

1. Product Name

Crackbond LR321 Injection Resin

2. Manufacturer

Adhesives Technology Corp.
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3. Product Description

GENERAL DESCRIPTION

Crackbond LR321 Injection Resin is a two component, 2:1 ratio, 100% solids, high modulus, structural epoxy adhesive. It is a solvent free, low odor, high strength, moisture insensitive, low viscosity epoxy system. **Crackbond LR321** can be used at temperatures between 40°F - 110°F., providing contractors with a choice for injecting cracks in high and low temperature environments.

In addition, **Crackbond LR321** has a viscosity of 450 cps which is ideal for gravity feed crack injection applications. **Crackbond LR321** is an excellent choice where a high strength adhesive with maximum field reliability is desired.

BASIC USE:

- Pressure injection of hairline cracks
- Pre-stressed membrane repairs – bridges, reservoirs, dams, etc.
- Gravity feed crack repairs
- Bonding agent for concrete, steel and wood structures
- Vertical anchor installations

Crackbond LR321 is formulated for use as an injection resin for cracks in wood and concrete structures that are hairline to medium sized in width (1/400 – 1/8”). It has the viscosity of light oil, and low surface tension, allowing it to deeply penetrate fine cracks. It cures to a solid with no shrinkage, bonds to both surfaces of the crack, bonding the structure back to its original monolithic strength.

This bond forms a permanent polymeric adhesion that cannot re-emulsify, and forms a moisture barrier that is resistant to chlorides, corrosion, water, grease, alkalis, salt and mild non-organic acids. **Crackbond LR321** is moisture insensitive and will adhere to moist or damp surfaces (for maximum bond, it is better to work on dry surfaces).

LIMITATIONS: **Crackbond LR321** is not intended for repairing cracks that are subject to movement. Repairs should be made to the cracked member to eliminate the causes of cracking before injection is done. **Crackbond LR321** is not designed to stop seeping or flowing water from cracks and therefore is not recommended as a water stopping product. It may be applied in moist or damp environments as long as standing water is removed. **Crackbond LR321** is moisture insensitive and forms a moisture barrier when cured making it ideal for use in applications that will come in contact with water after installation.

COLOR

“A” Component (Resin): Clear
“B” Component (Hardener): Amber
Mixed: Amber

SOLIDS: Weight: 100% Volume: 100%

SHELF LIFE: 24 Months RATIO: 2:1 Ratio by volume

STORAGE STABILITY: Product must be stored in unopened containers at 40°F – 95°F.

SIZE/PACKAGING

Cartridge Sizes: **Crackbond LR321** is available in:

- 6 oz. cartridges; part number: A6-LR321
- This cartridge is available in an all inclusive CRACK-KIT package that contains everything necessary to repair 11 feet of 1/32-inch crack in an 8-inch thick concrete member. Part number: CRACKKIT
- 16 oz cartridges; part number: A16-LR321

The resin and hardener are uniformly dispensed from a dual component cartridge and mixed simultaneously through a mixing nozzle, providing installers with a self mix delivery system.

Bulk Sizes: **Crackbond LR321** is available in bulk sizes:

- 1 gallon kit (102 fl. oz.); part number: BUG-LR321
- 3 gallon kit; part number: B3G-LR321
- 15 gallon kit; part number: B15G-LR321
- 150 gallon kit; part number: B150G-LR321

4. Technical Data

Crackbond LR321 has been independently tested and meets ASTM C 881, Type I, II, IV & V, Grade 1, Class C

Crackbond LR321 Tension Load – 4,000 psi concrete				
Rebar Size	Hole Diameter	Embedment Depth	Ultimate Tension Load	Allowable Tension Load
#7	1"	9"	49,200 lbs	12,300 lbs



EPOXY SPECIFICATIONS

COMPONENT	COLOR	MIX RATIO	VISCOSITY	DENSITY	CHEMICAL MAKE-UP
"A" Component	Clear	2 parts by volume	500-600 cps	9.3 lbs/gal	100% epoxy resin
"B" Component	Amber	1 part by volume	250-300 cps	8.4 lbs/gal	Modified polyamine hardener
Mixed	Amber	2:1 ratio by volume	350-450 cps	9 lbs/gal	100% true epoxy

CURE SCHEDULE / WORKING TIME*

CONCRETE TEMP.	CARTRIDGE	1 GALLON KIT	LOAD TIME**
90°F	4 minutes	2-3 minutes	36 hours
75°F	15 minutes	3-5 minutes	40 hours
50°F	30 minutes	5-8 minutes	48 hours

*Working Time – Amount of time to work with mixed epoxy before gelling occurs.
**Load Time – Time to obtain standard load strength. Epoxy may continue to cure and gain chemical resistance for up to 7 days.

Independent ASTM C881-99 Technical Data

Shelf Life	2 years	2 years
Storage Conditions		40°F – 95°F
Color		Amber Tint
Temperature Range		40°F - 110°F
Mixing Ratio A:B (Volume)		2:1
Compressive Strength – 7 days	ASTM D695	10,200 psi
Compressive Modulus – 7 days	ASTM D695	202,430 psi
Bond Strength – 2 days	ASTM C882	1,250 psi
Bond Strength – 7 days	ASTM C882	1,680 psi
Water Absorption – 24 hours	ASTM D570	0.28%
Linear Shrinkage	ASTM D2566	0.002 cm/cm
Tensile Strength – 7 days	ASTM D638	7,220 psi
Elongation at Break – 7 days	ASTM D638	1.8%
Heat Deflection Temperature	ASTM D648	134°



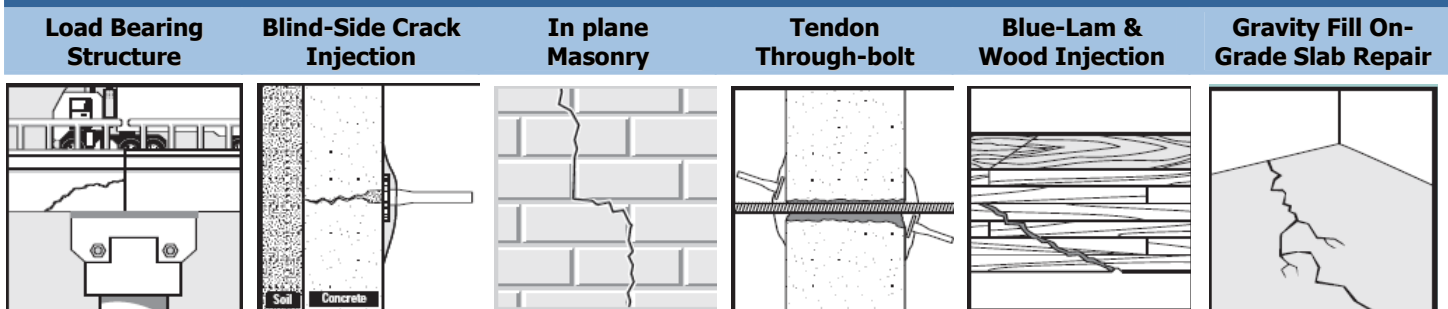
The capping material is ground off after the crack is repaired. This step is only necessary if cosmetics are a concern. If the face of the concrete is not exposed then this process is not necessary.

DEPARTMENT OF TRANSPORTATION APPROVALS

Crackbond LR321 is approved for use by the following Transportation Departments (DOT's):

- Arizona
- Georgia
- Illinois
- Indiana
- Iowa
- Kentucky
- Michigan
- Nebraska
- Ohio
- Oklahoma
- Tennessee

TYPICAL APPLICATIONS



The Crackbond Epoxy Crack Injection System is a unique, high quality, low cost method of structurally re-bonding cracked concrete and wood members. Because structural epoxy has excellent adhesion to concrete and wood surfaces, and has superior physical properties, epoxies are capable of restoring a cracked member to its pre-cracked strength. If properly installed, any new failure of the structure will typically occur in the concrete or wood, not within the epoxy.

Examine the Crack: Before repairs are attempted, the crack should be analyzed to determine the type of repair that is required. Cracks in concrete and wood members are classified as either active (moving) or dormant. Dormant cracks may occur from cure shrinkage, stabilized settlement, or one-time overload events such as earthquakes or floods. For dormant cracks in a structure that is to be rehabilitated, structural crack injection is recommended. By contrast, active cracks are those which are caused by inadequate design, seasonal heaving, temperature swings or repeated overloading. Since structural crack injection reintegrates the cracked member, preventing movement at the crack line, it would be necessary to install joints to redirect this movement if structural crack repair is desired.

Required Materials: The required materials are a capping epoxy (such as Miraclebond 1350, Crackbond CG300, CP1400 or CP3400), injection resin (**Crackbond LR321**), injection ports, dispenser, wire brush, protective eye glasses, gloves, tongue depressors or putty knife and mixing nozzles (or injection kit).

- Note: component "A" contains epoxy resin and is an irritant / sensitizer; component "B" contains amines and is a corrosive / sensitizer; prior to using **Crackbond LR321**, consult the MSDS for proper handling instructions.
- Make certain the crack surface is prepared in advance before starting a new cartridge.
- If at all possible, schedule dispensing to consume an entire cartridge at one time with no interruption of material flow.
- Always wear safety glasses and gloves when working with epoxy or cleaning and preparing cracks.



Note: **Crackbond LR321** should be used with the T58CBS nozzle to ensure proper mixing. This nozzle offers superior mixing performance over other nozzles.

System requirements						
Container Size:	Available Capping Materials			LR321 Crack-Injection Packaging Options		
	9 oz	16 oz	Bulk	6 oz	16 oz	Bulk
Product:	A9-MB1350	A16-CG300	BUG-CP1400 BUG-CP3400	A6-LR321	A16-LR321	BUG-LR321 B3G-LR321 B15G-LR321 B150G-LR321
Dispenser (manual):	TM9HD	TM16HD	N/A	TM9HD	TM16HD	N/A
Dispenser (air):	N/A	TA16HD	Bulk Pump*	N/A	TA16HD	Bulk Pump*
Mixer Nozzle:	T58CBS	T58CBS	T58CBS	T58CBS	T58CBS	T58CBS
Injection Port:	CRPORTSS or IJ-220			CRPORTSS or IJ-220		
Flow control:	N/A	N/A	N/A	CBEZFC	CBFC	
Injection Tubing:	TUBE-ASSE (3/8" tubing kit)			TUBE-ASSE (3/8" tubing kit)		
Wire Brush:	A wire brush is required to clean the crack surface so that the capping material can bond.					
Gloves:	Gloves are required to protect your skin from the epoxy materials.					
Tongue Depressors:	Tongue depressors are required to spread the capping material over the face of the crack and to mount the surface ports.					
*Bulk Pump:	*Please contact Adhesives Technology Corp. for recommended bulk pumps					
Minimum Substrate Temperature During Application	40° F. or warmer. Note: if below 50° F., we recommend warming the product and the concrete using a heater or heat gun and keep covered to maintain warmth. This will allow epoxy to penetrate deeper into crack. DO NOT USE DIRECT FLAME.					

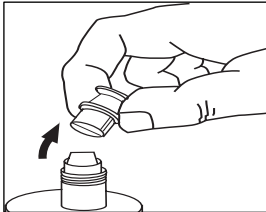


5. Installation Procedures - To achieve desired results, carefully follow these procedures!

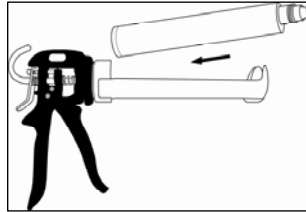
Crack-Injection Instructions (Cartridge)

CRACK PREPARATION: (be sure to wear safety glasses and gloves when working with epoxy or cleaning and preparing cracks)
Clean the surface immediately surrounding the crack with a wire brush to achieve proper bond. Remove all dust, debris, oil and any other contaminants from the crack by blowing out with clean, oil-free compressed air. For best results crack must be dry at the time of injection. If water is seeping from crack, steps must be taken to stop the flow in order to achieve desired repair.

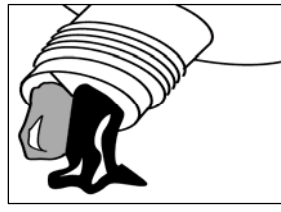
CARTRIDGE PREPARATION (Capping Material):



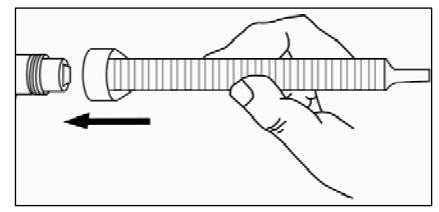
I. Unscrew plastic cap from threaded end of cartridge and remove plug.



II. Place cartridge into dispenser.



III. Dispense a small amount of material into a disposable container until both materials flow from cartridge.



IV. Attach mixing nozzle to cartridge and dispense a small amount of material until uniform color is achieved.



Capping cracks



Securing ports

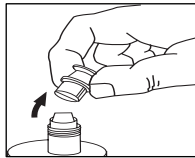
V. Place and secure injection ports with the Capping Gel material (Miraclebond 1350), taking care not to leave any pin-holes. Port spacing should be approximately 6 – 12 inches apart (typically the width of the concrete member). **Do not allow the epoxy to block the passage between the port and the crack face.**

VI. Place additional Miraclebond 1350 between the ports making sure the entire face of the crack is sealed off and ports are securely fastened to the concrete. If the crack is evident and accessible on the back side of the concrete member seal with capping gel.

VII. Allow the capping material to cure before injecting crack (at least 2 hours at 75°F. if using the Miraclebond 1350).

INJECTING THE CRACK:

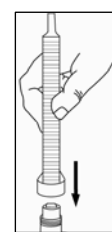
VIII. Using the LR321 (injection material), unscrew plastic cap from threaded end of cartridge and remove plug.



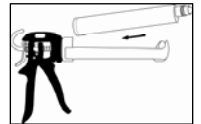
IX. Insert flow control port onto top of cartridge.



X. Immediately attach the mixer nozzle.



XI. Place cartridge into dispenser and dispense enough material until uniform color is achieved.



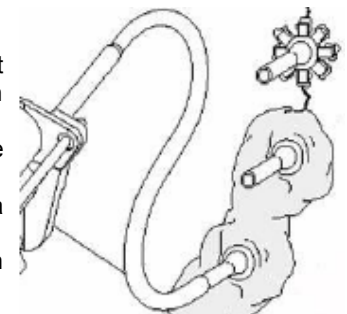
XII. Attach the tube assembly to the barbed end of nozzle.

XIII. Attach other end of tubing to the bottom injection port. Inject epoxy into port until you either get flow from adjacent port or until epoxy stops flowing. Plug the port you were injecting into and attach tubing to adjacent port. Continue procedure until complete.

XIV. Leave the tubing attached to the last port on each crack for 30 seconds under pressure to assure crack is completely filled.

XV. Allow Injection resin to cure (at least 24 hours). Ports and capping material can be removed with a chisel and/or grinder.

Note: Some cracks may take more time to inject, especially hair-line cracks. Cracks may be smaller in width (or larger) than they appear from the surface.



DISPENSING AND INJECTION TIPS: DO NOT EXCEED 35 psi AIR PRESSURE TO THE PNEUMATIC DISPENSING TOOL

- **PNEUMATIC DISPENSER:** Must be used with an air pressure regulator. Start at a low setting and gradually increase pressure as needed until desired epoxy flow. Do not exceed 35 psi air pressure. Excessive pressure may result in cartridge plunger leakage.
- For basement walls (where back side of concrete is not accessible) inject with LR GEL. This is a unique thixotropic gel that will feed into small cracks and bridge the back side without runoff.
- Do not dispense epoxy through gelled mixer nozzle. If epoxy gels in nozzle, replace nozzle before continuing.



Bulk Mix and Application Instructions

Note: component "A" contains epoxy resin and is an irritant / sensitizer; component "B" contains amines and is a corrosive / sensitizer; prior to using the **Crackbond LR321**, please consult the material safety data sheet for proper handling instructions.

I. Surface Preparation:

Concrete and Steel: Surfaces must be sound and cleaned so there is no dust, dirt, grease, wax, oil or any other contaminants. Surfaces may be damp (or dry) however there should be no standing water. Surfaces may be prepared by shot blasting or other equivalent mechanical means.

II. Mixing Instructions:

Thoroughly stir each component before mixing them together.

BUG packaging (102 fluid oz kits): Pour the contents of the "B" component pail (hardener) into the "A" component pail (resin).

B3G, B15G & B150G packaging: Mix only the amount of material that can be used before the pot life expires. Proportion parts by volume at a 2:1 ratio (2 parts of component "A" and 1 part of component "B") into a clean pail. Be sure that components are mixed at an exact 2:1 ratio by volume.

Mix thoroughly with a low speed drill (400 – 600 rpm) with a mix paddle attachment (i.e. a jiffy mixer). Carefully scrape the sides and the bottom of the container while mixing. Keep the paddle below the surface of the material to avoid entrapping air. Proper mixing will take at least 3 minutes and when well mixed the material will be free of streaks or lumps.

III. Application:

Bonding fresh concrete to hardened concrete: Using a brush, roller or airless sprayer, apply an even coat of the mixed **Crackbond LR321** to the clean and prepared concrete surface. While the epoxy is still tacky, place fresh concrete over the top of the mixed epoxy.

Bonding hardened concrete to hardened concrete: Using a brush, roller or airless sprayer, apply an even coat of the mixed **Crackbond LR321** to the clean and prepared concrete surface. Make sure to fill all gaps between the mating concrete surfaces.



Vertical Anchoring: Drill hole into concrete (1/16" – 1/4" diameter larger than the threaded rod or rebar). Typical embedment depth is 9 – 15 bar diameters (9D - 15D). Fill the anchor hole to about 2/3 full with the **Crackbond LR321** epoxy. While the epoxy is still wet, place the threaded rod or rebar into the anchor hole while turning clockwise. Do not disturb or bolt-up until minimum bolt up time has passed.

Gravity Feed Crack Injection: Cut a v-groove into the face of the crack/concrete surface, creating a reservoir for the crack repair material. Clean and blow out the crack, removing all dust, dirt, grease, wax, oil or any other contaminants. Pour mixed **Crackbond LR321** into a prepared v-grooved crack. Allow epoxy to feed into the crack. Continue adding the epoxy until the crack is completely filled.



CRACK-INJECTION USAGE ESTIMATING GUIDE

Approximate Coverage Rates in Linear Feet

Crack Width (inches)	Concrete Thickness (inches)	Crack Kit	Crack-Injection Material			Capping Gel for Capping Crack				
			6.1 fluid oz cartridge	9 fluid oz cartridge	16 fluid oz cartridge	9 fluid oz cartridge	16 fluid oz cartridge	22 fluid oz cartridge	33 fluid oz cartridge	53 fluid oz cartridge
1/400 or 0.0025	4	275.2	91.7	129.3	240.6	6.9	12.8	17.0	26.4	63.8
	6	183.5	61.2	86.2	160.4					
	8	137.6	45.9	64.7	120.3					
	10	110.1	36.7	51.7	96.3					
1/200 or 0.005	4	137.6	45.9	64.7	120.3	6.9	12.8	16.9	26.3	63.7
	6	91.7	30.6	43.1	80.2					
	8	68.8	22.9	32.3	60.2					
	10	55.0	18.3	25.9	48.1					
1/64 or 0.0156	4	44.0	14.7	20.7	38.5	6.8	12.6	16.7	26.1	63.0
	6	29.4	9.8	13.8	25.7					
	8	22.0	7.3	10.3	19.3					
	10	17.6	5.9	8.3	15.4					
1/32 or 0.03125	4	22.0	7.3	10.3	19.3	6.7	12.4	16.5	25.7	62.1
	6	14.7	4.9	6.9	12.8					
	8	11.0	3.7	5.2	9.6					
	10	8.8	2.9	4.1	7.7					
1/16 or 0.0625	4	11.0	3.7	5.2	9.6	6.5	12.1	16.0	24.9	60.2
	6	7.3	2.4	3.4	6.4					
	8	5.5	1.8	2.6	4.8					
	10	4.4	1.5	2.1	3.9					
1/8 or 0.125	4	5.5	1.8	2.6	4.8	6.1	11.4	15.1	23.5	56.9
	6	3.7	1.2	1.7	3.2					
	8	2.8	0.9	1.3	2.4					
	10	2.2	0.7	1.0	1.9					
3/16 or 0.1875	4	3.7	1.2	1.7	3.2	5.8	10.8	14.3	22.3	53.9
	6	2.4	0.8	1.1	2.1					
	8	1.8	0.6	0.9	1.6					
	10	1.5	0.5	0.7	1.3					
1/4 or 0.25	4	2.8	0.9	1.3	2.4	5.5	10.3	13.6	21.2	51.2
	6	1.8	0.6	0.9	1.6					
	8	1.4	0.5	0.6	1.2					
	10	1.1	0.4	0.5	1.0					
5/16 or 0.3125	4	2.2	0.7	1.0	1.9	5.3	9.8	13.0	20.2	48.8
	6	1.5	0.5	0.7	1.3					
	8	1.1	0.4	0.5	1.0					
	10	0.9	0.3	0.4	0.8					
3/8 or 0.375	4	1.8	0.6	0.9	1.6	5.0	9.3	12.4	19.3	46.5
	6	1.2	0.4	0.6	1.1					
	8	0.9	0.3	0.4	0.8					
	10	0.7	0.2	0.3	0.6					
7/16 or 0.4375	4	1.6	0.5	0.7	1.4	4.8	8.9	11.8	18.4	44.5
	6	1.0	0.3	0.5	0.9					
	8	0.8	0.3	0.4	0.7					
	10	0.6	0.2	0.3	0.6					
1/2 or 0.5	4	1.4	0.5	0.6	1.2	4.6	8.6	11.3	17.6	42.7
	6	0.9	0.3	0.4	0.8					
	8	0.7	0.2	0.3	0.6					
	10	0.6	0.2	0.3	0.5					

Note: Capping gel estimates are based on a cap thickness of 3/16" and a 1-inch width.

Note: The above chart is an approximate and may vary depending on waste, concrete and user technique.



Sample Specification – Injection material shall be a two component, 2:1 ratio, 100% solids epoxy system supplied in a dual component, single barrel (or side by side cartridge) and dispensed through a static mixing nozzle supplied by the manufacturer. The injection material must have a minimum compressive strength of 10,000 psi, a minimum heat deflection temperature of 134°F and a minimum tensile strength of 7,200 psi. Adhesive shall be **Crackbond LR321** manufactured by Adhesives Technology Corp., Pompano Beach, Florida.

BUILDING CODES

Installation of **Crackbond LR321** must comply with applicable local, state and national code requirements.

SITE CONDITIONS

Material shall be delivered in original unopened containers and stored in a dry environment at a temperature between 40° and 95°F.

PRECAUTIONS

- Wear safety glasses
- Avoid prolonged contact with skin.
- Keep out of reach of children
- Do not take internally
- If Ingested seek medical attention immediately.
- Eye contact. Flush with water for at least 15 minutes. Call a physician immediately.

5. Availability and Cost

AVAILABILITY

Crackbond LR321 is available through select distributors who can provide you with all of your construction needs. Please contact Adhesives Technology Corp. at (800) 892-1880 for a distributor near you.

COST

Cost information is available from your local distributor.

6. Warranty

All warranties of the product listed herein, in the corresponding ATC catalog, and in any other current literature, expressed or implied, including warranties of merchantability and fitness for a particular purpose are specifically and expressly excluded, with the following exception: At its sole discretion, ATC will repair or replace any product which it considers to be defective in material or workmanship, excepting normal wear and tear within sixty (60) days from the date of purchase from ATC. ATC shall not be liable for any injury, loss or damage, direct, indirect, incidental or consequential or arising out of use of, misuse of, negligence, accident or inability to use any ATC product.

7. Technical Services

For technical support contact Adhesives Technology Corp. at (800) 892-1880.

8. Maintenance

None required.

9. Filing System

Additional product information and specifications are available either on line at www.atc.ws or contact Adhesives Technology at (800) 892-1880 to get copies mailed to you.

ON THE JOB WITH CRACKBOND PRODUCTS



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