

Injection of cracks and joints

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Injection of cracks and joints

also known as injection sealing

is a process of repairing dry and wet cracks (that conduct water). Before starting the injection process, an inspection of the cracks should be conducted and the appropriate injection resin should be selected. It is also important to identify the causes of crack formation to better understand their nature and to choose the optimal solution.

For dry cracks and those that conduct small amounts of water, ResinBau CrackFlex can be used. It is a stabilizer for structures with very good adhesion and elastic properties. This resin is suitable for sealing dry and wet structures, even against water pressure, but it should be used when it has a chance to bind before washing out (3-10 minutes).

For wet cracks that conduct small, medium, and large amounts of water, ResinBau EasyInject / HydroGum / WaterStopper should be used. Remember that identifying the cause of the crack can help ensure a durable and effective solution, so it is worth paying attention to this aspect when repairing any damage.

Products needed:

- ❖ injection resin: ResinBau EasyInject / CrackFlex / HydroGum / WaterStopper
- ❖ ResinBau CrackOn.5 / LeakFix
- ❖ Hamm-pack® injection packers
- ❖ drills
- ❖ injection pump
- ❖ Hamm-pack® PI-Cleaner for pump cleaning

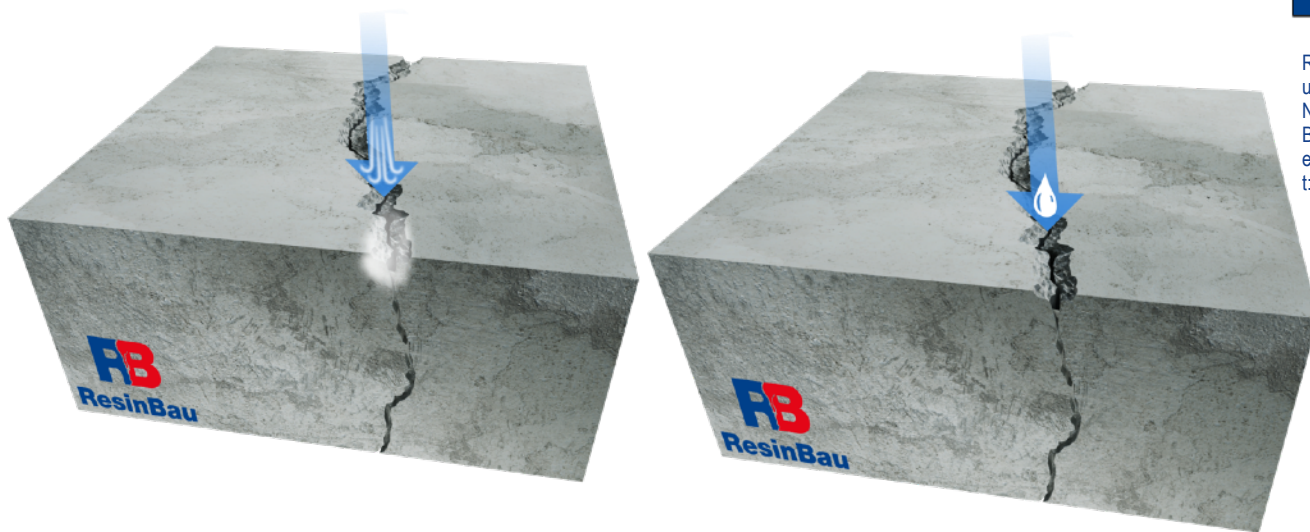
Preparation:

- ❖ inspect the cracks (element thickness, crack opening, degree of moisture, etc.)
- ❖ Secure the work area

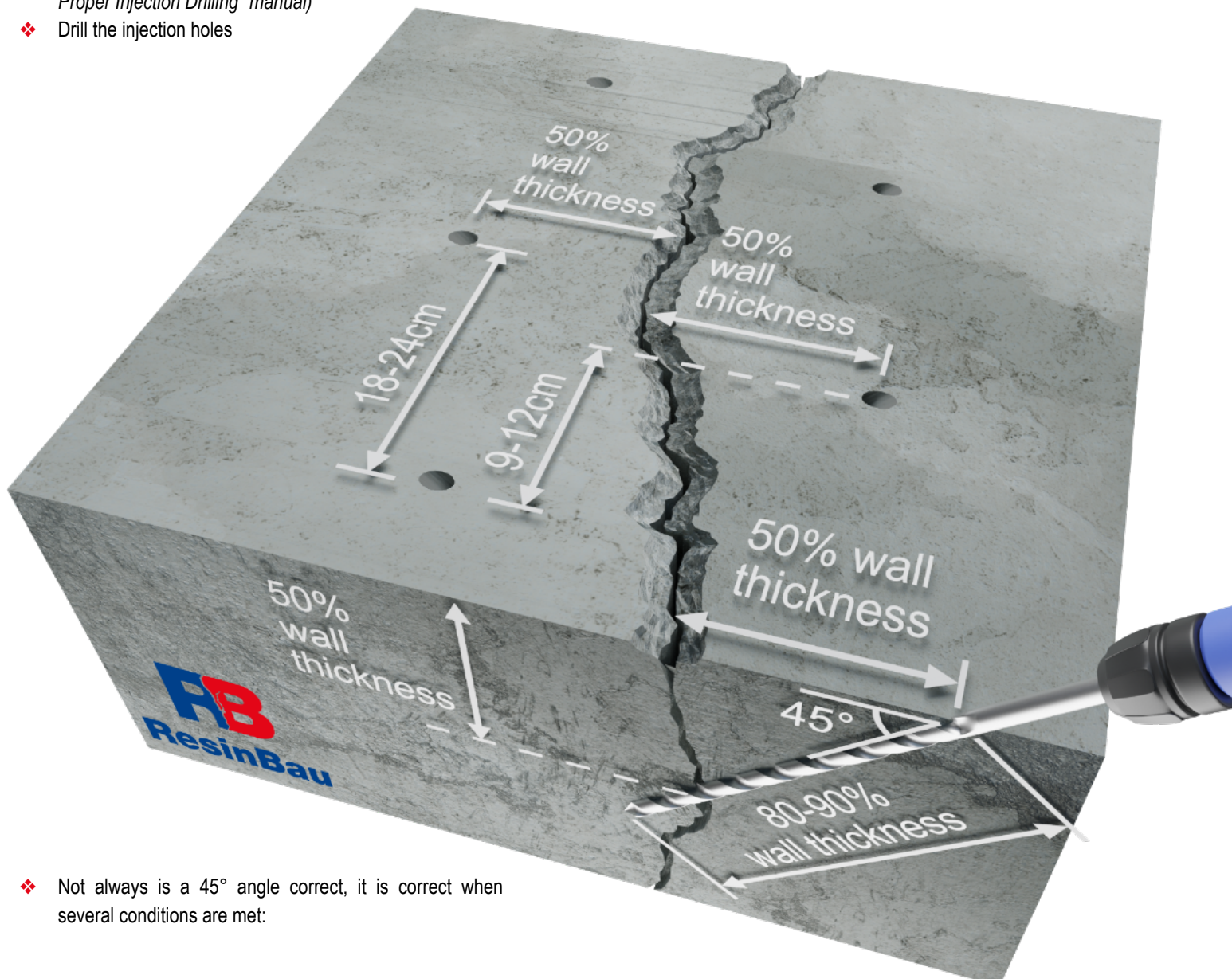
- ❖ Notch the crack



- ❖ Clean off construction dust



- ❖ Plan out the location, angle, number of injection holes, and their diameter (more information on proper drilling can be found in the "ResinBau - Proper Injection Drilling" manual)
- ❖ Drill the injection holes

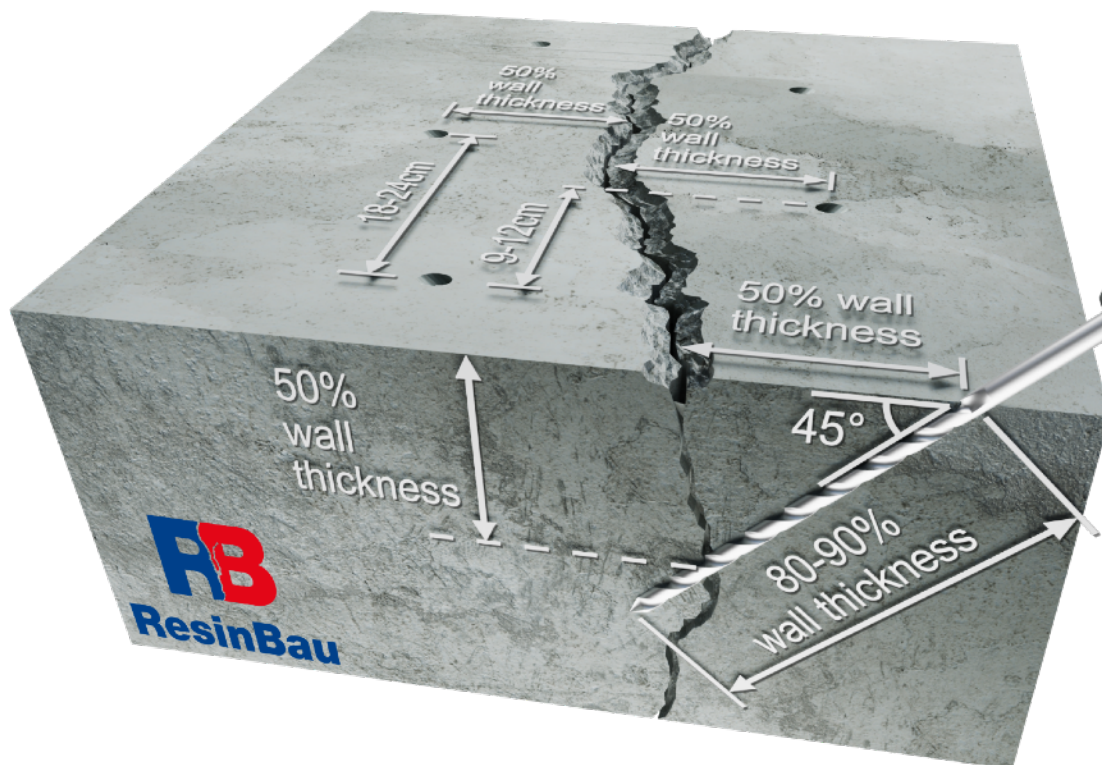


- ❖ Not always is a 45° angle correct, it is correct when several conditions are met:

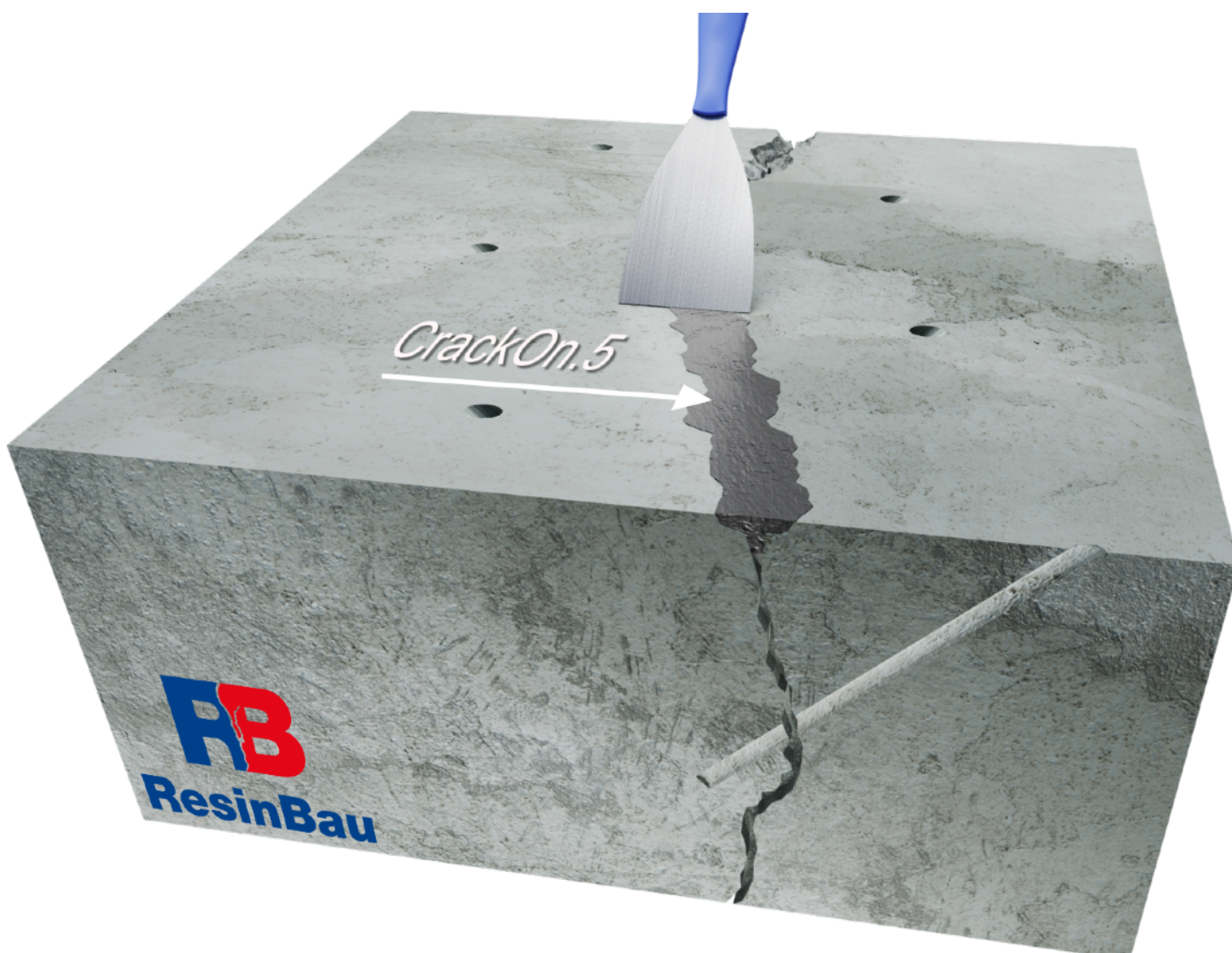


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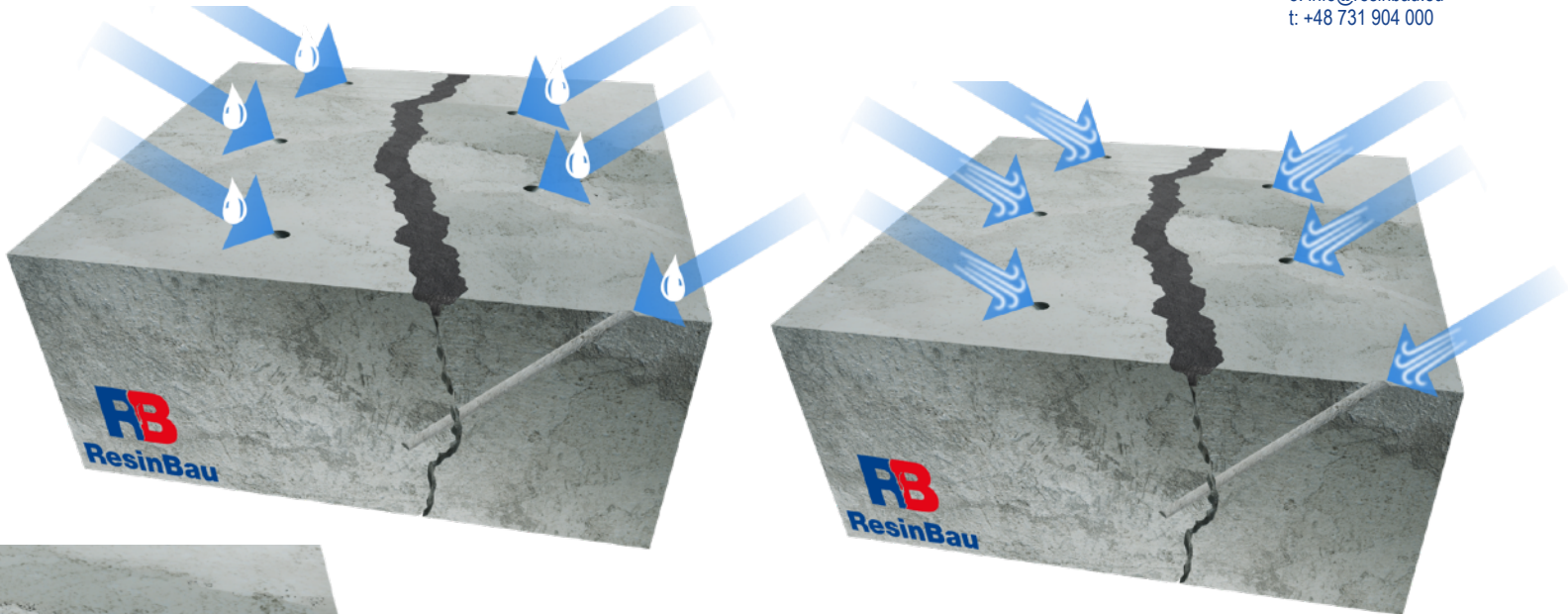


- ❖ Close the crack in the surface by applying ResinBau CrackOn.5 (quick surface closure solution, sets in 4-7 minutes). If the crack is not visible but there is active seepage, you can use a torch to dry the surface and try to locate the crack.
- ❖ For large leaks, use ResinBau LeakFix tamponade immediately to stop the surface leak.



- ❖ The injection hole should be cleaned with water under pressure (ideally using a long tube inserted to the end of the hole, through which water under pressure will flow and flush out the entire hole).

Do not flush the holes with a pump for injection resins (unless experienced), as moisture can cause an immediate reaction in the pump, clog the device, and expose it to costly repair. Water accelerates the reaction time of polyurethane resins.



- ❖ The packer should be installed in the injection hole so that the entire rubber seal is immersed in the hole's diameter plus about 1cm of the body
- ❖ If the hole is excessively widened, compress the packer with your fingers and insert it into the hole as described above.
- ❖ For long holes in soft materials, where the holes are excessively widened, packers with wings such as PI-SPHW 10/110 or drilling a short hole (5cm) for a larger diameter packer may be helpful
- ❖ Packer installation is best done with a drill set to screw tightening (with a clutch). This is the fastest way to install
- ❖ The tightening force must be checked for each new object. It is usually the maximum power of the drill for tightening. Sometimes you may need to add one and a half turns with a flat wrench, and sometimes reduce the power of the drill. The appropriate tightening force ensures optimal working conditions. Excessive tightening force can break the rubber seal, and the hole will not be suitable for injection. Remember the tightening force and do it consistently. You can always tighten the packer more if it loosens, but an over-tightened packer will not hold high pressure.

- ❖ Check if the pump works correctly and "prime" the pressure gauge to protect it from resin clogging.
- ❖ Fresh resin rule:

a) If you are using ResinBau EasyInject / HydroGum / WaterStopper resin, remember that water is the catalyst, but humidity from the air also matters. Watch the processing time, pour in a small amount of resin, max. 1-1.75 L into the pump (1/3 of this into the manual pump) and close the tank and resin immediately after use. If you store the 1K resin after opening, keep it in an inverted container and use it as soon as possible.

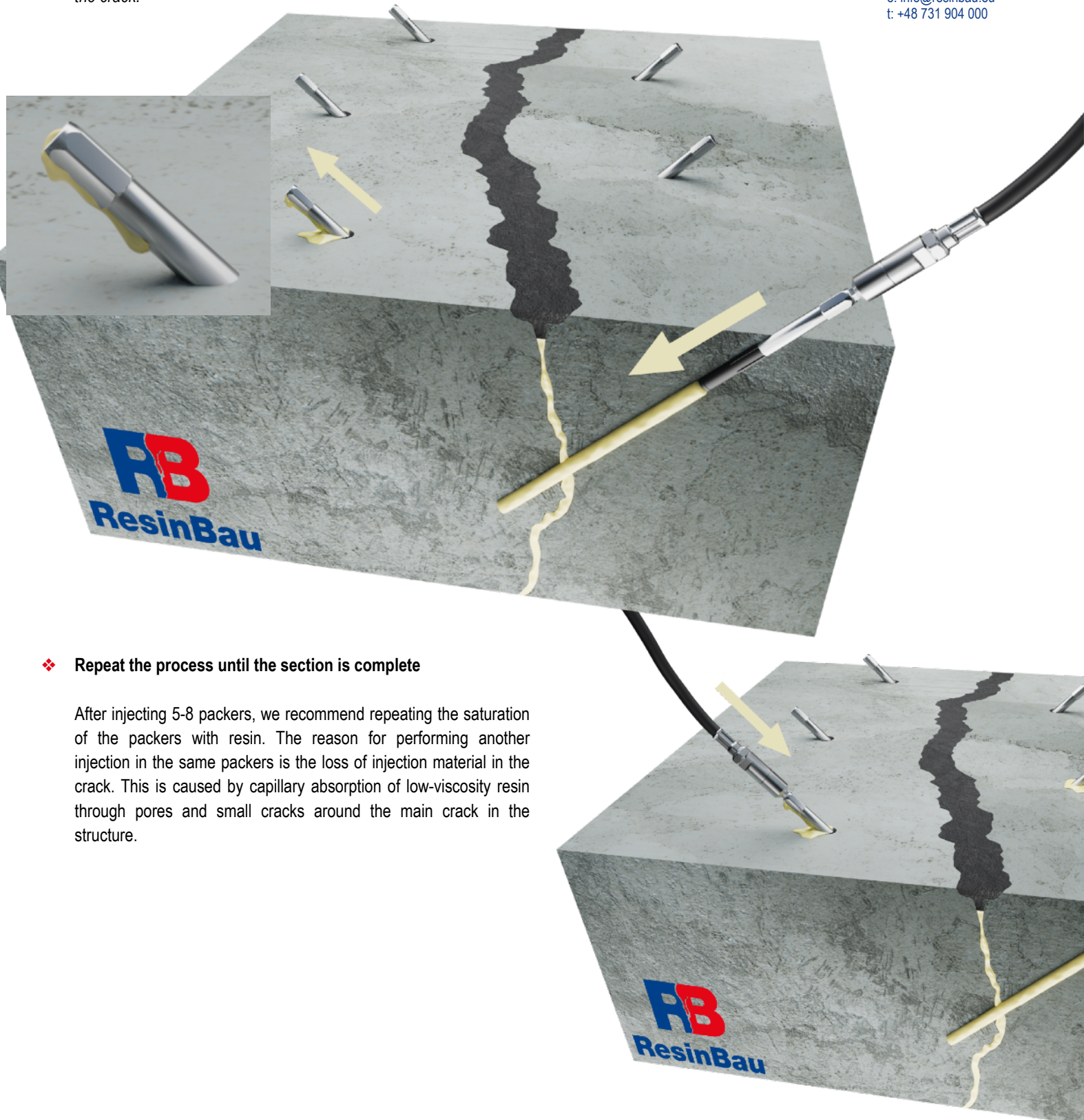
b) If you are using ResinBau CrackFlex resin, water and humidity also significantly accelerate the reaction time, but the mixing starts the process. Thoroughly mix the two components of the resin (max. 1-1.75 L of the mixture into the pump (1/3 of this into the manual pump) and close the tank and resin immediately after use.

Fresh resin has better properties, which results in better distribution in the structure (the resin is easier to "squeeze" and fills gaps better). Take advantage of this.

- ❖ **Injection should be carried out from the lowest point of the crack.** Install the nipple grease with pre-coating application on the injection packer. Begin injection. The best results are achieved by starting with low pressure and gradually increasing it if necessary. Watch for water or resin appearing in the neighboring packer. If it does appear, stop injection and install the nipple grease on the "vented packer".

(*) If the pump maintains high pressure but there is no sound of flow, the borehole under the packer may have missed the crack.

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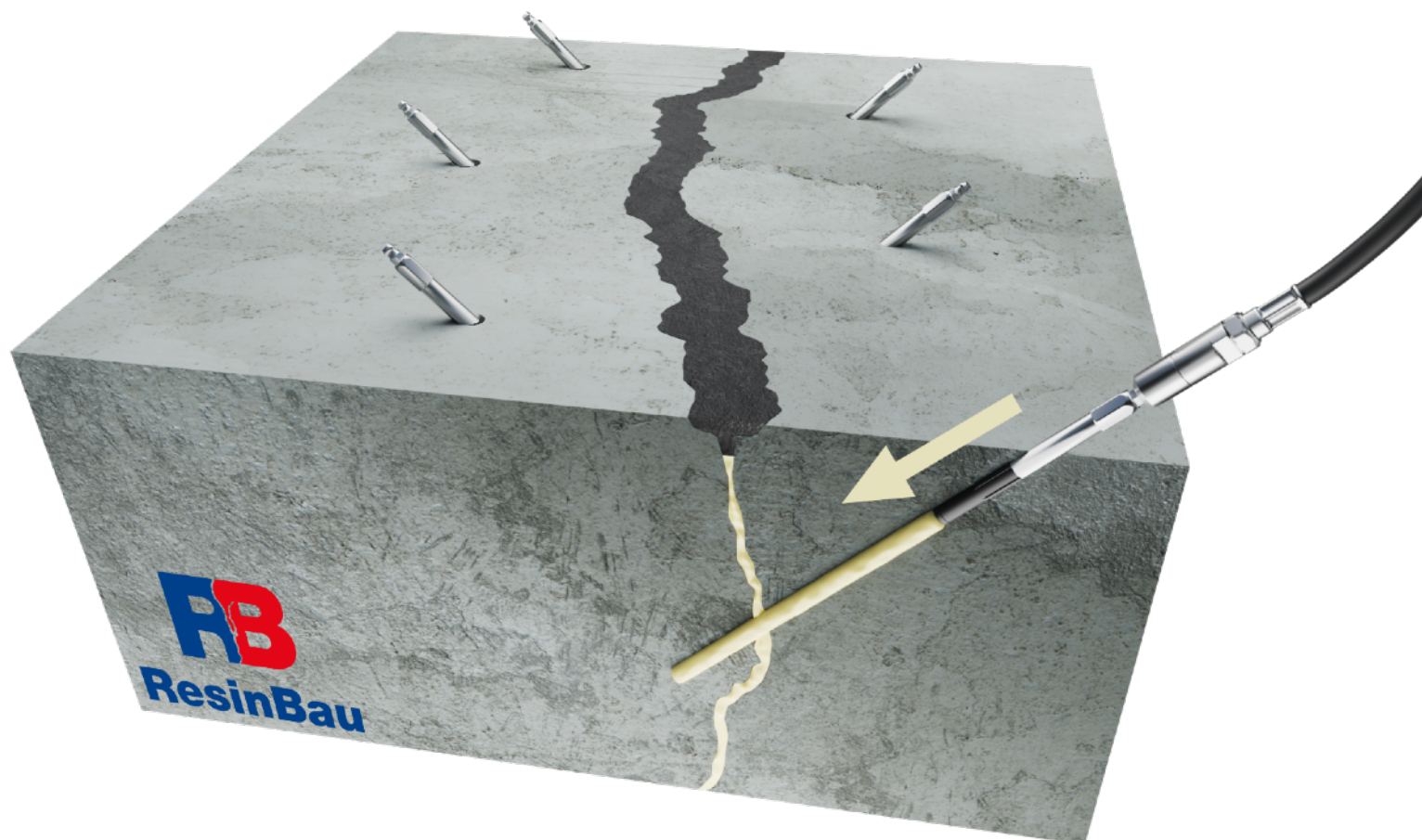


- ❖ **Repeat the process until the section is complete**

After injecting 5-8 packers, we recommend repeating the saturation of the packers with resin. The reason for performing another injection in the same packers is the loss of injection material in the crack. This is caused by capillary absorption of low-viscosity resin through pores and small cracks around the main crack in the structure.

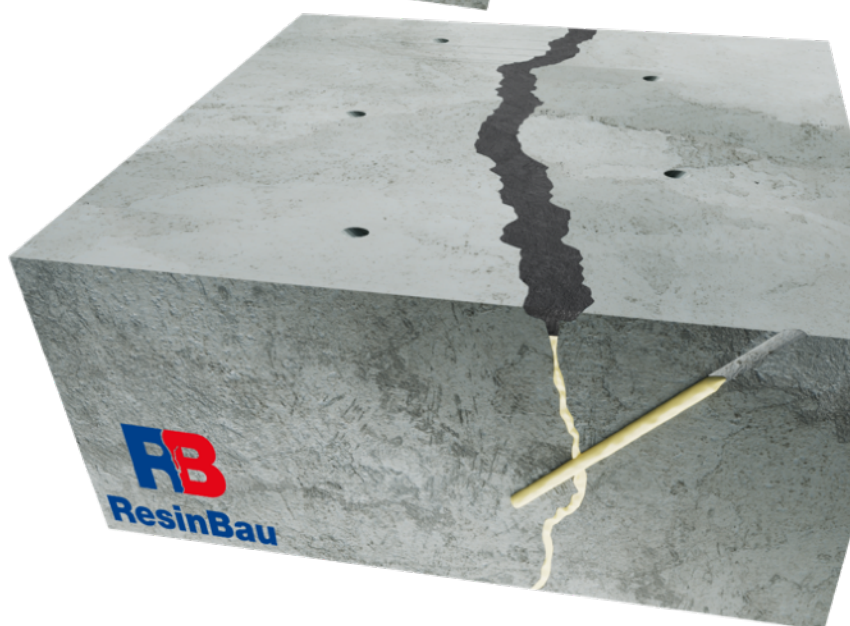
The described method is the most effective and economical in terms of resin consumption and efficient repair. However, it is not always possible to pass the resin from one packer to another, which may be caused by several factors such as the course of the crack in the structure, the width of the gap, the thickness of the element, the viscosity of the injection material, as well as the selection of appropriate pressure and flow rate. Additionally, it may happen that the injection holes were improperly made and did not cut the crack, or the rubber stopper blocked the gap. However, if we are sure that the holes were made correctly, and yet we do not observe flow between the packers, it is worth focusing on monitoring the consumption of injection resin and selecting the proper injection parameters.

- ❖ **The final injection** (as described above) should be done with caution to avoid excessive pressure, as time plays a crucial role here. If the resin begins to cure, it can make it difficult to introduce fresh resin.



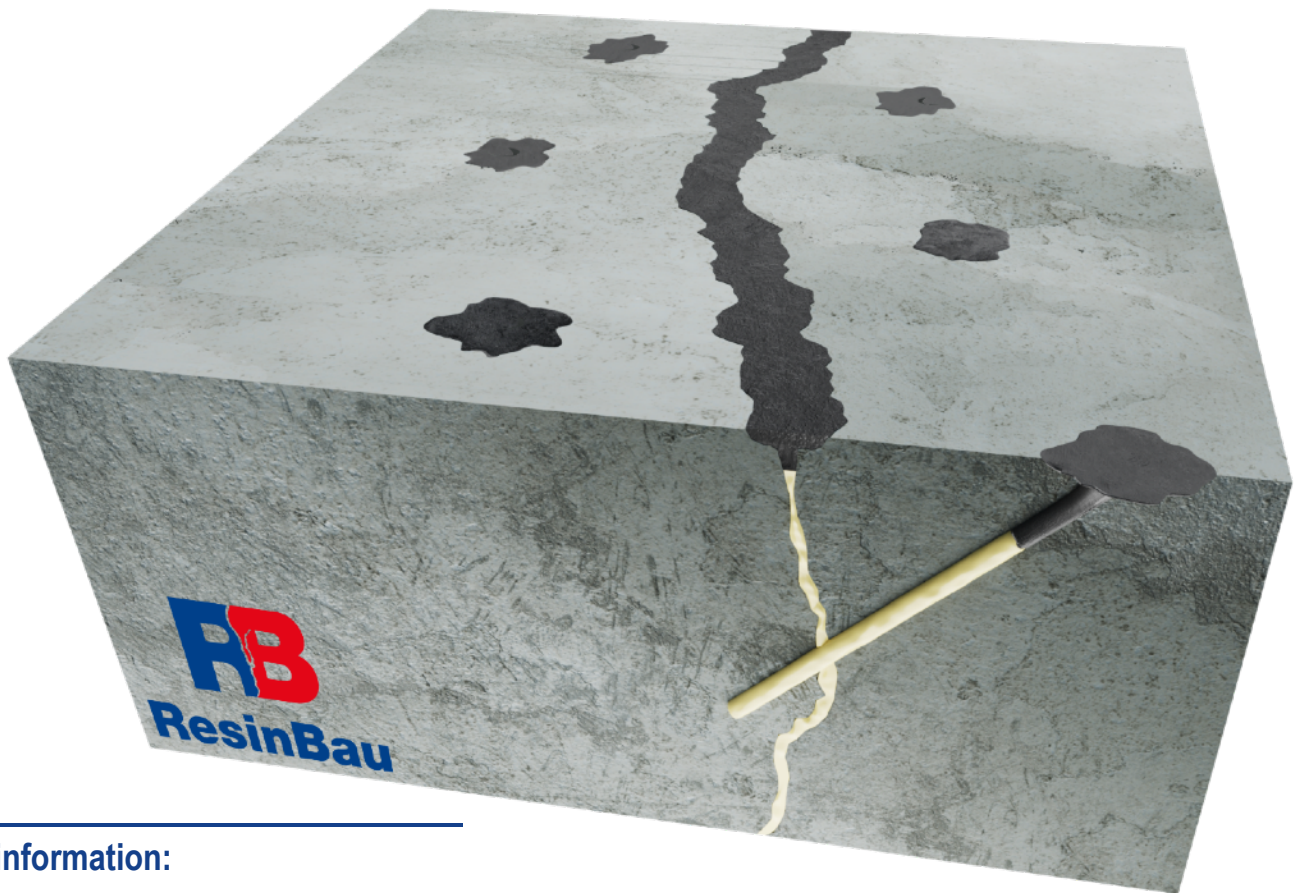
- ❖ The removal of the injection packer should take place after full curing of the resin (24-48 hours after injection)

Injection packers should be completely removed because they serve as tools, not building materials. However, this is not always possible due to difficulties caused by the cured resin. It may be helpful to loosen the packers and wait a few hours for the rubber stopper to release tension before removing the packers completely. Most contractors choose to leave the rubber stoppers with the pin in the wall and close them with fast-setting mortar.



Some practical tips to conclude:

- ❖ After using the tools and pump, clean them thoroughly using PI-CLEANER. For pump and pressure gauge maintenance, use PI-SAVER
- ❖ If the pressure is very low, the flow rate is too high, and no resin or water is visible in the adjacent packer, it may indicate that we have encountered a void. In this case, the resin moves to further corners and will appear later or flow out of the structure. You can move on to the next packer and return to this point in a few minutes when the resin thickens slightly, but injection is still possible
- ❖ To better observe the injection process, pour some resin into two plastic cups:
 1. This will allow you to determine how many hand pump strokes correspond to a certain resin volume, or in the case of an electric pump, approximately calculate the time to volume. In the case of a diaphragm pump, sometimes it is necessary to reduce the pressure to "0" (with an open valve) to check if it decreases. If it does not decrease, it means that there is no flow in the crack. If it decreases, the resin penetrates, but slowly
 2. Add some water to one of the cups and leave the other without water. This will allow you to observe the resin working time (temperature and humidity affect the working time).



Additional information:

- ❖ !! Before starting the injection, familiarize yourself with the technical data sheets of the products used !!
- ❖ !! During work, wear protective glasses, gloves, and clothing !!
- ❖ !! Avoid contact with skin and eyes !!

We encourage you to read the instructions that will help you perform the injection correctly: "ResinBau - Preliminary Injection", "ResinBau - Proper Injection Drilling", "ResinBau - Steel Injection Packers", "ResinBau - Diameter and Length", "Resinbau - Pressure and Flow", "ResinBau - Maintenance and Cleaning" and others...