

# K A U F M A N

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## Recommended Field Procedures for Epoxy Injection Using Cartridges

Kaufman Products' manufactures more than fifty different structural epoxy resin systems that meet all aspects of the ASTM C-881 specification and many state Department of Transportation specifications. Our philosophy is that epoxy resin systems are tools, and that if the correct system is chosen for a particular project the repair should go well.

The use of epoxy cartridge systems and either manual or pneumatic guns is an accepted procedure for injection of cracks in concrete to bond the concrete back together. However, this type of system will only produce low pressure injection of less than 50 psi. If high pressure injection is required, then a metering system and pump will be required, and these epoxy resin systems may be purchased in larger packaging systems.

### Materials

SurePox HMLV for structural repair of fine to medium cracks from 1/64" to 1/4". ASTM C-881, Types I, II, IV & V, Grade 1, Class C

SurePox HMLV Class B for structural repair of fine to medium cracks from 1/64" to 1/4". ASTM C-881, Types I, II, IV & V, Grade 1, Class B

SurePox HMSLV for structural repair of hairline cracks up to 1/4". Penetrates the smallest cracks. ASTM C-881, Types I, II, IV & V, Grade 1, Class C.

SurePox LMLV for structural repair of fine to medium cracks from 1/64" to 1/4". ASTM C-881, Types I & II, Grade 1, Class C

SurePox 116 for surface sealing of the cracks and adhering the ports to the concrete. May also be used for structural repair of cracks from 3/32-1/4". ASTM C-881, Types I, II, IV & V, Grade 3, Classes B and C, except modified for faster set.

SurePox 117 for surface sealing of the cracks and adhering the ports to the concrete. May also be used for structural repair of cracks from 3/32-1/4". ASTM C-881, Types I, II, IV & V, Grade 3, Classes B and C, except modified for faster set.

### Surface Preparation

Prior to application of the epoxy resin system, the concrete must be clean of all deleterious materials, dry, and structurally sound. The use of a wire wheel and/or wire brush will open up the crack for proper injection. However, make certain that there is no resulting debris or dust left in the crack. The use of clean and oil free air to low out any debris is

acceptable. If water is flowing through the crack, it must be stopped prior to injection of the epoxy resin. Furthermore, the crack should be dry prior to injection. If a coating, caulk, sealant, or paint has been applied to the concrete, it must be removed prior to sealing the crack. If a surface coating is bridging the crack, it must be removed, and there is a potential that the crack must be re-routed out prior to application. In the case of very narrow cracks it may be necessary to drill a small pilot hole to create the means for the epoxy to travel into the crack effectively.

### Installation of Surface Ports

When using epoxy cartridges, it is commonplace to use surface mounted ports to efficiently introduce the epoxy resin system into the cracks without the time and expense of drilling numerous ports into the concrete. The surface mounted ports are adhered to the concrete using an epoxy gel, such as SurePox 116, SurePox 117, or SurePox HM Gel. The base of the ports should be centered directly over the crack and in the instances where a pilot hole has been drilled over it as well. In general, the spacing of ports is based upon the thickness of the concrete. For example, if the concrete is 6" in depth, then the ports are spaced 6" apart. Do not allow the epoxy to block the port or the crack underneath it as this is where the epoxy will enter the crack. Make certain to apply enough epoxy around the base of the port to seal it adequately, which should be approximately 1/4" and extending out approximately 1" wide along the crack. This should prevent the injection resin from escaping.

### Sealing of the Cracks Prior to Injection

After the ports have been adhered to the concrete over the crack and/or pilot hole, the crack must be sealed with the same rapid epoxy gel (SurePox 116 or SurePox 117). The concrete must be cleaned and roughened to accept the epoxy gel for surface sealing. A wire brush is usually sufficient. The epoxy gel may be applied with a cartridge or hand-mixed, and finished with a margin trowel. If the crack runs completely through the concrete, then both sides will need to be sealed with the rapid setting epoxy gel. Once accomplished, the only way into the crack is through the ports. Before proceeding, allow the rapid setting epoxy gel to harden fully prior to injecting the epoxy through the ports. If this is not done correctly, there is potential risk that the seal or ports will blow out, even with low pressure injection.

**Crack Injection Process**

The injection process in vertical applications starts at the lowest point, and proceeds vertically. Place the tip of the static mixing nozzle of SurePoxy HMLV, SurePoxy HMLV Class B, SurePoxy HMSLV, or SurePoxy LMLV into the surface port and use constant, steady pressure on the cartridge gun to inject the epoxy resin through the port and into the crack. Slowly inject the resin through the lowest port until the epoxy system begins to escape through the port immediately above the one being injected. Remove the static mixing nozzle from the port, cap the port to prevent epoxy resin from leaking out, and attach the static mixing nozzle to the next port from where epoxy just emerged. Continue this process until epoxy emerges from the last port, and then inject a small amount of epoxy into the last port to make certain that the entire crack has been filled. All cracks are different however as you progress through this process the applicator should get a feel for how much epoxy will be dispensed. Once the last port is capped, allow the epoxy to harden sufficiently. In horizontal applications, the procedure is the same as vertical applications, except that it should start from one end and proceed across to the other end; never start in the middle and proceed outward. If epoxy is still able to be injected into a port, while coming out of another uncapped port, then cap the port that is not being injected and continue to inject epoxy. Continue closing ports whenever material comes out. While this may mean that some ports are not injected, it provides maximum pressure to force the injection resin the smallest areas of the crack.

If using a pneumatic injection gun, set at a low setting when beginning the injection process, and increase pressure if needed to get the epoxy flowing adequately. This is especially true with narrower cracks. In addition, in some instances it may be necessary to wait a few minutes for the epoxy to flow into the crack, and to travel to the next port.

**Removal of Ports & Surface Sealing Epoxy**

Once the epoxy resin system has cured inside of the crack, the surface ports and surface sealing epoxy may be removed. The ports may be removed with a hammer, and the surface sealing epoxy may be removed through grinding with an abrasive disc until flush with the concrete.

**General Precautions**

Epoxy cartridge systems never mix the first couple inches of the A and B component uniformly and therefore that materials should be wasted. Never re-use the static mixers; use a new one for each epoxy cartridge system.

If the epoxy is flowing into the crack, but not appearing at the next port, this can indicate that the cracks branches off under the surface of the

concrete, where it is not visible. This commonly occurs when the crack goes all the way through the concrete, and the backside has not or cannot be sealed. In these instances, if exaction is not possible to properly seal the backside, it may be necessary to use a different type of injection resin.

If back pressure is preventing the injection resin from flowing into the crack, this might be because the crack is not continuous and the portion being injected is full, the port is not placed over the crack and/or pilot hole, the crack is blocked by dust or debris, or the epoxy in the static mixer has set up and is therefore not able to be injected.

Crack Width (inches)	Concrete Thickness (Inches)	22 oz. Cartridge (linear feet)	16.5 oz. cartridge (linear feet)
1/64	4	47.7	35.7
	6	31.8	23.8
	8	23.8	17.9
	10	19.1	14.3
1/32	4	23.8	17.9
	6	15.9	11.9
	8	11.9	8.9
	10	9.5	7.1
1/16	4	11.9	8.9
	6	7.9	6.0
	8	6.0	4.5
	10	4.9	3.6
1/8	4	6.0	4.5
	6	4.0	3.0
	8	3.0	2.2
	10	2.4	1.8
3/16	4	4.0	3.0
	6	2.6	2.0
	8	2.0	1.5
	10	1.6	1.2
1/4	4	3.0	2.2
	6	2.0	1.5
	8	1.5	1.1
	10	1.2	0.9

*Coverages listed above are approximations only and will vary depending upon many factors including waste or concrete conditions.*

We recommend using from McMaster Carr a Push-to-Connect Tube Fitting for Air, Straight Adapter, 10 mm Tube OD x 1/4 NPT Male, part number 5225K717 and a Push-to-Connect Tube Fitting for Air, Straight Adapter, for 1/4" Tube OD x 1/4 NPT, part number 5779K131 to attach the static mixer to the port.

The complete Safety Data Sheet and Product Data Sheets on all products are available on our website at [www.kaufmanproducts.net](http://www.kaufmanproducts.net), and may be requested by phone at (800) 637-6372.

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