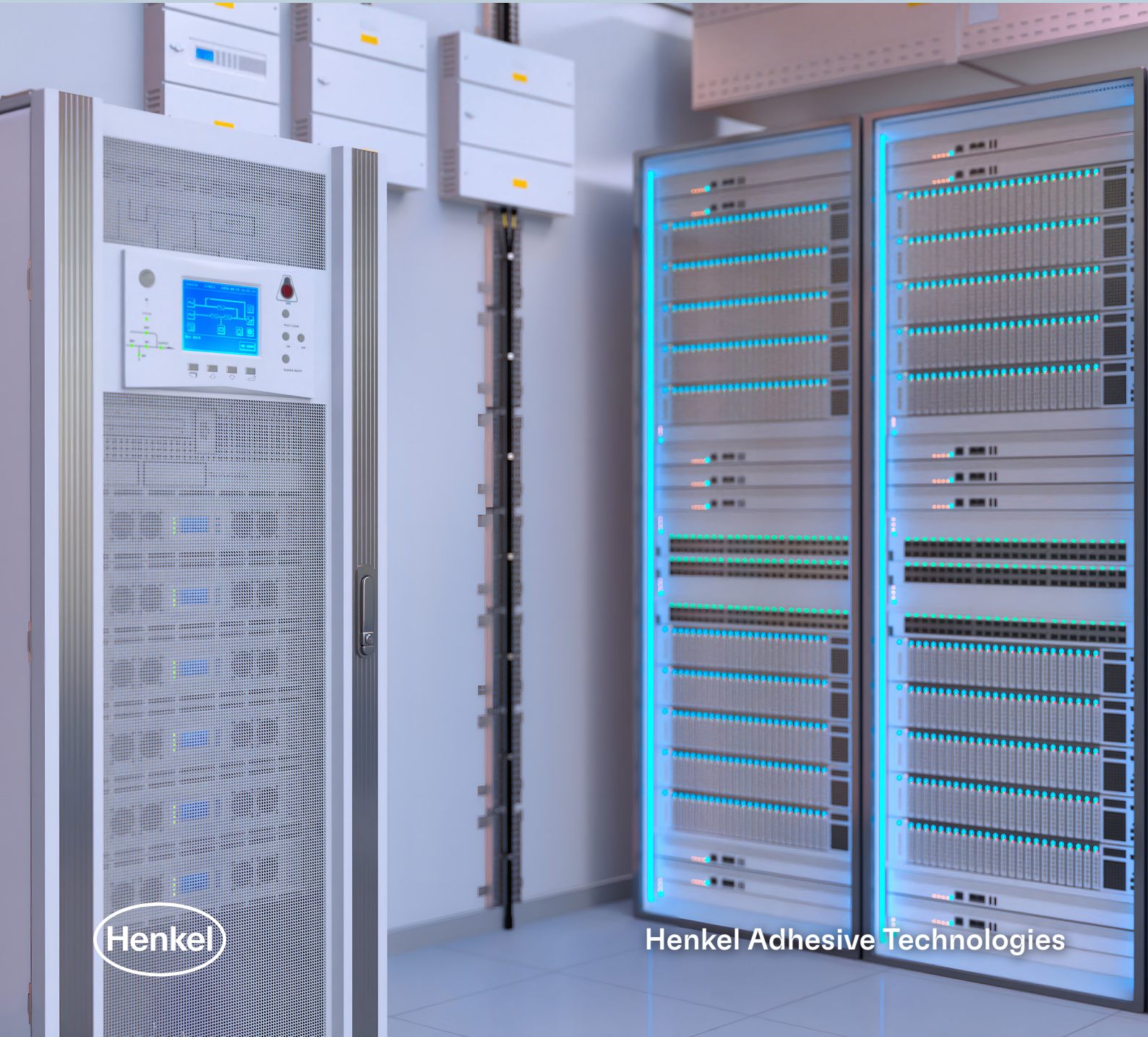
LOCTITE® TECHNOMELT®

sonderhoff BERGQUIST®

MATERIAL SOLUTIONS FOR
UNINTERRUPTIBLE POWER SUPPLY (UPS)

Formulated for Continuous Performance and Sustainable Results



Henkel

Henkel Adhesive Technologies

CONTENTS

UNINTERRUPTIBLE POWER SUPPLY (UPS) TECHNOLOGY

UPS systems, which are more efficient and intelligent than ever before, are designed to keep critical equipment running and offer protection from unclean power sources. As server space becomes more valuable, UPS designers are under pressure to make increasingly compact devices that can support higher power, provide efficiency, integrate additional functional features and reduce off-state power consumption. This improved performance and reduced size must be achieved while controlling UPS device cost to remain competitive. Realizing many of these goals is dependent upon materials performance and it's why UPS designers and manufacturers partner with Henkel for their electronic material requirements.

INDUSTRY-LEADING SOLUTIONS

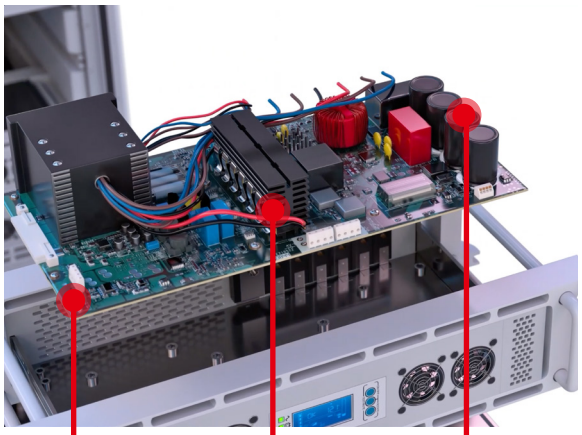
With an expansive range of materials to facilitate UPS function and dependability, Henkel's innovations are helping meet UPS price/performance expectations by pushing power density boundaries and reducing the total cost of ownership. Once UPS specialists partner with Henkel, they are fully supported by the company's broad global footprint, local access to technical assistance and unmatched R&D expertise.

MATERIAL SOLUTIONS FOR

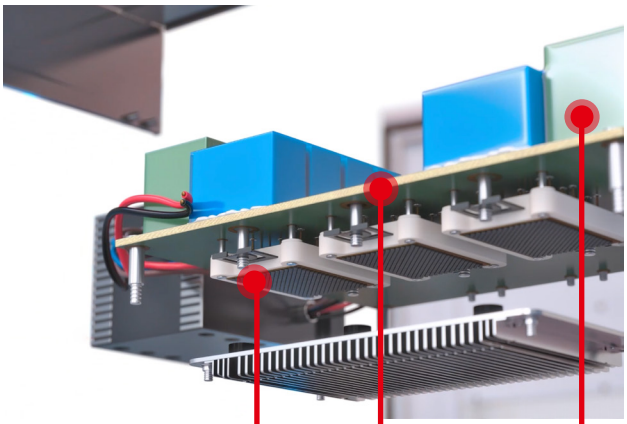
UPS Device

DIFFERENT TYPES OF CONVERTER BOARDS

Power Module System



Discrete Component System



THERMAL INTERFACE MATERIALS

Henkel thermal interface materials (TIMs) provide safety agency recognized insulation while providing an efficient thermal path for the removal of heat. Without proper heat management, the lifetime and effectiveness of electronic components is compromised. Many of Henkel's TIMs have relative thermal indices (RTI) above 130°C which complies with safety agency standards, allowing significant reductions in testing time and cost and enabling faster commercialization for UPS designers. Higher-performing TIMs also support increased power density designs within more compact architectures to address server room space challenges.

THERMAL MATERIALS FOR UPS

BOND-PLY	GAP PAD®	GAP FILLER	PHASE CHANGE	SIL-PAD®
BERGQUIST® BOND-PLY TBP 1400LMS-HD	BERGQUIST® GAP PAD® TGP 100VOUS	BERGQUIST® GAP FILLER TGF 1500	BERGQUIST® HI-FLOW THF 1500P	BERGQUIST® SIL PAD® TSP K900
	BERGQUIST® GAP PAD® TGP HC3000	BERGQUIST® GAP FILLER TGF 1500LVO	BERGQUIST® HI-FLOW THF 1600G	BERGQUIST® SIL PAD® TSP K1100
	BERGQUIST® GAP PAD® TGP HC5000	BERGQUIST® GAP FILLER TGF 3500LVO	BERGQUIST® HI-FLOW THF 1600P	BERGQUIST® SIL PAD® TSP 1100ST
	BERGQUIST® GAP PAD® TGP 6000ULM	BERGQUIST® GAP FILLER TGF 3600	LOCTITE® TCP 4000 D	BERGQUIST® SIL PAD® TSP K1300
	BERGQUIST® GAP PAD® TGP 7000ULM	BERGQUIST® GAP FILLER TGF 4000		BERGQUIST® SIL PAD® TSP K1600
		BERGQUIST® GAP FILLER TGF 4500CVO		BERGQUIST® SIL PAD® TSP 1600S
		BERGQUIST® GAP FILLER TGF 3000SF		BERGQUIST® SIL PAD® TSP 1800ST
				BERGQUIST® SIL PAD® TSP Q2000
				BERGQUIST® SIL PAD® TSP Q2000
				BERGQUIST® SIL PAD® TSP Q2500
				BERGQUIST® SIL PAD® TSP 3500

BOND-PLY

Product Name	Description	Key Attributes	Thermal Conductivity (W/m·K)	Dielectric Breakdown Voltage	Thickness (mm)	Recommended Cure	Flammability Rating
BERGQUIST® BOND-PLY TBP 1400LMS-HD	Thermally conductive, heat curable laminate material	• TO-220 Thermal performance: 2.3°C/W, initial pressure only lamination • Exceptional dielectric strength • Very low interfacial resistance • 200 psi adhesion strength • Continuous use of -60 – 180°C • Eliminates mechanical fasteners	1.4	5,000	0.254 – 0.457	30 min. at 125°C	UL 94 V-0

GAP PAD®

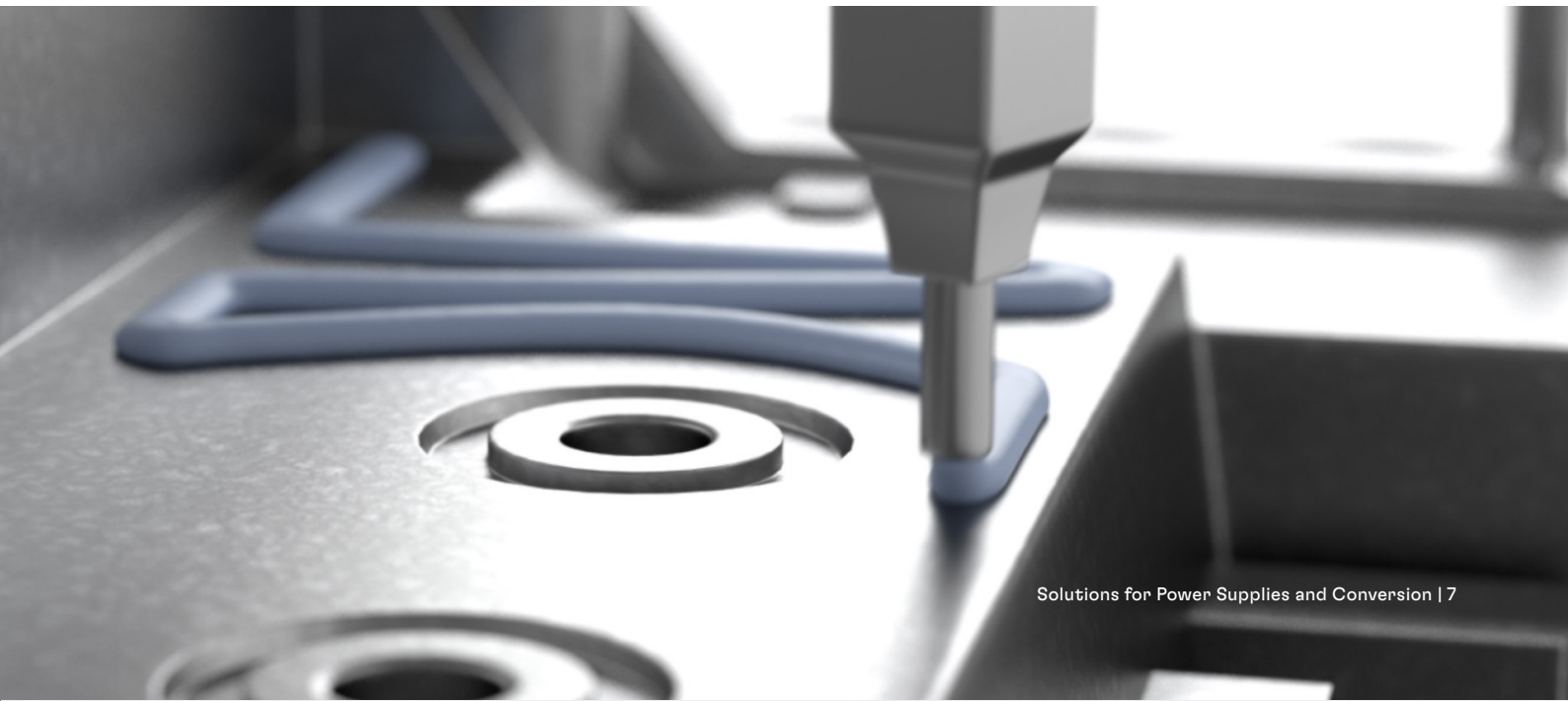
Product Name	Description	Key Attributes	Thermal Conductivity (W/m·K)	Modulus at 25°C (kPa)	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST® GAP PAD® TGP 1000VOUS	Thermally conductive gap filling material	• Highly conformable, low hardness • "Gel-like" modulus • Decreased strain • Puncture, shear and tear resistant • Electrically isolating	1.0	55	6,000 V at 500 µm	0.508 – 6.350	UL 94 V-0
BERGQUIST® GAP PAD® TGP HC3000	Thermally conductive gap filling material	• High-compliance, low compression stress • Fiberglass reinforced for shear and tear resistance • Low modulus	3.0	110	5,000 V at 500 µm	0.508 – 3.175	UL 94 V-0
BERGQUIST® GAP PAD® TGP HC5000	Thermally conductive gap filling material	• Highly conformable • Exceptional thermal performance • High-compliance, low compression stress • Fiberglass reinforced for shear and tear resistance • Low modulus	5.0	121	5,000 V at 500 µm	0.508 – 3.175	UL 94 V-0
BERGQUIST® GAP PAD® TGP 6000ULM	High performance thermally conductive gap filling material with ultra low modulus	• Thermally conductive: 6.0 W/m·K • High-compliance, low compression stress • Ultra low modulus	6.0	41	5,000 V at 500 µm	1.524 – 3.175	UL 94 V-0
BERGQUIST® GAP PAD® TGP 7000ULM	High performance thermally conductive gap filling material with ultra low modulus	• Thermally conductive: 7.0 W/m·K • Highly conformable, extremely low compression stress • Conforms and maintains structured integrity with minimum stress applied	7.0	28	5,000 V at 500 µm	1.016 – 3.175	UL 94 V-0

GAP FILLER

Product Name	Description	Key Attributes	Thermal Conductivity (W/m·K)	Viscosity at 25°C (cP)	Dielectric Strength (V/25 µm)	Recommended Cure	Flammability Rating
BERGQUIST® GAP FILLER TGF 1500	Two-part, high performance, thermally conductive liquid gap filling material	• Optimized shear thinning characteristics for ease of dispensing • Excellent slump resistance (stays in place) • Ultra-conforming with excellent wet-out for low stress interface applications • 100% solids – no cure by-products • Excellent low and high temperature mechanical and chemical stability	1.8	250,000	400	5 hr. at 25°C	UL 94 V-0

GAP FILLER (CONTINUED)

Product Name	Description	Key Attributes	Thermal Conductivity (W/m·K)	Viscosity at 25°C (cP)	Dielectric Strength (V/25 µm)	Recommended Cure	Flammability Rating
BERGQUIST® GAP FILLER TGF 1500LVO	A two-part, high performance, thermally conductive liquid gap filling material with significantly lower levels of silicone outgassing	• Thermal conductivity: 1.8 W/m·K • Low volatility for silicone sensitive applications • Ultra-conforming, with excellent wet-out • 100% solids — no cure by-products • Excellent low and high temperature mechanical and chemical stability	1.8	20,000	400	8 hr. at 25°C	UL 94 V-0
BERGQUIST® GAP FILLER TGF 3500LVO	Thermally conductive, low outgassing liquid gap filling material	• Low volatility for outgassing sensitive applications • Ultra-conforming with excellent wet-out for low stress interfaces on applications • 100% solids - no cure by-products • Ambient or accelerated cure schedules	3.5	45,000	275	24 hr. at 25°C	UL 94 V-0
BERGQUIST® GAP FILLER TGF 3600	Thermally conductive liquid gap filling material	• High thermal performance • Thixotropic nature makes it easy to dispense • Ultra-conforming material designed for fragile and low-stress applications • Ambient or accelerated cure schedules	3.6	150,000	275	15 hr. at 25°C	UL 94 V-0
BERGQUIST® GAP FILLER TGF 4000	Two-part, high thermal conductivity, liquid gap filling material	• Extended working time for manufacturing flexibility • Ultra-conforming, with excellent wet-out • 100% solids - no cure by-products • Excellent low and high temperature mechanical and chemical stability	4.0	50,000	450	24 hr. at 25°C 30 min. at 100°C	UL 94 V-0
BERGQUIST® GAP FILLER TGF 4500CVO	Two-part, high performance, thermally conductive, liquid gap filling material	• Thermal conductivity: 4.5 W/mK • Extended working time for manufacturing flexibility • Controlled Volatile Silicones • High dispense throughput • Optimized viscosity for automated dispensing processes	4.5	20,000	–	48 hr. at 25°C	UL 94 V-0
BERGQUIST® GAP FILLER TGF 3000SF	Two-part room temperature curable gap filler suitable for use in high throughput assembly applications	• Thermal Conductivity: 3.0 W/m-K • Dispensable liquid, 2K Silicone free Gap Filler • Room temperature cure - no oven required • Extremely high dispense rate: Equipment dependent • Low compression stress during assembly	3.0	22,000	–	72 hr. at 25°C 3 hr. at 85°C	UL 94 V-0



PHASE CHANGE

Product Name	Description	Key Attributes	Thermal Conductivity (W/m·K)	Volume Resistivity (Ω·m)	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST® HI-FLOW THF 1500P	Thermally conductive phase change material, reinforced with a polyimide film that provides high dielectric strength and cut through resistance	• Thermal impedance: 0.20°C-in²/W (at 25 psi) • 150°C high temperature reliability • Natural tack one side for ease of assembly • Exceptional thermal performance in an insulated pad	1.5	1 x 10^{12}	5,000	0.114 – 0.140	UL 94V-0
BERGQUIST® HI-FLOW THF 1600G	Thermally conductive 55°C phase change compound coated on a fiberglass web, designed as a thermal interface material between a computer processor and a heat sink	• Thermal impedance: 0.20°C-in² /W (at 25 psi) • Will not drip or run like grease • Phase change compound coated on a fiberglass carrier	1.6	1 x 10^{8}	300	0.127	UL 94V-0
BERGQUIST® HI-FLOW THF 1600P	Thermally conductive 55°C phase change compound coated on a thermally conductive polyimide film	• Thermal impedance: 0.13°C-in²/W (at 25 psi) • Field-proven polyimide film with excellent dielectric performance and cut-through resistance • Outstanding thermal performance in an insulated pad	1.6	1 x 10^{12}	5,000	0.102 – 0.127	UL 94V-0
LOCTITE® TCP 4000 D	Non-silicone, reworkable phase-change material supplied as a paste that can be stenciled, needle-dispensed or screen-printed onto a heat sink, base plate or other surfaces	• Reworkable • Highly efficient thermal transfer • Thixotropic above phase change temperature	3.4	1 x 10^{9}	N/A	0.025 – 0.250	–

SIL PAD®

Product Name	Description	Key Attributes	Thermal Conductivity (W/m·K)	Hardness	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST® SIL PAD® TSP K900	Specially developed film that withstands high voltages and requires no thermal grease	• Thermal impedance: 0.48°C-in² /W (at 50 psi) • Withstands high voltages • High dielectric strength • Very durable	0.9	90 (Shore 00)	6,000	0.152	UL 94 VTM-0
BERGQUIST® SIL PAD® TSP K1100	Medium performance film coated with silicone elastomer to provide a strong dielectric barrier	• Thermal impedance: 0.49°C-in² /W (at 50 psi) • Physically strong dielectric barrier against cut-through • Medium performance film	1.1	90 (Shore 00)	6,000	0.152	UL 94 VTM-0
BERGQUIST® SIL PAD® TSP 1100ST	Fiberglass-reinforced material that is inherently tacky on both sides for easy handling in high volume assemblies	• Inherent tack on both sides for exceptional thermal performance and easy placement • Re-positionable for higher utilization, ease of use and assembly error reduction • Exceptional thermal performance even at a low mounting pressure	1.1	85 (Shore 00)	5,000	0.305	UL 94 V-O

SIL PAD® CONTINUED

Product Name	Description	Key Attributes	Thermal Conductivity (W/m·K)	Hardness	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST® SIL PAD® TSP K1300	High performance insulator to replace ceramic insulators such as Beryllium Oxide, Boron Nitride, and Alumina	• Thermal impedance: 0.41°C-in² /W (at 50 psi) • Tough dielectric barrier against cut-through • High performance film • Designed to replace ceramic insulators	1.3	90 (Shore 00)	6,000	0.152	UL 94 VTM-0
BERGQUIST® SIL PAD® TSP 1600	Highly compliant pad that provides high thermal performance and electrical isolation at low mounting pressures	• Thermal impedance: 0.45°C-in² /W (at 50 psi) • High value material • Smooth and highly compliant surface • Electrically isolating	1.6	91 (Shore A)	3,000	0.127	UL 94 V-0
BERGQUIST® SIL PAD® TSP 1600S	Thermally conductive insulation material that provides high thermal performance and electrical isolation at low mounting pressures	• Thermal impedance: 0.61°C-in²/W (at 50 psi) • Electrically isolating • Low mounting pressures • Smooth and highly compliant surface • General-purpose thermal interface material solution	1.6	92 (Shore A)	5,500	0.229	UL 94 V-0
BERGQUIST® SIL PAD® TSP 1800ST	Fiberglass-reinforced material that is tacky on both sides for high volume assemblies	• Thermal impedance: 0.23°C-in²/W (at 50 psi) • Naturally tacky on both sides • Pad is reposition-able • Excellent thermal performance • Auto-placement and dispensable	1.8	75 (Shore 00)	3,000	0.203	UL 94 V-0
BERGQUIST® SIL PAD® TSP Q2000	Fiberglass-reinforced grease replacement that withstands processing stresses without losing physical integrity and provides ease of handling during application	• Thermal impedance: 0.35°C-in²/W (at 50 psi) • Eliminates processing constraints typically associated with grease • Conforms to surface textures • Easy handling • May be installed prior to soldering and cleaning without worry	2.0	86 (Shore A)	Non-Insulating	0.127	UL 94 V-0
BERGQUIST® SIL PAD® TSP Q2500	Aluminum foil coated on both sides with thermally/electrically conductive rubber for applications needing maximum heat transfer but not requiring electrical isolation	• Thermal impedance: 0.22°C-in²/W (at 50 psi) • Maximum heat transfer • Aluminum foil coated both sides • Designed to replace thermal grease	2.5	93 (Shore A)	Non-Insulating	0.152	UL 94 V-0
BERGQUIST® SIL PAD® TSP Q3500	High performance, thermally conductive insulator	• Thermal impedance 0.33°C-in²/W (at 50 psi) • Optimal heat transfer • High thermal conductivity 3.5 W/m-K	3.5	90 (Shore A)	4000 V	0.254 – 0.508	UL 94 V-O

PROTECTING MATERIALS FOR UPS

PCB AND COMPONENT PROTECTION

Regardless of the environmental conditions, uninterruptible power supplies must work when needed. Even in the most challenging of conditions, robust protection of the PCB and electrical components will help safeguard UPS functionality. LOCTITE® and TECHNOMELT® brand circuit board protection materials deliver critical defense against harsh environments and electrically harmful conditions. Henkel's conformal coatings keep electronic circuits shielded from dust, moisture, and other contaminants; TECHNOMELT® low pressure molding materials provide a fast, non-damaging solution for electronic encapsulation; and a wide variety of potting material chemistries including silicone, epoxy and polyurethane offer processing flexibility and maximum protection. With environmental consciousness as a priority, Henkel's materials development efforts focus on formulation of halogen-free, SVHC-free, solvent-free and low-VOC products.

PROTECTING MATERIALS FOR UPS					
POTTING MATERIALS	CIRCUIT BOARD PROTECTION	ENCAPSULANT	UNDERFILL	SEALING/GASKETING	
POLYURETHANE	CONFORMAL COATING	EPOXY	EPOXY	FORM IN PLACE FOAM GASKETI (FIPG)	CURE IN PLACE
LOCTITE® STYCAST US 2350	LOCTITE® PC-40 UMF	LOCTITE® ABLESTIK 933-1	LOCTITE® 3508NH	FERMAPOR K31	LOCTITE® SI 5699
LOCTITE® STYCAST US 2651	LOCTITE® STYCAST PC 62	LOCTITE® ECCOBOND EO1061	LOCTITE® ECCOBOND FP4531	FERMASIL	LOCTITE® SI 5810F
EPOXY	LOCTITE® STYCAST SI 5293				LOCTITE® SI 5910
LOCTITE® STYCAST ES 4512	LOCTITE® STYCAST UV 7993				
LOCTITE® STYCAST 2850FT CAT 11	LOCTITE® STYCAST CC 8555				
LOCTITE® STYCAST 2850FT CAT 23LV	LOW PRESSURE MOLDING				
LOCTITE® STYCAST ES 2505 CAT 11	TECHNOMELT® PA 646				
LOCTITE® STYCAST EE 4215 HD 0243	TECHNOMELT® PA 2692				
SILICONE	TECHNOMELT® PA 6481				
LOCTITE® STYCAST 5954					
LOCTITE® STYCAST 4350 CAT 50-2					

POTTING

Product Name	Alternate Cure	Viscosity cP at 25°C	Pot Life at 25°C	Hardness	Thermal Conductivity (W/m·K)	Temperature Range	Shelf Life
			Polyurethane				
LOCTITE® STYCAST US 2350	2 hr. at 60°C	2,400	45 min.	85A	0.510	-65°C – 125°C	1 year
LOCTITE® STYCAST US 2651	16 hr. at 25°C	1,000	10 min.	15A	0.180	-65°C – 125°C	1 year
			Epoxy				
LOCTITE® STYCAST ES 4512	36 – 48 hr. at 25°C or 3 hr. at 60°C	19,000	200 g mass 60 min.	88D	0.644	-40°C – 125°C	1 year
LOCTITE® STYCAST 2850FT / CAT 11	8 – 16 hr. at 80°C 2 – 4 hr. at 100°C 30 – 60 min. at 120°C	64,000	100 g mass at 25°C for 1 hr.	96D	1.280	-55°C – 125°C	1 year
LOCTITE® STYCAST 2850FT / CAT 23LV	16 – 24 hr. at 25°C 4 – 6 hr. at 25°C 2 – 4 hr. at 65°C	5,600	100 g mass at 25°C for 1 hr.	92D	1.100	65°C – 105°C	1 year
LOCTITE® STYCAST ES 2505 / CAT 11	4 hr. at 100°C (w/CAT 11)	5,000	> 4 hr.	72D	0.820	-55°C – 155°C	1 year
LOCTITE® STYCAST EE 4215 / HD 0243	2 hr. at 80°C + 2hr. at 150°C	20,000 to 30,000	7 – 8 hr.	80 – 85D	0.480	-40°C – 180°C	6 months

Product Name	Description	Color	Cure Schedule	Application	Storage Temperature	Shelf Life
		Silicone				
LOCTITE® STYCAST 5954	Two-part, highly filled, addition-cure, thermally conductive silicone. High thermal conductivity, noncorrosive	Red	4 hr. at 65°C	Encapsulant	25°C	6 months at 25°C
LOCTITE® STYCAST 4350/ CAT 50-2	RTV condensation cure, silicone rubber potting compound is designed for potting and encapsulation	Red	16 – 24 hr. at 25°C or 2 – 4 hr. at 65°C	Potting or Encapsulant	25°C	152 days at 25°C

CONFORMAL COATING

Product Name	Description	Key Attributes	Viscosity at 25°C	Operating Temperature (°C)	Volume Resistivity (Ω·cm)	Color	Recommended Cure
LOCTITE® STYCAST PC 40-UMF	Urethane conformal coating	• One component • VOC-free • Conforms to IPC-CC-830 requirements	250	-40 – 135	3.50×10^{16}	Clear	10 sec. at 300 – 600 mW/cm² + 2 – 3 days at atmospheric moisture
LOCTITE® STYCAST PC 62	Rapid drying acrylic for circuit board protection applications	• Fluorescent under UV light • Provides environmental and mechanical protection • Toluene-free alternative • Superior toughness and abrasion resistance • Easily removable with soldering iron or suitable solvent	50	-40 – 125	1.04×10^{16}	Colorless	24 hr. at 25°C
LOCTITE® SI 5293	Silicone conformal coating	• One component • Exhibits positive fluorescence under UV light • Repairable • Solvent-free • Designed for severe temperature environments and high-reliability automotive applications	400 – 800	-40 – 200	1.00×10^{14}	Transparent amber to yellow	20 – 40 sec. per side at 70 mW/cm² + 72 hr. at 50% relative humidity
LOCTITE STYCAST UV 7993	Urethane conformal coating	• One component • Solvent-free • Good moisture resistance • Excellent chemical resistance	120	-40 – 130	2.20×10^{16}	Translucent Yellow	5 sec. at 400 – 700 mW/cm² + 100 hr. at 50% relative humidity

CONFORMAL COATING – CONTINUED

Product Name	Description	Key Attributes	Viscosity at 25°C	Operating Temperature (°C)	Volume Resistivity (Ω·cm)	Color	Recommended Cure
LOCTITE® STYCAST CC 8555	Urethane conformal coating	• UV curable Room temperature moisture cure for shadowed areas • One component • VOC/Solvent free • Good moisture resistance • Excellent chemical resistance • Good wettability and void free	60	-40 TO 130	1.46×10^{14} @ 25°C	Clear Liquid	-

LOW PRESSURE MOLDING

Product Name	Description	Key Attributes	Color	Operating Temperature (°C)	Shore Hardness
TECHNOMELT® PA 646	Moldable polyamide	• Ideal for applications where strength and hardness are needed • Good adhesion for high-temperature applications	Black	-40 – 125°C	92A
TECHNOMELT® PA 2692	Moldable polyamide	• Suitable for high-humidity applications • Formulated for very low water vapor transmission	Amber	-40 – 150°C	88A
TECHNOMELT® PA 6481	Moldable polyamide	• Used for molding applications • This material is formulated with improved UV stability • Especially suitable for outdoor applications	Black	-40 – 130°C	93A

ENCAPSULANT

Product Name	Description	Key Attributes	Viscosity at 25°C (cP)	Glass Transition Temperature, T_g (°C)	Coefficient of Thermal Expansion, CTE (ppm/°C)		Pot Life	Recommended Cure
					Below T_g	Above T_g		
LOCTITE® ABLESTIK 933-1	Epoxy encapsulant is designed for encapsulating microelectronic chips	• One component • Electrically Insulating • Provides environmental and mechanical protection	360,500	124	30	100	–	2 hr. at 125°C 3 hr. at 150°C
LOCTITE® ECCOBOND EO1061	Designed to pass 1,000 hr. of temperature/humidity/ bias testing and thermal cycling up to 125°C	• High performance • Medium flow	Spindle 6, speed 2 rpm 50,000	125	40	–	25°C for 25 days	3 hr. at 140°C

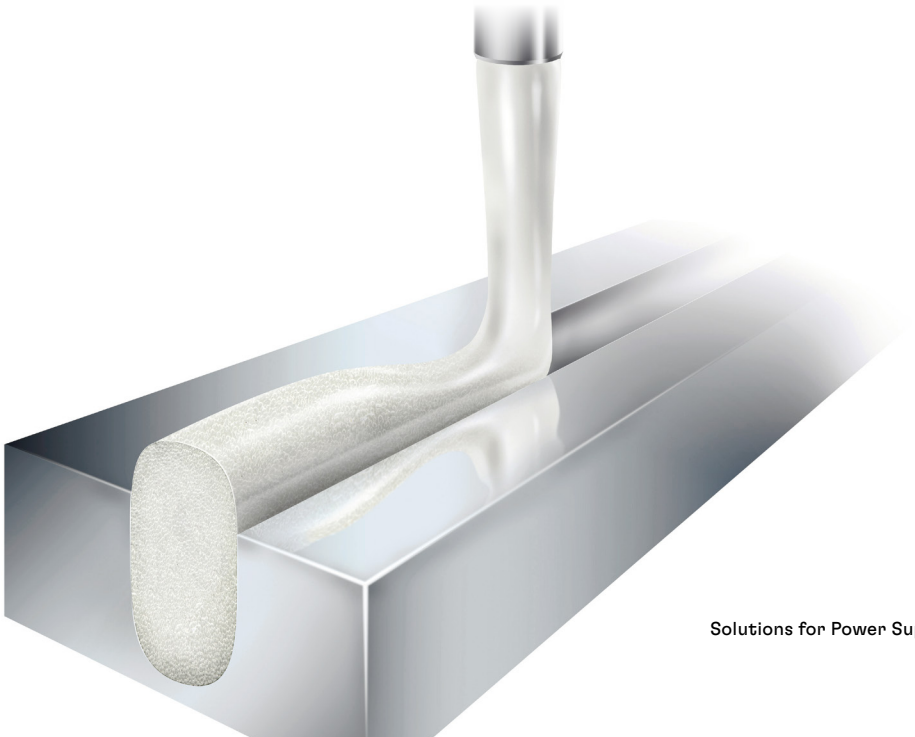
UNDERFILLS

Product Name	Description	Key Attributes	Viscosity at 25°C (cP)	Glass Transition Temperature, T_g (°C)	Coefficient of Thermal Expansion, CTE (ppm/°C)		Pot Life	Recommended Cure
					Below T_g	Above T_g		
LOCTITE® 3508NH	Reworkable cornerfill designed to cure during pb-free reflow while allowing self-alignment of IC components	• One component • Reflow curable • Eliminates post-reflow dispense and cure steps • Reworkable • Halogen-free	70,000	118	65	175	30 days at 25°C	Cure during Pb-free solder reflow profile at 245°C
LOCTITE® ECCOBOND FP4531	Designed for flipchip on flex applications with a 1 mil gap	• Snap curable • Fast flow • Passes NASA outgassing	10,000	161	28	104	25°C for 24 hr.	7 min. at 160 °C

GASKETING/SEALING

Product Name	Description	Flame Retardancy	Water Absorption	Compression Load Deflection	Temperature Resistance	Compression set (DVR)
FERMAPOR K31	Two-component room-temperature crosslinking polyurethane soft foam system	Up to UL-94 HF-1 possible	From < 3.5 %, hydrophobic versions available	From 5 – 200 kPa (at 25% compression)	From -40°C – +100°C (short time up to +160)	< 97 % depending on test conditions
FERMASIL	Two-component room-temperature crosslinking silicone foam system	Up to UL-94 V-0 possible	App. 1	From 20 – 150 kPa (at 25% compression)	From -60°C – +180°C (short time up to +350)	< 97 % depending on test conditions

Product Name	Description	Chemistry	Viscosity (cP)	Cure Condition (25°C / 50±5 % RH)	Cure Type
LOCTITE® 5810F	Form in place gasketing primarily designed for sealing plastic and metal housings on electronic components	Polyacrylate	Paste	≤ 120 min.	RTV
LOCTITE® SI 5910	One-component, silicone sealant designed for sheet metal covers with good oil resistance	Oxime Silicone	Paste	≤ 40 min.	RTV
LOCTITE® SI 5699	One-component, silicone sealant has excellent adhesion and can be used to seal electronic components	Oxime Silicone	Paste	≤ 30 min.	RTV



BONDING MATERIALS FOR UPS

STREAMLINED STRUCTURAL INTEGRITY

LOCTITE® adhesives facilitate lower processing costs and reduced device footprints by providing reliable, strong bonding solutions that eliminate manufacturing steps and do away with mechanical hardware such as screws or clips. Our portfolio of staking adhesives ensure that large and heavy components will stay in place during manufacturing and throughout product life by reducing strain on interconnects. A multitude of adhesive and sealant solutions offer adaptable and customizable bonding technologies to meet customer process and product requirements. From LOCTITE® adhesives for mixed- and double-sided SMT applications to BERGQUIST® materials for structural adhesion of components and PCBs to heat sinks, Henkel's range of bonding solutions ensures all parts are securely connected for long-lasting product integrity and processes are optimized for maximum efficiency.

ASSEMBLY ADHESIVES		THERMALLY CONDUCTIVE ADHESIVES	THREAD LOCKING ADHESIVES
ACRYLIC	**EPOXY**	**ACRYLIC**	**ACRYLIC**
LOCTITE® 3345	LOCTITE® 3609	LOCTITE® 315	LOCTITE® 243
LOCTITE® AA 3103	LOCTITE® 3611	LOCTITE® 384	LOCTITE® 425
LOCTITE® AA H4100	LOCTITE® 3614	LOCTITE® 3874	
CYANOACRYLATE	LOCTITE® 3616	LOCTITE® 3875	
LOCTITE® 444	LOCTITE® 3621	**SILICONE**	
LOCTITE® 4211	LOCTITE® 3627	BERGQUIST® LIQUI-BOND TLB EA1800	
SILICONE	LOCTITE® 3629C	BERGQUIST® LIQUI-BONDTLB SA2005RT	
LOCTITE® SI 5404	LOCTITE® ABLESTIK 84-3		
SOLVENT CLEANER	LOCTITE® CB 3626M		
LOCTITE® SF 7360	LOCTITE® 3626MHF		
	LOCTITE® ABLESTIK 2151		

ASSEMBLY ADHESIVES

Product Name	Description	Chemistry	Color	Cure Speed	Application	Storage Temp
			Acrylic			
LOCTITE® 3345	Designed for bonding glass to metal including medical devices which may be exposed to steam sterilization conditions	Acrylic	Clear, light straw colored liquid	Cured at 100 mW/ cm^2, measured at 365 nm, for 20 sec. + 24 hr. at 22°C	Surface mount adhesive	8 – 21°C
LOCTITE® AA 3103	Primarily designed for bonding polycarbonate to itself, while not inducing stress cracking under typical molded stress levels	Acrylic	Transparent to slightly hazy liquid	Cured at 30 mW/ cm^2, measured at 365 nm, for 80 sec. using a glass filtered metal halide light source	Surface mount adhesive	8 – 21°C
LOCTITE® AA H4100	Non-sagging, two component, room temperature curing, 10:1 mix ratio, methacrylate adhesive system	Acrylic	Dark, red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
			Acrylate			
LOCTITE® 3875	Bead-on-bead, thermally conductive adhesive is designed to thermally couple and structurally bond heats sinks to heat dissipating electronic components	Acrylate	Part A - Pale Yellow Part B - Pale Blue	24 – 72 hr. at 23°C , 50% RH	Thermal management	Optimal Storage (PART A): -20°C Alternative Storage (PART A): 2 – 8°C Optimal Storage (PART B): 2 – 8°C
			Epoxy			
LOCTITE® 3609	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Dark, red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE® 3611	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE® 3614	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE® 3616	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous paste	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE® 3621	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE® 3627	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red gel-like material	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE® 3629C	Epoxy is formulated for bonding surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red	150 sec. at 120°C or 90 sec. at 150°C at the bondline	Surface mount adhesive	2 – 8°C
LOCTITE® ABLESTIK 84-3	Adhesive is designed for die attach applications as well as component attach	Epoxy	Blue	1 hr. at 150°C 2 hr. at 125°C	Die Attach	-40°C
LOCTITE® 3626M	Designed for bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red gel-like material	Minimum 120 sec. at 130°C or 90 sec. at 150°C at the bondline	Surface mount adhesive	2 – 8°C

ASSEMBLY ADHESIVES – CONTINUED

Product Name	Description	Chemistry	Color	Cure Speed	Application	Storage Temp
LOCTITE® CB 3626MHF	Designed for bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red gel-like material	30 min. at 150°C	Component assembly, NCA, surface mount adhesive	2 – 8°C
LOCTITE® ABLESTIK 2151	Thixotropic, two-part adhesive that develops strong, durable high-impact bonds at room temperature, improving heat transfer while maintaining electrical insulation	Epoxy	Blue	24 hr. at 25°C or 2 – 4 hr. at 65°C	Conductive adhesive	21°C

Product Name	Description	Chemistry	Color	Cure Speed	Viscosity cP at 25°C
Cyanoacrylate					
LOCTITE® 444	Single part, fast curing medium viscosity cyanoacrylate adhesive formulated for electronics applications	Ethyl cyanoacrylate	Clear	30 sec. fixture / 24 hr. full	700
LOCTITE® 4211	Single part, fast curing high viscosity cyanoacrylate adhesive	Ethyl cyanoacrylate	Black	60 sec. fixture / 24 hr. full	2,500

Product Name	Description	Chemistry	Color	Cure Speed	Optimal Storage
Silicone					
LOCTITE® SI 5404	Designed to bond metallic heat sinks, ceramic chips and circuit board substrates	Silicone	White to gray pastel	1 hr. at 150°C	2 – 8°C
Solvent Cleaner					
LOCTITE® SF 7360	Non-CFC, low odor, solvent based formulation intended for the removal of uncured adhesive and adhesive residues used in the PCB assembly industry	Aliphatic ester blend	Clear colorless solution	–	8 – 21°C

THERMALLY CONDUCTIVE ADHESIVES

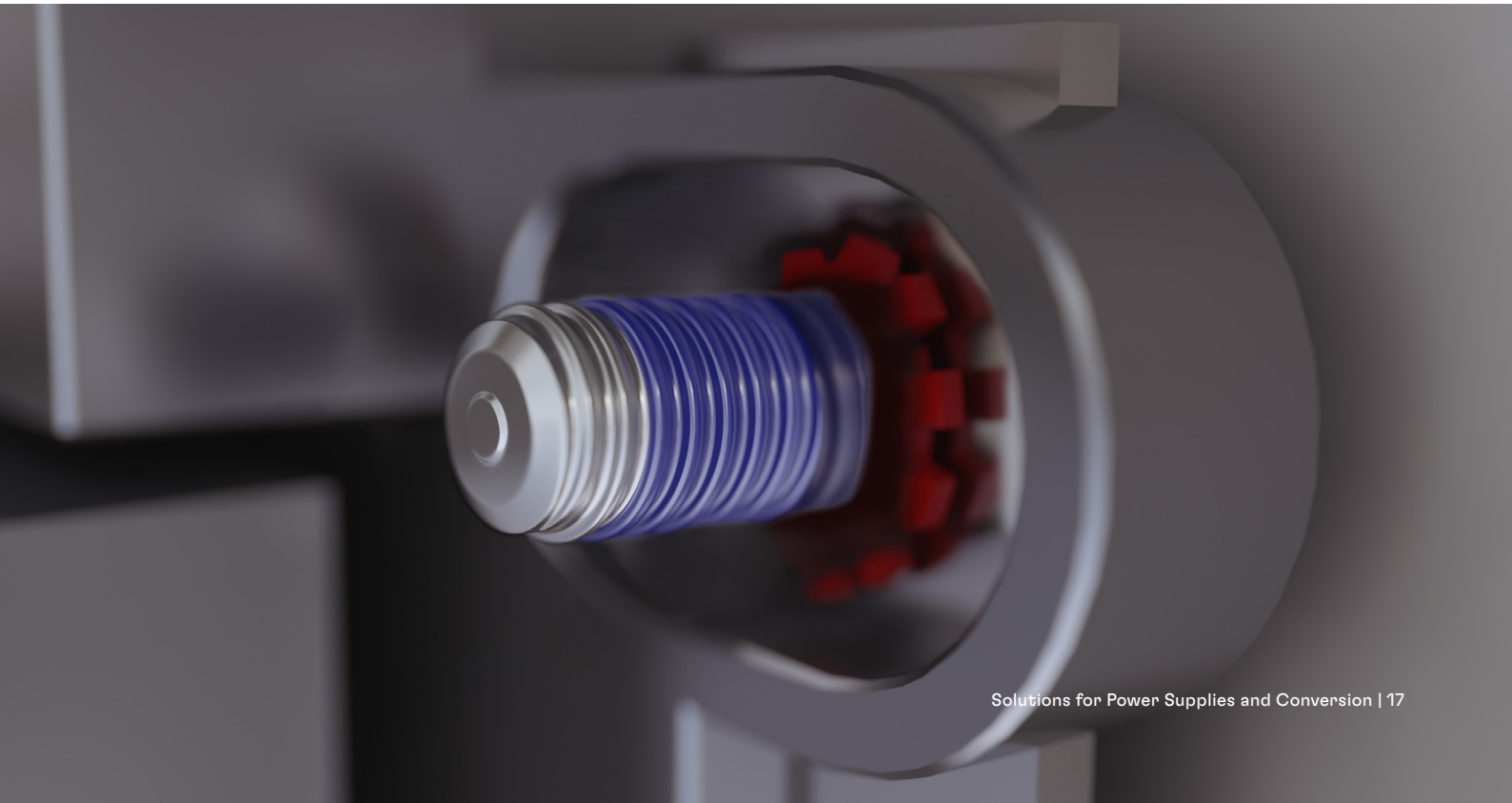
Product Name	Description	CURE TYPE	Thermal Conductivity (W/m·k)	Volume Resistivity (Ω·m)	Cure Schedule	Shelf Life
Acrylic						
LOCTITE® 315	A self-shimming, thermally-conductive, one-part adhesive for bonding electrical components to heat sinks with an insulating gap	LOCTITE® SF 7387™ activator	0.81	1.3×10^{12}	24 – 72 hr. at 20°C	9 months at 5°C
LOCTITE® 384	Repairable, room-temperature, curing adhesive utilized for parts subject to disassembly	LOCTITE® SF 7387™ activator	0.76	1.3×10^{12}	24 – 72 hr. at 20°C	9 months at 5°C
LOCTITE® 3874	Thermally conductive adhesive. When used with LOCTITE SF 7387™ activator, it cures rapidly to form a high strength, high modulus, thermoset acrylic polymer	LOCTITE® SF 7387™ activator	1.25	4.3×10^{14}	24 hr. at 70°C, followed by 7 days at 22 °C	–
LOCTITE® 3875	Bead-on-bead, thermally conductive adhesive is designed to thermally couple and structurally bond heats sinks to heat dissipating electronic components	–	1.75	–	24 – 72 hr. at 23°C, 50% RH	–

THERMALLY CONDUCTIVE ADHESIVES – CONTINUED

Product Name	Description	Operating Temperature Range	Thermal Conductivity (W/m·k)	Volume Resistivity (Ω-m)	Cure Schedule	UL Rating
		Epoxy				
BERGQUIST® LIQUI-BOND TLB EA1800	Thermally conductive, two-part, liquid epoxy adhesive	-40 – 125°C	1.8	1×10^{14}	10 hr. at 25°C or 10 min. at 125°C	UL 94 V-0
		Silicone				
BERGQUIST® LIQUI-BOND TLB SA2005RT	A two-part, high performance silicone thermal adhesive	-60 – 180°C	2.00	1.0×10^{13}	7 days at 25°C or 1 hr. at 85°C	UL 94 V-0

THREAD LOCKING ADHESIVES

Product Name	Description	Chemistry	Color	Cure Speed	Viscosity cP at 25°C
	Acrylic				
LOCTITE® 243	General purpose threadlocker of medium bond strength. This threadlocker secures and seal bolts, nuts and studs to prevent loosening due to vibration	Acrylic	Blue	24 hr.	1,300 – 3,000
	Cyanoacrylate				
LOCTITE® 425	Fast curing, low strength adhesive for locking metal and plastics fasteners	Cyanoacrylate	Dark blue liquid	24 hr. at 22°C	40 – 80



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