SECTION 07 19 11.10
CRACK INJECTION

Basis of Design: Spetec AG200 | 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 three-component, water-swelling acrylic hydrogel 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. Spetec AG200 is intended for fine and hairline cracks and joints that will remain wet in service.

D. 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 D3505 - Standard Test Method for Density or Relative Density of Pure Liquid Chemicals.
2. ASTM D4878 - Standard Test Methods for Polyurethane Raw Materials: Determination of Viscosity of Polyols.

B. International Organization for Standardization and European Committee for Standardization:

1. DIN EN ISO 527-3 - Plastics: Determination of Tensile Properties, Test Conditions for Films and Sheets.
2. DIN EN ISO 62 - Plastics: Determination of Water Absorption.
3. DIN EN 14022 - Structural Adhesives: Determination of the Pot Life of Multi-Component Adhesives.

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. Component proportions proposed and the resulting pot life for the crack length 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. Mix Schedule: TEA and SP concentrations proposed and the published gelling time at those concentrations.

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, component proportions, 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. Dispose of surplus material and empty containers in accordance with local regulations.

1.9 FIELD CONDITIONS

A. Processing temperature range: 41 to 104 deg F (5 to 40 deg C). Confirm ambient and substrate temperatures are within this range before injection.

B. Pot life at 68 deg F (20 deg C) ranges from 9 seconds to 7 minutes depending on component proportions. Select proportions that provide adequate working time for the crack being injected.

C. Quantity of material is assessed on site and is influenced by the amount of water leakage 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 AG200.

B. Description: Three-component, water-swelling hydrogel based on acrylic monomers that cures to an elastic product. Low shrinkage. Durable in wet and dry conditions.

C. Components: Spetec AG200 resin, TEA (Spetec AG TEA Accelerator), and SP (Spetec SP Accelerator). The A side consists of Spetec AG200 resin with TEA. The B side consists of SP dissolved in water. The A side and B side are mixed at the injection head at a 1:1 ratio by volume.

2.3 SUBSTITUTIONS

A. Spetec AG200 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 cure to a soft-elastic hydrogel.

B. Injected material shall exhibit low shrinkage and shall be durable in wet and dry conditions.

C. Pot life shall be adjustable within the published range by adjustment of component proportions.

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

2.5 PRODUCT PROPERTIES

A. Spetec AG200 resin, uncured (Technical Data Sheet Rev. 4/30/2026):

1. Appearance: Amber colored liquid.
2. Active content: 42 percent.
3. pH: 6.5 to 7.0.
4. Density at 68 deg F (20 deg C), ASTM D3505: 74.9 lb/cu ft (1.2 kg/dm3).
5. Viscosity at 68 deg F (20 deg C), ASTM D4878: 25 cP (25 mPa-s).

B. SP:

1. Appearance: White powder.
2. Active content: Greater than 99 percent.

C. TEA:

1. Appearance: Colorless liquid.
2. Active content: 29 percent.
3. pH: 10 to 12.
4. Density at 68 deg F (20 deg C), ASTM D3505: 67.4 lb/cu ft (1.08 kg/dm3).
5. Viscosity at 68 deg F (20 deg C), ASTM D4878: Less than 300 cP (300 mPa-s).

D. Mixture:

1. Processing temperature: 41 to 104 deg F (5 to 40 deg C).
2. Viscosity at 68 deg F (20 deg C), ASTM D4878: 6 cP (6 mPa-s).
3. Pot life at 68 deg F (20 deg C), DIN EN 14022: 9 seconds to 7 minutes.

E. Mix proportions and gelling time at 68 deg F (20 deg C). TEA is dosed by weight of Spetec AG200 resin in the A side; SP is dosed by weight of water in the B side:
   1. TEA 2 percent, SP 2.5 percent: 2 minutes.
   2. TEA 4 percent, SP 2.5 percent: 58 seconds.
   3. TEA 6 percent, SP 2.5 percent: 36 seconds.
   4. TEA 8 percent, SP 2.5 percent: 27 seconds.
   5. TEA 2 percent, SP 5 percent: 1 minute 10 seconds.
   6. TEA 4 percent, SP 5 percent: 31 seconds.
   7. TEA 6 percent, SP 5 percent: 20 seconds.
   8. TEA 8 percent, SP 5 percent: 15 seconds.
   9. Example: 24 kg (53 lb) Spetec AG200 resin with 0.96 kg (2.1 lb) TEA (4 percent), and 20 kg (44 lb) water with 0.5 kg (1.1 lb) SP (2.5 percent), gives a gelling time of 58 seconds.
   10. Gelling time is slower at low temperatures, is slowed in acid conditions and accelerated in alkaline conditions, and may be affected by minerals and metals in the substrate. Diluting the resin extends the gelling time.

F. Spetec AG200, cured:
   1. Consistency: Soft-elastic. Color: Amber.
   2. E-modulus, DIN EN ISO 527-3: 37.7 psi (260 kPa).
   3. Free rise tensile strength, DIN EN ISO 527-3: 5.80 psi (40 kPa).
   4. Elongation at break, DIN EN ISO 527-3: 510 percent.
   5. Water absorption, DIN EN ISO 62: 125 percent.
   6. Certification: NSF/ANSI/CAN 61 certified for contact with drinking water.

G. Properties will vary depending on application conditions.

2.6 ACCESSORIES

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

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

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

D. Surface Seal: Epoxy gel or hydraulic cement.

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

F. Cleaning: Clean water.

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

E. 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. 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.

C. 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.

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

E. 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.

F. Flush Cracks: With fittings removed, inject water through the ports to clear debris 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.

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

H. 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. Prepare the grout immediately before injection.

B. A Side: Add the required quantity of TEA to the Spetec AG200 resin, 2 to 8 percent by weight of resin, and mix thoroughly with a stainless steel mixer or a plastic or wooden rod.

C. B Side: Dissolve the required quantity of SP in water, 2.5 to 5 percent by weight of water, and mix thoroughly.

D. Select the TEA and SP concentrations from the gelling time table in Article 2.5 to provide adequate working time for the crack being injected.

E. Cup Test: Before injection, mix equal amounts of A side and B side in a small plastic cup by pouring back and forth, and measure the time to gelling. Where the gelling time deviates significantly from the table, adjust the TEA and SP concentrations.

F. Do not combine the A side and B side except in the cup test and at the injection head.

G. Prepare only the quantity that can be injected within the selected pot life. Discard material that has exceeded its pot life.

3.4 INSTALLATION

A. Injection Equipment:

1. Two-component stainless steel injection pump set to a 1:1 volume ratio, delivering the A side and B side simultaneously and mixing them at the injection head, with a water flush option to rinse the mixing chamber between injection runs and a pressure gauge visible to the operator.
2. Check the pump, mixing ratio, injection head, and flushing system before injection. Flush the mixing chamber with water between injection runs and when work is halted.

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.

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, component proportions, 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 material to cure before removing ports.

B. Remove excess cured material 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. Clean all equipment and materials that contacted the resin with water immediately after finishing the injection work.

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