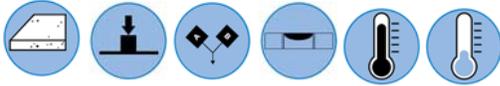


CRACKBOND® LR-321



Product Description

CRACKBOND® LR-321 is a two-component, low viscosity, high modulus structural epoxy adhesive used for a variety of repair projects. Due to its low viscosity, it is perfect for horizontal gravity-feed repair of fine to medium size cracks, 1/8" - 1/4" (0.32 - 0.64 cm) maximum width. It can be used for crack repair using injection ports in conjunction with a capping gel. Its bonding and sealing capabilities for interior/exterior slabs are exceptional, and can be used as an epoxy mortar spall repair when mixed with aggregate. Usable temperature range is between 50°F and 100°F (10°C and 38°C).

General Uses & Applications

- Pressure injection of fine to medium size cracks of approximately 1/8" to 1/4" (0.32 cm to 0.64 cm) in width
- Primer for industrial coatings
- Bonding agent for fresh to hardened concrete or hardened to hardened concrete
- Epoxy resin binder for epoxy mortar patching with addition of aggregate
- Sealer for interior slabs and exterior above-ground slabs from water, chlorides and mild chemical attack
- Gravity feed structural crack repair in horizontal concrete

Advantages & Features

- Low viscosity and surface tension allows product to deeply penetrate into cracks
- Cures to a solid with virtually no shrinkage and bonds to all surfaces

Availability: Adhesives Technology Corp. (ATC) CRACKBOND products are available through select distributors who can provide you with all your construction needs. Please contact ATC for a distributor near you or visit our website to search by zip code.

STANDARDS & APPROVALS

ASTM C881 Type I, II*, IV & V*
Grade 1, Class C

AASHTO M235

*With exceptions

Color & Ratio: Part A (Resin): Clear, Part B (Hardener): Amber, Mixed: Amber, Mix Ratio: 2:1

Storage & Shelf Life: 24 month shelf life when stored in unopened containers in dry conditions. Store between 50°F (10°C) and 95°F (35°C).

Installation & Coverage: Manufacturer's Printed Installation Instructions (MPII) are available in this Technical Data Sheet (TDS) and online at www.atcepoxy.com. Due to occasional updates and revisions, always verify that you are using the most current version of the MPII. In order to achieve maximum results, proper installation is imperative.

Chemical Resistance: A Chemical Resistance Chart for ULTRABOND®, MIRACLE BOND® and CRACKBOND® epoxy products is available upon request. Contact a Technical Service Representative for details.

Clean Up: Always wear appropriate protective equipment such as safety glasses and gloves during cleanup. Clean uncured materials from tools and equipment with mild solvents. Cured material can only be removed mechanically.

Limitations & Warnings:

- Do not thin with solvents, as this will prevent cure
- Not intended for repairing cracks subject to movement, cracking prior to repair and cause of the cracking in the member needs to be eliminated
- Product not designed to stop seeping or flowing water, however, it may be applied in moist or damp environments as long as standing water is removed

Safety: Please refer to the Safety Data Sheet (SDS) for CRACKBOND LR-321 published on our website or call ATC for more information at 1-800-892-1880.

Specification: The crack injection material shall be a two component, 2:1 ratio system. The adhesive material must meet the requirements of ASTM C881 specification for Type I, II*, IV & V*, Grade 1, Class C. The epoxy must have a minimum compressive strength of 10,150 psi (70.0 MPa) at 60°F (16°C), a minimum heat deflection temperature of 120°F (49°C) per ASTM D648 and a minimum tensile strength of 7,230 psi (49.8 MPa) at 60°F (16°C). Shelf life must be a minimum of 24 months. Adhesive shall be CRACKBOND LR-321 manufactured by ATC, Pompano Beach, Florida.



Concrete Repair

ORDERING INFORMATION

TABLE 1: CRACKBOND LR-321 Adhesive, Dispensing Tools and Mixing Nozzles^{1,2}

Package Size	6.1 oz (180 ml) Cartridge	15.9 oz (470 ml) Cartridge
Part #	A6-LR321N	A16-LR321
Manual Dispensing Tool	TM9HD	TM16HD
Pneumatic Dispensing Tool	N/A	TA16HD-A
Case Qty	12	10
Pallet Qty	1116	720
Pallet Weight (lbs)	888	1077
Recommended Mixing Nozzle	T58CBSK or T58CBS	T58CBSK or T58CBS

1. Call for bulk packaging availability and lead times.
2. For bulk dispensing pumps, contact ATC for recommended manufacturers.



A16-LR321



T58CBSK



TM9HD

Concrete Repair

MATERIAL SPECIFICATION

TABLE 2: CRACKBOND LR-321 performance to ASTM C881-10¹

Property	Cure Time	ASTM Standard	Units	Sample Conditioning Temperature 60 °F (16 °C)
Gel Time - 60 Gram Mass ²	----	C881	minutes	27
Viscosity	----	D2393	cP	500
Compressive Yield Strength	7 day	D695	psi (MPa)	10,150 (70.0)
Compressive Modulus			psi (MPa)	300,000 (2,068.4)
Tensile Strength		D638	psi (MPa)	7,230 (49.8)
Tensile Elongation	%		4.4	
Bond Strength Hardened to Hardened Concrete	2 day	C882	psi (MPa)	1,330 (9.2)
	14 day		psi (MPa)	1,920 (13.2)
	14 day		psi (MPa)	2,200 (15.2)
Bond Strength Plastic to Hardened Concrete	14 day			
Heat Deflection Temperature ³	7 day	D648	°F (°C)	120 (48.9)
Water Absorption ³	14 day	D570	%	0.3
Linear Coefficient of Shrinkage ³	48 hrs	D2566	%	0.0003
Volatile Organic Compounds (VOC's) ⁴	----	----	grams/liter	40

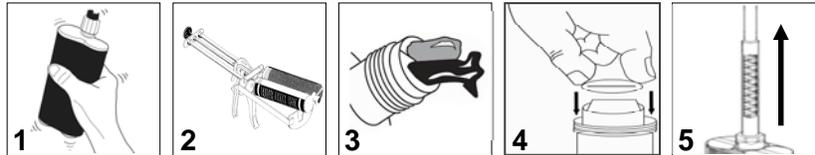
1. Results based on testing conducted on a representative lot (or lots) of product. Average results will vary according to the tolerances of the given property.
2. Gel time is lower than the minimum required for ASTM C881 Type II and Type V adhesives.
3. For this property, testing was conducted at 73°F (23°C).
4. VOC content is outside of the scope of ASTM C881.

INSTALLATION INSTRUCTIONS (MPII)

Surface Preparation

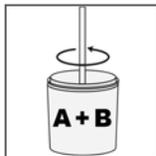
Surface preparation will be dependent upon the application of the product. Old concrete must be clean and profiled or textured. New concrete should be a minimum of 28 days old. All dirt, oil, debris, wax, grease or dust must be removed. Prepare the surface mechanically using a scarifier, sandblast, shotblast or other equipment that will give the surface profile needed for the application. A roughened surface is imperative for good adhesion. Always be sure the bonding surfaces are prepared in advance before starting a new cartridge or mixing product. If at all possible, schedule dispensing to consume an entire cartridge at one time with no interruption of epoxy flow. For bulk, mix only enough product that can be used within the curing time frame.

CRACKBOND LR321 Cartridge Preparation



- 1 SHAKE the CARTRIDGE vigorously for 60 seconds then stand the cartridge upright for 60 seconds allowing the bubbles to rise to the top.
- 2 Place cartridge into dispenser. Crack injection gels are low viscosity products, so hold the dispenser pointing upward and remove the cap and the plug.
- 3 Before attaching the nozzle and still pointing the cartridge upward at a slight angle, dispense enough material into a disposable container until both resin and hardener flow evenly.
- 4 Insert the flow control port onto the top of the cartridge and attach the nozzle.
- 5 Holding the dispenser straight up, slowly apply pressure to the dispenser moving any bubbles and product up through the nozzle until it reaches the tip. Tilting only slightly, dispense this first full stroke of material into a disposable container. The cartridge is now purged and ready for use.

Mix Instructions for Bulk Packaging



Thoroughly stir each component separately before mixing them together. Mix only the amount of material that can be used before the gel time expires. Proportion parts by volume into a clean pail at the exact and proper mix ratio for that product. (For CRACKBOND LR-321 use 2 parts by volume of component "A" and 1 part by volume of component "B").

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.

Bonding Agent Applications

Bonding fresh concrete to hardened concrete or when repairing concrete spalls use as a bonding agent: Using a brush, roller or airless sprayer, apply an even coat of the bulk 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.

Spall Repair Applications

To avoid a feathered edge, cut around the spall into sound concrete with a grinder or circular saw using a diamond or concrete abrasive blade. The edge cut should be equal to the maximum depth of the spall or to at least, a minimum depth of 3/4" (1.9 cm). Chip out all loose concrete within the entire spall to a minimum depth of 3/4" (1.9 cm). Follow surface preparation instructions above to clean the spall. Estimate the amount of bulk product needed and mix Part A and Part B, 2 to 1 by volume. Mix part A and B thoroughly. Slowly add 3-4 parts by volume of kiln-dried sand or aggregate of choice and mix well, pour and trowel until smooth/level. **Note:** the low viscosity of this product will aid in wetting out aggregate to create a repair mortar. Maximum mortar thickness is 1.5" (3.8 cm) per lift.

Gravity Feed Crack Repair for Horizontal Applications

CRACKBOND LR-321 is formulated to repair fine to medium size cracks 1/8" to 1/4" (0.32 cm to 0.64 cm). For hairline cracks, use CRACKBOND SLV-302. For best results, cut a groove to open up the crack to a width of 1/4" (0.64cm) and minimum depth of 3/8" (0.95cm) using an abrasive or diamond blade. Clean and blow out the crack to remove all dust, dirt, grease, wax, oil or any other contaminants. Pour CRACKBOND LR-321 into the crack and its self-leveling ability will fill the entire area. Repeat application if necessary to completely fill crack. Follow cartridge preparation instructions.



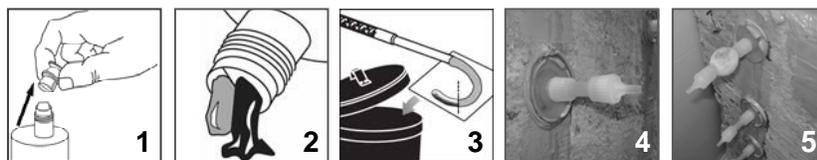
Low Pressure Crack Injection for Vertical, Horizontal and Overhead Structural Repair

Before repairs are attempted, **examine the crack**, to determine the type of repair that is required. Cracks in concrete and wood members are classified as either dynamic (moving) or static (dormant). Static cracks may occur from a one-time overload event such as an earthquake or flood. For static cracks in a structure that is to be rehabilitated, structural crack injection is recommended. By contrast, dynamic cracks are those which are caused by inadequate design, seasonal heaving, temperature swings or repeated over-loading. Dynamic cracks **CANNOT** effectively be repaired using crack injection. Dynamic cracks can be sealed using a flexible repair material such as CRACKBOND JF-311 (horizontal cracks) or CRACKBOND EJ (horizontal and vertical cracks).

Crack Injection Preparation

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.

Capping Paste Cartridge Preparation



- 1** MIRACLE BOND 1350 is the perfect product to be used as a capping paste for crack injection. Its non-sag/fast-set properties are ideal for rapid installations (horizontal, vertical and overhead). Unscrew plastic cap from threaded end of cartridge and remove plug. Place cartridge into dispenser.
- 2** Balance the cartridge by dispensing a small amount of material into a disposable container until both materials flow evenly from the cartridge. Part A is white, Part B is dark gray.
- 3** Attach the mixing nozzle to the cartridge of MIRACLE BOND 1350 and dispense a small amount of material until uniform gray color without streaks is achieved.
- 4** Place and secure injection ports with the capping paste material. Port spacing should be approximately 6-12" (152-305 mm) apart (typically the width of the concrete member). Do not allow the epoxy to block the passage between the port and the crack face.
- 5** Place additional MIRACLE BOND 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 paste.

Injecting the Crack

Drill-in Ports

IJ-220 is a standard tube port used in conjunction with a 3/8" tubing to connect to a static mixer or manifold assembly. Care must be taken not to mechanically disturb the anchor while attaching the tube or during injection.

Surface Mount Ports

CRPORTSS is a tube port containing a ball bearing to minimize backflow prior to capping the port after injection. Attach the Tubing Assembly (TUBE-ASSE) to the static mixer and the fitted end assembly to the barbed port. Leave the tubing attached to the last port on each crack for 30 seconds under pressure to assure crack is completely filled. The tubing assembly contains a pinch valve to stop flow from the static mixer between ports.



INSTALLATION INSTRUCTIONS (MPII)

Crack Injection

Reservoir Ports

T-Port is a reservoir port that allows for a continuous low pressure injection of epoxy expediting the process. Inject resin into the T-Port until the latex storage reservoir expands to a volume of approximately 20cc (about the diameter of a quarter). Continue to fill remaining T-Ports as they will self-inject.

Important note: When under direct sunlight or when using a resin that generates substantial heat, inject smaller volumes at a time to avoid damage to the latex reservoir.



Pump and Pneumatic Dispensing

DO NOT EXCEED 40 psi (0.28 MPa) PRESSURE TO THE PNEUMATIC DISPENSING TOOL OR INJECTION PUMP. An air pressure regulator MUST be used with a Pneumatic Dispenser. Start at a low setting and gradually increase pressure as needed until desired epoxy flow. Use maximum 40 psi (0.28 MPa) air pressure. Excessive pressure may result in cartridge plunger leakage.

Begin the injection process from the lowest port on a vertical surface moving up the wall. On horizontal surfaces, begin at the widest part of the crack (as marked prior to capping) and move outward. Inject epoxy into port until you either get flow from adjacent port or until epoxy stops flowing.

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

For basement walls (where back side of concrete is not accessible) inject with slightly higher viscosity, CRACKBOND LR-321G. 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.

