

Construction Chemicals, Inc.

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Specifications: Chemical Grout Injection for Wall/Floor Joints

1. General Requirements

1.1 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 the chemical grouting work indicated in the Contract Drawings, specified herein, and/or as directed by the Engineer.
- b. The work consists of the injection of liquid chemical grouts into active leaks through concrete cracks, joints or holes located in roofs, sidewalls, floors, rooms beams and other locations as shown on the Contract Drawings and in other area designated by the Engineer and located within the limits of the Contract.
- 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. In order to judge performance, all sealed work shall be inspected by the Contractor and the Engineer within three days after a greater than 1/2 inch rainfall in one 24 hour period during the construction phase. The work priorities will be adjusted according to the results of the survey, at the direction of the Engineer.

1.2 Contractor Qualifications

The chemical grouting work specified herein shall be performed by a qualified Contractor with a minimum of five years recent experience in performing chemical grouting work in similar conditions.

1.3 Field Supervision

The Contractor, if he does not meet the requirements of Section 1.2, he shall hire a grouting consultant on a full time basis to monitor and supervise all phases of chemical grouting. The grouting consultant shall have a minimum of five years of related recent experience under similar conditions.

1.4 Sequence of Work (All Jobs Have Different Scope)

1.5 Bid Quantities

The bid quantities for treating cracks with chemical grout are based on the best information available and on the Engineer's inspection. In the estimate of quantities for leaks and defects, allowance has been made for (a) anticipated migration of leaks during construction phases and (b) additional defects which have developed since the inspection.

2. Grout Materials

2.1 General

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 years under conditions similar to the current project.

2.2 Polyurethane Grout

Polyurethane grout supplied shall be water-reactive liquid polyurethane base solutions which, when reacted, expand by foaming to at least seven times the initial liquid volume; and when set produce a flexible, closed void solid resistant to degradation by wet and dry cycles and chemicals found in concrete construction. Polyurethane grout shall be hydrophobic by nature, MDI base isocyanate and flash point should exceed 250°F. Waterproofing grouts marketed by the following manufacturer or approved equal shall be used for the purpose:

2.3 Product Verification Approval

a. 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.

b. Grout shall have a recorded and published history of successful use in at least five similar applications of major scope for a period of at least four years, and must have a chemical make-up of recognized permanence. Grout should have proven QA/QC program in accordance with ANSI/NSF 61 Standards.

c. Contractor shall submit the following filled forms:

1. Chemical Review Request form (CRRF)
2. Chemical Product Data Request (CPDR)
3. Material Safety Data Sheet (MSDS)
4. Flammability & Toxicity Characteristics for accelerator

2.4 Handling, Storage and Disposal of Chemicals

All grout materials shall be delivered to the site in unopened containers bearing the manufacturer's original label. All grout 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.

3. Construction Methods

3.1 Equipment

a. General

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 Federal, State and Local 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 repairs (within 1 hour) of essential operating items.

4. Each grout crew shall maintain its own equipment items required herein in order to operate independently of, and separate from, other grout crews.

b. Pumping Equipment

1. Not Used

2. 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 5 fluid ounces per minute at high pressure (2,000 psi) and flow rates of at least 1/4 gallon per minute at pressures of 500 psi and lower, and in accordance with the manufacturers recommendations and under the direction of the Engineer. 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 effecting the mixture of the grout 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 and joints shall be such that no grout leakage occurs and no air is aspirated into the injected grout.

4. Grouting 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 speeds.

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. 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.

6. Hoses and fittings shall have maximum safe operating pressure ratings and dimensions as recommended by the manufacturer and under the direction of the Engineer.

7. 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.

8. Descriptions of pumping units for polyurethane grout shall be submitted for approval by the Engineer as required in these specifications before starting the actual grouting work. Written approval of the pumping units shall be received from the Engineer by the Contractor before actual grouting is started.

c. Polyurethane Grout Pumps

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

d. Not Used

e. Packers

Packers which are specifically designed for the grouting operations shall be supplied and used capable of safely sealing and packing grout holes drilled into concrete and injected at pressures of up to 3,000 psi, and as recommended by the manufacturer of the grout. Packers shall be of the removable type such that the drilled hole can be cleaned and patched to at least 3 inches deep.

f. Drills

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: (1) Rotary percussion capable of drilling up to 18 inches deep in non-reinforced concrete; (2) Rotary flushing type with diamond coring bits capable of drilling up to 24 inches deep in reinforced concrete. 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.