

LORD® 309-1D/309-2D and 309-1D GB/309-2D Epoxy Adhesives

Description

LORD® 309-1D/309-2D and 309-1D GB/309-2D adhesives are high performance, thixotropic, two-component epoxy adhesive systems used for applications that require gap filling or non-sag characteristics on a vertical surface. These adhesive systems provide excellent adhesion to prepared metals, fiberglass reinforced plastics (FRP), wood, prepared rubber, and other materials.

LORD 309-1D/309-2D and 309-1D GB/309-2D adhesives can be either room temperature cured or heat cured for faster processing. LORD 309-1D GB/309-2D adhesive allows precise control of the adhesive bondline thickness due to its content of glass beads.

Features and Benefits

Durable – provides load bearing properties equal to or greater than the materials being bonded. LORD 309-1D GB/309-2D adhesive provides excellent peel strength.

Environmentally Recommended – contains no solvent, nonflammable and virtually odorless.

Environmentally Resistant – resists moisture, sunlight and weathering.

Temperature Resistant – performs at temperatures from -30 to +250°F (-34 to +121°C).

Chemically Resistant – resists dilute acids, alkalis, solvents, greases and oils.

Excellent Engineering Properties – provides low shrinkage, good creep properties and low water absorption.

Application

Surface Preparation – Remove soil, grease, oil, fingerprints, dust, mold release agents, rust and other contaminants from the surfaces to be bonded by solvent degreasing or alkaline cleaning.

On metal surfaces which are free of oxidation, use an isopropyl alcohol wipe. If necessary, use an abrasive material to remove tarnish. Always follow abrasion by a second cleaning to ensure removal of loose particles.

When bonding cured rubber, allow LORD 7701 adhesion enhancer/surface modifier to flash off before applying LORD 309-1D/309-2D or 309-1D GB/309-2D adhesive. Prime glass and ceramic surfaces with LORD AP-134 adhesion enhancer/surface modifier to promote adhesion.

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

Typical Properties*

	309-1D Resin	309-1D GB Resin	309-2D Hardener
Appearance	Blue Paste	Blue Paste	Amber Paste
Viscosity, cP @ 77°F (25°C)	300,000-1,100,000	300,000-1,100,000	300,000-1,000,000
Density			
lb/gal	10.5-10.8	10.5-10.9	8.25-8.65
(kg/m ³)	(1258-1294)	(1258-1306)	(989-1036)
Flash Point (Closed Cup), °F (°C)	>200 (>93)	>200 (>93)	>200 (>93)

*Data is typical and not to be used for specification purposes.

LORD TECHNICAL DATA

Mixing – Thoroughly mix the proper amount of resin and hardener until uniform in color and consistency. Be careful not to whip excessive air into the adhesive system. Handheld cartridges will automatically dispense the correct volumetric ratio of each component.

Heat buildup due to an exothermic reaction between the two components will shorten the working time of the adhesive. Mixing smaller quantities will minimize heat buildup. Do not use any adhesive that has begun to cure.

Applying – Apply the mixed adhesive to bond surfaces using automatic meter/mix/dispense equipment, handheld cartridges or any convenient tool such as a stiff brush, spatula or trowel. For general use, film thickness of LORD 309-1D/309-2D adhesive should be approximately 0.02 in (0.51 mm).

For LORD 309-1D GB/309-2D adhesive, a film thickness of approximately 0.005 inch (0.127 mm) is recommended. Solid glass spheres, 0.005" in diameter, have been formulated into LORD 309-1D GB resin to accurately control bondline thickness.

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 surfaces. 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 cure is likely. Maximum adhesion will occur only with parts which mate well without the need for excessive clamping pressure during cure. Excessive clamping may squeeze too much adhesive from the bond area which can result in a poor bond.

Curing – Adhesive will cure to full strength in 24 hours, provided that the adhesive, substrates and ambient temperature are 65°F (18°C) or higher.

Higher temperatures will provide faster cure times; however, the bondline temperature should not exceed 325°F (162°C). Elevated temperature cure produces the highest bond strengths and impact resistance.

Typical Cured Properties*

Tensile Strength at Break, psi (MPa)	5500 (37.9)
ASTM D882-83A, modified	
Elongation, %	6
ASTM D882-83A, modified	
Young's Modulus, psi (MPa)	157,480 (1086)
ASTM D882-83A, modified	
Glass Transition Temperature, °F (°C)	158 (70)
ASTM E1640-99, by DMA	

Typical Properties* of Resin Mixed with Hardener

	309-1D/309-2D	309-1D GB/309-2D
Mix Ratio, Resin to Hardener		
General Purpose, -30 to 250°F (-34 to 121°C)		
Mixed Stress Joint Design		
by Volume	1:1	0.635:1
by Weight	1.2:1	1:2
High Temperature, 50-250°F (10-121°C)		
Shear Stress Joint Design		
by Volume	2:1	—
by Weight	2.5:1	—
Low Temperature, -40 to 100°F (-40 to 38°C)		
Peel Stress Joint Design		
by Volume	1:2	—
by Weight	1:1.7	—
Solids Content, %	100	100
Working Time, hr @ 75°F (24°C)	1.5-2	1.5-2
54 g mass		
Time to Handling Strength, hr	8-16	8-16
Mixed Appearance	Blue-green Paste	Blue-green Paste
Cured Appearance	Blue-green	Blue-green

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LORD TECHNICAL DATA

Bond Performance

Substrates	Cold Rolled Steel to Cold Rolled Steel Lap Shear psi (MPa)	Aluminum to Aluminum Lap Shear psi (MPa)	SMC to SMC Lap Shear psi (MPa)	Natural Rubber to Cold Rolled Steel 45° Peel pli (N/mm)	SBR to SBR T-Peel pli (N/mm)
Test @ Room Temperature Failure Mode	2560 (17.6) A	1550 (10.7) 36C/A	575 (3.9) 91FT/A	38 (6.6) 47R/A	118 (20.7) 67R/SB
Test @ Hot Strength, 180°F (82°C) Failure Mode	970 (6.7) A	940 (6.5) A	410 (2.8) 25FT/A	34 (5.9) 18R/A	—
Test after 7 days in H ₂ O @ 130°F (54°C) Test after 24 hours Failure Mode	2490 (17.2) A	1380 (9.5) A	450 (3.1) 26FT/A	39 (6.8) 25R/A	106 (18.6) SB
Test after 14 days Salt Spray Exposure Test Immediately Failure Mode	1970 (13.6) A	945 (6.5) A	570 (3.9) 47FT/A	—	116 (20.3) SB
Test after 14 days @ 100°F (38°C), 100% RH Test Immediately Failure Mode	2830 (19.5) A	1510 (10.4) A	610 (4.2) 42FT/A	30 (5.3) 3R/A	103 (18.0) SB
Test @ -30°F (-34°C) Failure Mode	2130 (14.7) A	1240 (8.5) A	665 (4.6) FT	67 (11.7) 85R/A	123 (21.5) SB

Substrate

Cold Rolled Steel and Aluminum
Sheet Molded Compound (SMC)
Styrene Butadiene Rubber (SBR)
Natural Rubber

Surface Treatment

MEK Wipe, Grit Blast, MEK Wipe
320-grit Sandpaper, Dry Rag Wipe
Primed with LORD 7701 Surface Treatment
Primed with LORD 7701 Surface Treatment

Bonded Parameters

Metal Lap Shears
SMC Lap Shears
T-Peels
45° Peels

Bond Area

1.0"x0.5"
1.0"x1.0"
1.0"x3.0"
1.0"x1.0"

Film Thickness

0.010"
0.030"
0.020"
0.020"

Cure

72 hr @ RT
72 hr @ RT
72 hr @ RT
72 hr @ RT

Mix Ratio

1:1 by Volume
1:1 by Volume
1:1 by Volume
1:1 by Volume

Failure Mode Definition

Adhesive Failure
Cohesive Failure
Fiber Tear
Rubber Failure
Stock Break

Abbreviation

A
C
FT
R
SB

LORD TECHNICAL DATA

Firm recommendations of cure times and temperatures depend on material composition and heating methods.

Once the adhesive has cured, it can be filed, sanded, machined or otherwise handled in the same way as a light metal. Paint, lacquers, enamels and other coatings can be applied to cured adhesive.

Cleanup – Clean excess adhesive on the bonded assembly, as well as the equipment, prior to the adhesive cure with hot water and detergent or an organic solvent such as ketones. Once adhesive has cured, heat the adhesive to 400°F (204°C) or above to soften the cured adhesive. This allows the parts to be separated and the adhesive to be more easily removed. Some success may be achieved with commercial epoxy strippers.

Shelf Life/Storage

Shelf life is two years from date of manufacture when stored at 40-80°F (4-27°C) in original, unopened container.

Cautionary Information

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

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

Values stated in this technical data sheet 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 Support Center.

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LORD Corporation World Headquarters

111 Lord Drive
Cary, NC 27511-7923
USA

Customer Support Center (in United States & Canada)

+1 877 ASK LORD (275 5673)

www.lord.com

For a listing of our worldwide locations, visit LORD.com.

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