LORD® 320/322 Epoxy Adhesive

Technical Data Sheet

LORD® 320/322 adhesive is a general purpose, two-component epoxy adhesive system formulated for primerless adhesion to automotive sheet molded compounds (SMC). This adhesive system also provides excellent adhesion to prepared metals, rubber, fiberglass reinforced plastics (FRP), polyester thermosets and thermoplastics, and many other materials. LORD 320/322 adhesive can be either room temperature cured or heat cured for faster processing.

Features and Benefits:

Durable – provides load bearing properties equal to or greater than the materials being bonded; provides impact resistance down to -40˚F (-40˚C) and extreme durability through superior inhibition of crack propagation.

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

Environmentally Resistant – resists humidity, sunlight, salt spray and temperature extremes.

High Temperature Resistant – resists postbakes up to 400˚F (204˚C).

Chemically Resistant – solvent resistant when cured; anti-corrosion processes including phosphatizing and ELPO (e-coat) coatings do not affect the adhesive or its bond strength. Continuous immersion in solvents is not recommended.

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 abrasives to remove oxidation and mill scale. 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 320/322 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.

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.

Typical Properties*

	320 Resin	322 Hardener
Appearance	Off-white Paste	Grey Paste
Viscosity, cP @ 77˚F (25˚C) Brookfield HBF Helipath, 5 rpm	300,000 - 1,000,000 T-Bar Spindle D	450,000 - 2,000,000 T-Bar Spindle E
Density lb/gal (kg/m^3)	 12.5 - 12.9 (1498 - 1546)	 10.33 - 10.54 (1238 - 1263)
Flash Point, ˚F (˚C) Closed Cup	>200 (>93)	>200 (>93)

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

Applying – Apply the mixed adhesive to bond surfaces using automatic meter/mix/dispense equipment or any convenient tool such as a stiff brush, spatula or trowel. Handheld cartridges or a disposable paper cone can be used to apply the adhesive in a continuous bead. For general use, a film thickness of approximately 0.02-0.03 inch (0.51-0.76 mm) is recommended. To control bondline thickness, a small amount of solid glass beads can be added into the mixed adhesive.

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 – LORD 320/322 adhesive will cure to full strength in approximately 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). When heated at 180˚F (82˚C), full cure strength can be obtained in 45-60 minutes. 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 Properties* of Resin Mixed with Hardener

Mix Ratio, Resin to Hardener	
General Purpose, -40˚F to 400˚F (-40˚C to 204˚C) Mixed Stress Joint Design	
by Volume	1:1
by Weight	1.2:1
High Temperature, 50˚F to 400˚F (10˚C to 204˚C) Shear Stress Joint Design	
by Volume	1.5:1
by Weight	1.8:1
Low Temperature, -40˚F to 100˚F (-40˚C to 38˚C) Peel Stress Joint Design	
by Volume	1:1.5
by Weight	1:1.2
Solids Content, %	100
Working Time, minutes @ 75˚F (24˚C) 54 g mass	20 - 40
Time to Handling Strength, hours	2 - 4
Mixed Appearance	Grey Paste
Cured Appearance	Grey

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Typical Cured Properties*

Tensile Strength at Break, psi (MPa) ASTM D882-83A, modified	4440 (30.6)
Elongation, % ASTM D882-83A, modified	3
Young's Modulus, psi (MPa) ASTM D882-83A, modified	230,000 (1586)
Glass Transition Temperature (Tg), ˚F (˚C) ASTM E1640-99, by DMA	176 (80)

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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	2225 (15.3)	1690 (11.7)	620 (4.3)	63 (11.0)	91 (15.9)
Failure Mode	A	C	FT	R	50R/C
Test @ Hot Strength, 180°F (82°C)	1590 (11.0)	1495 (10.3)	640 (4.4)	30 (5.3)	11 (1.9)
Failure Mode	C	C	15SB/FT	20R/A	C
Test after 7 days Water Immersion @ 130°F (54°C) Test after 24 hours	2300 (15.9)	1540 (10.6)	600 (4.1)	52 (9.1)	100 (17.5)
Failure Mode	C	A	FT	R	20SB, 50R/C
Test after 14 days Salt Spray Exposure Test Immediately	2260 (15.6)	1247 (8.6)	710 (4.9)	50 (8.8)	107 (18.7)
Failure Mode	C	A	FT	80R/C/A	70SB/R
Test after 14 days @ 100°F (38°C), 100% RH Test Immediately	2270 (15.7)	1920 (13.2)	635 (4.4)	58 (10.2)	98 (17.2)
Failure Mode	C	50C/A	98FT/A	R	33SB/R
Test @ -30°F (-34°C)	2025 (14.0)	1690 (11.7)	731 (5.0)	64 (11.2)	89 (15.6)
Failure Mode	A	A	FT	R	25R/C

Substrate	Surface Treatment
Cold Rolled Steel and Aluminum	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	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"x 1.0"	0.030"	72 hr @ RT	1:1 by Volume
T-Peels	1.0"x3.0"	0.020"	72 hr @ RT	1:1 by Volume
45° Peels	1.0"x1.0"	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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