



# UR312 and UR324

## MICROELECTRONIC GRADE, CLEAR, LOW MODULUS URETHANE ENCAPSULATING GEL

### Description:

UR312 A/B and UR324 A/B are the same components used at different mix ratios, therefore, giving different properties.

LORD UR312 and UR324 are two-component, room temperature curing urethane gels. The cured elastomer is soft, flexible and has a very low modulus at temperatures down to -80°C. Cured UR312 and UR324 also have excellent thermal shock resistance, electrical properties, and adhesion to a variety of materials. The hydrophobic nature of this resin system imparts exceptional hydrolytic stability to the cured resin.

LORD UR312 and UR324 are soft, jelly-like, but non-flowable, materials that have tenacious, pressure-sensitive adhesion to most substances.

The low modulus over a wide temperature range makes UR312 and UR324 ideal materials for encapsulating fragile, pressure sensitive, microelectronic components which would be damaged by more rigid encapsulants during cure or later thermal cycling. LORD UR312 and UR324 are generally suitable in applications exposed up to 130°C. Lord microelectronic grade silicones are suggested for encapsulating delicate components that operate at higher temperatures. Either cures very well at room temperature, or the cure may be accelerated by using moderately elevated temperatures.

### Typical Properties:

The values listed below are averages and they are not intended for specification purposes. Contact LORD when establishing specifications. In the interest of achieving optimum properties in a minimal amount of time, the cured physical and electrical properties were developed by using a cure schedule of sixteen hours at 25°C plus two hours at 100°C. The choice of cure schedule will vary with the application and users must establish their own optimum cure schedules.

Handling Properties:	UR312	UR324
<b>Mix Ratio</b> (resin and hardener)		
By weight	100:55	100:108
By volume	100:50	1:1
<b>Viscosity @ 25°C (cps)</b>		
Resin	3,750	3,750
Hardener	75	75
Mixed STM 1	1500	750
<b>Working Life @ 25°C (minutes)</b>	20	20
<b>Typical Cure Schedule</b>		
Full @ 25°C	1 week	1 week
@ 85°C	2 hours	2 hours

Physical Properties:	UR312	UR324
<b>Hardness (Shore)</b>	OO-50	A-20
<b>Specific Gravity</b>	0.937	0.95
STM 2		
<b>Color</b>	Clear	Clear
<b>Thermal Shock</b>	Excellent	Excellent
<b>Tensile Strength (psi)</b> (ASTM D 638)	50	100
<b>Tensile Elongation (%)</b> (ASTM D 638)	250	250
<b>Weight Loss %</b>	0.56	0.24
	130°C/168 hrs	100°C/24 hrs
<b>Water Absorption %</b> (ASTM D 570)	0.29	0.30
	25°C/168 hrs	25°C/168 hrs

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<b>Electrical Properties:</b>	<b>UR312</b>	<b>UR324</b>
<b>Dielectric Constant (1MHz)</b>		
@ -40°C	3.18	
@ 25°C	3.58	3.52
@ 140°C	3.50	
(ASTM D 150)		
<b>Dissipation Factor (1MHz)</b>		
@ -40°C	0.070	
@ 25°C	0.032	0.02
@ 140°C	0.005	
(ASTM D 150)		
<b>Volume Resistivity</b>	$1.15 \times 10^{16}$	$2 \times 10^{16}$
@ 25°C (ohm-cm)		
(ASTM D 257)		

**\*Temperature Rating Guide:** Is based on average design requirements and the guide is not intended as a guarantee of suitability for all applications operating at that temperature. The guide is based on the weight loss.

In most cases, Lord Standard Test Methods (STM) correspond with standard ASTM tests. Copies are available upon request.

### Proportioning and Mixing:

LORD UR312 and UR324 can be proportioned by weight or volume. These ratios are stoichiometrically calculated and should be closely followed. Automated meter-mix, dispensing equipment may be used for high volume production. (A list of dispensing equipment manufacturers is available from Lord.)

When mixing small amounts of UR312 or UR324, it is best to use a balance and disposable containers. The containers should be large enough to hold both resin and hardener and still have ample room for mixing. After allowing for the weight of the container, the correct amount of resin is added to the container. The scale is then set for the total weight of both resin and hardener, and the hardener is added slowly until the total weight is reached.

To insure thorough mixing, periodic scraping of the sides and bottom of the container is necessary. Even small amounts of improperly mixed material can cause soft spots or irregular curing.

### Deairing and Evacuation:

Unless a closed-chamber, mechanical mixer is to be used, air will be introduced into the urethane system either during premixing or when catalyzing the mixture. The electrical properties of a urethane are best when air bubbles and voids are minimized. Lord, in critical applications, vacuuming may be appropriate.

Should vacuuming prove to be necessary for the application, the mixed urethane should be deaired in a container large enough to allow for expansion from two to five times the original volume.

A vacuum of 2mm of Hg for two to five minutes is generally adequate for small (one quart or less) batches. Larger batches may require longer vacuuming, lower pressures (<2 mm Hg), or introduction of the urethane into the chamber in thin streams. Once the urethane has been adequately deaired, the vacuum should be slowly released.

### Clean-Up:

It is recommended that customers use disposable containers and utensils when working with urethanes. However, when disposable materials are impractical, uncured urethanes can be removed by cleaning equipment with solvent. Observe appropriate precautions when using flammable solvents. Solvent-cleaned utensils should be thoroughly dried before reuse. Any remaining solvent can contaminate the next mixture.

### Shelf Life and Storage:

LORD UR312 and UR324 resins and hardeners have shelf lives of approximately six months at room temperature (25°C) in closed containers. Before resealing a partially used container of UR312 or UR324 resin or hardener, the user should spray dry nitrogen gas into the container for 15 seconds with the lid partially open. The inert gas will displace the moist atmospheric air which shortens the shelf life of UR312 and UR324.

### Crystallization:

LORD UR312 and UR324 hardeners should be stored between 70° and 95°F to prevent crystallization and dimerization. The first sign of freezing appears as slow crystal formation, usually on the container wall after extended exposure. In the event of crystallization, it is best to promptly remelt it by loosening the lid, heating to 90° to 115°F, and periodically stirring the hardener as it is reliquefying. The heating period should not be longer than two to three hours as excessive heating will cause dimerization.