LOCTITE® TECHNOMELT® TEROSON® BERGQUIST® sonderhoff

HENKEL LIGHTING SOLUTIONS FOR THE AUTOMOTIVE INDUSTRY

Henkel

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TAIL LAMP

» Foam gasketing

CENTER HIGH MOUNT STOP LAMP (CHMSL) THIRD BRAKE LAMP

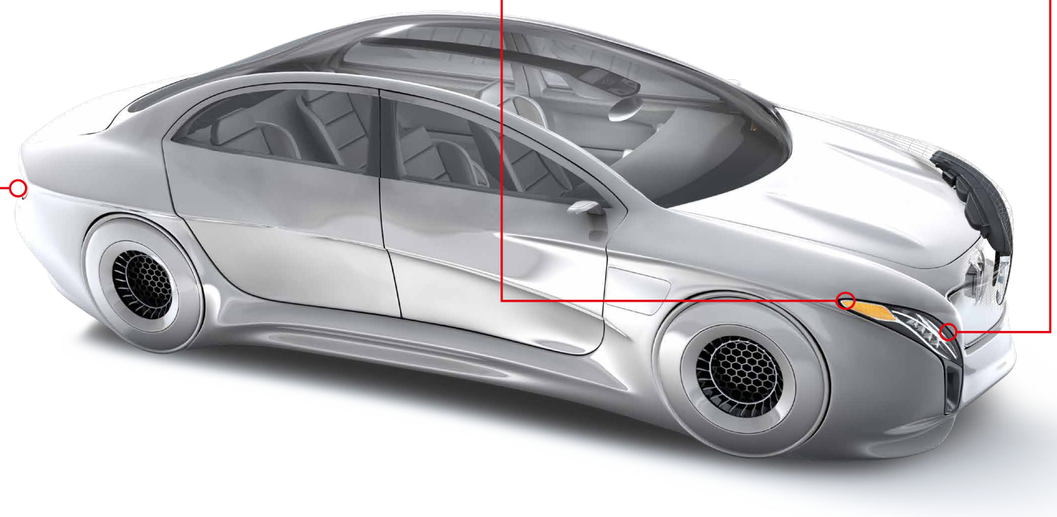
» Foam gasketing

HOUSING

» Lens to housing bonding
» Lens cover gasketing

HEAD / FOG LAMPS

» Lens to housing bonding
» Lens cover gasketing
» Signal lights



Core Technology Advantages

» Hot-applied and cold-applied adhesives available
» Fast and high green strength allows short cycle times and quick leak testing
» Excellent durability and high heat resistance
» Leader in external lighting assemblies
» Proven technology with long history of lighting assembly
» Low emission (fogging) technology

For high-quality automotive lamp assembly, lighting manufacturers trust Henkel adhesives for their design requirements and production processes.

Trusted Brands and Performance Materials

TECHNOMELT®

» High performance, reactive hotmelt for headlamp bonding applications
» Withstands and operates at higher exposure temperatures than traditional sealants and adhesives
» Able to bond to a wide range of substrates, while quickly achieving bond strength and leak-free assemblies

TEROSON®

» One-and two-component adhesives with excellent durability and fast curing properties
» Rubber based (RB) products provide good sealing performance and enable disassembly

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» Two-component soft formed in place foam gasketing (FIPFG)
» Cures at room temperature
» Customized chemistry for dynamic operations
» Good serviceability with ability to reopen parts
» Highly automated application with Sonderhoff dosing systems

Lighting Assembly Solutions

BONDING & SEALING SELECTION GUIDE

	Structural adhesives			Non structural adhesives		
	1C reactive	2C PU	MS	1C non-reactive Butyl	STM	2C PU foam
Key features and benefits	» Easy process » High green strength	» Faster full curing » Dispensing at RT*	» High elongation » Label free » Dispensing at RT*	» Easy process and storage » Adhesion on LSE**	» Allows disassembly » Very high elongation	» Allows easy disassembly » Customizable features » Dispensing at RT*
Technology	Hotmelt PU	PU	Modified Silane	Butyls	Soft Tack Melt	PU
Curing	Chemical reaction (by moisture and temperature)	Chemical reaction	Chemical reaction (by moisture)	Physical setting of material (by cooling)	Compression sealing	Chemical reaction
Application temperature	High	RT*	RT*	Very high	Very high	RT*

RT*: Room Temperature // LSE**: Low Energy Substrate // BMC***: Bulk Molding Compound

LIGHTING ASSEMBLY SOLUTIONS

PUR HOTMELT

» Reactive moisture-curing hotmelt adhesives are designed for fast processes due to quick setting time
» Operating temperature 110 – 140°C
» Mixing ratio not required (1C system)

Process Efficiency
» Simple processing
» Short cycle times
» High green strength

Highest Quality
» High heat resistance
» Excellent durability
» Low fogging

TECHNOMELT®

TECHNOMELT 1C PUR HOTMELT PORTFOLIO (STRUCTURAL ADHESIVES)

TECHNOMELT	PUR 34-858B	PUR 9350	PUR 34-712A	PUR 8831
Color	Black solid	Black solid	Black solid	Black solid
Application temperature	140 °C	130 °C	120 °C	120 °C
Viscosity (m·Pas)	22,000 @ 135°C	12,500 @ 130°C	17,000 @ 120°C	8,000 @ 120°C
Density (g/ccm)	1.05	1.20	1.05	1.15
Open time (sec)	< 30	< 60	< 60	< 90
Packing unit	18kg	20kg foil bag	18kg	20kg foil bag
Application equipment type	Bulk Melter	Bulk/Bag Melter	Bulk Melter	Bulk/Bag Melter
Key performance	Higher green strength	Heat stability	Excellent adhesion to difficult surfaces (e.g. steel, PC, BMC***)	Faster curing

RT*: Room Temperature // LSE**: Low Energy Substrate // BMC***: Bulk Molding Compound

LIGHTING ASSEMBLY SOLUTIONS
2C PU

» TEROSON 2C Polyurethane adhesives (Polyol + Isocyanate hardener) with proven adhesion to PP (pretreated) and PC
» Application at room temperature
» Mixing ratio 5:1 (standard)

Process Efficiency
» Room temperature application (no required heating to dispense)
» Faster curing speed (moisture not required for curing)
» Curing can be accelerated with IR heater

Highest Quality
» Superior characteristics
» High durability

TEROSON®

TEROSON 2C PU PRODUCT PORTFOLIO

TEROSON	U433 + U142	U632 + U152	U642 + U154
Color	Black	Black	Black
Application temperature	Room temperature	Room temperature	Room temperature
Viscosity (m·Pas @ 23°C)	A: 100,000 – 220,000 // B: 14,000 – 40,000		
Mix ratio (by volume)	100 : 22	100 : 21.3	100 : 21.6
Pot life @ 23°C	5.5 min	3 min	3 min
Adhesion strength	~1.5 MPa	~1.5 MPa	~2 MPa
Application equipment	Meter mix pump / Static mix head	Meter mix pump / Static mix head	Meter mix pump / Static mix head
Key performance	Higher green strength Able to leak test soon after application		Higher demand for low fogging at temperature up to 130°C

LIGHTING ASSEMBLY SOLUTIONS
SILANE MODIFIED POLYMER

» TEROSON MS 930 is a one component adhesive based on silane modified polymer
» Used for bonding of headlamp lens to PP housings when PU hotmelts are not preferred
» High elongation provides effective sealing throughout defined service temperatures
» 0% isocyanate content
» Long open time and good adhesion on different substrates

TEROSON®

Process Efficiency
» High flow ability for rapid dispensing
» Allows for quick leak testing

Highest Quality
» Non hazardous adhesive (Isocyanate-free and label-free)
» Low application temperature

TEROSON SILANE MODIFIED POLYMER PORTFOLIO

TEROSON	MS 930
Color	Black, grey or white
Application temperature	5 – 40°C
Viscosity (m·Pas @ 23°C)	Pasty, thixotropic
Elongation	Approximately 490%
Solids	100%

LIGHTING ASSEMBLY SOLUTIONS

RUBBER BASED

- TEROSON RB soft rubber sealant for automotive lamps
- Enables disassembly of headlamps while offering good sealing properties
- Mixing ratio not required (1C)

Process Efficiency
- Simple processing
- No required treatment on PP

Highest Quality
- Excellent durability

TEROSON®

TEROSON RUBBER PRODUCT PORTFOLIO

TEROSON	RB H378	RB 4040
Color	Black	Black
Application temperature	170 – 180°C	200 – 220°C
Viscosity (m·Pas)	200,000 @ 180°C	115,000 @ 210°C
Application equipment	Standard melter, Bulk melter	Drum melter, Block melter
Key performance	Good adhesion with lens materials	STM; Easily removed for disassembly

LIGHTING ASSEMBLY SOLUTIONS

TAILOR-MADE CHEMISTRY FOR EVOLVING REQUIREMENTS

SONDERHOFF FERMAPOR K31 is a two-component polyurethane (PU) system which produces soft, elastic foam gaskets using Formed-In-Place-Foam-Gasket (FIPFG) technology. The system consists of a basic resin and a hardener, which are combined in a pre-determined mixing ratio to produce a flexible sealing foam in minutes.

The material is applied directly onto the part and reacts to form a seamless foam seal. After reaction of the material components, the foam gasket is tack-free and can be assembled into mating components. The sealing function is achieved with a compression of approximately 30 to 60% of the cured foam gasket. Highly customizable, the flow behavior, reactivity and color of the material formulations can be adjusted as required.

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Two-dimensional application on a flat surface
Thixotropic (pasty) sealing systems are preferred. Depending on the degree of viscosity, they form a seal body with a height/width ratio of 1:3 to 1:1.5.

2-dimensional application in a groove
Liquid sealing systems, which are self-levelling over the coupling area, are usually used in this case. This allows seamless foam seals to be created.

Three-dimensional application on flat surface
Thixotropic (pasty) sealing systems are preferred. Depending on the degree of viscosity, they form a seal body with a height/width ratio of 1 : 3 to 1 : 1.5. Use is possible even with extreme slopes up to vertical applications.

Three-dimensional application in a groove
Thixotropic (pasty) sealing systems are most often used. It is also possible to apply gaskets on extreme slopes and on vertical applications.

LIGHTING ASSEMBLY SOLUTIONS

PHYSICAL AND CHEMICAL PROPERTIES
SONDERHOFF FERMAPOR K31 SERIES

» **Sealing of CHMSL/3rd brake lamp/rear lamp**
Sealing against water and dust SONDERHOFF FERMAPOR K31

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SONDERHOFF FERMAPOR K31	
Appearance	Black or grey, other colors upon request
Hardness	from shore 00 to 40 shore A achievable
Compression load deflection	from 5 to 200 Pa at 25% compression
Density	from 0.1g/cm³ to 0.6g/cm³
Temperature resistance	from -40°C to +80°C
Viscosity	900 – 200,000 m·Pas
Tensile strength	up to 2MPa [N/cm²]
Elongation at break	up to 400%
Resetting ability	>95% (<5% compressive deformation rest), depending on test conditions
Water absorption	from < 3.5%, hydrophobic versions available
Flame retardancy	up to UL- 94HF-1 possible
Optional features	e.g. sliding properties (achievable with suitable component design)

LIGHTING ASSEMBLY SOLUTIONS

SONDERHOFF FERMAPOR K31

» Formed-in-Place-Foam-Gasket (FIPFG) technology
» 2C Polyurethane Foam (Polyol + Isocyanate hardener)
» Operates/mixes/dispenses at room temperature
» Use with SONDERHOFF equipment (preferred mixing and dosing DM 402 and mixing head MK 625)

Process Efficiency
» Room temperature application, no heating required
» Customizable features (curing speed, color, density, hardness, etc.)

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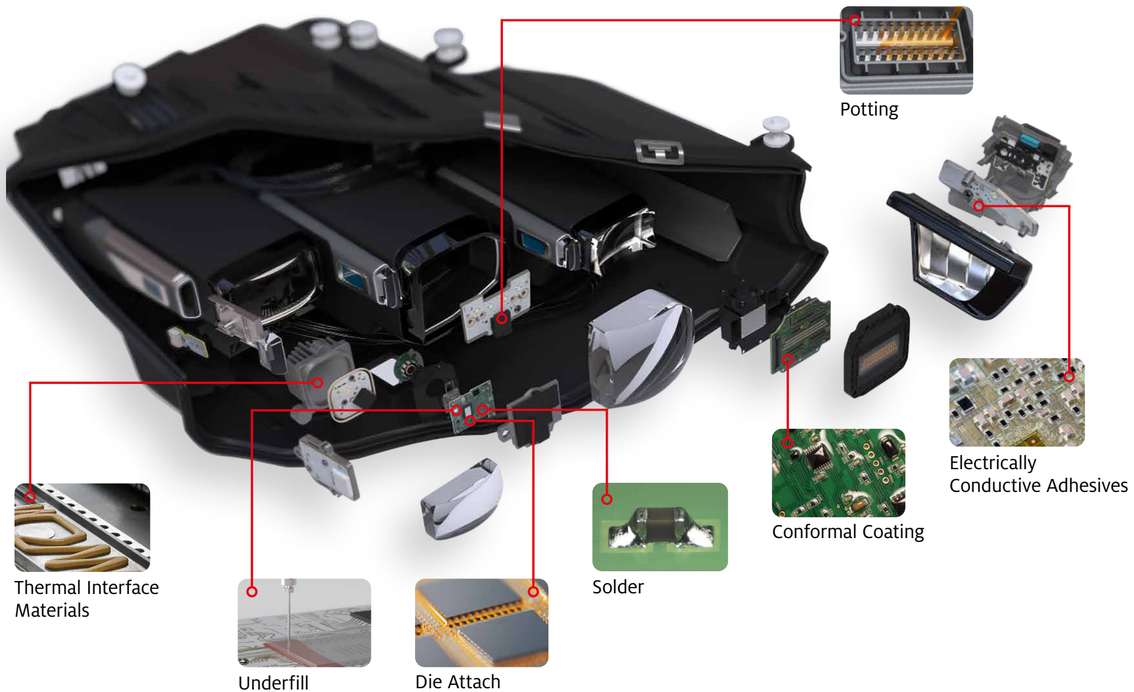
Superior Quality
» Low density (0.1-0.6 g/ccm)
» Excellent resetting ability enables repeated opening and closing without any loss of tightness
» FIPFG optimized part design possible

SOLUTION PORTFOLIO FOR LEDS AND CONTROL MODULES



THERMAL INTERFACE MATERIALS

» Comprehensive portfolio of thermal interface materials (TIMs)
» Wide variety of TIM mediums (pads, liquids, gels, etc.) to meet specific component designs and requirements

THERMAL INTERFACE MATERIAL

Product	Type	Chemistry	Curing	Thermal conductivity [ASTM D5470]	Key product benefits
BERGQUIST GAP FILLER TGF 1500LVO	Gap Filler	Silicone (2C)	RT or heat	1.8 W/m-K	· Low volatile gap filler (<100ppm) for silicone sensitive applications and low optical impact · Ultra-conforming, with excellent wet-out for low stress interface applications
BERGQUIST GAP FILLER TGF 3500LVO	Gap Filler	Silicone (2C)	RT or heat	3.5 W/m-K	· Low volatile gap filler (<40ppm) for silicone sensitive applications and low optical impact · Ultra-conforming, with excellent wet-out for low stress interface applications
BERGQUIST SIL PAD TSP K1300	Sil Pad	Silicone	n/a	1.3 W/m-K	· Good cut-through properties · High dielectric strength
BERGQUIST SIL PAD TSP 1600S	Sil Pad	Silicone	n/a	1.6 W/m-K	· Electrically isolating · Glass-weave reinforced for mechanical robustness
BERGQUIST SIL PAD TSP Q2500	Sil Pad	Silicone	n/a	2.5 W/m-K	· Not electrically isolating · High thermal performance due to graphite laminate · Easy reworkability, optional: available with one-sided adhesive coating
BERGQUIST HI FLOW THF 1500P	Hi Flow	Silicone-free	n/a	1.5 W/m-K	· Phase change tape with high dielectric isolation properties · Excellent wet-out due to thin phase change laminate on both sides · High temperature stability up to 150°C
LOCTITE TCP 2875	Thermally conductive adhesive	Acrylate (2C)	RT	1.2 W/m-K	· Thermally conductive material with adhesive properties · Corrosion resistant · Fast cure
LOCTITE 3875	Thermally conductive adhesive	Acrylate (2C)	RT	1.75 W/m-K	· Thermally conductive material with adhesive properties, designed to thermally couple and structurally bond heats sinks to heat dissipating electronic components · Fast cure bead-on-bead application necessary · Formulated to cure when the two components encounter one another, requiring no primer or heat
BERGQUIST TLB SA2005RT	Thermally conductive adhesive	Silicone (2C)	RT or heat	2.0 W/m-K	· Adaptive cure kinetics depending on process requirements · Good lap shear on various surfaces · High elongation-to-break

CONNECTING MATERIALS
LEAD-FREE SOLDER PASTES

» Halogen-free solder paste systems with excellent processability delivering best-in-class solder joint reliability
» Consistently low voiding performance for use on LED modules

HIGH RELIABILITY SOLDER PASTE

- 90iSC is a high-resistance alloy that delivers robust solder joint reliability during thermal cycling, thermal aging and mechanical stress between -40°C and 150°C
- Compliant with OEM automotive engineering test MS184-01 for high-stress components; maintains more than 75% of joint strength after thermal cycling

Product	Alloy	Particle size type	Flux description	Optimal shelf life	Key product benefits
LOCTITE HF 212	90ISC SAC305	Type 3, 4	ROL0, Halogen free	6 months @ 0 – 10°C	• 90ISC alloy recommended to reduce solder joint failure rate caused by thermal stress, vibration or drop/shock • Wide process window • Flux is compatible with 90ISC and standard SAC alloys

TEMPERATURE STABLE SOLDER PASTE

- Improved paste management, saving indirect costs related to energy, performance, waste and reliability
- Consistent low-voiding performance under large thermal pad area components (e.g., LED, QFN)
- High surface insulation resistance (SIR)
- Excellent compatibility with protection, encapsulation and thermal management materials

Product	Alloy	Particle size type	Flux description	Optimal shelf life	Key product benefits
LOCTITE GC18	SAC305	Type 3, 4	ROL0, Halogen free	12 months @ 26°C	• Very low voiding (<20%) • High SIR under harsh conditions
LOCTITE GC50	SAC305	Type 3	ROL0, Halogen free	12 months @ 26°C	• Jetting and dispensing application solder paste for volume add-on or prototyping

CONNECTING MATERIALS
ELECTRICALLY CONDUCTIVE ADHESIVES & DIE ATTACH

» Allow for increased flexibility compared to solder materials
» Use of non-noble metallization possible
» Rigid to flexible systems available
» Lower and faster cure temperatures vs. solder
» Miniaturization possible (no flux residues)
» Pass automotive reliability requirements

ELECTRICALLY CONDUCTIVE ADHESIVE

Product	Chemistry	Cure mechanism	Operating temperature	Key product benefits
LOCTITE ABLESTIK CE 3103WLV	Epoxy	Heat cure	Up to 150°C	• Pb-free alternative to solder • Passes NASA outgassing standards • Low cure temperature • Fast cure
LOCTITE ABLESTIK 2030SC	Hybrid chemistry	Heat cure	Up to 150°C	• Developed for use in high throughput die attach applications • Developed to minimize stress and resulting warpage between dissimilar surfaces • Low stress • Snap curable

DIE ATTACH PASTES

Product	Chemistry	Cure mechanism	Operating temperature	Key product benefits
LOCTITE ABLESTIK ABP 8037TI	Acrylate	Heat cure	Up to 150°C	• Specifically designed for LED applications • High reliability in demanding environments (high temperature stability, thermal cycling)
LOCTITE ABLESTIK QMI529HT	BMI/ Acrylate	Heat cure	Up to 150°C	• High thermal conductivity • High MSL* reliability and resistance to delamination

MSL*: Moisture Sensitivity Level

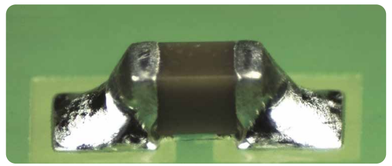
PROTECTING MATERIALS
UNDERFILL

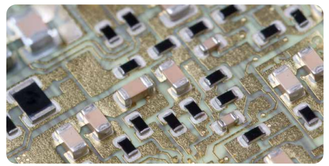
» Enhances solder interconnect reliability
» Fast flow and cure capability
» REACH (SVHC) and CMR compliant

UNDERFILL SOLUTIONS

Product	Chemistry	Cure mechanism	Operating temperature	Key product benefits
LOCTITE ECCOBOND E 1216M	Epoxy	Heat cure	Up to 105°C	• Very fast cure • Good processing stability and very long worklife • CMR and SVHC Free • Low cure temperature possible
LOCTITE ECCOBOND UF 1173	Epoxy	Heat cure	Up to 150°C	• Low CTE, high Tg for excellent reliability enhancement • Good processing stability and long worklife • CMR and SVHC-free • Excellent flux compatibility


THERMAL INTERFACE MATERIALS


SOLDER PASTES

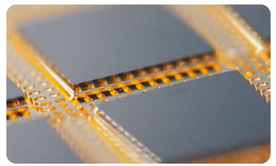

ELECTRICALLY CONDUCTIVE ADHESIVES

PROTECTING MATERIALS
CONFORMAL COATING & POTTING

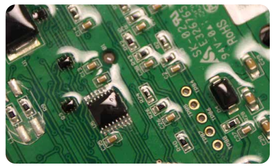
» Environmental protection for the substrate/printed circuit board (PCB)

CONFORMAL COATINGS & POTTING

Product	Type	Chemistry	Cure mechanism	Operating temperature	Key product benefits
LOCTITE STYCAST PC 62	Conformal Coating	Acrylate	Air dry @ RT	Up to 125°C	• Colourless • Rapid drying • Fluorescent under UV light
LOCTITE SI 5293	Conformal Coating	Silicone (1C)	UV	Up to 200°C	• High flexibility • Fast cure • High operating temperature • Fluorescent under UV light • Protection of PCB around the LED
LOCTITE SI 5710	Potting	Silicone (2C)	RT or heat	Up to 200°C	• Transparent (optically clear) potting for LED trays


DIE ATTACH PASTES


UNDERFILL


CONFORMAL COATINGS


POTTING

LOCTITE® TECHNOMELT® TEROSON® BERGQUIST® sonderhoff

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