SECTION 07 19 11.10
CRACK INJECTION

Basis of Design: Spetec F400 | Revision 1 | Issued 2026-09-24

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sealing of leaking cracks and joints in concrete structures by pressure injection of single-component, water-reactive, hydrophobic, closed-cell polyurethane resin through injection ports or mechanical packers drilled to intersect the crack or joint.

B. Work of this Section corrects water intrusion through cracks and joints in concrete. Completion is judged by cessation of visible leakage at each treated crack or joint.

C. Cracks in masonry walls are not included in this Section. Where leakage occurs through a crack in a masonry wall, curtain grouting is recommended in place of crack injection.

1.2 RELATED REQUIREMENTS

A. Division 01 - Product Requirements, including controlled substitution procedures.

B. Division 01 - Quality Requirements.

C. Division 03 - Concrete, for repair of structural concrete and concrete surfaces.

D. Curtain grouting, specified separately, for leakage through masonry walls and for barriers formed on the exterior side of the structure.

1.3 REFERENCES

A. ASTM International:

1. ASTM D1475 - Standard Test Method for Density of Liquid Coatings, Inks, and Related Products.
2. ASTM D3574 - Standard Test Methods for Flexible Cellular Materials: Slab, Bonded, and Molded Urethane Foams.
3. ASTM D4878 - Standard Test Methods for Polyurethane Raw Materials: Determination of Viscosity of Polyols.

B. International Organization for Standardization:

1. EN ISO 2811-1 - Paints and Varnishes: Determination of Density.

C. NSF International:

1. NSF/ANSI/CAN 61 - Drinking Water System Components: Health Effects.

1.4 PREINSTALLATION MEETINGS

A. Convene a preinstallation meeting before starting work of this Section. Review at minimum:

1. Current Technical Data Sheets and Safety Data Sheets for each product to be used.
2. The leak survey required under Article 3.1.
3. Port and packer layout, spacing, drill angle, and distance from the crack.
4. Catalyst selection and dosage for the water flow and temperature expected.
5. Injection sequence and the method of confirming leak cessation.
6. Ambient and substrate temperature limits.
7. Ventilation and safety requirements for confined spaces, where applicable.

1.5 ACTION SUBMITTALS

A. Submit under provisions of Division 01.

B. Product Data: Current Technical Data Sheet for each product and accessory to be used, including revision date.

C. Safety Data Sheet for each product and accessory to be delivered to the site.

D. Injection Plan: Drawing or marked photographs showing each crack and joint to be treated, port or packer spacing, drill angle, distance from the crack, and injection sequence.

E. Catalyst Schedule: Catalyst proposed, dosage by volume, and the published reaction rate at that dosage and temperature.

F. Where the work occurs within a drinking water structure, submit current NSF/ANSI/CAN 61 certification of the injected material.

1.6 INFORMATIONAL SUBMITTALS

A. Leak Survey: Location, severity, crack width, and orientation of each leak before injection.

B. Injection Record: For each port or section, location, spacing, catalyst percentage, pressure range, volume injected, material travel, and anomalies.

C. Redrilled Port Record: Location of each port redrilled because the hole did not intersect the crack.

D. Completion Record: Confirmation of cessation of leakage at each treated location.

E. Installer Qualification: Evidence that the Installer satisfies Article 1.7.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall have completed Alchatek contractor training, or Alchatek Technical Service shall be present at the start of the work.

B. Field Spacing Verification: At each crack, before production injection, drill one test hole, flush with water, and observe how far water travels to adjacent areas. Use the observed travel to set port spacing for that crack.

C. Safety Data Sheets: Personnel shall review the Safety Data Sheet for each product before handling or injecting.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in unopened original containers bearing the product name and manufacturer identification.

B. Store products between 50 and 80 deg F (10 and 26 deg C). Shelf life is 24 months in unopened containers stored within this temperature range.

C. Retain empty catalyst containers for disposal.

D. Dispose of surplus material and empty containers in accordance with local regulations.

1.9 FIELD CONDITIONS

A. Application temperature range: 41 to 95 deg F (5 to 35 deg C). Confirm ambient and substrate temperatures are within this range before injection.

B. Spetec F400 is water reactive. Water must be present in the crack for the resin to react.

C. Select catalyst type and dosage for the water flow present and the ambient temperature.

D. Quantity of material is assessed on site and is influenced by the amount of water leaking and the thickness of the concrete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Alchatek (www.alchatek.com).

B. Substitution of products from other manufacturers is governed by the controlled substitution procedures of Division 01.

2.2 BASIS-OF-DESIGN PRODUCT

A. Basis-of-Design Product: Spetec F400.

B. Description: Solvent-free and phthalate-free, water-reactive, hydrophobic, closed-cell, low-viscosity, shrink-free, flexible, single-component polyurethane injection resin for shutting off water leaks.

C. Catalyst: Spetec F400 requires Alchatek Gen Cat or Alchatek Gen Cat Fast.

2.3 SUBSTITUTIONS

A. Spetec F400 is the product specified for this Section.

B. A product proposed for substitution shall satisfy every requirement of Article 2.4 and shall be supported by current published technical data demonstrating compliance.

C. Where drinking water certification is required, a product not carrying NSF/ANSI/CAN 61 certification is not an acceptable substitution.

2.4 PERFORMANCE REQUIREMENTS

A. Injected material shall react and cure in the presence of water.

B. Injected material shall be closed cell in the cured state.

C. Injected material shall remain flexible after cure.

D. Reaction time shall be adjustable by catalyst type and dosage.

E. Where the work occurs within a drinking water structure, injected material shall be NSF/ANSI/CAN 61 certified.

2.5 PRODUCT PROPERTIES

A. Spetec F400, uncured (Technical Data Sheet Rev. 7/13/2026):

1. Appearance: White liquid.
2. Viscosity at 77 deg F (25 deg C), ASTM D4878: 350 cP (350 mPa-s).
3. Density at 77 deg F (25 deg C), ASTM D1475: 64.3 lb/cu ft (1.03 kg/dm3).

B. Spetec F400, cured:

1. Elongation at break, ASTM D3574: 100 percent.
2. Certification: NSF/ANSI/CAN 61 certified for contact with drinking water.

C. Alchatek Gen Cat:

1. Appearance: Yellow-orange liquid.
2. Viscosity at 77 deg F (25 deg C), ASTM D4878: 75 cP (75 mPa-s).
3. Density at 77 deg F (25 deg C), EN ISO 2811-1: 65.5 lb/cu ft (1.05 kg/dm3).
4. Flash point: 313 deg F (156 deg C).

D. Alchatek Gen Cat Fast:

1. Appearance: Yellow-orange liquid.
2. Viscosity at 77 deg F (25 deg C), ASTM D4878: 70 cP (70 mPa-s).
3. Density at 77 deg F (25 deg C), EN ISO 2811-1: 65.5 lb/cu ft (1.05 kg/dm3).
4. Flash point: 313 deg F (156 deg C).

E. Reaction rate with Alchatek Gen Cat at 10 percent (start / end):

1. 41 deg F (5 deg C): 60 seconds / 165 seconds.
2. 59 deg F (15 deg C): 24 seconds / 104 seconds.
3. 77 deg F (25 deg C): 17 seconds / 73 seconds.

F. Reaction rate with Alchatek Gen Cat Fast at 10 percent (start / end):

1. 40 deg F (4.4 deg C): 21 seconds / 72 seconds.
2. 60 deg F (15.6 deg C): 14 seconds / 59 seconds.
3. 77 deg F (25 deg C): 14 seconds / 47 seconds.

G. Properties will vary depending on application conditions.

2.6 ACCESSORIES

A. Catalyst: Alchatek Gen Cat or Alchatek Gen Cat Fast.

B. Oakum: Alchatek Oakum, for wide cracks and high-flow leaks.

C. Hammer-In Ports: Plastic, 3/8 inch, for sound concrete.

D. Mechanical Packers: Steel or aluminum, 1/2 inch standard duty or 5/8 inch heavy duty, for deteriorated concrete or high-pressure injection.

E. Fittings: Grease (zerk) fittings or button-top fittings with matching couplers.

F. Surface Seal: Epoxy gel or hydraulic cement.

G. Hole Patching: Hydraulic cement, non-shrink grout, or epoxy gel.

H. Pump Flush: Alchatek Pump Flush.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Review project documents and confirm against field conditions: wall and slab thickness, construction type, reinforcing locations and density, and water source.

B. Survey the structure and record each leaking crack and joint: location, severity (weeping, steady, or gushing), crack width (tight, moderate, or wide), orientation, joint type, and surface condition (efflorescence, mineral deposits, or deterioration).

C. Confirm the cracked element is concrete. Where the crack is in a masonry wall, notify the Engineer; curtain grouting is recommended in place of crack injection.

D. Verify the pH of the water source is between 3 and 10.

E. Identify reinforcing steel and embedded items within the drilling zone.

F. Do not begin injection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean crack surfaces with a wire brush, grinder with wire cup wheel, or pressure washer to remove mineral deposits, efflorescence, coatings, and loose debris. Where a chemical cleaner is used, flush or neutralize before proceeding.

B. Wide Cracks and High-Flow Leaks: Soak Alchatek Oakum in catalyzed Spetec F400 and pack it into the leaking crack or joint to slow water flow before drilling.

C. Port Spacing: Stagger ports on alternating sides of the crack. Space ports as follows, then adjust to the travel observed under Article 1.7:

1. Tight (hairline) cracks: 3 to 4 inches.
2. Standard cracks in 8 to 12 inch walls: 6 to 8 inches.
3. Wide cracks and joints: 12 to 24 inches.

D. Drilling:

1. Drill at a 45 degree angle toward the crack, starting at a distance from the crack equal to one half the wall thickness, to intersect the crack at approximately the midpoint of the wall thickness.
2. Use a 3/8, 1/2, or 5/8 inch carbide-tipped bit to suit the port or packer.

3. Drill vertical cracks from bottom to top and horizontal cracks from one end across. Do not intersect adjacent holes.
4. Use water flush during drilling to control silica dust.

E. Flush each drilled hole with clean water to remove drill dust. Flush from top to bottom on vertical surfaces.

F. Install Ports and Packers:

1. Hammer-In Ports: Drive until snug and insert the grease fitting.
2. Mechanical Packers: Insert until the rubber sleeve is just below the surface and tighten until firm. Do not over-tighten.
3. Leave fittings off to monitor water travel.

G. Flush Cracks: With fittings removed, inject water through the ports to clear debris, provide water for reaction, and verify each port intersects the crack. Proceed from the lowest port upward on vertical cracks and from one end across on horizontal cracks. Redrill dry holes.

H. Where leakage through a wide crack would waste material, seal the crack surface with epoxy gel or hydraulic cement before injection.

I. Personal Protection: Provide eye and face protection, chemical-resistant gloves, long sleeves and long pants, work boots, and safety vests. Provide respiratory protection and mechanical ventilation in confined spaces. Keep a clean water source and a portable eyewash unit at the work site. Use cordless tools or GFCI protection when drilling in wet areas.

3.3 MIXING

A. Mix resin and catalyst in a plastic or metal container.

B. Add catalyst to the resin and mix to an even consistency.

C. Select catalyst type and dosage by volume within the range published by Alchatek, based on water flow and temperature. Increase catalyst in cold conditions and reduce catalyst in hot conditions.

D. Batch small quantities to limit waste.

3.4 INSTALLATION

A. Injection Equipment:

1. Resin Pump: Hand, pneumatic, or electric injection pump with a pressure gauge visible to the operator and a high-pressure ball valve assembly on the hose.
2. Water Pump: Separate pump for flushing. Never allow water into the resin pump.
3. Flush the resin pump with Alchatek Pump Flush before and after each operation.

B. Injection Sequence:

1. Vertical cracks: Begin at the lowest port and proceed upward.
2. Horizontal cracks: Begin at one end and proceed across.

C. Injection Method:

1. Start at low pump pressure and increase slowly only as needed for penetration.
2. Inject at a rate that allows the material to travel along and seal the crack.
3. When material appears at the adjacent port, pause, install the fitting on the adjacent port, and resume injection at the current port to maintain continuous flow.

D. Monitor during injection for material emerging at adjacent ports, material seeping from the crack surface, pressure spikes indicating blockage or refusal, and excessive material exit rate. Material shall travel port to port, not only exit at the entry point.

E. Advance to the next port when material movement stops at the current port, when material exits at an excessive rate, or when target travel is achieved.

F. Stop injection at a port when material travels to the adjacent port, when material exits faster than it enters, when pressure indicates refusal, or when the port reaches its design volume.

G. Do not apply pressure that causes spalling, cracking, or port blowout.

H. Where a crack is dry, inject water before injecting resin.

3.5 FIELD QUALITY CONTROL

A. After injection, re-inject water into each port to verify the crack and drill holes are sealed.

B. Where leakage continues, re-inject the affected location and re-verify.

C. Record for each port or section: location, spacing, catalyst percentage, pressure range, volume injected, material travel, and anomalies.

D. Conduct a final walkthrough to confirm no leaks were missed.

3.6 CLEANING

A. Allow the injected resin to cure before removing ports.

B. Remove excess cured resin from crack surfaces with a scraper, utility knife, or grinder with wire wheel.

C. Remove ports and packers by pulling them from the structure or drilling 3 inches below the surface. Remove all metal components.

D. Clean injection holes and fill with hydraulic cement, non-shrink grout, or epoxy gel. Match the surrounding finish.

E. Remove used ports, packers, debris, and cured material from the site and dispose of in accordance with local regulations.

F. Flush the injection pump and lines with Alchatek Pump Flush before and after each operation. Never rinse the resin pump with water.

3.7 PROTECTION

A. Protect treated areas from traffic and mechanical damage until the injected material has cured.

B. Protect adjacent finishes and equipment from contact with uncured material.

END OF SECTION 07 19 11.10