

**SECTION 03740
CONCRETE REPAIR CRACK INJECTION**

PART 1 – GENERAL

1.1 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. D638, Standard Test Method for Tensile Properties of Plastics.
2. D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
3. D1622, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
4. D1623, Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
5. D2842, Standard Test method for Water Absorption of Rigid Cellular Plastics.

1.2 WORK INCLUDED

Investigate, seal and repair cracks and/or joints in and/or through concrete with Hydrophobic Polyurethane Chemical Grout (HPCG), including all materials, labor, tools, equipment, storage provisions, safety provisions and weather-protection provisions necessary to perform, monitor and test repairs.

1.3 DEFINITIONS

A. Cracks:

Cracks are not defined by width and include, but are not limited to:

1. Intended and unintended cracks.
2. Cracks caused by relief of thermal and/or settlement movements.
3. Cracks resulting from mechanical processes.
4. Cracks caused by the effects of the weather.
5. Cracks resulting from damage and/or misuse.
6. Voids.
7. Fractures.

B. Principal Cracks:

These are cracks identified by the engineer as most problematic and should be addressed as a priority.

C. Secondary Cracks:

These are cracks that may or may not be addressed as determined by the engineer.

1.4 SUBMITTLES

A. Supplier's Information:

1. Physical and chemical properties for chemical grout and grout accelerator.
2. Technical data for metering, mixing and injection equipment.
3. Injection ports.
4. Materials Safety Data Sheets (MSDS).

B. Quality Control Submittals:

1. Supplier's recommended surface preparation procedures and product application instructions.
2. Instruction for removing injection-process devices, and other grout installation provisions, and for associated reinstatement and repairs of effected concrete.
3. Supplier's Certificate of Compliance: Certified test results for each batch of HPCG and accelerator.
4. Statements of Qualification for the HPCG installation process:
 - a. Supplier's site representative.
 - b. Crack-prep and injection personnel.
 - c. Injection pump operating technician.
 - d. Certification from the supplier of the specified product attesting to the "Experienced Contractor" status of the installation contractor.

C. Contract Close-out Submittals:

Records of injected crack locations, with injection pressure, HPCG volume injected and accelerator/grout ratio for each location.

1.5 Quality Assurance

A. Supplier's qualifications:

1. The supplier of the specified product shall offer a program for training, certifying, technically supporting and periodically re-certifying "Experienced Contractors". The program shall have

been ongoing for a minimum of 10 years.

B. Contractor qualifications:

1. The installation contractor shall be an “Experienced Contractor” of the supplier of the specified product, have completed the supplier’s program of instruction in the use of the specified repair material and have a minimum of five years experience in installing the product under condition similar to those on this project.

C. Qualification for Installation Personnel:

1. Supplier’s Site Representative:
 - a) Capable of instructing successful methods for injection cracks in concrete structure utilizing a hydrophobic polyurethane chemical grout injection process.
 - b) Understands, and is capable of explaining, technical aspects of correct material selection, mixing, use and application.
 - c) Experienced in the operation, maintenance and trouble-shooting for application equipment.
2. Installation crew and Crew Foreman:
 - a) Verifiable evidence showing compliance with the following requirements:
 1. Certified by the grout supplier.
 2. Crew Foreman with minimum 5 years experience in successful HPCG injection of at least 10,000 lineal feet.

D. Guarantee:

Provide standard quality assurance guarantee.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver the specified products in original, unopened containers, with the supplier’s name, product label, product identification, MSDS’s and batch numbers.
- B. Store and protect the specified products as recommended by their supplier.

1.7 JOB CONDITIONS

A. Protection:

Precautions shall be taken to avoid damage to all surfaces at or near the work zone, resulting from mixing, handling and/or placement procedures of the specified materials.

B. Environmental Conditions:

1. Comply with the supplier's recommendations for weather and/or confined space working conditions.
2. Crack repair work is not permitted when ice is present in void or crack.

PART 2 – PRODUCTS

2.1 SUPPLIER

A. Grout:

Hydrophobic polyurethane chemical grout, and accelerator, shall be "Mountain Grout" Flexible, SLV, HL-100, Gelfoam, MG295, Ultra, ULTRA SLV along with corresponding Mountain Grout Accelerator, as supplied by Green Mountain International, Inc., 235 Pigeon Street, Waynesville, NC 28786 (800-942-5151).

- A. HPCG must be shipped as non-hazardous and contain no solvents or VOC's.
- B. HPCG pump cleaner/flush must be solvent free and non-flammable.

B. Injection Ports:

Injection Ports shall be free of corrosive materials and shall be recommended and supplied by Green Mountain International, Inc., 235 Pigeon Street, Waynesville, NC 28786 (800-942-5151).

PART 3 – EXECUTION

3.1 GENERAL

- A. Repair cracks by injection of hydrophobic polyurethane chemical grout.
- B. Repair cracks specified and/or as shown.

3.2 PREPARATION

Slabs and walls, etc., to be treated shall have their surfaces cleared of all debris and attachments to allow free and clear access to the work, and also to allow access for monitoring grout travel. Before commencing with the work, review contract drawings, existing drawings and physical surroundings to ascertain impediments to setting injection ports and injection grout.

3.3 APPLICATION

- A. Cracks and/or joints shall be filled to the maximum with the HPCG. Remove spalled and/or weakened concrete, loose mortar, dirt, laitance, oil, grease, salt, and other contaminants from the path of the crack.
- a. Preparation: Holes shall be drilled adjacent to each crack at an approximate angle of 45 degrees to the plane of the concrete member. The holes shall be offset to each side of the line of the crack such that opposing holes intersect the joint/crack at its approximate mid-depth. Provide holes from both sides of a wall where access can be readily made available. All drill dust must be flushed from the holes, using copious amounts of water injection into the hole until it runs clear. The holes shall be flushed in successive order, beginning with the bottom-most hole.
 - b. Injection Port Devices: Two styles of injection ports are acceptable, each available from Green Mountain International, Inc.
 - i. 5/8" diameter holes shall be drilled for Mechanical Type Injection Ports, which are inserted into the drilled holes and secured into place by an expandable rubber section as the packer is tightened.
 - ii. 3/8" diameter holes shall be drilled for "tap-in" type injection ports, which are hammered into the drilled hole.
 - c. Hole Spacing: Successive holes servicing a crack shall be placed at appropriate intervals, typically 12" apart, to ensure full infiltration of HPCG throughout the length and depth of the joint/crack. In narrow (hairline) cracks, holes will be closer together, and in wide cracks they may be farther apart. Visually monitor grout flow to determine and verify adequate hole spacing.
 - d. Mixing Procedure: Mountain Grout shall be mixed by very gradually pouring component "B", accelerator, into component "A" while carefully stirring, so as not to entrain air into the mixture. Do not allow water to enter the mixture.
 - e. Placement: HPCG shall be pumped through a piston pump, typically within an operating range of between 500 and 1000 psi, but nevertheless, capable of producing discharge pressures of

3000 psi.

f. Cracks may be actively leaking water during crack preparation and, ideally, during grout injection. Small quantities of water may be injection into the crack to simulate a leaking condition and promote activation of the grout. This technique must begin at the deepest parts of the crack.

g. Pumping shall alternate from injection port to injection port, with multiple passes on each hole, until either stall pressure is achieved or grout flow is observed issuing from the crack/joint as a result of continued injection onto a hole local to the area. Begin pumping procedures at the base of vertical crack-lines. Monitor the injection process and adjust injection technique and material mix-proportions as appropriate.

h. If penetration of any crack proves impossible, discontinue the injection procedure and consult the engineer. If, to fill the cracks, modification of the procedure is required, submit a written proposal to the engineer for consideration, and/or acceptance, prior to proceeding.

i. Adhere to all limitations and cautions for the grout stated in the supplier's current printed literature.

B. Cleaning:

All excess HPCG shall be cleaned from the area and legally discarded. Leave finished work, and work area, in a neat, clean condition.

3.4 FIELD QUALITY CONTROL

Successful grouting shall be adjudged from visual inspection by the engineer or core drilling representative samples for evaluation.

END OF SECTION