

# LED Packaging

## Advanced silicone technology for LED applications

Dow Corning silicone solutions for LED packages are designed to meet the challenging needs of the LED market. Silicone products offer good compatibility with standard LED substrates and processing techniques. The Dow Corning product line contains gels, elastomers and resins.

### Features

- High optical transparency
- Excellent UV resistance
- Excellent thermal stability
- Low moisture up-take
- Low ionic content

### Benefits

- Well-suited for IR, visible or UV optical applications
- Lead-free solder reflow temperatures
- Flexibility in manufacturing
- Good adhesion to various lead frames

### 1. Encapsulants: Gel, Elastomer and Resin

Dow Corning provides both High RI and Normal RI OE Series silicone encapsulants, which have outstanding light transmittance across the application wavelengths of LEDs. These encapsulants provide excellent stress relief, moisture protection and UV resistance for LED chip sealing and protection.

**Physical Form:** Low- to medium-viscosity liquid; cures to a flexible gel or elastomer.

**Special Properties:** Transparent with refractive index range of 1.41 to 1.53.

### 2. Lens Molding: Elastomer and Resin

Dow Corning provides the high RI resin material needed for optical lens fabrication. These products are designed with excellent injection and compression molding characteristics.

### 3. Overmolding: Elastomer and Resin

Dow Corning® OE Series silicone encapsulants are excellent candidates for the overmolding process, the leading-edge process technology.

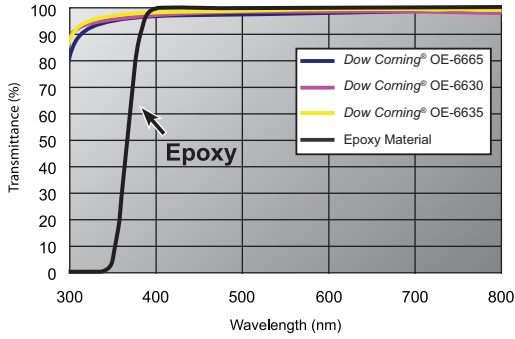
## Material Properties of HRI Encapsulants

HRI Encapsulants	Gel		Elastomers		Resins	
	Dow Corning® OE-6450	Dow Corning® OE-6520	Dow Corning® OE-6550	Dow Corning® OE-6630	Dow Corning® OE-6635	Dow Corning® OE-6665
<b>As Supplied</b>						
Component	2-part	2-part	2-part	2-part	2-part	2-part
Mixing Ratio	1:1	1:1	1:1	1:4	1:3	1:20
Viscosity, Pa·s	1.8	2	4	2.5	5	2.2
Cure Condition, °C/hr	100/1	150/1	150/1	150/2	150/2	150/2
<b>After Cure</b>						
Hardness	—	26 (JIS A)	62 (JIS A)	41 (shore D)	33 (shore D)	68 (shore D)
Refractive Index	1.54	1.54	1.54	1.53	1.53	1.53
Transmittance, % @ 450 nm, 1 mm	100	100	100	100	100	99.5
CTE	—	230	210	—	—	—

\*NOTE: Please check with your local Dow Corning office for a full product range and availability in your area.

### Transmittance (after cure)

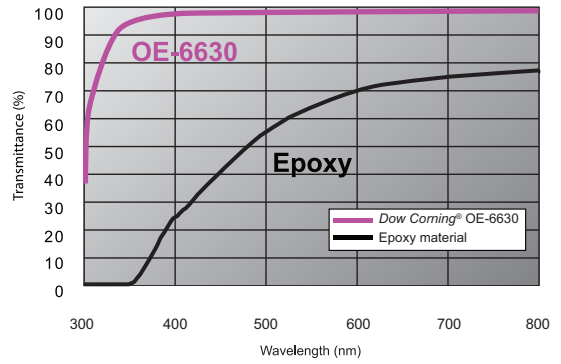
High transparency between 350 nm to 800 nm  
Higher transparency between 300 nm to 400 nm than epoxy



Sample thickness = 4 mm  
Epoxy = typical optical grade epoxy

### Transmittance (after UV irradiation)

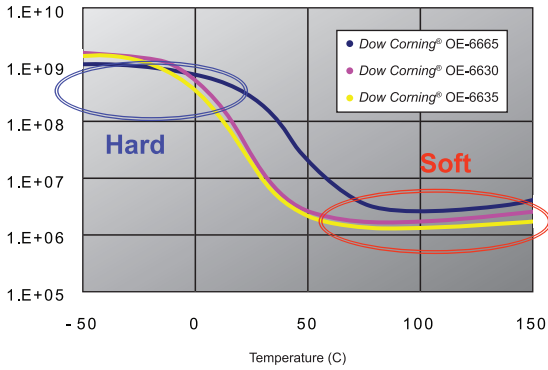
Higher UV stability than epoxy



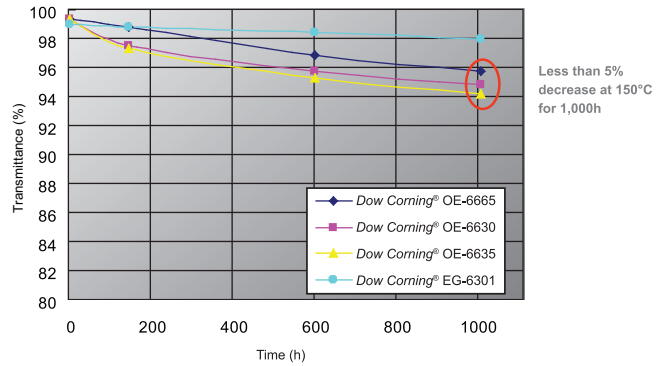
Test condition: UV = 365 nm, 19 m W/cm<sup>2</sup>, 4 h

### Storage Modulus

Hard material becomes softer at high temperature, therefore, stress in package can be minimized.



### Transmittance (after thermal aging)



Thickness = 1 mm, Transmittance = 400 nm  
Sample aging condition = 150°C, air

Less than 5% decrease at 150°C for 1,000h

## Material Properties of NRI Encapsulants

NRI Encapsulants	Gels			Elastomers		
	Dow Corning® JCR 6110 A/B	HIPEC® Q1-4939	Dow Corning® OE-6250	Dow Corning® JCR 6122	Dow Corning® EG-6301	Dow Corning® OE-6336
<b>As Supplied</b>						
Component	2-part	2-part	2-part	2-part	2-part	2-part
Mixing Ratio	10:1	10:1	1:1	1:1	1:1	1:1
Cure Condition, °C/hr	150/1	125/0.5	80/1	150/1	150/1	150/1
Viscosity, Pa·s	2.1	5.4	0.5	0.35	3.4	1.5
<b>After Cure</b>						
Hardness, JIS A	—	—	—	35	71	65
Refractive Index	1.42	1.41	1.41	1.40	1.41	1.41
Transmittance, % @ 450 nm, 1 mm	99	91.5	100	99	97	98

## Material Properties of HRI Silicone Lens Resin

HRI Lens Molding	Silicone Resin	
	Dow Corning® SR-7010	Dow Corning® OE-4705*
Application	Cavity Molding	Injection Molding
<b>As Supplied</b>		
Components	2-part	2-part
Mixing Ratio	1:1	1:2
Viscosity, Pa·s	14	44
Curing Condition	< 1 min@170°C	150 ~ 170°C/2 min (thickness dependent)
<b>After Cure</b>		
Hardness, Shore D	67	60
Refractive Index	1.53	1.53
Light Transmittance, % @ 450 nm	99	> 99

\*NOTE: Please check with your local Dow Corning office to confirm the specification and for a full product range and availability in your area.

## Global Connection

For more information about Dow Corning LED solutions, visit [www.dowcorning.com/LED](http://www.dowcorning.com/LED), or contact one of our primary locations:

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