

Crack Injection Guide for ETI-SLV, ETI-GV and Crack-Pac® Injection Epoxy

IMPORTANT: The following instructions are intended as recommended guidelines. Due to the variability of field conditions, selection of the proper material for the intended application and installation are the sole responsibility of the applicator.

Epoxy injection is an economical method of repairing non-moving cracks in concrete walls, slabs, columns and piers and is capable of restoring the concrete to its pre-cracked strength. Prior to doing any injection it is necessary to determine the cause of the crack. If the source of cracking has not been determined and remedied, the concrete may crack again.

For larger-scale crack repair projects, Simpson Strong-Tie recommends preparing and attaching a few injection ports and paste-over for trial to ensure that the port spacing is adequate to achieve full epoxy injection penetration.

Definitions

Dry Crack: A crack containing no moisture.

Wet Crack: A crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack: A wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack: A crack with a slow trickle of water emitting from its face.

Preparation of the Crack for Injection

Clean the crack and the surface surrounding it to allow the paste-over to bond to sound concrete. At a minimum, the surface to receive paste-over should be brushed with a wire brush. Oil, grease or other surface contaminant must be removed in order to allow the paste-over to bond properly. Take care not to impact any debris into the crack during cleaning. Using clean, oil-free compressed air, blow out the crack to remove any dust, debris or standing water. Best results will be obtained if the crack is dry at the time of injection. If water is continually seeping from the crack, the flow must be stopped in order for epoxy injection to yield a suitable repair. Other materials such as polyurethane resins may be required to repair an actively leaking crack.

For many applications, additional preparation is necessary in order

to seal the crack. Where a surfacing material has been removed using an acid or chemical solvent, prepare the crack as follows:

1. Using clean, compressed air, blow out any remaining debris and liquid.
2. Remove residue by high-pressure washing or steam cleaning.
3. Blow any remaining water from the crack with clean compressed air.

If a coating, sealant or paint has been applied to the concrete, it must be removed before placing the paste-over epoxy. Under the pressure of injection, these materials may lift and cause a leak. If the surface coating is covering the crack, it may be necessary to route out the opening of the crack in a "V" shape using a grinder in order to get past the surface contamination.

Sealing of the Crack and Attachment of E-Z-Click™ Injection Ports

1. To adhere the port to the concrete, apply a small amount of paste-over around the bottom of the port base (Picture 1). Place the port at one end of the crack (Picture 2) and repeat until the entire crack is ported. As a rule of thumb, injection ports should be placed no more than 200 mm apart along the length of the crack.

IMPORTANT: Do not allow paste-over to block the port or the crack under it; this is where the injection epoxy must enter the crack.

2. Using a putty knife or other paste-over tool, generously work paste-over along the entire length of the crack (Picture 3). Take care to mound the paste-over around the base of the port to approximately 6 mm thick extending 25 mm out from the base of the port and to work out any holes in the material.

It is recommended that the paste-over should be a minimum of 5 mm thick and 25 mm wide along the crack. Insufficient paste-over will result in leaks under the pressure of injection. If the crack passes completely through the concrete element, seal the back of the crack, if possible. If not, epoxy may be able to run out the back side of the crack, resulting in an ineffective repair.

3. Allow the paste-over to harden before beginning injection.

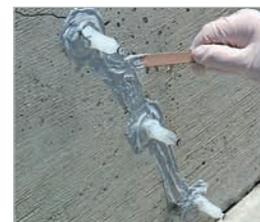
NOTE: CIP-LO and ETR epoxies are fast-cure materials and may harden prematurely if left in a mixed mass on the mixing surface while installing ports. Spreading paste-over into a thin film (approximately 3 mm) on the mixing surface will slow curing by allowing the heat from the reaction to dissipate.



Picture 1



Picture 2



Picture 3

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Injection Procedure

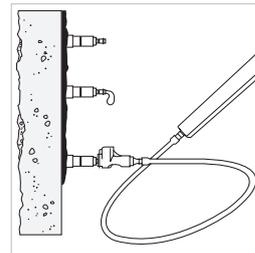
1. Follow cartridge preparation instructions on the cartridge label. Verify that the material flowing from the Optimix® mixing nozzle is a uniform and consistent colour: for ETI-SLV, the mixed product is black; and ETI-GV is grey. For Crack-Pac® injection epoxy, verify that the mixed material in the cartridge is a transparent amber colour.
2. Attach the E-Z-Click™ fitting to the end of the nozzle by pushing the tubing over the barbs at the end of the nozzle. Make sure that all ports are pushed in to the open position.
3. Attach the E-Z-Click™ injection fitting to the first E-Z-Click™ port until it clicks into place. Make sure that the heads of all the ports are pushed in to the open position. In vertical applications, begin injection at the lowest port and work your way up. In a horizontal application, start at one end of the crack and work your way to the other end.
4. Inject epoxy into the first port until it will no longer flow into the crack. If epoxy shows at the next port and the first port still accepts material, close the second port and continue to inject into the first

port until it accepts no more epoxy. Continue closing ports where epoxy appears until the first port refuses epoxy. When the first port reaches the point of refusal, brace the base of the port and pull out gently on the head of the port to close it. Pulling too hard may dislodge the port from the surface of the concrete, causing a leak. Depress the steel tab on the head of the E-Z-Click fitting and remove it from the port.



Picture 4

5. Go to the last port where epoxy appeared while injecting the first port, open it, and continue injection at this port. If the epoxy has set up and the port is bonded closed, move to the next clean port and repeat the process until every portion of the crack has refused epoxy.



Picture 5

While this method may appear to leave some ports un-injected, it provides maximum pressure to force the epoxy into the smaller areas of the crack. Moving to the next port as soon as epoxy appears will allow the epoxy to travel along the wider parts of the crack to the next ports rather than force it into the crack before it travels to the next ports.

Gravity-Feed Procedure

In some horizontal applications where complete penetration isn't a requirement, cracks can be repaired using the gravity-feed method.

1. Follow cartridge preparation instructions on the cartridge label. Verify that the material flowing from the Optimix® mixing nozzle is a uniform and consistent colour: for ETI-GV is grey. For Crack-Pac® injection epoxy, verify that the mixed material in the cartridge is a transparent amber colour.
2. Starting at one end of the crack, slowly dispense epoxy into the crack, moving along the crack as it fills. It will probably be necessary to do multiple passes in order to fill the crack. It is possible that the epoxy will take some time to run into the crack, and the crack may appear empty several hours after the initial application. Reapply epoxy until the crack is filled.

3. In situations where the crack completely penetrates the member (e.g., concrete slab), the material may continue to run through the crack into the subgrade. It may be possible to use a small amount of coarse, dry sand to act as a barrier for the injection epoxy. Place the sand in the crack to a level no more than 6 mm thickness of the member and apply the injection epoxy as described in Step 2. The epoxy level will drop as it penetrates the sand, but should cure and provide a seal to the bottom of the crack. Reapply the epoxy until the crack is filled. In some cases, application of sand is impractical or not permitted and epoxy repair may not provide a complete and effective repair. Use of a gel viscosity injection epoxy (ETI-GV) may permit a surface repair to the crack with partial penetration.



Picture 6