

TECH NOTE

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Xypex Injection Techniques

A Xypex modified grout injection technique for repair of poorly consolidated concrete (honeycomb) and wide cracks or voids in concrete elements has been proven effective through several years of field experience in India and other markets around the world. The process entails injection of a Xypex rich grout mix into the deficient areas essentially inserting a Portland cement / Xypex chemistry blend into areas where poor consolidation, large crack, “loose” joints, etc. have left a cement paste deficient area within the hardened concrete structure.

Common applications would be long narrow bands of honeycomb concrete along the bottom of a wall, wall to slab or wall to wall interface joints where insufficient consolidation has left a loose joint, wide settlement or shrinkage cracks or corner areas where again, insufficient consolidation may have created an area of weakness where structural deficiency or more commonly water leakage may occur.

Clearly the proven methods of full removal of poorly consolidated concrete and reinstatement with a high quality repair material should be considered but the following represents another tool to be considered for mitigation of various concrete deficiencies.



Examples of areas that could be treated with Xypex Injection Techniques

Xypex Crystalline Technology

Xypex Coatings and Xypex Admixtures impart to concrete a unique blend of chemicals. These chemicals drive a process that causes the formation of a non-soluble, permanent crystal structure within the concrete. The crystal structure develops from a reaction between the Xypex chemistry, the constituents of hardened cement paste and water. This reaction will normally take days to weeks to create a crystal structure robust enough to heal hairline cracks and densify the matrix. At this point, water ingress through the concrete is stopped and prevented.

The following have provided good results for common injection applications;

- Chip along honeycomb affected cold joint to provide 1" x 2" (25 mm x 50 mm) deep slot.
- Place grout ports into the full depth of the slot and pack joint between ports.
- Grout ports consist of rigid pipe or tubing cut to an appropriate length. Grout ports are normally from ½" to 1" (12 mm – 25 mm) in diameter.

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- Material for packing around and between ports will consist of 1 part Concentrate, 5 parts cement, and 10 parts sand. Mix this blend to a dry mortar consistency. A blend of 3 parts Xypex Concentrate and 1 part Xypex Patch'n Plug powders mixed to a mortar consistency may also be used and provide a rapid hardening option.
- Spacing ports approximately 3 feet (1 m) from each other is normally effective but spacing should be adjusted depending on the geometry of the voids and areas to be injected.
- Drilling of port sockets using an appropriate sized vacuum drill bit (such that the powder associated with the hammer drilling process does not pack into the void structure at the bottom and sides of the hole) has also been effective as an alternative to chipping of a slot.
- Cap the front face of the area to be injected with the same blend (as given above) used to pack around the ports. Cap with a ½" (12 mm) layer or as appropriate such that the cap will not be pushed off by the grout that is being injected.
- Inject into the ports using a mix of 1 part Xypex Concentrate and 3 parts Portland cement. Blend the powder mixture with water to produce a flowable mix.
- Using a hand operated grout pump, pump the grout into a port until the grout is seen starting to flow out at the next port. Cap the port currently being injected and move to the next port (the one with the injection grout starting to flow out of it) and repeat the injection process.



Capped area with Xypex injection ports installed

These injection techniques are often done in blind-side applications where the back side of the wall or element is not accessible. If voids go right through the element then grout will normally go through the concrete until any void area between the back side of concrete element and soil is filled prior to the injection grout becoming evident at the next port. Usually honeycomb only extends 3 – 4 inches (75 mm – 100 mm) back from the front surface of the wall so sound concrete behind this area acts to cap the grout from going through. Clearly if the backside of the affected element is accessible and it can be seen that the defect extends through the concrete then the backside would be capped using the same material and techniques as described above.

The above repair methods have proven to provide a very effective way to treat in place concrete defects reducing the need to fully remove the honeycombed concrete or otherwise treat large cracks and voids. Xypex would like to recognize and thank APAAR Infratech Private Limited, India for the information provided in regards to the techniques described above.