HYDROPHILIC OR HYDROPHOBIC POLYURETHANE INJECTION RESINS

ARE YOU USING THE RIGHT PRODUCT FOR YOUR APPLICATION?

While polyurethane injection resins (PUR) are becoming increasingly familiar to the specialty contractor, there is still a lot of confusion about product uses and effectiveness.

Two thirds of our planet is made of water, and many times that water ends up going places we don't want it to go. We try to hold it back using earth or concrete, but it still pushes through. PUR injection is the most effective method to halt flowing water, but many injection repairs end up as temporary fixes because the wrong type of PUR is used. When the correct materials are used, the repair can be permanent.

PUR injection resins are based either on MDI (Diphenylmethane diisocyanate) or TDI (Toluene diisocyanate). These same resins are used in the manufacture of foam mattresses, pillows, car seats, car dashboards, as well as polyurethane coatings and sealants. The base resins are modified through chemical processes to react with water.

MDI based resins possess **hydrophobic** properties which means that **they will not easily mix with water.** When MDI based materials are pumped into cracks or joints in concrete they tend to resist penetration into the pores of wet concrete and do not get a good bond. These materials can temporarily stop water leaks because they expand during their reaction stage and in effect form a compression seal. When concrete experiences a moderate temperature change causing the joint or crack to close up, it will often causes MDI based materials to go into compression set. As the temperature cycle reverses and the crack opens up, problems can and most often do occur. Because the material is not bonded to the concrete and because it is "set" in its previously compressed state, it will not move with the concrete and the preciously watertight crack or joint begins to leak again.

TDI based resins possess **hydrophilic** properties and **readily mix with water.** This is important when trying to permanently seal a wet crack in concrete. The hydrophilic materials seek out water and get an excellent "bite" into the pores of wet concrete. Because of the flexibility of TDI based materials, when cracks or joints open and close with temperature changes a tight water seal and bond is maintained.

PRIME RESINS, INC. • 2291 Plunkett Road • Conyers, Georgia 30012
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HYDROPHILIC

Hydrophilic polyurethanes should always be used to stop water leaks in cracks!

Hydrophilic resins seek out water in a crack. They **chase the water and absorb** into the tight micro-cracks and pores of the concrete. This gives hydrophilic resins a tenacious bond to the wet concrete.

Hydrophobic resins **repel water** in a crack. They resist movement towards wet areas and will not absorb into tight micro cracks and pores in the concrete. They may be forced in under pressure, but the water will act as a bond breaker between the polyurethane foam and the concrete resulting in extremely low bond strengths.

WHY IS BOND IMPORTANT?

Concrete expands and contracts with changes in temperature. In the summer temperatures rise, concrete expands, and cracks tighten up. In the winter when temperatures fall, concrete contracts, and cracks open up.

Polyurethane foams are designed to seal leaking cracks. If the material does not bond to wet concrete, it is destined to eventually fail during these thermal cycles, particularly during cold weather. The cracks will open up and leave a gap between the concrete and the foam allowing water to seep back through.

BUT I HAVE USED HYDROPHOBIC MATERIALS BEFORE AND THEY STOPPED THE WATER.

There is no doubt that hydrophobic resins can be effective at stopping water leaks. They will expand and fill up a wet crack as well as most hydrophilic resins. The failure will usually occur a few months after the job is finished.

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DO HYDROPHILIC RESINS SHRINK IN THE ABSENCE OF WATER?

Some hydrophilic resins will absorb as much water as they come in contact with during the time of initial cure. These resins do a good job of stopping the water leaks, but usually fail if the water table drops. The water they absorbed will evaporate and cause the material to shrink, sometimes resulting in failure.

Prime-Flex 900 LVSF were designed specifically to eliminate this problem. Prime Resins hydrophilic resins will only absorb as much water as they need to facilitate the reaction during initial cure. The rest of the water is rejected in the same way that hydrophobic resins reject water.

IF PRIME-FLEX 900 LVSF REJECT EXTRA WATER DURING INITIAL CURE, HOW CAN THEY BOND TO WET CONCRETE?

Initial cure and final cure are two separate issues. The initial cure is the time when the polyurethane resin foams up. The final cure may take up to 24 hours. It is during this time that hydrophilic resins bite into the pores and micro cracks of the concrete.

"Innovations in Infrastructure Repair Technology"
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HYDROPHOBIC

RIGID HYDROPHOBIC RESINS SHOULD BE USED FOR STABILIZING SOIL AND FILLING VOIDS!

Hydrophobic Polyurethane is usually used to fill voids and stabilize soil because of its low viscosity, high expansion rate, and ability to set up under wet conditions without diluting.

Hydrophobic resin repels water. When injected into loose soil or voids, it expands and displaces any water present. Rigid-hydrophobic-soil-stabilization material expands up to 2,900% in soil and forms a strong, impermeable mass.

Hydrophilic resin absorbs water. Hydrophilic soil stabilization material absorbs as much water as it comes into contact with during initial cure. This absorption allows the resin to be extended with water. The end result is a gelatin type product that doesn't add much strength, but is impermeable to water.

When the water table drops, moisture in the hydrophilic stabilization product evaporates and the products shrink. Our testing has shown that re-absorption recovery only ranges from 60-80%.

Because **rigid hydrophobic** material is **not affected by fluctuation in the moisture content of soil**, it is virtually unaffected by water table level. It retains its strength, size, and impermeability under almost all soil conditions.

Prime-Flex 910 is an extremely low viscosity rigid foam that will penetrate the finest soils. The set time can be adjusted from over one hour for slow penetration to 30 seconds for penetration rapid enough to cut off underground streams.

Prime-Flex 920 will expand up to 2,900% to fill voids behind tunnel liners, manholes, under concrete slabs, etc... The set time can be controlled using an accelerator. Prime-Flex 920 viscosity is low enough to be used for soil stabilization.

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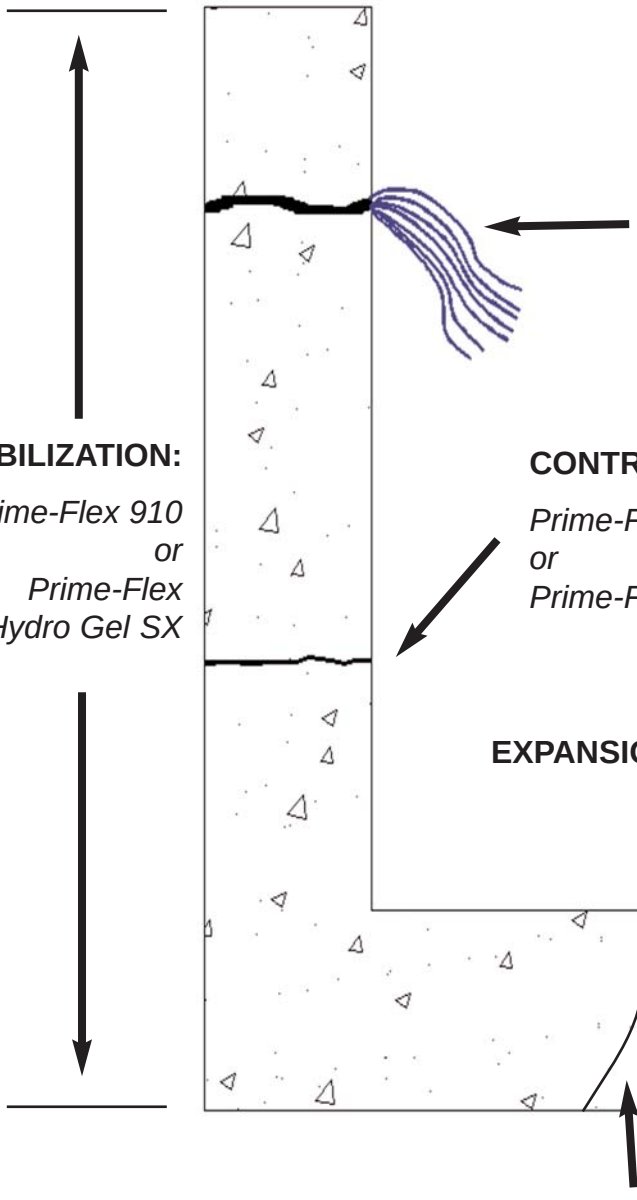
BELOW GRADE STRUCTURES



GUSHING LEAK:

Prime-Flex 920
or
Hydro Gel SX

SOIL STABILIZATION:

Prime-Flex 910
or
Prime-Flex
Hydro Gel SX

CONTROL JOINT:

Prime-Flex 900 XLV
or
Prime-Flex 900 LVSF

EXPANSION JOINT WITH FAILED WATER STOP:

Prime-Flex 900 LVSF

HAIRLINE OR SHRINKAGE CRACKS:

Prime-Flex 900 XLV or Prime-Flex 900 LVSF

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