Printed Circuit Board Protection
For today’s electronics products, reliability is critical. Consumers expect unfailing function, uninterrupted long-term use and cost effectiveness. Manufacturing of complex electronic devices requires the highest quality materials to ensure robust performance and superb protection from harsh conditions and environmental influences.

Henkel’s broad portfolio of printed circuit board protection materials safeguards electronic components and printed circuit boards (PCBs) from damaging environmental factors, such as extreme temperatures, fluids, corrosive elements, shock and vibration. Our advanced potting materials, sealants, low pressure molding systems and conformal coatings ensure that even the most complex circuitry is protected. With a wide range of materials for applications that span multiple markets, including automotive, industrial, medical and consumer electronics, Henkel’s PCB protection materials deliver comprehensive solutions for a variety of products.
Electronic devices used in automotive applications are constantly subjected to increasingly harsh conditions. Under-the-hood components risk damage from high temperatures. Elsewhere on the vehicle, contaminants from weather, road salts, oils and other automotive fluids can wreak havoc on sensitive and operation-critical electronics. Protecting electronic devices within automotive environments has been Henkel’s passion for more than 20 years. Our unique formulations are found in automotive vision systems, electronic control modules, safety and security systems, sensors and lighting. With potting materials, conformal coatings, sealing and gasketing systems, and low pressure molding solutions, Henkel delivers protection where you need it most – under the hood and on the road.
Printed Circuit Board Protection Market Solutions
Automotive Electronics

AUTOMOTIVE

Electronic Control Unit (ECU)
- Potting
- Conformal Coatings
- Low Pressure Molding
- Sealants

Sensors
- Conformal Coatings
- Low Pressure Molding

Lighting/Vision Systems
- Potting

Ignition Coils
- Underhood

LOCTITE® 5140
LOCTITE® 5192
LOCTITE® 5089
LOCTITE® 5092
LOCTITE® 5210
LOCTITE® 5293
LOCTITE® 5089
TECHNOMELT® PA 341
TECHNOMELT® PA 641/646
TECHNOMELT® PA 673/678
LOCTITE® STYCAST PC 40-UM
LOCTITE® STYCAST PC 40-UMF
TECHNOMELT® US 2350
TECHNOMELT® US 2500
TECHNOMELT® US 2651

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Sensors
- Acceleration
- Mass Air Flow
- Occupancy
- Position/Distance
- Speed/Rotation
- Temperature/Pressure

Safety/Security
- Air Bag Systems
- Alarm Systems
- Keyless Entry
- Seat Belt Systems
- Tire Pressure

Vision Systems
- Passenger Detection
- Pre-Crash Warning

Electronic Control Modules
- Air Bag Systems
- Braking Systems
- Energy Systems
- Fuel Pump Drive
- Fuse Boxes
- Heated Washers
- Transmission Systems
- Voltage Regulators

Cabin Devices
- A/V Systems
- Instrument Panels
- Navigation Systems
- Power Modules
- Seat Heaters

Electronic Lighting
- LED Systems

APPLICATIONS | MATERIAL SOLUTIONS
---|---
PCB Assembly | - Conductive/Non-Conductive Pastes
- Film Adhesives
- SMT Bonding
- Solder
- Underfills

PCB Protection | - Conformal Coatings
- Encapsulants
- Low Pressure Molding Adhesives
- Potting
- Sealants

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Printed Circuit Board Protection Market Solutions

Consumer Electronics

Everyone who uses consumer electronics has one expectation in common: function without fail. Whether it’s a washing machine, dishwasher, smartphone or tablet, immediate response and reliable operation is often taken for granted. Keeping our modern conveniences in good working order, however, takes the protection that Henkel’s market-leading conformal coatings and encapsulation materials provide. Without these critical materials, the PCBs, which are arguably the foundation of all consumer electronics, would be nonresistant to corrosion, high temperatures, moisture, vibration and more. Henkel’s nimbleness and formulation expertise address the dynamics of this market with material solutions that deliver real value. Consumers trust that the products they rely on will work on demand, and manufacturers of these products trust Henkel.
Industrial electronics have to be rugged. They include applications like transformers, water meter sensors, industrial lighting and stadium lighting. Being able to withstand all types of weather conditions, extreme temperature swings and constant operation is par for the course for industrial electronics. Without protective materials, such as Henkel’s conformal coatings, potting and low pressure molding compounds, however, the reliability of these important systems would be compromised. That’s why the world’s top industrial electronics manufacturing firms partner with Henkel for unfailing performance, exceptional reliability and in-field dependability.
Printed Circuit Board Protection Materials
Conformal Coatings

Henkel’s advanced LOCTITE® brand of conformal coating materials protect PCBs and advanced substrates from thermal shock, moisture, corrosive liquids and other adverse environmental conditions. Shielding electronic function from external influences ensures long product life cycles for harsh marine, automotive, medical and consumer electronics applications.

With exceptionally fast-cure capability and 100 percent solvent-free formulations, Henkel’s conformal coatings provide fast processing and are environmentally responsible.
<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>CURE SCHEDULES</th>
<th>VISCOSITY mPa-S (cP)</th>
<th>OPERATING TEMPERATURE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACRYLICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCTITE® STYCAST PC 62</td>
<td>Conformal coating that provides environmental and mechanical protection. Toluene-free alternative with superior toughness and abrasion resistance.</td>
<td>45 min. @ 75°C</td>
<td>50</td>
<td>-40°C to 125°C</td>
</tr>
<tr>
<td>LOCTITE® 3900</td>
<td>Aerosol, fast-cure, solvent-based acrylic coating. Designed for small product runs.</td>
<td>Air dry - 5 min.</td>
<td>N/A (Aerosol)</td>
<td>-40°C to 125°C</td>
</tr>
<tr>
<td><strong>URETHANE ACRYLATES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCTITE® STYCAST PC 40-UM</td>
<td>One-component, solvent-free conformal coating that gels rapidly and cures with UV/moisture.</td>
<td>30 sec. UV + 3 days @ RT</td>
<td>500</td>
<td>-40°C to 135°C</td>
</tr>
<tr>
<td>LOCTITE® STYCAST PC 40-UMF</td>
<td>Conformal coating specifically formulated to rapidly gel and immobilize when exposed to UV light and then fully cure when exposed to atmospheric moisture, ensuring optimum performance even in shadowed areas.</td>
<td>10 sec. UV + 3 days @ RT</td>
<td>250</td>
<td>-40°C to 135°C</td>
</tr>
<tr>
<td>LOCTITE® STYCAST UV 7993</td>
<td>Conformal coating designed to provide rugged protection from moisture and harsh chemicals. It is compatible with industry-standard solder masks, no-clean fluxes, metalization, components and substrate materials.</td>
<td>10 sec. UV + 50 hours @ &gt; 70% RH</td>
<td>120</td>
<td>-40°C to 105°C</td>
</tr>
<tr>
<td><strong>URETHANE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCTITE® STYCAST PC 18M</td>
<td>Flexible, one-component, solvent-based urethane coating that may be cured at room temperature.</td>
<td>2 hrs. @ 60°C w/ 30-50% RH</td>
<td>350</td>
<td>-40°C to 110°C</td>
</tr>
<tr>
<td><strong>SILICONES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCTITE® 5092</td>
<td>Noncorrosive, UV/moisture-cure silicone for shallow potting, coating and sealing of electronic assemblies. High adhesion to difficult-to-bond substrates.</td>
<td>60 sec. UV + 3 days @ RT</td>
<td>5,800</td>
<td>-40°C to 200°C</td>
</tr>
<tr>
<td>LOCTITE® 5290</td>
<td>UV/moisture cure silicone conformal coating. Designed for severe temperature environments. High-reliability automotive applications. Solvent-free.</td>
<td>20 sec. UV + 3 days @ RT</td>
<td>300</td>
<td>-40°C to 200°C</td>
</tr>
<tr>
<td>LOCTITE® 5293</td>
<td>Repairable, solvent-free, medium-viscosity, UV/moisture-cure silicone, designed for severe temperature environments. High-reliability automotive applications.</td>
<td>20 sec. UV + 3 days @ RT</td>
<td>600</td>
<td>-40°C to 200°C</td>
</tr>
</tbody>
</table>
Printed Circuit Board Protection Materials
Low Pressure Molding

TECHNOMELT®, Henkel’s unique polyamide hot melt material, provides a low pressure molding solution with superior sealing adhesion and excellent temperature and solvent resistance. TECHNOMELT® quickly encapsulates exposed circuitry to form the outer shell of the device and delivers a self-contained integrated assembly. Low application pressure between 20 and 500 psi within the mold cavity safeguards sensitive circuitry. When in a liquid state, TECHNOMELT® flows in and around the tightest dimensions without the high levels of pressure used with traditional injection molding or potting techniques, and significantly reduces stress even for the most highly miniaturized components.

TECHNOMELT® cycle time is very short, allowing for a high throughput process, and its functional design enables manufacturers to remove process steps. This novel material from Henkel has found application in a variety of products within the automotive, medical, industrial and consumer markets.

Process
Traditional potting process flow

Low pressure process flow

Key Benefits

Design
• Additive design allows for alternative solutions (simplified process vs. traditional technologies)
• “Sky Lining” allows the use of less material, precise encapsulation and less weight
• Functional design removes process steps
• Improved look and image

Process
• Reduces total cost of ownership (TCOO)
• Increased throughput
• Low capital equipment costs and reduced footprint
• Low-viscosity materials allow for low injection pressures

Products
• Adhesion to multiple surfaces
• Complete watertight encapsulation
• Safe, one component, UL 94-V0 approved
• High-temperature resistance
• Compliant materials suitable for sensitive electronic components
• Less handling and shorter process
• No cure process required

Sustainability
• Zero waste
• All excess material and scrap are recyclable
• Natural ingredients

Through the combination of design, process, product and sustainability, Low Pressure Molding with TECHNOMELT® delivers customers an advanced and environmentally sustainable solution to Circuit Board Protection.

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### Polyamide: High Temperature Resistance

**TECHNOMELT® PA 673**
- Moldable polyamide with good adhesion for high-temperature applications, such as in an automotive underhood.
  - **Color**: Amber
  - **Performance Temperature**: -40°C to 140°C
  - **Shore A Hardness**: 90
  - **Softening Point**: 187°C ± 5°C

**TECHNOMELT® PA 678**
- Moldable polyamide for the most demanding high-humidity applications, such as on the inside of an automobile tire. Formulated for very low water vapor transmission.
  - **Color**: Amber
  - **Performance Temperature**: -40°C to 140°C
  - **Shore A Hardness**: 88
  - **Softening Point**: 188°C ± 5°C

### Polyamide: Adhesion to Plastics

**TECHNOMELT® PA 633**
- Moldable polyamide with service temperature up to 130°C, such as in an automotive firewall.
  - **Color**: Amber
  - **Performance Temperature**: -40°C to 130°C
  - **Shore A Hardness**: 90
  - **Softening Point**: 175°C ± 5°C

**TECHNOMELT® PA 638**
- Moldable polyamide where excellent adhesion and cold-temperature flexibility are important, such as in an automotive exterior. Also used extensively in white goods.
  - **Color**: Black
  - **Performance Temperature**: -40°C to 100°C
  - **Shore A Hardness**: 77
  - **Softening Point**: 157°C ± 5°C

**TECHNOMELT® PA 652**
- Moldable polyamide with excellent adhesion to tough substrates. Great flexibility offers incredible strain relief on cables and wires. Ideal for encapsulation of heat-producing components in appliances and consumer electronics, UL RTI 95°C.
  - **Color**: Black
  - **Performance Temperature**: -40°C to 110°C
  - **Shore A Hardness**: 78
  - **Softening Point**: 155°C ± 5°C

### Polyamide: Increased Hardness

**TECHNOMELT® PA 341**
- High-performance, thermoplastic polyamide designed to offer blaze orange color for easy identification of components. Typically used to encapsulate high-voltage modules.
  - **Color**: Blaze Orange
  - **Performance Temperature**: -25°C to 125°C
  - **Shore A Hardness**: 92
  - **Softening Point**: 173°C ± 5°C

**TECHNOMELT® PA 641**
- Moldable polyamide where strength and hardness are needed, such as in memory sticks and computer connectors.
  - **Color**: Black
  - **Performance Temperature**: -40°C to 130°C
  - **Shore A Hardness**: 92
  - **Softening Point**: 175°C ± 5°C

### Polyolefin: Excellent Adhesion to Metals, Plastics, Tough Surfaces

**TECHNOMELT® AS 5375**
- Moldable polyolefin for resistance against moisture and solvents. Excellent adhesion to the most difficult substrates. Compatible with a secondary overmold with a harder polyamide.
  - **Color**: Opaque White
  - **Performance Temperature**: -30°C to 100°C
  - **Shore A Hardness**: 55
  - **Softening Point**: 139°C ± 5°C
Printed Circuit Board Protection Materials

Sealants

Effective sealing of electronic components and modules protects complex, fine-pitch components from excessive thermal shock and high-temperature exposure. Henkel's silicone-based LOCTITE® sealant and encapsulant materials offer precise and reliable safeguarding of sensitive electronics against the damaging effects of moisture, while also improving thermal cycling performance.

Henkel's sealant materials are UV curable to enable fast processing; environmentally responsible with reduced solvent content; conveniently packaged for dispense operations; and offer exceptional ease of use. These advanced formulations are suitable for a wide variety of applications and manufacturing requirements.

### SEALANTS

- **LOCTITE® 5089**
  - Used for gasketing and sealing applications. Upon exposure to sufficient UV light and/or atmospheric moisture, this product cures to form a durable, flexible rubber sealant. Typical applications include gasketing/sealing of enclosures that require a rapid-curing, post-applied sealant that facilitates immediate on-part inspection.
  - 60 sec. UV + 3 days RT
  - Alkoxy silicone
  - Viscosity (cP): 100,000
  - Shore hardness: >25

- **LOCTITE® 5210**
  - One-component, ultra-fast-curing, noncorrosive RTV silicone designed for potting, wire tacking, selective sealing, vibration dampening and repair/rework applications on PCBs. Suited for high-volume manufacturing and is particularly effective for automotive electronics applications or other harsh environments. Fast surface cure allows material to be handled quickly after dispensing.
  - 24 hrs. @ 25°C
  - Alkoxy silicone
  - Extrusion rate: 400 gm/min.
  - 48

- **LOCTITE® 5910**
  - One-component silicone sealant. Typical applications include stamped sheet metal covers (timing covers and oil sumps) where good oil resistance and the ability to withstand high-joint movement is required.
  - 7 days @ 25°C
  - Oxime silicone
  - Extrusion rate: 600 gm/min.
  - 30

- **LOCTITE® 5964**
  - 10 min. @ 150°C or 4 min. using VFM
  - Heat cure silicone
  - Extrusion rate: 150 gm/min.
  - 28

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Printed Circuit Board Protection Materials

Potting

One-Component

Epoxies
- LOCTITE® STYCAST A 316-48
- LOCTITE® STYCAST EO 1058
- LOCTITE® STYCAST EO 7038

Silicones
- LOCTITE® 5140
- LOCTITE® 5145

Two-Component

Epoxies
- LOCTITE® STYCAST 2651MM*
- LOCTITE® STYCAST 2850FT*
- LOCTITE® STYCAST 2850KT*
- LOCTITE® STYCAST 2651-40
- LOCTITE® STYCAST US 2500

Silicones
- LOCTITE® 5952
- LOCTITE® 5954
- LOCTITE® US 2050

Urethanes
- LOCTITE® STYCAST U 2500
- LOCTITE® STYCAST US 1150
- LOCTITE® STYCAST US 2650

Heat Cure
Room Temperature Cure

*Optional heat cure to reduce cure time
Printed Circuit Board Protection Materials

Potting

Potting and encapsulation systems from Henkel offer superb protection of printed circuit boards and electrical devices. Used in today’s most challenging environments, such as automotive and defense/aerospace, where thermal conductivity and operating-temperature boundaries are pushed to the limit, potting materials deliver enhanced mechanical strength, provide electrical insulation and improve thermal reliability.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>MIX RATIO BY WEIGHT</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONE-COMPONENT EPOXIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCTITE® STYCAST EO 1098</td>
<td>One-component epoxy potting compound formulated to protect automotive sensors used in harsh environments. Provides excellent environmental and thermal protection.</td>
<td>NA</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST EO 7038</td>
<td>One-component epoxy potting compound formulated to protect automotive sensors used in harsh environments.</td>
<td>NA</td>
<td>Black</td>
</tr>
<tr>
<td><strong>ONE-COMPONENT SILICONES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCTITE® S140</td>
<td>Noncorrosive, self-leveling RTV silicone. Designed for shallow potting, sealing and coating of electronics.</td>
<td>NA</td>
<td>Clear</td>
</tr>
<tr>
<td>LOCTITE® S145</td>
<td>High-strength, noncorrosive form-in-place RTV silicone adhesive for bonding and sealing electrical devices.</td>
<td>NA</td>
<td>Clear</td>
</tr>
<tr>
<td><strong>TWO-COMPONENT EPOXIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCTITE® STYCAST 2651MM</td>
<td>Filled, general-purpose, epoxy encapsulant that requires low viscosity and low abrasion. It is especially useful for machine dispensing and for parts that require post-molding machining.</td>
<td>100:7.0 (CAT 9)</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST 2850FT</td>
<td>Two-component, thermally conductive epoxy encapsulant that can be used with a variety of catalysts. Used in the encapsulation of components that need heat dissipation and thermal shock properties.</td>
<td>100:3.5 (CAT 9)</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST 2850KT</td>
<td>Two-component, thermally conductive epoxy encapsulant designed for replacement for heat sinks in non-integrated electrical components and assemblies.</td>
<td>100:2.0 (CAT 9)</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 1000</td>
<td>Two-component casting system with a long pot life. This low-cost, flexible system is filled with a non-abrasive filler for machine metering/dispensing. Good thermal shock resistance and low exotherm, making it suitable for encapsulation of various components and modules.</td>
<td>100:90</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 1002</td>
<td>Two-component casting system with excellent handling properties. This low-cost, flexible system is filled with a non-abrasive filler for machine metering/dispensing or regular hand mixer applications.</td>
<td>100:100</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 1900</td>
<td>Transparent, medium-viscosity, epoxy resin formulation recommended for small potting and laminating applications where clarity and excellent structural, mechanical and electrical properties are required.</td>
<td>100:46</td>
<td>Clear</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 1901</td>
<td>Fast-setting, toughened, medium-viscosity, industrial-grade epoxy adhesive. Ideal for bonding plastic, metal, glass, wood, ceramic, rubber and masonry materials where flexibility is needed. Designed for a variety of applications, such as flex circuits, cable boots and staking fillet bonds.</td>
<td>100:105</td>
<td>Clear</td>
</tr>
</tbody>
</table>
Henkel’s potting formulas provide excellent adhesion strength to all surface types and are electrically insulating and thermally stable with a broad operating temperature range. Applications such as insulation of electronic components, protection of electronic control modules in automotive and defense/aerospace devices, and environmental safeguarding of consumer electronics like LED sign boards are all made more reliable with Henkel’s potting and encapsulation materials.

<table>
<thead>
<tr>
<th>RECOMMENDED CURE SCHEDULE</th>
<th>ALTERNATE CURE CYCLE</th>
<th>VISCOSITY cP AT 25°C</th>
<th>POT LIFE</th>
<th>HARDNESS</th>
<th>THERMAL CONDUCTIVITY W/M°C</th>
<th>FLAMMABILITY RATING</th>
<th>TEMPERATURE RANGE</th>
<th>SHELF LIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 min. @ 140°C</td>
<td>30 min. @ 100°C</td>
<td>50,000</td>
<td>3 months</td>
<td>86D</td>
<td>0.4</td>
<td>None</td>
<td>-40°C to 180°C</td>
<td>3 months @ 25°C</td>
</tr>
<tr>
<td>2 hrs. @ 140°C</td>
<td>3 hrs. @ 125°C</td>
<td>50,000</td>
<td>10 days</td>
<td>90D</td>
<td>0.5</td>
<td>None</td>
<td>-40°C to 180°C</td>
<td>7 months @ 5°C</td>
</tr>
<tr>
<td>2 hrs. @ 140°C</td>
<td>2 hrs. @ 90°C plus 2 hrs. @ 130°C</td>
<td>40,000</td>
<td>3 days</td>
<td>92D</td>
<td>ND</td>
<td>None</td>
<td>-40°C to 180°C</td>
<td>4 months @ 5°C or 12 months @ -20°C</td>
</tr>
<tr>
<td>72 hrs. @ 25°C</td>
<td>NA</td>
<td>35,000</td>
<td>skin over in 3 hrs.</td>
<td>30A</td>
<td>ND</td>
<td>None</td>
<td>-55°C to 205°C</td>
<td>12 months @ 25°C</td>
</tr>
<tr>
<td>72 hrs. @ 25°C</td>
<td>NA</td>
<td>extrusion rate 200 g/min.</td>
<td>skin over in 3 hrs.</td>
<td>33A</td>
<td>0.2</td>
<td>None</td>
<td>-55°C to 205°C</td>
<td>12 months @ 25°C</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 65°C</td>
<td>14,000</td>
<td>45 min.</td>
<td>88D</td>
<td>0.6</td>
<td>None</td>
<td>-40°C to 205°C</td>
<td>1 year</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 65°C</td>
<td>58,000</td>
<td>45 min.</td>
<td>96D</td>
<td>1.25</td>
<td>None</td>
<td>-40°C to 130°C</td>
<td>1 year</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 65°C</td>
<td>174,000</td>
<td>10 min.</td>
<td>94D</td>
<td>2.68</td>
<td>None</td>
<td>-40°C to 130°C</td>
<td>1 year</td>
</tr>
<tr>
<td>36 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>25,000</td>
<td>180 min.</td>
<td>75D</td>
<td>0.42</td>
<td>94HB</td>
<td>-25°C to 105°C</td>
<td>1 year</td>
</tr>
<tr>
<td>36 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>19,500</td>
<td>60 min.</td>
<td>88D</td>
<td>0.64</td>
<td>94V-0</td>
<td>-25°C to 105°C</td>
<td>1 year</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 65°C</td>
<td>6,000</td>
<td>10 min.</td>
<td>90D</td>
<td>0.2</td>
<td>None</td>
<td>-60°C to 125°C</td>
<td>1 year</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>1 hr. @ 65°C</td>
<td>2,400</td>
<td>3 min.</td>
<td>55D</td>
<td>0.2</td>
<td>None</td>
<td>-40°C to 105°C</td>
<td>1 year</td>
</tr>
</tbody>
</table>
# Printed Circuit Board Protection Materials

## Potting

<table>
<thead>
<tr>
<th>PRODUCT</th>
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<th>MIX RATIO BY WEIGHT</th>
<th>COLOR</th>
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</thead>
<tbody>
<tr>
<td>LOCTITE® STYCAST ES 1902</td>
<td>Two-part, transparent, low-viscosity UV epoxy. Designed for potting and laminating applications where low color and excellent electrical and mechanical properties are desired. This material exhibits a fast UV gellation followed by room temperature cure. The ES 1902 has low shrinkage and bonds to most metals and many rigid plastics.</td>
<td>100:41.7</td>
<td>Clear</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 2500</td>
<td>Resilient, low-cost, fast-gelling potting compound. Designed for easy 2-to-1 meter mix-dispense machinery and low abrasion. This material is ideal for potting and encapsulating high-volume parts.</td>
<td>100:29.5</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST 2651-40</td>
<td>Low-viscosity, general-purpose epoxy encapsulant. Excellent adhesion to metals, plastics and ceramics. Compatible with CAT 9, CAT 11 and CAT 23LV.</td>
<td>100:9 (w/CAT 9)</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 2201</td>
<td>Unfilled, low-viscosity epoxy casting system with exceptional resistance to impact and thermal shock. Adheres well to lead and wire materials like PVC, vinyl and neoprene.</td>
<td>100:30</td>
<td>Amber</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 2204</td>
<td>Filled, low-viscosity epoxy casting system. Recommended for potting where high-impact strength is required. Adheres well to lead and wire materials like PVC, vinyl and neoprene.</td>
<td>100:15</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 2505</td>
<td>Low-viscosity, filled, dielectric-grade epoxy encapsulant designed for general-purpose applications. It is suitable for potting and encapsulating electrical devices that require flame retardancy. ES 2505 is RoHS-compliant version of 2651-40FR. Compatible with CAT 9, CAT 11 and CAT 23LV.</td>
<td>100:9.5 (w/CAT 11)</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 2510</td>
<td>Low-viscosity, dielectric-grade epoxy encapsulant designed for general-purpose applications. It is suitable for potting and encapsulating electrical devices that require flame retardancy. Excellent dielectric properties. ES 2510 is RoHS-compliant version of LA9823-76. Compatible with CAT 9 and CAT 11.</td>
<td>100:57</td>
<td>Beige</td>
</tr>
<tr>
<td>LOCTITE® STYCAST ES 6050</td>
<td>Filled, low volatile potting and sealing epoxy.</td>
<td>100:19.3</td>
<td>Pink</td>
</tr>
</tbody>
</table>

## TWO-COMPONENT SILICONEs

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>MIX RATIO BY WEIGHT</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCTITE® 5952</td>
<td>Two-part, addition-cure silicone encapsulant. Good thermal conductivity. Noncorrosive. Excellent electrical properties.</td>
<td>1:1</td>
<td>Red</td>
</tr>
<tr>
<td>LOCTITE® 5954</td>
<td>Two-part, highly filled, addition-cure, thermally conductive silicone. High thermal conductivity. Noncorrosive.</td>
<td>1:1</td>
<td>Red</td>
</tr>
</tbody>
</table>

## TWO-COMPONENT URETHANES

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>MIX RATIO BY WEIGHT</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCTITE® STYCAST U 2500</td>
<td>Encapsulant designed for transformers, PCBs and other insulation applications. Allows complete impregnation of either small, slightly wound coils or large castings.</td>
<td>100:07</td>
<td>Amber</td>
</tr>
<tr>
<td>LOCTITE® STYCAST US 1150</td>
<td>Extended polybutadiene/MDI base, mineral-filled, medium-hardness, ambient-cure urethane encapsulant/sealant. This material can be used for potting electronics or devices for protection against environmental hazards.</td>
<td>21:100</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST US 2050</td>
<td>Quick-setting, optically clear polyurethane compound that exhibits excellent ultraviolet resistance. The excellent electrical properties also suggest its use for electrical and electronic component encapsulation.</td>
<td>100:55</td>
<td>Clear</td>
</tr>
<tr>
<td>LOCTITE® STYCAST US 2250</td>
<td>Flexible, flame-retardant, mineral-filled polyurethane compound. This low-viscosity potting compound has a long pot life and adheres to many substrates.</td>
<td>21:2:100</td>
<td>Black</td>
</tr>
<tr>
<td>LOCTITE® STYCAST US 2650</td>
<td>Inexpensive, low-viscosity, flexible, flame-retardant, castor oil/MDI-based urethane potting/encapsulating compound. This material was designed for potting indoor and outdoor telephone connector blocks. It is suitable for potting and encapsulating other electronic or electrical devices or assemblies.</td>
<td>21:1:100</td>
<td>Tan</td>
</tr>
<tr>
<td>LOCTITE® STYCAST US 2651</td>
<td>Unfilled, low-viscosity, re-enterable potting and encapsulation compound. It can be used to encapsulate electronics for automotive applications, including under the hood.</td>
<td>52.3:47.7</td>
<td>Clear Amber</td>
</tr>
<tr>
<td>LOCTITE® STYCAST US 5544</td>
<td>Fast-gelling, flexible, flame-retardant urethane encapsulant. Low-viscosity material that flows well and adheres to a variety of substrates.</td>
<td>15:85</td>
<td>Opaque White</td>
</tr>
<tr>
<td>RECOMMENDED CURE SCHEDULE</td>
<td>ALTERNATE CURE CYCLE</td>
<td>VISCOSITY cP AT 25°C</td>
<td>POT LIFE AT 25°C</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------</td>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>UV- 20 sec. at 200mW/cm² plus 24 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>290</td>
<td>60 min.</td>
</tr>
<tr>
<td>16 hrs. @ 25°C</td>
<td>2 hrs. @ 65°C</td>
<td>1,500</td>
<td>10 min.</td>
</tr>
<tr>
<td>2 hrs. @ 65°C</td>
<td>24 hrs. @ 25°C</td>
<td>5,000</td>
<td>45 min.</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>600</td>
<td>35 min.</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>2,000</td>
<td>80 min.</td>
</tr>
<tr>
<td>60 min. at 120°C (w/CAT 11)</td>
<td>4 hrs. @ 100°C (w/CAT 11)</td>
<td>5,000</td>
<td>&gt;4 hrs.</td>
</tr>
<tr>
<td>2 hrs. @ 60°C</td>
<td>16 hrs. @ 40°C</td>
<td>5,500</td>
<td>2.5 hrs.</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>8,000</td>
<td>30 min.</td>
</tr>
<tr>
<td>48 hrs. @ 25°C</td>
<td>2 hrs. @ 65°C</td>
<td>40,000</td>
<td>100 min.</td>
</tr>
<tr>
<td>48 hrs. @ 25°C</td>
<td>4 hrs. @ 65°C</td>
<td>35,000</td>
<td>90 min.</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>4 hrs. @ 60°C</td>
<td>6,600</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>24 to 48 hrs. @ 25°C</td>
<td>2 to 4 hrs. @ 60°C</td>
<td>3,500</td>
<td>40 to 60 min.</td>
</tr>
<tr>
<td>48 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>1,200</td>
<td>4 min.</td>
</tr>
<tr>
<td>24 hrs. @ 25°C</td>
<td>2 hrs. @ 60°C</td>
<td>2,400</td>
<td>45 min.</td>
</tr>
<tr>
<td>16 hrs. @ 25°C</td>
<td>1 hr. @ 60°C</td>
<td>3,500</td>
<td>19.5 min.</td>
</tr>
<tr>
<td>16 hrs. @ 25°C</td>
<td>1 hr. @ 65°C</td>
<td>1,000</td>
<td>10 min.</td>
</tr>
<tr>
<td>4 hrs. @ 25°C</td>
<td>30 min. @ 85°C</td>
<td>2,000</td>
<td>3 min.</td>
</tr>
</tbody>
</table>