Fusor® 309-1D/309-2D Epoxy Adhesive

Description

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

Fusor 309-1D/309-2D 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.

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 Fusor 309-1D/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.

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*

	309-1D Resin	**309-2D Hardener**
Appearance	Blue Paste	Amber Paste
Viscosity, cP @ 77°F (25°C) Brookfield HBF Helipath, T-C Spindle, 5 rpm	300,000 - 1,100,000	300,000 - 1,000,000
Density		
lb/gal	10.5 - 10.8	8.25 - 8.65
(kg/m^3)	(1258 - 1294)	(989 - 1036)
Flash Point (Closed Cup), °F (°C)	>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, handheld cartridges or any convenient tool such as a stiff brush, spatula or trowel. For general use, film thickness of Fusor 309-1D/309-2D adhesive should be approximately 0.02 in (0.51 mm).

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.

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.

Typical Properties* of Resin Mixed with Hardener

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
by Weight	1.2:1
High Temperature, 50°F to 250°F (10°C to 121°C) Shear Stress 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
Working Time, hr @ 75°F (24°C) 54 g mass	1.5-2
Time to Handling Strength, hr	8-16
Mixed Appearance	Blue-green Paste
Cured Appearance	Blue-green

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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, °F (°C) ASTM E1640-99, by DMA	158 (70)

Bond Performance

Subtrates	**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	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 and Alumimum	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"x1.0"	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

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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