



**Link**<sup>TM</sup> **AL-3241**

**Silicone Elastomer**  
For photonics and fiber optics

**ÅNGSTRÖM Link**<sup>TM</sup> **KEY FEATURES**

- Long pot life, room temperature curing elastomer
- Ultra-clear, resists yellowing at high temperatures
- 1.41 index for LED encapsulation, coupling, UV optics

ÅngstromLink AL-3241 is an encapsulation material designed especially for protection of sensitive photonics assemblies from mechanical shock, thermal shock, dust, and ambient atmosphere.

The product is a two-part room temperature curing system which remains fluid for approximately 4 hours of pot life, and then cures to an elastomer within twenty-four hours at room temperature. No UV exposure or temperature bake is required to initiate the cure process. The long pot life of AL-3241 enables the material to fill in voids in a complex assembly and to permit time for any trapped air bubbles to float to the fluid surface and escape.

AL-3241 is supplied in a ready-to-use cartridge which maintains the 10:1 mix ratio automatically as it is dispensed. The product offers a service temperature range of -40°C to +180°C (+260°C for 1 to 2 minutes for soldering operations).

## Applications

LED encapsulation

Elastomeric lens gap medium for UV lithography optics

Matrix medium for suspension of photonically active powders, switch elements, etc.

Clear low absorbance encapsulation for near UV, blue, or visible emitters or detectors

## Benefits

### Long pot life

Allows ample time for encapsulation of multiple or large assemblies

### Cures at room temperature, or rapidly with heat

Eliminates dislocation of delicate assemblies during heat bake.

### Elastomer consistency

Protects against environmental hazards of shock, vibration, moisture, ozone, dust, chemicals

### Ultra-clear

Allows efficient optical coupling down to the near UV

### Wide temperature service

Suitable for outside plant telecom; permits solderability

(revision 06/2010)

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1-800-IS-FIBER (473-4237); (508) 992-6464; Fax us at (508) 991-8876, or via email at [sales@focenter.com](mailto:sales@focenter.com)  
Please visit us on the web at [WWW.FOCENTER.COM](http://WWW.FOCENTER.COM)

Property (at 25°C unless noted)	Test Method	Typical Value
<b>Cure Processing Characteristics</b>		
Uncured mixed viscosity	ASTM D-1084	5300 cP
Pot Life (2x Viscosity)	ASTM D-1084	4 hours
Full Cure Time	Visual	24 hours
<b>Cured Mechanical Properties</b>		
Physical Consistency	Visual	Soft Rubber
Shore A Durometer	ASTM D-2240	50
Tensile Strength	ASTM D-412	1.300 psi (dyne/cm <sup>2</sup> )
Tear Strength	ASTM D-624	20 ppi
Elongation	ASTM D-412	100%
Specific Gravity	ASTM D-792	1.03
<b>Cured Thermal Properties</b>		
Glass Transition	TMA	< -40°C, est.
Thermal Expansion by Volume	TMA	8 x 10 <sup>-4</sup> cc/cc/°C, est.
Thermal Conductivity	ASTM C-177	0.13 watt/meter-°K, est.
<b>Cured Electro-Optical Properties</b>		
Appearance	Visual	Optically clear
Ionics (K, Na, P, Ag, Cu, Sn)	ICP	< 10 ppm, each, est.
Volume Resistivity	ASTM D-257	10 <sup>15</sup> ohm-cm
Dielectric Strength	ASTM D-149	20 kV/mm
Refractive Index, 589 nm	ASTM D-1218	1.41
Refractive Index vs. Temperature, 589 nm	ASTM D-1218	- 3.5 x 10 <sup>-4</sup> /°C
Refractive Index vs. Wavelength	prism coupler	(see chart)
Optical Absorption	spectrophotometer	(see chart)

## Pot Life and Cure Rate

At constant temperature, viscosity increases at a constant rate until near then end when it accelerates, a process sometimes called the 'kick'. The cure rate is increased by heating, and decreased by cooling. See below for a guideline of the cure schedule of this product.

Temperature °C	Tacky Cure	Full Cure
-40	Arrests curing	n/a
0	-	less than 2 weeks to full cure
25	8 hours	needs some heat to remove tack within 24 hrs
50	20 minutes	4 hours
100	1 minute	4 minutes
150	1 minute (no tack)	-

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## Cure Inhibition

AL-3241 will cure in contact with most properly cleaned substrate materials including optical glasses, optical plastics, and photonic semiconductors. Adhesion to fluoroplastic substrates is generally poor but may be improved with chemical etching or plasma etching of the substrate. Substrates to avoid include certain butyl, nitrile, chlorinated, and EPDM elastomers, certain plastics with leachable plasticizers, and the cure residues of certain adhesives including UV-cured epoxies and amine-cured epoxies.

## Deaeration and Avoiding the formation of bubbles

If air bubbles become trapped in the dispensed fluid volume during the dispensing process, the assembly should self-deaerate due to the product's long room temperature pot life and low viscosity as long as no pockets of air are trapped beneath mechanical parts. If accelerated deaeration is required, the assembly may be vacuum deaerated using a pressure of 635 mmHg (25 inHg) or greater. Apply the vacuum while observing the uncured fluid for presence of bubble formation and increase vacuum slowly enough to avoid rapid foaming. Hold vacuum until bubbles at the fluid surface collapse and are no longer visible.

If the mixed silicone is de-aired and then transferred to the device, ensure air is not entrained into the uncured material at any point – pressurized systems, leaky dispensing lines and cavitation can ingest air into the material.

Alternatively, for prototypes and lab assemblies refrigerate the filled assembly to extend the pot life, and let the bubbles rise by buoyancy. Depending on the viscosity of the material this can work in hours to overnight. Then use heat to complete the cure.

Curing, especially at elevated temperatures, can result in bubbles appearing in the cured product that were not evident immediately after dispensing. Avoid the creation of bubbles during cure by preheating the device to an intermediate temperature prior to exposure to the final cure temp.

## Substrate Preparation

Substrates should be free of dust, oil, and fingerprint soils. Clean substrates using suitable industrial techniques for cleaning electro-optics. If hydrocarbon solvent cleaning (e.g. acetone, toluene) is used, a final rinse with reagent grade isopropanol is recommended. If aqueous detergent cleaning is used, multiple final rinses with de-ionized water or a single rinse with reagent grade isopropanol is recommended. Keep the substrate clean and dry. Plasma etching can activate the surface and improve adhesion. Preheating the substrate is also an option. Avoid additives and mold releases on any substrates that come into contact with the silicone. Adhesion to fluoroplastic substrates is generally poor but may be improved with chemical etching or plasma etching of the substrate.

## Cleanup

AL-3241 may be removed from surfaces by first wiping off any excess with a suitable dry lint-free wipe and then by wiping down the surface with a lint-free wipe soaked with acetone. If the surface material is incompatible with acetone - acetone can soften or crack some plastics – use isopropanol. If acetone residues are undesirable, the clean-up process should be completed with a final rinse with reagent grade isopropanol. The user is responsible for compliance with all applicable regulations governing disposal of waste materials as indicated in the MSDS.

## Packaging

AL-3241 is supplied in a two-part cartridge which mixes the material in a controlled 10:1 ratio as the material is dispensed. Fiber Optic Center offers a choice of packages:

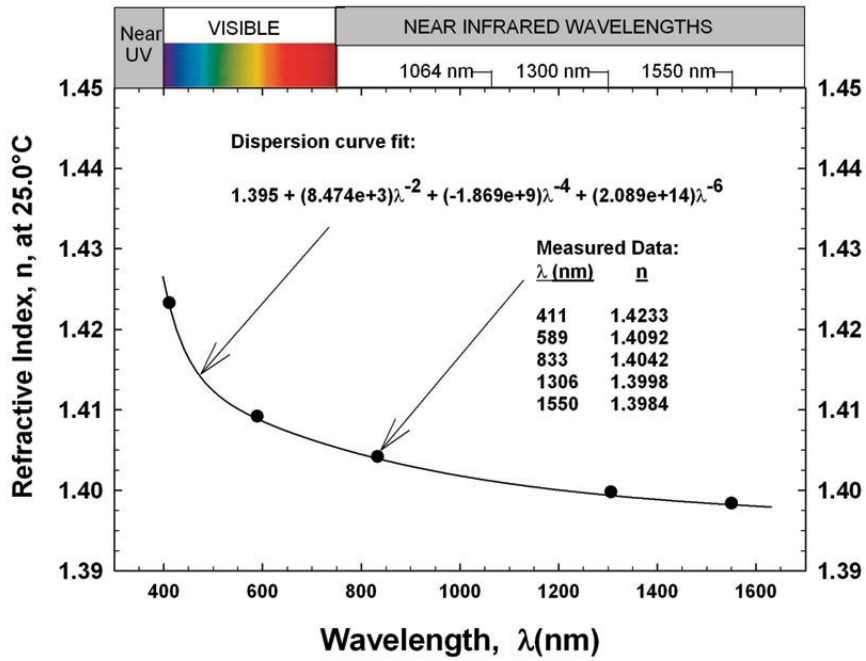
Size	Use	Compatible Dispenser
37cc	Prototyping, small production batches.	Fiber Optic Center p/n DMA 51-00-10
1-pint kit	Large volume users	-

Other container options are also available for use with automated dispensing equipment. Contact Fiber Optic Center.

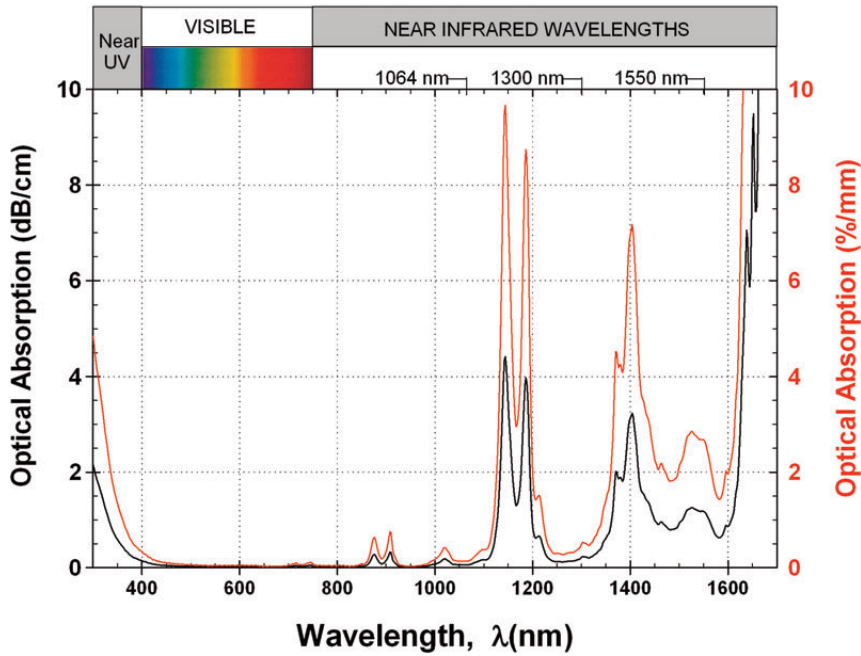
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Refractive Index vs Wavelength (25°C)  
 AngstromLink Encapsulation Gel  
 AL-3241



Optical Absorption vs. Wavelength  
 AngstromLink Optical Fluid  
 AL-3241



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## Specifications

The typical properties quoted on this product data sheet should not be used as a basis for preparation of product specifications, and may change without notification. Because we cannot anticipate or control the many different conditions under which this information and our products may be used, we cannot guarantee the applicability of this information or the suitability of our products in any individual situation. Consult Fiber Optic Center for assistance with establishing specification limits and test conditions. Statements concerning the possible use of our products are not intended as recommendations to use our product in the infringement of any patent.

## Shelf Life

AL-3241 has a limited shelf life (6 months from date of manufacture when stored in its unopened original container under the storage temperature range noted on the product label). Use of a product after the expiration date shown on the package, or use of a product which has been improperly stored, may result in improperly cured material.

## Warranty

AL-3241 is sold without warranty, express or implied. Fiber Optic Center expressly disclaims any liability for incidental or consequential damages resulting from use of this product.

## Safety

Consult the Material Safety Data Sheet (MSDS) for AL-3241 before use. AL-3241 is an industrial product, designed for use only by qualified laboratory or production personnel.

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## For Special Quotes and Technical Consultations

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