



## Product System Specification: KOSTER Hose Injection System

### INJECTABLE WATERSTOP HOSE SYSTEMS

#### SECTION 03 11 16.13

##### PART 1 GENERAL:

###### 1.01 SECTION INCLUDES:

- A. Provision of injectable waterstop hoses embedded in concrete with a 1/2" flexible, porous hose that allows for low pressure injection resins. The Hose Injection System is installed prior to the installation of concrete and injected after the concrete has fully cured for a minimum of 28 days so the Injection Resins can reach and effectively seal the capillaries, bleed water tracks, junction areas, and small cracks, creating a permanently sealed region.
- B. Non-metallic waterstops for use in concrete joints subjected to chlorinated water, municipal wastewater, seawater, and many waterborne chemicals.

###### 1.02 SCOPE:

- A. The work shall include the furnishing by the Contractor, of all supervision, training, labor, materials, tools and equipment and the performance of all operations necessary for proper placement of an injectable waterstop and injection, if required with a suitable urethane chemical grout that shall be hydrophobic and capable of reacting with water to form a very dense closed cell foam; or suitable acrylate resin that shall be hydrophilic and self-reacting to form an elastic hydro gel, to seal all cold joints, expansion joints or penetrations, as indicated in the contract drawings, specified herein, and/or as directed by the Engineer of project. This system shall be the KOSTER Hose Injection, as manufactured by KOSTER American Corporation of Virginia Beach, VA.
- B. The work shall consist of the proper placement in accordance with the manufacturers installation instructions, of the KOSTER Hose Injection System when active water infiltration occurs.
- C. The work shall be performed in a skillful and workmanlike manner with special care taken to prevent damage to existing structures, drains and utility lines. Damage caused by improper work procedures or failure to maintain drains, lines, equipment or structures shall be the responsibility of the Contractor.
- D. Documentation of the work performed shall be submitted by the Contractor, including both daily work reports and color-coded markings of grouting locations marked neatly on the concrete surface adjacent to each leak repaired, at the time of completion of the repair to indicate grouting pass number, grout used, grouting crew identity and date of repair. Contractor shall submit his documentation and coding scheme for approval.
- E. The installation contractor shall be responsible for the protection of the installed hose from damage by other trades on the jobsite, until the KOSTER Hose Injection System is covered by concrete. An inspection of the installed hose should be performed prior to pouring concrete. Any damage occurring to the KOSTER Hose Injection System shall be brought to the attention of the Engineer and repaired according to the manufacturers recommendations prior to pouring concrete.



## Product System Specification: KOSTER Hose Injection System

### 1.03 SUBMITTALS

- A. Submit all product data. Show all hose runs, junction box locations, and details on the shop and installation drawings.
- B. Submit procedures for installation, inspection, grout injection, and vacuuming of hose.

### 1.03 QUALITY ASSURANCE

- A. Waterstop manufacturer shall demonstrate (5) years minimum continuous, successful experience in production of injectable hose waterstops.
- B. The chemical grouting work specified herein shall be performed by a qualified Contractor with a minimum of five (5) years' recent experience in performing chemical grouting work in similar conditions.
- C. Any Contractor, not meeting the requirements of Section 1.03.B., shall hire a grouting consultant on a full-time basis to monitor and supervise all phases of the installation of the KOSTER Injection Hose System and chemical grouting. The grouting consultant shall have a minimum of five (5) years of related recent experience under similar conditions.

### 1.04 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be delivered to the site in unopened containers bearing the manufacturer's original label. All materials shall be stored and handled as recommended by the Manufacturer, in a safe and responsible manner, and in accordance with all local, state and/or federal regulations, codes and ordinances. Spilled, spoiled, or open unused chemicals shall be disposed of in accordance with all applicable Municipal, State and Federal codes and regulations.

## PART 2 PRODUCT

### 2.01 MATERIALS

- A. The Resin Injection Hose System shall be used for all construction joints, cold joints, expansion joints and/or pipe penetrations. The System shall have a verifiable history of a minimum of five (5) years of use under similar conditions to this application.

### 2.02 Injection Materials:

- A. Chemical grout shall be used for sealing concrete cracks and joints. The selection of a grout for application at specific locations shall be based on the nature of the crack or joint in relation to the grout's properties. All grout used shall have a successful history of application for at least four (4) years under conditions similar to the current project.
  - 1. Acrylic Gel: Shall be a water soluble, hydrophilic, acrylate ester resin. In the uncured state, resin shall be water soluble, non-water reactive, and solvent free. Resin shall have viscosity of less than 20 mPas and be easily pumped, flushed, and vacuumed during the injection process with the injectable waterstop hose. All procedures shall



#### Product System Specification: KOSTER Hose Injection System

be performed within the set time of the injected material. In the cured state, material shall be solid, hydrophilic, and flexible with reversible swelling action in excess of its initially installed volume. Cured material shall be resistant to common ground water contaminants, stable in the presence of acids, alkaline solutions, solvents and fuels, and resistant to permanent water pressure and salt-water environments. Acceptable products include:

- (a) KOSTER Injection Gel G4
- (b) KOSTER Injection Gel S4

- 2. Polyurethane grout: Shall be water-reactive liquid polyurethane base solution which, when reacted by water, expands by foaming to at least seven (7) times the initial liquid volume producing a flexible, closed cell solid resistant to degradation by wet and dry cycles and chemicals found in concrete construction. Polyurethane grout shall be a hydrophobic, MDI based isocyanate with a flash point greater than 250°F.

- (a) KOSTER IN 5
- (b) KOSTER 2 IN 1
- (c) KOSTER IN 2

- B. Waterproofing grouts and injection hose marketed by the following manufacturer or approved equal shall be used for the purpose:

KOSTER American Corporation  
2585 Aviator Drive, Virginia Beach  
Virginia, 21921  
Phone: 757-425-1206  
Email: [info@kosterusa.com](mailto:info@kosterusa.com) or [techsupport@kosterusa.com](mailto:techsupport@kosterusa.com)

#### 2.03 Injection Hose:

- A. The KOSTER Hose Injection System contains a very high strength coiled wire which prevents the hose collapse during installation of the concrete. The filter membrane prevents the Hose from being clogged from the concrete.
- B. The KOSTER Hose Injection System is placed inside the concrete form and attached with anchoring clips prior to installing the concrete. (It is recommended to only have a maximum of 25 feet of hose length between injection packers).
- C. The anchoring clips should be installed every 1 foot with either concrete anchors or nails applied with a powder actuated system.
- D. The trumpet connectors allow for the attachment of the yellow hose to the clear PVC tubing. Always allow for 2.5" of concrete cover. The KOSTER Injection Hose should always terminate into a trumpet end piece. Never install the KOSTER Injection Hose outside of the formwork or outside of where the concrete is to be poured.
- E. Attach the clear PVC tubing to the barbed end of the trumpet and cut to appropriate length to allow the PVC tubing to reach a formholder packer or so it extends outside of the concrete form. Always protect the PVC tubing with a cap or tape to prevent damage during installation of the concrete.

#### 2.04 Product Verification Approval:

KOSTER American Corp. 2585 Aviator Drive, Virginia Beach Virginia, 21921  
Phone: 757-425-1206 Email: [info@kosterusa.com](mailto:info@kosterusa.com) or [techsupport@kosterusa.com](mailto:techsupport@kosterusa.com)



#### Product System Specification: KOSTER Hose Injection System

- A. The manufacturer's literature detailing the proper installation of resin Injection System shall be submitted to engineer for approval before start of work.
- B. Manufacturer's literature detailing the components, mixing and handling procedures, and characteristics of the set time for the grout products shall be submitted to the Engineer for approval before actual start of injection work.
- C. Injection material(s) shall have a recorded and published history of successful use in at least five (5) similar applications of major scope for a period of at least four (4) years and must have a chemical makeup of recognized permanence.
- D. Contractor shall submit the following forms:

Installation instruction sheet  
Chemical Product Data Request (CPDR)  
Safety Data Sheet (SDS)

### PART 3. CONSTRUCTION METHODS

#### 3.1 GENERAL:

##### A. Equipment:

- 1. The Contractor shall supply all equipment, including pumps, containers, hoses, gauges, packers, drills, bits, scaffolds, compressors, generators, vacuums, accessories, and all other items required to perform the work and accomplish the goals outlined in the Specifications.
- 2. The equipment shall be of a type, capacity, and mechanical condition suitable for doing the work in an effective and efficient manner. All equipment, including all power sources, cables, chemical containers, scaffolds, and anything used in the performance of the work, shall meet all applicable safety and other requirements of Local, State and Federal ordinances, laws, regulations and codes.
- 3. All equipment shall be maintained in excellent working condition at all times. Sufficient spare parts and tools shall be maintained on the job to provide for immediate (1 hour) repairs of essential operating items.
- 4. Each injection crew shall maintain its own equipment items required herein in order to operate independently of, and separate from, other injection crews.

##### B. PUMPING UNITS

- 1. Pumps shall be capable of continuous injection of the liquid grout under variable pressures up to a maximum pressure of 2,000 psi and at flow rates of at least 1/4 gallon per minute at high pressure (2,000 psi) and flow rates of at least 1/2 gallon per minute at pressures of 500 psi and lower, and in accordance with the manufacturers' recommendations and under the direction of the Engineer.
- 2. Pumps may be electric, air or hand driven provided the above capabilities are attained. Pumps shall be so arranged that rapid changes in pumping rates and pressures can be obtained by the pump operator without affecting the mixture of the injection material being injected and without stopping the pumps.
- 3. Pumping Units shall be made of materials compatible with the chemicals being used, and shall be equipped with all necessary hoses, chemical containers, gauges, fittings, packers and other accessories required to inject the grout properly. Seals



#### Product System Specification: KOSTER Hose Injection System

and joints shall be such that no injection material(s) leakage occurs, and no air is aspirated into the injected material(s).

4. Injection Units shall be so arranged that flushing can be accomplished with grout intake valves closed, flushing fluid supply valves open, and the pump operated at full speed.
5. Pumping Units shall be equipped with accurate pressure gauges at the pump and near the injection point. Gauges shall be accurate to within 5% and shall be periodically checked for accuracy against new, undamaged or calibrated gauges.
6. Damaged or inaccurate gauges shall be replaced immediately. Pumping units shall not be operated without properly operating gauges. Replacement gauges shall be on hand at all times.
7. Hoses and fittings shall have maximum safe operating pressure ratings and dimensions as recommended by the manufacturer and under the direction of the Engineer.
8. Suitable mixing and holding tanks shall be supplied with each grouting unit to permit continuous pumping at maximum pump capacity. Tanks shall have satisfactory covers and shall be stable against tipping under normal usage.
9. Descriptions of pumping units for polyurethane injection material shall be submitted for approval by the Engineer as required in these specifications before starting the actual grouting work. The Contractor shall receive written approval of the pumping units from the Engineer before actual grouting is started.

#### C. INJECTION PUMPS:

##### 1. Polyurethane Injection Pumps:

- a. Injection pumps used for polyurethane injection shall be either single or double pump type as recommended by the injection material(s) manufacturer. Pumps shall be arranged and operated in a manner consistent with the grout injected and the injection manufacturer's recommendations.

##### 2. Acrylic Injection Gel:

- a. Injection Pumps used for Acrylate Injection Gel shall be Pneumatic pump made of stainless steel for the application of KOSTER Injection Gel G4 and S4. Mixing ratio 1: 1 Capacity: 3 ltr. per minute with a working pressure of 20 - 200 bar.

#### D. DRILLS

1. Hand drills capable of drilling small diameter holes of 1/2 to 1 inch in diameter in concrete shall be supplied and operated. The following two types of drills shall be supplied for each grouting crew:
  - (a) Rotary percussion capable of drilling up to 18 inches deep in un-reinforced concrete.
  - (b) Rotary flushing type with diamond coring bits capable of drilling up to 24 inches deep in reinforced concrete.



#### Product System Specification: KOSTER Hose Injection System

2. Drills shall be supplied with bits of a diameter and length consistent with packer requirements and hold lengths needed for the drilled holes to intersect the target crack of joint as specified. Damaged or worn bits shall not be used. Back-up drills and bits shall be supplied in sufficient numbers so that two drills of either type can be used simultaneously.

### 3.02 INSTALLATION

- A. All installation, inspection, injection, and vacuuming operations shall be in strict accordance with the injectable hose system manufacturer's instructions and shall be done by an approved applicator of the injectable hose system manufacturer or under the direct supervision of the injectable hose system manufacturer's representative.
- B. Protect all injectable hoses from flame, sparks, oil, dirt, concrete splatter and damage prior to concrete pour.
- C. Concrete surfaces where injectable hoses are to be installed are to be clean, dry, smooth, and free from dirt and debris.
- D. Hoses must be located with at least 2- 4 inches of concrete cover. Install as close as possible to the centerline of wall or slab, with only the vent ends crossing over the injectable hose. Only vent ends should leave the joint.
- E. Do not fasten injectable hoses to reinforcing steel.
- F. Visible honeycombs at the surface should be patched directly after dismantling formwork to avoid loss of injection material during the injection operation.

### 3.02 INJECTION

- A. If any leakage is evident at construction joints, inject approved injection material as a remedial measure to stop such leaks and seal the joint area.
- B. Prepare injection material and perform actual injection in strict accordance with the manufacturer's printed instructions and specifications regarding mixing, injection procedures, application pot-life, and equipment requirements.
- C. Initial injection pressure should be approximately 200-300 psi. Once the injection material has filled the joint area and is no longer flowing, gradually increase the pressure to 500-600 psi. Maintain this pressure for 3-5 minutes, allowing for the injection material to thoroughly penetrate the joint area.
- D. If injection material penetrates the wall surface, wipe clean with water.
- E. Immediately after injection, vacuum the hose system by means of the manufacturer's recommended procedures with clear water, leaving the hose system clean and available for reinjection. Repeat injection if the leaks have not been stopped. Reinjection should only occur after the previously injected material has had sufficient time to cure.
- F. Piston type pumps (not diaphragms) shall be used with hydrophilic resin injections.
- G. Diaphragm and Piston type pumps shall be used with hydrophobic resin injections.
- H. Allow concrete to cure for 28 days prior to injection work.

### 3.03 HOSE EVACUATION

- A. Hose evacuation to be performed in strict accordance with manufacturer's printed instructions and specifications for acrylate injection.



Product System Specification: KOSTER Hose Injection System

- B. Connect a vacuum pump to the end of either PVC vent end. Place the other vent end into a bucket filled with clean water and draw water through the hose by applying vacuum.
- C. When water flow is clear on the vacuum side, disconnect the water supply by removing the vent end from the bucket of water.

End of Section