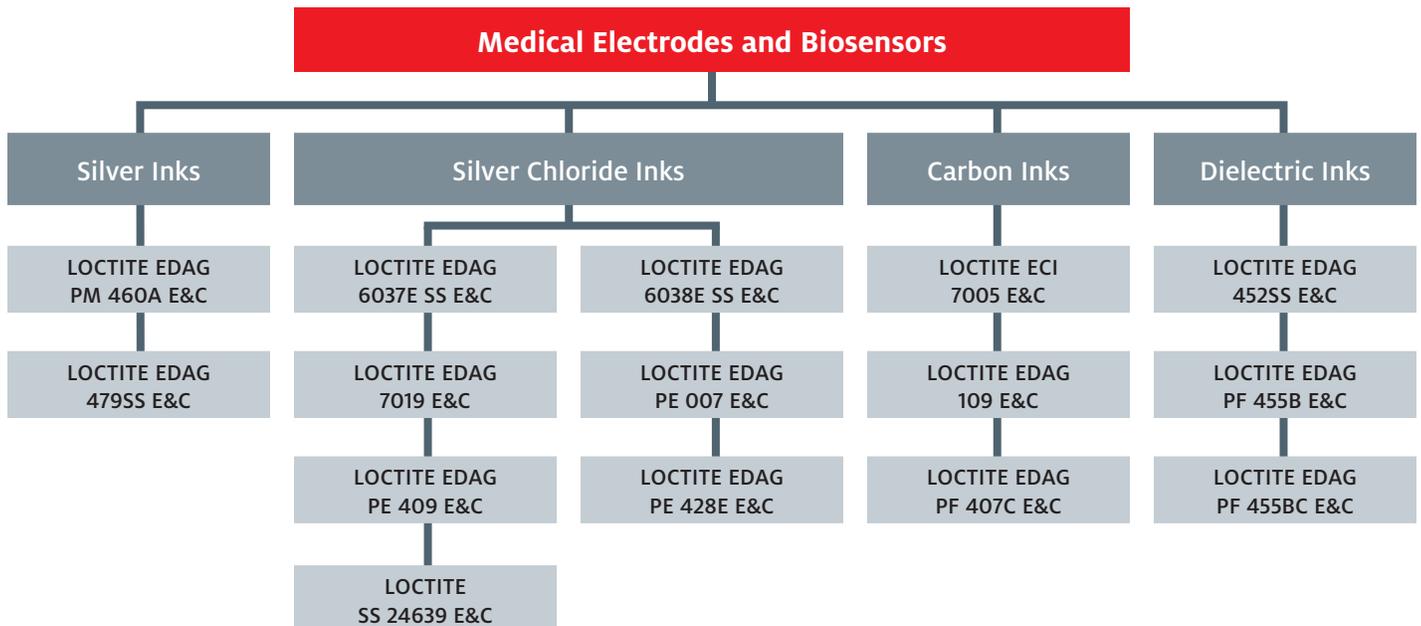
With continuous roll to roll processing, newer flexo machines are capable of running at speeds that cannot be matched with current flatbed printing. Henkel has developed a line of inks that can be effectively processed, deposited and cured at the thicknesses needed for today's functional inks.

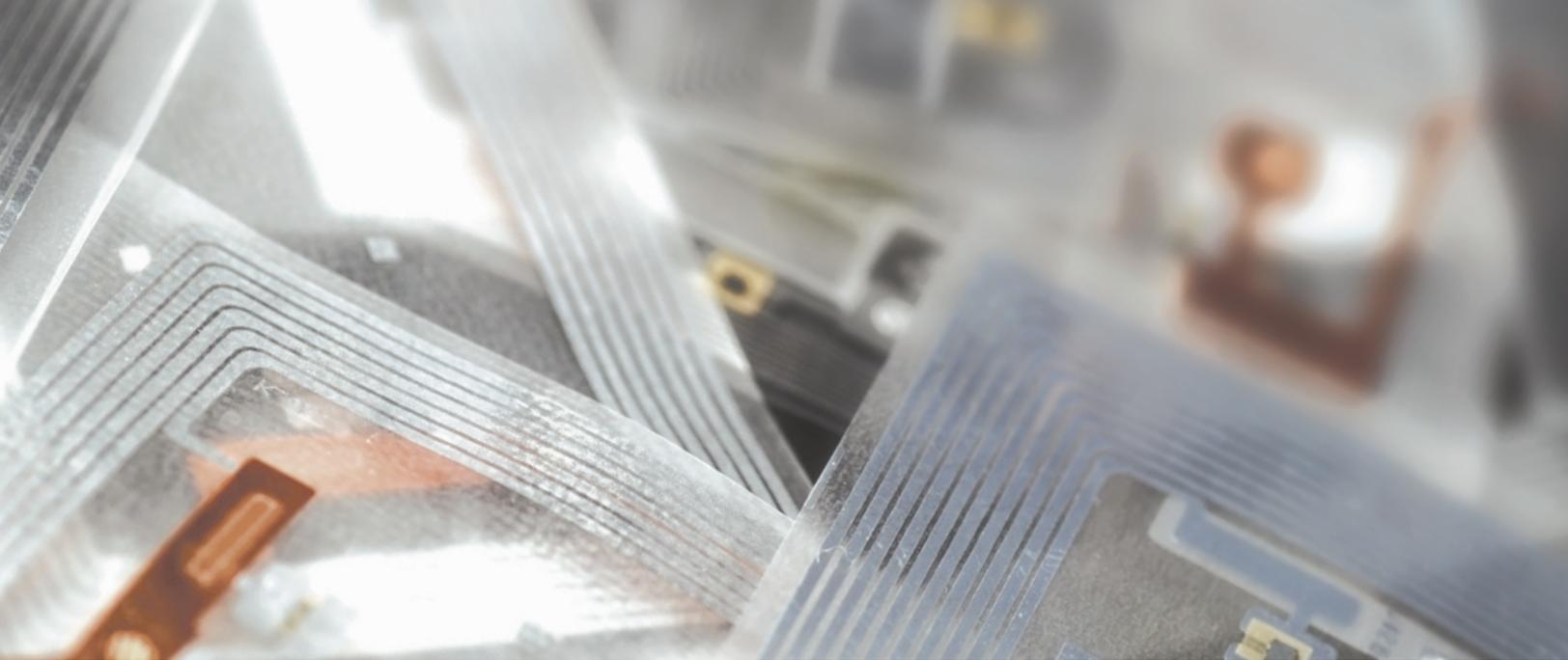




MEDICAL ELECTRODES AND BIOSENSORS

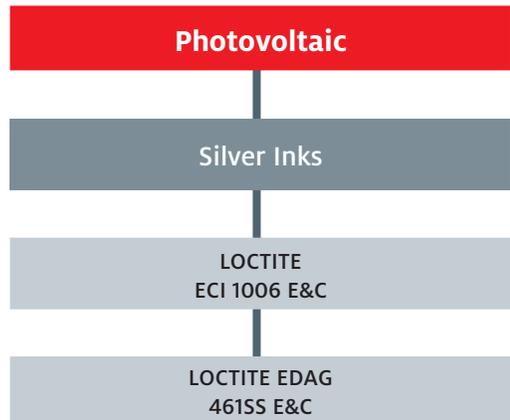
For medical electronics products, reliability and dependability are critical. Patient comfort, less invasiveness, disposable products and remote diagnostics are driving development in medical electronics. Biosensors such as glucose test strips, EKG/ECG electrodes, TENS pads for muscle stimulation, iontophoresis pads for drug delivery and countless other medical electronics applications depend on Henkel inks to provide accuracy, reliability and compatibility. Formulated to be compatible with the human body and various interactive medical gels and chemicals, Henkel's advanced inks are making modern medical devices possible.





PHOTOVOLTAIC CELLS

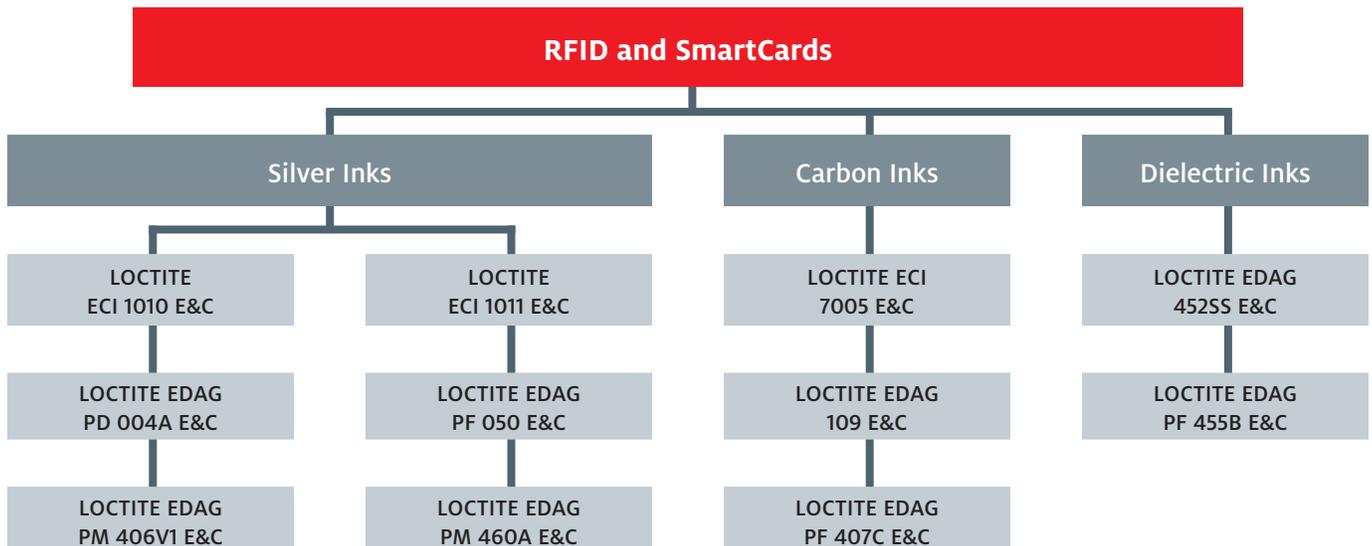
Photovoltaic cells are used to convert solar energy to direct current electricity. With the increased push for sustainability and renewable energy, this market has high potential. Conductive inks can be used on flexible and rigid substrates for grid line applications in thin film and photovoltaics.





RFID AND SMARTCARDS

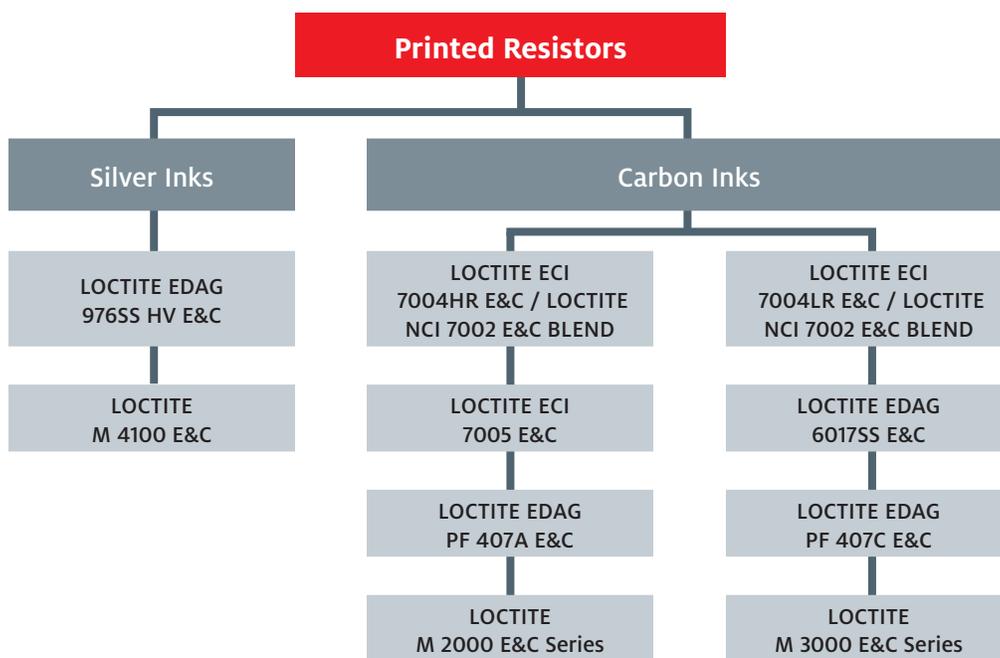
RFID technology is found in a variety of devices including SmartCards, passports, credit cards, various transportation payment systems and more. In addition to flexibility, adhesion and compatibility requirements, electronic inks used for RFID products have to be capable of transmitting and receiving specific radio frequencies. All of the elements within the ink system have to be formulated to interact effectively with RF fields and this requires materials that offer good permeability, surface roughness and low impedance. Henkel has a long and successful history developing inks for RFID devices and this knowledge base is enabling the next generation of these popular ID products.

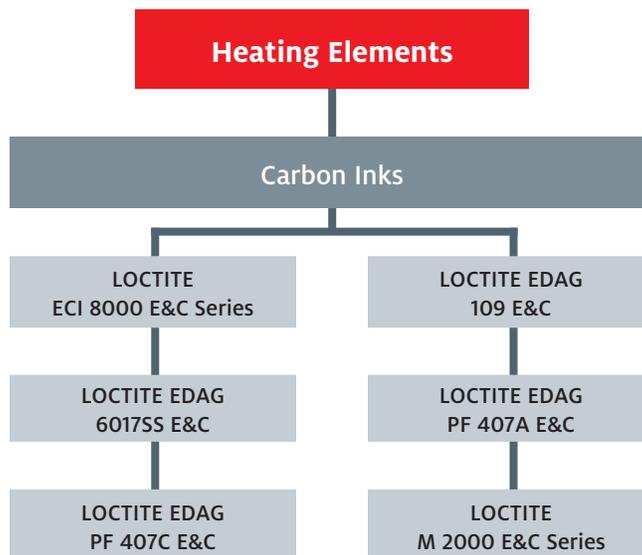
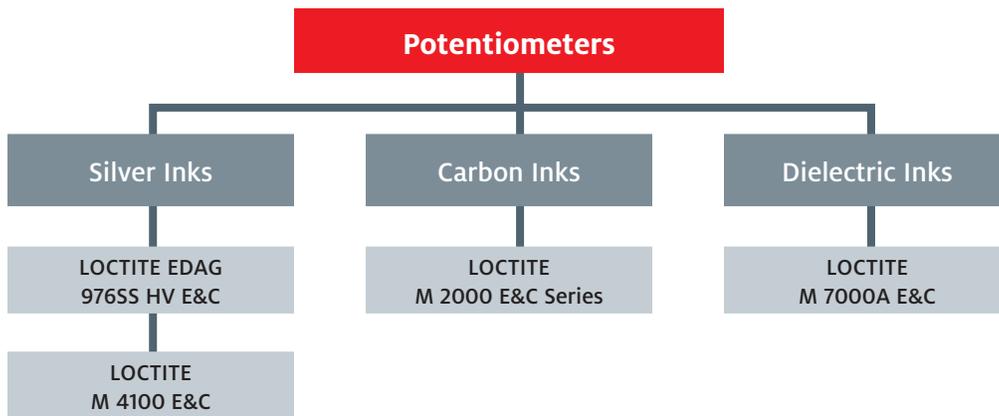


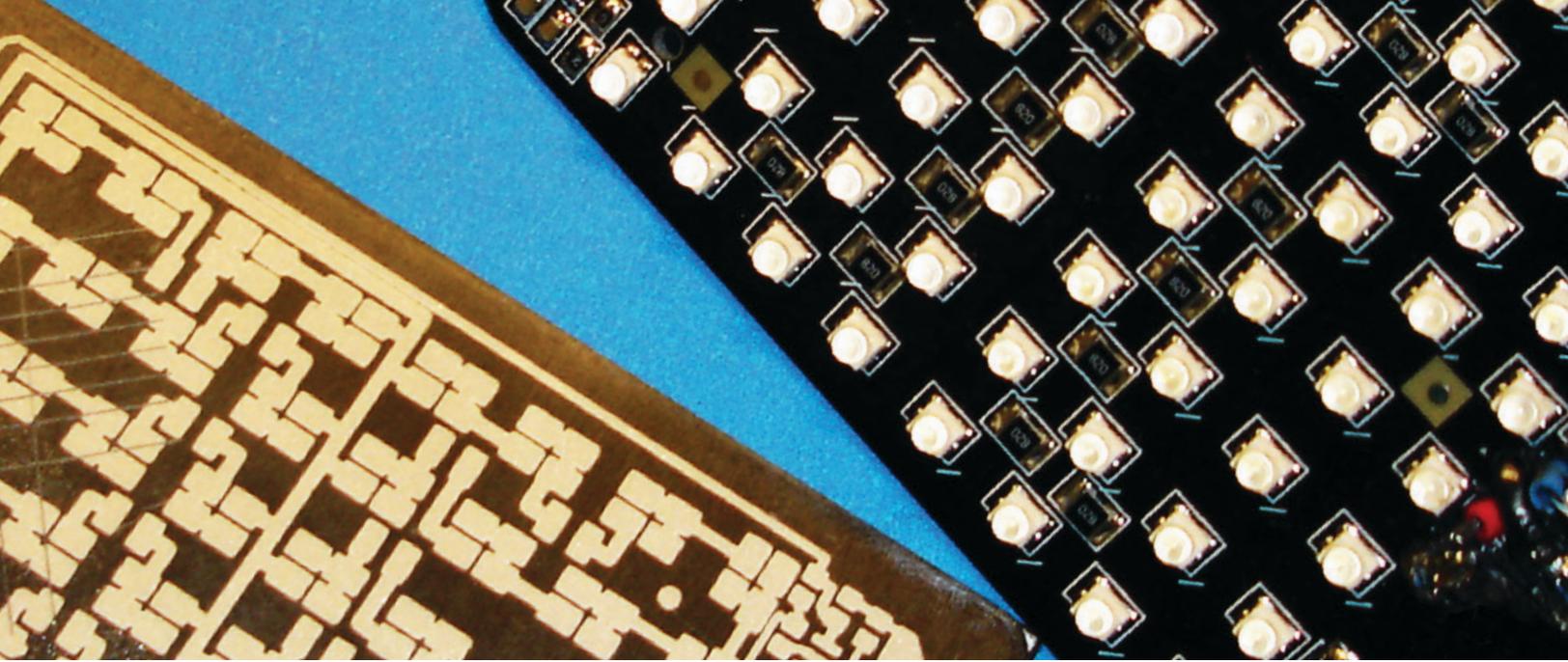


PRINTED RESISTORS, POTENTIOMETERS AND HEATING ELEMENTS

Using inks to print sensors has been a proven method of electronics printing for some time. Inks for printing sensors and resistors vary widely in resistance values and compositions and are used for a variety of applications from seat sensors for airbag deployment, to potentiometers for the automotive and consumer markets.

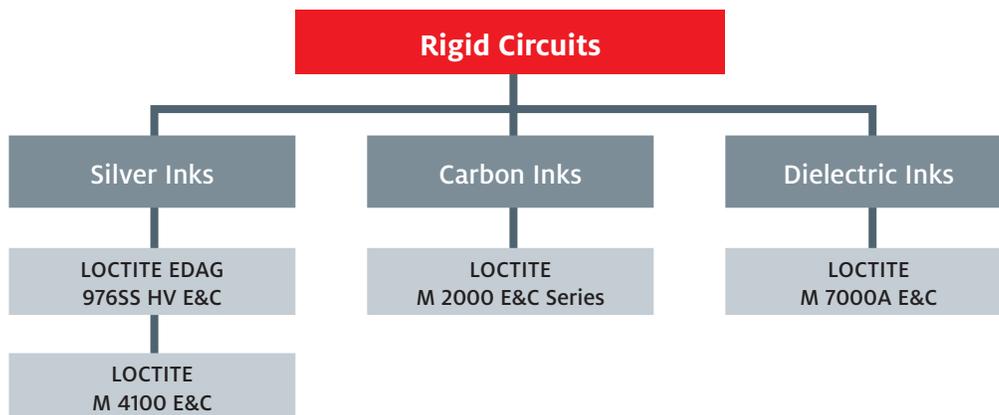






RIGID CIRCUITS

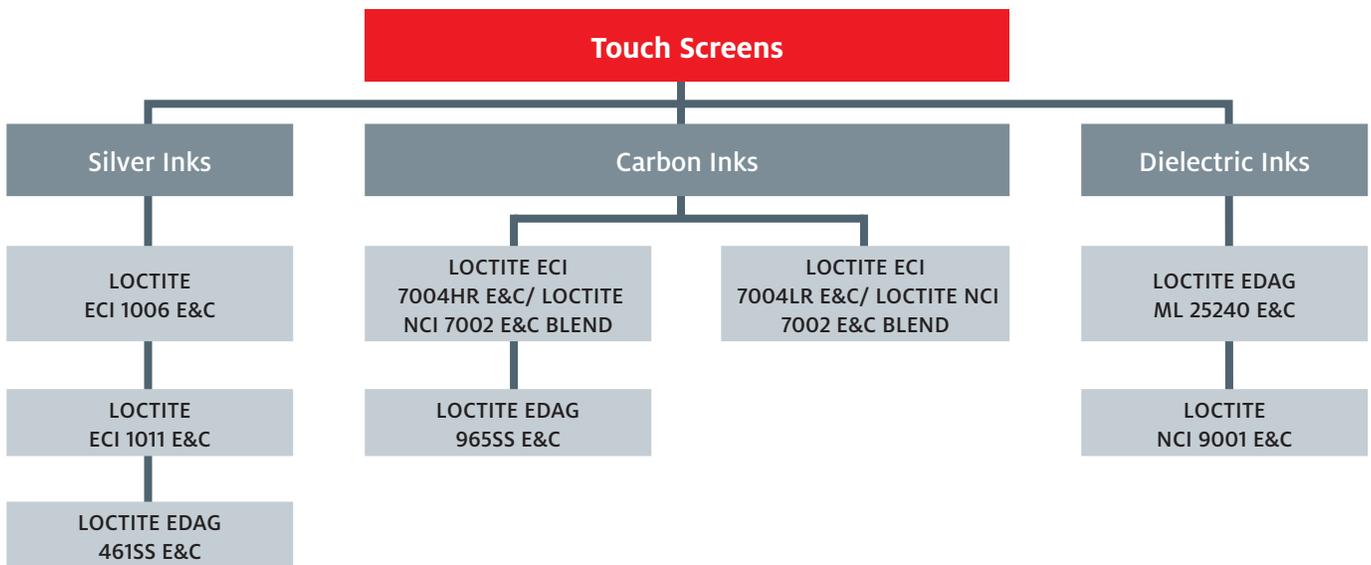
Inks are used on printed circuit boards as a way to maximize connections and functionality while minimizing space. Inks can be utilized as crossovers, copper contact protection, resistors, and through-hole connections on printed circuit boards and ceramics.





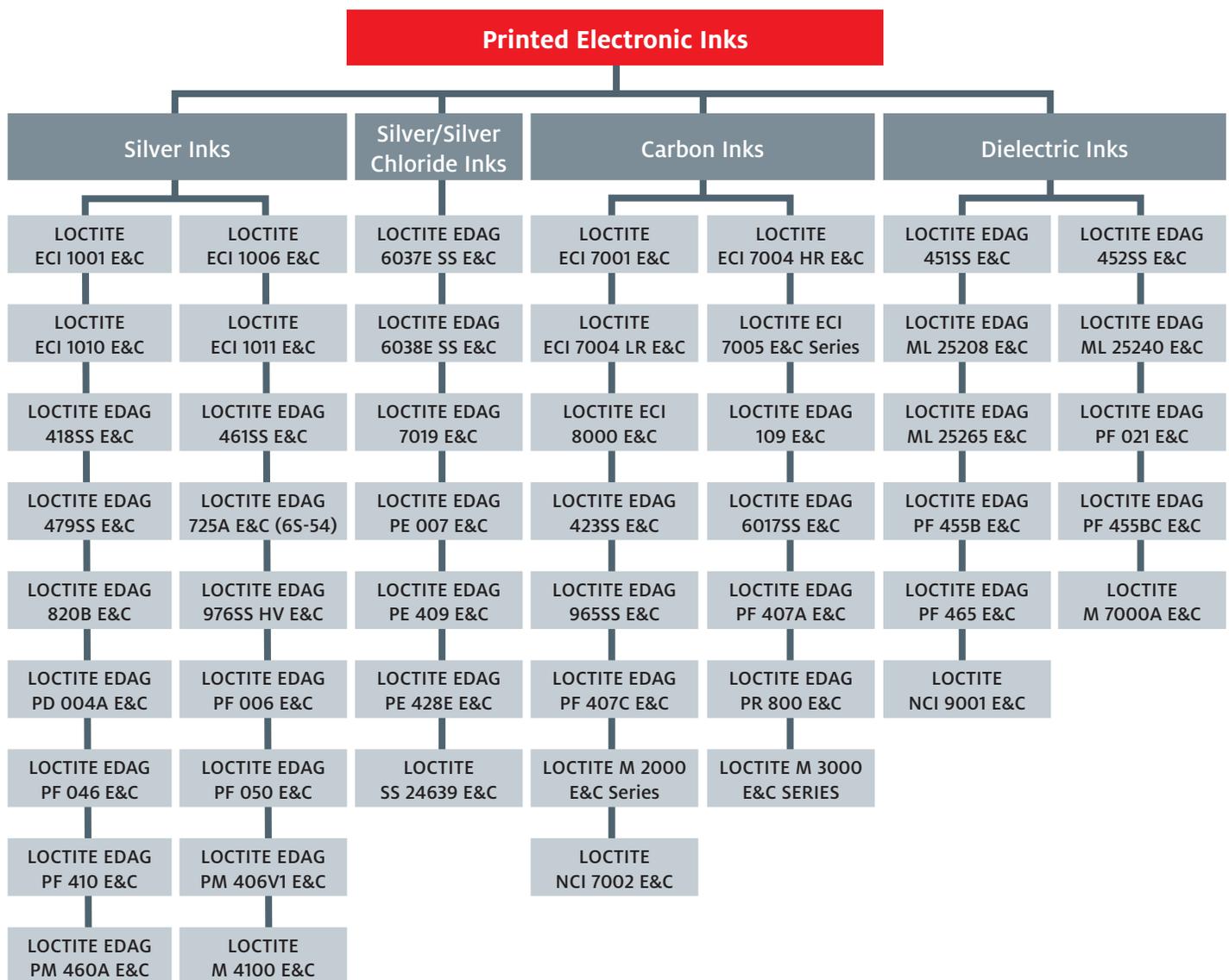
TOUCH SCREENS

Display technologies rely on many different printed solutions to help make the devices function properly and under very diverse conditions. Henkel has developed materials specifically for these applications including transparent conductors and protective top coats, printable dot spacers, UV dielectrics and fine line silver inks for busbar support. Henkel solutions provide an additive, adaptable and cost-effective alternative for many types of display devices. These inks, in combination with protective top layers, are delivering outstanding results for industrial touch screens as well as membrane touch switches, automotive touch screens, backlight switches, keyless entry devices, luminescent displays, printed LED lighting and shielding.



Henkel's printed electronics inks product portfolio includes silver, carbon, dielectric and specialty inks such as positive temperature coefficient (PTC), transparent conductive and silver plated copper (SPC) inks.

PRODUCT PORTFOLIO

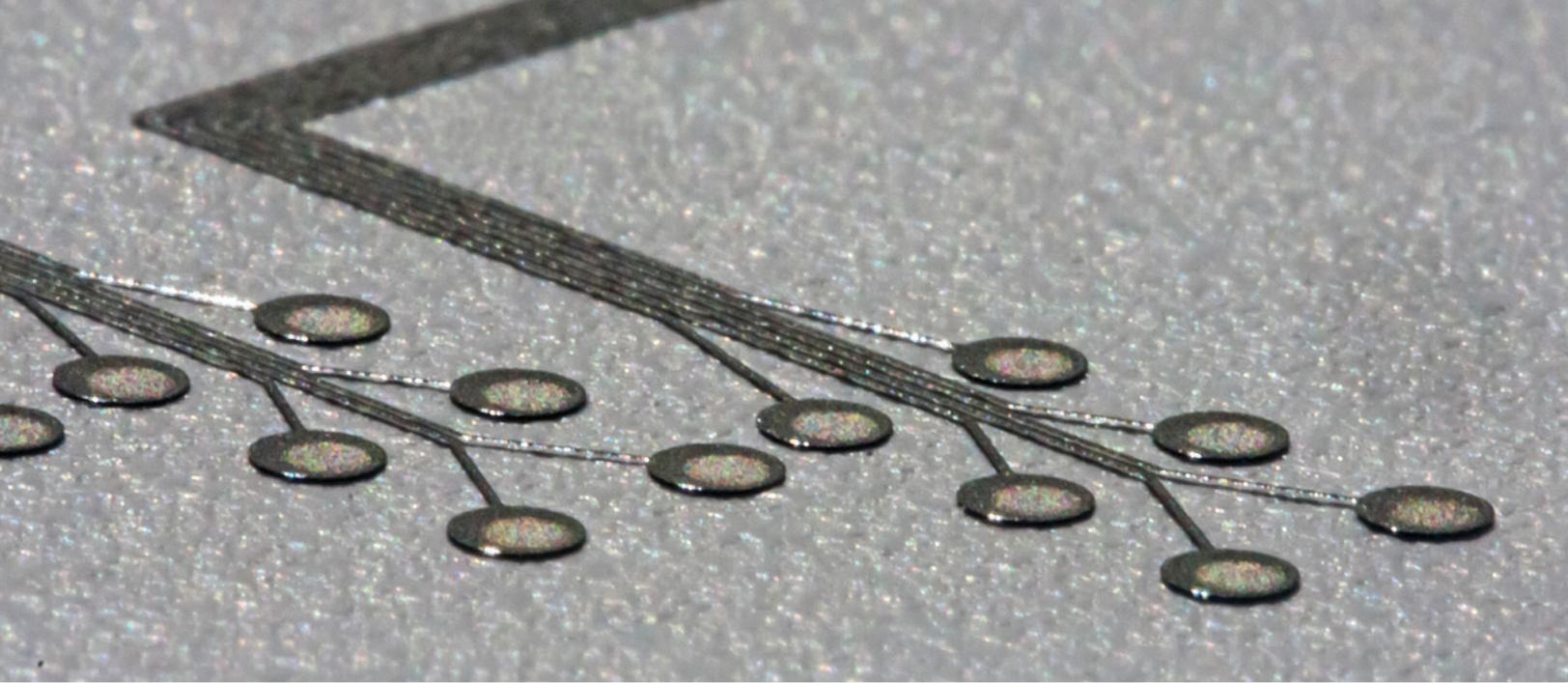


INK CLASSIFICATIONS

Utilizing different ink pigments, such as silver and carbon, Henkel materials experts have formulated robust carrier and resin systems to allow for outstanding ink performance within a variety of ink classifications.

Silver – Silver is the most electrically and thermally conductive of all metals and is used as the basis for many of Henkel’s conductive ink products. When combined with specific resin systems, Henkel silver inks can deliver better flexibility, crease resistance and longevity. These inks find uses in many different applications within numerous market sectors and are available in UV and solvent formulations.

| Product Name | Application | Key Features | Flex | Rigid | Sheet Resistance ($\Omega/\text{sq}/25 \mu\text{m}$) | Processing | Substrates | Cure |
|-------------------------------|---|--|------|-------|--|---------------------------|--|------------------|
| LOCTITE ECI 1001 E&C | <ul style="list-style-type: none"> Flexible circuits Membrane switches Keyboards | <ul style="list-style-type: none"> Low cost ink Excellent balance of flexibility, hardness and adhesion | X | | < 0.030 | Screenprint | Treated and untreated PET | 10 min. at 120°C |
| LOCTITE ECI 1006 E&C | <ul style="list-style-type: none"> Busbar support for ITO films Digitizers Flexible circuits Membrane switches Photovoltaic Touch screens | <ul style="list-style-type: none"> Halogen-free Excellent fine-line and high resolution printability 50 μm lines and spaces attainable Excellent adhesion to sputtered ITO and PET good electrical conductivity | X | | < 0.030 | Screenprint | Treated and untreated PET, Kapton, ITO film | 10 min. at 130°C |
| LOCTITE ECI 1010 E&C | <ul style="list-style-type: none"> Flexible circuits RFID SmartCards | <ul style="list-style-type: none"> High conductive with optimum mechanical performance Compatible with LOCTITE EDAG 440A E&C, LOCTITE EDAG 440B E&C and LOCTITE EDAG PF 455B E&C | X | | < 0.007 | Screenprint | Treated and untreated PET, Kapton | 10 min. at 120°C |
| LOCTITE ECI 1011 E&C | <ul style="list-style-type: none"> Flexible circuits RFID SmartCards | <ul style="list-style-type: none"> Appearance of the coating is very smooth and shiny | X | | < 0.003 | Screenprint, Flexographic | Treated and untreated PET, Kapton, ITO film | 10 min. at 120°C |
| LOCTITE EDAG 4185S E&C | <ul style="list-style-type: none"> Flexible circuits | <ul style="list-style-type: none"> Developed for solvent sensitive substrates like ABS and polycarbonate. Also good choice for crossovers on UV dielectrics | X | | < 0.030 | Screenprint, Flexographic | PC, PET, ABS | 30 min. at 90°C |
| LOCTITE EDAG 4615S E&C | <ul style="list-style-type: none"> Flexible circuits Touch screens Photovoltaic cells flexible | <ul style="list-style-type: none"> Halogen-free Good adhesion to sputtered ITO films and difficult to adhere to substrates Low temp cure for heat sensitive substrates | X | | < 0.020 | Screenprint | Sputtered ITO, PET, ABS | 30 min. at 71°C |
| LOCTITE EDAG 4795S E&C | <ul style="list-style-type: none"> Flexible circuits Keyboards Membrane switches Medical electrodes Biosensor | <ul style="list-style-type: none"> Halogen-free Good flexibility | X | | < 0.020 | Screenprint | Treated and untreated PET, Kapton, PEN, ABS, paper | 15 min. at 93°C |
| LOCTITE EDAG 725A E&C (6S-54) | <ul style="list-style-type: none"> Flexible circuits Keyboards Membrane switches | <ul style="list-style-type: none"> Excellent flexibility with good pencil hardness High conductivity Low viscosity | X | | < 0.014 | Screenprint | Treated and untreated PET, Kapton, PEN, ABS, paper | 10 min. at 120°C |
| LOCTITE EDAG 820B E&C | <ul style="list-style-type: none"> Flexible circuits Membrane keyboard printing | <ul style="list-style-type: none"> Untreated substrates | X | | < 0.015 | Screenprint | Treated and untreated polyester | 20 min. at 120°C |



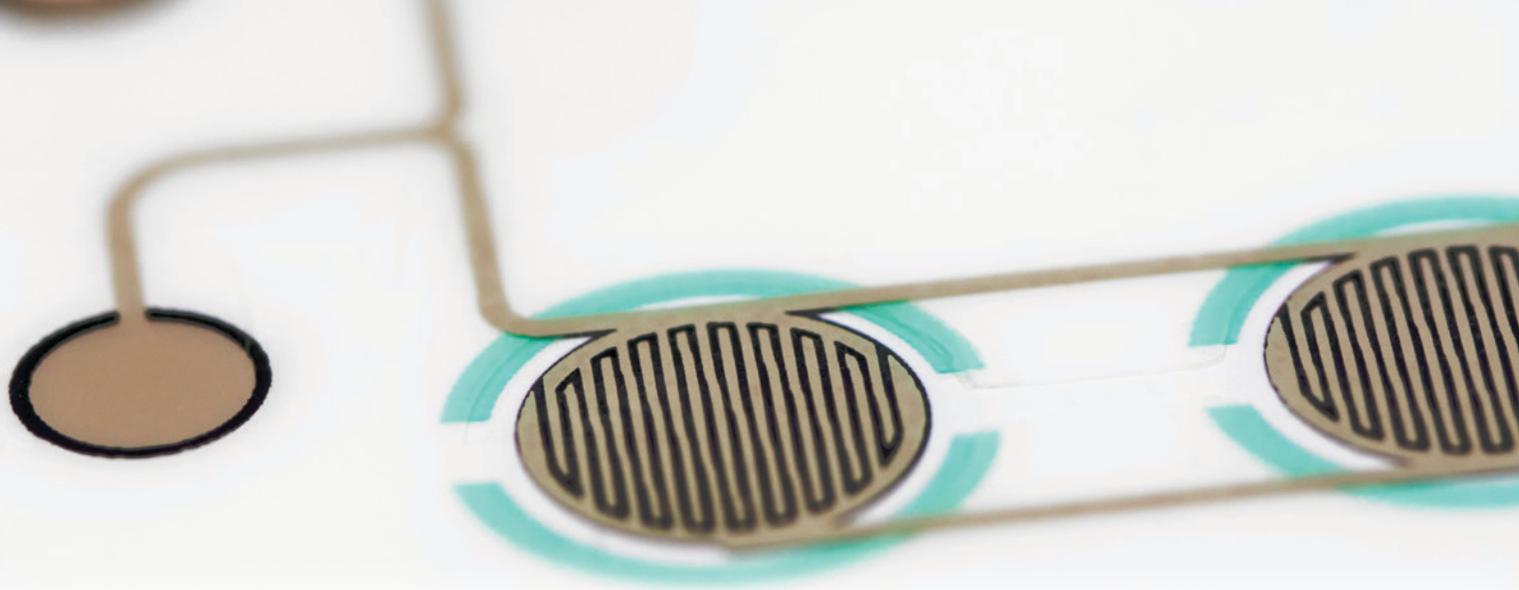
SILVER

| Product Name | Application | Key Features | Flex | Rigid | Sheet Resistance ($\Omega/\text{sq}/25 \mu\text{m}$) | Processing | Substrates | Cure |
|---------------------------|---|--|------|-------|--|---------------------------|---|--|
| LOCTITE EDAG 976SS HV E&C | <ul style="list-style-type: none"> Potentiometers Printed resistors Rigid circuits | <ul style="list-style-type: none"> Excellent adhesion on plain and copper laminated substrate Resistant to wave soldering Used in peelable solder masks Resistant to cleaning solvents commonly used in the printed circuit board industry | | X | < 0.025 | Screenprint | Rigid printed circuit boards on substrates such as phenolic paper, epoxy paper, glass epoxy | 30 min. at 160°C |
| LOCTITE EDAG PD 004A E&C | <ul style="list-style-type: none"> Flexible circuits Flexo high speed RFID SmartCards | <ul style="list-style-type: none"> UV cure Low volatile organic compounds (VOC) Designed for solvent sensitive substrates | X | | < 0.100 | Flexographic, Rotogravure | Treated and untreated PET, ABS, paper, polycarbonate | 1.4 J/cm ² + 60 sec. at 150°C |
| LOCTITE EDAG PF 006 E&C | <ul style="list-style-type: none"> Flexible circuits | <ul style="list-style-type: none"> Excellent flexibility and adhesion Very low silver migration | X | | < 0.020 | Screenprint | Treated and untreated PET, ABS, paper | 5 min. at 120°C |
| LOCTITE EDAG PF 046 E&C | <ul style="list-style-type: none"> Flexible circuits | <ul style="list-style-type: none"> Outstanding flexibility High conductivity Excellent adhesion to the wide variety of substrates | X | | < 0.010 | Screenprint | Treated and untreated PET, Kapton, ITO film | 5 min. at 120°C |
| LOCTITE EDAG PF 050 E&C | <ul style="list-style-type: none"> Flexible circuits RFID SmartCards | <ul style="list-style-type: none"> Very high conductivity Developed for RFID good line definition | X | | < 0.010 | Screenprint | PET, ABS, PVC, paper | 15 min. at 121°C |
| LOCTITE EDAG PF 410 E&C | <ul style="list-style-type: none"> Flexible circuits Keyboards Membrane switches | <ul style="list-style-type: none"> Halogen-Free Good flexibility | X | | < 0.025 | Screenprint | Treated and untreated PET, Kapton, PEN, ABS, paper | 10 min. at 120°C |
| LOCTITE EDAG PM 406V1 E&C | <ul style="list-style-type: none"> RFID SmartCards | <ul style="list-style-type: none"> High conductivity High solids content | X | | < 0.015 | Screenprint | PET, PVC, paper | 30 min. at 90°C |
| LOCTITE EDAG PM 460A E&C | <ul style="list-style-type: none"> Biosensors Flexo high speed Medical electrodes RFID SmartCards | <ul style="list-style-type: none"> Can be applied to plastic or paper substrates Maintain low resistance even after heat exposure, cold and humid conditions | X | | < 0.010 | Flexographic, Rotogravure | Plastics, paper | 15 min. at 70°C |
| LOCTITE M 4100 E&C | <ul style="list-style-type: none"> Rigid circuits Potentiometers Printed resistors | <ul style="list-style-type: none"> Untreated substrates | | X | < 0.040 | Screenprint | FR-4, ceramic, Kapton, | 20 min. at 200°C |



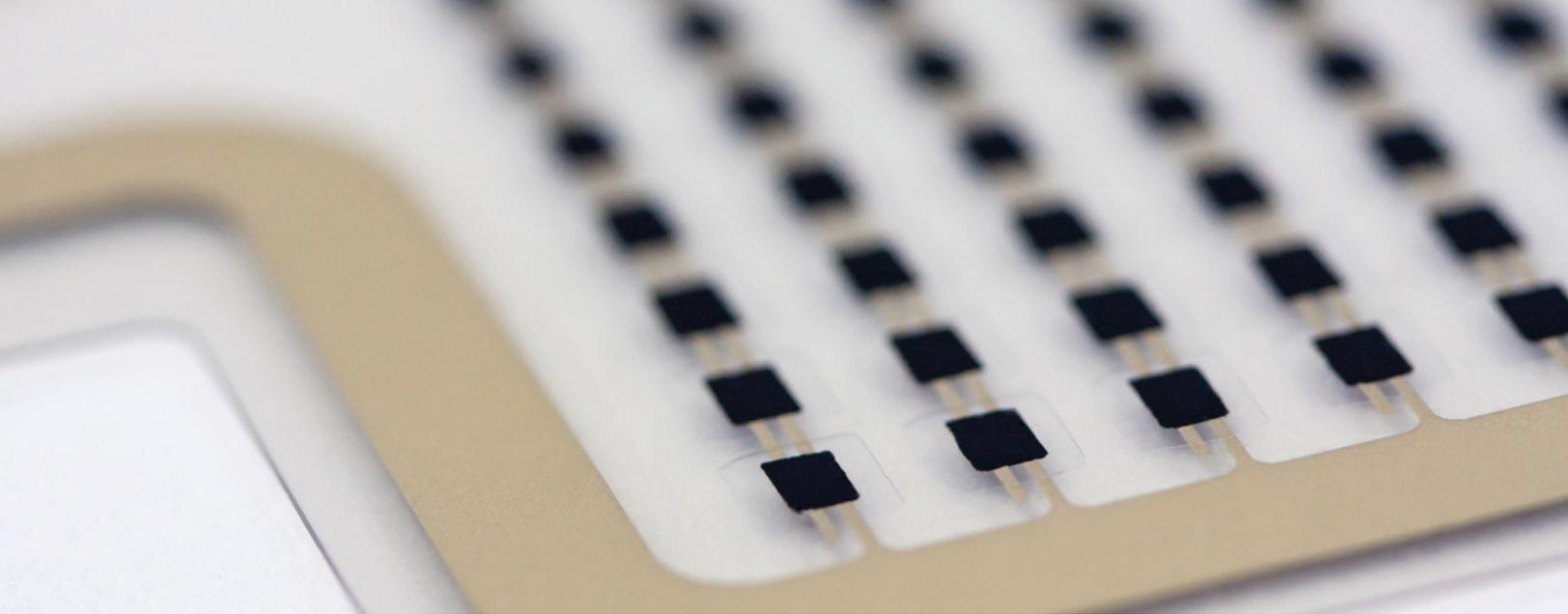
Silver/silver chloride – Silver/silver chloride ink formulations provide excellent conductivity and allow interaction with organic interface gels to measure electronic signals on the human body for medical applications.

| Product Name | Application | Key Features | Flex | Rigid | Sheet Resistance (Ω /sq/25 μ m) | Processing | Substrates | Cure |
|---------------------------|--|---|------|-------|---|----------------------------|----------------------------|-------------------|
| LOCTITE EDAG 6037E SS E&C | <ul style="list-style-type: none"> Medical electrodes Biosensors | <ul style="list-style-type: none"> Silver/silver chloride ratio 3:2 Blend with LOCTITE EDAG 6038E SS E&C | X | | < 0.12 | Screenprint | Polyester, paper | 15 min. at 120°C. |
| LOCTITE EDAG 6038E SS E&C | <ul style="list-style-type: none"> Medical electrodes Biosensors | <ul style="list-style-type: none"> Silver/silver chloride ratio 9:1 Blend with LOCTITE EDAG 6038E SS E&C | X | | < 0.04 | Screenprint | Polyester, paper | 15 min. at 120°C |
| LOCTITE EDAG 7019 E&C | <ul style="list-style-type: none"> Medical electrodes Biosensors | <ul style="list-style-type: none"> Excellent adhesion Silver/silver chloride ratio 4:1 | X | | < 0.05 | Screenprint | Polyester, paper, ABS, PVC | 10 min. at 107°C |
| LOCTITE EDAG PE 007 E&C | <ul style="list-style-type: none"> Medical electrodes Biosensors | <ul style="list-style-type: none"> Compatible with LOCTITE EDAG silver and carbon inks Meets ANSI/AAMI standards for pre-gelled ECG disposable electrodes | X | | < 0.10 | Rotogravure | Polyester, paper | 2 min. at 107°C |
| LOCTITE EDAG PE 409 E&C | <ul style="list-style-type: none"> Medical electrodes Biosensors | <ul style="list-style-type: none"> Silver/silver chloride ratio of 9:1 | X | | < 0.05 | Screenprint, Rotary screen | Polyester | 15 min. at 120°C |
| LOCTITE EDAG PE 428E E&C | <ul style="list-style-type: none"> Medical electrodes Biosensors | <ul style="list-style-type: none"> Meets ANSI/AAMI standards for pre-gelled ECG disposable electrodes (when used with appropriate gel) | X | | < 0.17 | Flexographic, Rotogravure | Polyester, paper | 15 min. at 70°C |
| LOCTITE SS 24639 E&C | <ul style="list-style-type: none"> Medical electrodes Biosensors | <ul style="list-style-type: none"> Compatible with LOCTITE EDAG silver and carbon inks Meets ANSI/AAMI standards for pre-gelled ECG disposable electrodes | X | | < 0.15 | Flexographic, Rotogravure | Polyester, paper | 5 min. at 121°C |



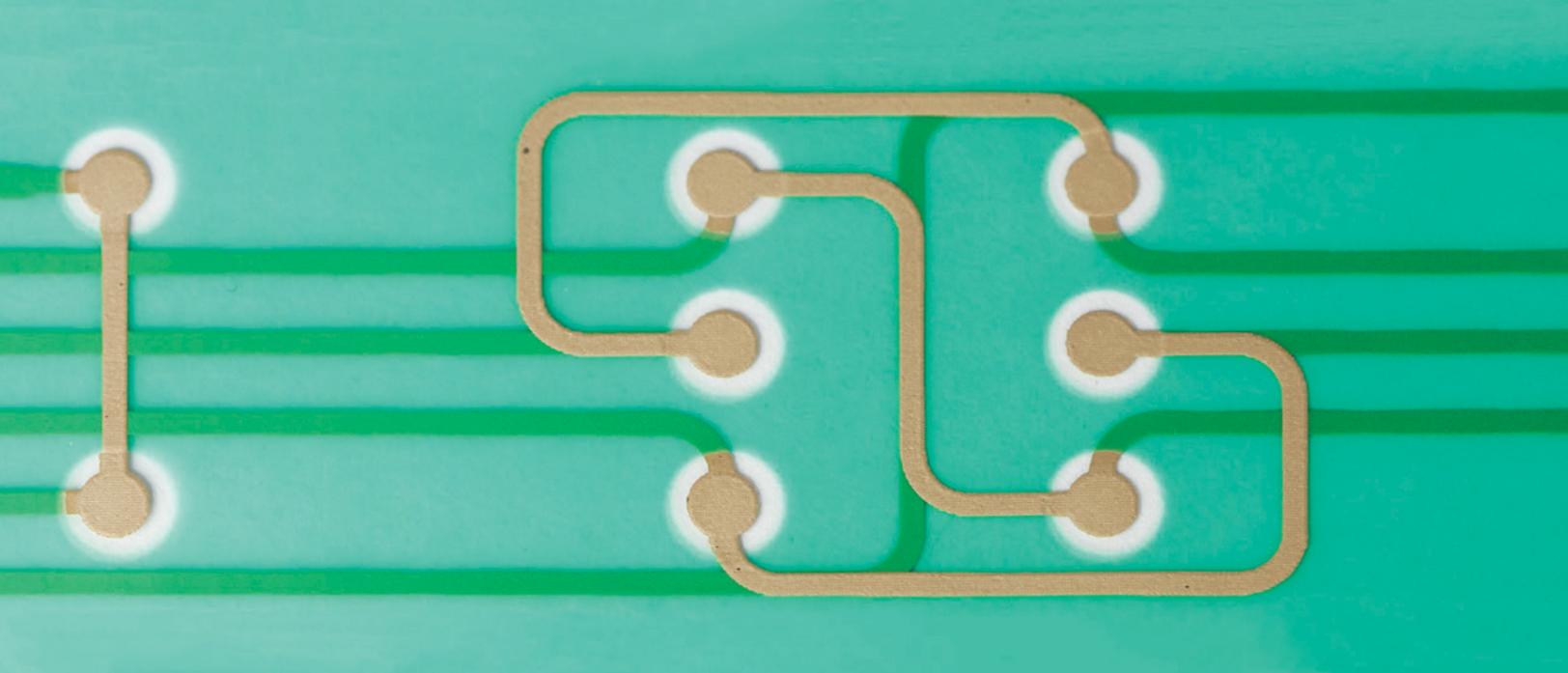
Carbon – Carbon inks typically complement silver inks, providing lubricity, protection of the silver surface and prevention of silver migration. When functional resistance is required, carbon inks offer excellent performance. Henkel's portfolio includes products for a variety of PET films, paper substrates, membrane switches and rigid printed circuit boards.

| Product Name | Application | Key Features | Flex | Rigid | Sheet Resistance (Ω /sq/25 μ m) | Processing | Substrates | Cure |
|-----------------------------|--|---|------|-------|---|----------------------------|---|-------------------------------|
| LOCTITE ECI 7001 E&C | • Printable batteries | • Used for printable batteries applied on flexible substrates • Highly conductive | X | | < 10 | Screenprint, Rotary screen | Treated and untreated polyester, PEN, paper | 10 min. at 120°C |
| LOCTITE ECI 7004HR E&C | • Force-sensitive modules • Printed resistors and sensing devices | • Force sensitive ink responds to increased force with decreased resistance • Blend with LOCTITE NCI 7002 E&C • Suitable for slow responsive sensitivity profiles | X | | 5,000 – 500,000 | Screenprint | Treated polyester and polyimide | 5 to 10 min. at 120°C |
| LOCTITE ECI 7004LR E&C | • Force-sensitive modules • Printed resistors and sensing devices | • Force sensitive ink responds to increased force with decreased resistance • Blend with LOCTITE NCI 7002 E&C • Suitable for fast responsive sensitivity profiles | X | | 50 – 5,000 | Screenprint | Treated polyester and polyimide | 5 to 10 min. at 120°C |
| LOCTITE ECI 7005 | • Flexible circuits • Flexo high speed • Biosensors • RFID • Printed resistors | • Water based • High speed printing | X | | < 40 | Flexographic, Rotogravure | PET, plastics, paper | 2 min. at 120°C |
| LOCTITE ECI 8000 E&C Series | • Heating elements | • Positive Temperature Coefficient (PTC) printable ink • Self regulating heater | X | | 1,700 | Screenprint | Polyester, PEN, Kapton | 10 min. at 120°C |
| LOCTITE EDAG 109 E&C | • Flexible circuits • Biosensors • RFID • Heating elements • Flexo high speed | • High speed printing | X | | < 30 | Flexographic, Rotogravure | Polyester, paper | 15 to 30 min. at 70°C to 80°C |
| LOCTITE EDAG 423SS E&C | • Flexible circuits | • Excellent adhesion • Stable electrical resistance • Excellent environmental stability | X | | < 25 | Screenprint | Treated and untreated polyester, PEN, | 5 min. at 120°C |
| LOCTITE EDAG 6017SS E&C | • Heating elements • Printed resistors | • Blend with LOCTITE EDAG PM 404 • Good for low voltage circuitry | X | | 50 – 3,800 | Screenprint | Treated and untreated polyester, Paper | 10 min. at 100°C |



CARBON

| Product Name | Application | Key Features | Flex | Rigid | Sheet Resistance ($\Omega/\text{sq}/25 \mu\text{m}$) | Processing | Substrates | Cure |
|---------------------------|---|--|------|-------|--|-------------|--|-----------------------|
| LOCTITE EDAG 965SS E&C | <ul style="list-style-type: none"> Flexible circuits Touch screens | <ul style="list-style-type: none"> Good for low voltage circuitry to protect silver pads and tracks from chemical attack and silver migration | X | | < 60 | Screenprint | Treated and untreated polyester, ITO film | 15 min. at 120°C |
| LOCTITE EDAG PF 407A E&C | <ul style="list-style-type: none"> Flexible circuits Printed resistors Heating elements | <ul style="list-style-type: none"> Good screen residence time Flexible low temperature drying cycle Very good adhesion | X | | < 20 | Screenprint | Treated and untreated polyester, polycarbonate, paper, cardboard | 15 min. at 120°C |
| LOCTITE EDAG PF 407C E&C | <ul style="list-style-type: none"> Flexible circuit Printed resistors Heating elements Medical biosensors | <ul style="list-style-type: none"> Highly conductive Good for low voltage circuitry | X | | < 15 | Screenprint | Treated and untreated polyester, PEN, paper | 5 min. at 120°C |
| LOCTITE EDAG PR 800 E&C | <ul style="list-style-type: none"> Heating elements Potentiometers Printed resistors Rigid circuits | <ul style="list-style-type: none"> Resistant to high abrasion Excellent resistance to heat and humidity Organic solvent resistant | | X | < 15 | Screenprint | FR-4, FR-3, CEM-1, CEM-3, PEN, ceramic, metals | 30 min. at 150°C |
| LOCTITE M 2000 E&C Series | <ul style="list-style-type: none"> Heating elements Potentiometers Printed resistors Rigid circuits | <ul style="list-style-type: none"> Eliminates soldering of discrete components Excellent wear resistance Can be trimmed via laser (linearity of 1%) | | X | 1 to 75,000 | Screenprint | FR-4, FR-3, CEM-1, CEM-3, PEN, ceramic | 30 min. at 200°C |
| LOCTITE M 3000 E&C Series | <ul style="list-style-type: none"> Printed resistors Flexible circuit | <ul style="list-style-type: none"> Blended for a custom fixed resistor One component for easy processing Excellent screenprint performance | X | | 10,000 to 100,000 | Screenprint | Polyester, polyimide | 30 min. at 120°C |
| LOCTITE NCI 7002 E&C | <ul style="list-style-type: none"> Force-sensitive modules Printed resistors and sensing devices Heating elements | <ul style="list-style-type: none"> Non-conductive Blend with LOCTITE ECI 7004HR E&C or LOCTITE ECI 7004LR E&C Good adhesion | X | | > 360,000 | Screenprint | Treated polyester and polyimide | 5 to 10 min. at 120°C |



Dielectric – Non-conductive, dielectric inks insulate multilayer circuitry to allow for circuitry crossover and multilayer applications. These materials offer excellent flexibility, humidity resistance and additional protection for improved strength and performance for multiple applications including keyboards, copper-etched circuitry and hybrid circuits.

| Product Name | Application | Key Features | Flex | Rigid | Processing | Substrates | Cure |
|---------------------------|---|---|------|-------|---------------------------|--|------------------------------|
| LOCTITE EDAG 451SS E&C | <ul style="list-style-type: none"> • Flexible circuits • Flexo high speed | <ul style="list-style-type: none"> • UV cure • Smooth film • Compatible with LOCTITE EDAG silver and carbon inks | X | | Screenprint, Flexographic | Untreated and print receptive polyester and polycarbonate film | 0.3 to 0.7 J/cm ² |
| LOCTITE EDAG 452SS E&C | <ul style="list-style-type: none"> • Flexible circuits • RFID • Medical electrodes • Biosensors | <ul style="list-style-type: none"> • Excellent printability • Excellent flexibility • Excellent adhesion • UV cure | X | | Screenprint | Untreated polyester and polycarbonate film | 0.5 J/cm ² |
| LOCTITE EDAG ML 25208 E&C | <ul style="list-style-type: none"> • Flexible circuits | <ul style="list-style-type: none"> • Translucent • Excellent printability • UV cure • Excellent adhesion • Excellent flexibility | X | | Screenprint | Untreated and print receptive polyester and polycarbonate film | 0.5 J/cm ² |
| LOCTITE EDAG ML 25240 E&C | <ul style="list-style-type: none"> • Touch screens • Flexible circuits | <ul style="list-style-type: none"> • Insulating • UV cure • Excellent adhesion • High peel strength in high temperature and humidity | X | | Screenprint | Flexible copper circuits, ITO sputtered polyester film, metals and glass | 0.3 to 0.6 J/cm ² |
| LOCTITE EDAG ML 25265 E&C | <ul style="list-style-type: none"> • Flexible circuits | <ul style="list-style-type: none"> • Translucent • Insulating • UV cure • Excellent adhesion • High peel strength in high temperature and humidity | X | | Screenprint | ITO sputtered polyester film, metals and glass | 0.3 to 0.6 J/cm ² |
| LOCTITE EDAG PF 021 E&C | <ul style="list-style-type: none"> • Flexible circuits • Surface mounting | <ul style="list-style-type: none"> • Translucent • UV cure • Prevents silver migration • LED glob top • Dot dispensable | X | X | Screenprint, Dispense | Polyester, polycarbonate film and FR-4 | 0.4 to 1.0 J/cm ² |



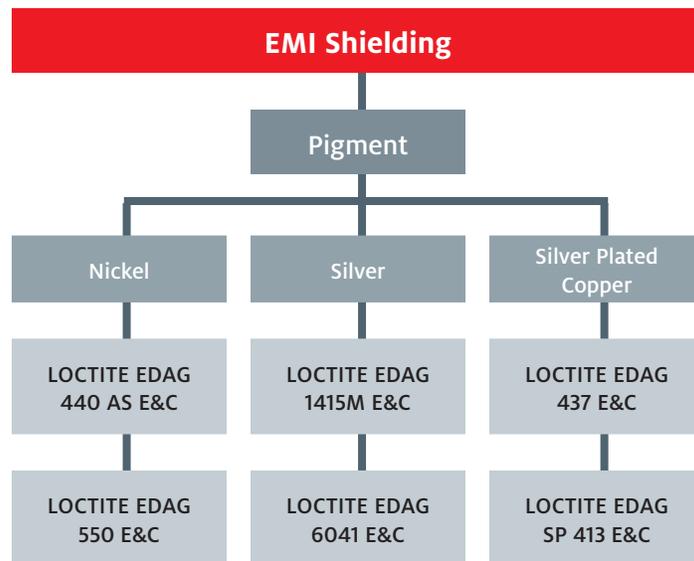
DIELECTRIC

| Product Name | Application | Key Features | Flex | Rigid | Processing | Substrates | Cure |
|------------------------------|---|---|------|-------|---------------------------|--|----------------------|
| LOCTITE EDAG PF 455B E&C | <ul style="list-style-type: none"> Flexible circuits RFID Medical electrodes Biosensors | <ul style="list-style-type: none"> Excellent humidity resistance Excellent printability Excellent adhesion Good dielectric strength UV cure | X | | Screenprint | Treated and untreated polyester film | 80 W/cm ² |
| LOCTITE EDAG PF 455BC E&C | <ul style="list-style-type: none"> Flexible circuits RFID Medical electrodes Biosensors | <ul style="list-style-type: none"> Translucent Excellent humidity resistance Compatible with LOCTITE EDAG conductive inks UV cure | X | | Screenprint | Treated and untreated polyester foil | 80 W/cm ² |
| LOCTITE EDAG PF 465 E&C | <ul style="list-style-type: none"> Flexible circuits | <ul style="list-style-type: none"> Translucent blue Excellent printability UV cure Excellent flexibility Good dielectric strength Compatible with other EDAG conductive polymer thick film inks | X | | Screenprint | Untreated and print receptive polyester and polycarbonate film | 80 W/cm ² |
| LOCTITE M 7000A E&C | <ul style="list-style-type: none"> Rigid circuits Potentiometer | <ul style="list-style-type: none"> One component Insulating High resistance to heat and humidity | | X | Screenprint | Printed circuit boards, copper, ceramic | 25 min. at 165°C |
| LOCTITE NCI 9001 E&C | <ul style="list-style-type: none"> Touch screens Flexible circuits | <ul style="list-style-type: none"> Minimal dielectric strength Excellent flexibility Resistant to abrasion Primer coat for difficult to adhere to substrate | X | | Screenprint, Flexographic | Flexible copper circuits, ITO sputtered polyester film, metals and glass | 5 min. at 130°C |



PRINTED ELECTRONIC COATINGS

Minimizing electromagnetic interference (EMI) is an important design criteria that needs to be addressed during the development of any new electronic device, especially if the device is going to be housed in a plastic enclosure. Conductive coatings have been used successfully as a method of EMI shielding for over 25 years and are common throughout the electronic industry. Henkel offers a wide range of shielding coatings: nickel coatings offer unique performance benefits, while silver plated copper and silver formulations are for applications where the highest levels of shielding are required.





EMI SHIELDING

| Product Name | Pigment | Key Features | Flex | Rigid | Attenuation | Sheet Resistance ($\Omega/\text{sq}/25\ \mu\text{m}$) | Substrates | Cure |
|-------------------------|----------------------|---|------|-------|--------------------------------|---|---|------------------|
| LOCTITE EDAG 440 AS E&C | Nickel | <ul style="list-style-type: none"> Excellent shielding against radiated electromagnetic interference (EMI) Protection against electrostatic discharge (ESD) Stable in difficult environmental conditions such as high humidity or heat | | X | 50 – 70 dB at 50 μm | < 0.50 | Plastic | 20 min. at 70°C |
| LOCTITE EDAG 550 E&C | Nickel | <ul style="list-style-type: none"> Extremely conductive and stable nickel acrylic lacquer coating Provides excellent long-term shielding protection against radiated EMI UL recognized coating Can be overcoated by decorative top coatings with minimum affect on the shielding properties | | X | 60 – 65 dB at 50 μm | < 0.9 | Plastic | 30 min. at 70°C |
| LOCTITE EDAG 1415M E&C | Silver | <ul style="list-style-type: none"> Excellent shielding against radiated electromagnetic interference (EMI) Maintains low resistance after exposure to heat, cold, humidity and salt spray Air drying system that requires no primer or top coat | | X | 60 dB at 25 μm | < 0.015 | Plastic | 30 min. at 70°C |
| LOCTITE EDAG 6041 E&C | Silver | <ul style="list-style-type: none"> Cure hot air drying and heat cure Dry rapidly to form a flexible conductive coating | | X | N/A | < 0.1 | Plastic, phenolic paper, epoxy paper, glass epoxy | 30 min. at 150°C |
| LOCTITE EDAG 437 E&C | Silver Plated Copper | <ul style="list-style-type: none"> Excellent shielding against radiated electromagnetic interference (EMI) and protection against electrostatic discharge (ESD) | | X | 50 – 70 dB at 50 μm | < 0.5 | Plastic | 30 min. at 25°C |
| LOCTITE EDAG SP 413 E&C | Silver Plated Copper | <ul style="list-style-type: none"> Excellent shielding against radiated electromagnetic interference (EMI) at low coating thicknesses | | X | 70 – 80 dB at 15 μm | < 0.015 | Plastic | 30 min. at 70°C |

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