sol epoxy

PRODUCT SELECTOR GUIDE

OPTOELECTRONIC COMPOUNDS

PRODUCTS APPLICATIONS DATA

SOLEPOXY SERVES THE WORLD

Corporate

Olean, NY, USA
Research & Development
Manufacturing
Customer Service

Amsterdam, NL
Marketing
Planning
Technical Sales

Warehouses

Olean, NY, USA
Rotterdam, NL
Calexico, CA, USA
Chennai, India
Manila, Philippines

Safety stock in cold-storage warehouses around the globe minimize shipping costs and delivery time.

Market Partners

Indian subcontinent
Greater China
Korea
Southeast Asia

Representatives fluent in local languages provide product information & technical support

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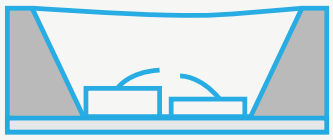
Silicone Replacement

Epoxy for Mid-Power LED devices

Epoxy has superior mechanical properties that prevent common silicone issues from occurring:

Rigid, non-tacky surface

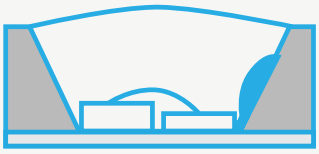
Pressure applied on soft silicone can break delicate wire bonds. Dust often adheres to the tacky surface of silicone, reducing light output.



Epoxy is more rigid and once cured, provides a tack-free surface that minimizes dust collection.

Increased PPA/PCT adhesion

Silicones are known to delaminate at the PPA/PCT interface. This creates "dark spots" and reduces reflectivity and light output.



Epoxy has increased adhesion to PPA/PCT and therefore can guarantee consistent reflectivity and light output.

Low permeability prevents corrosion

Silicones allow sulphur compounds to evaporate and corrode silver pad causing a black surface that over time will result in destruction of the electrical contact.

Epoxy has inherently very low permeability, reducing the likelihood of corrosion.

	OL10-1	OP1000	OC10-1	OG10-1	Silicone
Product type	One part liquid hybrid epoxy	Pressed mold compound	Cast mold compound	Fine ground powder	Silicone
Transmission (initial)	■■■■	■■■■	■■■■	■■■■	■■□□
Adhesion	■■■■	■■■■	■■■■	■■■■	■□□□
Gas Permeability	■■■■	■■■■	■■■■	■■■■	■■□□
Rigidity	■■■■	■■■■	■■■■	■■■■	■■□□
UV Resistance	■■□□	■■□□	■■□□	■■□□	■■■■
Heat Resistance	■■□□	■■□□	■■□□	■■□□	■■■■
Refractive Index	■■■□	■■■□	■■■□	■■■□	■□□□
Production Flexibility	■■■□	■□□□	■□□□	■□□□	■■■■
Production Efficiency	■■□□	■■■■	■■■■	■■■■	■■■□

■□□□ Poor ■■□□ Fair ■■■□ Good ■■■■ Best

OL10-1, OP1000, OC10-1 and OG10-1

Target Applications

Mid-Power LED SMD that have a junction temperature < 105°C

Leadless MAP devices

UV LED applications that require high transmittance >350nm

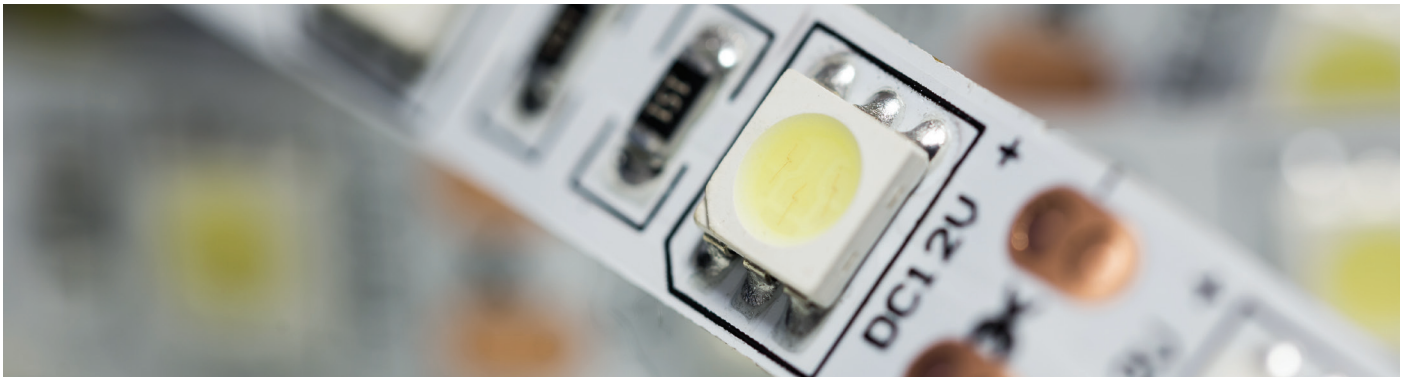
Outdoor RGB SMT LED applications that require UV Resistance

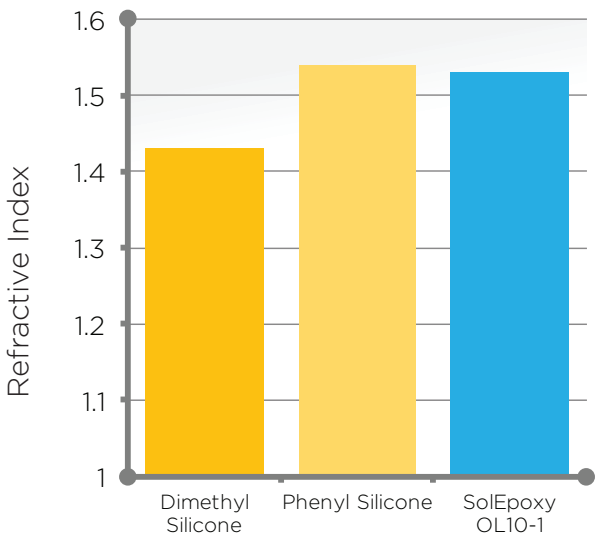
Benefits

Cost Effective
Alternative to silicone for encapsulation of Mid Power LED

High transmission
> 90% transmittance from 400 - 1600 nm

Non-yellowing
After thousands of hours at temperature of 105°C





High Refractive Index
Higher RI for higher light output

Features:

- Much better RI than dimethyl silicones
- Near match to expensive phenyl silicones

Benefits:

- Higher efficiency
- Reduced cost per lumen
- Increased lumens per watt

Anti-yellowing

Heat and UV resistant clear compounds

Description

SolEpoxy offers a portfolio of heat and UV resistant clear encapsulants that do not yellow after continuous heat exposure.

This resistance ensures color stability of your LEDs so that your whites stay white, your reds stay red and your blues stay blue. As such, your color binning labeling is correct from day one, and after 10 years.

Benefits

Heat resistant
Non-yellowing after continuous heat exposure.

UV resistant
Non-yellowing after UV exposure

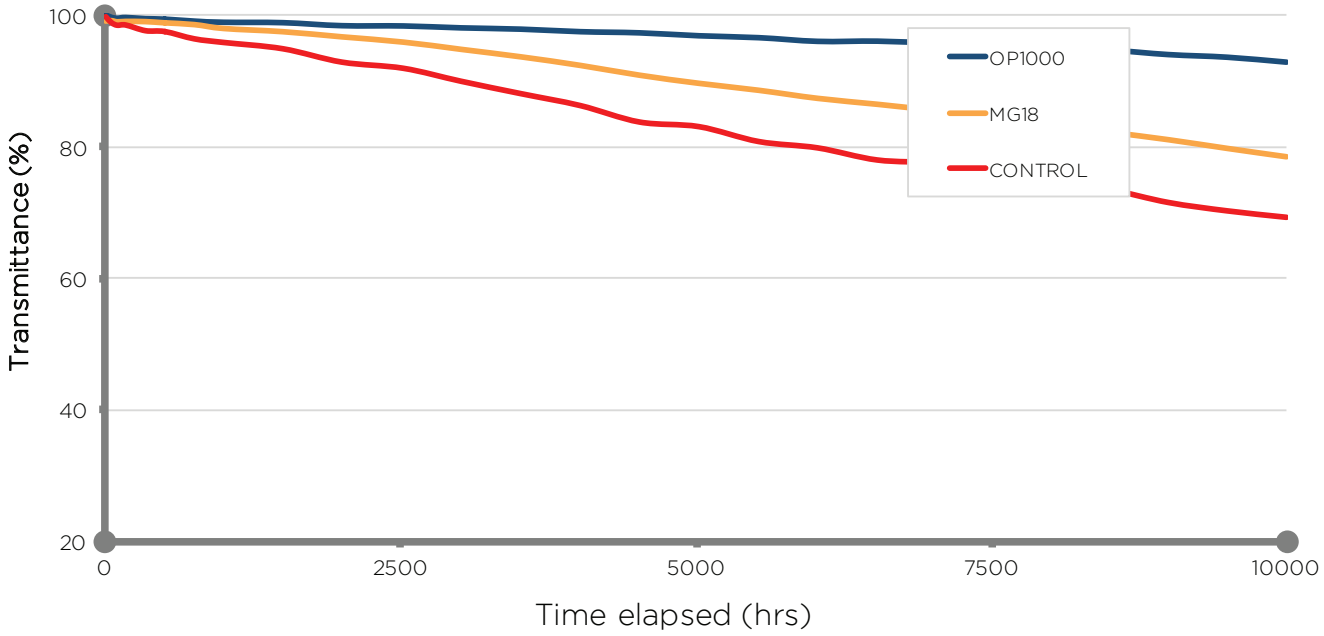
Color stability
This resistance ensures color stability of your LEDs.

*All data after 4 hours @ 150 °C	Units	Control	OG10-1	OP1000	OC10-1	OL10-1
Product type	-	Pressed mold compound	Fine ground powder	Pressed mold compound	Cast mold compound	One part liquid
Glass Transition temperature (Tg)	°C	140	140	139	142	147
Coefficient of Thermal Expansion (CTE) Alpha 1	ppm/°C	79	77	80	75	70
Alpha 2	ppm/°C	160	162	161	163	167
Adhesion to Leadframes: Ag	kg	20	-	25.4	41.3	N/A
Cu	kg	20	-	4.99	20.1	N/A
Ni/Pd/Au	kg	37	-	49.9	38.6	N/A
Moisture absorption 1 hr @ 95 °C	%	0.45	-	0.48	0.44	0.25
Flexural Properties after Strength	MPa	110	-	110	121	136
Modulus	GPa	3.0	-	3.0	2.9	3.3
Refractive Index @400nm	-	1.53	1.53	1.53	1.53	1.52
Internal Transmittance @ 460 nm T-Tran	%	70	99.7	99.8	99.7	100

OP1000, OC10-1, OG10-1
and OL10-1

Effect of Transmittance after Heat Aging @ 125°C

@ 460 nm for 1 mm thick specimens



The new standard for UV and heat resistant

When designing a lighting environment, it's important to know that the color will not change over time. When replacing an old lamp with a new one, it should not be obvious which unit was replaced.

SolEpoxy products are tested at extreme conditions (125°C) to ensure that under normal conditions, there is minimal transmission loss or yellowing.

Sensor Capability

Alternative to expensive optical filters

Description

Traditional optical filters, besides being expensive, requires extra process steps to assemble over the light-sensing electronics.

Also, old-fashioned glass filter technology is difficult to miniaturize.

SolEpoxy introduces a revolutionary chemical filter technology that can be incorporated into our world-class yellow resistant optically clear encapsulants.

Benefits

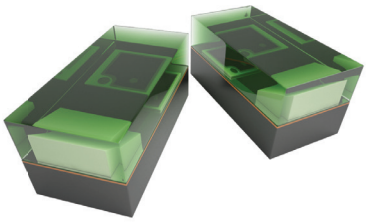
Lower cost compared to traditional glass
Traditional optical filters can often run into the hundreds of dollars.

Miniaturization
Allows miniaturization of your parts by reducing footprint size and process steps

Custom cutoffs
SolEpoxy is able to tailor to your wavelength requirements.

IR Proximity Sensor

Lens Filter

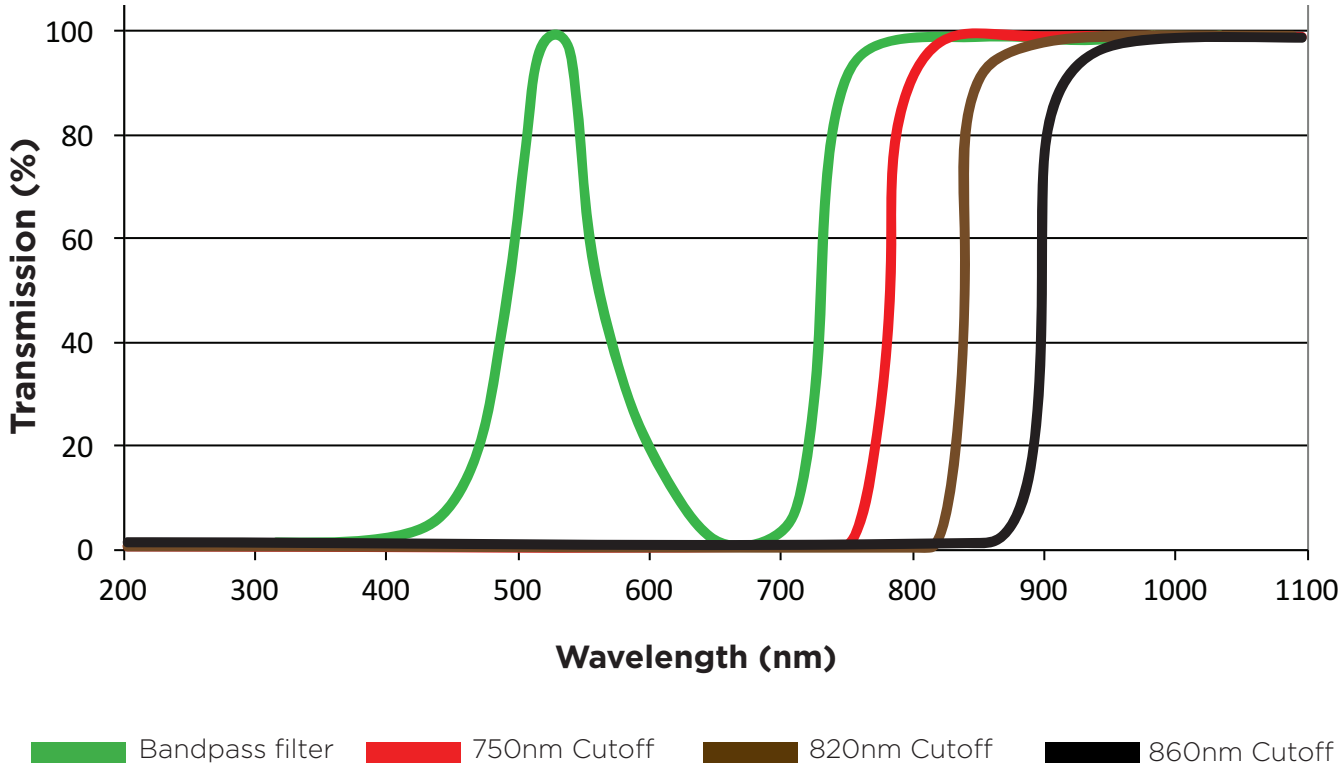


Ambient Light Sensor

*All data after 4 hours @ 150 °C	Units	OP7000	OP70-2 Black	OL1000F-820	OP10-1CIE Green
Product type	-	Pressed mold compound	Pressed mold compound	One part liquid	Pressed mold compound
Glass Transition Temperature (Tg)	°C	140	137	145	139
Coefficient of Thermal Expansion (CTE)					
Alpha 1:	ppm/°C	79	81	90	81
Alpha 2:	ppm/°C	160	161	315	160
Specific Gravity,	g/cc	1.28	1.28	-	1.29
Moisture absorption 1 hr @ 95°C	%	0.45	0.49	0.46	0.47
Flexural Properties after 4hrs @150°C					
Strength	MPa	110	94.5	103	100
Modulus	GPa	3.0	2.9	2.8	3.0
Adhesion to Leadframes					
Ag	kg	20	46	-	-
Cu	kg	20	27	-	-
Ni/Pd/Au	kg	37	56	-	-

OP7000, OP70-2 Black, OP10-1CIE Green and OL1000F-820

Custom Wavelength available



Applications

Optical filters are used in a range of automotive, biometric, and consumer applications.

- **Light filter technology** allows any wavelength cutoff value
- **Excellent transmittance** initially and after long-term heat exposure

Low stress and high clarity

Improved MSL optically clear encapsulants

Description

Optically clear encapsulants provide durable clarity, high product yields, superior process characteristics, and high reliability.

Typically transmittance data is severely compromised when using low stress additives.

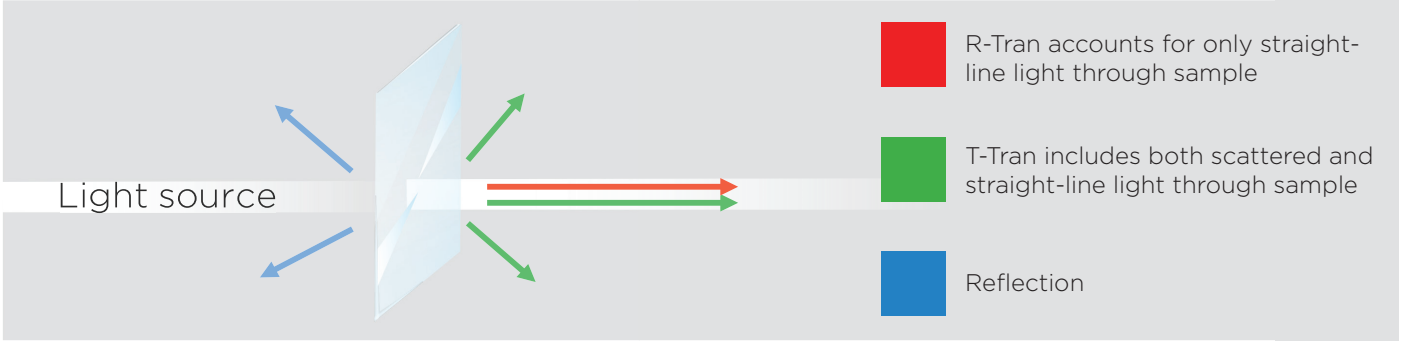
This patent technology is the only only Low Stress epoxy that preserves straight light transmission

Benefits

Lowest CTE clear compound
Thermal expansion reduced by 60% while maintaining optical transmittance.

Reduced moisture absorption
Moisture absorption reduced by 70%.

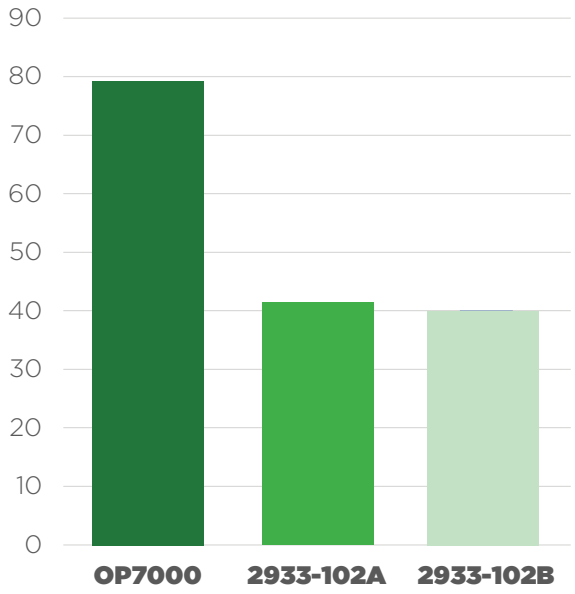
High transmission
High transmission of wavelengths between 400 and 1600nm.



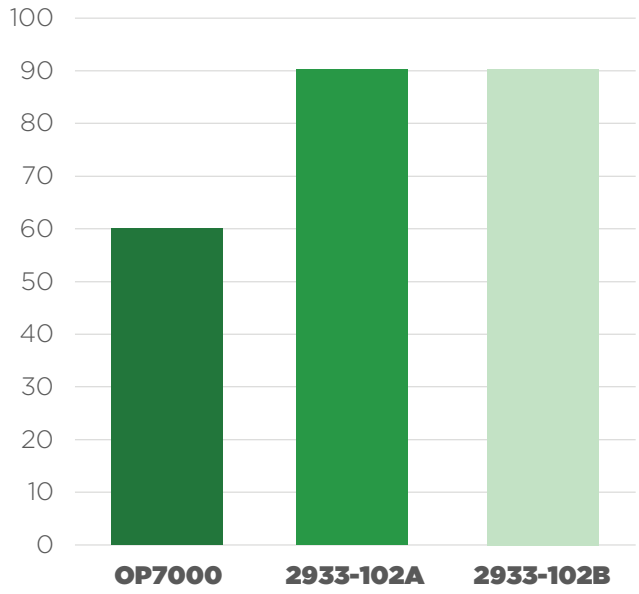
*All data after 4 hours @ 150 °C		Units	OP7000	2933-102A	2933-102B
Glass Transition Temperature (Tg)		°C	140	151	150
Coefficient of Thermal Expansion (CTE)	Alpha 1 Alpha 2	ppm/°C ppm/°C	79 160	41 90	40 88
Moisture Absorption 1 hr @ 95°C		%	0.45	0.20	0.22
Measured Transmittance, R-Tran 1 mm thick, %	460nm 850nm	% %	91 92	52 70	75 85
Refractive Index @ 460nm			1.52	1.52	1.52
Hot Hardness, Shore A			60	90	90
Flexural Properties after	Flexural Strength, Flexural Modulus, Flexural Toughness,	MPa GPa MPa	110 3.0 281	107 5.4 108	- - -

2933-102A and 2933-102B

CTE Below Tg (ppm/°C)

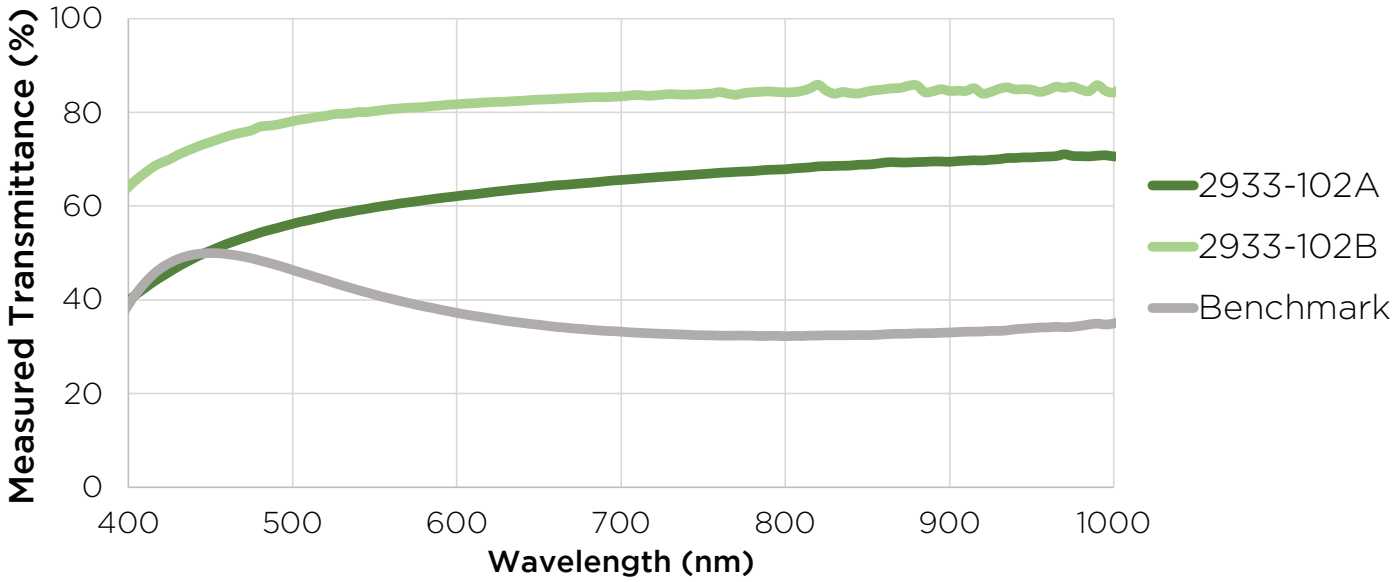


Hot Hardness (Shore A)



Transmittance

Straight-Line Transmittance, 1 mm thick



UV transmittance

High transmittance and high refractive index

Description

SolEpoxy OP1000 is a non-yellowing clear molding compound for the encapsulation of optoelectronic devices.

It features high refractive index and low gas permeability. It may be used as a cost-effective silicone alternative with similar light output for LEDs.

It is uniquely suited for SMT devices requiring excellent light transmission under 500 nm.

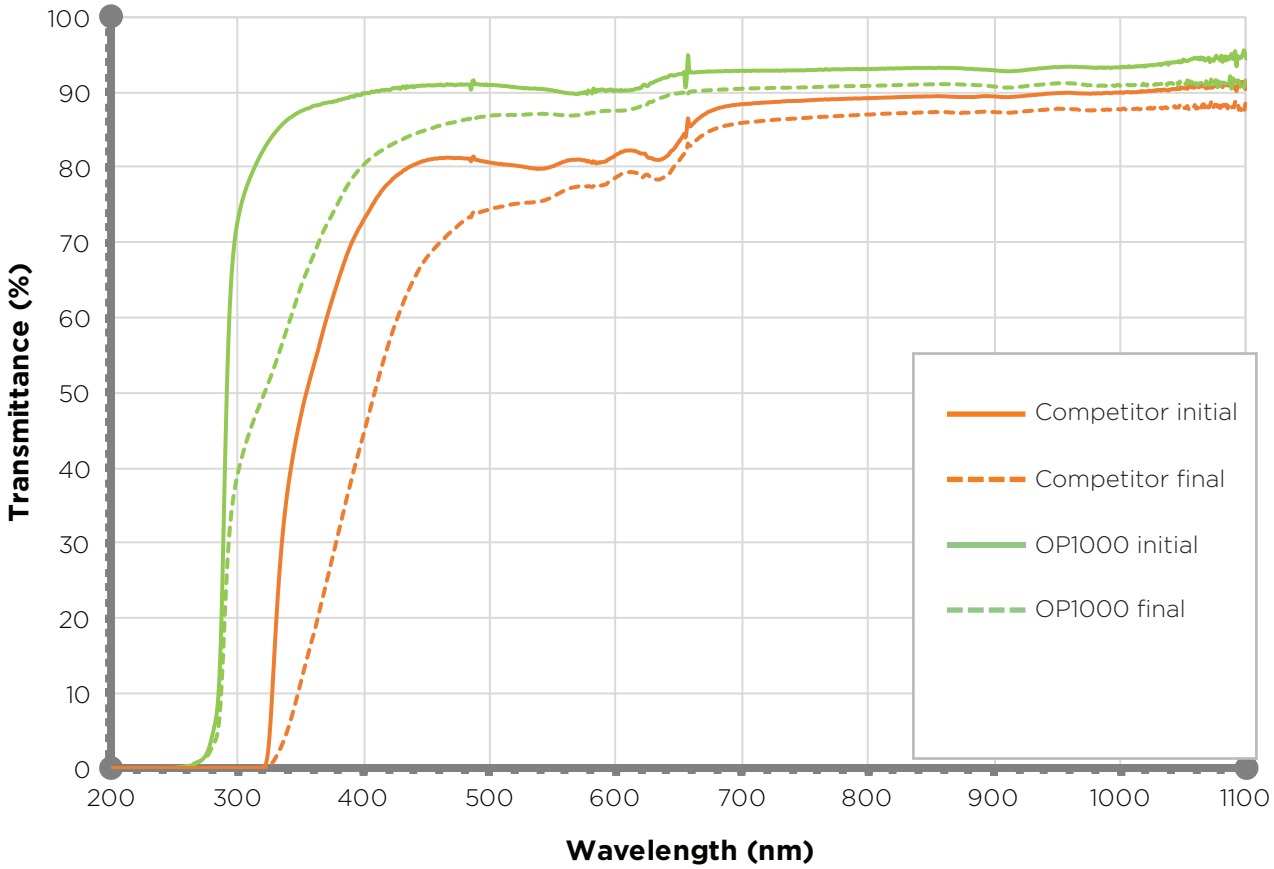
Benefits

Great Transmittance
Drop <6% after 7,000 hours @ 125°C

Higher Refractive Index
Compared to typical Methyl Silicone

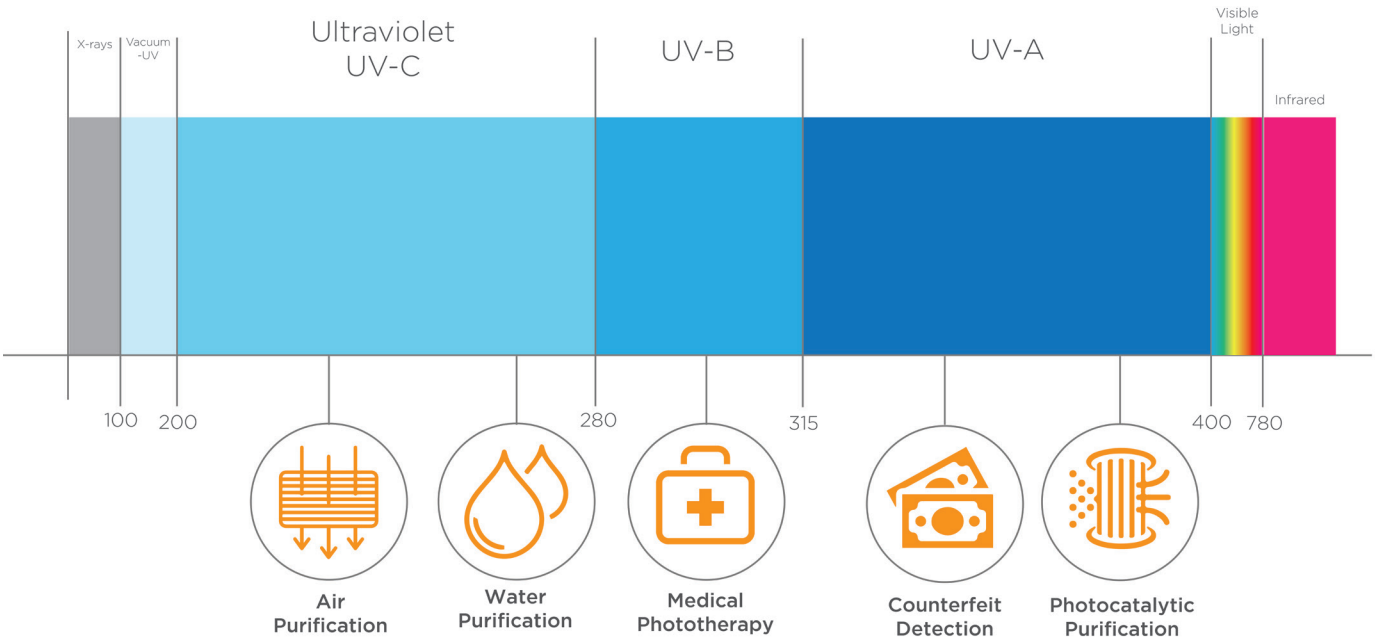
Excellent Cost vs. Performance
For LEDs

R-Tran measured before and after 3 reflow passes



UV Applications

As a function of Wavelength



HEAT RESISTANT

Non-yellowing after continuous heat exposure of up to 85°C.

UV RESISTANT

Non-yellowing after long-term UV exposure.

LOW UV TURN-ON

Turns on at UV wavelengths as low as 280nm.

White Reflective

Low CTE Reflective White Mold Compound

Description

SolEpoxy NB2912-58C is a white epoxy molding compound with low CTE and excellent color stability.

It is designed for applications requiring high brightness and reflectivity, and is specifically intended for use in combination with SolEpoxy NB2933-102A a clear optoelectronic molding compound with similar CTE.

Benefits

Matched CTE
Designed to match CTE of NB2933-102A, thus minimizing thermal stress in the package

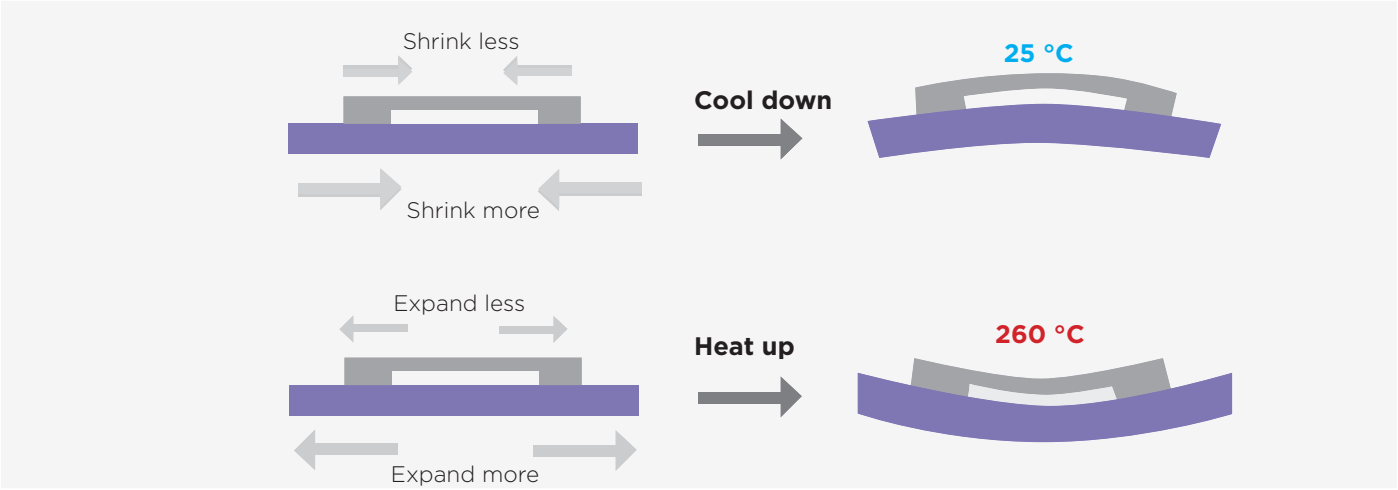
Improved adhesion
Designed for high adhesion to NB2933-102A, much better than compared to silicone

Compatible chemistry
With low stress clear compound for optimal product performance

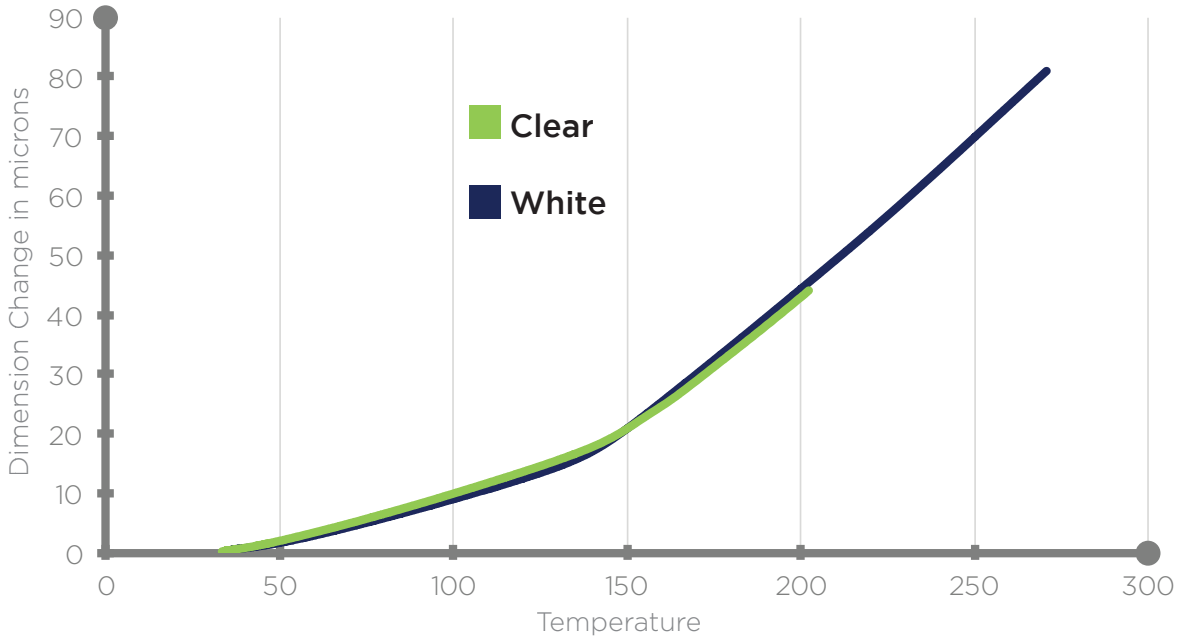
*All data after 4 hours @ 150 °C		Units	2933-102A	2912-58C
Product Type		-	Pressed mold compound	Pressed mold compound
Product color		-	Clear	white
Reflectance	L* 460 nm	 %	N/A N/A	97 > 90
Glass Transition Temperature (Tg)		°C	151	132
Coefficient of Thermal Expansion (CTE)	Alpha 1 Alpha 2	ppm/°C ppm/°C	41 90	42 110
Flexural Properties @ 25°C	Strength Modulus	MPa GPa	107 5.4	100 7.0
Moisture, 1 hr @ 95°C		%	0.2	0.22

Advantages of Matched CTE

A higher CTE material will shrink more during cooling, or expand more during heating. This behavior causes warpage in the molded package. If adhesion between two materials of mismatched CTE is poor, delamination may occur. Even when adhesion is excellent, excessive thermal stress between materials with two different CTEs can lead to cracking or wire breakage. **Matched CTEs minimize warpage and the associated failures.**



Overlap of CTE-matched Clear and White



Weather resistant for outdoor display

Featuring High Contrast

Description

SolEpoxy offers epoxy liquids and mold compounds that can withstand exposure to the natural elements with minimal degradation to key properties. Their robust performance makes these products ideal for use in outdoor displays.

In addition to several clear products, our portfolio includes a unique gray molding compound specifically designed for high contrast, improved productivity, and low warpage.

Benefits

High clarity
For increased light output.

Outstanding resistance
To heat and humidity.

Reduced moisture absorption
Of OL88-8 and high contrast gray improves MSL performance.

Low warpage of high contrast gray
Material is advantageous for the production of large panels.

Demonstrated Success in Reliability Testing*:

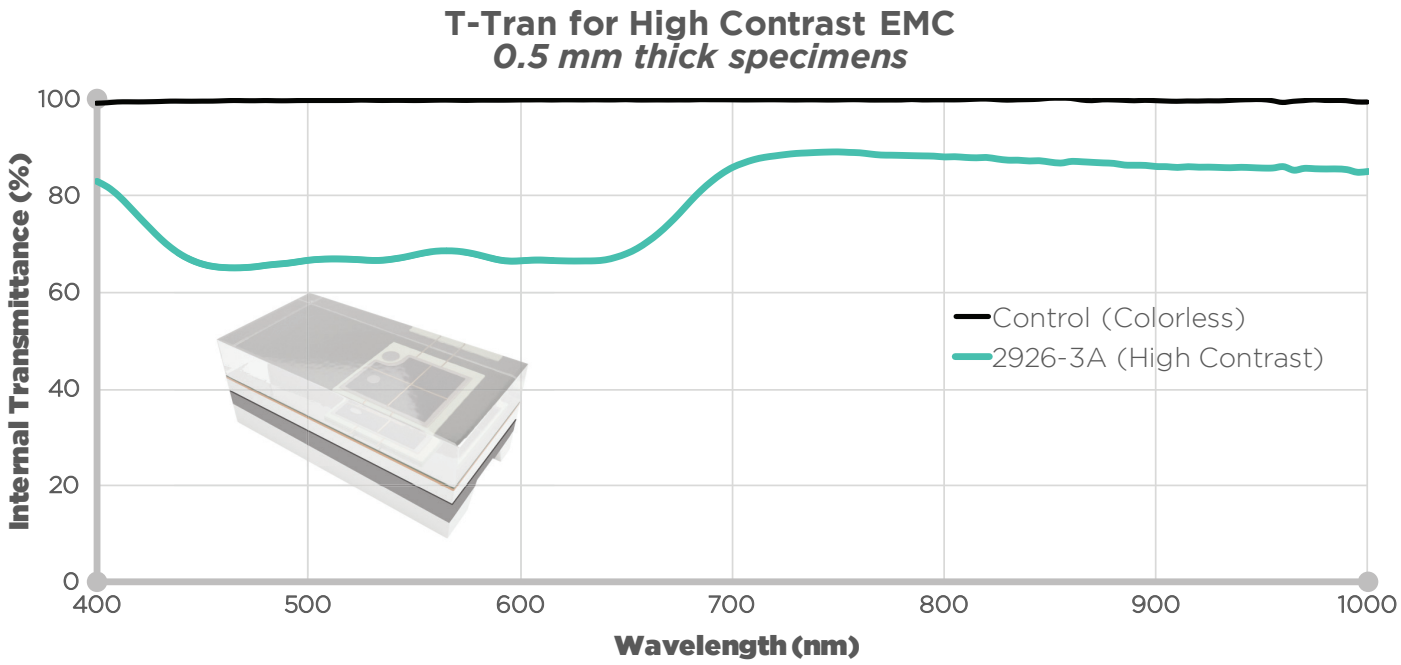
No failures experienced by OL88-8 screened for use in SMD2121 PLCC packages under the following conditions:

- 1000 hours at 60 °C and 90% Relative Humidity
- 100 Temperature cycles between -30 °C and 85 °C
- 1000 hours at room temperature

** 256 units were submitted to each testing.*

*All data after 4 hours @ 150 °C	Units	OL88-8	OP1000	NB2926-3A
Color		Clear	Clear	Gray
Product type	-	One part liquid	Pressed mold compound	Pressed mold compound
Glass Transition Temperature (Tg)	°C	147	139	122
Coefficient of Thermal Expansion (CTE)				
Alpha 1	ppm/°C	70	80	43
Alpha 2	ppm/°C	167	161	99
Moisture absorption 1 hr @ 95 °C	%	0.25	0.48	0.21
Specific Gravity		1.28	1.28	1.80
Refractive Index @ 460 nm		1.51	1.52	-
Adhesion to Leadframes				
Ag	kg	-	25	45
Cu	kg	-	5	31
Ni/Pd/Au	kg	-	50	39

OL88-8, OP1000 and NB2926-3A



OL88-8: The new standard for Outdoor RGB LED Displays

During several visits to southern China and with a great deal of input from outdoor LED display manufacturers, we learned that the industry really needs an affordable, durable and easy-to-use clear encapsulation material in order to truly unlock the potential for outdoor LED billboards. That's why we formulated OL88-8.

OL88-8 is a water-clear epoxy hybrid that cures hard and smooth so it will protect LED chips even in dusty, all-weather outdoor environments. And it's easy to use!

- OL88-8 is a 1-part, pot-stable liquid that you can drop-in to your silicone encapsulation line,
- Shelf life of 9 months when storage in temperatures below -20 °C,
- Even though OL88-8 is better than silicone for outdoor displays, it's also less expensive.

Rapid prototyping

Liquid versions of optically clear mold compounds

Description

OL10-1 and OP1000 are non-yellowing products for the encapsulation of optoelectronic devices. OL10-1 is a liquid version of OP1000.

Both products feature high transmittance, high refractive index, and cure to form a hard, non-tacky encapsulant with low gas permeability. They may be used as a cost-effective silicone alternative with similar light output for LEDs.

Benefits

Excellent transmittance
For wavelengths from 400 nm to 1600 nm

Nearly matching refractive index
compare OL10-1 to OP1000

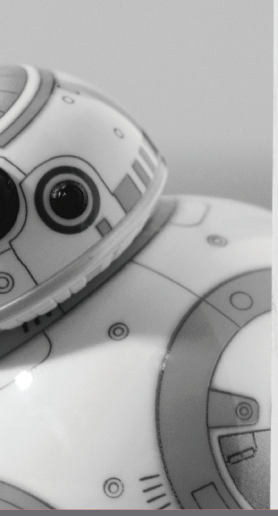
Outstanding resistance to yellowing
After heat aging up to 105°C

Capital light prototyping with liquid dispense

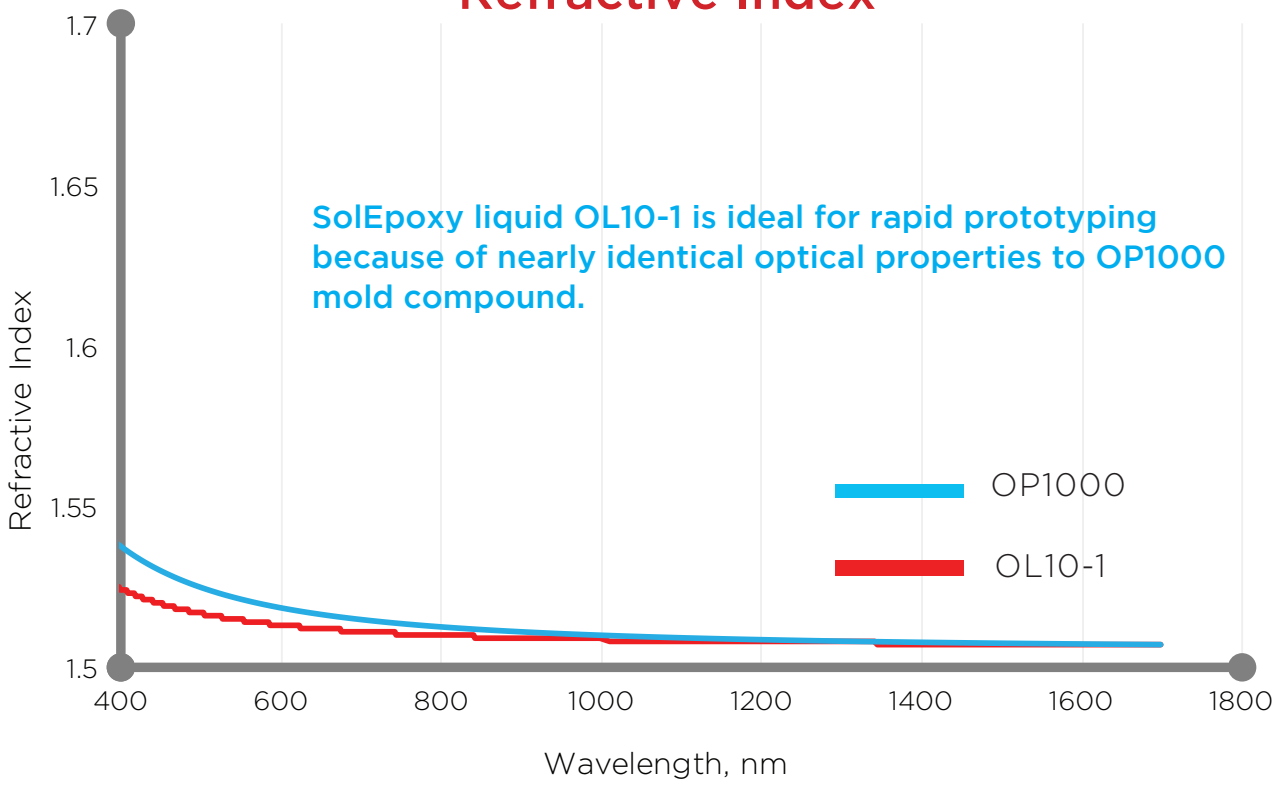
Use standard part singulation process

Same singulated part as with clear EMC.

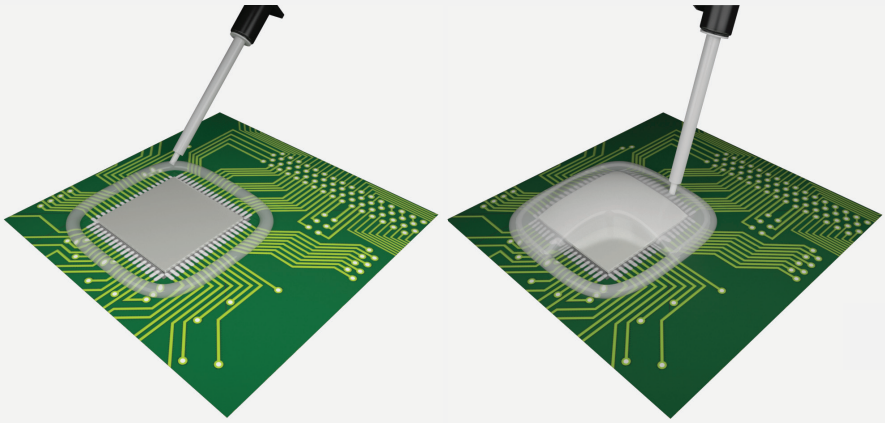
**All data after 4 hours @ 150 °C*		Units	OP1000	OL10-1
Product type		-	Pressed mold compound	One part liquid
Glass Transition Temperature (Tg)		°C	139	147
Coefficient of Thermal Expansion (CTE)	Alpha 1	ppm/°C	80	70
	Alpha 2	ppm/°C	161	167
Specific Gravity		g/cc	1.28	1.28
Moisture absorption 1 hr @ 95°C		%	0.48	0.25
Flexural Properties after 4hrs @150°C	Strength	MPa	110	136
	Modulus	GPa	3.0	3.3



Refractive Index



Dam & fill prototyping



- Prototype with **minimal investment** in both cost and lead times for equipment and tooling; requires only a dispenser and x-y table
- Our product portfolio allows for **seamless transition from liquid to mold compound** within the same chemical family

Liquid and mold compound materials have **similar cured properties**

Notes

sol
epoxy

Phone: 716.372.6300
Toll Free: 800.829.2209
info@solepoxy.com
www.solepoxy.com

SOLEPOXY IS YOUR PARTNER IN PROBLEM SOLVING

Phone: 716.372.6300
Toll Free: 800.829.2209
info@solepoxy.com
www.solepoxy.com