LORD® 309-1D/309-2D AND 309-1D GB/309-2D EPOXY ADHESIVES

Technical Data Sheet

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°F to +250°F (-34°C 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 (kg/m^3)	 10.5 - 10.8 (1258 - 1294)	 10.5 - 10.9 (1258 - 1306)	 8.25 - 8.65 (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.

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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.

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.

Typical Cured Properties*

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

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Typical Properties* of Resin Mixed with Hardener

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

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Bond Performance*

Substrates	CRS to CRS Lap Shear, psi (MPa)	AL to AL Lap Shear, psi (MPa)	SMC to SMC Lap Shear, psi (MPa)	NR to CRS 45° Peel, pli (N/mm)	SBR to SBR T-Peel, pli (N/mm)
Test @ Room Temperature	2560 (17.6)	1550 (10.7)	575 (3.9)	38 (6.6)	118 (20.7)
Failure Mode	A	36C/A	91FT/A	47R/A	67R/SB
Test @ Hot Strength, 180°F (82°C)	970 (6.7)	940 (6.5)	410 (2.8)	34 (5.9)	—
Failure Mode	A	A	25FT/A	18R/A	
Test after 7 days in H_2O @ 130°F (54°C) Test after 24 hours	2490 (17.2)	1380 (9.5)	450 (3.1)	39 (6.8)	106 (18.6)
Failure Mode	A	A	26FT/A	25R/A	SB
Test after 14 days Salt Spray Exposure Test immediately	1970 (13.6)	945 (6.5)	570 (3.9)	—	116 (20.3)
Failure Mode	A	A	47FT/A		SB
Test after 14 days @ 100°F (38°C), 100% RH Test immediately	2830 (19.5)	1510 (10.4)	610 (4.2)	30 (5.3)	103 (18.0)
Failure Mode	A	A	42FT/A	3R/A	SB
Test @ -30°F (-34°C)	2130 (14.7)	1240 (8.5)	665 (4.6)	67 (11.7)	123 (21.5)
Failure Mode	A	A	FT	85R/A	SB

Substrate	Surface Treatment
Cold Rolled Steel (CRS) and Aluminum (AL)	MEK Wipe, Grit Blast, MEK Wipe
Sheet Molded Compound (SMC)	320-grit Sandpaper, Dry Rag Wipe
Styrene Butadiene Rubber (SBR)	Primed with LORD 7701 Surface Treatment
Natural Rubber (NR)	Primed with LORD 7701 Surface Treatment

Bonded Parameters	Bond Area	Film Thickness	Cure	Mix Ratio
Metal Lap Shears	1.0"x0.5"	0.010"	72 hr @ RT	1:1 by Volume
SMC Lap Shears	1.0"x1.0"	0.030"	72 hr @ RT	1:1 by Volume
45° Peels	1.0"x1.0"	0.020"	72 hr @ RT	1:1 by Volume
T-Peels	1.0"x3.0"	0.020"	72 hr @ RT	1:1 by Volume

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

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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 60-80°F (16-27°C) in original, unopened container.

Cautionary Information

Before using this or any Parker 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.

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DS3373 OD 12/24 Rev.8