

# PRODUCT INFORMATION



# 309

## General Purpose, Thixotropic, Two-Part, Epoxy Adhesive

### Description

Lord® 309 is a general purpose, thixotropic, two-part epoxy adhesive that is used for applications that require gap filling or non-slumping characteristics on a vertical substrate. The cured adhesive offers strong, durable, chemically and environmentally resistant bonds. Lord 309 adhesive has demonstrated excellent adhesion to prepared metals, FRP, wood, prepared rubber, and other materials.

### Features and Benefits

**Contains No Solvent** - provides 100% solids content, nonflammable, and virtually odorless.

**Convenient and Cost Effective** - allows an ideal mix ratio for Lord-Pak™ small packaging systems and meter/mix/dispense equipment.

**High Strength** - provides load bearing properties equal to or greater than the materials being bonded in many instances.

**Chemically/Environmentally Resistant** - resists dilute acids, alkalis, solvents, greases, oils, moisture, sunlight, and weathering. Temperature resistant from -34°C to 121°C (30°F to 250°F).

**Variable Cure** - cures completely at room temperature or much more quickly at elevated temperatures. See graph on page 2.

**Excellent Engineering Properties** - provides low shrinkage, good creep properties, and low water absorption. For these and other engineering properties, see Table 3 on page 3.

**Flexible Mix Ratio** - accommodates a range of service temperatures and stress loads through modification of the resin-to-hardener mix ratio. See Table 2 on page 2.

**Table 1: Typical Properties\* of Uncured Lord 309 Adhesive**

	Resin	Hardener	Mixed
Appearance	Blue paste	Amber paste	Blue-green paste
Viscosity, cP @ 25°C (77°F) Brookfield HBF w/Helipath and T-C, 5 rpm	300,000 - 1,100,000	300,000 - 1.0 MM	N/A
Density kg/m <sup>3</sup> lb/gal	1263 - 1300 10.5 - 10.8	992 - 1040 8.25 - 8.65	N/A N/A
Flash Point (closed cup)	>93°C (>200°F)	>93°C (>200°F)	>93°C (>200°F)
Percent Solids	100%	100%	100%
Working Time 54 g mass at 25°C (77°F)	N/A	N/A	1.5 - 2 Hours
Handleable Bonds	Temperature Dependent, See Graph on Page 2		
General Purpose Mix Ratio by weight by volume	1.2 1	1 1	N/A N/A
Shelf Life from date of shipment at 25°C (77°F), unopened container	1 Year	1 Year	N/A

\*Note to be used for specification purposes

*For industrial/commercial use only.* Must be applied by trained personnel only. Not to be used in household applications. Not for consumer use.

### Surface Preparation

Remove soil, grease, oil, fingerprints, dust, mold release agents, rust, and other contaminants from substrate surfaces.

Vapor degrease or wipe the surfaces with a clean cloth soaked in an uncontaminated ketone or chlorinated solvent and allow to dry thoroughly. If a solvent cannot be used, substitute a detergent solution or, for metals only, a suitable alkaline degreasing agent following the manufacturer's instructions for use. Wear chemical resistant gloves.

Next, use an abrasive material to roughen the surfaces or remove tarnish if necessary. Abrasion should always be followed by a second degreasing which will ensure removal of loose particles.

Glass and ceramic surfaces that have been primed with Lord AP134 primer exhibit superior environmental resistance. Cured rubber should first be primed with Lord 7701 surface treatment. Prime metal surfaces with Lord 7714 primer.

Handle prepared surfaces carefully to avoid contamination. Assemble as soon as possible.

### Mixing

#### Non-automated

Measure the resin and hardener components to meet the service temperature needs and joint design (see Table 2). Thoroughly mix the components until uniform in color and consistency. Be careful not to whip excessive air into the adhesive.

Heat buildup due to an exothermic reaction between the two components will shorten the working time of the adhesive. Mixing smaller quantities or spreading the mixing operation over a large substrate area will minimize heat buildup. Do not attempt to use any adhesive that has begun to set.

#### Automated

Lord 309 adhesive can be packaged in Lord-Pak packaging systems for convenient, automated mixing and application. Lord-Pak systems eliminate the waste involved in hand mixing and application without the capital investment of meter/mix/dispense equipment. Meter/mix/dispense equipment can be used if the particular adhesive usage justified the investment.

### Application

The mixed adhesive may be applied by spreading it on one or both of the substrates to be bonded using any convenient tool such as a spatula, or notched trowel. A film thickness of approximately 20 one-thousandths of an inch (~0.020" or ~0.5 mm) is suggested. The addition of a small amount of solid glass beads to the mixed adhesive is a convenient way to control the thickness of the bondline.

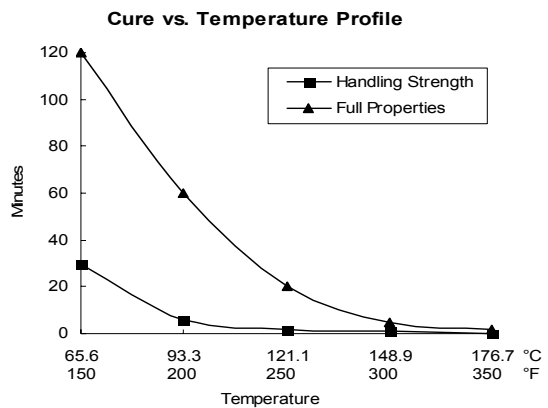
### Parts Assembly

Join the parts in such a way as to avoid entrapped air. Apply only enough pressure to ensure good wetting of the adhesive on both substrates. Squeezing a little adhesive out at the edges is usually a sign of proper assembly. It is not necessary to clamp the assembly unless movement during adhesive set-up is likely. Excessive clamping pressure will create a poor bond.

### Curing

The graph below shows suggested times versus temperatures for accelerating the cure of Lord 309 adhesive. Elevated temperature cures produce the highest bond strengths and impact resistance. Firm recommendations of cure times and temperatures are difficult because heat transmission varies considerably depending upon material composition and heating methods.

The adhesive will cure fully in 24 - 48 hours with handling strength in 8 - 16 hours, provided that the adhesive, substrates, and ambient temperature are 18°C (65°F) or higher.



**Table 2: Mix Ratios for Lord 309-1 Resin: Lord 309-2 Hardener**

	Low Temp	General Purpose	High Temp
Service Temperature	-40°C-38°C (-40°F-100°F)	-34°C-121°C (-30°F - 250°F)	10°C-121°C (50°F-250°F)
Mix Ratio			
by weight	1:1.6	1.2:1	2.5:1
by volume	1:2	1:1	2:1
Joint Design	Peel Stress	Mixed Stress	Shear Stress

**Table 3: Typical Properties of Cured Lord 309 Adhesive Mixed 1:1 by Volume, RT Cure\***

	Values	Units	Test Method
Hardness	74	Shore D	Lord TM 23B
Tensile Strength at Break	5500	psi	ASTM D882-83A (mod)
Elongation at Break	6	%	ASTM D882-83A (mod)
Young's Modulus	157480	psi	ASTM D882-83A (mod)
Water Absorption	0.21	%	ASTM D570-81 (24 hour immersion)
Glass Transition Temperature (Tg)	56 (158)	°C (°F)	ASTM E1640-99 (by DMA)
Coefficient of Thermal Expansion above Tg	268 x 10 <sup>-6</sup>	mm/mm°C	Lord Internal Method (by DMA)

**Table 4: Bond Performance Data\***

	Cold Rolled Steel to Cold Rolled Steel	Aluminum to Aluminum	SMC to SMC	Natural Rubber to Cold Rolled Steel	SBR to SBR
Substrates	Lap Shear	Lap Shear	Lap Shear	45% Peel	T-Peel
Room Temperature	2560 psi A	1550 psi 36C/A	575 psi 91FT/A	38lbs 47R/A	118 lbs 67R/SB
Hot Strength at 85°C (180°F)	970 psi A	940 psi A	410 psi 25FT/A	34 lbs 18/R/A	– N/A
24 Hour Recovery 7 Days in H <sub>2</sub> O at 85°C (130°F)	2490 psi A	1380 psi A	450 psi 26FT/A	39 lbs/in 25R/A	106 lbs/in SB
14 Days Salt Spray Exposure, Test Immediately	1970 psi A	945 psi A	570psi 47FT/A	N/A	116 lbs SB
14 Days at 38°C (100°F), 100% Relative Humidity, Test Immediately	2830 psi A	1510psi A	610 psi 42FT/A	30 lbs 3R/A	103 lbs SB
Test at -30°F (-34°C)	2130 psi A	1240 pi A	665 psi FT	67 lbs 85R/A	123 lbs SB

Surface Preparations	Substrate	Surface Treatment
	Cold Rolled Steel and Aluminum Sheet Molded Compound (SMC) Styrene Butadiene Rubber 9SBR) Natural Rubber	MEK Wipe, Grit Blast, MEK Wipe 320 Grit Sandpaper, Dry Rag Wipe Primed with Lord 7701 Primer Primed with Lord 7701 Primer

**Bond Parameters**

	Bond Area	Film Thickness	Cure	Mix Ratio	
Metal Lap Shears	1.0" x 0.5"	0.010"	72 hr. @ RT	1:1 by Vol.	<i>All values represent an average of 5 test samples.</i>
Nonmetal Lap Shears	1.0" x 1.0"	0.030"	72 hr. @ RT	1:1 by Vol.	
T-Peels	1.0" x 3.0"	0.020"	72 hr. @ RT	1:1 by Vol.	
45° Peels	1.0" x 1.0"	0.020"	72 hr. @ RT	1:1 by Vol.	

**Failure Mode Key**

Abbreviation	R	FT	A	C	SB
Description	Rubber Failure	Fiber Tear	Adhesive Failure	Cohesive Failure	Stock Break

\*All data is typical and not to be used for specification purposes. Physical properties may vary depending on mix ratio, degree of crosslink, and cure method as well as other parameters.

**Table 5: Coverage Information†**

Square Coverage by Wet Film thickness					Linear Coverage by Bead Diameter									
Wet Film Thickness		Per Gallon		~ Gals. Required Per 1000 Sq. Ft. (93 Sq. M)	Bead Diameter		Per		Per Lord Pak 50		Per Lord Pak 200		Per Lord Pak CX	
mils	mm	Sq.Ft.	Sq. M		In.	mm	Ft.	M	Ft.	M	Ft.	M	Ft.	M
5	0.13	320	29.7	3.1	1/16	1.59	6100	1800	82	25	330	100	630	192
10	0.25	160	14.9	6.5	1/8	3.18	1500	457	20	6.0	82	25	160	48.7
20	0.51	80	7.4	12.5	3/16	4.76	690	210	8.5	2.5	35.5	10.8	68	20.7
30	0.76	52	4.8	20	1/4	6.35	375	114	4.5	1.3	19	5.8	38.5	11.7
31.25*	0.79	50	4.6	20	3/8	9.52	165	50	2	0.6	8.5	2.6	16	4.8
40	1.02	40	3.7	25	1/2	12.7	95	29	-	-	4.5	1.3	8.5	2.6
60	1.52	26	2.4	40	3/4	19.0	35	11	-	-	2	0.6	3.5	1.0
62.5**	1.59	25	2.3	40	7/8	22.2	30	9	-	-	-	-	2.5	0.7
125***	3.18	12	1.1	80	1	25.4	22	7	-	-	-	-	1	0.3

\*1/32 in. \*\*1/16 in. \*\*\*1/8 in. 1 mil = 0.001 inch †All values are approximate; not for specification purposes.

**Clean Up**

*Uncured Adhesive*

It is important to clean up excess adhesive on the bonded assembly, as well as mixing and application equipment, before the adhesive sets up. Use hot water and detergent, or an organic solvent; ketones have been shown to work best.

*Cured Adhesive*

Removing cured Lord 309 adhesive is difficult because of its resistance to chemicals, solvents, and cleaning agents. Heating to 204°C (400°F) or greater will soften the adhesive, allowing the parts to be separated and the adhesive to be more easily removed. Some success may be achieved with commercial epoxy strippers.

**Subsequent Processing**

After the adhesive has been cured, it may be filed, sanded, machined or otherwise handled in the same way as a light metal. Paints, lacquers, enamels, and other coatings may be applied without danger of solvent attack.

Values stated in this bulletin represent typical values as not all tests are run on each lot of material produced. For formalized product specifications for specific product end uses, contact the Customer Service Department.

Information provided herein is based upon tests believed to be reliable. Inasmuch as Lord Corporation has no control over the manner in which others may use this information, it does not guarantee the results to be obtained. In addition, Lord Corporation does not guarantee the performance of the product or the results obtained from the use of the product or this information where the product has been repackaged by any third party including but not limited to any product end user. Nor does the company make any express or implied warranty of merchantability, or fitness for a particular purpose concerning the effects or results of such use.

**Packaging**

- 1/2 Pint Container (0.24 Liter)
- 1 Gallon Container (3.8 Liter)
- 5 Gallon Pail (19 Liter)
- 55 Gallon Drum (208 Liter)

It may be special-ordered in minimum quantities in Lord-Pak Systems which contain 50, 200, and 380 ml of mixed adhesive.

**Storage**

Ship and store Lord 309 adhesive in the original container between 4°C - 27°C (40°F - 80°F).

**Cautionary Information**

Before using this or any Lord product, refer to the Material Safety Data Sheet (MSDS) and label for safe use and handling instructions.

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