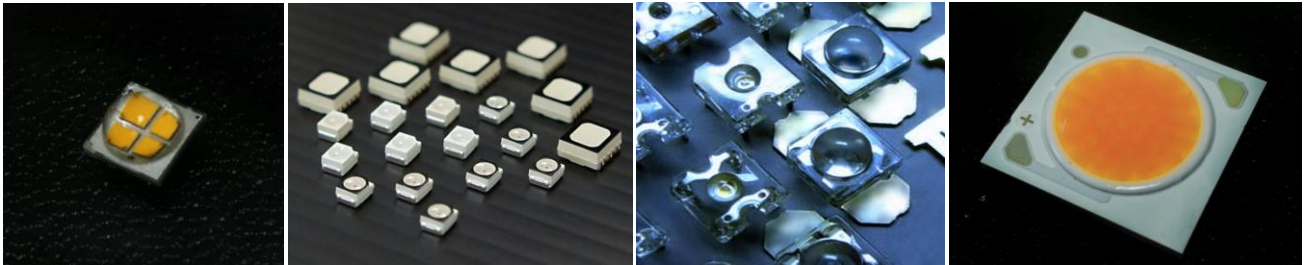


LED Encapsulation

Penchem LED encapsulation material is a clear, water-white system suitable for encapsulation of high performance optoelectronic devices. This material has designed for excellent performances in temperature cycling, high temperature storage, humidity storage, light output degradation and outdoor weathering performances. This system offers good properties such as maximum resistance to yellowing from oxidation, high temperature degradation and sunlight. The 2-part system is suitable for through hole LED (3/5mm, oval & flat-top), super flux and snap LED. It has outstanding performance for outdoor applications such as automobile lightings, signals, indicators and traffic signal lights. It has the advantage of low thermo-mechanical stress and high thermal and crack resistance.

Special Features

- ✦ Good UV resistance
- ✦ Good crack resistance from thermal and mechanical stresses
- ✦ High glass transition temperature
- ✦ High temperature storage
- ✦ High optical clarity
- ✦ Excellent performance in thermal cycling
- ✦ Comply to RoHS and REACH requirements



Epoxy for LED Lighting

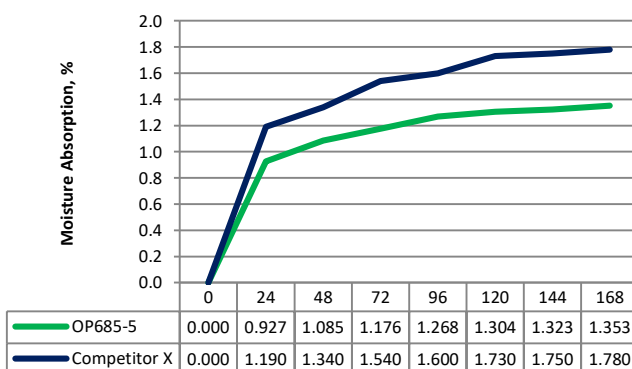
Penchem Epoxy LED material is a clear, water-white epoxy system suitable for encapsulation of high performance OP devices like indicator lamps. It is cured with anhydride hardeners. This material has designed for excellent performances in temperature cycling, high temperature storage, humidity storage, light output degradation and outdoor weathering performances. This system offers good properties such as maximum resistance to yellowing from oxidation, high temperature degradation and sunlight. Therefore, these make LEDs has good crack resistance from thermo mechanical stresses and increase production efficiency.

Silicone for LED Lighting

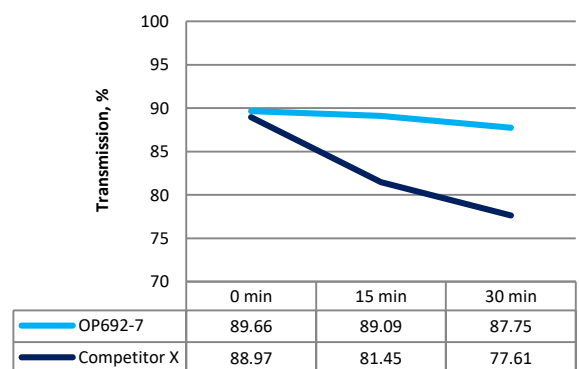
Penchem Silicone LED material is transparent that can be cured with silicone hydride crosslinker. Chemical structure of silicone consists of an inorganic silicon-oxygen backbone and hydro carbon group attached to the silicon atoms. Penchem silicone has excellent flexibility and a wide range of hardness.

Penchem silicone LED material has created to achieve minimal light output degradation and excellent resistance to outdoor weathering as well as low stress for excellent performances in temperature cycling. This material has advantage to cope with high temperature and humidity storage that is suitable for a variety of middle and high-power LED package types, including surface-mount, lens mold and chip on board architectures

Moisture Absorption at 85°C/85%RH



Percentage of Transmission after UV Aging



Product Selector Guide

2 Part LED Encapsulation

Parameter	Unit	OP692-7	OP695-7	OP685-5	OP583-18	PT1002	OP955-4
Special Features	-	Good UV resistance in 3 and 5 mm lamps	Snapled, Superflux, Piranha	High power PLCC up to More than 30mA max. , 3mm&5mm LED Lamps & PLCC	IR emitter and Receiver casted Lead-frame	LED camera color sensor encapsulation with PT405 Yellow Dye	Low RI silicone for high power flat LED, PLCC
Curing Profile	-	Pre-cure: 120°C/2hr Post-cure: 150°C/2hrs	Pre-cure: 120°C/2hrs Post-cure: 150°C/2hrs	Pre-cure: 120°C/2hrs Post-cure: 150°C/2hrs	Pre-cure: 120°C/2hrs Post-cure: 150°C/2hrs	Pre-cure: 135°C/2hrs Post-cure: 150°C/8hrs	160°C/2hrs
Chemical Type	-	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Silicone
Color & Appearance	-	Blue & Transparent	Blue & Transparent	Blue & Transparent	Blue & Transparent	Blue & Transparent	Colorless Transparent
Shelf Life	Month	12	12	12	12	12	12
Pot life	hr	3	2	2	2	8	24
Viscosity	cP	579	1260	1260	610	360-815	3000
Specific Gravity	-	Part A: 1.17 Part B: 1.15	Part A: 1.10 Part B: 1.20	Part A: 1.10 Part B: 1.20	Part A: 1.1 Part B: 1.2	Part A: 1.18 Part B: 1.21	Part A: 1.032 Part B: 0.985
Mix Ratio					1:1	1.2:1	10:1
Hardness	Shore D	85	87	87	80	88	A59
Refractive Index	-	1.49	1.49	1.49	1.517	1.518	1.41
Percent of Transmission	%	90	90	90	>90	>90	>95
CTE 1	ppm/K	75	55	71	42	90	-
CTE 2	ppm/K	149	180	182	196	240	293
Glass Transition Temperature	°C	168	142	154	110	130	-101

OP685-5 achieved superior moisture resistance in MSL 1 @ 85°C/85%RH

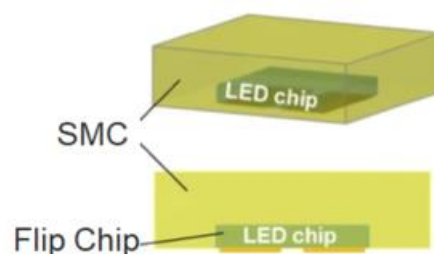
OP692-7 achieved lower UV degradation after UV aging

SMC

Penchem SMC material is a solid molding material suitable for encapsulation of high performance chip scale package. This material has designed for excellent performances in temperature cycling, high temperature storage, humidity storage, high reflectivity and outdoor weathering performances. This system offers good properties such as maximum resistance to yellowing from oxidation, high temperature degradation and sunlight. It has outstanding performance for outdoor applications such as automobile lightings and general lightings. It has the advantage of low thermo-mechanical stress and high thermal and crack resistance.

Special Features

- ◆ Good UV resistance
- ◆ Good crack resistance from thermal and mechanical stresses
- ◆ High temperature storage
- ◆ High reflectivity
- ◆ Excellent performance in thermal cycling
- ◆ Comply to RoHS and REACH requirements
- ◆ Suitable for over and transfer molding process.



SM870

Uncured Properties	Typical Value	Unit	Test Method
Chemical type	Silicone	-	-
Appearance	White	-	PEN 10
Shelf life, -20°C	6	Months	PEN 26
Pot life, 25°C	8	hours	PEN 57
Cured Properties @ condition??	Typical Value	Unit	Test Method
Density	2.06	g/cm ³	PEN 61
Hardness	81	Shore A	PEN 29
Reflectivity, 150°C/4Hour	93.3	%	PEN 139
Reflectivity, 260°C/30min	91.5	%	PEN 139
Flexural strength, 150°C/4Hour	31 to 42	MPa	PEN 116

For more information about these products, please contact our technical and commercial team, who will be always pleased to help.