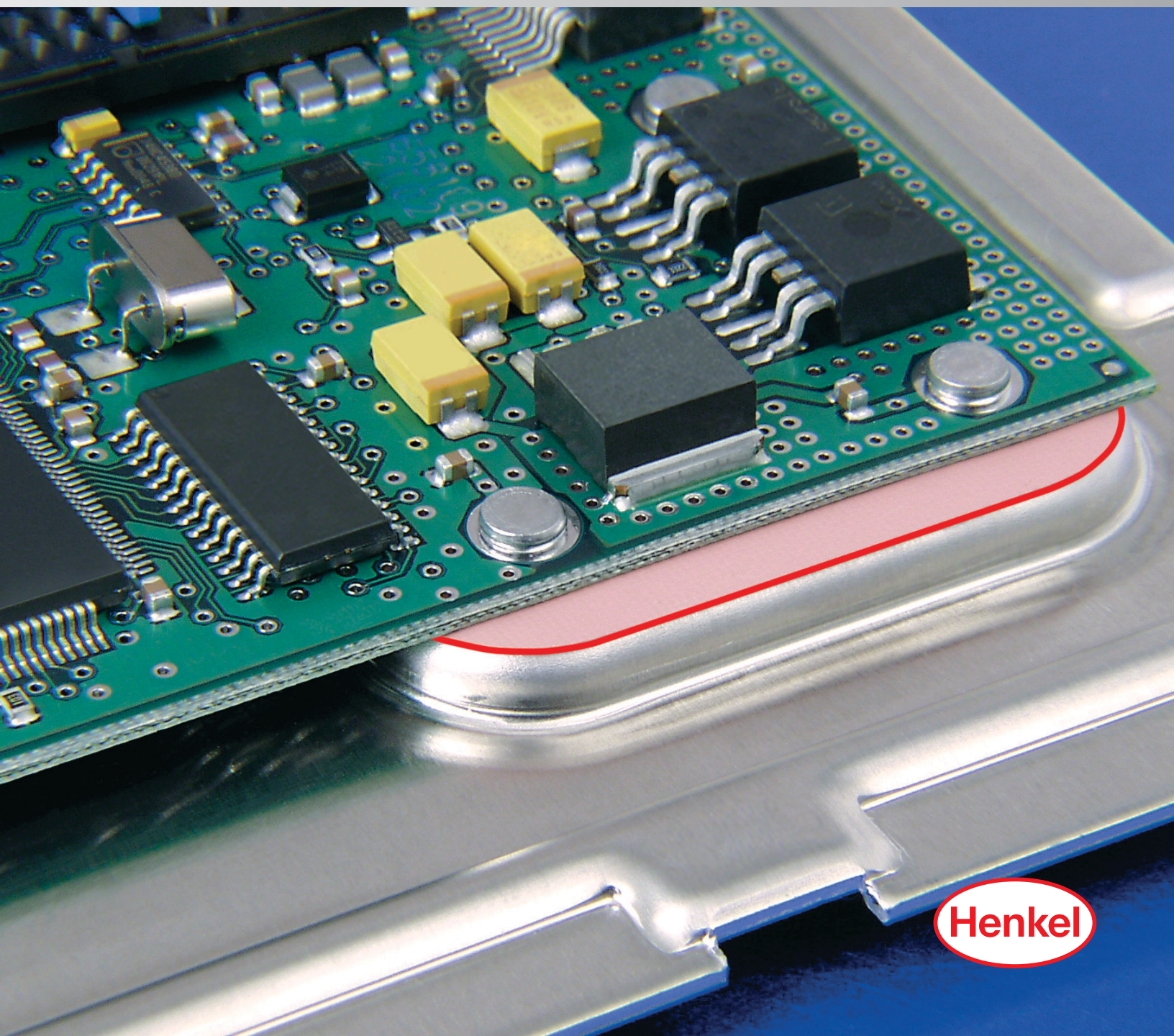
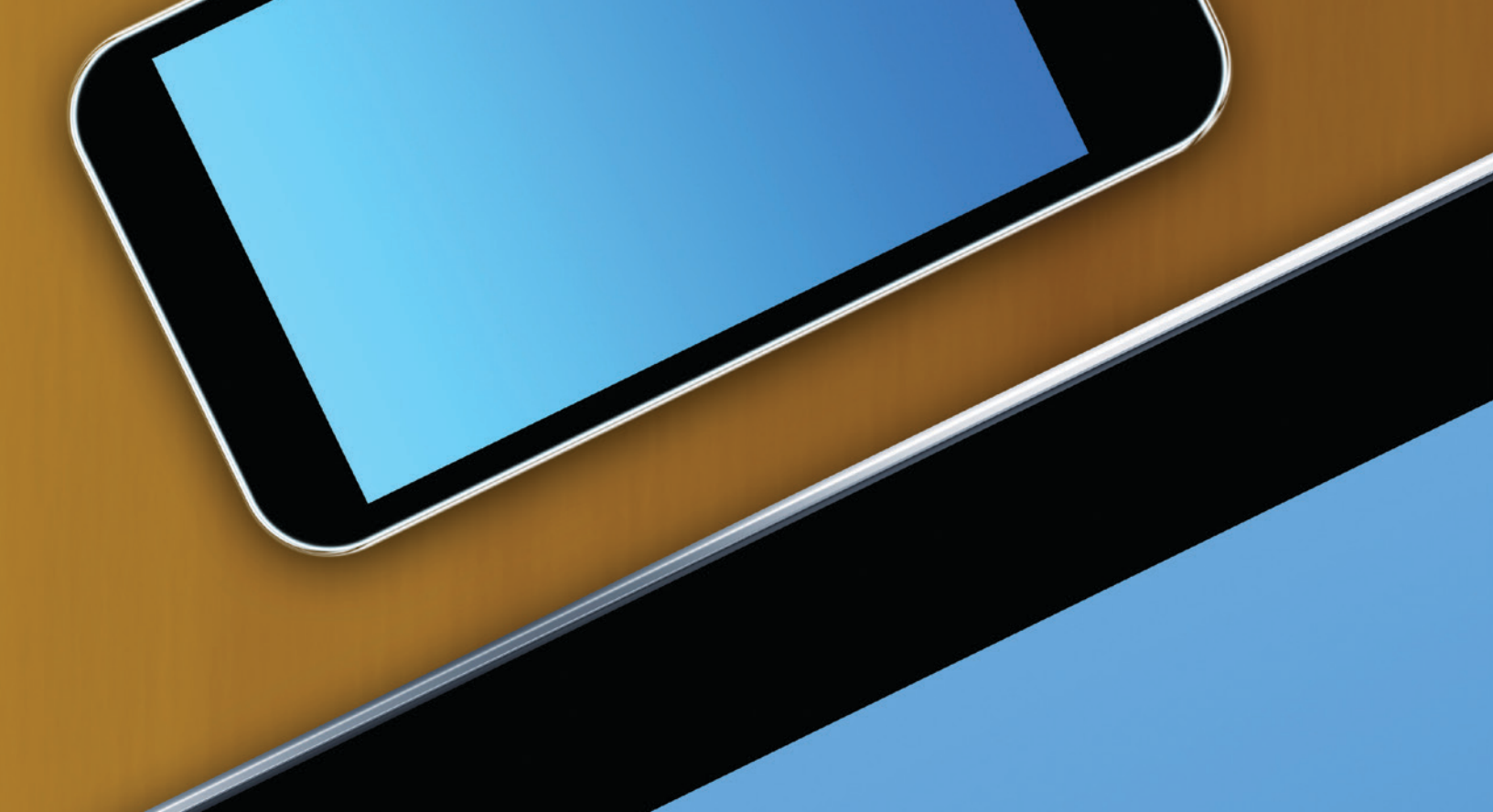


Thermal Management Materials





CONTENTS

Introduction.....	3
Product Portfolio	4
THERMAL ADHESIVES	
Tapes.....	6
Films	7
Liquids.....	8
THERMAL NON-ADHESIVES	
Thin Pads.....	10
Gap Fillers.....	12
Phase-Change Materials.....	14
Greases.....	15



INTRODUCTION

To address the thermal demands of today's electronic devices, Henkel has developed a complete portfolio of high-performance, user-friendly products. Effective control of heat is an increasing concern among today's electronic device manufacturers and, as products become smaller, the need to dissipate damaging heat effectively will be greater than ever.

Of course, each application is unique and its requirements specific, which is why Henkel has formulated a comprehensive range of thermal management materials to suit a variety of current and future heat control needs. Under the banner of the well-respected LOCTITE® and BERGQUIST® brands, Henkel's thermal management materials include:

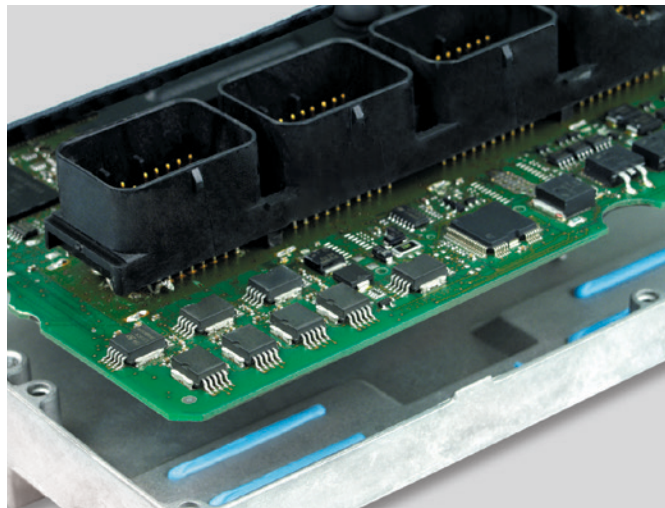
THERMAL ADHESIVES

- Tapes
- Film
- Liquids

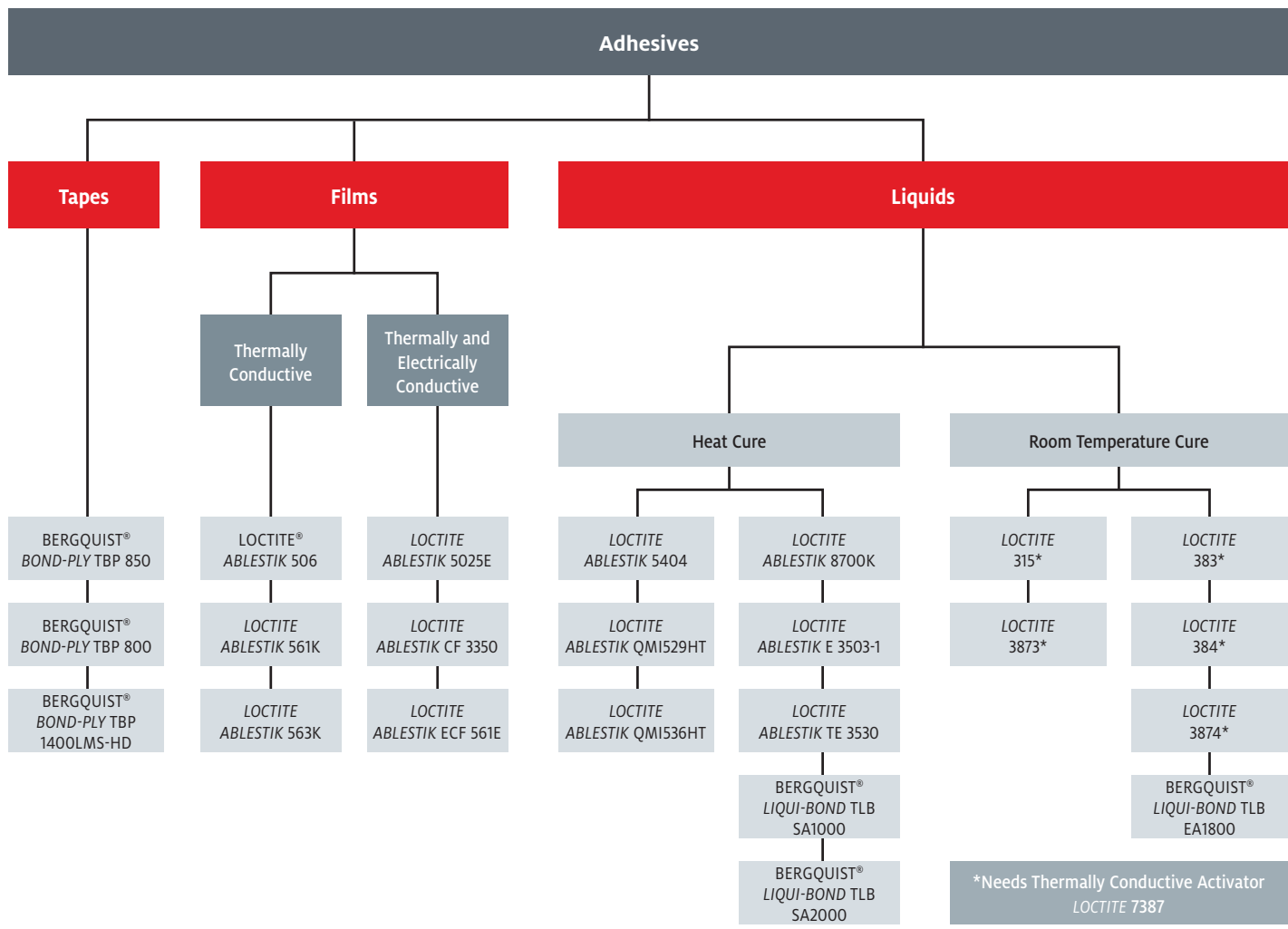
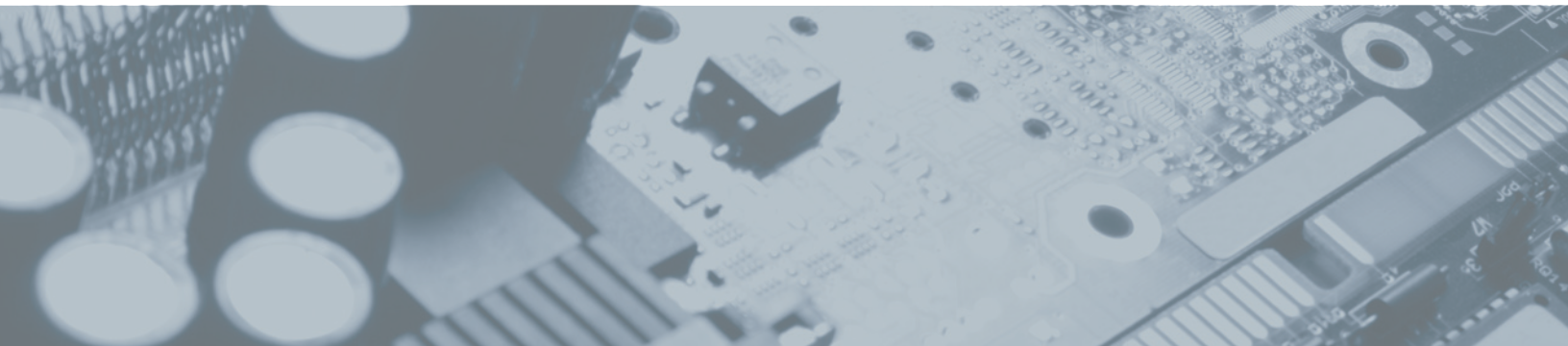
THERMAL NON-ADHESIVES

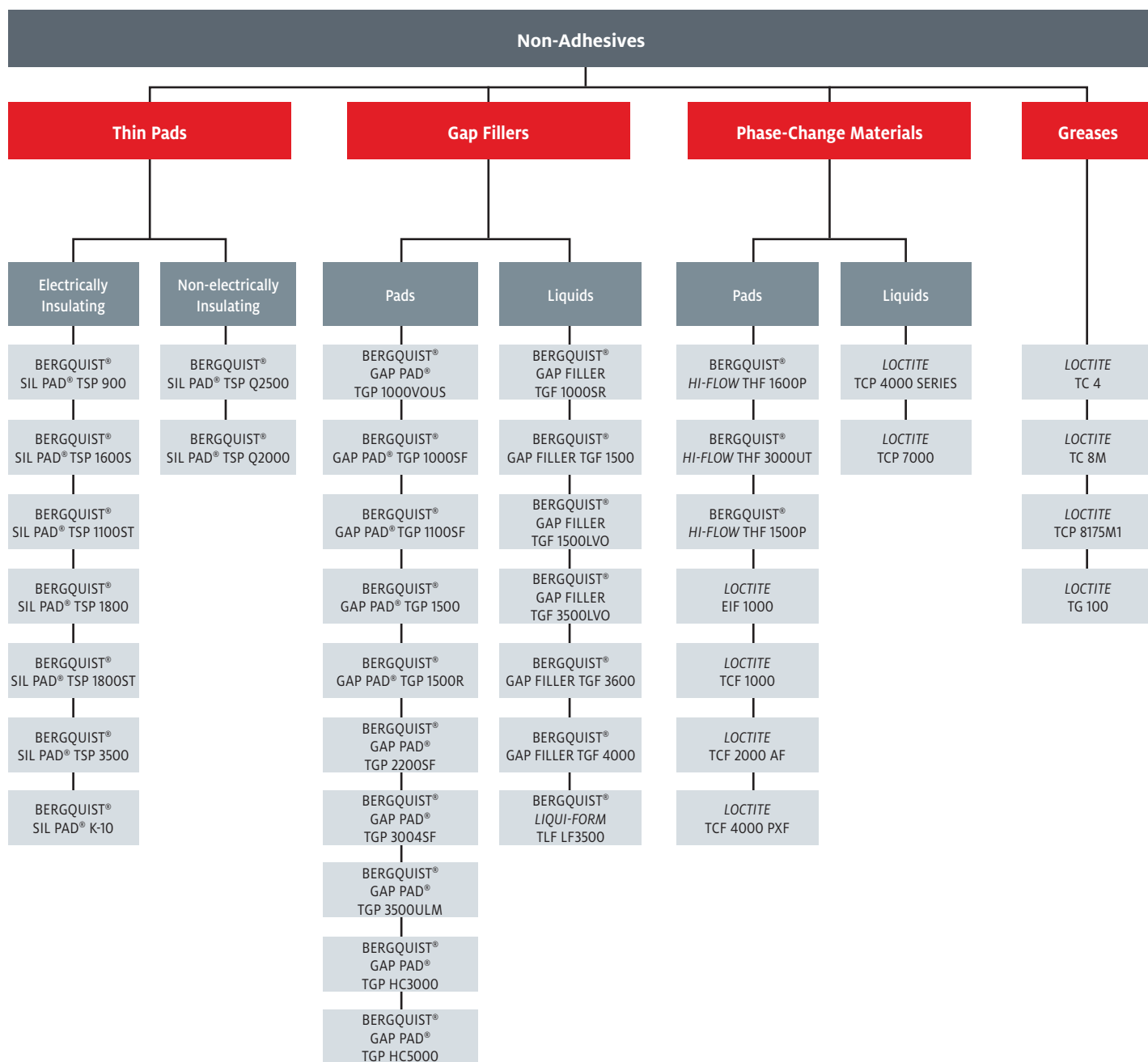
- Thin Pads
- Gap Fillers
- Phase-Change Materials
- Greases

As consumer demand and product capability continue to drive greater function within ever-decreasing footprints, effectively controlling the thermal load will be critical to ensuring long product life cycles and expected reliability. That's why today's electronics manufacturers are increasingly turning to Henkel for trusted, proven thermal management solutions.



PRODUCT PORTFOLIO

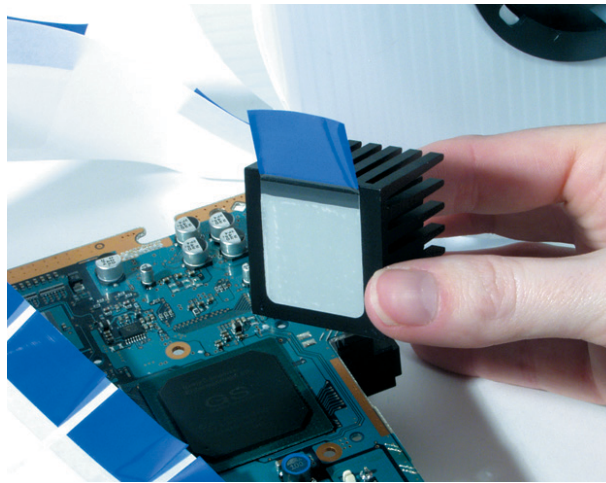
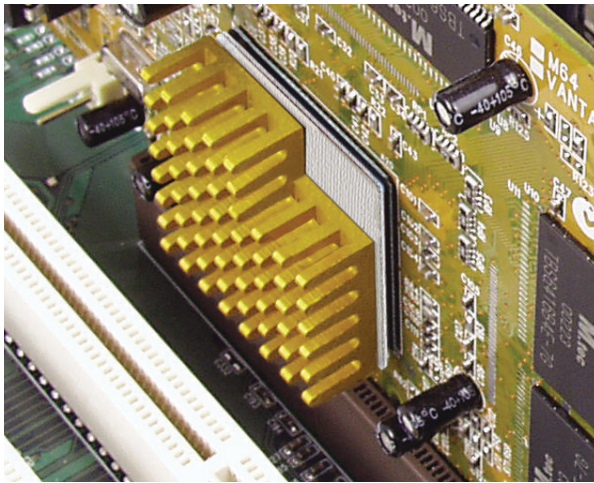




ADHESIVES | TAPES

The *BOND-PLY* family of materials are thermally conductive and electrically isolating. *BOND-PLY* is available in a pressure-sensitive adhesive (PSA) or laminating format. *BOND-PLY* provides for the decoupling of bonded materials with mismatched thermal coefficients of expansion. *BOND-PLY* provides:

- A replacement to heat cure adhesives
- A replacement to screw mounting
- A replacement to clip mounting



Tapes

BERGQUIST®
BOND-PLY TBP 850

BERGQUIST®
BOND-PLY TBP 800

BERGQUIST® *BOND-PLY*
TBP 1400LMS-HD

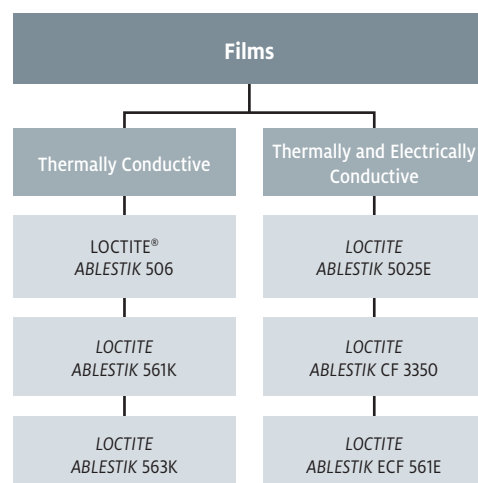
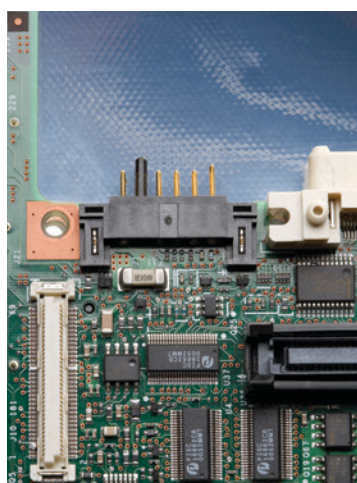
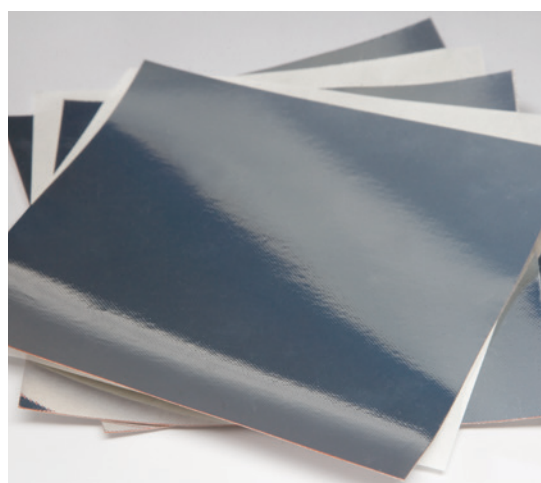
PRODUCT	DESCRIPTION	COLOR	THICKNESS (in.)	LAP SHEAR AT RT (psi)	BREAKDOWN VOLTAGE (VAC)	FLAME RATING (UL 94)	THERMAL CONDUCTIVITY (W/m-K)	THERMAL IMPEDANCE (°C-in. ² /W)
Tapes								
BERGQUIST® <i>BOND-PLY</i> TBP 850 (Formerly know as <i>BOND-PLY</i> 100)	Fiberglass-reinforced pressure-sensitive adhesive tape	White	0.005 0.008 0.011	100	3,000 6,000 8,500	V-0	0.8	0.52 0.78 1.01
BERGQUIST® <i>BOND-PLY</i> TBP 800 (Formerly know as <i>BOND-PLY</i> 800)	Fiberglass-reinforced pressure-sensitive adhesive tape	Gray	0.005 0.008	150	4,000 6,000	V-0	0.8	0.60 0.72
BERGQUIST® <i>BOND-PLY</i> TBP 1400LMS-HD (Formerly know as <i>BOND-PLY</i> LMS-HD)	Silicone, high-durability lamine material	Yellow	0.010 0.012	200	5,000	V-0	1.4 ⁽¹⁾	2.1 (°C/W) ⁽²⁾

(1) The ASTM D5470 (BERGQUIST® modified) test procedure was used on post-cured BERGQUIST® *BOND-PLY* 1400LMS-HD material. The recorded value includes interfacial thermal resistance. These values are given for customer reference only.

(2) TO-220 Thermal Performance testing, per the BERGQUIST® RD2010 specification for laminates, was completed on pre-laminated TO-220 assemblies. Lamination was completed at the pressure levels referenced above. Actual pressure during performance testing was limited to the inherent weight distribution of the TO-220 component. No additional pressure was applied.

ADHESIVES | FILMS

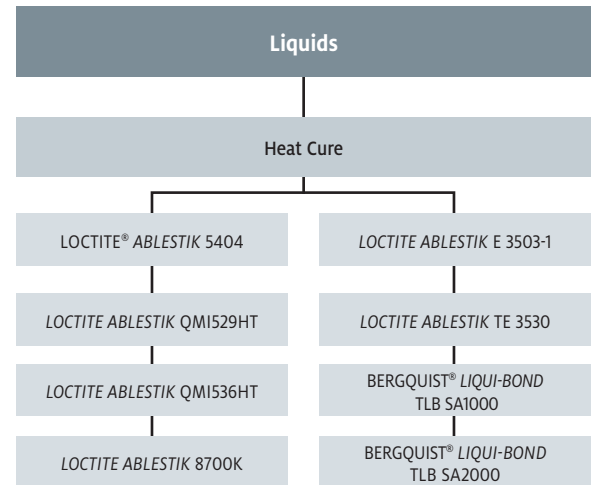
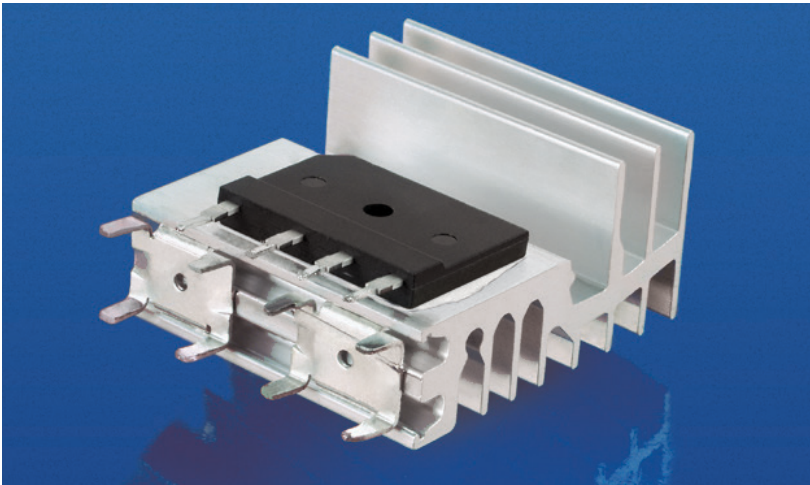
When there is a requirement for bonding large areas or complex parts together, thermal adhesive films are the preferred materials. Larger bonding areas are problematic for liquid-based mediums as voids may result; films, however, deliver uniform, void-free bondlines and controlled thicknesses. Supplied in custom, pre-cut formats, Henkel's line of thermal adhesive films offers a clean, waste-free, easily-processed solution with a low total cost of ownership in thermally and electrically-conductive formulas.



PRODUCT	DESCRIPTION	TENSILE STRENGTH LAP SHEAR (psi)	THERMAL CONDUCTIVITY (W/m-K)	VOLUME RESISTIVITY (Ω-cm)	PRIMARY CURE CYCLE	SHELF LIFE	FILM THICKNESS AVAILABLE (mil)
Thermally Conductive							
LOCTITE® ABLESTIK 506	Flexible film adhesive designed for bonding mismatched CTE materials; slight tack can simplify assembly	1,200	0.9	7×10^{12}	1 hr. at 150°C	6 months at -40°C	4, 5, 6
LOCTITE ABLESTIK 561K	High adhesion strength with excellent flexibility for bonding mismatched CTE materials	3,300	0.9	9×10^{12}	30 min. at 150°C	1 year at -40°C	4, 5, 6
LOCTITE ABLESTIK 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. at 150°C	1 year at -40°C	2, 3, 4, 5, 6
Thermally and Electrically Conductive							
LOCTITE ABLESTIK 5025E	Sister formulation to LOCTITE ABLESTIK CF 3350 that has been certified to MIL-STD-883, Method 5011	2,500	6.5	2×10^{-4}	30 min. at 150°C	6 months at 5°C	2, 3, 4, 5, 6
LOCTITE ABLESTIK CF 3350	Silver-filled film with an excellent balance of adhesion strength, electrical and thermal conductivity, and processability; especially suited for RF applications	3,400	7	2×10^{-4}	30 min. at 150°C	9 months at 5°C	2, 4
LOCTITE ABLESTIK ECF 561E	Most flexible of the fiberglass-supported, electrically conductive products	2,000	1.6	6.0×10^{-3}	1 hr. at 150°C	1 year at -40°C	4, 5, 6

ADHESIVES | LIQUIDS

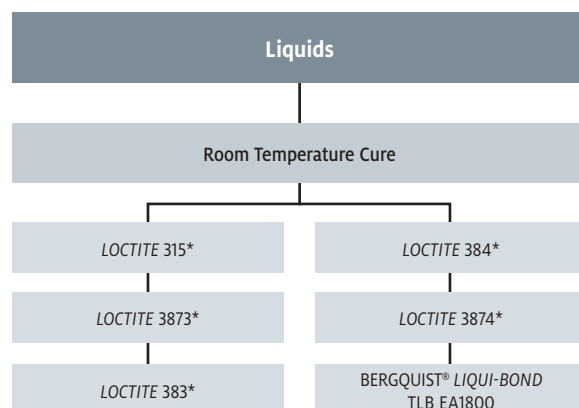
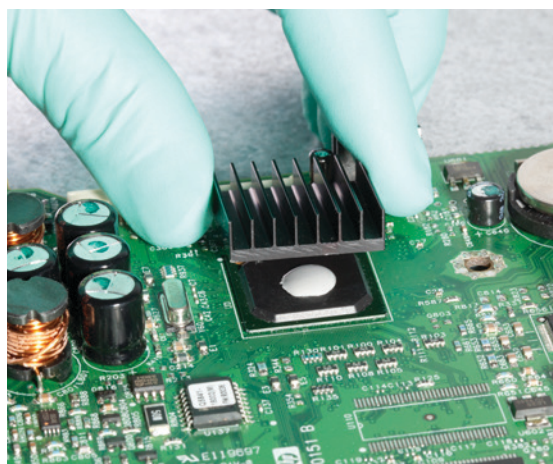
Henkel's heat-cure liquid adhesives provide robust mechanical attachment, allowing for the elimination of fasteners such as screws and clips, which also helps reduce device size and weight to align with the trend toward electronics miniaturization. These are ideal for coupling "hot" electronic components mounted on PC boards with an adjacent metal case or heat sink.



PRODUCT	DESCRIPTION	CURE TYPE	CURE SCHEDULE	VISCOSITY (cP)	THERMAL CONDUCTIVITY (W/m-K)	VOLUME RESISTIVITY (Ω-cm)	SHELF LIFE
Heat Cure							
LOCTITE® ABLESTIK 5404	Self-shimming, flexible silicone adhesive for high-temperature-resistant applications such as ceramic boards	Heat	10 min. at 150°C	Paste	1	2.9 X 10 ¹⁴	5 months at 5°C
LOCTITE ABLESTIK QM529HT	Electrically conductive, silver-filled adhesive with high thermal conductivity	Heat	Snap Cure (single zone): 60 sec. at 185°C. Oven Cure: 30 min. at 185°C	18,500	6	4 X 10 ⁻⁵	12 months at -40°C
LOCTITE ABLESTIK QM536HT	Boron nitride-filled, electrically non-conductive paste	Heat	Skip Cure: 0.8 sec. at 150°C Oven Cure: 15 min. at 15°C	13,000	0.9	1.0 X 10 ¹³	12 months at -40°C
LOCTITE ABLESTIK 8700K	Mil standard certified, one-component, thermally-conductive epoxy adhesive	Heat	60 min. at 175°C 2 hrs. at 160°C	45,000	0.5	3.0 X 10 ¹⁴	9 months at -40°C
LOCTITE ABLESTIK E 3503-1	Smooth paste assuring minimum bondline thickness for lower overall thermal resistance	Heat	30 min. at 100°C 10 min. at 120°C 5 min. at 150°C	60,000	1	1.0 X 10 ¹⁴	6 months at -18°C to -25°C
LOCTITE ABLESTIK TE 3530	One-component, low-temperature curing, thermally-conductive epoxy adhesive	Heat	30 min. at 100°C	60,000	2.3	1.0 X 10 ¹⁵	6 months at -18°C to -25°C
BERGQUIST® LIQUI-BOND TLB SA1000 (Formerly know as LIQUI-BOND SA1000)	One-component, thermally-conductive silicone adhesive	Heat	20 min. at 125°C 10 min. at 150°C	125,000	1.0	1.0 X 10 ¹⁰	6 months at 10°C
BERGQUIST® LIQUI-BOND TLB SA2000 (Formerly know as LIQUI-BOND SA2000)	One-component, thermally-conductive silicone adhesive	Heat	20 min. at 125°C 10 min. at 150°C	200,000	2.0	1.0 X 10 ¹¹	6 months at 10°C

ADHESIVES | LIQUIDS

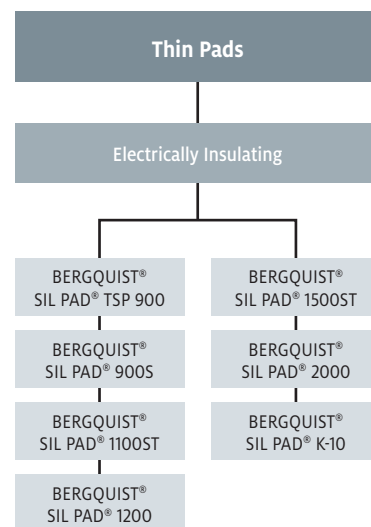
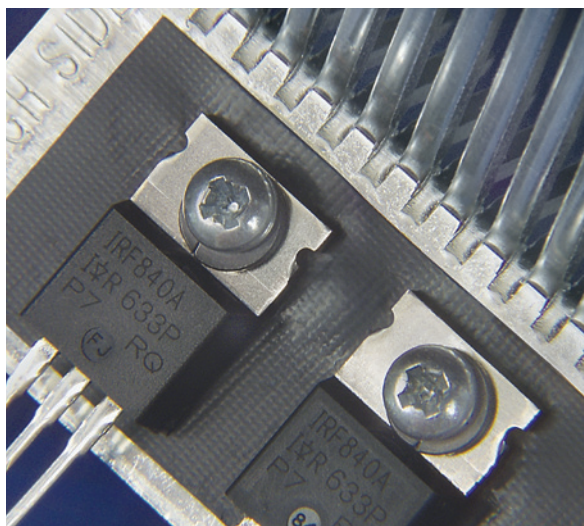
Henkel's room-temperature cure adhesives can be utilized with typical applications include bonding transformers, transistors and other heat-generating electronic components to printed circuit board assemblies or heat sinks. With the ability to maintain thin bondlines and excellent thermal paths, LOCTITE® and BERGQUIST® brand liquid adhesives provide superb thermal management.



PRODUCT	DESCRIPTION	CURE TYPE	CURE SCHEDULES	VISCOSITY (cP)	THERMAL CONDUCTIVITY (W/m·K)	VOLUME RESISTIVITY (Ω·cm)	SHELF LIFE
Room-Temperature Cure							
LOCTITE 315	A self-shimming, thermally-conductive, one-part adhesive for bonding electrical components to heat sinks with an insulating gap	Activator (LOCTITE 7387)	24 to 72 hr. at 20°C	600,000	0.81	1.3 X 10 ¹²	9 months at 5°C
LOCTITE 3873	Self-shimming adhesive with high bonding strength for heat sink application	Activator (LOCTITE 7387)	24 to 72 hr. at 20°C	200,000	1.25	4.3 X 10 ¹⁴	21 months at 5°C
LOCTITE 383	High-strength, room-temperature curing adhesive for permanent assemblies	Activator (LOCTITE 7387)	24 to 72 hr. at 20°C	500,000	0.6	5.2 x 10 ¹¹	9 months at 5°C
LOCTITE 384	Repairable, room-temperature curing adhesive utilized for parts subject to disassembly	Activator (LOCTITE 7387)	24 to 72 hr. at 20°C	100,000	0.76	1.3 X 10 ¹²	9 months at 5°C
LOCTITE 3874	Fast-curing, high-conductivity adhesive for bonding heat-generating devices to a thermal spreader "without glass beads"	Activator (LOCTITE 7387)	24 to 72 hr. at 20°C	800,000	1.25	4.3 X 10 ¹⁴	9 months at 5°C
BERGQUIST® LIQUI-BOND TLB EA1800 (Formerly know as LIQUI-BOND EA1805)	Two-component, epoxy-based, liquid-dispensable adhesive	Room or elevated temperature	10 hr. at 25°C 10 min. at 125°C	Part A: 60 Part B: 62	1.8	1 X 10 ¹⁴	6 months at 25°C

NON-ADHESIVES | THIN PADS

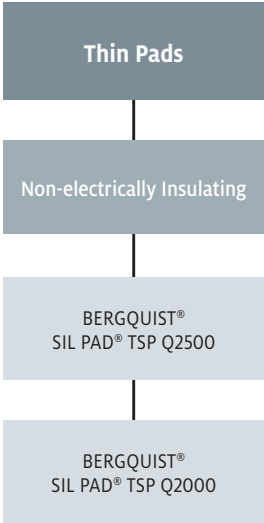
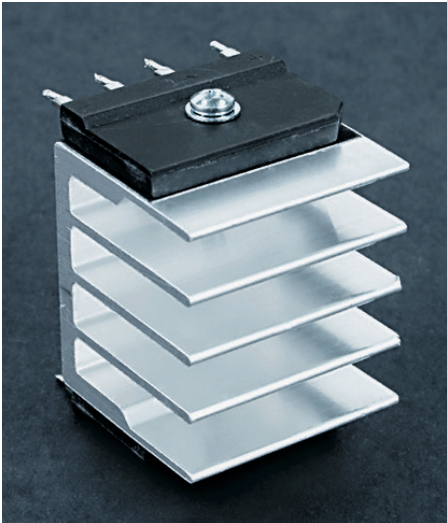
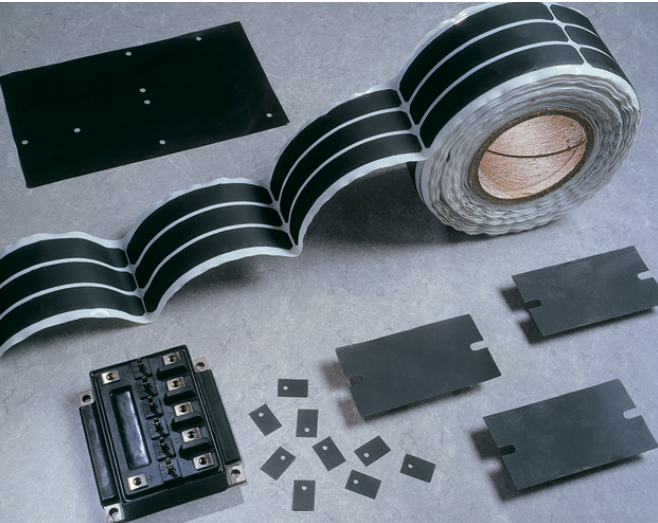
More than 35 years ago, Henkel set the standard for elastomeric thermal interface materials with the introduction of SIL PAD®. Today, Henkel is a world leader with a complete family of SIL PAD® materials to meet the critical needs of a rapidly changing electronics industry. In their many forms, SIL PAD® thermally conductive insulators continue to be a clean and efficient alternative to mica, ceramics, or grease for a wide range of electronic applications. Henkel application specialists work closely with customers to specify the proper SIL PAD® material for every unique thermal management requirement.



PRODUCT	DESCRIPTION	COLOR	THICKNESS (in.)	VOLTAGE BREAKDOWN (VAC)	VOLUME RESISTIVITY (Ω-m)	THERMAL CONDUCTIVITY (W/m-K)	THERMAL IMPEDANCE at 50 psi (°C-in. ² /W)	FLAME RATING (UL 94)
Electrically Insulating								
BERGQUIST® SIL PAD® TSP 900 (Formerly know as SIL PAD® 400)	The original fiberglass-reinforced, silicone-based insulator	Grey	0.007 0.009	3,500 4,500	1 X 10 ¹¹	0.9	1.13	V-0
BERGQUIST® SIL PAD® TSP 1600S (Formerly know as SIL PAD® 900S)	Value fiberglass-reinforced, silicone-based insulator	Pink	0.009	5,500	1 X 10 ¹⁰	1.6	0.61	V-0
BERGQUIST® SIL PAD® TSP 1100ST (Formerly know as SIL PAD® 1100ST)	Low-pressure, fiberglass-reinforced, silicone-based insulator	Yellow	0.012	5,000	1 X 10 ¹⁰	1.1	0.66	V-0
BERGQUIST® SIL PAD® TSP 1800 (Formerly know as SIL PAD® 1200)	High-performance, fiberglass-reinforced, silicone-based insulator	Black	0.009 0.012 0.016	6,000	1 X 10 ⁹	1.8	0.53	V-0
BERGQUIST® SIL PAD® TSP 1800ST (Formerly know as SIL PAD® 1500ST)	Low-pressure, high-performance, silicone-based insulator	Blue	0.008	3,000	1 X 10 ¹¹	1.8	0.23	V-0
BERGQUIST® SIL PAD® TSP 3500 (Formerly know as SIL PAD® 2000)	Fiberglass-reinforced, silicone-based insulator with very high performance capabilities; designed for defense and aerospace applications	White	0.010 0.015 0.020	4,000	1 X 10 ¹¹	3.5	0.33 0.37 0.55	V-0
BERGQUIST® SIL PAD® TSP K1300 (Formerly know as SIL PAD® K-10)	High-performance, film-reinforced, silicone-based insulator	Beige	0.006	6,000	1 X 10 ¹²	1.3	0.41	VTM-0

NON-ADHESIVES | THIN PADS

These materials are designed for those applications when maximum heat transfer is needed and electrical isolation is not required, making SIL PAD® the ideal thermal interface material to replace messy thermal-grease compounds. Thin pads eliminate problems associated with grease, such as contamination of re-flow solder or cleaning operations. Unlike grease, BERGQUIST® SIL PAD® TSP Q2500 can be used prior to these operations. BERGQUIST® SIL PAD® TSP Q2500 also eliminates dust collection, which can cause possible surface shorting or heat buildup.

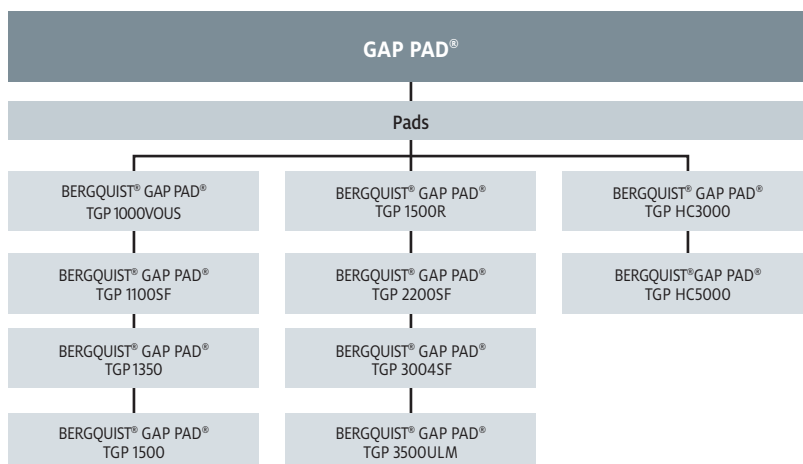
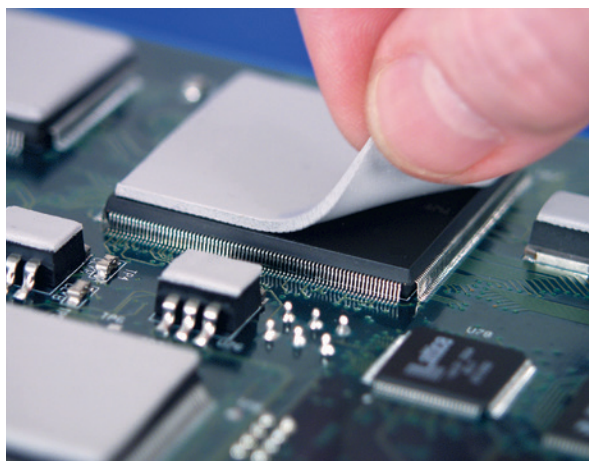


PRODUCT	DESCRIPTION	COLOR	THICKNESS (in.)	VOLTAGE BREAKDOWN (VAC)	VOLUME RESISTIVITY (Ω-m)	THERMAL CONDUCTIVITY (W/m-K)	THERMAL IMPEDANCE at 50 psi (°C-in. ² /W)	FLAME RATING (UL 94)
Non-electrically Insulating								
BERGQUIST® SIL PAD® TSP Q2500 (Formerly know as Q PAD II)	Aluminum-foil substrate, silicone-based grease replacement	Black	0.006	Non-insulating	1 X 10 ²	2.5	0.22	V-0
BERGQUIST® SIL PAD® TSP Q2000 (Formerly know as Q PAD 3)	Fiberglass-reinforced, silicone-based grease replacement	Black	0.005	Non-insulating	1 X 10 ²	2.0	0.35	V-0

NON-ADHESIVES | GAP PAD®

Henkel developed the GAP PAD® thermal interface material family to meet the electronic industry's growing need for interface materials with greater conformability, higher thermal performance, and easier application.

GAP PAD® provides an effective thermal interface between heat sinks and electronic devices where uneven surface topography, air gaps and rough surface textures are present.

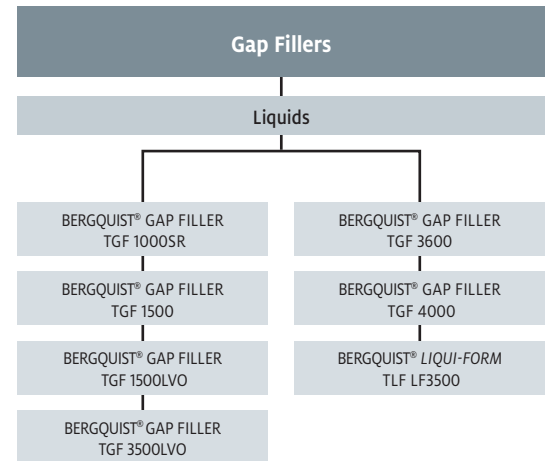


PRODUCT	DESCRIPTION	COLOR	THICKNESS (in.)	HARDNESS, BULK RUBBER (Shore 00)	VOLTAGE BREAKDOWN (VAC)	VOLUME RESISTIVITY (Ω-m)	THERMAL CONDUCTIVITY (W/m-K)	THERMAL IMPEDANCE (% Strain) (°C-in. ² /W)			FLAME RATING (UL 94)
Pads											
BERGQUIST® GAP PAD® TGP 1000VOUS (Formerly know as GAP PAD® VOUS)	Fiberglass-reinforced, silicone-based pad	Mauve/ Pink	0.020 to 0.250	5	6,000	1 X 10 ¹¹	1.0	10%	20%	30%	V-0
								1.97	1.87	1.68	
BERGQUIST® GAP PAD® TGP 1100SF (Formerly know as GAP PAD® 1000SF)	Fiberglass-reinforced, silicone-free polymer pad	Green	0.010 to 0.125	40	> 6,000	1 X 10 ¹⁰	0.9	—			V-1
BERGQUIST® GAP PAD® TGP 1350 (Formerly know as GAP PAD® 1450)	Silicone-based pad with a permanent liner	Light Pink	0.020 to 0.125	30	> 6,000	1 X 10 ⁹	1.3	—			V-0
BERGQUIST® GAP PAD® TGP 1500 (Formerly know as GAP PAD® 1500)	Unreinforced, silicone-based pad	Black	0.020 to 0.200	40	> 6,000	1 X 10 ¹¹	1.5	10%	20%	30%	V-0
								1.62	1.50	1.33	
BERGQUIST® GAP PAD® TGP 1500R (Formerly know as GAP PAD®1500R)	Fiberglass-reinforced, silicone-based pad	Black	0.010 to 0.020	45	> 6,000	1 X 10 ¹¹	1.5	10%	20%	30%	V-0
								1.07	0.88	0.82	
BERGQUIST® GAP PAD® TGP 2200SF (Formerly know as GAP PAD® 2200SF)	Fiberglass-reinforced, silicone-free polymer pad	Green	0.010 to 0.125	70	> 5,000	1 X 10 ⁸	2.0	—			V-0
BERGQUIST® GAP PAD® TGP 3004SF (Formerly know as GAP PAD® 3004SF)	Slicone-free polymer pad with a permanent liner	Light Grey	0.010 to 0.125	70	> 5,000	1 X 10 ¹¹	3.0	—			V-0
BERGQUIST® GAP PAD® TGP 3500ULM (Formerly know as GAP PAD® 3500ULM)	Ultra-low modulus, fiberglass-reinforced, silicone-based pad	Grey	0.020 to 0.125	—	> 5,000	1 X 10 ¹⁰	3.5	10%	20%	30%	V-0
								0.50	0.44	0.39	
BERGQUIST® GAP PAD® TGP HC3000 (Formerly know as GAP PAD® HC3.0)	Fiberglass-reinforced, silicone-based pad	Blue	0.020 to 0.125	15	> 5,000	1 X 10 ¹⁰	3.0	10%	20%	30%	V-0
								0.57	0.49	0.44	
BERGQUIST® GAP PAD® TGP HC5000 (Formerly know as GAP PAD® HC5.0)	Fiberglass-reinforced, silicone-based pad	Violet	0.020 to 0.125	35	> 5,000	1 X 10 ¹⁰	5.0	10%	20%	30%	V-0
								0.35	0.30	0.26	

NON-ADHESIVES | GAP FILLERS

Henkel's BERGQUIST® brand of highly-engineered, thermally-conductive liquids are specifically designed to support optimized dispensing control with excellent thermal and mechanical performance. Dispensed in a liquid state, the material creates virtually zero stress on components. It can be used to interface and conform to the most intricate topographies and multilevel surfaces.

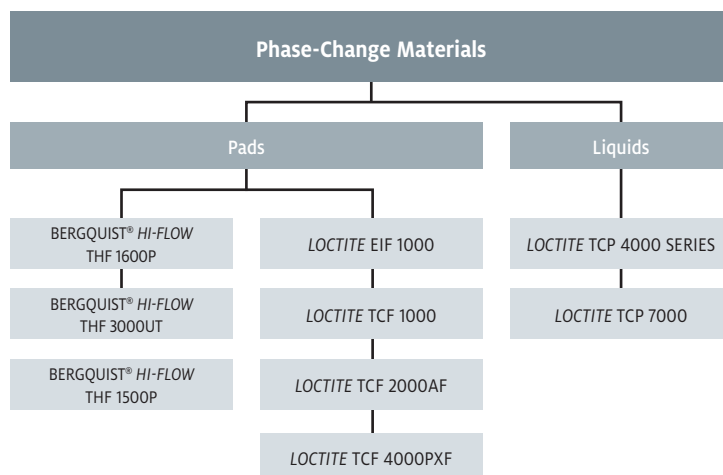
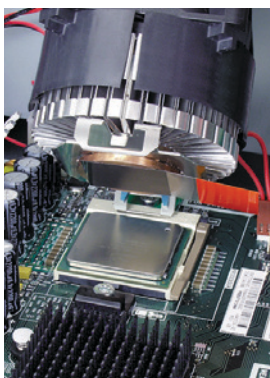
Henkel has teamed with the highly respected automated dispensing equipment companies of Musashi Engineering, RAMPF, Scheugenpflug AG, bdtronic, and Graco to further assist our customers in creating an optimized dispensing process. Like Henkel, they are the best in the world at supplying intelligent world-class solutions. By joining in the "solutions partnership," we amplify our capabilities as the total solution provider.



PRODUCT	DESCRIPTION	CURE TYPE	CURE SCHEDULES	VISCOSITY	THERMAL CONDUCTIVITY (W/m-K)	VOLUME RESISTIVITY (Ω-m)	SHELF LIFE (months)
Liquids							
BERGQUIST® GAP FILLER TGF 1000SR (Formerly know as GAP FILLER 1000SR)	Two-part, liquid gap-filling material featuring outstanding slump resistance	RT or Heat	20 hr. at 25°C 10 min. at 100°C	20 Pa-s, High Shear	1.0	1 X 10 ¹¹	6
BERGQUIST® GAP FILLER TGF 1500 (Formerly know as GAP FILLER 1500)	Two-part, liquid gap-filling material with high-shear thinning for ease of dispensing	RT or Heat	5 hr. at 25°C 10 min. at 100°C	250,000 cP, As Mixed	1.8	1 X 10 ¹⁰	6
BERGQUIST® GAP FILLER TGF 1500LVO (Formerly know as GAP FILLER 1500LV)	Two-part, liquid gap-filling material with significantly lower levels of silicone outgassing	RT or Heat	8 hr. at 25°C 10 min. at 100°C	75 Pa-s, High Shear	1.8	1 X 10 ¹⁰	6
BERGQUIST® GAP FILLER TGF 3500LVO (Formerly know as GAP FILLER 3500LV)	High-performance, two-part, liquid gap-filling material with significantly lower levels of silicone outgassing	RT or Heat	24 hr. at 25°C 30 min. at 100°C	45 Pa-s, High Shear	3.5	1 X 10 ¹⁰	5
BERGQUIST® GAP FILLER TGF 3600 (Formerly know as GAP FILLER 3500S35)	High-performance, two-part, liquid gap-filling material with exceptional softness	RT or Heat	15 hr. at 25°C 30 min. at 100°C	150,000 cP, As Mixed	3.6	1 X 10 ⁹	5
BERGQUIST® GAP FILLER TGF 4000 (Formerly know as GAP FILLER 4000)	High-performance, two-part, liquid gap-filling material	RT or Heat	24 hr. at 25°C 30 min. at 100°C	50 Pa-s, High Shear	4.0	1 X 10 ¹⁰	5
BERGQUIST® LIQUI-FORM TLF LF3500 (Formerly know as LIQUI-FORM 3500)	High-performance, one-part, cured gel with thixotropic properties	—	—	40 g/min., Dispense Rate	3.5	1 X 10 ¹¹	6

NON-ADHESIVES | PHASE-CHANGE MATERIALS

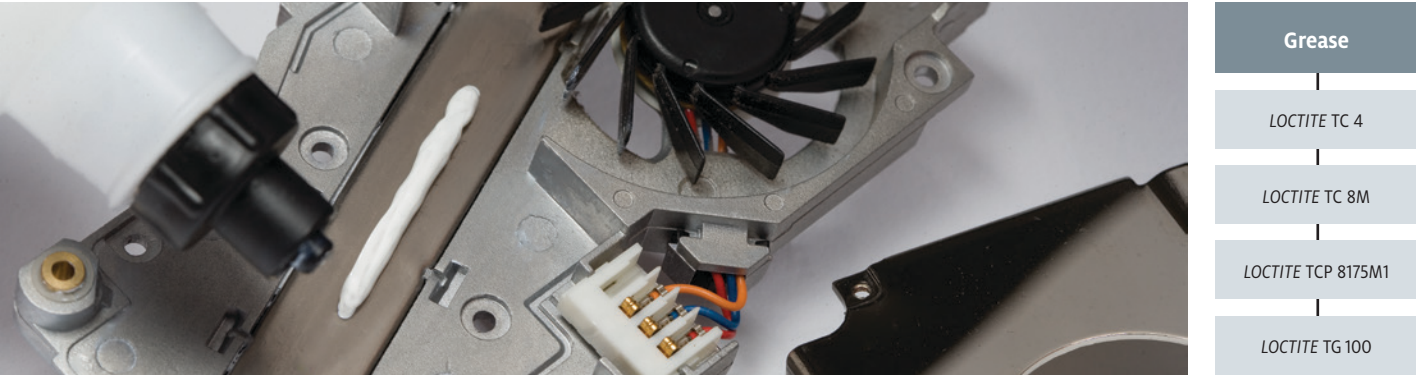
Ideal for high-performance, solid-state devices such as CPUs, GPUs, IGBTs and discrete components, LOCTITE® and BERGQUIST® brand phase-change materials deliver on-demand performance with none of the drawbacks of traditional greases. These materials are solid at room temperature but melt and flow during device operation to provide a thin bondline and high reliability without the pump-out often experienced with some thermal greases. Phase-change materials offer an excellent alternative to grease.



PRODUCT	DESCRIPTION	THERMAL IMPEDANCE	THERMAL CONDUCTIVITY (W/m·K)	PHASE CHANGE TEMP (°C)	VOLUME RESISTIVITY (Ω·m)	DIELECTRIC BREAKDOWN VOLTAGE	THICKNESS (in.)
Pads							
BERGQUIST® HI-FLOW THF 1600P (Formerly know as HI-FLOW 300P)	Dry compound, coated on thermally-conductive polyimide film	0.13°C-in²/W at 25 psi	1.6	55	1 X 10 ¹²	5,000	0.0040 0.0045 0.0050
BERGQUIST® HI-FLOW THF 3000UT (Formerly know as HI-FLOW 565UT)	Naturally tacky, unreinforced phase-change material supplied in an easy-to-use tabulated pad	0.05°C-in²/W at 25 psi	3.0	52	N/A	N/A	0.005 0.010
BERGQUIST® HI-FLOW THF 1500P (Formerly know as HI-FLOW 650P)	Phase-change material coated on thermally-conductive polyimide film with one side that is naturally tacky	0.20°C-in²/W at 25 psi (0.0045" thick)	1.5	52	1 X 10 ¹²	5,000	0.0045 0.0050 0.0055
LOCTITE EIF 1000	Phase-change material coated on thermally-conductive polyimide film	0.12°C-in²/W at 80 psi	0.45	60	N/A	4,500	KA: 0.003 KB: 0.005 K3: 0.007
LOCTITE TCF 1000	Phase-change material coated on aluminum foil	0.14°C-in²/W at 80 psi	1.0	60	1 X 10 ¹²	N/A	AL: 0.005 ALH: 0.006
LOCTITE TCF 2000AF	High-performance phase-change material coated on aluminum foil	0.009°C-in²/W at 80 psi	3.0	51	N/A	N/A	0.005
LOCTITE TCF 4000PXF	Non-silicone, reworkable phase-change material, free-standing film supplied between two release liners	0.019°C-in²/W at 80 psi	3.4	45	N/A	N/A	0.008
Liquids							
LOCTITE TCP 4000 SERIES	Supplied as a paste that can be stenciled, needle-dispensed or screen-printed onto a heat sink, base plate or other surfaces	0.003°C-in²/W at 80 psi	3.4	45	N/A	N/A	0.0005 to 0.010+
LOCTITE TCP 7000	Non-silicone, reworkable phase-change material supplied in cartridges	–	> 3.0	45	N/A	N/A	N/A

NON-ADHESIVES | GREASES

For manufacturers with a preference for traditional thermal greases, Henkel has several RoHS-compliant formulations. Used in high-performance applications where minimal bondline thickness is essential for high-thermal performance, greases offer immediate functionality upon application. In addition, greases have a tendency to compensate for voids easily so they are a particularly viable solution for devices that have flatness or coplanarity issues. Available in cartridges or bulk containers, Henkel’s thermal greases include high-performance,high-temperature reliability, silicone-free and water-cleanable formulas.



PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY (W/m-K)	VOLUME RESISTIVITY (Ω-cm)	DIELECTRIC STRENGTH (V/mil)	THICKNESS (in.)
Greases					
LOCTITE TC 4	Thermally-conductive, high-temperature silicone thermal grease	0.6	1 X 10 ¹³	500	0.0005 to 0.010+
LOCTITE TC 8M	High-thermal conductivity, high-temperature thermal grease	1.3	1 X 10 ¹⁴	500	0.0005 to 0.010+
LOCTITE TCP 8175M1	High-thermal conductivity, high-temperature stability, high-thixotropic (or non-sag), electrically-insulating, self-shimming silicone thermal grease	1.3	8.2 X 10 ¹²	480	0.007 (spacer)
LOCTITE TG 100	Ultra-high-performance thermal grease	3.4	N/A	N/A	0.0005 to 0.010+

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