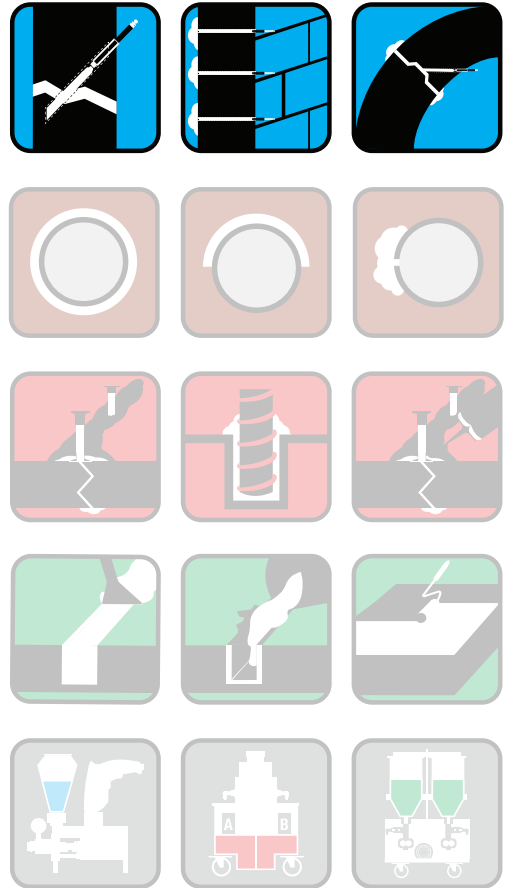
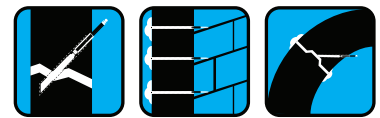


## WATERSTOP INJECTION SYSTEMS





## Waterstop Injection Systems

### Introduction

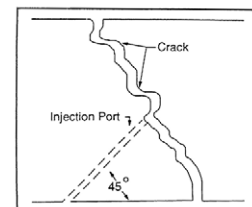
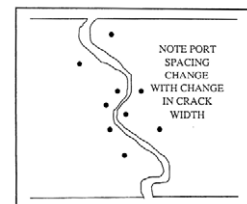
Thank you for choosing the SealBoss® Concrete Repair System for your chemical injection application. You are now well on your way to a successful and permanent concrete repair solution. In the pages to follow, we would like to provide a repair technique introduction and encourage you to familiarize yourself with the process as we proceed to explain the advantages of the SealBoss® repair systems and what we can offer you as a valued SealBoss® customer.

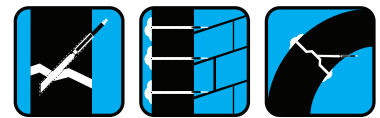


### Application Crack Injection with Polyurethane & Acrylate:

SealBoss® polyurethane injection systems are designed for concrete crack and joint waterproofing applications as commonly found in most concrete and masonry structures such as parking garages, basements, elevator shafts, pools and planters, and many more. For crack and joint applications, the low viscosity resins are injected into the actively leaking cracks or joints, contact moisture, and expand into a closed-cell, flexible, fully-penetrated polyurethane seal. Because the cured product offers a degree of while remaining water-tight for years to follow. Once you have identified the crack and/or joints that have allowed water infiltration, you are now ready to begin!

1. Wear adequate protective gear and goggles at all times and follow data sheet and MSDS instructions.
2. Thoroughly clean the face of the crack or joint by wire brush, disc sander, pressure washing, or similar. It is recommended to inject into the cleanest substrate possible for optimal results.
3. Identify the drill hole spacing and depths. For structures thicker than 4 inches SealBoss® recommends drilling at a 45 degree angle into the concrete structure in order to intersect the crack approximately halfway through the thickness of the substrate. This is achieved by not drilling directly into the crack, rather to begin drilling a few inches to the left or right of the crack in an angled approach to the crack itself. This technique permits the 'inside-out' reaction which is required for full penetration of the crack or joint. (Note: Typical drill spacing along the surface of the crack range from 6-12 inches depending on the thickness of the crack. Hairline cracks require closer spacing than larger cracks because the material will not travel as far). Industry standards for drill diameters are 3/8-5/8 inches depending on the mechanical packer being used.
4. At this point, you will install mechanical packers which are to be inserted into the drill holes. These packers have a threaded shaft with a rubber base. Following insertion, tightening of the threaded shaft will compress the rubber inside the drill hole, resulting in a compression seal through which you will inject the polyurethane resin. Diameters of these packers range from 1/4-3/4 inches with industry standards being 3/8-5/8 inches. Other packer types are available. (Note: SealBoss® also provides high quality SDS drill bits.) In poured concrete substrates, the drill hole will act as a solid channel which will direct the resin to the crack which permits the usage of shorter length packers. In substrates which may exhibit voids such as block wall, stone, brick, and rubble, SealBoss® recommends using longer packers which provide a definite grout delivery channel to the crack or joint being sealed. Tighten packers securely to withstand injection pressures!
5. Note: If a separate water pump is not available this step may be omitted! Once the first hole is drilled, some contractors may test and flush the hole by injecting water into the port. If the crack is accepting water, you have intersected the crack successfully and you may move onto the next hole. If the crack is not accepting water, you may not have drilled deep enough or the crack is directed in to the opposite side. In this case, drill from the opposite side of the crack and water test again. (Note: Never water test with the same pump from which polyurethane resin will be dispensed. Polyurethanes are water activated and will cause pump failure.)
6. Once the holes are drilled, and packers are set, you are now ready to mix the material, and inject the crack. The most commonly used hydrophobic polyurethane foam grout is **SealBoss® 1510 WaterStopFoam** or **SealBoss® 1570 WaterStopFoam** which is accompanied by the **SealBoss® 15x Accelerator**. The applicator is able to adjust reaction times based on flow rate and application variables. This is achieved by adjusting the amount of 15x accelerator accordingly in the range of 2-20%. For gushing leaks, 20% accelerator solution will provide immediate results while most common crack leaks are repaired with a 5% solution. This is roughly 7oz. of SealBoss® 15x Accelerator per 1 gallon of SealBoss® 1510 WaterStopFoam or SealBoss® 1570 WaterStopFoam. After mixing, the polyurethane is ready for injection.
7. SealBoss® pressure pumping equipment couples to SealBoss® zerk style packers and ports via 4-tooth SealBoss® zerk coupler or SealBoss® button head style packers via heavy duty slide coupler. SealBoss® starter kits come equipped accordingly. After coupling to the secured and tightened packers, begin injecting.





- Due to the use of high pressure injection equipment, product may travel further than expected within the structure and may show up many feet from the point of injection. Small crack may show up that had been invisible prior to the injection process. Caution: Be prepared, product may shoot out from the structure or around the drill holes. Packers may blow out! Begin injection from the lowest packer. A common observation will be the decrease of water flow from the face of the crack and/or reacting material exiting the face of the crack. This is a good indication of successful penetration and results. However, the applicator must ensure that enough material is injected into each crack in order to achieve the required density for sustainable results. A good technique is to inject 2-5 ports with observable penetration, and then go back to reinject those 2-5 ports once again to ensure adequate material consumption. Packers that still consume considerable amounts of product should be injected a third time or as much as necessary to create a permanent seal. (Note: It is quite possible to achieve differing results on the same injection application due to inadequate material consumption alone). If the crack is not accepting product, you may not have drilled deep enough or the crack is directed in the opposite side. In this case, drill from the opposite side of the crack and ensure to intersect the crack.
- Continue this procedure until the entire length of the crack or joint is sealed.
- After allowing the material to fully cure overnight if possible, packers can be removed by loosening the shaft. Some applicators leave the rubber base in the wall and then patch the drill hole while others remove the entire packer prior to patch. In some remote injection applications packers even remain in place permanently. This is the applicator or owner's preference. A final cleanse of the face of the crack is necessary to remove cured product via wire brush, pressure washing, etc. The substrate is now ready for final finish to client's intention.
- Flush all dispensing equipment with initially with a small amount of solvent such as xylene or acetone to cut the product (if permitted on the job). Follow this step by flushing generously with SealBoss® R70 Pump Flush & Cleaner for protecting hoses and for pump lubrication purposes. Do not use solvent for the final flush as it will diminish the life of your equipment drastically. **DO NOT CLEAN WITH WATER!** Store for next use.



Staggered port placement on vertical crack.



Port placement at 45 degree angle.



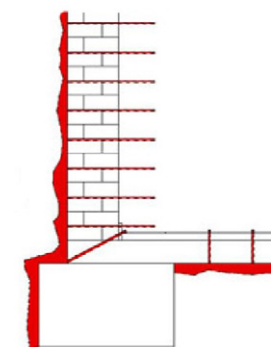
Hose set coupling to installed mechanical packer.

### Application Technique Curtain & Bladder Injection

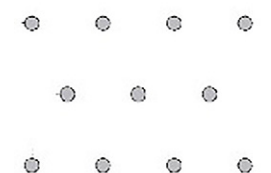
Curtain or Bladder injections refer to a technically advanced method of chemical injection that is used on block, brick, stone and concrete substrates where the applicator observes large area below grade moisture intrusion and wetness through the entire substrate opposed to intrusion through a specific crack and/or joint.

Because of the immense costs associated with excavation and application of a new positive side membrane, the Curtain or Bladder injection method is an economically viable solution for repair. By drilling a grid pattern of holes the entire way through the substrate, applicators can repair the failed membrane from the inside of the structure.

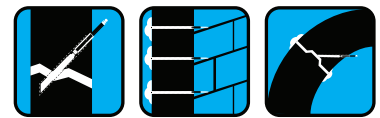
- Wear adequate protective gear and goggles at all times and follow data sheet and MSDS instructions.
- Identify the water source and pattern of moisture intrusion. Most block, stone, and brick leaks are caused by failed positive side membranes. Block walls are often unfilled which also creates voids and pockets for water intrusion.
- Drill 3/8 or 1/2 inch holes along the water marks at 2 feet intervals. Moving up the wall, continue to space the holes at 2 feet intervals creating a grid pattern of injection holes as seen in the image. These drill holes are to penetrate the substrate at full depth creating a channel in the wall through which chemicals can be injected.
- Once the grid pattern is created, mechanical packers may be inserted into each one. In the case of block walls that are not filled adequately, longer packers are recommended providing a full length channel which ensures that material reached the back side of the wall (it is not recommended to simply fill the blocks with materials – block wall curtain injections require material travel through the entire wall as seen in image on the previous page). In the case of older and disturbed stone or brick structures, however, it is also common to inject the structure itself as seen to the right.
- Based on the application and circumstances, SealBoss® may recommend using hydrophobic SealBoss® 1510 WaterStopFoam, **SealBoss® FlexGel** hydrophilic polyurethanes or **SealBoss® 2400 SLV Acrylate**. SealBoss® FlexGel can react with large amounts of water forming a foam or a gel, providing a membrane like positive side shield. They expand and contract based on the surrounding water content. During wet cycles or rain seasons the material will then expand to greater coverage area providing optimal probability for full membrane coverage. SealBoss® FlexGel may be injected through single component, high pressure equipment with the presence of moisture behind the substrate. Dual component, multi-ratio equipment may also be used by injecting FlexGel2 and H<sub>2</sub>O simultaneously.



Block wall curtain injection theory reinstating positive side membrane.



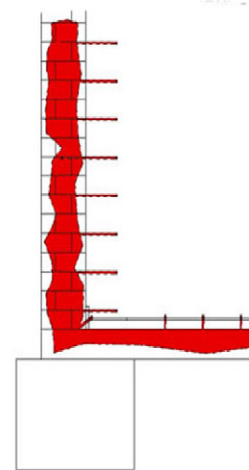
Grid pattern of injection sites, typical of curtain or bladder injection. Two feet on center.



## Waterstop Injection Systems

FlexGel2 will exhibit waterproofing properties in ratios of 1:1–15:1 (H<sub>2</sub>O:FlexGel2). SealBoss® 2400 SLV Acrylate is a hydrophilic water thin injection material that offers specific characteristics. The product must be pumped via a dual component stainless steel pump such as the **SealBoss® IP2C Gel Injection Pump** shown to the right. The uncured product can be cleaned off with water.

6. Because backfill and soil consolidation behind the structures are sometimes unknown, applicators must monitor flow rates and material consumption in each hole. A typical coverage for SealBoss® FlexGel hydrophilic polyurethane is 9 square feet/gallon. This equates to approximately ½ gallon injected into each drill hole. If large voids are expected behind the wall, expansive hydrophobic polyurethane such as SealBoss® 1510 WaterStopFoam may be injected initially in order to fill these voids and provide a solid mass against which the hydrophilic gel can be injected.
7. Some time may be required to assess the coverage of the repair. Job site inspection following subsequent wet/dry cycles may require spot injections to the original grid pattern and/or to the migrating moisture pattern as the moisture intrusion is eliminated.



Injection of internal substrate, commonly found in deteriorated brick and stone.

### Benefits of SealBoss® Professional Starter Kits™

SealBoss® offers complete system solutions and SealBoss® Professional Starter Kits that provide the applicator optimal probabilities for successful repairs. While the kits offer significant convenience and savings, all products and materials can be reordered individually for future projects. Professional Starter Kits include the products necessary for an industrial or commercial project including a high pressure, industrial grade pump. The SealBoss® Professional Starter Kits include everything required to perform approximately 100-200 ft. of concrete crack and joint repair work! Some of the SealBoss® Professional Starter Kits benefits include:

- 1) Affordable for beginning applicators on smaller and manageable projects
- 2) Low investment for high return repair system offering
- 3) Great way to familiarize yourself with SealBoss® Concrete Solutions
- 4) Additional revenue stream
- 5) Niche system solution creating company differentiation
- 6) Minimal investment for industrial grade system
- 7) Industrial grade pump for future applications
- 8) Higher pressure pump = better results
- 9) Support of established and valued SealBoss® brand
- 10) Significant amount of referral business



Professional Starter Kit materials shown here.

It is important to note that the increased pressures and higher quality dispensing equipment of SealBoss® Professional Starter Kits achieve more favorable results for these repairs. As mentioned in the application technique, the amount of material inside the crack or joint is paramount to the prolonged success of the repair. By pumping at higher pressures combined with re-injecting each packer one or two times, you will inevitably observe better material consumptions and travel, which creates a better density upon expansion, which creates a more closed cell structure which provides long-lasting results.

**High Pressures = Greater Volumes = Increased Density = Closed-Cell Structure = Water Tight Repair = Referral and Repeat Business**

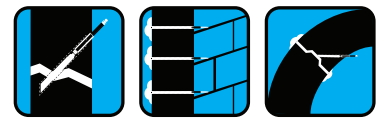
### Enjoy Benefits of Approved Applicator Certificate

At this stage, you are now familiar with the SealBoss® Polyurethane Injection Systems, own an industrial grade pump, possibly through the purchase of a SealBoss® Professional Starter Kit, and may have repaired cracks and joints successfully and permanently! If you have found yourself at this stage in the repair industry, it is time to consider the SealBoss® Approved Applicator Program.

SealBoss® puts a considerable amount of resources into engineer specification efforts and commercial architects and builders. It is quite common for engineers and architects to require an approved applicator for specialty repairs such as the chemical injection systems. In an effort to increase quality assurance and adhere to engineer specifications, SealBoss® offers a training program for contractors to obtain an **SealBoss® Approved Applicators Certificate**.







## Waterstop Injection Systems

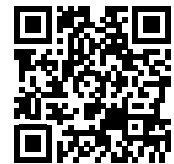
### Professionalism, Competence, and Knowledge!

1. Set your company up for success with an approved applicator certificate.
2. Qualify yourself in bid meetings with your certificate.
3. Gain access to the SealBoss® lead generation system.
4. Be included on SealBoss® applicator list for engineers.
5. Join the proven SealBoss® team!

### Commonly Used Pump System Overview:

Product Name	Application	Benefits	Image
HP100	High & Low Pressure Polyurethane Injection	<ul style="list-style-type: none"> <li>• Convenient</li> <li>• Easy to operate</li> <li>• No power supply required</li> </ul>	
P2002	High & Low Pressure Polyurethane Injection	<ul style="list-style-type: none"> <li>• Convenient</li> <li>• Electric Drill Operated</li> <li>• 6000+ psi</li> </ul>	
P3003-2C	High & Low Pressure Polyurethane and Epoxy Injection	<ul style="list-style-type: none"> <li>• Convenient</li> <li>• Electric Drill Operated</li> <li>• Pumps EP and PU resin</li> <li>• 1:1 and 2:1 ratios</li> </ul>	
IP495	High & Low Pressure Polyurethane Injection	<ul style="list-style-type: none"> <li>• Lightweight</li> <li>• Electric</li> <li>• Heavy Duty for extended pumping durations</li> </ul>	
IP2C	High & Low Pressure Polyacrylate Gel Injection	<ul style="list-style-type: none"> <li>• Stainless Steel</li> <li>• Dual Component</li> <li>• Flush Pump Included</li> </ul>	

Please contact SealBoss® with all questions concerning our progression program to become an Approved Chemical Injection Applicator. Take the time to experience our commitment to service and knowledge by speaking with one of our experienced representatives. We look forward to hearing from you soon!



**Limited Warranty Policy and Disclaimer for Products Supplied and/or Distributed by SealBoss Corp.:** SealBoss Corp. Products are for Professional Use. All recommendations, statements and technical data herein are based on tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty either expressed or implied. User shall rely on his or her own information and tests to determine suitability of the product for the intended use and user assumes all risk and liability resulting from his or her use of the product. Nothing contained in any supplied materials relieves the user of the obligation to read and follow the warnings and instruction for each product as set forth in the current Technical Data Sheet, product label and Safety Data Sheet prior to product use. SealBoss Corp. warrants supplied / distributed products to be free of manufacturing defects. Seller's and manufacturer's sole responsibility shall be to replace that portion of the product of the manufacturer which proves to be defective. There are no other warranties by SealBoss Corp. of any nature whatsoever expressed or implied, including any warranty of merchantability or fitness for a particular purpose in connection with this product. SealBoss Corp. shall not be liable for damages of any sort, including remote or consequential damages resulting from any claimed breach of any warranty whether expressed or implied. SealBoss Corp. shall not be responsible for use of this product in a manner to infringe on any patent or any other intellectual property rights held by others. In addition, no warranty or guarantee is being issued with respect to appearance, color, fading, chalking, staining, shrinkage, peeling, UV damage, excessive temperature exposure, normal wear and tear or improper application by the applicator. Damage caused by abuse, neglect and lack of proper maintenance, acts of nature and / or physical movement of the substrate or structural defects are also excluded from the limited warranty. SealBoss Corp. reserves the right to conduct performance tests on any material claimed to be defective prior to any repairs by owner, general contractor, or applicator. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss or damage directly or indirectly resulting from use of or inability to use the product. Recommendations and statements other than those contained in a written agreement signed by an officer of the manufacturer shall not be binding upon the manufacturer or seller. SealBoss Corp. reserves the right to change the properties of products without notice.

Revised 201705