



**Functional coating,  
Bonding & Sealing innovations  
for the Lighting Industry**

**Dimitri Clément**



**Excellence is our Passion**

# Three Areas of Competence

## Consumer Businesses

### Laundry & Home Care



**Persil** **Purex** **Pril**

### Beauty Care



Schwarzkopf syOSS Dial

## Industrial Business

### Adhesive Technologies

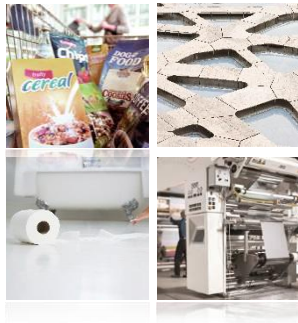


**LOCTITE**  
**TECHNOMELT** **Pritt**

# Adhesive Technologies

## Five Business Segments

### Packaging and Consumer Goods Adhesives



### Transport and Metal



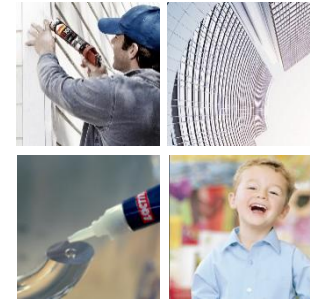
### General Industry



### Electronics



### Consumer, Craftsmen and Building



# Discover what Henkel Adhesive Technologies can do for you

- global leader in adhesive, sealing, potting and surface treatment
- wide range of product solutions engineered for the design and manufacture of lighting devices
- Typical applications include diffuser bonding and sealing, potting, general bonding and heat transfer
- rigorous testing and qualifying in our labs and are backed by external expertise.
- Whatever the need, Henkel will work with you to find a solution

## Exterior



## Industrial



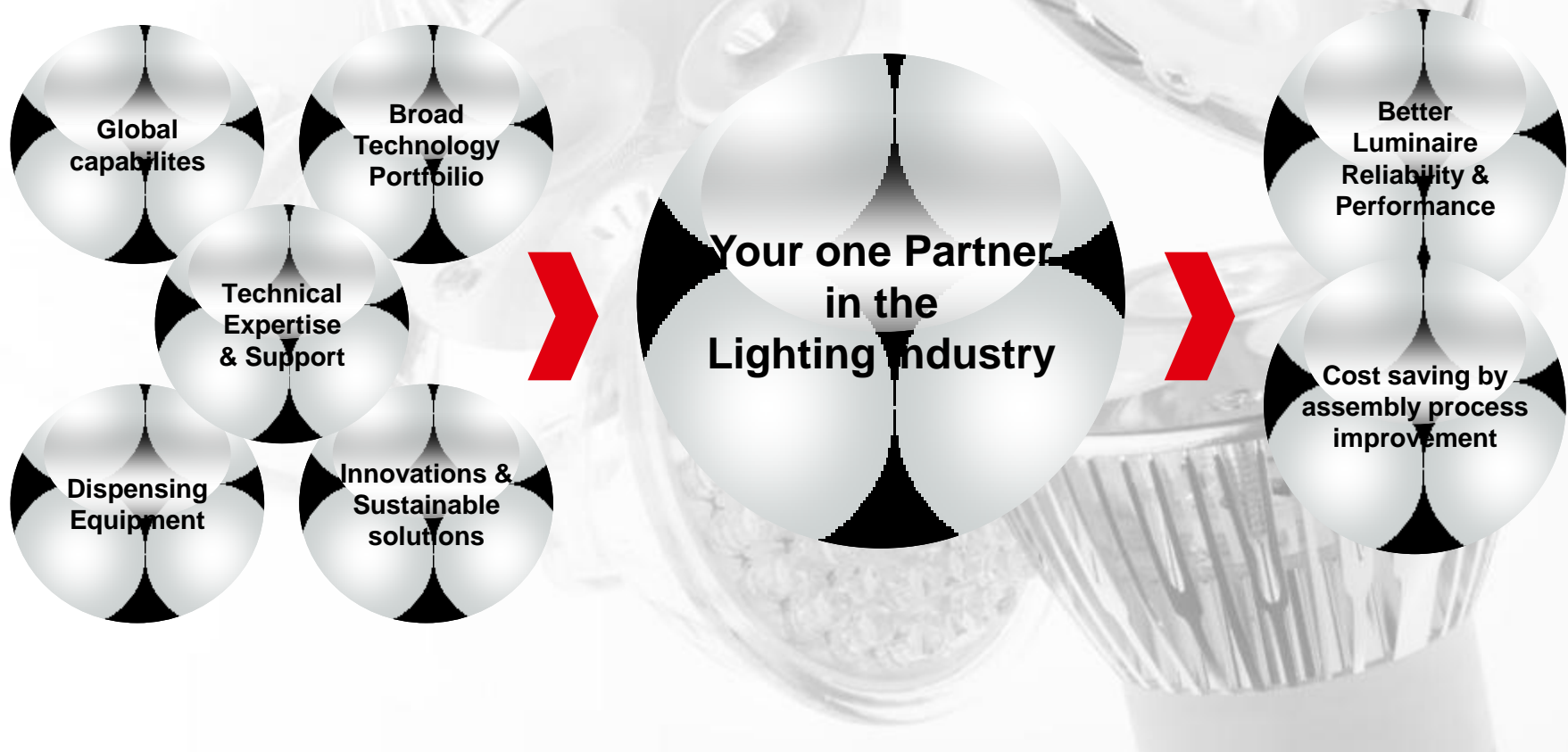
## Residential



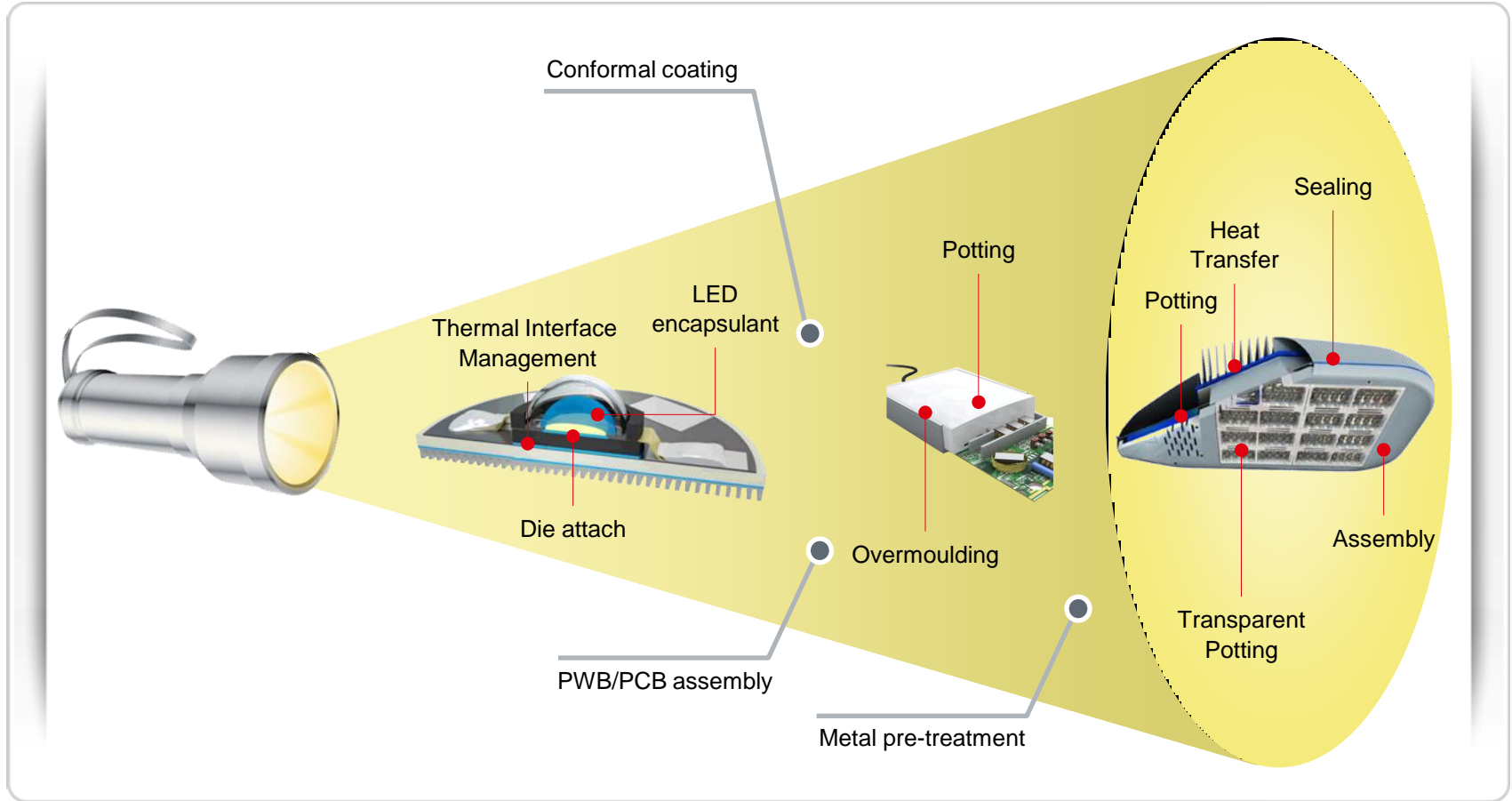
## Commercial



# What Henkel Provides to the Lighting Industry



# Henkel solutions along the lighting manufacturing process





# Adhesive and Surface Treatment Applications Lighting

## LED Lighting

### Bonding / Sealing

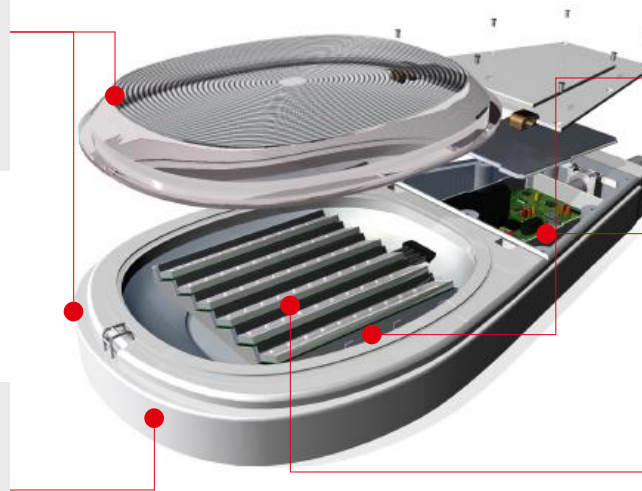
#### Diffuser and Housing

- Fast cure
- Good water resistance
- Reliable adhesion
- Manage gaps and thermal expansion

### Surface Treatment

#### Housing and Pole

- Less process steps
- Low temperatures
- No sludge with heavy metals



### Heat Conducting

#### Potting, Sealing and Bonding

#### Driver to Heat Sink Lighting Module in Fixture

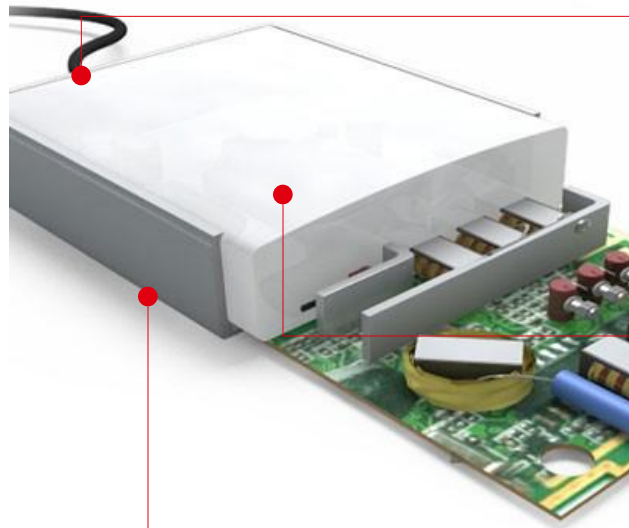
- High thermal conductive performance
- Permanent or removable
- Process simplification
- Improved reliability for interconnects

### Transparent Potting

#### Lighting Module

- No yellowing / cracking
- High light transmission
- Fast cure and low shrinkage
- Good water resistance

# Adhesive and Surface Treatment Applications Lighting Drivers, Accessories and Components



## Low Pressure Moulding

### Electrical connections Components

- Process simplification
- Protect against wear and impact
- Good water resistance

## Potting and Sealing

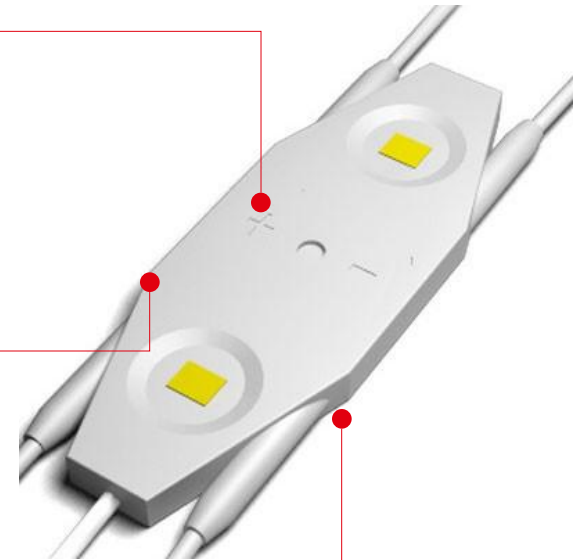
### Driver

- Protect against environmental influences and impact
- Good water resistance
- Thermally conductive
- UL approval

## Bonding

### Component to Housing Driver to Heat Sink

- Thermally conductive
- Process simplification
- Reliable adhesion





# Adhesive and Surface Treatment Applications Lighting

## Thermal Management for LED boards and Drivers

### Gap Filler products:

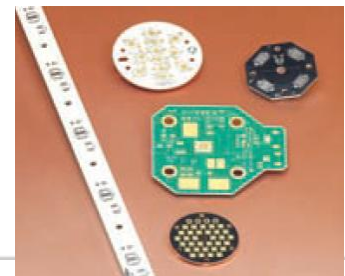
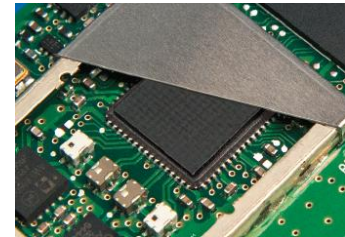
- Cure in place compound
- low modulus

### Gap Pad products:

- Special fillers
- Variety in thickness and hardness

### Thermal conductive Adhesives:

- 1 or 2 component liquids
- RT or Heat curable
- PSA Tapes

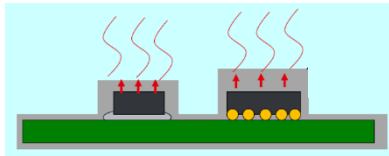


# Adhesive and Surface Treatment Applications Lighting

## Thermal Management for LED boards and Drivers

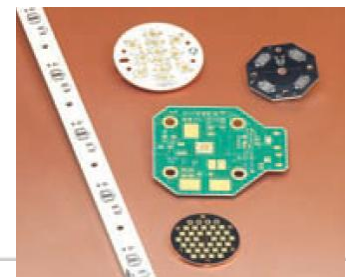
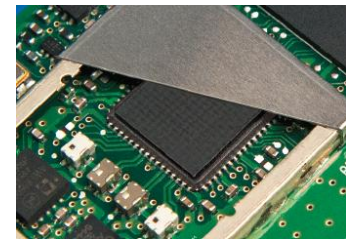
### Thermal conductive moulding:

- heat transfer through the moulded encapsulates
- Low pressure moulding



### T-Clad®

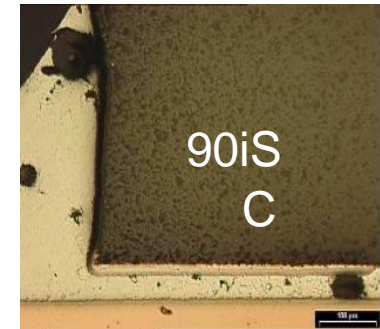
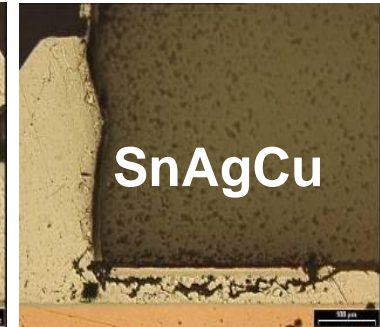
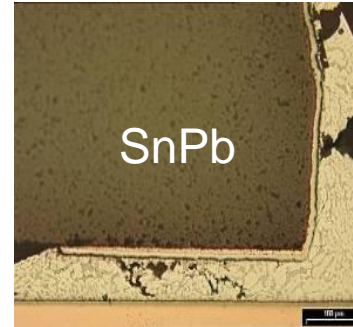
- Metalcore PCB
- 1.0 – 7.5 W/m-K Tc Performance
- Stabilux® high reflective coating



# Adhesive and Surface Treatment Applications Lighting Interconnectivity

## High reliability solder paste:

- Pb-free
- Vibration resistant → no cracks
- Thermal cycle & -shock resistant
- Creep resistant
- Exceptional performance in high-reliability applications e.g. Hi-Power LED's



## Electrically conductive adhesives:

- high temperature, adhesion and throughput applications
- adhesion to flex substrates
- adhesion to non-noble (Sb) and ceramic substrates



# Our Solutions for the Lighting Industry

## LED Package, Driver, Power Module & Connections

Technical  
Consultancy

Metal  
Working

Cleaning

Pre-  
Treatment

Bonding

Sealing

Filling &  
Protecting

Coating

Lubricating

Expert  
Training

### Protecting LED packages and electronic components

- **Seal the LED** from outside conditions and maintain lighting performance with **highly transparent** and UV aging stable silicone
- **Thermal management** solutions for permanently fixed or removable LED modules
- Potting that fits your process needs: from the **easy to use** to the **fully automated** cure time optimized



# Our Solutions for the Lighting Industry

## Diffuser and Housing

Technical  
Consultancy

Metal  
Working

Cleaning

Pre-  
Treatment

Bonding

Sealing

Filling &  
Protecting

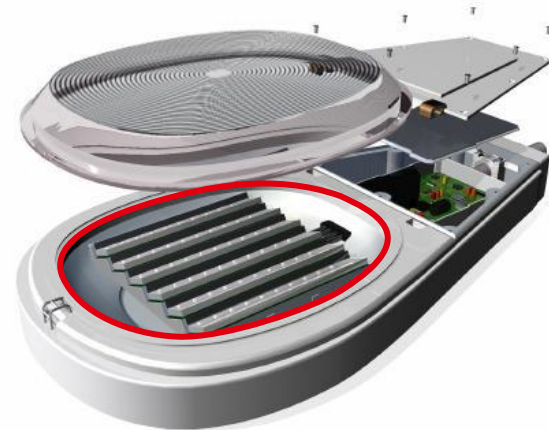
Coating

Lubricating

Expert  
Training

### We have the solution fitting your needs

- **Production simplification** by bonding even challenging substrates, like polyolefines
- **Sealing sensitive components** to increase luminaire reliability also in extreme conditions
- **Time is money**: instant and fast UV curing adhesives
- Adapted to your process: from **simple to use** products to integration in **fully automated processes**
- Satisfying highest standards for **luminaire esthetics**



# Our Solutions for the Lighting Industry

## Housing and Pole

Technical  
Consultancy

Metal  
Working

Cleaning

Pre-  
Treatment

Bonding

Sealing

Filling &  
Protecting

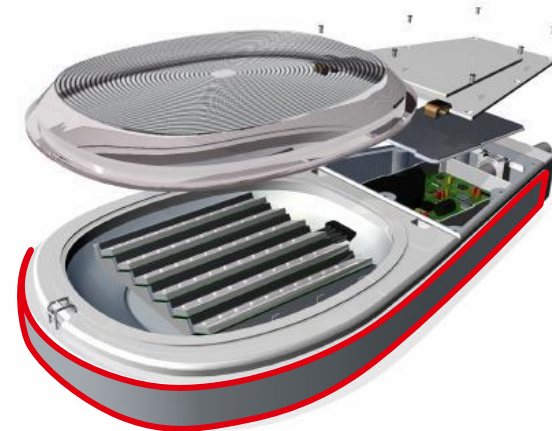
Coating

Lubricating

Expert  
Training

### Next generation surface treatment for aluminum and steel with improved cost and environmental profile

- Less process steps and shorter contact times compared to traditional iron or zinc phosphating
- Operation at low temperatures
- No sludge with heavy metals





# Our Solutions for the Lighting Industry

## Application and Dispensing Equipment

Technical  
Consultancy

Metal  
Working

Cleaning

Pre-  
Treatment

Bonding

Sealing

Filling &  
Protecting

Coating

Lubricating

Expert  
Training



### 1K Dispense Equipment

- For CA and UV-acrylic
- Available for different levels of automation
- Safe and reliable, easy application



### 2K Dispense Equipment

- For 2K silicones (Si5700), PU and epoxies
- Adjustable mix ratio
- Supply out of 400 ml dual cartridges or pails

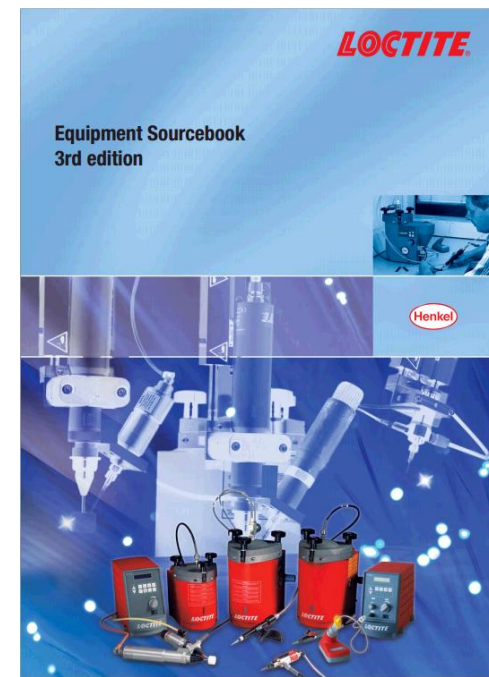


### UV-Curing Equipment

- For 1K UV Acrylics (3494, 3321) and UV silicones (Si5088)
- Flood, line and spot cure systems
- LED and arc lamp technology

For more details:

[www.loctite-equipment.com](http://www.loctite-equipment.com)

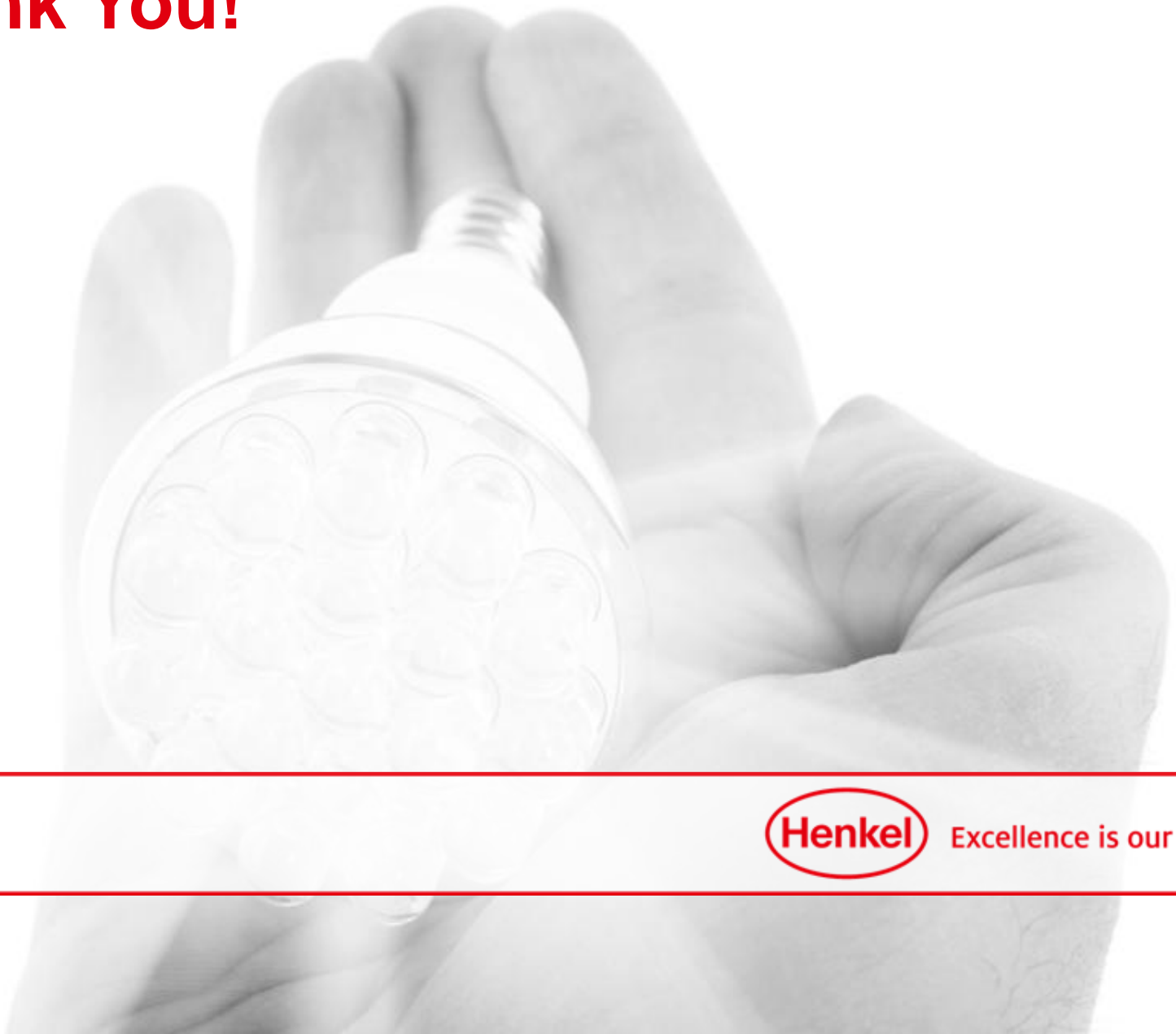


# Question & Answers



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# Thank You!



Excellence is our Passion

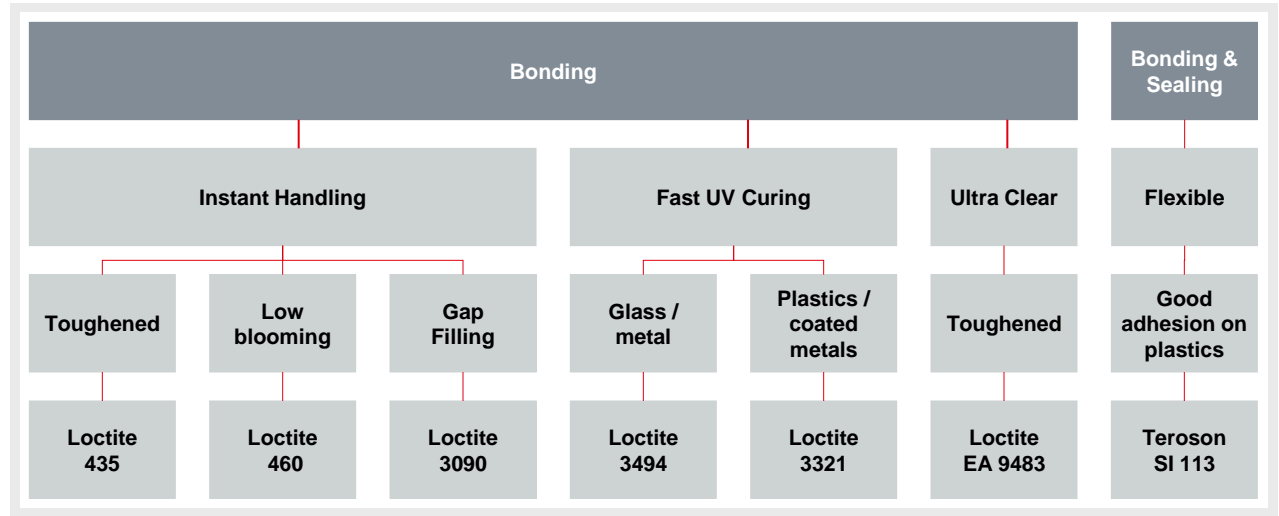
# Back up slides



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# Clear Bonding and Sealing

## Diffuser and Housing



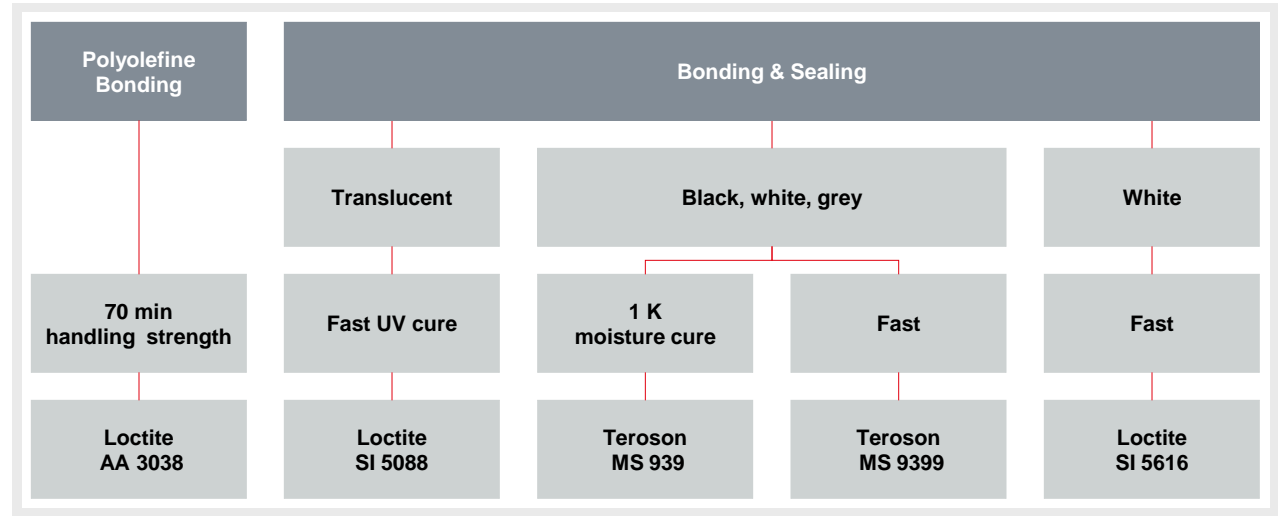
Type	Cyanoacrylate 1K	Cyanoacrylate 1K	Cyanoacrylate 2K	Acrylic UV Cure 1K	Acrylic UV Cure 1K	Epoxy 2K	Alkoxy silicone 1K
Pot life / Skin Formation Time	*	*	*	indefinite	indefinite	25-60	11 min
Tensile Strength <sup>1</sup>	30	30	28	23	19	47	2.5
Final cure time	Few Hours	Few hours	Few hours	Few minutes	Few minutes	24h	*

<sup>1</sup> N/mm<sup>2</sup>

\* Not applicable or data yet to be generated

# Colored and Translucent Bonding and Sealing

## Diffuser and Housing



Type	Acrylate 2K	UV cure alkoxy silicone 1K	Silane modified polymer 1K	Silane modified polymer 2K	Silicone 2K
Pot life / Skin Formation	4 min	11 min	10 min	20-30 min	5 min
Tensile Strength <sup>1</sup>	13	1	3	3	1
Final cure time	Few days	72 h	1 week	1 week	Few days

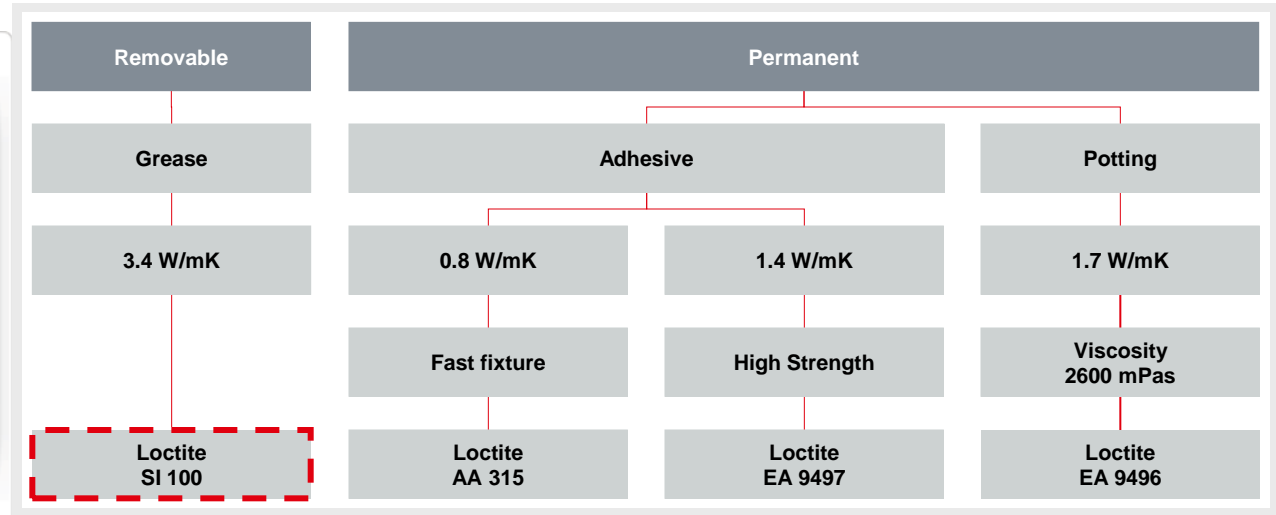
<sup>1</sup> N/mm<sup>2</sup>

\* Not applicable or data yet to be generated



# Heat Conduction

## LED package to housing, Driver to Heat Sink




Type	Silicone grease	1K acrylic	2K epoxy	2K epoxy
Tensile Strength <sup>1</sup>	none	5.2	53	67
Fixture time / Tack free time	instant	*	8 hrs	6-7 h
Dielectric Stgth <sup>2</sup>	*	27	*	28
Volume Resistivity <sup>3</sup>	*	1.3 10 <sup>12</sup>	41 10 <sup>15</sup>	*
Final cure time	instant	1 day	1- 7 days	~24 h

1 N/mm<sup>2</sup>  
2 kV/mm

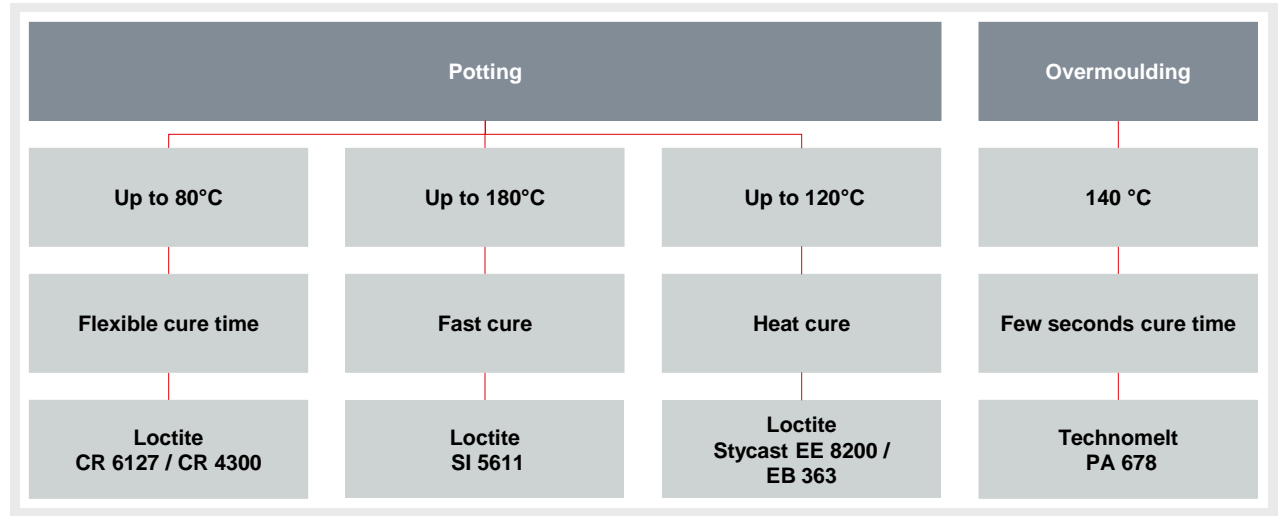
3 ohms-cm

\* Not applicable or data yet to be generated

 Please consult us for availability

# General Moulding and Potting

## Power Modules, Electrical Connections



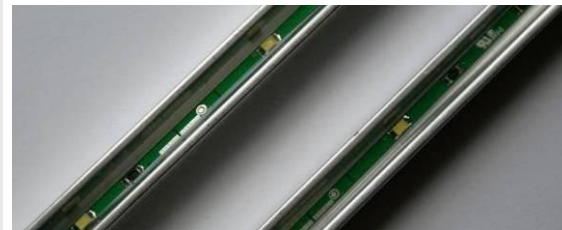
Type	2K polyurethane	2K alkoxy silicone	2K epoxy	Polyamide hotmelt
Viscosity (mPas)	2.6K	3k -10k	11k	3.4k
Thermal conductivity <sup>1</sup>	0.51	0.32	0.48	0.15
Dielectric Stgth <sup>2</sup>	>20	19.8	58	>20
Volume Resist. <sup>3</sup>	3.5*10 <sup>13</sup>	3.5*10 <sup>14</sup>	8 *10 <sup>13</sup>	1.9 *10 <sup>12</sup>
Pot Life	2-90 min	6 min	8 hrs	*
Hardness	A 80-90	A50	D 68	A88
UL-94	V0	V0	V0	V0

<sup>1</sup> W/mK  
<sup>2</sup> kV/mm

<sup>3</sup> ohms-cm  
\* Not applicable or data yet to be generated

# Transparent Potting

## Sealing Lighting Module




Transparent potting

Locite SI 5700

- Ultra clear
- Outstanding stability under aging conditions
- Low viscous & self leveling
- Simple 1:1 mix ratio
- No by-product
- Can be heat accelerated
- Low shrinkage level

Mixed viscosity (mPas)	6000-7000
Potlife	25 min
Hardness	A 39
Tensile strength	4 Mpa
Chromaticity Coordinate x	0,3324 +/- 0,0007
Chromaticity Coordinate y	0,3478 +/- 0,0006
Refractive index	1,41
Transmission Rate	95% at 2 mm / 550 nm



 Development Product please consult us for availability

# Surface Treatment

## Housing and Pole

