

Chemical Injection Tips

1. Drilling Techniques

Many injection professionals teach the drilling practice of 8"-12" spacing, staggering the ports top/bottom or left/right prior to beginning the work. In theory, SealBoss agrees with this technique. However, we feel that it is important to find the leak, make 1-2 drill holes for performance and results identification, and then scaling the job as needed depending on the observed results. We aim to provide the most efficient repair by implementing a systematic procedure specific to the project and leak.

2. Finding Leaks

It is very common to arrive on site and see water traveling along pipes, conduits, cold joints, cracks, and any other elements providing capillary travel of water. It is also commonly believed that all of these joints and cracks observed to be leaking require injection. The first step should be to clean the surface with wire brush and/or grinder, wipe off any active leakage, and observe the pathway of water working back to the source of the water. Often times injecting the real source of the leak first will eliminate the need for "downstream" injection of wet/leaking elements.

3. Port Spacing

As identified, typical port spacing is about 1' depending on crack/joint width and substrate condition. As referenced above, it is good practice to identify the source of the leak first, and then identify a scalable method from the first 2-3 packer performances observed at the wall. If spacing is too far apart, the applicator may not achieve required penetration of the dense cured product to seal the crack/joint between the ports. Subsequent porting may be required between primary ports if leaking persists between 2 ports. Subsequent porting is known as secondary porting.

4. Staggering

Staggered porting is commonly taught throughout the industry. However, this is not always possible. For example, wall-floor joints can only be ported from the wall face or the floor face (depending on such things as topping slab presence and pour design). Even in standard poured concrete cracks, cracks can transvers up or down, or left or right. In these cases, staggering drill holes may not provide connectivity on both sides of the cracks. Again, thorough exploratory and diagnostic procedures at the beginning of the project can provide the required job-specific information.

5. Mixing Material

Once the cracks are ready to be injected, we are ready to mix material. One of the most common mistakes seen on site is inadequate mixing of base PU and catalyst. Each job site condition is unique. It is recommended to perform a few cup tests prior to mixing large batch to ensure that the desired product is being mixed. This also eliminates product performance fluctuations created by shelf life, moisture content, and temperature. Once a desired mix is identified, this solution should be replicated. Applicators must mix the material and catalyst very well with paint mixer or stir rod PRIOR to filling a hopper or placing a suction tube into the batch. Simply pouring the catalyst into the base PU will not produce optimal results.

6. Success Indicators

'Pump until the leak stops' is the most well-known success indicator in the industry. Although simple and true in logic, there are several other steps that can be taken to ensure optimal results. Once a row of 5 or more injection ports have been established to accept material, it is good practice to inject 3-4 ports, and then go back to the first to see if more material will be accepted in that drill hole. If excessive foam is exiting the face of the crack, this can cause lack of density inside the crack. A subsequent injection of these ports several minutes later may create a denser seal than initially established. This can be achieved by removing the packer and setting a new packer in the drill hole to allow for passage of material. It is also common to see a small bit of uncured residue at the drill hole upon removal of the packer. This can be remedied with small piece of oakum rope saturated in catalyzed PU to be stuffed into the drill hole, and patched with cementitious grout or hydraulic cement. SealBoss is developing water tests procedures for quantitative evaluation of injection repairs. In it's simplest form, water tests done at the beginning of the project and following injection can provide real data on the degree to which the permeability of the structure has been decreased.

7. Temperature Recommendations

Temperatures can affect the reaction of the material as well as the condition of the concrete. Both of these variables can be the difference between a success and failure. Concrete expands and contracts through thermal expansion and contraction. For this reason, a sealed substrate can open considerably in times of thermal contraction (cold) when concrete contracts a bit. For this reason, it is always recommended to apply these materials in as cold of a condition as possible with respect to the required job execution time frame. The reason for this is so that the material will be injected into the cracks and joints when they are at their widest condition. When temperatures increase, the joint/crack will become smaller due to the thermal expansion of the concrete. The sealant will then be in a compressed state compared to an elongated state in the opposite direction. A compression seal will perform better in a compressed state than it will in an expanded state. It is also a good idea to perform the small cup tests prior to injection to observe how much the temperature has effected the reaction time of the material. The penetration that is achieved on a 50°F day may be much less than what is achieved on a 90°F day. The reason for this is that once the material is fully reacted, more material cannot travel past that mass of cured PU.

8. Leaks Moving

Keep in mind that leaks will travel. Be sure to indicate to the client where the areas of repair are being performed, and explain subsequent leakage in other areas will be considered new leaks, and not an extension of the initial repair. This phenomenon of leak-travel is very common. Water will penetrate the substrates and showcase the leaks at the point of least resistance. It is common in a below-grade structures, with positive side membranes in place, to develop leaks in areas significantly far away from the breach in membrane. For this reason, the applicator often works "backwards" to seal the structure as you move closer to the breach in membrane or real hydrostatic pressure source.

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9. Leaks Returning

False success indicators are often seen days, weeks, or even months following the initial repair. Considering some of the techniques listed in this bulletin above, the repairs can cut off the water initially which gives the applicator a success indicator. However, if the material was mixed adequately, catalyzed too much, installed in extreme thermal expansion conditions, or simply not in enough volume, the cured product can be less dense than desired. In these cases, the initial repair stops the leaks. However, with persistent hydrostatic pressures, the water will work a path around the masses of cured PU and eventually present themselves in a subsequent leak. Trained and experienced contractors experience call-backs of this type far less often than less experienced contractors. Hopefully the tips listed herein can assist in avoiding some of these issues and promote successful applications the first time, and every time.

10. Common Sense Directive

Perhaps one of the best pieces of advice given at the Grouting Fundamentals and Current Practice annual short course is to use common sense. When approaching any water infiltration project, ask as many questions as possible in order to provide highest probability of recommending an intelligent and reasonable method of repair. Water infiltration can present huge problems that turn into costly repairs on any jobsite. The mere presence of a small leak is worrisome to all clients, and for good reason. With a thoughtful, experienced, and quality solution presented in a thorough and reasonable fashion, there is no reason that these menacing repairs can't be remedied with a much higher degree of success the first time. SealBoss® Corporation has 29 years of industry experience providing these very solutions.



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