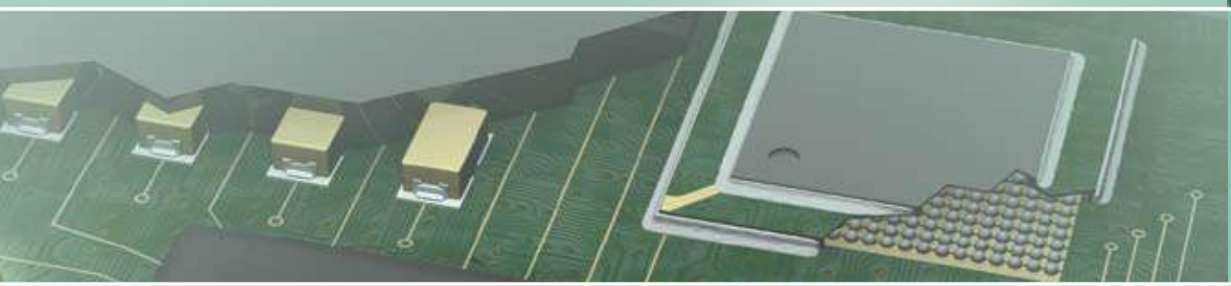
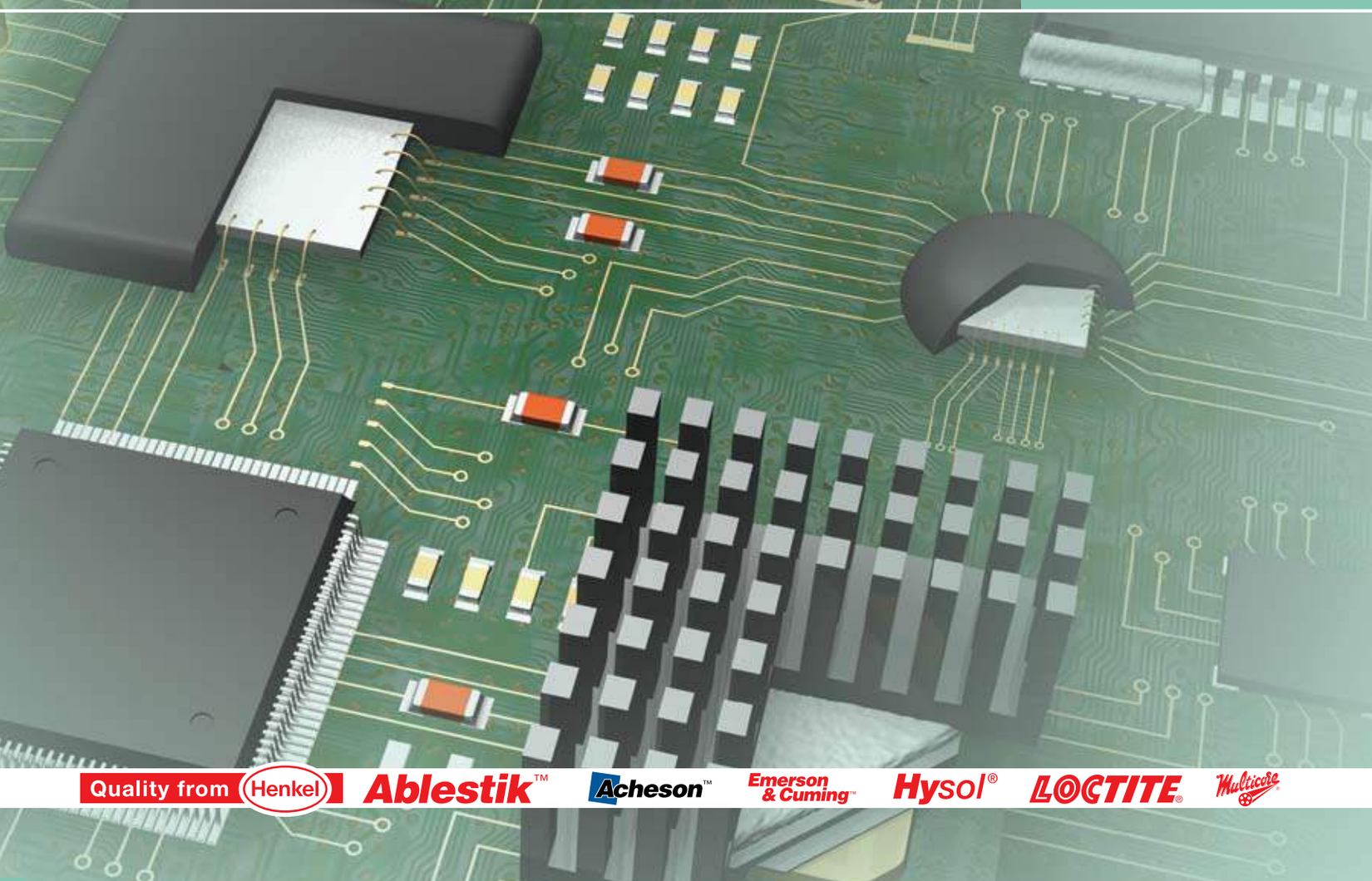
ELLSWORTH ADHESIVES

Global Distributor of Henkel LOCTITE
(800) 888-0698 info@ellsworth.com

Henkel
Electronics Assembly Solutions



Henkel



Quality from Henkel Ablestik™ Acheson™ Emerson & Cuming™ Hysol® LOCTITE® Multicore®

WORLDWIDE MANUFACTURING & ORGANIZATION

ELECTRONICS GROUP OF HENKEL

★ Headquarters/Product Development
■ Product Development/Manufacturing
● Product Development
▲ Manufacturing

Across the Board, Around the Globe.
www.henkel.com/electronics

Corporate Profile – Henkel Corporation

Henkel is the world's leading and most progressive provider of qualified, compatible material sets for semiconductor packaging, printed circuit board (PCB) assembly and advanced soldering solutions. As the only materials developer and formulator with vast technical expertise for all materials required for package production and assembly, Henkel is uniquely positioned to deliver world-class materials products, process expertise and total solutions across the board to enable tomorrow's electronic industry.

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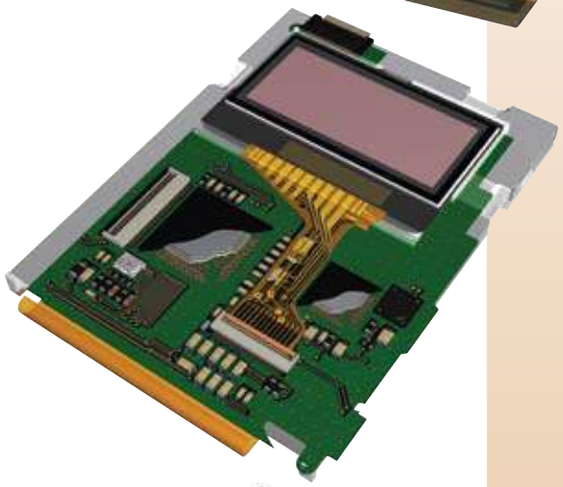

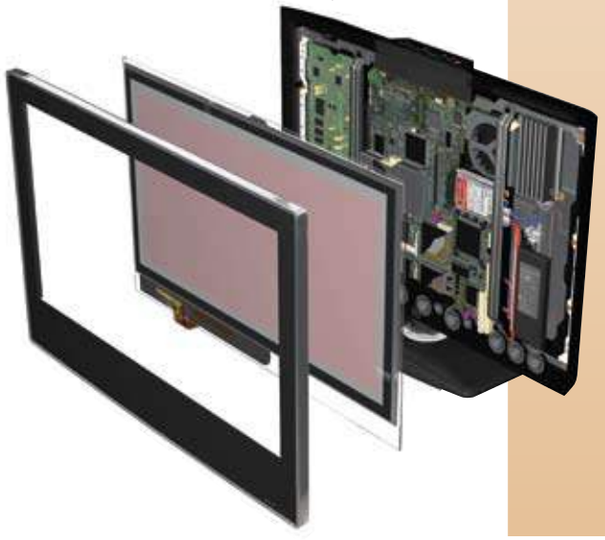

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MATERIAL SOLUTIONS FOR ELECTRONIC PACKAGING AND ASSEMBLY

SEMICONDUCTOR MATERIALS

- Die Attach Adhesives
- Semiconductor Underfills
- Semiconductor Encapsulants
- Thermal Compression Materials
- Coating Powders
- Electronic Molding Compounds
- Semiconductor Molding Compounds
- Solder and Flux Materials

ASSEMBLY MATERIALS

- Adhesives
- Inks & Coatings
- Display Materials
- CSP Underfills
- Chip-on-Board Encapsulants
- PCB Protection
- Solder Materials
- Surface Mount Adhesives
- Thermal Management Materials

Please see LT-5013 for Semiconductor Solutions Guide

ASSEMBLY MARKET SOLUTIONS

Today's electronics assembly market can be complex. Your materials supplier partnership shouldn't be.

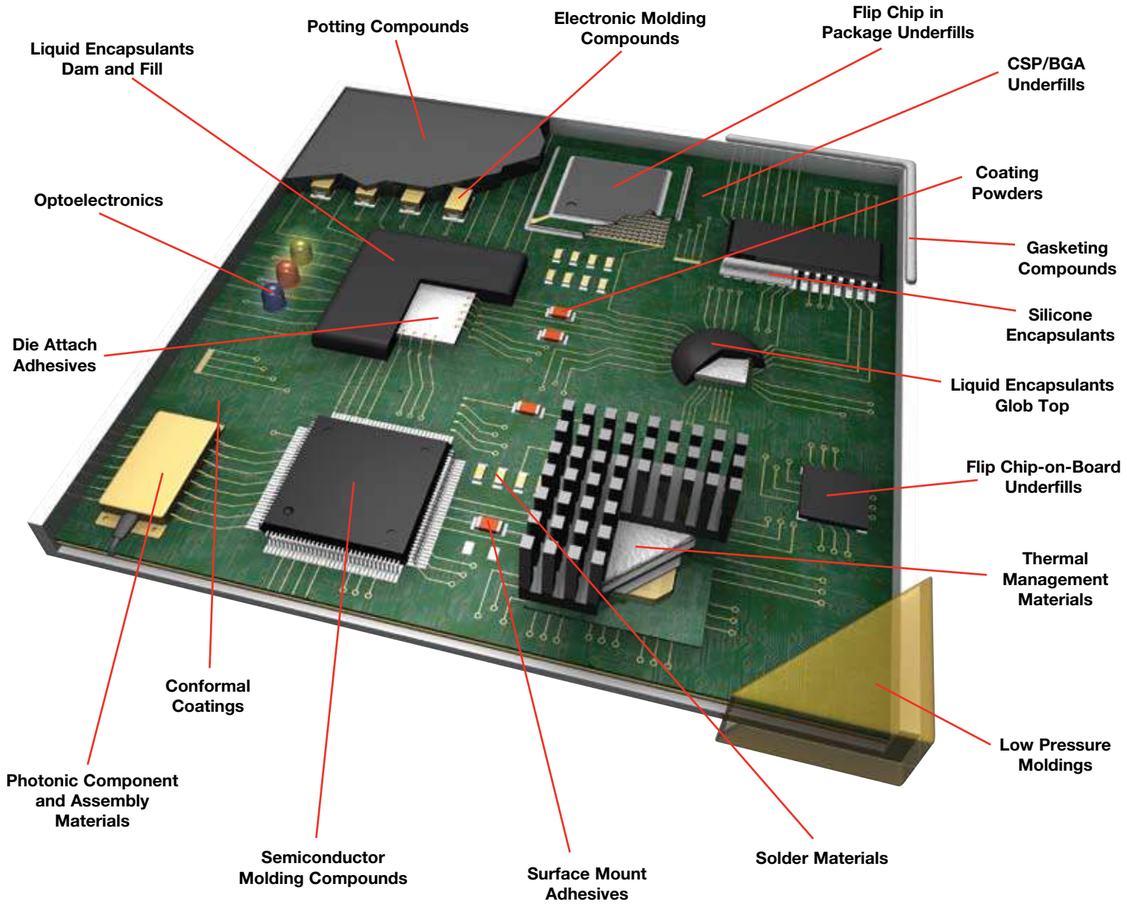
That's why Henkel has researched, analyzed, designed and formulated the most comprehensive range of advanced assembly materials available. We deliver unprecedented choice, convenience and, above all, a low-risk proposition to your business so that complexity is eliminated and performance is elevated. Any application that requires joining, bonding, adhering or protecting an electronic assembly will benefit from the value-added solutions within Henkel's unmatched technology toolbox.

Our leading-edge materials are uniquely strengthened by the exceptional expertise of our people. Bringing together the industry's best and brightest chemists, applications experts, sales professionals, technical support specialists, scientists and researchers all under the guidance of a knowledgeable and dedicated management team, Henkel provides the depth of experience and breadth of capability you need to get the job done. Our worldwide service, manufacturing, sales and product development network delivers the global footprint that enables your company's competitiveness – regardless of your requirements or your locale.

Henkel's successful history is only superseded by our promising future. Even as we have commercialized ground-breaking formulations for modern electronics manufacture, we are diligently researching and developing materials technology that will make tomorrow's products possible.

Quality from Henkel Ablestik™ Acheson™ Emerson & Cuming™ Hysol® LOCTITE® Multicore

ASSEMBLY MARKET SOLUTIONS



ASSEMBLY MARKET SOLUTIONS

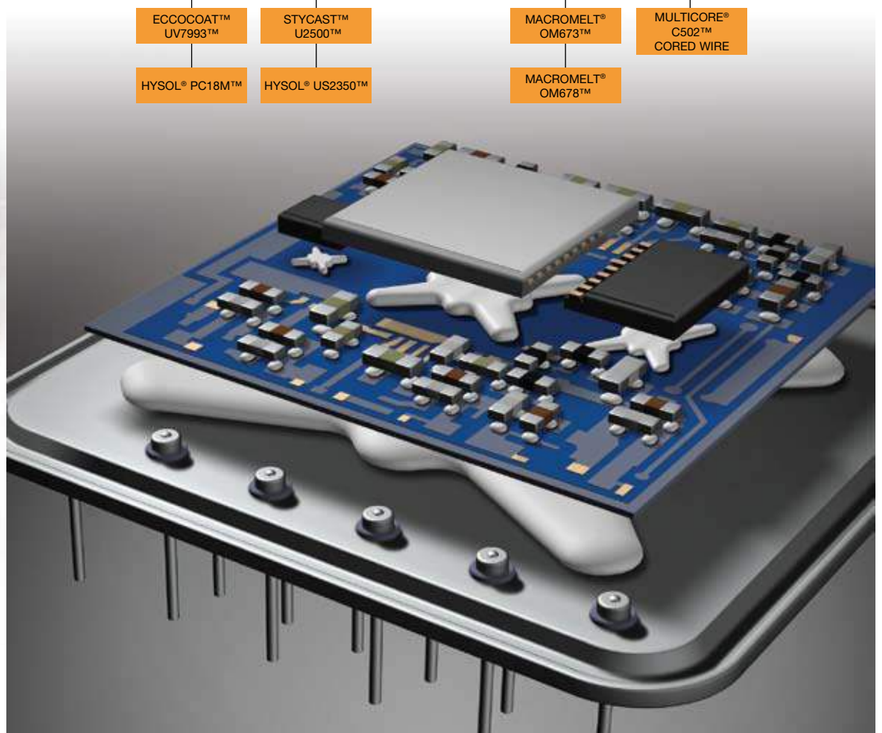
AUTOMOTIVE ELECTRONICS

Addressing the needs of today's advanced automotive industry, Henkel has developed a broad range of conductive paste and film adhesives, glob top and underfill encapsulants, conformal coatings, sealants, potting encapsulants and solder products, technical and analytical test support, and customized formulations to meet increasingly demanding requirements. Our solutions are used in a wide range of vehicle electronic and sensor components for common rail fuel systems, safety electronics, engine and powertrain management, infotainment, and lighting applications.

ASSEMBLY MARKET SOLUTIONS

AUTOMOTIVE ELECTRONICS

- Automotive Electronics
  - Adhesives
    - Electrically Conductive Pastes
      - ABLEBOND® 8175Q™
      - ECCOBOND™ CE3516LCL™
      - ECCOBOND™ CE3520-3™
      - ECCOBOND™ CE3535™
      - ECCOBOND™ CE8500™
      - HYSOL® QMI516LC™
    - Insulating Pastes
      - ECCOBOND™ 2332™
      - ECCOBOND™ A164-1™
      - ECCOBOND™ A316-48™
      - ECCOBOND™ A401™
      - ECCOBOND™ G909™
    - Thermally Conductive Pastes
      - ECCOBOND™ E3503-1™
      - ECCOBOND™ E8502-1™
      - ECCOBOND™ TE3530™
      - LOCTITE® 5404™
  - Inks and Coatings
    - Electrically Conductive Inks
      - ELECTRODAG™ 725A™
  - Micro-Encapsulants
    - Glob Tops
      - HYSOL® EO1060™
      - HYSOL® EO1062™
      - HYSOL® EO1072™
    - Underfills
      - EMERSON & CUMING™ E1172A™
      - EMERSON & CUMING™ E1216™
  - PCB Protection
    - Conformal Coatings
      - LOCTITE® 5290™
      - LOCTITE® 5293™
      - LOCTITE® 5296™
      - ECCOCOAT™ SC3613™
      - ECCOCOAT™ UV7993™
      - HYSOL® PC18M™
    - Encapsulants-Potting
      - HYSOL® EO1058™
      - HYSOL® ES1902™
      - STYCAST™ 2850FT™
      - STYCAST™ E2534FR™
      - STYCAST™ U2500™
      - HYSOL® US2350™
    - Sealants
      - LOCTITE® NUVA-SIL® 5089™
      - LOCTITE® 5210™
      - LOCTITE® 5699™
      - LOCTITE® 5810F™
    - Low Pressure Molding (Macromelt®)
      - MACROMELT® OM641™
      - MACROMELT® OM646™
      - MACROMELT® OM652™
      - MACROMELT® OM657™
      - MACROMELT® OM673™
      - MACROMELT® OM678™
  - Solder Materials
    - MULTICORE® LF318™ SOLDER PASTE
    - MULTICORE® MF300™ LIQUID FLUX
    - MULTICORE® MFR301™ LIQUID FLUX
    - MULTICORE® C400™ CORED WIRE
    - MULTICORE® C502™ CORED WIRE
  - Surface Mount Adhesives
    - LOCTITE® 3616™
    - LOCTITE® 3621™
  - Thermal Management Materials
  - Electrically Conductive Films
    - EMERSON & CUMING™ CF3350™

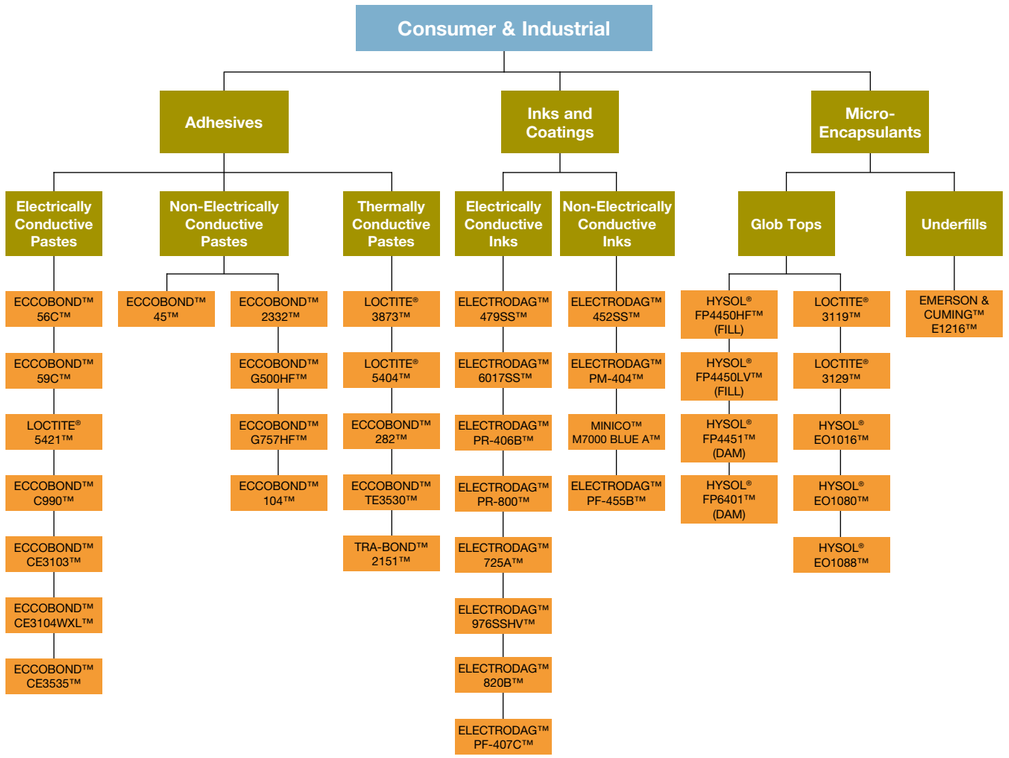


ASSEMBLY MARKET SOLUTIONS

CONSUMER & INDUSTRIAL ELECTRONICS

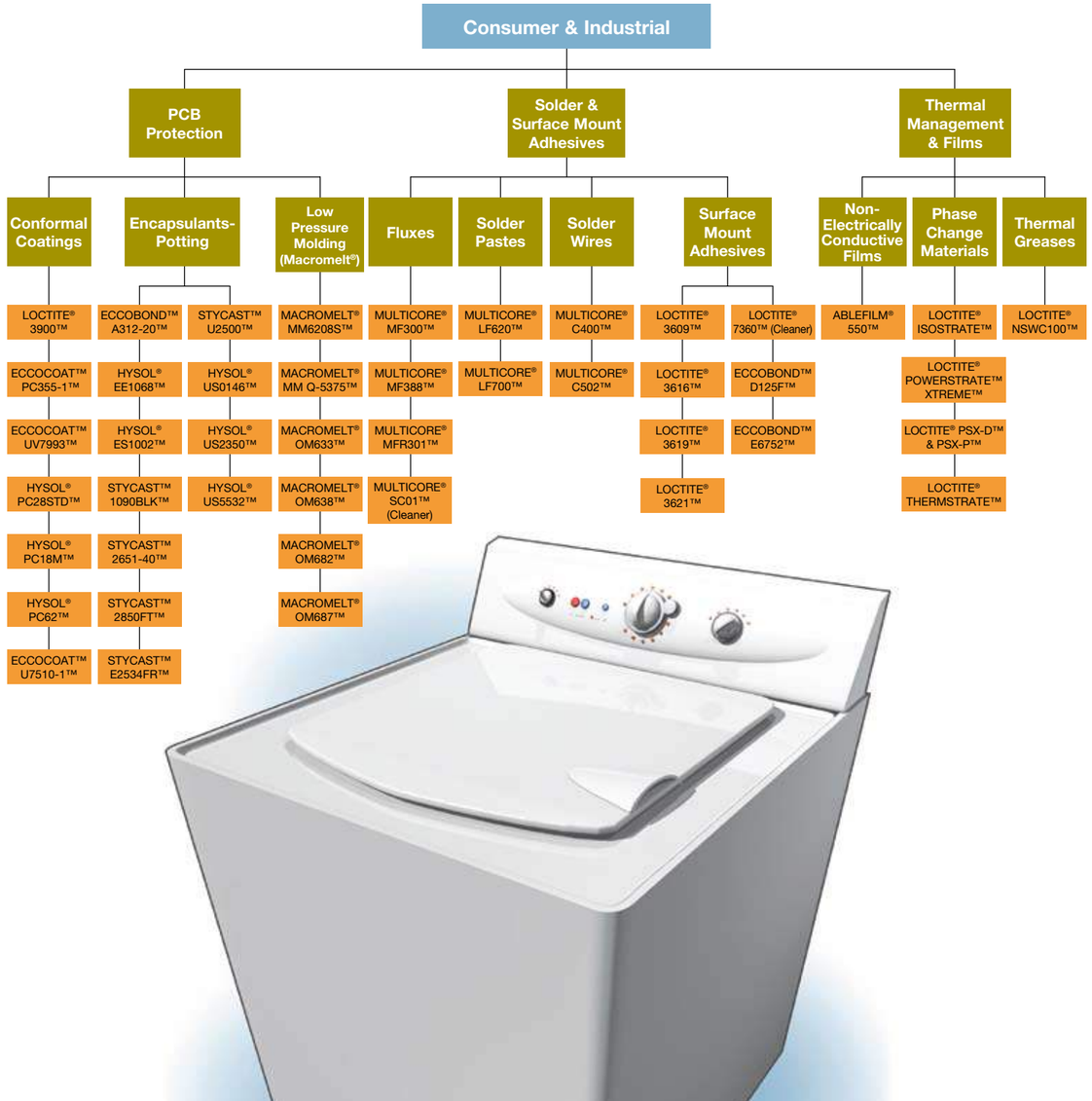
Consumer and industrial applications require materials solutions that can meet the ever-changing demands for high reliability and improved performance. With decades of materials development expertise, Henkel offers a wide range of assembly and protection materials for challenging industrial and consumer electronics environments. We also offer advanced conformal coatings to be used in protecting electronics circuits from moisture, chemicals and other contaminants.

But, we haven't stopped there, with an unyielding commitment to sustainability, Henkel has developed materials that not only deliver the high reliability required, but also address the needs of our environment. Halogen-free, lead-free, solvent-free and low-VOC materials are all part of our portfolio and our ongoing promise to be environmentally responsible. All these innovative solutions will enable manufacturers to introduce products faster to market and improve production efficiency.



ASSEMBLY MARKET SOLUTIONS

CONSUMER & INDUSTRIAL ELECTRONICS



DEFENSE & AEROSPACE ELECTRONICS

Henkel has more than 35 years of experience in supplying the defense and aerospace industry with Emerson & Cuming™, Ablestik™, Loctite®, Hysol® and Multicore® product solutions. We are qualified and specified by all major defense and aerospace OEMs and contractors, and support our products through a worldwide sales, application engineering, research and development, and manufacturing network.

Our state-of-the-art products, certification to major defense and aerospace specifications, and technical expertise ensure that products built with Henkel electronic assembly materials will be both the highest in performance and in reliability. We are committed to meeting and exceeding your requirements with:

- MIL-STD 883, Method 5011 approved products
- NASA outgassing ASTM E 595-77/84/90 approved products
- Proven film and paste technology in Defense and Aerospace applications
- Custom film pre-form manufacturing capability
- Low-risk supply chain

ASSEMBLY MARKET SOLUTIONS

DEFENSE & AEROSPACE ELECTRONICS

- **Defense & Aerospace**
  - **Conformal Coatings**
    - Non-Conductive
      - ECCOCOAT™ UV7993™
  - **Encapsulants**
    - Non-Conductive
      - STYCAST™ 2651™
      - STYCAST™ 2850FT™
      - STYCAST™ 50500D™
      - STYCAST™ 50500-1™
      - HYSOL® FP4451TD™
      - HYSOL® FP4470™
      - HYSOL® FP4460™
  - **Film Adhesives**
    - Conductive
      - ABLEFILM® 5925E™
      - EMERSON & CUMING™ CF3350™
      - ABLEFILM® ECF561E™
      - ABLEFILM® ECF564A™
      - ABLEFILM® ECF568™
    - Non-Conductive
      - ABLEFILM® 5020K™
      - ABLEFILM® 550K™
      - ABLEFILM® 561K™
      - ABLEFILM® 563K™
      - ABLEFILM® 564K™
  - **Paste Adhesives**
    - Conductive
      - TRA-DUCT™ 2902™
      - LOCTITE® 3880™
      - ABLEBOND® 8175™
      - ECCOBOND™ 56C™/CAT 11™
      - ECCOBOND™ 57C
      - ABLEBOND® 84-1LMISR4™
      - ABLEBOND® 84-1LMIT1™
    - Conductive
      - ABLEBOND® 85-1™
      - ABLEBOND® 8700E™
      - ABLEBOND® 967-1™
      - ECCOBOND™ CE3103™
      - ECCOBOND™ CE8500™
      - ECCOBOND™ CE3104WXL™
    - Non-Conductive
      - TRA-BOND™ 2151™
      - ECCOBOND™ 104™
      - ABLEBOND® 724-14C™
      - ABLEBOND® 84-3™
      - ABLEBOND® 8700K™
    - Non-Conductive
      - ABLEBOND® 958-11™
      - ABLEBOND® 967-3™
      - ECCOBOND™ E3503-1™
      - ECCOBOND™ E8502-1™
      - TRA-BOND™ F112™
  - **PC TIM**
    - Thermal Pads
      - LOCTITE® ISOSTRATE™
      - LOCTITE® POWERSTRATE™ XTREME™
      - LOCTITE® SILVERSTRATE™
  - **Solder & Surface Mount Adhesives**
    - No-Clean Tin Lead
      - MULTICORE® MP218™
    - Water Wash Tin Lead
      - MULTICORE® WS200™
    - Cored Wire
      - MULTICORE® 381™
      - MULTICORE® Hydro-X™
    - Liquid Flux
      - MULTICORE® Hydro-X20™
    - Surface Mount Adhesive
      - LOCTITE® 3616™
      - LOCTITE® 3621™
  - **Underfills**
    - Capillary Flows
      - ABLEFILL™ UF8807™
      - EMERSON & CUMING™ XE1218™

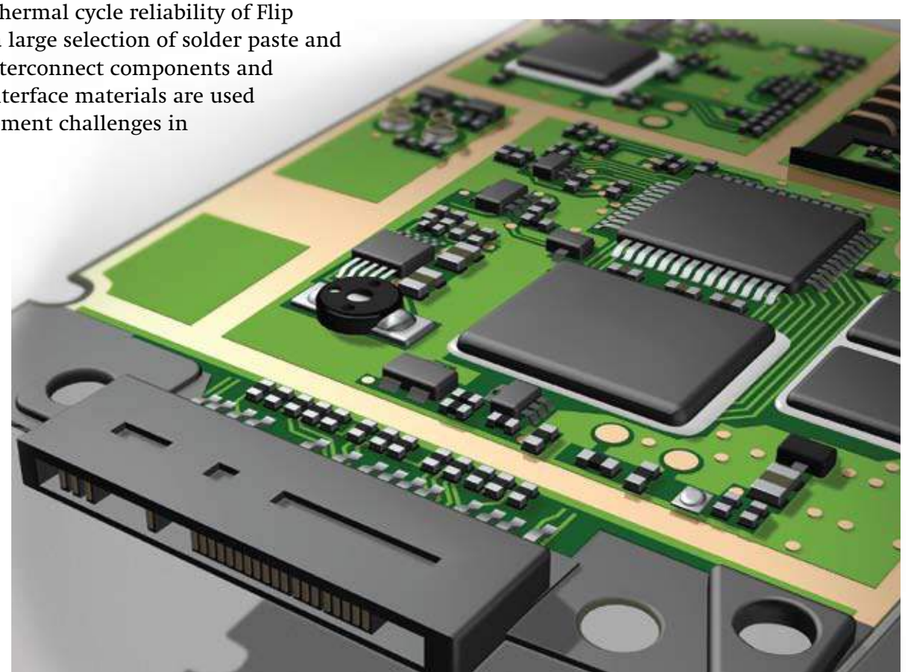
HANDHELD COMMUNICATIONS & COMPUTING

Henkel designs and sells materials that improve the quality, robustness, use life and cost of laptops, mobile phones, MP3 players, game consoles, digital cameras, memory cards, and a range of other handheld devices and associated products. Our broad portfolio of encapsulants, adhesives, solder pastes, inks and coatings are used by designers and manufacturers during circuit assembly.

We offer innovative products optimized to provide the processibility needed for intricate handheld applications. The materials Snap Cure at low temperatures to keep pace with fast production cycle times and are highly stable, offering convenient storage, staging and use conditions. We custom formulate and optimize current technology platforms to integrate with customers' unique processes and needs, and continue to develop future technology platforms that offer greater value to customers by combining new benefits with lower overall cost of use.

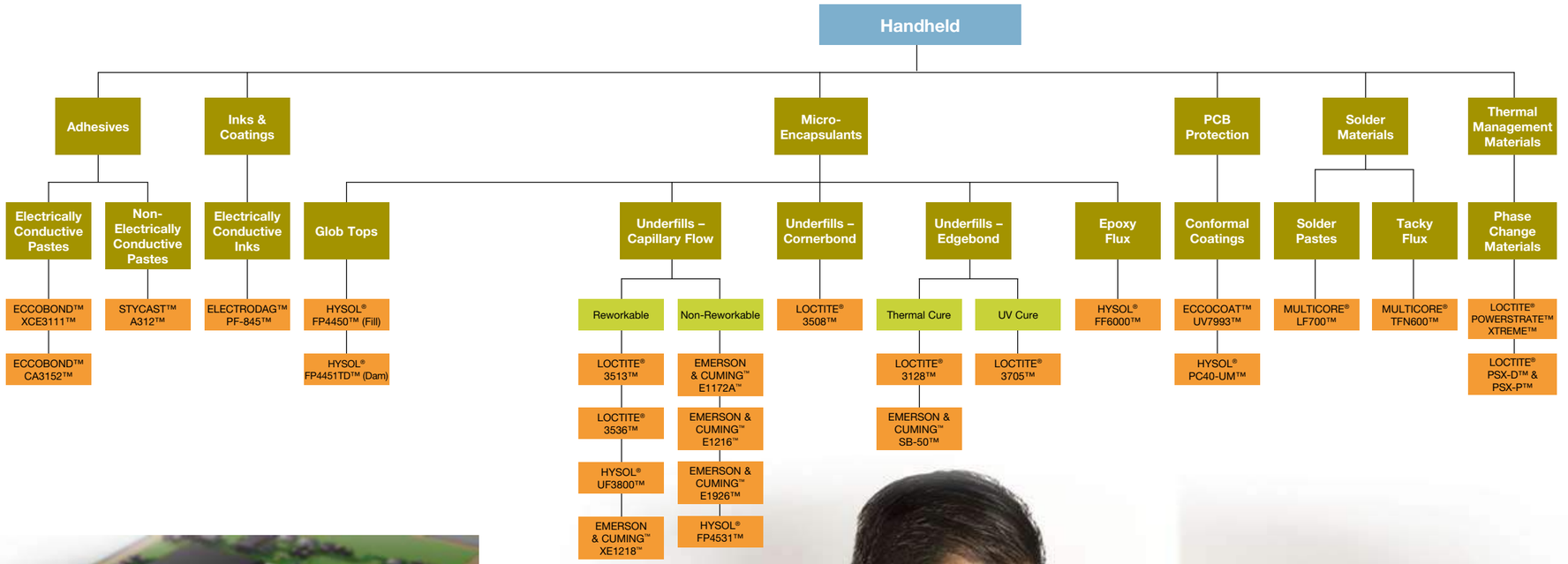
Henkel offers a wide range of underfills that improve the mechanical robustness of CSP, BGA, LGA and WLSP components in mobile phones and other handheld devices, as well as underfills that dramatically improve the thermal cycle reliability of Flip Chip assemblies. We also offer a large selection of solder paste and conductive adhesives used to interconnect components and circuitry. Our line of thermal interface materials are used for a variety of thermal management challenges in laptops and handhelds.

Henkel has developed halogen-free conductive inks used in membranes for keyboards to provide optimal ER performance. Our coatings provide excellent moisture and environmental protection for delicate circuitry in handheld devices.



ASSEMBLY MARKET SOLUTIONS

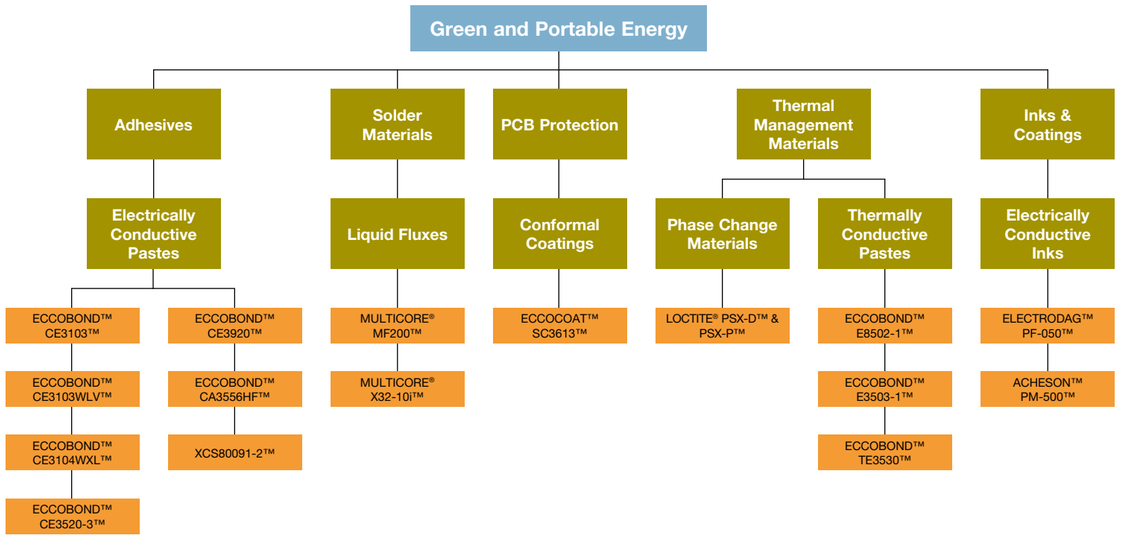
HANDHELD COMMUNICATIONS & COMPUTING

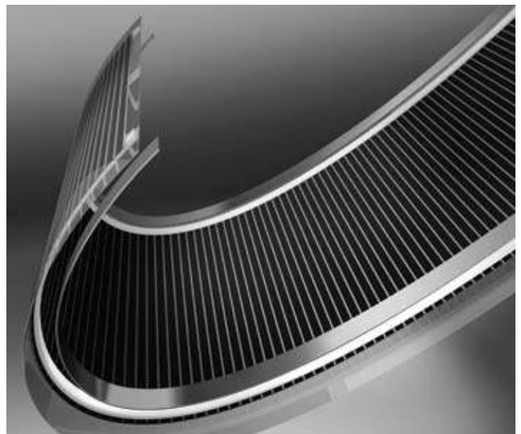


ASSEMBLY MARKET SOLUTIONS

GREEN AND PORTABLE ENERGY (GAPE)

Henkel manufactures numerous assembly and protection materials for the demanding requirements of photovoltaic electronics. Whether your solar cells and modules are based on silicon, thin film, concentrator, dye sensitized or organic technology, Henkel materials enable a robust assembly, providing the performance and reliability required. Our portfolio consists of thermally conductive materials, electrically conductive adhesives and inks, as well as fluxes, solders, encapsulation materials, dielectric adhesives and sealants for assembly of photovoltaic modules.



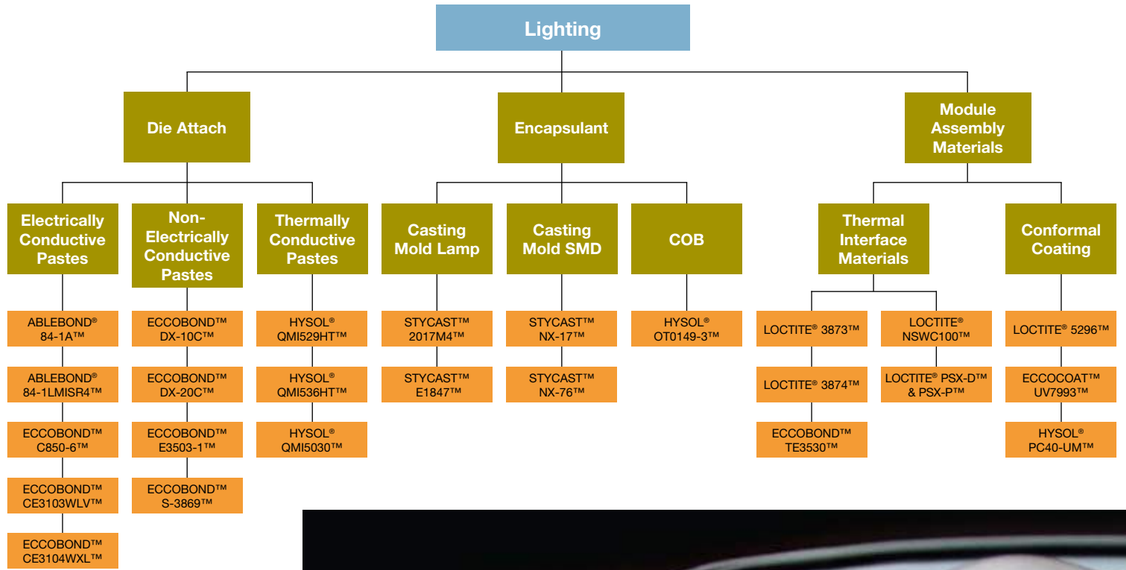


ASSEMBLY MARKET SOLUTIONS

LED LIGHTING

Lighting advancements are one of the most promising areas of electronics market growth. In fact, by some estimates, the LED market is projected to grow at CAGR rates in the double digits over the next few years. Driven by the need for high brightness (HB) LEDs and the requirement to manufacture these even more efficiently, opportunities in the lighting market abound. Success, however, depends on partnering with the right material supplier who can deliver both LED assembly and protection solutions.

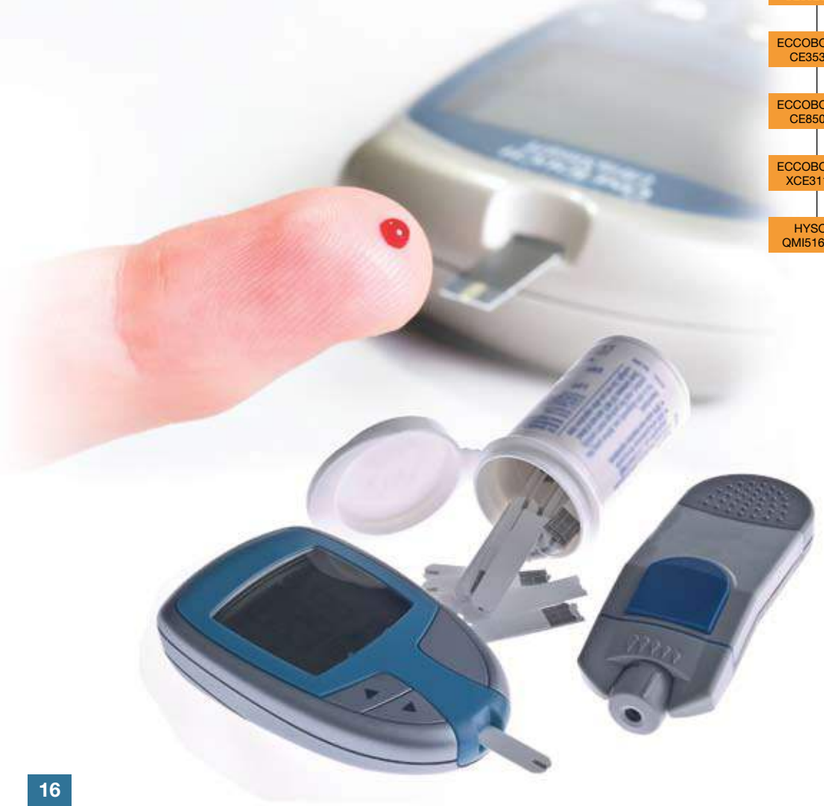
With unmatched expertise in this market and now empowered by the integration of the well-respected Ablestik™, Emerson & Cuming™, Hysol® and Loctite® brands, Henkel offers a broad range of products to meet the increasingly demanding requirements of LED-based lighting assembly and protection. Our extended product line covers LED encapsulant, die attach, PCB protection and thermal management materials. High performance inks are also available for applications that dictate a printable solution.



ASSEMBLY MARKET SOLUTIONS

MEDICAL ELECTRONICS

Accurate diagnosis, improved alternative treatments, patient monitoring: electronic technology and related assembly materials are having an ever-increasing impact on healthcare. They improve access to healthcare, enabling more accurate collection of patient data for more precise treatment. They enable doctors to treat more patients with less, reducing the costs and improving the effectiveness of total healthcare and expanding the capability to treat chronic medical conditions. Implanting medical devices, as well as improving ease of use, requires a form factor that is achieved through advanced electronic components, materials and assembly methods. Henkel combines local technical support and applies materials developed for the most advanced electronic assembly processes to provide solutions for applications ranging from printing simple biological sensors to advanced implantable micro-electronic assemblies.



ASSEMBLY MARKET SOLUTIONS

MEDICAL ELECTRONICS

- **Medical Electronics**
  - **Adhesives**
    - **Electrically Conductive Pastes**
      - ABLEBOND® 84-1LMISR4™
      - ECCOBOND™ CE3520-3™
      - ECCOBOND™ CE3535™
      - ECCOBOND™ CE8500™
      - ECCOBOND™ XCE3111™
      - HYSOL® QMI516LC™
    - **Non-Electrically Conductive Pastes**
      - ABLEBOND® 84-3™
      - ABLEBOND® 967-3™
      - ABLEBOND® 2025D™
      - TRA-BOND™ 2116™
      - TRA-BOND™ FDA2™
      - TRA-BOND™ FDA2T™
      - TRA-BOND™ FDA16™
  - **Inks and Coatings**
    - **Electrically Conductive Inks**
      - ELECTRODAG™ 109™
      - ELECTRODAG™ 479SS™
      - ELECTRODAG™ PE-007™
      - ELECTRODAG™ PF-407A™
      - ELECTRODAG™ PF-407C™
      - ELECTRODAG™ 725A™
    - **Non-Conductive Inks**
      - ELECTRODAG™ 452SS™
      - ELECTRODAG™ PF-455B™
  - **Micro-Encapsulants**
    - **Glob Tops**
      - General
        - HYSOL® EO1060™
        - HYSOL® EO1062™
        - HYSOL® EO1072™
        - HYSOL® FP4460™
        - ECCOBOND™ UV9052™
      - Dam
        - HYSOL® FP4451™
        - HYSOL® FP4451TD™
        - STYCAST™ 50500D™
      - Fills
        - HYSOL® FP4450™
        - HYSOL® FP4450HF™
        - HYSOL® FP4450LV™
        - STYCAST™ 50500-1™
    - **Underfills - Capillary Flows**
      - LOCTITE® 3563™
      - ABLEFILL™ UF8807™
      - EMERSON & CUMING™ E1172A™
      - EMERSON & CUMING™ E1216™
      - EMERSON & CUMING™ XE1218™
  - **PCB Protection**
    - **Conformal Coatings**
      - LOCTITE® 5290™
      - LOCTITE® 5293™
      - LOCTITE® 5296™
      - ECCOCOAT™ SC3613™
      - ECCOCOAT™ UV7993™
      - HYSOL® PC18M™
    - **Low Pressure Molding (Macromelt®)**
      - MACROMELT® MM6208™
      - MACROMELT® OM652™
      - MACROMELT® OM657™
  - **Solder & Surface Mount Adhesives**
    - **Solder Pastes**
      - MULTICORE® LF318™
      - MULTICORE® MP218™
      - MULTICORE® WS300™
    - **Flux No Clean**
      - MULTICORE® MF388™
      - MULTICORE® MFR301™
    - **Solder Wires**
      - MULTICORE® C400™
      - MULTICORE® Hydro-X™
    - **Surface Mount Adhesives**
      - LOCTITE® 3609™
      - LOCTITE® 7360™ (Cleaner)
      - LOCTITE® 3611™
      - ECCOBOND™ D125F™
      - LOCTITE® 3616™
      - ECCOBOND™ E6752™
      - LOCTITE® 3619™
      - LOCTITE® 3621™

ASSEMBLY MARKET SOLUTIONS

RADIO FREQUENCY IDENTIFICATION (RFID)

Used for everything from toll booths to department store inventory control to pet identification, Radio Frequency Identification (RFID) tags are devices capable of uniquely identifying an object via a pre-programmed response when queried by an external radio frequency wave.

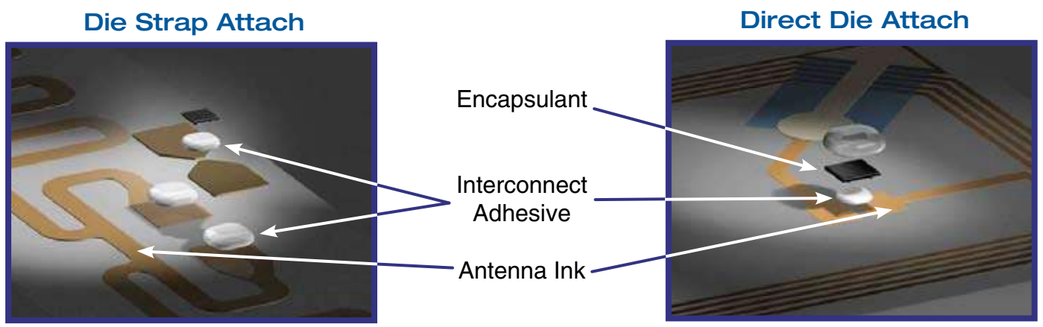
Today's RFID tags consist of a graphic overlay and an inlay, with the inlay being the functional part of the tag and containing the die (used to carry the coded information) and the antenna (used to both transmit and receive RF signals). Critical to the assembly of the tags and their robust in-field performance is the selection of adhesives used to construct these devices.

Adhesive materials are used to attach dies onto antenna to build the inlays, which can be constructed in one of two ways:

1. An interconnect adhesive is used to attach a small bare die directly to an antenna.
2. An interconnect adhesive is first used to build a much larger packaged die (interposer or die strap), which is then adhered onto an antenna.

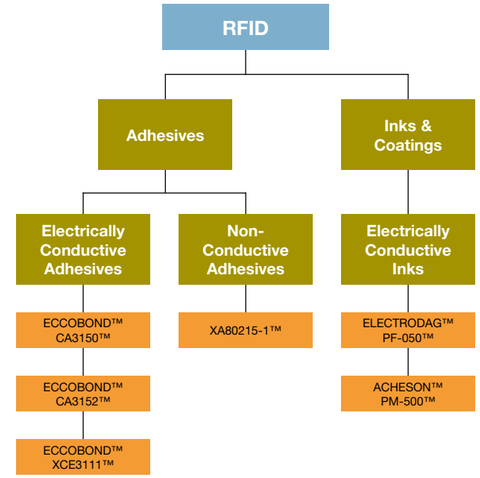
Both methods of assembly have been successfully employed to make active and passive RFID tags.

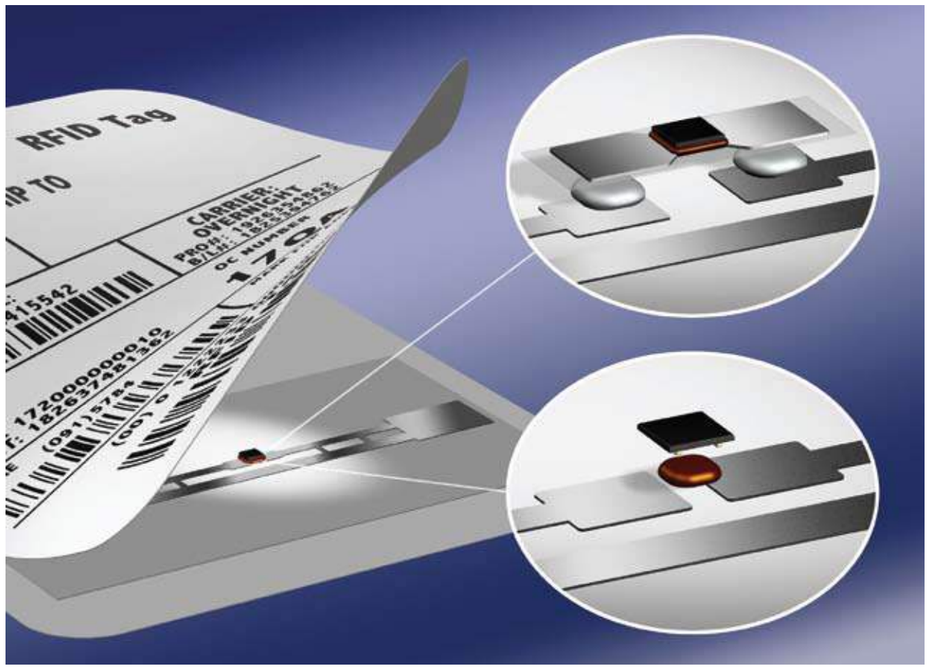
Henkel's line of RFID adhesives are advancing this critical technology by addressing the dichotomy of high-performance and lower-cost assembly that defines the RFID market. By formulating materials that offer increased throughput, exceptional processability, simplified manufacturing techniques and outstanding in-field reliability, Henkel is facilitating higher yield, lower cost manufacturing for modern RFID assembly.



ASSEMBLY MARKET SOLUTIONS

RADIO FREQUENCY IDENTIFICATION (RFID)





ASSEMBLY MARKET SOLUTIONS

WIRELESS DATACOM INFRASTRUCTURE

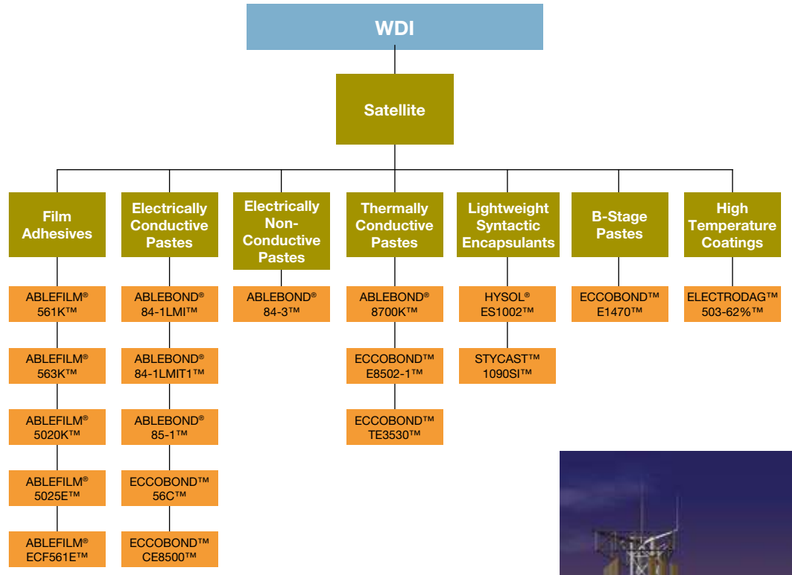
Henkel supplies high-performance assembly materials for electronics in wireless telecommunications infrastructure equipment. With our unique RF grounding adhesives, available in both film and paste formats, we have earned a leading position in the assembly of base station electronics, as well as point-to-point and point-to-multipoint radiolink devices, satellite electronics, wireless home/office equipment and fiber optics.

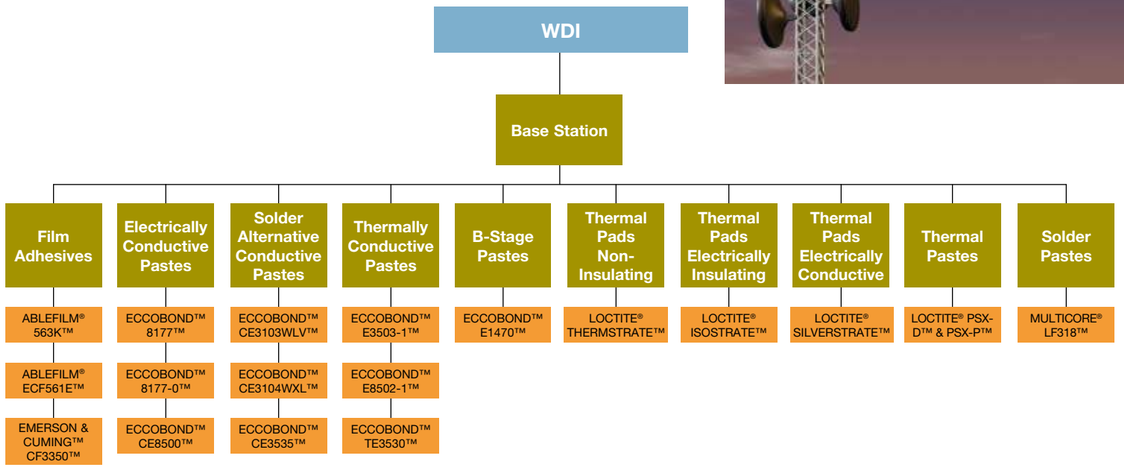
Henkel products are used in the assembly of power amplifiers, transmitters, receivers, couplers, and filters, as well as RF modules such as system-in-packages, power transistors, oscillators, optical fiber and more.

Our unique product line meets emerging market demands for improved RF performance in next-generation wireless telecommunications equipment, as well as increased thermal dissipation requirements for achieving longer distance communication capabilities. Henkel's solutions for these market challenges include RF grounding adhesives in film and paste formats, thermal interface materials for heat dissipation of high power components, electrically conductive adhesives as lead-free solder alternatives for active and passive component attach, lid seal adhesives, and underfills for component reinforcement.

ASSEMBLY MARKET SOLUTIONS

WIRELESS DATACOM INFRASTRUCTURE





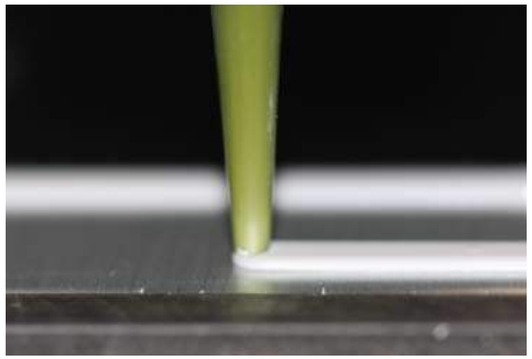
ASSEMBLY MATERIALS

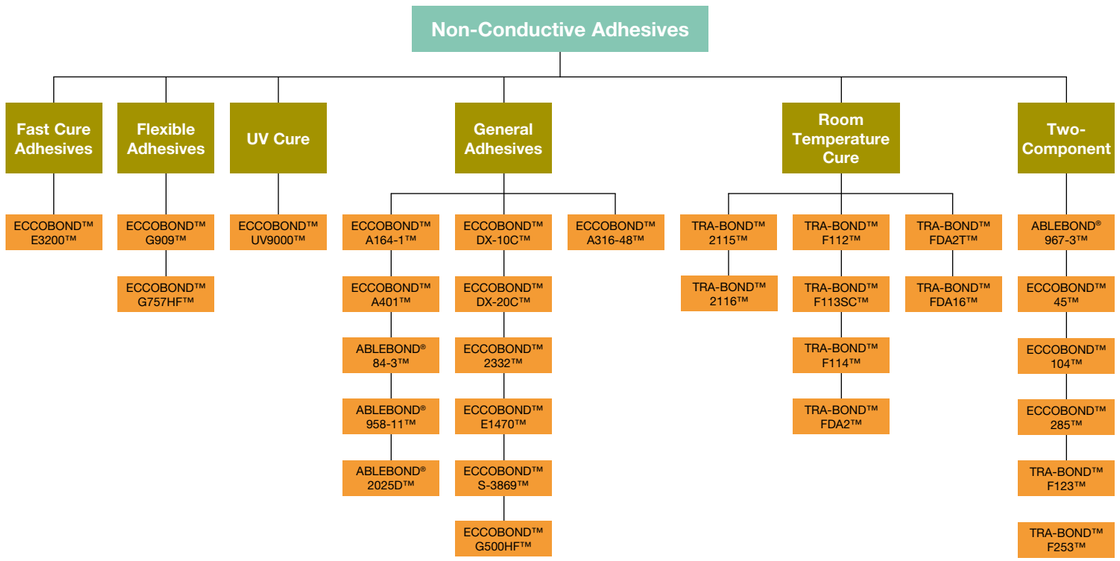
ADHESIVES

Henkel's diverse portfolio of adhesive and sealant solutions includes advanced materials technologies to address today's most demanding applications. From electrically conductive and non-conductive paste adhesives through to thermally conductive dielectric materials, Henkel's product line affords maximum performance and cost-efficiency.

Our electrically conductive and non-conductive paste adhesives are ideal for withstanding the thermal and physical stresses of Defense, Automotive, Medical and Consumer Electronic assembly applications, while our spot cure technologies enable high-speed assembly for RFID tags and other printed electronic devices. Non-conductive paste systems in the Henkel portfolio include a series of one- and two-part room temperature, thermal and UV cure adhesives for the ultimate in flexibility and performance.

For manufacturers that require both adhesive and thermal dissipation functionality, Henkel's line of thermally conductive dielectric pastes are the most trusted and reliable materials on the market. Providing outstanding adhesion and thermal performance, Henkel offers both shimmed and non-shimmed formulations. For assembly specialists that require the utmost in accuracy, our shimmed adhesives contain engineered spacers for more precise bondline control.





ASSEMBLY MATERIALS

ADHESIVES

NON-CONDUCTIVE ADHESIVES

NON-CONDUCTIVE ADHESIVES – FAST CURE ADHESIVES

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	TENSILE STRENGTH LAP SHEAR (PSI)	SHELF LIFE	POT LIFE
ECCOBOND™ E3200™	A very fast and low temperature curing one-component adhesive, with good flexibility, chemical and humidity resistance.			Thermal	5 min. @ 120°C	150,000	–	90 days @ -18°C to 25°C	24 hrs.

NON-CONDUCTIVE ADHESIVES – FLEXIBLE ADHESIVES

ECCOBOND™ G909™	One-component, thixotropic, flexible epoxy adhesive with high peel and tensile lap shear strength over a broad temperature range.			Heat	90 min. @ 100°C 20 min. @ 150°C	Paste	2,900	3 months @ 4°C	2 weeks
ECCOBOND™ G757HF™	One-component epoxy adhesive providing high mechanical strength; stable contact resistance on Cu and 100% Sn.			Heat	1 hr. @ 150°C	Paste	1,740	4 months @ -40°C	1 week

NON-CONDUCTIVE ADHESIVES – UV CURE

ECCOBOND™ UV9000™	Thixotropic, UV curing, solvent-resistant sealant for gold and plastic substrates.			UV	5 sec. @ 80 W/cm	30,000	–	6 months @ RT	1 week

NON-CONDUCTIVE ADHESIVES – GENERAL ADHESIVES

ABLEBOND® 84-3™	Exceptionally low thermal resistance. Superior contact resistance and adhesion stability on Sn, SnPb and OSP Cu. Very low weight loss & bleed during cure.	Yes	Yes	Heat	60 min. @ 150°C 10 min. @ 175°C	50,000	6,800	4 months @ -40°C	–
ABLEBOND® 958-11™	An electrically insulating adhesive designed to absorb stresses produced when bonding large ICs.	Yes		Heat	1 hr. @ 150°C	45,000	2,700	1 year @ -40°C	–
ECCOBOND™ A164-1™	Good adhesion and peel strength to metal, glass, plastics; excellent thermal shock resistance.			Heat	60 min. @ 120°C 20 min. @ 160°C			4 months @ 8°C	
ECCOBOND™ A401™	Good thermal conductivity; good high temperature resistance; bonds well to metal, glass, plastics, and ceramics.			Heat	60 min. @ 120°C 5 min. @ 180°C			6 months @ 0°C	
ABLEBOND® 2025D™	A hybrid chemistry die attach adhesive designed for PBGA, FlexBGA and for stacking BGA packages.			Heat	30 min. ramp to 175ºC; Hold 15 min. @ 175ºC	11,000	10,000	1 year @ -40°C	24 hrs.
ECCOBOND™ DX-10C™	Epoxy base clear type. Low viscosity.			Heat	60 min. @ 140°C	3,000		6 months @ -20°C	24 hrs.
ECCOBOND™ DX-20C™	Epoxy base.			Heat	60 min. @ 170°C	12,000, 10 RPM		6 months @ -20°C	24 hrs.
ECCOBOND™ 2332™	One-component, slightly thixotropic, solventless epoxy adhesive with high peel and tensile strength when cured at temperatures as low as 100°C.			Heat	20 min. @ 150°C 90 min. @ 100°C	70,000	3,140	6 months @ 8°C	24 hrs.
ECCOBOND™ E1470™	B-stage capable adhesive designed for component and lid attach applications. Bonds well to engineering plastics such as LCP as well as silicon & metals such as aluminum.			Heat	B-stage: 45 min. @ 100°C Final cure: 5 min. @ 180°C	12,000	>1,900	3 months @ -20°C	1 week
ECCOBOND™ S-3869™	Hybrid type.			Heat	120 min. @ 160°C	6,200, 10 RPM		3	8 days
ECCOBOND™ G500HF™	A one-component, high strength epoxy adhesive.			Heat	5 min. @ 175°C	Paste	17,000	4 months @ 25°C	4 months
STYCAST™ A316-48™	A one-component, oxide-filled, pourable epoxy adhesive with exceptional thermal stability.			Heat	5 min. @ 120°C	50,000	17,300	3 months @ RT	3 months

ASSEMBLY MATERIALS

ADHESIVES

NON-CONDUCTIVE ADHESIVES

NON-CONDUCTIVE ADHESIVES – ROOM TEMPERATURE CURE ADHESIVE

PRODUCT	DESCRIPTION	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	TENSILE STRENGTH, LAP SHEAR (PSI)	SHELF LIFE	POT LIFE
TRA-BOND™ 2115™	Clear, low viscosity epoxy formulation used in the fabrication of lasers. It is capable of withstanding 30 seconds of 60 watt direct laser energy. The low cure shrinkage (using a room temperature cure) make 2115™ an excellent choice for bonding optical components where alignment accuracy is essential. It has been used in cycling applications down to 4K.	Room/ Thermal	24 hrs. @ 25°C 1 hr. @ 65°C	250	3,800		35 min.
TRA-BOND™ 2116™	A thixotropic, low vapor pressure epoxy system that passes the NASA Outgassing Specification.	Room/ Thermal		100,000	2,500		
TRA-BOND™ F112™	Long pot life, impact resistant, fiber-optic adhesive. This two-part, low viscosity epoxy has the distinct advantage of remaining below 3000 cPs for a minimum of 40 minutes. Sufficient cure is developed for polishing connectors in 15 minutes at 65°C.	Room/ Thermal	24 hrs. @ 25°C 1 hr. @ 65°C 15 min. @ 90°C	1,400	3,000	6 months @ 25°C	45 min.
TRA-BOND™ F113SC™	Room temperature curing, high Tg and low viscosity adhesive formulated for terminating ALL TYPES of fiber-optic connectors. TRA-BOND™ F113SC™ provides high bond strength & low stress connections with no pistoning.	Room/ Thermal	24 hrs. @ 25°C 1 hr. @ 65°C	1,250	3,900	6 months @ 25°C	35 min.
TRA-BOND™ F114™	Optically clear, blush-free, low viscosity, room temperature cure, epoxy system with good optical properties that contains no solvents, has excellent wicking and wetting characteristics. Recommended for fiber-optic (glass and plastic) assembly and repair applications, lens and prism assembly, and small volume optical potting.	Room/ Thermal	24 hrs. @ 25°C 1 hr. @ 65°C	625	3,000	–	35 min.
TRA-BOND™ FDA2™	A two-part, room temperature cure adhesive system specifically developed for bonding and coating applications in accordance with Title 21, U.S. Code of Federal Regulations.	Room/ Thermal	72 hrs. @ 25°C	9,000	3,500	6 months @ 25°C	4 hrs.
TRA-BOND™ FDA2T™	A thixotropic epoxy resin system specifically developed for medical device applications. It has been tested in accordance with USP biological reactivity tests, in vivo and received Class VI approval.	Room/ Thermal	24 hrs. @ 25°C 1 to 4 hrs. @ 65°C	26,000	1,800		
TRA-BOND™ FDA16™	A medium viscosity epoxy resin system specifically developed for medical device applications. It has been tested in accordance with USP biological reactivity tests, in vivo and received Class VI approval.	Room/ Thermal		1,700	2,000		

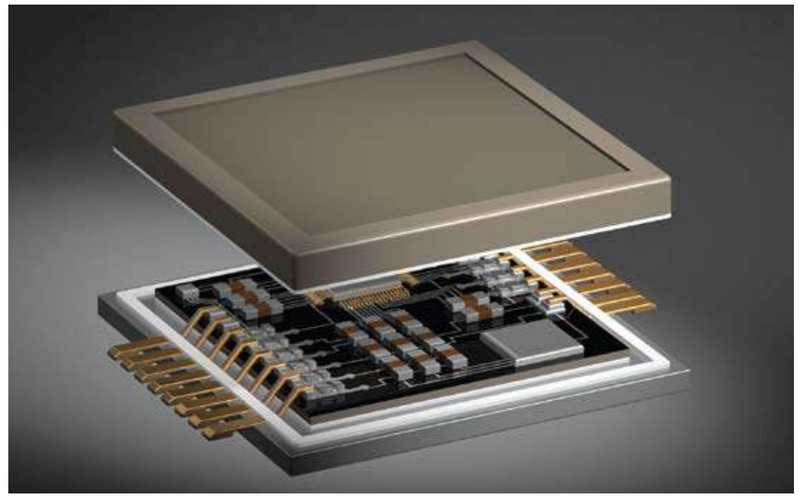
ASSEMBLY MATERIALS

ADHESIVES

NON-CONDUCTIVE ADHESIVES

NON-CONDUCTIVE ADHESIVES – TWO COMPONENT

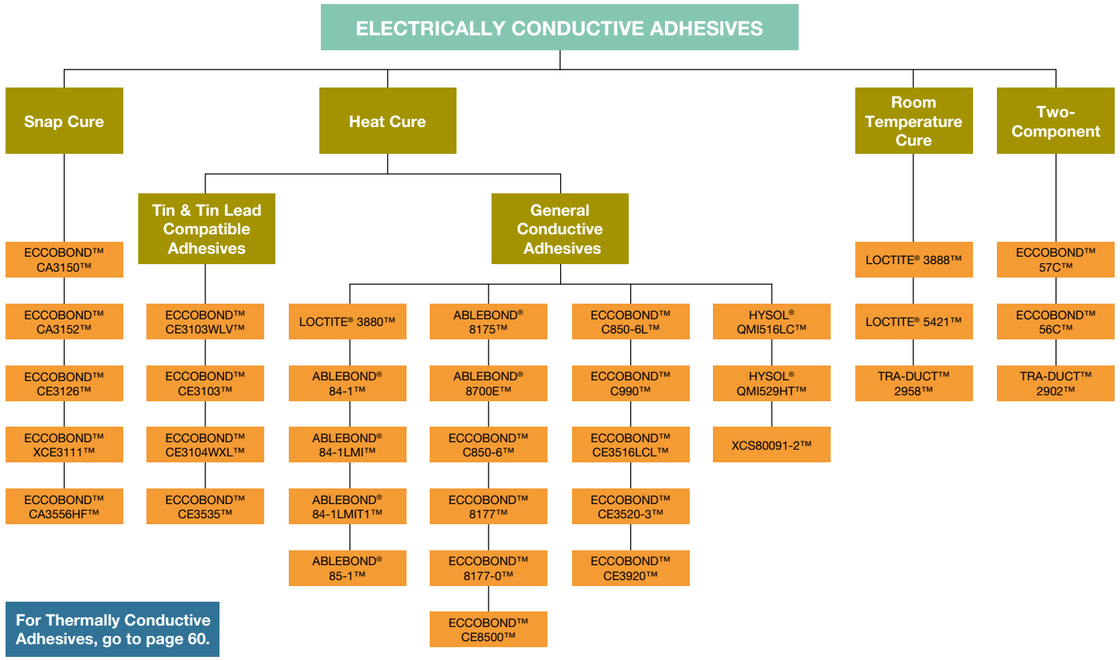
PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	TENSILE STRENGTH, LAP SHEAR (PSI)	SHELF LIFE	POT LIFE
ABLEBOND® 967-3™	A two-component, solvent-free adhesive designed for applications that require lower-than-normal cure temperatures.	Yes		Heat	30 min. @ 150°C	7,000	7,000	1 year @ -40°C	
ECCOBOND™ 45™	A two-component, room temperature curing, variable flexibility epoxy adhesive.				16 hrs. @ 25°C	200,000 - 250,000	2,500	6 months @ 25°C	2 hrs.
ECCOBOND™ 104™	A two-component epoxy adhesive with outstanding physical and dielectric properties and service temperatures up to 230°C.			Activator or Heat	6 hrs. @ 120°C	Paste	1,540	6 months @ 25°C	12 hrs.
ECCOBOND™ 285™	A highly filled, thermally conductive, thixotropic epoxy paste with low CTE.			Room/ Thermal	24 hrs. @ RT	Paste	1,230	12 months @ 25°C	4 hrs.
TRA-BOND™ F123™	A low viscosity formulation that signals both proper mixing and curing when bonding fiber-optic bundles, potting glass fibers, and/or terminating single or multichannel fiber-optic connectors. Unmixed components are light yellow, turning light green on mixing, and changing again to a deep reddish-amber after the REQUIRED 100°C HIGH TEMPERATURE CURE.			Room/ Thermal	5 min. @ 100°C	2,000	2,900	6 months @ 25°C	4 hrs.
TRA-BOND™ F253™	A low viscosity, high temperature, two-part epoxy formulation that changes color during the curing process to indicate cure status. Unmixed components are light yellow; the mixture is green/blue; and the fully cured adhesive is reddish-amber. It exhibits excellent wicking, and develops strong, tough, mechanically stable bonds to a wide variety of fiber-optic and optical materials that includes most metals, ceramics, glass and many plastics, and yielding excellent pot and polish connections.			Room/ Thermal	15 min. @ 100°C 5 min. @ 125°C 1 min. @ 150°C	1,750	2,700	6 months @ 25°C	1 hr.



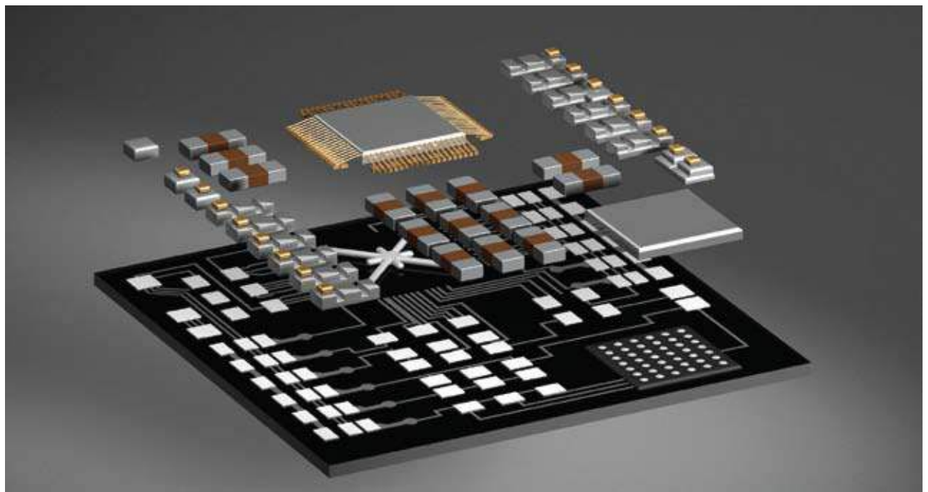
ASSEMBLY MATERIALS

ADHESIVES

ELECTRICALLY CONDUCTIVE ADHESIVES



For Thermally Conductive Adhesives, go to page 60.



ASSEMBLY MATERIALS

ADHESIVES

ELECTRICALLY CONDUCTIVE ADHESIVES

CONDUCTIVE ADHESIVES – SNAP CURE

PRODUCT	DESCRIPTION	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE	POT LIFE
ECCOBOND™ CA3150™	Snap curable, low temperature cure, electrically conductive adhesive with excellent adhesion and reliability of Cu and Al substrates.	Thermal	10 sec. @ 130°C	17,000	<0.01	6 months	1 day
ECCOBOND™ CA3152™	Snap curable, low temperature cure, electrically conductive adhesive with excellent adhesion and reliability of Cu and Al substrates.	Thermal	10 sec. @ 130°C	17,000	<0.01	6 months	2 days
ECCOBOND™ CE3126™	Snap curable anisotropic adhesive is especially suited in applications where throughput is critical. This product is typically used for very fine pitch flip chip interconnections where electrical conductivity is desired in only one direction.	Heat	8 sec. @ 170°C	16,300	N/A	6 months @ -40°C	2 days
ECCOBOND™ XCE3111™	One-component, snap curable, electrically conductive adhesive.	Heat	10 sec. @ 110°C	18,000	0.004	6 months @ -40°C	2 days
ECCOBOND™ CA3556HF™	One-component, highly flexible, conductive adhesive for applications with large CTE mismatches between substrates.	Heat	35 min. @ 140°C	18,000	0.004	5 months @ -40°C	1 day

CONDUCTIVE ADHESIVES – HEAT CURE

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE	POT LIFE
TIN & TIN LEAD COMPATIBLE ADHESIVES									
ECCOBOND™ CE3103™	A one-component, electrically conductive epoxy adhesive that is a lead-free alternative to solder for surface mount devices (SMD) interconnect formation.			Heat	5 min. @ 125°C	40,000 - 60,000	0.0007	6 months @ -40°C	3 days
ECCOBOND™ CE3103WLV™	Electrically conductive adhesive for thin film PV assembly with superior contact resistance stability. Low viscosity for fine line dispensing.			Heat	3 min. @ 150°C	15,000 - 25,000	0.0008	6 months @ -40°C	3 days
ECCOBOND™ CE3104WXL™	Electrically conductive adhesive with superior contact resistance stability. Viscosity optimized for screen- and/or stencil-printing.			Heat	3 min. @ 150°C	65,000	0.0007	6 months @ -40°C	3 days
ECCOBOND™ CE3535™	One-component epoxy adhesive providing high mechanical strength; stable contact resistance on Cu and 100% Sn.			Heat	1 hr. @ 150°C	50,000	0.0003	4 months @ -40°C	6 hrs. @ RT
GENERAL CONDUCTIVE ADHESIVES									
LOCTITE® 3880™	Electrically conductive adhesive for bonding of metals, ceramics, rubbers and plastics with superior adhesion, electrical and thermal conductivity.			Heat	15 min. @ 130°C	100,000 (cp51, 5 RPM)	0.008	6 months @ 0°C	-
ABLEBOND® 84-1™	Standard type. Fast cure.			Heat	10 min. @ 180°C	18,000	0.0002	12	2 weeks
ABLEBOND® 84-1LMI™	Enhanced thermal conductivity, fast cure, low stress die & component attach adhesive optimized for GaAs MMIC attach.			Heat	6 min. @ 130°C (hotplate) 4 min. @ 150°C (hotplate) 10 min. @ 150°C (convection)	28,000	2×10^{-4}	12 months @ -40°C	36 hrs.
ABLEBOND® 84-1LMIT1™	Fast, low temperature cure, electrically & thermally conductive adhesive. Ideally suited for low stress die & component attach, this adhesive has a unique silver particle size allowing very thin bond lines.	Yes	Yes	Heat	4 min. @ 130°C	22,000	1×10^{-4}	12 months @ -40°C	24 hrs.

ELECTRICALLY CONDUCTIVE ADHESIVES

CONDUCTIVE ADHESIVES – HEAT CURE (CONTINUED)

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE	POT LIFE
GENERAL CONDUCTIVE ADHESIVES (Continued)									
ABLEBOND® 85-1™	Gold-filled, high reliability conductive adhesive for critical applications.	Yes		Heat	1 hr. @ 150°C 2 hr.s @ 125°C	N/A	0.0008	12 months @ -40°C	2 days
ECCOBOND™ C850-6™	Strong hot adhesion and good anti-migration.				30 min. @ 150°C	100,000	0.00094	6 months @ -20°C	12 hrs.
ABLEBOND® 8175™	An electrically conductive adhesive for solder replacement and microelectronic interconnect applications.	Yes			30 min. @ 150°C	55,000	0.0005	6 months @ -10°C	2 weeks
ABLEBOND® 8700E™	An electrically conductive epoxy adhesive with high shear strength after thermal cycling.	Yes	Yes	Heat	1 hr. @ 175°C	19,000	0.0002	12 months @ -20°C	1 week
ECCOBOND™ C850-6L™	Low viscosity version of C850-6™.			Heat	60 min. @ 120°C	80,000	0.00094	6 months @ -20°C	12 hrs.
ECCOBOND™ 8177™	Fast, low temperature cure, electrically & thermally conductive adhesive. Ideally suited for low stress die & component attach, this adhesive has a unique silver particle size allowing very thin bond lines.			Heat	4 min. @ 130°C	12,000	1×10^{-4}	12 months @ -40°C	24 hrs.
ECCOBOND™ 8177-0™	Enhanced thermal conductivity, fast cure, low stress die and component attach adhesive optimized for GaAs MMIC attach.			Heat	6 min. @ 130°C (hotplate) 4 min. @ 150°C (hotplate) 10 min. @ 150°C (convection)	65,000	6×10^{-4}	12 months @ -40°C	36 hrs.
ECCOBOND™ CE8500™	One-component, low stress adhesive for mismatched CTE applications. High thermal conductivity.			Heat	40 min. @ 150°C 90 min. @ 120°C	130,000	0.0002	4 months @ -18°C	16 hrs.
ECCOBOND™ C850-6L™	Low viscosity version of C850-6™.			Heat	60 min. @ 120°C	80,000	0.00094	6 months @ -20°C	8 weeks
ECCOBOND™ C990™	One-component, silver-filled epoxy adhesive.			Heat	1 hr. @ 150°C 20 sec. @ 270°C		0.001	5 months @ 8°C	3 weeks @ RT
ECCOBOND™ CE3516LCL™	One-component, non-bleeding, epoxy adhesive with low outgassing, eliminating wicking and bridging under small components.			Heat	30 min. @ 140°C	70,000	0.0003	6 months @ -18°C	7 days
ECCOBOND™ CE3520-3™	One-component, low stress Ni-filled adhesive for mismatched CTE; good shielding properties.			Heat	1 hr. @ 120°C 30 min. @ 150°C	73,000	0.2	6 months @ -18°C	3 days
ECCOBOND™ CE3920™	Electrically conductive adhesive for thin film PV assembly with superior contact resistance stability. Viscosity optimized for dispensing.			Heat	3 min. @ 150°C	148,000	0.0008	6 months @ -40°C	3 days
XCS80091-2™	One-component, highly flexible conductive adhesive for applications with large CTE mismatches between substrates.			Heat	35 min. @ 140°C	30000 - 50000	0.00004	5 months @ -40°C	1 day
HYSOL® QMI516LC™	Low temperature cure, silver-filled adhesive.			Heat	90 min. @ 80°C	Paste	<0.01	12 months @ -40°C	4 hrs.
HYSOL® QMI529HT™	Silver-filled high TC; stable at high temperature.			Heat	≥60 sec. @ 185°C (*Skip*Cure™) 30 min. @ 200°C (oven)	18,500	0.00004	12 months @ -40°C	24 hrs.

ELECTRICALLY CONDUCTIVE ADHESIVES

CONDUCTIVE ADHESIVES – ROOM TEMPERATURE CURE

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE	POT LIFE
LOCTITE® 3888™	A room temperature or heat curable, silver-filled adhesive designed for electronic interconnect applications requiring a combination of good mechanical and electrical properties.			Thick Paste	2 hrs. @ 65°C	Paste	<0.001	12 months	6 months
LOCTITE® 5421™	RTV silicone provides EMI/RFI shielding on electronic device enclosures.			Moisture	72 hrs. @ 25°C	Paste	≤0.01	3 months @ RT	30 min. open time
TRA-DUCT™ 2958™	Two-part, smooth paste of specially refined and processed epoxy and silver components, recommended for electronic, microelectronic, and die-attach bonding and sealing applications that require superior electrical and mechanical properties. It has a long pot life, and is free of contaminating solvents and additives, develops strong durable, void-free, electrically and thermally conducting bonds, seals and coatings – after a REQUIRED high temperature cure cycle.				15 min. @ 100°C 5 min. @ 125°C 2 min. @ 150°C	40,000	1000	6 months @ 25°C	4 hrs.

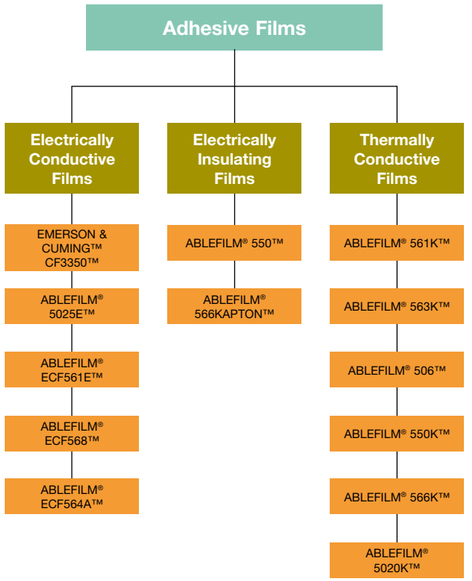
CONDUCTIVE ADHESIVES – TWO COMPONENT

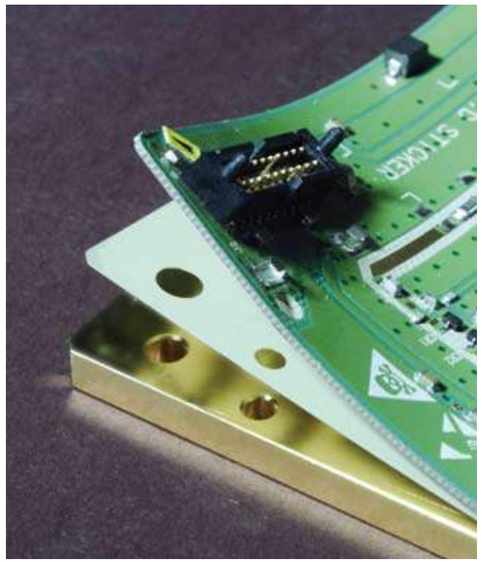
ECCOBOND™ 56C™	Two-component, thixotropic, flexible epoxy adhesive with high peel and tensile lap shear strength over a broad temperature range.			Heat	Depends on catalyst used	Paste	0.0002	6 months @ 25°C	24 hrs.
ECCOBOND™ 57C™	Convenient 1:1 mix ratio, high electrical and thermally conductive two-component adhesive.		Yes	Heat	45 min. @ 100°C	Paste	6×10^{-4}	12 months @ 25°C	1 hr.
TRA-DUCT™ 2902™	Silver-filled epoxy recommended for electronic bonding and sealing applications that require a combination of good mechanical and electrical properties. This two-part, smooth paste formulation of refined pure silver and epoxy is free of solvents and copper or carbon additives. TRA-DUCT™ 2902™ cures at room temperature and can be used as a cold solder for heat-sensitive components where hot soldering is impractical. This adhesive complies with the requirements of NASA's Outgassing Specification.		Yes	Room/ Thermal	24 hrs. @ 25°C 1 hr. @ 65°C	24,000	9×10^{-4} (cured 2 hrs. @ 65°C)	6 months @ 25°C	1 hr.

ASSEMBLY MATERIALS

ADHESIVES

ADHESIVE FILMS





ELECTRICALLY CONDUCTIVE ADHESIVE FILMS

PRODUCT	DESCRIPTION	TENSILE STRENGTH, LAP SHEAR (PSI)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	PRIMARY CURE CYCLE	STORAGE LIFE	FILM THICKNESS AVAILABLE (MILS)
EMERSON & CUMING™ CF3350™	CF3350™ offers an excellent balance of adhesion strength, electrical and thermal conductivity, and processability. It is especially suited for RF applications.	3,400	7	0.0002	30 min. @ 150°C	9 months @ 5°C	2, 4
ABLEFILM® 5025E™	5025E™ is a sister formulation to CF3350™ that has been certified to MIL-STD-883, Method 5011.	2,500	6.5	0.0002	30 min. @ 150°C	6 months @ 5°C	2, 3, 4, 5, 6
ABLEFILM® ECF561E™	ECF561E™ is the most flexible of the fiberglass supported products.	2,000	1.6	0.0060	1 hr. @ 150°C	1 year @ -40°C	4, 5, 6
ABLEFILM® ECF568™	ECF568™ was designed for low temperature cure applications. It has superior adhesion to most surfaces.	5,100	0.9	0.0003	2 hrs. @ 95°C	1 year @ -40°C	4, 5, 6
ABLEFILM® ECF564A™	ECF564A™ is an ionically clean, fiberglass supported adhesive with very good thermal conductivity. It is certified to MIL-STD-883, Method 5011.	2,200	3.8	0.0004	2 hrs. @ 150°C	1 year @ -40°C	4, 5

ASSEMBLY MATERIALS

ADHESIVES

ADHESIVE FILMS

ELECTRICALLY INSULATING ADHESIVE FILMS

PRODUCT	DESCRIPTION	TENSILE STRENGTH, LAP SHEAR (PSI)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	PRIMARY CURE CYCLE	STORAGE LIFE	FILM THICKNESS AVAILABLE (MILS)
ABLEFILM® 550™	A high strength adhesive that bonds well to gold and other difficult-to-bond surfaces.	5,700	0.2	1 x 10^{14}	30 min. @ 150°C	1 year @ -40°C	4, 5, 6
ABLEFILM® 566KAPTON™	566KAPTON™ contains a polyamide carrier providing high insulation resistance. With a low temperature cure and excellent flexibility it is particularly suitable for bonding printed wiring boards.	2,300	0.2	1 x 10^{15}	3 hrs. @ 90°C	1 year @ -40°C	4, 5, 8

THERMALLY CONDUCTIVE ADHESIVE FILMS

PRODUCT	DESCRIPTION	TENSILE STRENGTH, LAP SHEAR (PSI)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	PRIMARY CURE CYCLE	STORAGE LIFE	FILM THICKNESS AVAILABLE (MILS)
ABLEFILM® 561K™	561K™ provides high adhesion strength with excellent flexibility for bonding mismatched CTE materials.	3,300	0.9	9 x 10^{12}	30 min. @ 150°C	1 year @ -40°C	4, 5, 6
ABLEFILM® 563K™	563K™ is an electrically insulating film with high thermal conductivity and adhesion strength. It is available either unsupported or with a fiberglass carrier.	3,000	1	1 x 10^{13}	30 min. @ 150°C	1 year @ -40°C	2, 3, 4, 5, 6
ABLEFILM® 506™	A flexible film adhesive designed for bonding TCE mismatched materials. Slight tack can simplify assembly.	1,200	0.9	7 x 10^{12}	1 hr. @ 150°C	6 months @ -40°C	4, 5, 6
ABLEFILM® 550K™	Combines high adhesion strength with very good thermal conductivity in a fiberglass supported film adhesive available in a wide range of thicknesses.	3,300	0.8	7 x 10^{12}	30 min. @ 150°C	1 year @ -40°C	4, 5, 6, 7, 8
ABLEFILM® 566K™	566K™ offers low temperature cure in a thermally conductive adhesive with excellent flexibility and adhesion.	2,200	0.8	1 x 10^{13}	2 hrs. @ 100°C	1 year @ -40°C	4, 5, 6
ABLEFILM® 5020K™	A high purity adhesive with excellent adhesion to gold-plated surfaces, particularly suited for use in hermetic packages. It is certified to MIL-STD-883, Method 5011.	3,000	0.7	8 x 10^{14}	1 hr. @ 150°C	1 year @ -40°C	4, 5, 6

ASSEMBLY MATERIALS

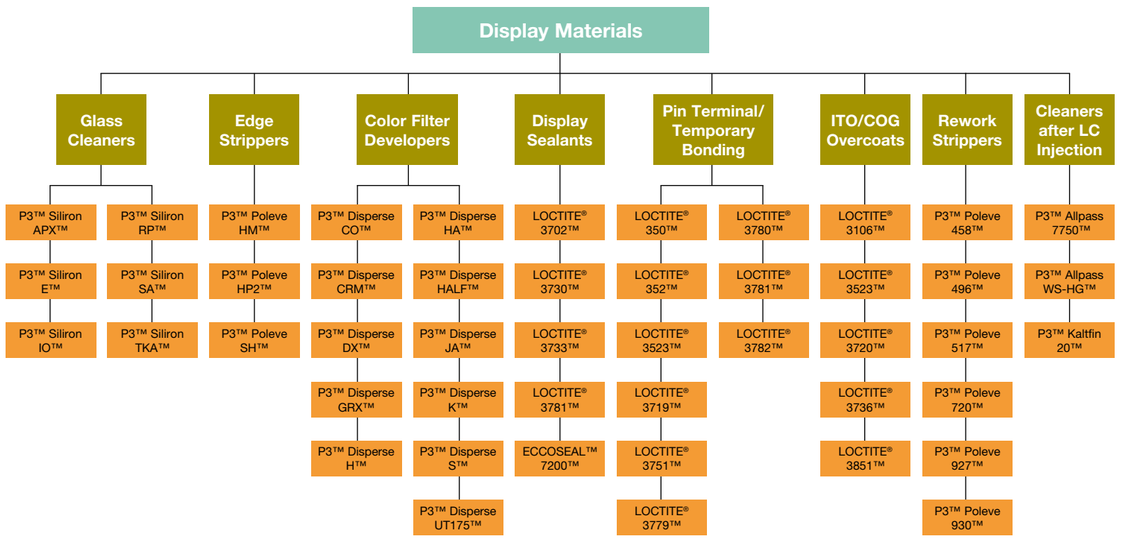
DISPLAY MATERIALS

With materials solutions for many facets of flat panel display (FPD) production, Henkel delivers a variety of Loctite®, Hysol®, P3®, Eccoseal™ and Electrodag™ branded products that enable highly efficient manufacturing and excellent reliability.

For color filter production, the P3® line of cleaners, developers and strippers ensures that the essential FPD color filters are prepared properly and are very stable for the subsequent module assembly process. With both off-the-shelf and customer-developed materials, Henkel's FPD line of materials enable highly efficient, advanced product manufacture.

Module and panel assembly materials are also part of Henkel's core competency. The Loctite® brand of UV curable temporary bonding and endseal materials are used to deliver a robust, complete panel assembly. In addition, Henkel has developed pin terminal bonding, overcoat and flexible printed circuit (FPC) materials to help reinforce and facilitate exceptional and reliable product-to-host connection.

The Hysol® QMI brand of through-hole bonding materials delivers a reliable panel assembly with its flexibility and low temperature curability. The newly joined Eccoseal™ brand provides UV cure and low temperature, fast cure perimeter sealants for displays requiring extreme protection against moisture, such as organic light-emitting diode (OLED) displays and electronic paper displays (EPD). The Electrodag™ brand provides thick polymer film ink for many applications including ITO-coated film. For display applications, a thermoplastic resin-based conductive ink is used to deliver a reliable printed busbar for touch screens with its low temperature process profile, wide range of flexibility and stable electric conductivity.



ASSEMBLY MATERIALS

DISPLAY MATERIALS

GLASS CLEANERS

PRODUCT	DESCRIPTION	TYPE	pH, 3% 20°C	TEMP, C	CONCENTRATION, %	USAGE
P3™ Siliron APX™	Neutral type; low damage to glass.	Neutral	8.5	40°C - 60°C	1-10	US, Dipping, Shower, Brush
P3™ Siliron E™	Low foaming, glass substrate for flat panel display (FPD).	Inorganic	11.5	Room Temp - 70°C	1-5	US, Dipping, Shower, Brush
P3™ Siliron IO™	Low foaming, glass substrate for FPD; non-nitrogen.	Inorganic	12.5	Room Temp - 60°C	1-5	US, Dipping, Shower, Brush
P3™ Siliron RP™	Glass substrate for FPD; after-polishing cleaner.	Organic	12.5	Room Temp - 60°C	1-5	US, Dipping, Shower, Brush
P3™ Siliron SA™	Low foaming, glass substrate for FPD; strong alkaline.	Inorganic	13.5	Room Temp - 60°C	1-5	US, Dipping, Shower, Brush
P3™ Siliron TKA™	Glass substrate for FPD; pre-cleaning of deposition.	Organic	12.5	45°C - 60°C	1-5	US, Dipping, Shower, Brush

EDGE STRIPPERS

PRODUCT	DESCRIPTION	TYPE	pH	TEMP, C	CONCENTRATION, %	USAGE
P3™ Poleve HM™	Edge stripper.	Organic	<12	Room Temp - 60°C	10	EDR
P3™ Poleve HP2™	Edge stripper.	Organic	<12	Room Temp - 60°C	10	EDR
P3™ Poleve SH™	Edge stripper.	Organic	<12	Room Temp - 60°C	10	EDR

COLOR FILTER DEVELOPERS

PRODUCT	DESCRIPTION	TYPE	pH	TEMP, C	CONCENTRATION, %	USAGE
P3™ Disperse CO™	Developer for positive-type photo, preventing Al corrosion.	Organic	>12	Room Temp	Undiluted Solution	Spray
P3™ Disperse CRM™	Developer for positive-type photo resist, standard.	Inorganic	>12	Room Temp	6	Spray
P3™ Disperse DX™	Developer for negative-type photo resist, high concentrate on array color filter.	Organic	>12	Room Temp	1	Spray
P3™ Disperse GRX™	Developer for negative-type photo resist, weak alkaline, high-concentrate type, color filter.	Inorganic	2.5	Room Temp	3	Spray
P3™ Disperse H™	Developer for negative-type photo resist, strong alkaline, standard color filter.	Inorganic	>12	Room Temp	1	Spray
P3™ Disperse HA™	Developer for negative-type photo resist, strong alkaline, high-concentrate type, color filter.	Inorganic	>12	Room Temp	1	Spray
P3™ Disperse HALF™	Developer for negative-type photo resist, strong alkaline, low-foaming, high-concentrate type, color filter.	Inorganic	>12	Room Temp	1	Spray
P3™ Disperse JA™	Developer for negative-type photo resist, weak alkaline, color filter.	Inorganic	9-11	Room Temp	5	Spray
P3™ Disperse K™	Developer for negative-type photo resist, weak alkaline, color filter.	Inorganic	9-11	Room Temp	5	Spray
P3™ Disperse S™	Developer for positive-type photo resist, preventing Al corrosion.	Inorganic	>12	Room Temp	50	Spray
P3™ Disperse UT175™	Developer for positive-type photo resist with surfactant, array board, or semiconductor.	Organic	>12	Room Temp	Undiluted Solution	Spray

ASSEMBLY MATERIALS

DISPLAY MATERIALS

DISPLAY SEALANTS

PRODUCT	DESCRIPTION	VISCOSITY, cPs	TACK-FREE PERFORMANCE		DEPTH OF CURE		Tg,°C	SHORE D HARDNESS
			TIME, sec.	CURING CONDITION, mW/cm²	DEPTH, mm	TIME @ CURING CONDITION		
LOCTITE® 3702™	TFT	12,000	4	40	4.4	50 sec. @ 40 mW/cm²	92 (DMA)	87
LOCTITE® 3730™	TFT	25,000	≤15	40	2.5	50 sec. @ 40 mW/cm²	80 (DMA)	82
LOCTITE® 3733™	TN/STN	13,000	≤15	40	≥2.5	20 sec. @ 100 mW/cm²	97 (DMA)	86
LOCTITE® 3781™	TN/STN	12,000	2	100	3.7	20 sec. @ 100 mW/cm²	68 (DMA)	82

PRODUCT	DESCRIPTION	VISCOSITY, mPa	CURING CONDITION	SHRINKAGE during cure, %	WATER VAPOR PERMEATION RATE, g mil/inch² day	Tg,°C	SHORE D HARDNESS
ECCOSEAL™ 7200™	EPD	2,600	30 min. @ 70°C	2.3	9	70 (DMA)	67

PIN TERMINAL/TEMPORARY BONDING

PRODUCT	DESCRIPTION	VISCOSITY, cPs	TACK-FREE PERFORMANCE		DEPTH OF CURE		Tg,°C	SHORE D HARDNESS
			TIME, sec.	CURING CONDITION, mW/cm²	DEPTH, mm	TIME @ CURING CONDITION		
LOCTITE® 350™	TN/STN	5,000	N/A	N/A	N/A	N/A	N/A	N/A
LOCTITE® 352™	TN/STN	20,500	<10	100	3	30 sec. @ 100 mW/cm²	45 (TMA)	60
LOCTITE® 3523™	TN/STN	20,000	<20	100	2.2	15 sec. @ 100 mW/cm²	45 (TMA)	70
LOCTITE® 3719™	TN/STN	13,000	3	40	2.1	50 sec. @ 40 mW/cm²	77 (DMA)	84
LOCTITE® 3751™	TN/STN	4,000	N/A	N/A	3.8	10 sec. @ 80 mW/cm²	N/A	73
LOCTITE® 3779™	TN/STN	12,000	7	100	2	20 sec. @ 100 mW/cm²	93 (DMA)	75
LOCTITE® 3780™	TN/STN	11,000	8	100	1.9	20 sec. @ 100 mW/cm²	92 (DMA)	73
LOCTITE® 3781™	TN/STN	12,000	2	100	3.7	20 sec. @ 100 mW/cm²	68 (DMA)	82
LOCTITE® 3782™	TN/STN	13,000	10	100	2.3	20 sec. @ 100 mW/cm²	110 (DMA)	76

ITO/COG OVERCOATS

PRODUCT	DESCRIPTION	VISCOSITY, cPs	TACK-FREE PERFORMANCE		DEPTH OF CURE		Tg,°C	SHORE D HARDNESS
			TIME, sec.	CURING CONDITION, mW/cm²	DEPTH, mm	TIME @ CURING CONDITION		
LOCTITE® 3106™	TN/STN	5,000	90	100	6	30 sec. @ 100 mW/cm²	116 (DMA)	53
LOCTITE® 3523™	TN/STN	20,000	<20	100	2.2	15 sec. @ 100 mW/cm²	45 (TMA)	70
LOCTITE® 3720™	TN/STN	2,600	10	100	6.6	20 sec. @ 100 mW/cm²	28 (DMA)	38
LOCTITE® 3736™	TN/STN	500	15	100	3	20 sec. @ 100 mW/cm²	27 (DMA)	36
LOCTITE® 3851™	TN/STN	5,000	20	100	1.2	30 sec. @ 100 mW/cm²		60 (Shore A)

ASSEMBLY MATERIALS

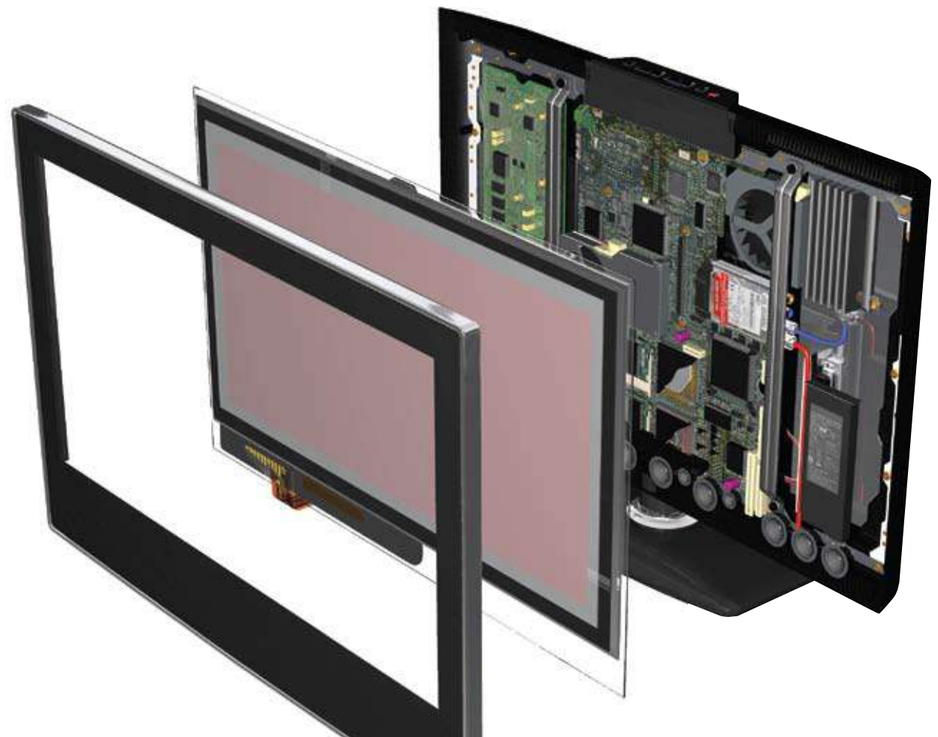
DISPLAY MATERIALS

REWORK STRIPPERS

PRODUCT	APPLICATION	TYPE	pH	TEMP, C	CONCENTRATION, %	USAGE
P3™ Poleve 458™	Positive-type photo resist stripper for color filter, array board.	Organic Solvent	N/A	50°C - 80°C	Undiluted Solution	US, Dipping, Shower
P3™ Poleve 496™	Positive-type photo resist stripper for array board or semiconductor.	Organic Semi-Aqua	12-14	50°C - 80°C	Undiluted Solution	Dipping, Shower
P3™ Poleve 517™	Positive-type photo resist stripper for array board.	Organic Semi-Aqua	12-14	50°C - 80°C	Undiluted Solution	Dipping, Shower
P3™ Poleve 720™	Positive-type photo resist stripper for array board or semiconductor.	Organic Aqua	12-14	50°C - 80°C	Undiluted Solution	Dipping, Shower
P3™ Poleve 927™	Negative-type photo resist for color filter and for rework.	Inorganic	12-14	50°C - 80°C	Undiluted Solution	US, Dipping, Shower, Brush
P3™ Poleve 930™	Negative-type photo resist for color filter and for rework.	Inorganic	12-14	50°C - 80°C	Undiluted Solution	US, Dipping, Shower, Brush

CLEANERS AFTER LC INJECTION

PRODUCT	APPLICATION	TYPE	pH	TEMP, C	CONCENTRATION, %	USAGE
P3™ Allpass 7750™	Cleaner for after liquid crystal injection.	Semi-Aqua	Neutral	40°C - 60°C	Undiluted Solution	Ultrasonic Dipping, Water Flushing
P3™ Allpass WS-HG™	Cleaner for after liquid crystal injection and particle.	Water	Neutral	40°C - 60°C	Undiluted Solution	Ultrasonic Dipping, Water Flushing
P3™ Kaltfin 20™	Cleaner after liquid crystal injection.	Solvent	Neutral	Room Temp	Concentrated Solution	Ultrasonic Dipping, IPA Rinsing



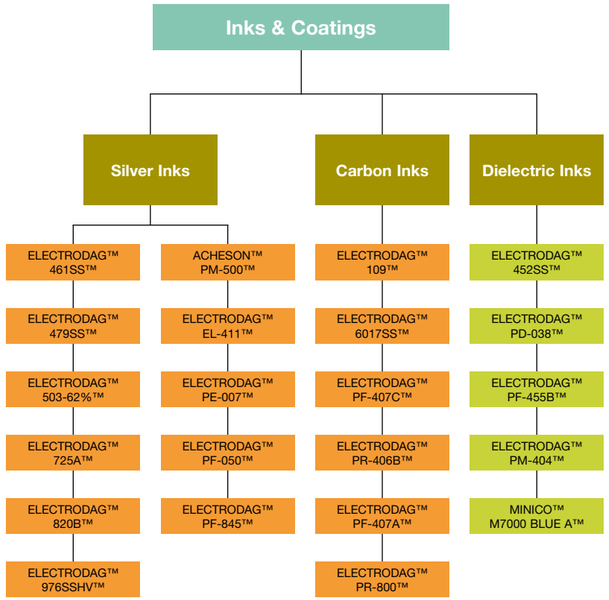
ASSEMBLY MATERIALS

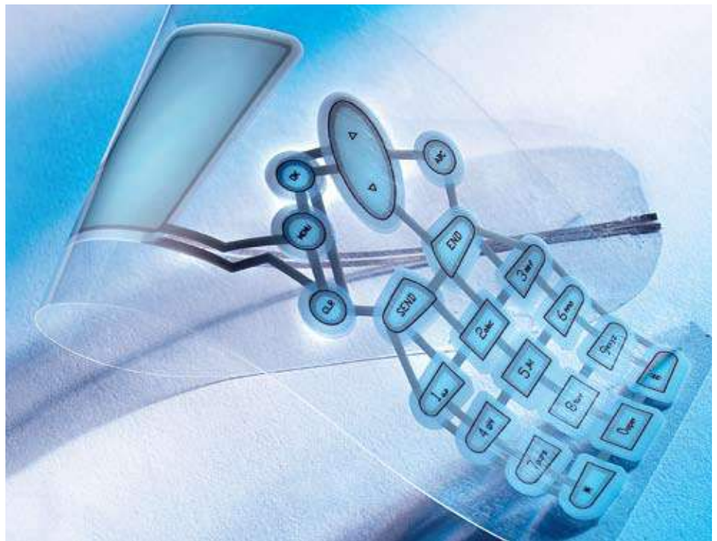
INKS & COATINGS

For decades, Henkel's product range of conductive, dielectric and other functional polymer thick film inks have been used to apply selective coatings on a variety of flexible and rigid substrates, via screen, flexographic and rotogravure printing methods.

They can be effectively dried or cured through heat or UV radiation. Henkel's conductive (silver, silver/silverchloride, carbon-based), dielectric and other functional (e.g., electroluminescing pigments–based) inks are used for the production of:

- Flexible circuits for membrane touch switches and keyboards for desktop and notebook PCs
- Heating elements
- Automotive sensors
- Biosensors and EKG/ECG electrodes
- Antennas for contactless smartcards and RFID labels
- Touch screens
- EL lamps
- Printed circuit boards and potentiometers





ASSEMBLY MATERIALS

INKS & COATINGS

ELECTRICALLY CONDUCTIVE INKS – SILVER INKS

PRODUCT	DESCRIPTION	APPLICATION	CURE SCHEDULES	SHEET RESISTANCE - OHM/SQUARE/25µ	SHELF LIFE
ACHESON™ PM-500™	Water-based silver ink for flexographic printing on paper and plastic film.	Printed antennas for RFID labels, bio and medical sensors.	1 min. @ 120°C	<0.025	6 months
ELECTRODAG™ 461SS™	Screen printable silver ink for ITO treated plastic film.	Busbar in touch screens and computer/palm-top panels. Electrode/busbar in El lamps.	5 min. @ 120°C	<0.020	12 months
ELECTRODAG™ 479SS™	Screen printable silver ink for PET film.	Conductive traces in membrane touch switches and other flexible circuitry.	15 min. @ 95°C	<0.020	12 months
ELECTRODAG™ 503-62%™	High temperature resistant, silver conductive coating.	Conductive coating in satellites.	Air dry @ 2-3 hrs.	<0.050	24 months
ELECTRODAG™ 725A™	Screen printable, economical silver ink for PET film. Excellent flexibility.	Conductive traces in membrane touch switches and other flexible circuitry.	10 min. @ 120°C	<0.015	12 months
ELECTRODAG™ 820B™	Screen printable, silver-filled polymer thick film ink. Excellent for producing notebook and full size computer keyboards on treated or untreated substrates.	Designed especially for membrane keyboard printing.	20 min. @ 120°C	<0.015	12 months
ELECTRODAG™ 976SSHV™	Screen printable silver ink for rigid printed circuit boards.	Cross-overs and through-hole connection (vacuum suction).	30 min. @ 70°C + 30 min. @ 160°C	<0.025	12 months
ELECTRODAG™ EL-411™	Screen printable silver ink for ITO treated plastic film. Good fine line printing capability.	Busbar in touch screens and computer/palm-top panels. Electrode/busbar in El lamps.	15 min. @ 120°C	<0.030	6 months
ELECTRODAG™ PE-007™	Silver/silver chloride ink for flexographic/rotogravure printing on plastic film.	Bio and medical sensors.	2 min. @ 110°C	<0.100	12 months
ELECTRODAG™ PF-050™	Screen printable silver ink for plastic film and paper substrates. Highly conductive, superior fine line printability.	Printed antennas for contactless smartcards and RFID labels.	15 min. @ 120°C	<0.010	12 months
ELECTRODAG™ PF-845™	Screen printable silver ink for PET film. Excellent flexibility and crease resistance.	Conductive traces for notebook and PC desktop keyboard circuitry.	30 min. @ 15°C	<0.015	12 months

ELECTRICALLY CONDUCTIVE INKS – CARBON INKS

ELECTRODAG™ 109™	Carbon ink for flexographic/rotogravure printing on plastic film (PET, PVC) and paper substrates.	Bio and medical sensors.	1 min. @ 120°C	<30	24 months
ELECTRODAG™ 6017SS™	Screen printable carbon ink for PET film.	Heating elements, printed resistors blendable with Electrodag™ PM-404™ to provide a range of resistance values.	15 min. @ 120°C	<35 50 - 3,800 when blended with Electrodag™ PM-404™	12 months
ELECTRODAG™ PF-407C™	Screen printable carbon ink for plastic film and paper substrates.	Membrane touch switches and keyboards. Bio and medical.	15 min. @ 120°C	<15	12 months
ELECTRODAG™ PR-406B™	Screen printable carbon ink for rigid printed circuit boards.	Cross-overs with copper contact protection.	30 min. @ 150°C	<10	12 months
ELECTRODAG™ PF-407A™	Conductive screen printable ink consists of very finely divided carbon particles dispersed in a thermoplastic resin.	Membrane touch switches.	30 min. @ 90°C 15 min. @ 120°C	<20	12 months
ELECTRODAG™ PR-800™	Screen printable, economical silver ink for PET film, excellent flexibility.	Cross-overs, key pad, copper contact protection on PCB.	30 min. @ 150°C	<20	12 months

NON-ELECTRICALLY CONDUCTIVE INKS – DIELECTRIC INKS

ELECTRODAG™ 452SS™	Screen printable, UV curable dielectric ink for plastic film and paper substrates. Excellent flexibility.	Tail coating membrane touch switches and PC desktop/notebook keyboards.	0.5 Joule/cm²	<2 x 10^9	12 months
ELECTRODAG™ PD-038™	Screen printable, UV curable dielectric ink for ITO treated PET film and copper-etched circuitry.	Dot spacer for touch screens and computer/palm-top panels. Spacer for copper-etched circuitry.	0.5 Joule/cm²	<2 x 10^9	12 months
ELECTRODAG™ PF-455B™	Screen printable, UV curable dielectric ink for plastic film. Excellent humidity resistance.	Crossover dielectric in membrane touch switches and PC desktop/notebook keyboards.	0.5 Joule/cm²	<2 x 10^9	12 months
ELECTRODAG™ PM-404™	Screen printable, highly resistive ink for PET film.	Heating elements, printed resistors, blendable with Electrodag™ 6017SS™ to provide a range of resistance values.	15 min. @ 120°C	<2 x 10^9	12 months
MINICO™ M7000 BLUE A™	Screen printable solvent-based dielectric ink for rigid substrates.	Dielectric for printed circuit boards and hybrid circuits.	25 min. @ 165°C	<2 x 10^9	12 months

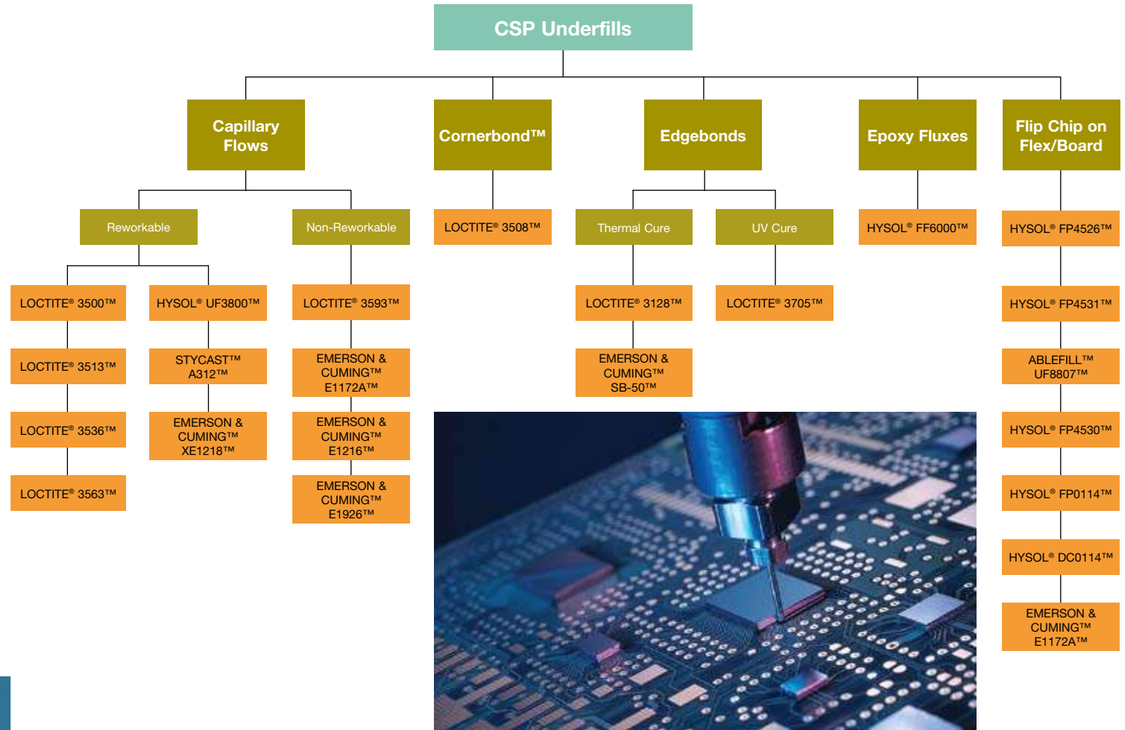
ASSEMBLY MATERIALS

MICRO-ENCAPSULANTS (CSP UNDERFILLS)

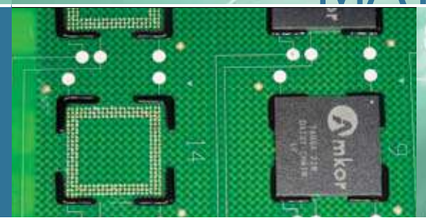
Henkel offers innovative capillary flow underfill encapsulants for Flip Chip, CSP and BGA devices. These are highly flowable, high purity, one-component encapsulants. They form a uniform and void-free underfill layer to improve the reliability performance by redistributing stress away from the solder interconnects as well as enhancing mechanical performance. We have formulations that quickly fill very small gap/pitch parts that offer fast cure capabilities, have a long pot and shelf life, and are reworkable. Reworkability allows for cost savings by allowing the removal of the underfill to enable re-use of a board.

Flip Chip applications require assistance with redistributing stress away from the solder joints to extend thermal aging and cycle life. A CSP or BGA application requires an underfill to improve the mechanical integrity of the assembly during a bend, vibration or drop test. Henkel's Flip Chip underfills are formulated with a high loading of specialty fillers to achieve low CTEs yet maintain the ability to flow fast in small gaps, possessing high glass transition temperatures and high modulus. Our CSP underfills are designed with little to no filler loading, a choice of glass transition temperatures, and modulus to match the intended application.

For certain applications, Loctite® Cornerbond™ and Edgebond™ technologies allow for a cost-effective underfill solutions. The Cornerbond™ technology is applied at all four corners of the package and then can be cured during the normal solder reflow cycle, allowing for a more efficient process. The material's self-centering characteristic ensures high assembly reliability and outstanding yield rates.



ASSEMBLY MATERIALS



MICRO-ENCAPSULANTS (CSP UNDERFILLS)

UNDERFILLS – CAPILLARY FLOW – REWORKABLE

PRODUCT	DESCRIPTION	VISCOSITY (cPs)	POT LIFE	CURE SCHEDULES	Tg (°C)	CTE α_1 (ppm/°C)	STORAGE TEMP
LOCTITE® 3500™	A reworkable room temperature flow underfill for CSP & BGA devices. It cures at low temperatures and is a fast cure underfill providing superior processing advantages.	203	14 days	2 min. @ 130°C	16	77	2°C - 8°C
LOCTITE® 3513™	Single-component epoxy used as a reworkable underfill for CSPs or BGAs.	4,000	48 hrs.	10 min. @ 150°C 15 min. @ 120°C 30 min. @ 100°C	69	63	2°C - 8°C
LOCTITE® 3536™	CSP/BGA reworkable underfill designed to cure rapidly at low temperatures. Once cured provides excellent protection for solder joints against mechanical stress such as shock, drop and vibration.	1,800	14 days	5 min. @ 120°C 2 min. @ 130°C	53	63	2°C - 8°C
LOCTITE® 3563™	A rapid curing, fast flowing, liquid epoxy designed for use as a capillary flow underfill for packaged ICs, such as CSPs and BGAs. Its rheology is designed to allow it to penetrate gaps as small as 25 µm.	5,000 to 12,000	8 to 12 hrs.	7 min. @ 150 °C	130	35	-40°C
HYSOL® UF3800™	A high reliability, good reworkability, room temperature dispensable underfill. Compatible with most common solder pastes.	375	3 days	8 min. @ 130°C	69	52	
STYCAST™ A312™	A one-component, unfilled solventless epoxy underfill encapsulant, fast curing and excellent chemical and heat resistance.	3,000		7 min. @ 160°C			2 months @ 25°C
EMERSON & CUMING™ XE1218™	Reworkable, Snap Cure, void-free, fast flowing underfill that also provides excellent adhesion and reliability benefits.	1,100	10 days	10 min. @ 110°C	60	75	-20°C

UNDERFILLS – CAPILLARY FLOW – NON-REWORKABLE

LOCTITE® 3593™	Non-reworkable underfill for high mechanical reliability. Fast flow and Snap Cure for improved process time.	4,500	7 days	5 min. @ 150°C	110	50	2°C to 8°C
EMERSON & CUMING™ E1216™	An innovative capillary flow underfill for CSP, BGA, or Flip Chip devices. Designed for high volume assembly operations that require an underfill that flows very fast, fully cures in the length of one reflow oven, and provides a void-free underfill area.	6,000	5 days	3 min. @ 165°C	115	34	-20°C
EMERSON & CUMING™ E1926™	A wafer-level underfill that provides excellent thermal reliability and cures relatively fast compared to standard first level underfills.	6,500	48 hrs.	20 min. @ 150°C	125	40	-20°C

UNDERFILLS – CORNERBOND™

LOCTITE® 3508™	Lead-free, one-component epoxy corner bond adhesive. Applied pre-reflow and allows self-alignment of SMT components during reflow operation. Used for lead-free applications.	50,000	30 days	Lead-free profile	155	55	2°C to 8°C

UNDERFILLS – EDGE BONDS – THERMAL CURE

LOCTITE® 3128™	One-component heat-cured epoxy adhesive designed to cure at low temperatures. Gives excellent adhesion on a wide range of materials.	Casson Viscosity 12 Pa-s	2 weeks	20 min. @ 80°C 60 min. @ 60°C	45	40	-15°C
EMERSON & CUMING™ SB-50™	Innovative high mechanical reliability and reworkable edge bond material designed for CSP and BGA devices. SB-50™ is designed for high volume assembly processes that require a material that does not flow under the component and will cure at low temperatures.	119,000	4 days	4 min. @ 120°C	30	70	-20°C

UNDERFILLS – EDGE BONDS – UV CURE

LOCTITE® 3705™	UV-cured adhesive designed for bonding electronics components on PCBs. Thixotropic nature reduces migration of product. Excellent adhesion to a wide range of substrate. Bonds in seconds upon exposure to UV light.	40,000	30 days	UV Cured	-44	157	2°C to 8°C

UNDERFILLS – EPOXY FLUXES

HYSOL® FF6000™	FF6000™ is a tacky flux with the additional features and benefits of an epoxy. It is formulated to provide both fluxing action during reflow and a cured adhesive bond after reflow in a Pb-free process – with no additional processing.	4,600	24 hrs.	Pb-free solder reflow profile @ 260°C	30	88	

UNDERFILLS – FLIP CHIP ON FLEX AND FLIP CHIP-ON-BOARD

HYSOL® FP4526™	Ceramic packages and FC on flex, Hi-Pb and no-lead applications; not for JEDEC performance.	4,700	36 hrs.	30 min. @ 165°C	133	33	-40°C
HYSOL® FP4531™	Fast flow encapsulant for Flip Chip underfill applications with a gap of 1 mil.	10,000	24 hrs.	7 min. @ 160°C	161	28	-40°C
ABLEFILL™ UF8807™	One-component, high flow liquid underfill encapsulant with superior moisture resistance.	17,000	8 hrs.	35 min. @ 165°C	135	21/80	12 months @ -40°C
HYSOL® FP4530™	Snap Cure Flip Chip underfill for FC on flex. Designed for small gaps (25 microns)	3,000	24 hrs.	7 min. @ 160°C	148	44	-40°C
HYSOL® FP0114™	Fine filler version of FP4526™ for gap of 25 microns.	5,000	36 hrs.	30 min. @ 165°C	135	33	-40°C
HYSOL® DC0114™	Die edge coating to prevent silicon chipping in HDD applications	20,000	–	30 min. @ 165°C	135	70	–
EMERSON & CUMING™ E1172A™	An innovative reworkable capillary flow underfill. E1172A™ is a fast flow, Snap Cure underfill. It is a one-component epoxy chemistry that is non-anhydride curing for enhanced moisture resistance.	20,000	48 hrs.	6 min. @ 165°C	30	30	-40°C

MICRO-ENCAPSULANTS (COB ENCAPSULANTS)

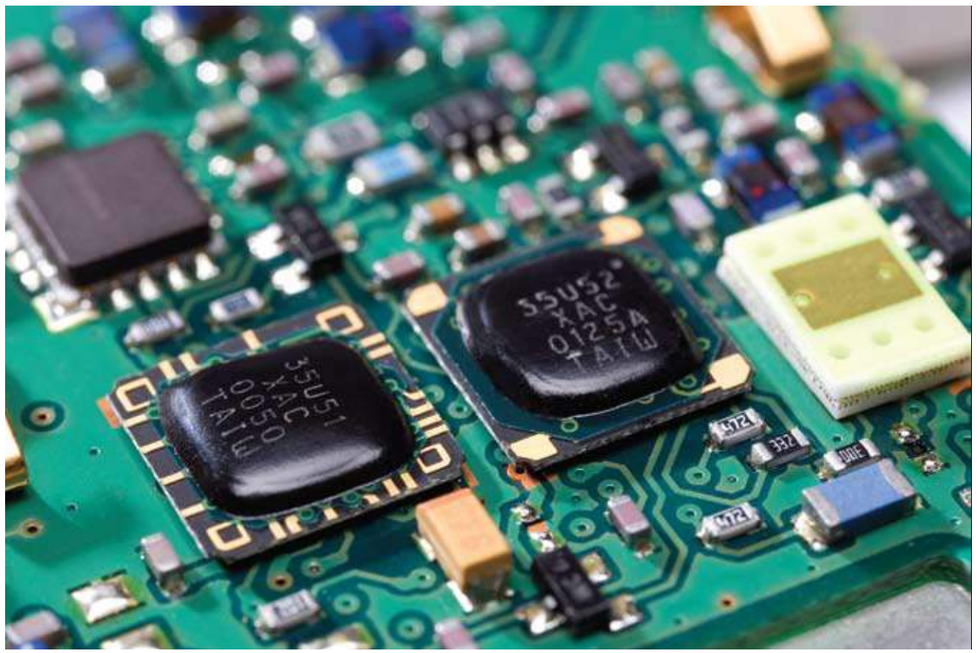
Encapsulants are used to provide environmental protection and add mechanical strength to wire bonded devices. Two different application technologies are employed for the protective encapsulation of wire bonded die:

- Glob top technology requires an encapsulant with a fine-tuned rheology, as the flow capabilities must allow the wires to be covered without the encapsulant flowing beyond the chip.

- Dam and fill technology, where the dam is used to limit the flow of the low viscosity fill material, allowing its use with fine pitch wire leads.

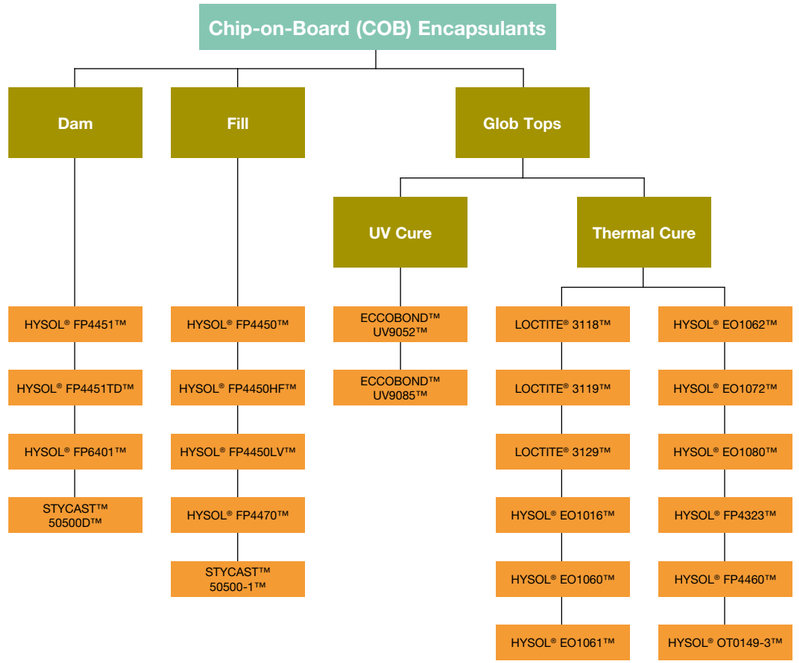
Henkel's Hysol® and Eccobond™ encapsulants are available as either thermal or ultraviolet cure materials and are designed for the highest reliability in that they offer low coefficient of thermal expansion, high glass transition temperature, and low ionic content. These encapsulants have been engineered to provide protection to wire bonds, leads, aluminium and silicon dies from harsh environments, mechanical damage and corrosion.

Formulated from epoxy, polyurethane, acrylate (UV curable) and silicone chemistries, these systems have proven reliability for electronic insulation. Henkel encapsulants offer excellent elevated temperature stability and thermal shock resistance, outstanding electrical insulation at both room and elevated temperatures, minimal shrinkage and low stress during cure, as well as excellent chemical resistance. Our encapsulants have been designed to offer high throughput and low-cost assembly processes.



ASSEMBLY
MATERIALS

MICRO-ENCAPSULANTS
(COB ENCAPSULANTS)



CHIP-ON-BOARD – DAM MATERIALS

PRODUCT	DESCRIPTION	CURE SCHEDULES	FLOW SPEED	VISCOSITY (cPs)	Tg (°C)	CTE α_1 (ppm/°C)	% FILLER
HYSOL® FP4451™	Industry standard damming material for BGAs.	30 min. @ 125°C 90 min. @ 165°C	N/A	900,000	145	24	72
HYSOL® FP4451TD™	Tall dam version of FP4451™ for applications requiring a taller, narrower dam. Ionically cleaner also.	30 min. @ 125°C 90 min. @ 165°C	N/A	300,000	150	21	73
HYSOL® FP6401™	High purity, liquid flexible damming material.	30 min. @ 165°C	N/A	300,000	0	77	9
STYCAST™ 50500D™	For protection of wire bonds, consider this high purity material as either a dam or a glob top.	2 hrs. @ 150°C	N/A	125,000	70	80	75

CHIP-ON-BOARD – FILL MATERIALS

HYSOL® FP4450™	Industry standard fill material for dam and fill or cavity down BGAs.	30 min. @ 125°C 90 min. @ 165°C	Medium	50,000	155	22	73
HYSOL® FP4450HF™	High flow version of FP4450LV™ using synthetic filler for use in fine wire and low alpha application.	30 min. @ 125°C 90 min. @ 165°C	Very High	32,000	160	19	73
HYSOL® FP4450LV™	Low viscosity, high purity, low stress liquid encapsulant.	30 min. @ 125°C 90 min. @ 165°C	Not Tested	35,000	160	18	72.5
HYSOL® FP4470™	High adhesion version of FP4450™ for 260°C L3 JEDEC performance.	30 min. @ 125°C 90 min. @ 165°C	High	48,000	148	18	75
STYCAST™ 50500-1™	For protection of wire-bonded ICS, consider this flowable material for a fill.	1 hr. @ 150°C	High	35,000	140	20	75

ASSEMBLY MATERIALS

MICRO-ENCAPSULANTS (COB ENCAPSULANTS)

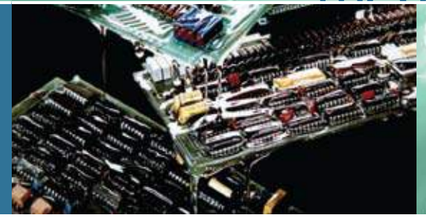
GLOB TOP MATERIALS – UV CURE

PRODUCT	DESCRIPTION	CURE SCHEDULES	VISCOSITY (cPs)	Hardness after UV & Moisture Cure (Shore D)	STORAGE TEMP
ECCOBOND™ UV9052™	A one-component, dual cure (UV & moisture) adhesive designed as a lead encapsulant.	5 sec. using a 300 W/in D bulb Moisture cure @ ambient temperature	6,400	<30	-20°C
ECCOBOND™ UV9085™	Designed as a faster curing, high thixotropic adhesive that gives good flow control and adhesion for a thick bondline.	5 sec. using a 300 W/in D bulb	40,000	<50	0°C to +4°C

GLOB TOP MATERIALS – THERMAL CURE

PRODUCT	DESCRIPTION	POT LIFE @ 25°C	CURE SCHEDULES	VISCOSITY (cPs)	Tg (°C)	CTE α_1 (ppm/°C)	FILLER TYPE	STORAGE TEMP
LOCTITE® 3118™	Image sensor adhesive, white.	2 weeks	20 min. @80°C 60 min. @ 60°C	16,000 to 50,000	45	40	Calcium Carbonate	-40°C
LOCTITE® 3119™	Image sensor adhesive.	1 week	20 min. @ 80°C 60 min. @ 60°C	10,000 to 38,000	110	65	Calcium Carbonate	-15°C
LOCTITE® 3129™	Image sensor adhesive.	3 weeks	10 min. @ 80°C 30 min. @ 60°C	100,000	41	45	Calcium Carbonate	-15°C
HYSOL® EO1016™	UL94V-0 encapsulant for smartcards and watch ICs. Non-abrasive filler allows for grinding if necessary.	3 months	20 min. @ 150°C	60,000	126	46	Calcium Carbonate	4°C
HYSOL® EO1060™	Low glob formulation for lower CTE and lower ionic than EO1016™ content for more demanding applications.	25 days	4 - 6 hrs. @ 125°C	20,000	125	40	Calcium Carbonate	4°C
HYSOL® EO1061™	Medium glob formulation for lower CTE and lower ionic than EO1016™ content for more demanding applications.	25 days	4 - 6 hrs. @ 125°C	50,000	125	40	Calcium Carbonate	4°C
HYSOL® EO1062™	High glob version of EO1061™.	25 days	4 - 6 hrs. @ 125°C	160,000	125	40	Calcium Carbonate	4°C
HYSOL® EO1072™	One-component, high performance epoxy encapsulant with high Tg and low extractable ionics.	30 days	5 min. @ 140°C	100,000	135	43	Calcium Carbonate	4°C
HYSOL® EO1080™	Low CTE version of EO1016™.	3 months	20 min. @ 150°C	60,000	121	35	Silica	4°C
HYSOL® FP4323™	High purity liquid epoxy encapsulant for Chip-on-Board (plastic substrate) and plastic PGA applications.	2 days	3 hrs. @ 170°C	220,000	174	28	Silica	-40°C
HYSOL® FP4460™	High purity, low stress glob top semiconductor encapsulant with improved moisture resistance and working life compared to earlier versions.	2 days	3 hrs. @ 150°C	420,000	171	20	Silica	-40°C
HYSOL® OT0149-3™	Clear glob top material with good adhesion to any substrate.		1 hr. @ 90°C + 3 hrs. @ 120°C		150			

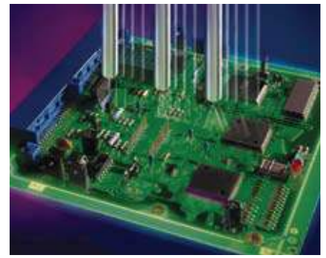
ASSEMBLY MATERIALS

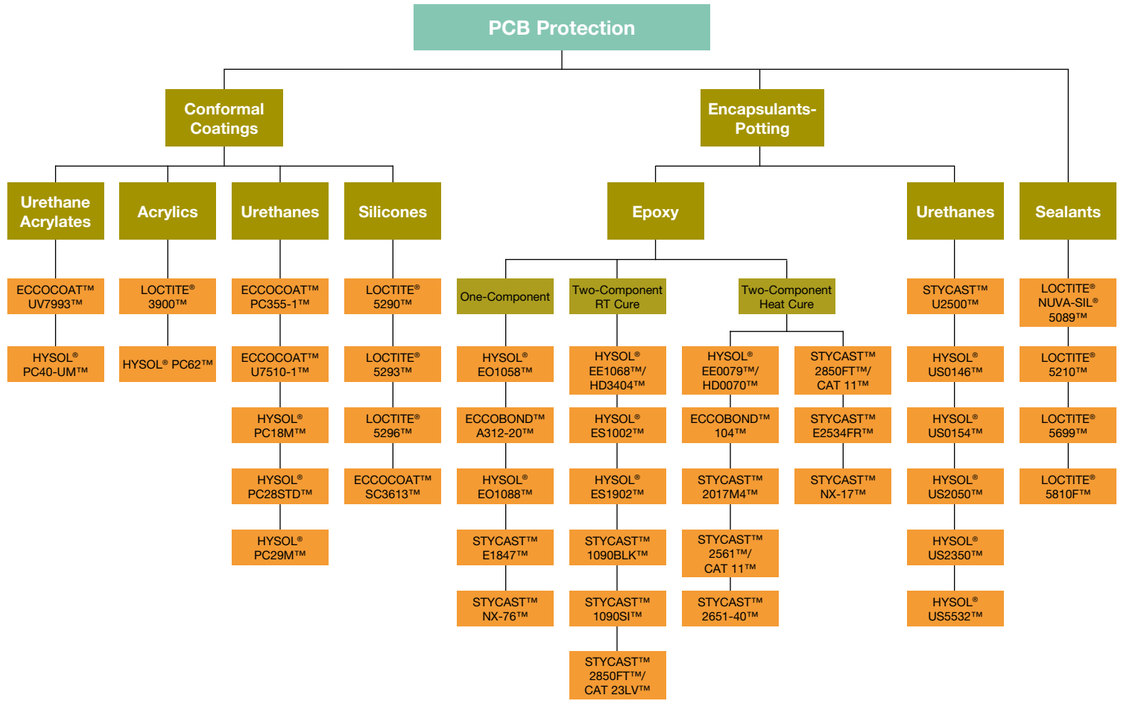


PCB PROTECTION

While Henkel is providing the leading materials used inside advanced packages and on sophisticated assemblies, we also deliver next-generation Loctite® and Eccocoat™ brand conformal coating materials to ensure superior product protection. Many applications expose printed circuit boards (PCBs) to harsh environments and Henkel is committed to delivering materials that provide extraordinary environmental and thermal cycling protection.

Our advanced conformal coating materials protect PCBs from thermal shock, moisture corrosive materials, and a variety of other adverse conditions to ensure long product life cycles in harsh marine, automotive, aerospace and consumer electronics applications. We also keep the environment top of mind with every formulation, which is why Henkel has migrated to solvent-free, low-VOC materials and processes. Loctite® and Eccocoat™ conformal coatings are available in solvent-free and fast cure materials, enabling process efficiency and environmental responsibility.





CONFORMAL COATINGS

CONFORMAL COATINGS – URETHANE ACRYLATES

PRODUCT	DESCRIPTION	RESIN TYPE	CURE SCHEDULES	VISCOSITY (cPs)	DIELECTRIC STRENGTH (V/mil)	SERVICE TEMP RANGE
ECCOCOAT™ UV7993™	Solvent-free one-component dual cure conformal coating.	Urethane Acrylate One-Component	5 sec. UV + 4 days @ RT	120	1,200	-40°C to +105°C
HYSOL® PC40-UM™	Solvent-free, low-viscosity, rapid gel, UV-moisture cure, one-component conformal coating.	Urethane Acrylate One-Component	10 sec. UV + 3 days @ RT	1,100	2,000	-40°C to +135°C

CONFORMAL COATINGS – ACRYLICS

LOCTITE® 3900™	This air-dry coating is designed for small production runs. It may be applied by spray, dip or brush procedures. Aerosol – fast cure. Note: Not sold in Europe.	Acrylic One-Component	Air Dry: 5 min.	Aerosol	1,652	-40°C to 125°C
HYSOL® PC62™	Non-toluene based, rapid drying, one-component acrylic for non-atomized spraying applications.	Acrylic One-Component	45 min. @ 75°C	50	2,000	-40°C to +125°C

CONFORMAL COATINGS – URETHANES

ECCOCOAT™ PC355-1™	Lead-free, transparent, one-component protective varnish system that is dry to the touch in under 30 minutes.	Urethane One-Component	1 hr. @ 80°C	300	N/A	-40°C to +130°C
HYSOL® PC18M™	Flexible solvent-based, one-component urethane coating. Provides good thermal shock resistance. MIL-I-46058C.	Urethane One-Component	2 hrs. @ 60°C	350	1,200	Continuous up to 110°C
HYSOL® PC28STD™	Convenient aerosol packaging, oxygen-cure, printed circuit board coating system.	Urethane One-Component	2 hrs. @ 60°C	35	1,500	Continuous up to 110°C
ECCOCOAT™ U7510-1™	Lead-free, transparent, one-component protective varnish system that is dry to the touch in under 30 minutes.	Urethane One-Component	2.5 hrs. @ 25°C	2,750	N/A	-30°C to +130°C
HYSOL® PC29M™	Thin-film printed circuit board coating with good toughness and high flexibility. Note: Not sold in Europe.	Urethane Two-Component	2 hrs. @ 100°C	225	1,500	Continuous up to 125°C

CONFORMAL COATINGS – SILICONES

ECCOCOAT™ SC3613™	Heat curable, optically clear, high purity, one-component coating to be applied by brush, dip or flow coating.	Silicone One-Component	30 min. @ 120°C	3,500	400	-40°C to 200°C
LOCTITE® 5290™	Solvent-free, low viscosity, UV/moisture cure silicone suited to brush, dip and selective coating.	Silicone One-Component	20 sec. @ 70 mW/cm^2 + 72 hrs. RT	300	500	-55°C to 200°C
LOCTITE® 5293™	Repairable, solvent-free, medium viscosity, UV/moisture cure silicone suited to brush, dip and selective coating.	Silicone One-Component	20 sec. @ 70 mW/cm^2 + 72 hrs. RT	600	406	-40°C to 200°C
LOCTITE® 5296™	Heat cure silicone can be applied with brush, dip, or spray. High reliability for automotive. Clear.	Silicone One-Component	Heat 7 min. @ 125°C	200	524	-40°C to 200°C

ASSEMBLY MATERIALS

PCB PROTECTION

ENCAPSULANTS – POTTING

Ensuring that electronics products function as they are designed to is just one piece of the materials solution Henkel delivers. Protecting printed circuit boards and electronic assemblies from thermal cycling and adverse environmental conditions is the other critical component for product durability and reliability. Under the leading Hysol® and Stycast™ brands, Henkel offers several PCB protection products to minimize external product stress and maximize performance. Our portfolio of conformal coatings keeps moisture, humidity and other adverse conditions from deteriorating printed circuit boards used in harsh marine, automotive, aerospace and consumer electronics applications. Henkel also strives to keep environmental consciousness at the forefront of all our product development efforts, which is why we have moved toward solvent-free, low-VOC materials and processes.

Henkel's potting and encapsulation compounds protect PCBs and electrical devices by enhancing mechanical strength, offering electrical insulation, and protecting against vibration and shock.

ENCAPSULANTS-POTTING – EPOXY – ONE COMPONENT

	HYSOL® EO1058™	ECCOBOND™ A312-20™	HYSOL® EO1088™	STYCAST™ E1847™	STYCAST™ NX-76™
Viscosity, cPs @ 25°C	50,000	20,000	62,000	680	800
Working Time @ 25°C	10 days	4 months	N/A	N/A	N/A
Gel Time	12 min. @ 121°C	35 sec. @ 160°C	3.5 min. @ 121°C	90 min. @ 110°C + 2 hrs. @ 140°C	N/A
Recommended Cure Cycle	2 hrs. @ 140°C	15 min. @ 120°C	30 min. @ 150°C	N/A	3 hrs. @ 85°C + 4 hrs. @ 145°C
Alternate Cure Cycle	3 hrs. @ 125°C	3 min. @ 160°C	2 hrs. @ 120°C	N/A	N/A
Color	Black	Black	Black	N/A	Opaque White
Specific Gravity	1.65	1.23	1.56	N/A	1.3
Hardness, Shore D	90	80	88	N/A	88
Tg, °C	140	N/A	125	135	125
CTE below Tg, ppm/°C	24	N/A	35	N/A	68
CTE above Tg, ppm/°C	150	N/A	125	N/A	110
Tensile Strength (psi)	10,000	N/A	N/A	N/A	N/A
Elongation, %	1.96	N/A	N/A	N/A	4.5
Dielectric Strength, v/mil	579	N/A	N/A	N/A	N/A
Volume Resistivity, ohm.cm: @ 25°C	1.4 x 10^{16}	4 x 10^{14}	N/A	N/A	N/A
@ 125°C	9.5 x 10^{14}	8 x 10^{10}	N/A	N/A	N/A
Dielectric Constant, 25°C: 1 kHz	3.8	N/A	N/A	N/A	N/A
100 kHz	3.7	N/A	N/A	N/A	N/A
Dissipation Factor, 25°C: 1 kHz	0.1	N/A	N/A	N/A	N/A
100 kHz	0.013	N/A	N/A	N/A	N/A
Dielectric Constant, 125°C: 1 kHz	4.27	N/A	N/A	N/A	N/A
100 kHz	3.78	N/A	N/A	N/A	N/A
Dissipation Factor, 125°C: 1 kHz	0.008	N/A	N/A	N/A	N/A
100 kHz	0.012	N/A	N/A	N/A	N/A
Flammability Rating	N/A	Class B	N/A	N/A	N/A

ENCAPSULANTS – POTTING

ENCAPSULANTS-POTTING – EPOXY – TWO COMPONENT – RT CURE

		HYSOL® EE1068™/ HD3404™	HYSOL® ES1002™	HYSOL® ES1902™	STYCAST™ 1090BLK™	STYCAST™ 1090SI™	STYCAST™ 2850FT™/ CAT 23LV™
Viscosity, cPs	**@ 25°C, Resin**	30,000	28,000	4,700	135,000	N/A	225,000
	@ 25°C, Hardener	25	6,300	50	25	25	25
	@ 25°C, Mixed	14,000	19,500	290	5,000	3,000	5,600
Pot Life @ 25°C		N/A	60 min.	60 min.	60 min.	30 min.	60 min.
Gel Time @ 25°C		80	5 hrs.	10 sec. UV	4 hrs.	3 hrs.	4 hrs.
Recommended Cure Cycle		24 hrs. @ 25°C	36 to 48 hrs. @ 25°C	24 hrs. @ 25°C	24 hrs. @ 25°C	24 hrs. @ 25°C	24 hrs. @ 25°C
Alternate Cure Cycle		2 hrs. @ 60°C	3 hrs. @ 60°C	2 hrs. @ 60°C	2 hrs. @ 60°C	N/A	2 hrs. @ 60°C
Color	**Resin**	Black	Black	Water White	Black	Black	Black
	Hardener	Amber	Tan	Light Amber	Amber	Amber	Amber
	Mixed	Black	Black	Water White	Black	Black	Black
Mix Ratio	**By Weight (R:H)**	100:5	1:1	100:41.7	100:18.5	100:23	100:7.5
	By Volume (R:H)	100:9	1:1	2:1	100:14.5	N/A	100:17.5
Specific Gravity		1.50	1.55	1.08	0.85	N/A	2.19
Hardness, Shore D		90	88	80	75	N/A	92
Tg °C		N/A	50	44	N/A	N/A	68
CTE below Tg, ppm/°C		N/A	66	68	N/A	N/A	39.4
CTE above Tg, ppm/°C		N/A	150	199	N/A	N/A	111.5
Tensile Strength (psi)		6,000	2,670	7,900	3,900	2,180	N/A
Elongation, %		1.5	6	3.7	N/A	N/A	N/A
Flexural Strength (psi)		12,000	4,975	10,000	6,900	4,060	15,300
Dielectric Strength (psi)		1300	1135	1390	N/A	373	375
Volume Resistivity, ohm. cm	**@ 25°C**	N/A	6.38×10^{14}	1.27×10^{16}	$>10^{13}$	$>10^{13}$	$>10^{15}$
	@ 105°C	N/A	9.28×10^{10}	2.3×10^{13}	N/A	N/A	N/A
Dielectric Constant @ 25°C	**1 kHz**	4.50	4.60	3.80	N/A	3.10	N/A
	100 kHz	4.50	4.20	N/A	N/A	N/A	N/A
Dissipation Factor @ 25°C	**1 kHz**	0.01	0.030	0.008	N/A	0.01	N/A
	100 kHz	0.01	0.020	N/A	0.05	N/A	N/A
Dielectric Constant @ 105°C	**1 kHz**	N/A	8.60	N/A	N/A	N/A	N/A
	100 kHz	N/A	7.00	N/A	N/A	N/A	N/A
Dissipation Factor @ 105°C	**1 kHz**	N/A	0.30	N/A	N/A	N/A	N/A
	100 kHz	N/A	0.09	N/A	N/A	N/A	N/A
Thermal Conductivity	**W/mK**	0.4	0.64	0.17	0.19	0.17	1.1
Flammability Rating		Passes 94 V-0 @ 6.5 mm	94V-0 @ 3.3 mm	None	None	None	None

ENCAPSULANTS-POTTING – EPOXY – TWO COMPONENT – HEAT CURE

PRODUCT	DESCRIPTION	CURE SCHEDULES	VISCOSITY (cPs)	SERVICE TEMP RANGE	SHORE D HARDNESS	SHELF LIFE
ECCOBOND™ 104™	A two-component epoxy adhesive with outstanding physical and dielectric properties and service temperatures up to 230°C.	6 hrs. @ 120°C	N/A	-	>90	6 months @ 25°C
HYSOL® EE0079™/HD0070™	Two-part epoxy system used for bonding leads on electronic devices.	2 hrs. @ 60°C	1,500	up to 105°C	85	12 months
STYCAST™ 2017M4™	Epoxy encapsulant developed for lamp type, blue LED.	45 min. @ 130°C + 2 hrs. @ 130°C	730	-	88	6 months @ 25°C
STYCAST™ 2561™/CAT 11™	For excellent adhesion, low outgassing and certification to MIL-I-16923, consider this encapsulant.	1 hr. @ 120°C	25,000	-75°C to +175°C	88	6 months
STYCAST™ 2850FT™/CAT 11™	For high thermal conductivity and low outgassing, consider this encapsulant.	1 hr. @ 120°C	5,600	-40°C to +150°C	93	12 months

ASSEMBLY MATERIALS

PCB PROTECTION

ENCAPSULANTS – POTTING

	STYCAST™ 2651-40™	STYCAST™ E2534FR™
One/Two Components	Two	Two
Viscosity, cPs @ 25°C	30,000	300,000 - 400,000
Working Time @ 25°C	30 min. for Cat 9; 4 hrs. for Cat 11	N/A
Gel Time	N/A	N/A
Recommended Cure Cycle	24 hrs. @ 25°C for Cat 9; 2 hrs. @ 100°C for Cat 11	15-24 hrs. @ 25°C for Cat 9; 16 hrs. @ 75°C for Cat 11
Alternate Cure Cycle	1 hr. @ 65°C for Cat 9	2 hrs. @ 65°C for Cat 9; 2 hrs. @ 100°C for Cat 11
Color	Black	Blue
Mix Ratio	100:9 for Cat 9; 100:11 for Cat 11	100:4 for Cat 9; 100:5 for Cat 11
Specific Gravity	1.45 and 1.55	2.1
Hardness, Shore D	>85	>90
Tg, °C	N/A	76 (Cat 9); 115 (Cat 11)
CTE below Tg, ppm/°C	45	39 (Cat 9); 37 (Cat 11)
CTE above Tg, ppm/°C	N/A	N/A
Tensile Strength (psi)	N/A	11.06 Mpa
Elongation, %	0.2 - 0.4	N/A
Dielectric Strength, v/mil	17.7 KV/mm	N/A
Flammability Rating	N/A	V-0

PRODUCT	DESCRIPTION	CURE SCHEDULES	VISCOSITY (cPs)	SHORE D HARDNESS	SHELF LIFE
STYCAST™ NX-17™	Good adhesion to PPA	2 hrs. @ 90°C + 4 hrs. @ 145°C	780	93	3 months @ 0°C to 5°C

ASSEMBLY MATERIALS

PCB PROTECTION

ENCAPSULANTS – POTTING

ENCAPSULANTS-POTTING – URETHANES

	STYCAST™ U2500™	HYSOL® US0146™	HYSOL® US0154™	HYSOL® US2050™	HYSOL® US2350™	HYSOL® US5532™
Viscosity, cPs, @ 25°C – UA (Resin)	12,500	40	55	2,000	55	75
UB (Hardener)	50	940	5,000	500	1,300	11,000
US (Mixed)	6,000	205	2,500	1,500	2,400	2,000
Working Time @ 25°C	120	35	200	3	45	10
Gel Time @ 25°C	60	60	400	5	90	15
Recommended Cure Cycle	24 hrs. @ 25°C	4 hrs. @ 85°C	16 to 24 hrs. @ 25°C	48 hrs. @ 25°C	24 hrs. @ 23°C	24 hrs. @ 25°C
Alternate Cure Cycle	4 hrs. @ 60°C	48 hrs. @ 25°C	5 hrs. @ 70°C	1 hr. @ 85°C	1 hr. @ 85°C	2 hrs. @ 70°C
Color: UA (Resin)	Black	Amber	Amber	Clear	Brown	Amber
UB (Hardener)	Amber	Amber	Black	Clear	Black	White
US (Mixed)	Black	Amber	Black	Clear	Black	White
Mix Ratio: By Weight (R:H)	100:7	1:1	14.1:100	100:55	21.2:100	15:100
By Volume (R:H)	100:8.5	10:11	14.7:100	1.78:1	1:4	18.2:100
Specific Gravity	1.35	1.04	1.3	1.05	1:4	1:5.5
Hardness, Shore A	72	50	70	90	85	80
Tg, °C	-53	-21	-15	5	0	N/A
CTE below Tg, ppm/°C	N/A	147	10	55	115	N/A
CTE above Tg, ppm/°C	N/A	230	43	230	155	N/A
Tensile Strength (psi)	435	185	150	2,500	476	1,500
Elongation, %	82	140	50	170	65	113
Moisture Absorption, 24 hr., %	0.75	0.11	0.06	0.66	0.09	0.15
Weight Loss after 168 hrs. @ 105°C, %	N/A	0.53	0.95	0.41	0.19	0.19
Dielectric Strength, v/mil	N/A	1,175	700	1,050	954	1,150
Volume Resistivity, ohm.cm @ 25°C	4×10^{11}	4.20×10^{13}	1.00×10^{14}	3.30×10^{14}	6.12×10^{13}	7.1×10^{13}
Dielectric Constant, 25°C: 1 kHz	N/A	6.8	6	2.4	5.1	N/A
Dissipation Factor, 25°C: 1 kHz	N/A	0.171	0.15	0.07	0.13	N/A
Flammability Rating	N/A	N/A	94V-0 @ 9.5 mm		94V-2 @ 6.1 mm	94V-0 @ 12.2 mm

ASSEMBLY MATERIALS

PCB PROTECTION

SEALANTS

Loctite® silicone gasketing materials offer precise, reliable sealing for electronic enclosures, ensuring that housing modules are tightly secured and componentry is protected. Loctite® silicone encapsulants are specially formulated to isolate sensitive fine-pitch leads from potentially damaging thermal cycling conditions. Like all Henkel products, these materials have been designed for ease-of-use and are conveniently packaged for dispense operations.

SEALANTS

PRODUCT	DESCRIPTION	RESIN TYPE	CURE SCHEDULES	VISCOSITY (cPs)	TENSILE STRENGTH, LAP SHEAR (PSI)	ELONGATION (%)	SHORE A HARDNESS
LOCTITE® NUVA-SIL® 5089™	UV-curing silicone for electronics module sealing. Ideal for high-speed potting. On-line pressure testing possible immediately after cure.	Alkoxy	UV Moisture 60 sec. @ 70 mW/cm^2	100,000	145	190	>25
LOCTITE® 5210™	An ultra-fast curing, non-corrosive RTV silicone designed for potting, wire tracking, selective sealing, vibration dampening, and repair/rework applications on PCBs.	Alkoxy	Moisture 24 hrs. @ 25°C	N/A	410	230	48
LOCTITE® 5699™	Non-corrosive silicone paste for forming use as a flange sealant in rigid housings, shows excellent oil resistance.	Oxime	7 days @ RT	Paste	348	>100	55
LOCTITE® 5810F™	Single-component, non-silicone, oxime-free, polyacrylate-based adhesive/sealant with fluorescent tracer that cures with moisture at room temperature. Primarily designed for flange sealing with excellent oil resistance.	Polyacrylate	7 days @ RT	45	140	>150	30

ASSEMBLY MATERIALS

PCB PROTECTION

LOW PRESSURE MOLDING (MACROMELT®)

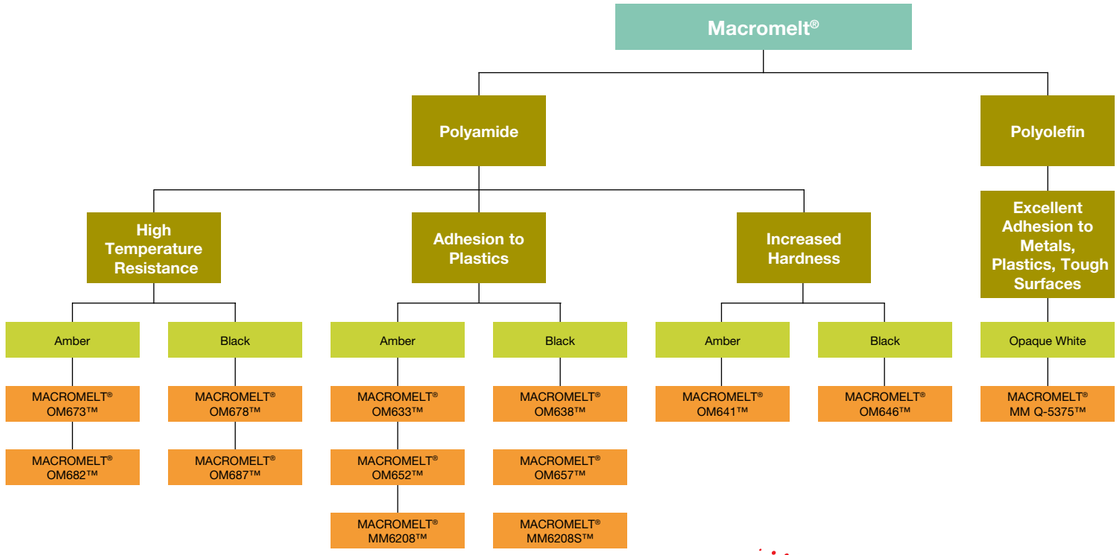
Henkel's renowned Macromelt® low-pressure molding solution is delivering superior sealing adhesion and excellent temperature and solvent resistance. The simplicity of these materials is their advantage: because the entire Macromelt® operation takes place at low pressure, cycle time is short and fine or fragile circuitry is not damaged, delivering measurable improvements over that of traditional potting or encapsulating processes. PCB and circuitry protection is essential in modern, challenging applications; and Henkel delivers manufacturers proven, reliable solutions and peace-of-mind.

Advantages:

- Complete watertight encapsulation
- Fast cycle time (15 to 45 seconds)
- Low capital equipment costs
- Safe, one component, UL 94V-0 approved
- Low pressure and high speed molding for electronics encapsulation

Applications:

- Automotive sensors
- Hall effect sensors
- Circuit board protection
- Strain relief
- Switches
- Battery sealing



Macromelt®

ASSEMBLY MATERIALS

PCB PROTECTION

LOW PRESSURE MOLDING (MACROMELT®)

POLYAMIDE, HIGH TEMPERATURE RESISTANCE

PRODUCT	DESCRIPTION	COLOR	PERFORMANCE TEMP	SHORE A HARDNESS	SOFTENING POINT
MACROMELT® OM673™	Moldable polyamide with good adhesion for higher temperature applications such as in an automotive under-hood.	Amber	-40°C to +140°C	90	187°C ± 5°C
MACROMELT® OM678™		Black			
MACROMELT® OM682™	Moldable polyamide for the most demanding high humidity applications such as on the inside of an automobile tire.	Amber	-40°C to +150°C	88	188°C ± 5°C
MACROMELT® OM687™	Formulated for very low water vapor transmission.	Black			

POLYAMIDE, ADHESION TO PLASTICS

MACROMELT® OM633™	Moldable polyamide with service temperature up to 125°C, such as in an automotive firewall.	Amber	-40°C to +125°C	90	175°C ± 5°C
MACROMELT® OM638™		Black			
MACROMELT® OM652™	Moldable polyamide where excellent adhesion and cold temperature flexibility are important, such as in an automotive exterior. Also used extensively in white goods.	Amber	-40°C to +125°C	77	157°C - 165°C
MACROMELT® OM657™		Black			
MACROMELT® MM6208™	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 appliance and consumer electronics. UL RTI 95°C.	Amber	-40°C to +130°C	78	155°C ± 5°C
MACROMELT® MM6208S™		Black			

POLYAMIDE, INCREASED HARDNESS

MACROMELT® OM641™	Moldable polyamide where strength and hardness are needed such as in memory sticks and computer connectors.	Amber	-40°C to +125°C	92	175°C ± 5°C
MACROMELT® OM646™		Black			

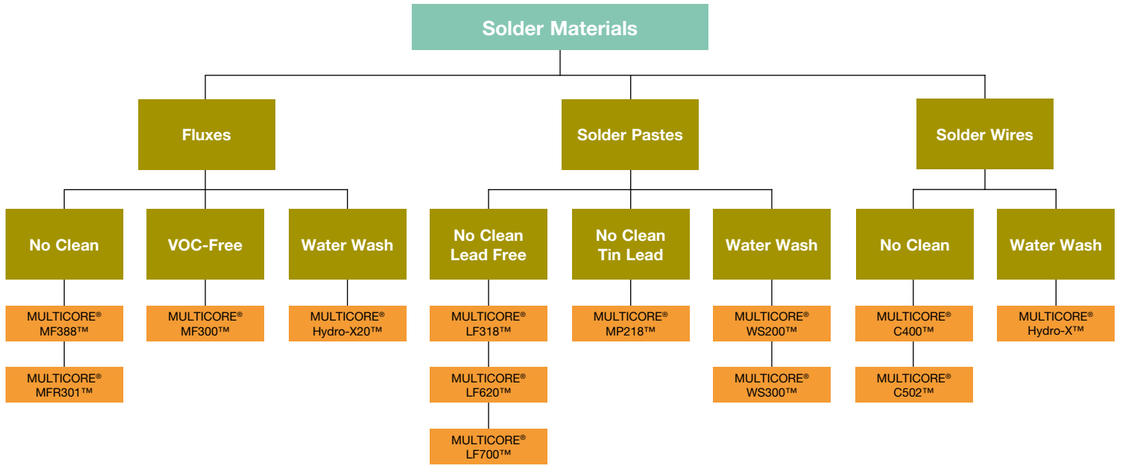
POLYOLEFIN, EXCELLENT ADHESION TO METALS, PLASTICS, TOUGH SURFACES

MACROMELT® MM Q-5375™	Moldable polyolefin for demanding moisture and solvent resistance. Excellent adhesion to the most difficult substrates.	Opaque White	-30°C to +100°C	55	139°C ± 5°C

ASSEMBLY MATERIALS

SOLDER MATERIALS

With a variety of formulations for various wave soldering processes, Multicore® brand high performance liquid flux technology is compatible with dual-wave and lead-free processes, delivering outstanding results. From no-clean to low-residue to VOC-free, Multicore® brand fluxes deliver unique properties for individualized manufacturing needs. Henkel's flux formulation teams are unmatched when it comes to expertise and ingenuity – two characteristics that are essential to the development of modern, lead-free and environmentally responsible processes. Through careful process analysis and a complete understanding of chemical interactions and manufacturing requirements, Henkel has developed a broad range of Multicore® brand liquid fluxes to suit a variety of applications.



ASSEMBLY MATERIALS

SOLDER MATERIALS

FLUXES

FLUXES – NO CLEAN

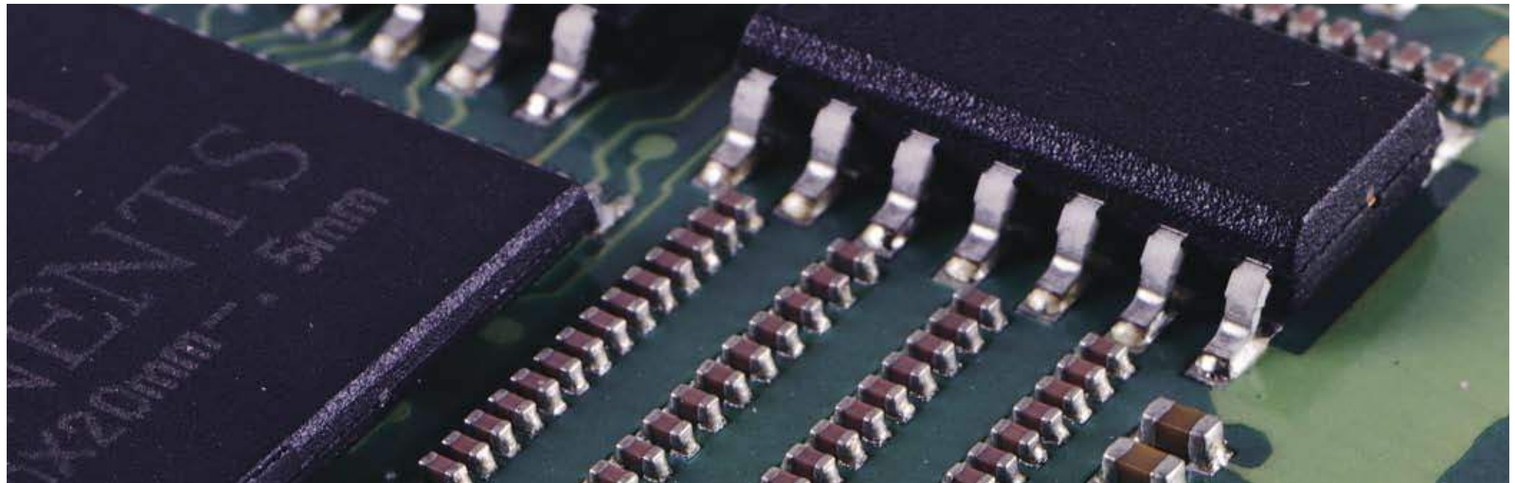
PRODUCT	DESCRIPTION	SOLIDS CONTENT (%)	ACID VALUE (MG KOH/G)	IPC/J-STD-004 CLASSIFICATION	APPLICATION
MULTICORE® MF388™	Sustained activity in high preheats for dual wave and lead-free processes. High PTH fill, low residues. High reliability. Solvent-based flux may be thinned with IPA.	3.5	20	ROL0	Spray
MULTICORE® MFR301™	Higher solids, halide-free flux for better wetting on reduced solderability surfaces and to minimize bridging on complex geometries. Fully lead-free and dual wave compatible. Solvent-based flux may be thinned with IPA.	6.0	40	ROM0	Spray/Foam

FLUXES – VOC-FREE

PRODUCT	DESCRIPTION	SOLIDS CONTENT (%)	ACID VALUE (MG KOH/G)	IPC/J-STD-004 CLASSIFICATION	APPLICATION
MULTICORE® MF300™	General purpose, VOC-free (water-based), no-clean, halide-free and resin-free flux with special formulation to minimize solder balling. Compatible with lead-free processes.	4.6	37	ORM0	Spray/Foam

FLUXES – WATER WASH

PRODUCT	DESCRIPTION	SOLIDS CONTENT (%)	ACID VALUE (MG KOH/G)	IPC/J-STD-004 CLASSIFICATION	APPLICATION
MULTICORE® Hydro-X20™	A high activity, water washable flux designed for the soldering of the most difficult electronic assemblies. Unique activator package enables a wider process window and the soldering of all common electronic surfaces with ease. Residues are readily and completely removable by water wash after soldering.	20	24	ORH1	Spray/Foam

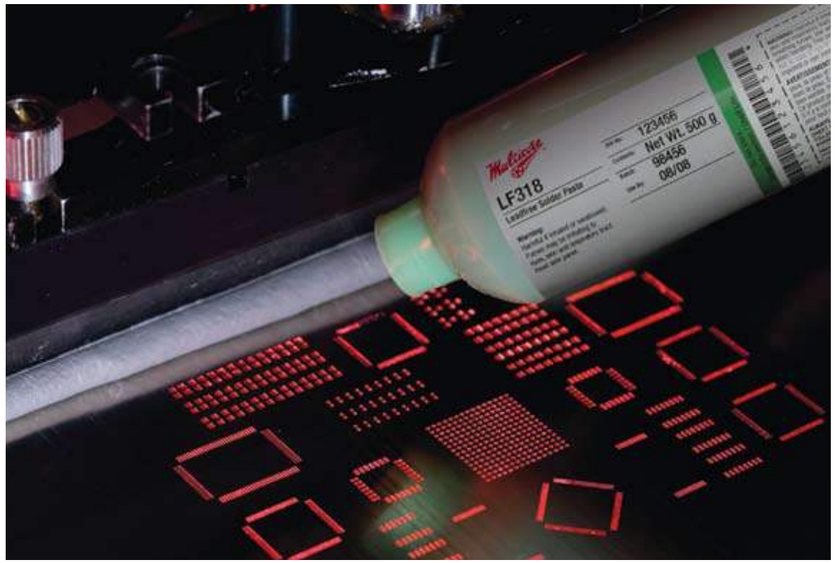


ASSEMBLY MATERIALS

SOLDER MATERIALS

SOLDER PASTES

As the world's leading developer of advanced solder paste materials, Henkel delivers decades of technology and expertise for optimized process performance. With groundbreaking new formulations to provide an easy transition to lead-free as well as proven, traditional tin-lead formulations, Multicore® brand solder materials are enabling the production of some of today's most advanced products. Our portfolio of solder paste materials addresses a variety of manufacturing requirements and offers performance characteristics unmatched by any other materials supplier. Low-voiding lead-free solder pastes, no-clean pastes, water-wash pastes and crossover pastes for mixed-metal manufacturing are all part of our vast offering. Supporting ultra-fine pitch printing at high speed, delivering long open and abandon times and pin-testability across all types of assemblies and surface finishes, Multicore® pastes deliver the flexibility modern electronics firms require to stay competitive. Our materials also offer outstanding resistance to high temperature and high humidity, providing multinational firms with the confidence they need to deploy Multicore® materials on a global level with consistent performance. Plus, all of our products are supported locally with outstanding technical expertise and are backed by Henkel's global infrastructure and inimitable resource base.



ASSEMBLY MATERIALS

SOLDER MATERIALS

SOLDER PASTES

SOLDER PASTES – NO CLEAN LEAD FREE

PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm²	PRINT SPEED, mm/s	IPC/J-STD-004 CLASSIFICATION
MULTICORE® LF318™	A halide-free, no-clean, Pb-free solder paste that has excellent humidity resistance and a broad process window for both reflow and printing. Offers high tack to resist component movement during high-speed placement, long printer abandon times and excellent solderability over a wide range of reflow profiles in air and N2 reflow ovens and across a wide range of surface finishes including Ni/Au, immersion Sn, Immersion Ag and OSP Cu. Proflow compatible. Available with both AGS (20-45µm, equivalent to IPC type 3) and DAP (20-38µm, equivalent to IPC type 4) powder.	96SC (95.5Sn 3.8Ag 0.7Cu, SAC387, 217C) 97SC (96.5Sn 3.0Ag 0.5Cu, SAC305, 217C)	88.5 and 89.0	1.8 AGS (Type 3 powder) 2.3 DAP (Type 4 powder)	25 - 150	ROL0
MULTICORE® LF620™	Halide-free, no clean, low voiding, Pb-free solder paste with excellent humidity resistance and broad process window. Suitable for both reflow and printing.	96SC (95.5Sn 3.8Ag 0.7Cu, 217°C) 97SC (96.5Sn 3.0Ag 0.5Cu, 217°C)	88.5	2.3	25 - 150	ROL0
MULTICORE® LF700™	A halide-free, no clean, Pb-free solder paste with a broad process window for printing, reflow and humidity resistance.	96SC (SAC387) 97SC (SAC305)	88.5	2.4	70 - 150	ROL0

SOLDER PASTES – NO CLEAN TIN-LEAD

MULTICORE® MP218™	High activity, soft residue, colorless, halide-free, no-clean solder paste that displays outstanding resistance to high temperature and humidity environments. Suitable for a large range of assembly processes, including rheo pump, proflow, large high-den.	Sn62/Sn63/63S4 (Anti-Tombstoning)	89.5 and 90	1.6	25 - 150	ROL0

SOLDER PASTES – WATER WASH

MULTICORE® WS200™	High performance, water-washable solder paste. Residues are readily removed with DI water, without the need for a saponifier. WS200™ has good open time with excellent print definition and soldering activity.	Sn62/Sn63/63S4 (Anti-Tombstoning)	88.5	0.8	25 - 100	ORH1
MULTICORE® WS300™	Flux system specially formulated for lead-free alloys. High performance, water washable solder paste. Residues are easily removed with DI water, without the need for a saponifier. Good open time with excellent print definition and soldering.	96SC (SAC387) 97SC (SAC305)	87	0.8	25 - 100	ORH1

ASSEMBLY MATERIALS

SOLDER MATERIALS

SOLDER WIRES

The Multicore® portfolio of cored solder wire features the award-winning multiple flux core technology that ensures the even and consistent distribution of flux throughout the solder wire. This mainstay in Henkel's line of solder products delivers ease of use and outstanding performance for today's delicate hand soldering assembly and rework operations.

Formulated with a variety of different alloy selections, Multicore® cored wires support traditional tin-lead manufacturing operations as well as modern lead-free processes. Our fast-wetting materials deliver excellent solder joint integrity and outstanding long-term performance.

SOLDER WIRES – NO CLEAN

PRODUCT	DESCRIPTION	ALLOY OPTIONS (Tin/Lead)	ALLOY OPTIONS* (LEAD FREE)	IPC/J-STD-004 CLASSIFICATION
MULTICORE® C400™	Halide-free, no-clean, clear residue, increased flux content for improved wetting.	SN62 60/40 63/37	SAC305 (97SC) SAC387 (96SC) 99C	ROL0
MULTICORE® C502™	No-clean, clear residue, medium activity flux with good wetting on difficult substrates.	SN62 60/40 63/37	SAC305 (97SC) SAC387 (96SC) 99C	ROM1

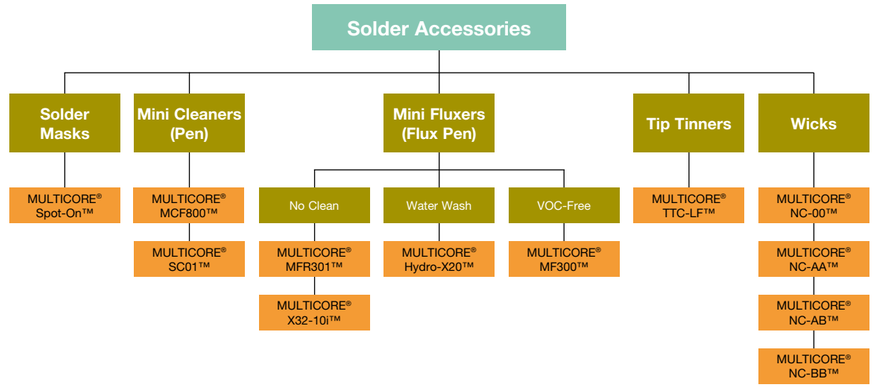
SOLDER WIRES – WATER WASH

PRODUCT	DESCRIPTION	SOLIDS CONTENT (%)	ACID VALUE (MG KOH/G)	IPC/J-STD-004 CLASSIFICATION
MULTICORE® Hydro-X™	High activity, water washable flux with excellent wetting on difficult substrates.	SN62 60/40 63/37	SAC305 (97SC) SAC387 (36SC) 99C	ORH1

ASSEMBLY MATERIALS

SOLDER MATERIALS

SOLDER ACCESSORIES



SOLDER MASK

PRODUCT	DESCRIPTION
MULTICORE® Spot-On™	Temporary solder used with circuit boards prior to soldering. Will withstand flux and soldering. Suitable for use with hand or pneumatic applications.

CLEANERS

PRODUCT	DESCRIPTION
MULTICORE® MCF800™	Designed for the effective removal of all types of soldering process residues from circuit boards, screens, fixtures, and equipment. Flash point of 105°C makes it ideal for use in heated cleaning systems.
MULTICORE® SC01™	Designed for the stencil cleaning and hand cleaning of process soldering residues. A highly effective cleaner that dries rapidly (fast evaporation).

MINI FLUXERS/MINI CLEANER (FLUX PENS)

PRODUCT	DESCRIPTION
MULTICORE® Flux Pen MF300™	Controlled release flux and cleaner pen applicators. Range of compatible flux types available. Ideal for controlled applications of flux when carrying out SMT rework. Cleaner pen easily removes residues.
MULTICORE® Flux Pen MFR301™	
MULTICORE® Flux Pen Hydro-X20™	
MULTICORE® Cleaner Pen SC01™	
MULTICORE® X32-10i™	Low solids synthetic resin flux meets global demand for ultra-low residue medium activity flux.

TIP TINNER

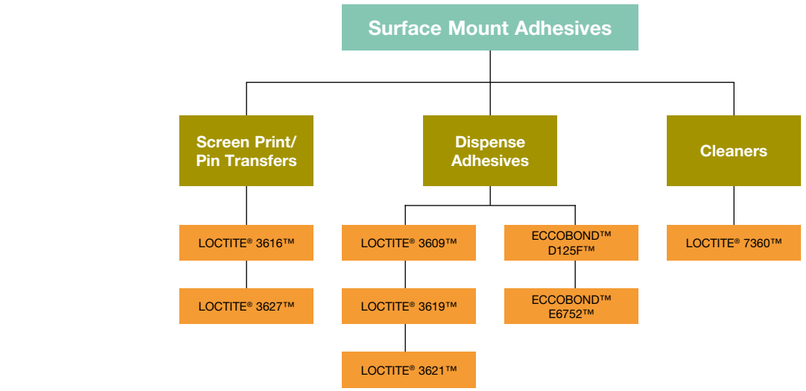
PRODUCT	DESCRIPTION
MULTICORE® TTC-LF™ Lead-Free Tip Tinner	Handy, non-abrasive, solder iron tip tinner. Easily wets hot solder irons leaving a brightly tinned tip. Improves hand soldering efficiency and extends tip life. Adhesive pad allows easy mounting on or near the solder iron holder.

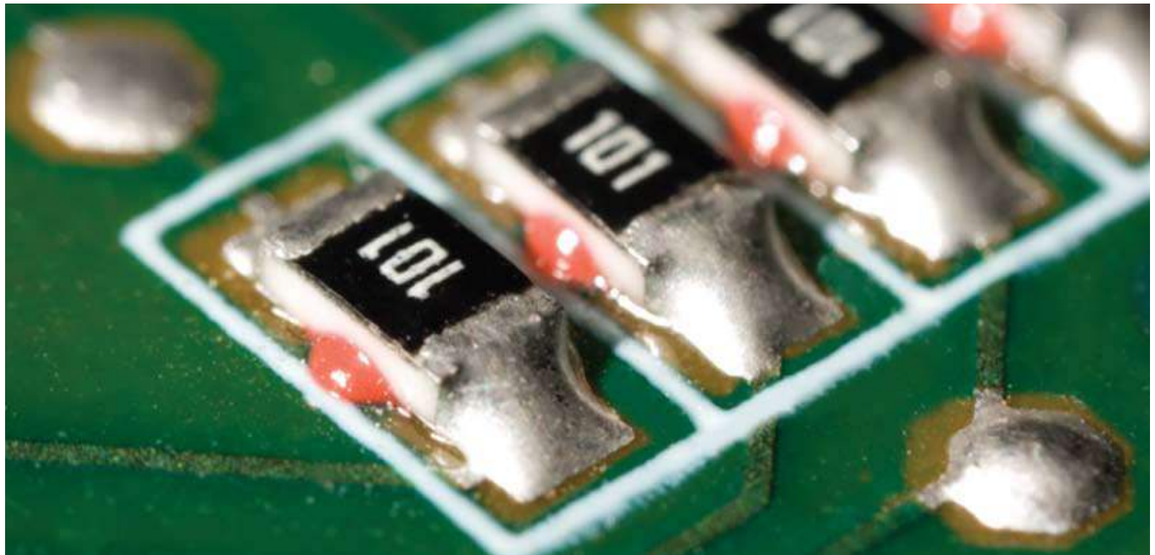
WICKS

SIZE REFERENCE	APPROXIMATE WIDTH
MULTICORE® NC-00™	0.8 mm (0.03 in.)
MULTICORE® NC-AA™	1.5 mm (0.06 in.)
MULTICORE® NC-AB™	2.2 mm (0.08 in.)
MULTICORE® NC-BB™	2.7 mm (0.10 in.)

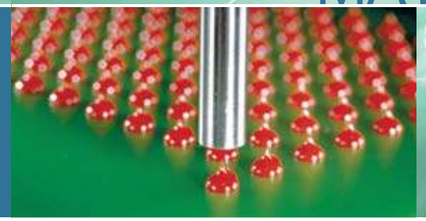
SURFACE MOUNT ADHESIVES (CHIPBONDER™)

As the first commercially available adhesive to address the emerging surface-mount market in the 1980s, Loctite® Chipbonder™ and Eccobond™ products today are the industry standard for mixed-technology and double-sided SMT applications. Henkel offers a wide range of Chipbonder™ and Eccobond™ products to meet the diversity and challenges of today's manufacturing requirements. Developed using in-process analysis ensures that Henkel's surface mount adhesives can address high-speed assembly processes while delivering lead-free compatibility with no loss in productivity. The portfolio includes formulations for low-temperature screen printing and dispensing.





ASSEMBLY
MATERIALS



SURFACE MOUNT ADHESIVES (CHIPBONDER™)

SURFACE MOUNT ADHESIVES – SCREEN PRINT/PIN TRANSFER

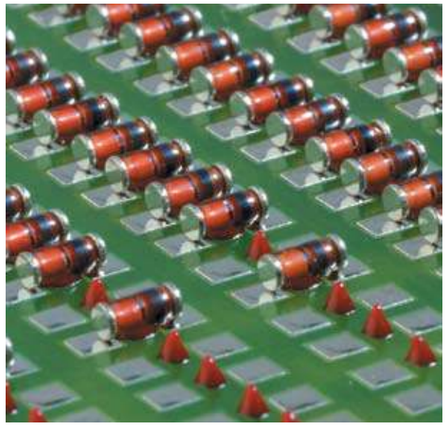
PRODUCT	DESCRIPTION	COLOR	CURE SCHEDULES	APPLICATION	STORAGE TEMP	SHELF LIFE
LOCTITE® 3616™	High speed stencil print adhesive. Compatible with DEK® Proflow® and MPM® Rheopump®. Ultra-low moisture pickup. Pin transfer capable also.	Red	90 sec. @ 150°C 2 - 3 min. @ 125°C	Stencil Print (60 - 150 mm/s)	5°C ± 3°C	9 months
LOCTITE® 3627™	High speed stencil print adhesive. Compatible with DEK® Proflow® and MPM® Rheopump®. Recommended product for DEK® Proflow® Pumprint process.	Red	90 sec. @ 150°C 3 - 4 min. @ 125°C	Stencil Print (60 - 150 mm/s)	5°C ± 3°C	6 months

SURFACE MOUNT ADHESIVES – DISPENSE ADHESIVES

LOCTITE® 3609™	For medium to high speed dispense applications. Excellent green strength for large components.	Red	90 sec. @ 150°C 3 - 4 min. @ 125°C	General Purpose Syringe Dispense	5°C ± 3°C	6 months
LOCTITE® 3619™	Ultra-low temperature cure, high speed syringe dispense.	Red	2 min. @ 100°C 5 - 6 min. @ 85°C	High Speed Syringe Dispense 40,000+ DPH Capable	5°C ± 3°C	10 months
LOCTITE® 3621™	High performance for ultra-high speed syringe dispense. Recommended product for Dispense Jet. Superior humidity resistance and electrical properties. Room temperature storage capable.	Red	90 sec. @ 150°C 3 - 4 min. @ 125°C	Very High Speed Syringe Dispense 47,000 DPH Capable	5°C ± 3°C or 8°C to 21°C for 30 days	10 months
ECCOBOND™ D125F™	Reduced "popcorn" effect upon cure.	Yellow	20 - 30 min. @ 100°C 7 - 20 min. @ 110°C 2 - 10 min. @ 120°C	Screen or Stencil Printing	5°C ± 3°C	8 months
ECCOBOND™ E6752™	A one-component, low temperature cure, surface mount adhesive that can be applied easily without stringing.	Red	20 - 30 min. @ 100°C 10 - 20 min. @ 110°C 3 - 10 min. @ 120°C	Dispensing	5°C ± 3°C	8 months

SURFACE MOUNT ADHESIVES: CLEANERS

PRODUCT	DESCRIPTION	SOLVENT TYPE	FLASH POINT	CORROSIVE PROPERTIES	OZONE DEPLETION POTENTIAL
LOCTITE® 7360™	Nozzle and dispense machine component cleaner. Excellent for removal of uncured adhesive from the board without causing the adhesive to gel. Available in environmentally responsible pump spray non-aerosol can for nozzle cleaning.	Aliphatic Ester Blend	100°C	None	None

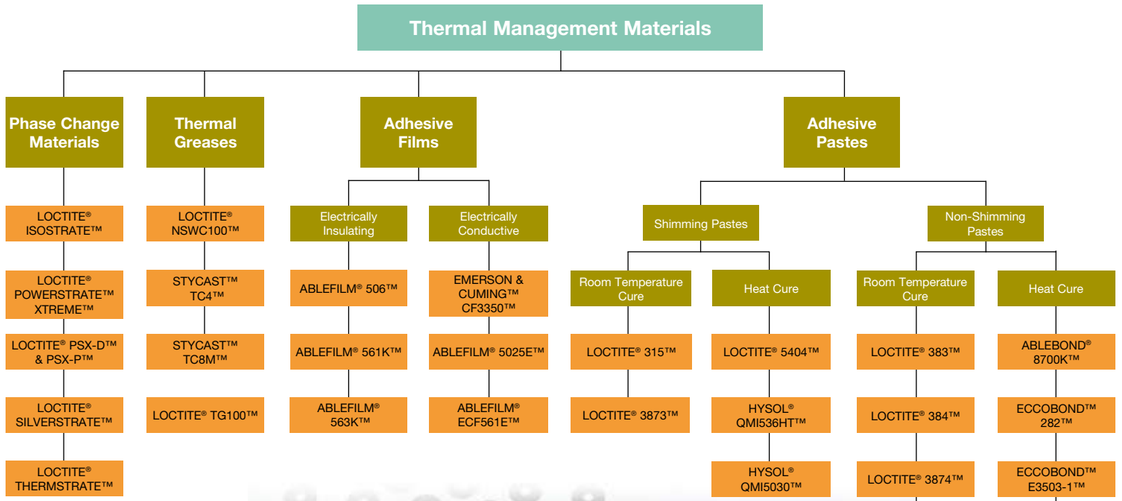


ASSEMBLY MATERIALS

THERMAL MANAGEMENT MATERIALS

Henkel's thermal materials scientists have developed some unique and user-friendly products to address the requirements of today's thermal transfer priorities. The Loctite® line of Phase Change Thermal Interface Materials (PCTIM) offers exceptionally low thermal impedance between heat dissipating devices and the surface to which the component is mounted. The premiere product in this line-up, Loctite® Powerstrate™ Xtreme™ adheres to heat sinks or components without heating, delivering amazing ease-of-use without compromising thermal performance.

Henkel offers a wide range of thermally conductive film adhesives that are ideal for bonding large areas or complex shapes. With customized preforms, adhesive can be placed precisely where needed, whether around through-holes or on any area requiring a specialized pattern, delivering exceptional accuracy and enhanced performance. Offering the perfect blend of high thermal conductivity with varying degrees of flexibility and adhesion, Henkel's thermally enhanced film products have been specially formulated for heat sink or thermal dissipation applications.



For Electrically Conductive Adhesives, go to page 26

ASSEMBLY MATERIALS

THERMAL MANAGEMENT MATERIALS

PHASE CHANGE MATERIALS

PRODUCT	DESCRIPTION	THERMAL IMPEDANCE (°C-in.²/W @ 80 psi)	THERMAL IMPEDANCE (°C-cm²/W @ 550 kPa)	THERMAL CONDUCTIVITY (W/mK)	PHASE CHANGE TEMP (°C)	VOLUME RESISTIVITY (OHM.CM)	DIELECTRIC STRENGTH (V/mil)	THICKNESS (in)
LOCTITE® ISOSTRATE™	Industry standard electrically insulating phase change material.	0.12	0.78	0.45	60	N/A	4,500 minimum	0.002 - 0.006
LOCTITE® POWERSTRATE™ XTREME™	Unsupported film with superior thermal performance even at low pressure. Direct attach to heat sink at room temperature without adhesive.	0.003	0.022	3.4	45	N/A	N/A	0.008
LOCTITE® PSX-D™ & PSX-P™	Repeatable phase change thermal interface material. Supplied as a paste that can be stenciled, needle dispensed, screen printed, or applied manually onto a heat sink, baseplate or other surfaces.	0.003	0.022	3.4	45	N/A	N/A	0.0005 - 0.010+
LOCTITE® SILVERSTRATE™	Excellent thermal performance particularly at higher pressures. Typically used on RF devices and SCRs where electrical conductivity is required (silver-filled).	0.003	0.022	3.14	51	2	N/A	0.004
LOCTITE® THERMSTRATE™	Industry standard phase change thermal interface material. Suitable for power IGBTs, semiconductors, DC-DC converters and other electrically isolated packages.	0.022	0.143	1	60	1.0×10^{12}	N/A	0.0025 - 0.008

THERMAL GREASES

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	DIELECTRIC STRENGTH (V/mil)	THICKNESS (in)
LOCTITE® NSWC100™	Non-silicone, water cleanable thermal compound.	1.4	1.9×10^{15}	250 minimum	0.0005 to 0.010+
STYCAST™ TC4™	Thermally conductive, high temperature silicone thermal grease.	1.5	1×10^{13}	500	0.0005 to 0.010+
STYCAST™ TC8M™	High thermal conductivity, high temperature thermal grease.	2.3	1×10^{13}	500	0.0005 to 0.010+
LOCTITE® TG100™	Ultra-high performance thermal grease.	3.4	N/A	N/A	0.0005 to 0.010+

THERMALLY CONDUCTIVE ADHESIVE FILMS – ELECTRICALLY INSULATING

PRODUCT	DESCRIPTION	TENSILE STRENGTH LAP SHEAR (PSI)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	PRIMARY CURE CYCLE	SHELF LIFE	FILM THICKNESS AVAILABLE (MILS)
ABLEFILM® 506™	Flexible film adhesive designed for bonding TCE mismatched materials. Slight tack can simplify assembly.	1,200	0.9	7×10^{12}	1 hr. @ 150°C	6 months @ -40°C	4, 5, 6
ABLEFILM® 561K™	High adhesion strength with excellent flexibility for bonding mismatched CTE materials.	3,300	0.9	9×10^{12}	30 min. @ 150°C	1 year @ -40°C	4, 5, 6
ABLEFILM® 563K™	Electrically insulating film with high thermal conductivity and adhesion strength. Available either unsupported or with a fiberglass carrier.	3,000	1	1×10^{13}	30 min. @ 150°C	1 year @ -40°C	2, 3, 4, 5, 6

THERMALLY CONDUCTIVE ADHESIVE FILMS – ELECTRICALLY CONDUCTIVE

PRODUCT	DESCRIPTION	TENSILE STRENGTH LAP SHEAR (PSI)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	PRIMARY CURE CYCLE	SHELF LIFE	FILM THICKNESS AVAILABLE (MILS)
EMERSON & CUMING™ CF3350™	Silver-filled film with an excellent balance of adhesion strength, electrical and thermal conductivity, and processability. It is specially suited for RF applications.	3,400	7	0.0002	30 min. @ 150°C	9 months @ 5°C	2, 4
ABLEFILM® 5025E™	Sister formulation to CF3350™ that has been certified to MIL-STD-883, Method 5011.	2,500	6.5	0.0002	30 min. @ 150°C	6 months @ 5°C	2, 3, 4, 5, 6
ABLEFILM® ECF561E™	Most flexible of the fiberglass-supported, electrically conductive products.	2,000	1.6	0.0060	1 hr. @ 150°C	1 year @ -40°C	4, 5, 6

ASSEMBLY MATERIALS

THERMAL MANAGEMENT MATERIALS

THERMALLY CONDUCTIVE ADHESIVES – SHIMMING – ROOM TEMPERATURE CURE

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE
LOCTITE® 315™	A self-shimming, thermally conductive, one-part adhesive for bonding electrical components to heat sinks with an insulating gap.			Activator or Heat	24-72 hrs. @ 20°C	600,000	0.81	1.3×10^{12}	9 months @ 5°C

THERMALLY CONDUCTIVE ADHESIVES – SHIMMING – HEAT CURE

LOCTITE® 3873™	Self-shimming, use with activator 7387™. High bonding strength for heat sink application.			Activator or Heat	Fixture time: 5 min.	200,000	1.25	4.3×10^{14}	21 months @ 5°C
LOCTITE® 5404™	Self-shimming, flexible silicone adhesive for high temperature resistant applications such as ceramic boards.			Heat	10 min. @ 150°C	Paste	1.0	2.9×10^{14}	5 months @ 5°C
HYSOL® QMI536HT™	Boron nitride–filled non-electrically conductive paste.			Heat	≥8 sec. @ 150°C (*Skip*Cure™) 15 min. @ 150°C (oven)	13,000	0.9	1.0×10^{13}	12 months
HYSOL® QMI5030™	Unique product resulting from blend of thermoset and thermoplastic resins.			Heat	30 min. @ 175°C (oven)	5,500	25	0.00004	12 months

THERMALLY CONDUCTIVE ADHESIVES – NON-SHIMMING – ROOM TEMPERATURE CURE

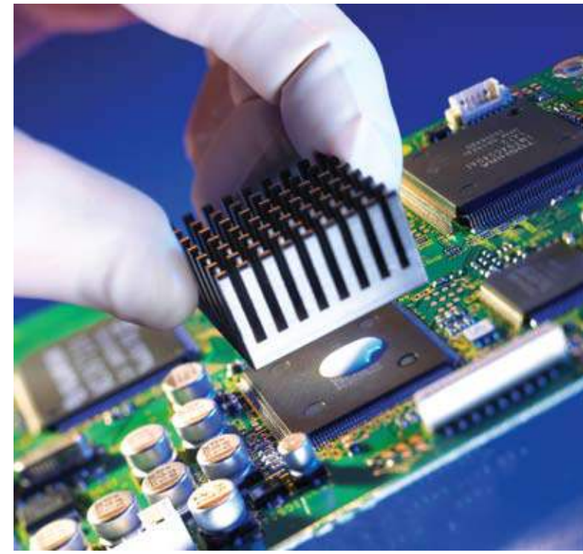
LOCTITE® 383™	High strength, room temperature curing adhesive for permanent assemblies.			Activator or Heat	24-72 hrs. @ 20°C	500,000	0.6	5.2×10^{11}	9 months @ 5°C
LOCTITE® 384™	Repairable, room temperature curing adhesive utilized for parts subject to disassembly.			Activator or Heat	24-72 hrs. @ 20°C	100,000	0.76	1.3×10^{12}	9 months @ 5°C
TRA-BOND™ 2151™	Thermal conductive electrical insulating compound.		Yes	Activator or Heat	24 hrs. @ 25°C	40,000	0.95	2.10×10^{15}	35 min.

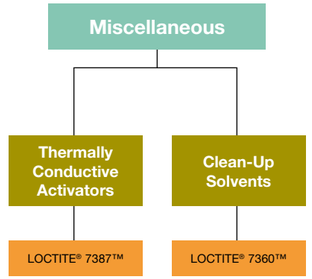
THERMALLY CONDUCTIVE ADHESIVES – NON-SHIMMING – HEAT CURE

LOCTITE® 3874™	No-bead containing version of 3873™.			Activator (7387™) or Heat	24 hrs. @ 25°C	5 min./ 24-72 hrs. @ 20°C	1.25	4.3×10^{14}	10 months @ 5°C
ABLEBOND® 8700K™	Mil standard certified, high performance, syringe dispensible, one-component, thermally conductive, epoxy adhesive.	Yes	Yes	Heat	60 min. @ 175°C 2 hrs. @ 160°C	45,000	0.5	3×10^{14}	9 months @ -40°C
ECCOBOND™ 282™	One-component, silk screenable, viscous epoxy with high thermal conductivity.			Heat	4 hrs. @ 100°C	280,000 - 380,000	1.3	1.0×10^{15}	3 months
ECCOBOND™ E3503-1™	Smooth paste assuring minimum bondline thickness for lower overall thermal resistance.			Heat	30 min. @ 100°C 10 min. @ 120°C 5 min. @ 150°C	60,000	1	1.0×10^{14}	6 months @ -18°C to -25°C
ECCOBOND™ TE3530™	One-component, low temperature curing, thermally conductive epoxy adhesive.			Heat	30 min. @ 100°C	60,000	2.3	1.0×10^{15}	6 months @ -18°C to -25°C
ECCOBOND™ E8502-1™	This low modulus, thermally conductive, modified epoxy adhesive is ideally suited for management of large CTE mismatch & bonding of stress sensitive components.			Heat	90 min. @ 120°C 60 min. @ 150°C 15 min. @ 175°C	45,000	0.6	4.07×10^{13}	6 months @ -18°C to -25°C

ASSEMBLY MATERIALS

THERMAL MANAGEMENT MATERIALS





MISCELLANEOUS ADHESIVES – THERMALLY CONDUCTIVE ACTIVATORS

PRODUCT	DESCRIPTION
LOCTITE® 7387™	Activator used in combination with Loctite® brands 315™, 383™, 384™.

MISCELLANEOUS ADHESIVES – CLEAN-UP SOLVENTS

PRODUCT	DESCRIPTION	SOLVENT TYPE	FLASH POINT
LOCTITE® 7360™	Nozzle and dispense machine component cleaner. Excellent for removal of uncured adhesive from the board without causing the adhesive to gel. Available in environmentally responsible pump spray non-aerosol can for nozzle cleaning.	Aliphatic Ester Blend	100°C

APPENDIX

SOLDER FORM AVAILABILITY

Multicore® Code	Alloy	Melting Point °C	RoHS	Solder Paste	Bar Solder	Cored Wire	Solid Wire
97SC	SAC305 or Sn96.5/Ag3.0/Cu0.5	217	YES	YES	YES	YES	YES
96SC	SAC387 or Sn95.5/Ag3.8/Cu0.7	217	YES	YES	NO	YES	YES
Bi58	Sn42/Bi58	138	YES	YES	NO	YES	NO
95A	Sn95/Sb5	236 - 242	YES	YES	NO	YES	NO
96S	Sn96.5/Ag3.5	221	YES	YES	NO	YES	NO
99C	Sn99.3/Cu0.7	227	YES	NO	YES	YES	NO
SAV1	Sn50.0/Pb48.5/Cu1.5	183 - 215	NO	NO	NO	YES	NO
Sn60	Sn60/Pb40	183 - 188	NO	NO	NO	YES	NO
Sn62	Sn62/Pb36/Ag2	179	NO	YES	NO	YES	NO
63S4	Sn62.8/Pb36.8/Ag0.4	179 - 183	NO	YES	NO	NO	NO
Sn63	Sn63/Pb37	183	NO	YES	YES	YES	YES
HMP	Sn5Pb93.5/Ag1.5	296 - 301	NO	YES	NO	YES	NO

Multicore® Powder Description	Powder Size (Microns)	IPC J-STD-006 Designation
BAS	53 - 75	Type 2
AGS	25 - 45	Type 3
DAP	20 - 38	Type 4
KBS	10 - 25	Type 5
LAW	5 - 15	Type 6

HELPFUL CONVERSIONS

Inch	Mil	Micron	Millimeter
0.001	1	25.4	0.0254
0.002	2	50.8	0.0508
0.003	3	76.2	0.0762
0.004	4	101.6	0.1016
0.005	5	127	0.127
0.006	6	152.4	0.1524

Degree Celsius	Degree Fahrenheit
-40	-40
-10	14
0	32
25	77
30	86
100	212
179	354
183	361
217	423
300	572

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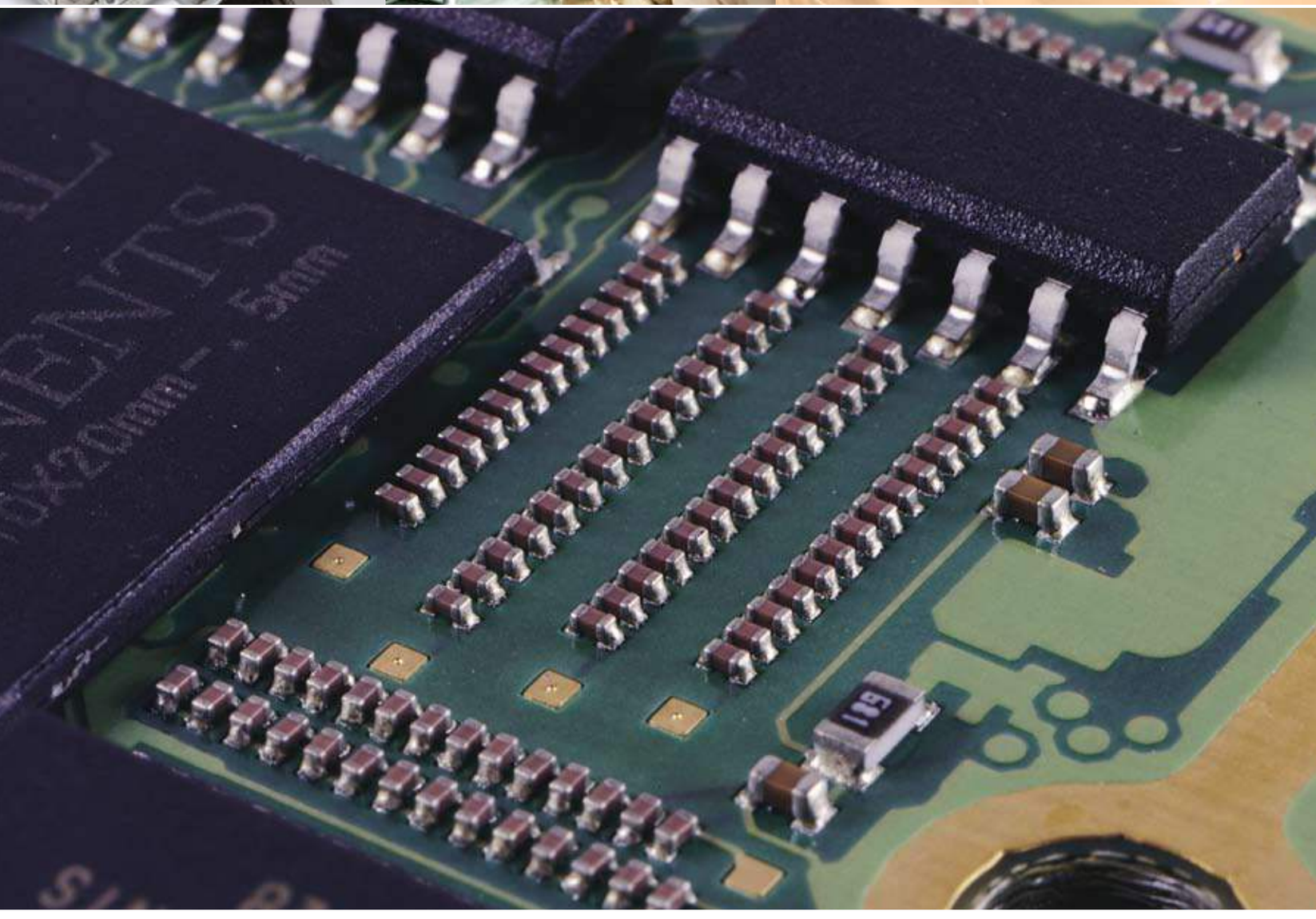

Henkel – Your partner worldwide

AMERICAS

HEADQUARTERS: UNITED STATES
15350 Barranca Parkway
Irvine, CA 92618
Tel: +1-949-789-2500
Tel: +1-800-562-8483

Henkel America
20021 Susana Road
Rancho Dominguez, CA 90221
Tel: +1-310-764-4600

Henkel America
46 Manning Road
Billerica, MA 01821
Tel: +1-978-436-9700
Tel: +1-800-832-4929

CANADA
Henkel Canada
2225 Meadowpine Blvd.
Mississauga, Ontario L5N 7P2
Tel: +1-905-814-6511
Tel: +1-800-263-5043
(within Canada)

BRAZIL
Henkel Brazil
Av. Prof. Vernon Krieble, 91
06690-250 Itapevi,
Sao Paulo, Brazil
Tel: +55 11 41 43 7000

MEXICO
Henkel Mexico
Boulevard Magnocentro No. 8
Centro Urbano Interlomas, 52760
Huixquilucan, Edo. de Mexico
Tel: +52 55 3300 3000

ASIA

HEADQUARTERS: ASIA
928 Zhangheng Road,
Zhangjiang Hi-Tech Park,
Pudong New District,
Shanghai, 201203, P. R. China
Tel: +86 21 2891 8000

AUSTRALIA
Henkel Australia
Unit 29 38-46 South Street,
Rydalmere 2216,
Sydney, Australia
Tel: +61 2 8844 4700

CHINA
Henkel China
928 Zhangheng Road,
Zhangjiang Hi-Tech Park,
Pudong New District,
Shanghai, 201203, P. R. China
Tel: +86 21 2891 8000

Henkel China
332 Mei Gui South Road,
Waigaoqiao FTZ
Shanghai 200131 China
Tel: +86 21 3898 4800

Henkel Hong Kong
15/F, Tower1, Landmark East,
100 How Ming Street,
Kwun Tong, Hong Kong
China
Tel: +852 2968-2977

INDIA
Henkel India
No.1, Airport Service Road,
Domlur Layout,
Bangalore-560 071,
India
Tel: +91 80 2535 7771

INDONESIA
Henkel Indonésia
Jalan Raya Jakarta Bogor
KM31.2,
Cimanggis Depok 16953,
Indonesia
Tel: +62 21 8775 2196

JAPAN
Henkel Japan
27-7 Shin Isogo-cho, Isogo-ku,
Yokohama, Japan 235-0017
Tel: +81 45 758 1800

Henkel Japan
100 Kaneda, Kanagawa
Atsugi-shi, Japan 243-0807
Tel: +81 46 294 2511

Henkel Japan
23-87 Asahidai, Kuriyama-cho,
Yubari-gun,
Hokkaido Japan 069-1507
Tel: +81-123-72-3432

KOREA
Henkel Korea
1st Floor, Mapo-tower,
418, Mapo-dong, Mapo-gu,
121-734 Seoul, Korea
Tel: +82 2 3279 1730

Henkel Korea
6th Floor, Dae Ryung Techno
Town II
569-21 Gasan-dong,
Kumchun-gu,
Seoul, Korea
Tel: +822 6675-8000

MALAYSIA
Henkel Malaysia
Lot 973, Jalan Kampung
Baru Hicom,
Persiaran Tengku Ampuan,
Lion Industrial Park, Sek 26,
Shah Alam, 40400 Selangor,
Malaysia
Tel: +60 3 5192 6200

Henkel Malaysia
(M) Sdn Bhd., 88K-2
Jalan Tun Dr Awang, Sri Bukit
Jambul
11900 Bayan Lepas,
Penang, Malaysia
Tel: +60 4-6435244

Henkel Malaysia
(M) Sdn Bhd., Lot 8 & 10
Jalan Tukul 16/5,
40000 Shah Alam,
Selangor, Malaysia
Tel: +60 3-55191105

PHILIPPINES
Henkel Philippines
21/F, Asia Star Building,
2402-2404 Asean Drive,
Filinvest Corporate City,
Alabang, Muntinlupa City 1781,
Philippines
Tel: +632 859 3100

Henkel Philippines
2 Perfector Drive,
Sta Maria Industrial Estate
Bagumbayan, Taguig,
Metro Manila
1600 Philippines
Tel: +632 837-5898

SINGAPORE
Henkel Singapore
401, Commonwealth Drive
#03-01/02,
Haw Par Techno Centre,
Singapore 149598
Tel: +65 6266 0100

Henkel Singapore
Block 11, Kallang Place #07-10
Kallang Basin Industrial Estate
Singapore 339155
Tel: +65 6297-1332

Henkel Singapore
Block 11, Kallang Place #07-05
Singapore
Tel: +(65) 62900820
Fax: +(65) 62923347

TAIWAN
Henkel Taiwan
10/F, No.866, ZhongZheng Road,
ZhongHe City, Taipei County 235,
Taiwan
Tel: +886 2 2227 1988

Henkel Taiwan
508-51, Wen-sien Road, Section 1
Jen-der, Tainan County
Taiwan 717
Tel: +886 6 366 1288

Henkel Taiwan
B-5F, No. 356 Sec 2
Ching Nien Road
Feng Shan City,
Kaoshiung, Taiwan
Tel: +886 7-776-2313

THAILAND
Henkel Thailand
Centralworld, 35th Floor,
999/9 Rama 1 Road,
Patumwan, Bangkok, 10330,
Thailand
Tel: +66 2 209 8000

Henkel Thailand
c/o NSC,40/14 Moo
12 Bangna Trad Road
Bangkaew, Bangplee,
Samutprakarn 10540 Thailand
Tel: +662 3120530-45

EUROPE

AUSTRIA
Henkel Central Eastern Europe
GmbH
Erdbergstrasse 29
A-1030 Vienna
Tel: +43-1-71104-0

BELGIUM
Henkel Belgium N.V.
Havenlaan 16
B-1080 Brussel
Tel: +32-(0)2-42125 55

Henkel Electronic Materials
(Belgium) N.V.
Nijverheidsstraat 7
B-2260 Westerlo, Belgium
Tel: +32 (0) 14 57 56 11

BULGARIA
Henkel Bulgaria E.O.O.D.
Business Park Sofia
Block 2, 4th floor
BG-1715 Sofia
Tel: +359 2 9151010

CZECH REPUBLIC
Henkel CR, spol. s r.o.
U Pruhonu 10
CZ-170 04 Praha 7
Tel: +420 2 20101401

CROATIA
Henkel Croatia d.o.o.
Budmanijeva 1
HR-10000 Zagreb
Tel. +85 1 6008-161

DENMARK
Henkel Norden AB,
Copenhagen
Horskaetten 3
DK-2630 Taastrup
Tel: +45 43 30 13 01

FINLAND
Henkel Norden Oy
Ayritie 12 a
01510 Vantaa
Tel: +358 020 122 311

FRANCE
Henkel France
10, Avenue Eugene Gazeau
BP 40090
F-60304 Senlis-Cedex
Tel: +33 0344 216600

GERMANY
Henkel AG & Co. KGaA
Gutenbergstrasse 3
85748 Garching
Tel.: +49-89-320800-1181
Fax: +49-89-320800-1233

HUNGARY
Henkel Magyarország Kft.
H-1113 Budapest
Dávid Ferenc u. 6.
Tel.: +36 30 9192993

ITALY
Henkel Italia Spa
Via Amoretti,78
20157 Milano - Italy
Tel: +39 02 357921

NETHERLANDS
Henkel Nederland B.V.
Henkel Technologies
Postbus 2100
3430 CM Nieuwegein
Tel: +31 030 607 38 50

NORWAY
Henkel Norway
Postboks:
6405 Etterstad
0604 Oslo
Tel: +47 23 37 15 20

POLAND
Henkel Polska S.A.
Domaniewska 41
PL-02-672 Warszawa
Tel: +48 22 5656200

ROMANIA
See Henkel Hungary

RUSSIA
RUSHENK
Kolokolnikov Pereulok., 11
RU-107045 Moscow
Tel: +7 495 7455588

SLOVAKIA
Henkel Slovensko s.r.o.
Zahradnicka 91
P.O. Box 66
SK-821 08 BRATISLAVA
Tel: +421 2 50246402, 111

SPAIN
Henkel Iberica, S.A.
Pol. Ind. Alparrache
Camino de Villaviciosa, 18 y 20
28600 Navalcarnero,
Madrid
Tel: +34 91 860 90 00

SWEDEN
Henkel Norden AB
P.O. Box 120 80,
SE-102 22 Stockholm,
Sweden
Tel: +46 863443800

SWITZERLAND
See Henkel Germany

TURKEY
Türk Henkel Kimya Sanayi ve
Ticaret A.S.
Kayisdagi CadKaraman Ciftligi
YoluKar Plaza D Blok
34752 Icerenköy - Istanbul,
Turkey
Tel: 0090 216 579 4000
Fax: 0090 216 579 4092

UKRAINE
POW Henkel Ukraine
Silver Centre
4, Lepse Blvd.
UA-03067 Kiev
Tel: +38 044 20145 77

UK AND IRELAND
Henkel Ltd.
Adhesives Limited
Technologies House
Wood Lane End,
Hemel Hempstead
Hertfordshire HP2 4RQ
Tel: +44 (0)1442 278000

Henkel Ltd. UK
Station Road, Linton
Cambridge CB1 6NW
Tel: +44 1-223-893-771

Henkel Corporation
15350 Barranca Parkway
Irvine, CA 92618
1-949-789-2500
1-800-562-8483

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www.henkel.com/electronics