SECTION 31 43 00.20
VOID FILLING

Basis of Design: AP Fill 720 | Revision 1 | Issued 2026-09-24

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes filling of subsurface cavities beneath concrete slabs, behind walls, and around buried structures by injection through small holes, or by free-spray into accessible cavities, of single-component, water-activated, hydrophobic polyurethane resin, to eliminate voids and prevent settlement.

B. Work of this Section corrects the presence of subsurface cavities. Completion is judged by complete fill of the cavity without lifting of overlying construction.

C. Raising of settled slabs and soil stabilization at depth are specified separately.

D. AP Fill 720 is intended for filling voids, including voids where water is present.

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 concrete surfaces, cracks, and injection holes.

D. Water and moisture intrusion control at below-grade walls bounding a filled cavity: Specified separately.

1.3 REFERENCES

A. ASTM International:

1. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. ASTM D756 - Standard Practice for Determination of Weight and Shape Changes of Plastics Under Accelerated Service Conditions.
3. ASTM D1042 - Standard Test Method for Linear Dimensional Changes of Plastics.
4. ASTM D1310 - Standard Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus.
5. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
6. ASTM D3505 - Standard Test Method for Density or Relative Density of Pure Liquid Chemicals.
7. ASTM D4878 - Standard Test Methods for Polyurethane Raw Materials: Determination of Viscosity of Polyols.

B. 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. Results of utility location, ground penetrating radar, and site inspection under Article 3.1.
3. Void location, boundaries, depth, and estimated volume.
4. Injection grid or free-spray method, and injection sequence.
5. The incremental injection method under Article 3.4 and the heat hazard it controls.

6. Monitoring to prevent lifting of overlying construction.
7. Catalyst selection and dosage for the temperature and water conditions expected.
8. Material temperature and cold- and hot-weather provisions.

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. Fill Plan: Drawing showing void boundaries, injection grid and spacing or free-spray areas, no-drill zones, estimated void volume, and monitoring locations.

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

F. Where the work occurs within a drinking water source or its zone of influence, submit current NSF/ANSI/CAN 61 certification of the injected material.

1.6 INFORMATIONAL SUBMITTALS

A. Site Investigation Report: Results of utility location, ground penetrating radar, and site inspection.

B. Injection Record: For each hole or lift, location, quantity placed, catalyst percentage, cooling interval observed, and any movement or emergence.

C. Completion Record: Confirmation that each cavity is filled.

D. 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. Utility Locate: Contact the applicable one-call utility locate service before drilling.

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. Keep lids tightly sealed when not in use and avoid splashing water into material containers.

D. Retain empty catalyst containers for disposal.

E. Dispose of surplus resin and catalyst in accordance with local regulations.

1.9 FIELD CONDITIONS

A. AP Fill 720 is water activated and requires moisture to react. Where the void is dry, add water before injection.

B. Cold Weather, below 50 deg F (10 deg C): Resin thickens and pumps more slowly, the reaction slows, and frozen ground prevents penetration and may cause material to pool when the ground thaws.

1. Do not inject when the ground is frozen.
2. Warm resin and catalyst to 60 to 80 deg F (16 to 27 deg C).
3. Increase catalyst percentage and extend wait times between injections.

C. Hot Weather, above 85 deg F (29 deg C): Resin reacts faster and may cure early, with risk of flash set, uncontrolled surfacing, lifting, and waste.
   1. Reduce catalyst percentage.
   2. Work in early morning or evening, use shorter injection bursts, monitor pressure closely, and store resin in shade.

D. High Humidity and Wet Conditions: Moisture speeds the reaction and foam may travel off target. Extend wait times between injections and monitor emergence closely.

E. Heat Hazard: Excessive foam build-up in confined spaces can result in high internal temperatures and expansion pressures. In large void fills, stage injections and allow cooling time between lifts. Never inject large volumes continuously at a single location.

F. Quantity of material is assessed on site and is influenced by void size and location, water flow rate, desired foam expansion, degree of confinement, and soil conditions.

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: AP Fill 720.

B. Description: Single-component, water-activated, hydrophobic, low-viscosity, closed-cell, semi-rigid polyurethane injection resin. Water impermeable. Phthalate free. Set time adjustable to as fast as 22 seconds.

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

2.3 SUBSTITUTIONS

A. AP Fill 720 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 and water impermeable in the cured state.

C. Injected material shall be injected as a single component.

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

E. Where the work occurs within a drinking water source or its zone of influence, injected material shall be NSF/ANSI/CAN 61 certified.

2.5 PRODUCT PROPERTIES

A. AP Fill 720, uncured (Technical Data Sheet Rev. 6/19/2026):
   1. Appearance: Brown liquid.
   2. Viscosity at 77 deg F (25 deg C), ASTM D4878: 215 cP (215 mPa-s).
   3. Density, ASTM D3505: 69.9 lb/cu ft (1.12 kg/dm3).

B. AP Fill 720, cured:
   1. Compressive strength (with fine sand), ASTM C39: 1,803 psi (12,400 kPa).

2. Tensile strength, ASTM D1623: 43 psi (296 kPa).
3. Tensile elongation, ASTM D1623: 3.80 percent.
4. Shrinkage, ASTM D1042 / D756: Negligible.
5. Certification: Certified by ALS Global to NSF/ANSI/CAN 61 for contact with drinking water.

C. Compressive strength is determined with fine sand and does not represent the resin alone.

D. Alchatek Gen Cat, liquid:
1. Appearance: Yellow-orange liquid.
2. Viscosity at 77 deg F (25 deg C), ASTM D4878: 75 cP (75 mPa-s).
3. Flash point, ASTM D1310: 313 deg F (156 deg C).
4. Density, ASTM D3505: 65.5 lb/cu ft (1.05 kg/dm3).

E. Alchatek Gen Cat Fast, liquid:
1. Appearance: Yellow-orange liquid.
2. Viscosity at 77 deg F (25 deg C), ASTM D4878: 70 cP (70 mPa-s).
3. Flash point, ASTM D1310: 313 deg F (156 deg C).
4. Density, ASTM D3505: 65.5 lb/cu ft (1.05 kg/dm3).

F. Reaction with Alchatek Gen Cat (start / end, expansion):
1. 41 deg F (5 deg C): 5 percent, 18 / 95 seconds, 40 times; 8 percent, 15 / 60 seconds, 42 times; 10 percent, 15 / 48 seconds, 42 times.
2. 59 deg F (15 deg C): 5 percent, 18 / 78 seconds, 40 times; 8 percent, 14 / 51 seconds, 42 times; 10 percent, 11 / 41 seconds, 42 times.
3. 77 deg F (25 deg C): 5 percent, 14 / 55 seconds, 49 times; 8 percent, 10 / 43 seconds, 49 times; 10 percent, 8 / 35 seconds, 49 times.

G. Reaction with Alchatek Gen Cat Fast (start / end, expansion):
1. 41 deg F (5 deg C): 5 percent, 19 / 75 seconds, 42 times; 8 percent, 15 / 40 seconds, 42 times; 10 percent, 10 / 35 seconds, 42 times.
2. 59 deg F (15 deg C): 5 percent, 14 / 57 seconds, 45 times; 8 percent, 10 / 35 seconds, 45 times; 10 percent, 8 / 28 seconds, 45 times.
3. 77 deg F (25 deg C): 5 percent, 9 / 43 seconds, 49 times; 8 percent, 7 / 30 seconds, 49 times; 10 percent, 5 / 22 seconds, 49 times.

H. Properties will vary depending on application conditions.

2.6 ACCESSORIES

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

B. Injection Ports: Injection ports compatible with the pump in use, and injection packers for targeting specific void zones.

C. Injection Tubes: 1/2 inch steel injection tubes for deep void access.

D. Surface Protection: Alchatek Surface Guard 125.

E. Crack Sealant: SlabSeal 142.

F. Pump Flush: Alchatek Pump Flush.

G. Hole Patching: Hydraulic cement or concrete patch for concrete, cold patch for asphalt, epoxy for interior slabs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locate utilities through the applicable one-call service before drilling.

B. Review site plans and project documents and confirm against field conditions: slab thickness and construction type, void location, depth, and estimated volume, reinforcing and post-tension cable locations, soil and erosion conditions, and underground utilities and drainage.

C. Investigate with ground penetrating radar to locate void boundaries and depth, reinforcing, post-tension cables, and utilities.

D. Confirm voids and verify depth and accessibility by probing. Where access permits, estimate void volume and conditions with a borescope camera.

E. Identify drainage and water management conditions contributing to void formation and report them before work begins.

F. Identify where the cavity is directly accessible without drilling and free-spray application is appropriate.

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

3.2 PREPARATION

A. Injection Grid:

1. Where the void is beneath a slab, lay out injection points 3 to 4 feet apart.
2. Keep holes 18 to 24 inches from joints and slab edges. Start at the lowest points. Avoid post-tension cables as verified by ground penetrating radar.
3. Where the void is open and accessible, no ports are required. Foam may be free-sprayed into the open space.

B. Drill injection holes through the slab with a 3/8 or 5/8 inch carbide-tipped bit to suit the ports in use. Note void depth as the bit breaks through. Clean debris from holes. Where reinforcing or post-tension cable is encountered, relocate the hole 6 to 12 inches away and mark the abandoned location.

C. Where used for large voids, drill a 1/2 inch monitoring hole and insert a borescope to monitor foam placement during injection.

D. Set dial indicators on overlying surfaces to detect unintended lifting.

E. Surface Protection: Pre-spray injection points and surrounding areas with Alchatek Surface Guard 125. Cover finished surfaces with plastic sheeting.

F. Where the void is dry, add water through the injection holes before injecting resin.

G. Personal Protection: Provide eye and face protection, chemical-resistant gloves, long sleeves and long pants, work boots, and safety vests. Provide respiratory protection in confined spaces.

3.3 MIXING

A. Batch mix resin and catalyst in a plastic or metal container, in small quantities to limit waste.

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

C. Select catalyst type and dosage by volume within the range published in Article 2.5, based on temperature and water conditions. Increase catalyst in cold conditions and reduce catalyst in hot conditions.

D. Mix only the quantity that can be placed within the reaction time of the dosage selected.

E. Keep containers closed when not in use and keep water out of the resin and the pump.

3.4 INSTALLATION

A. Injection Equipment:

1. Single-component injection pump capable of delivering catalyzed resin at controlled flow, with pressure indication visible to the operator.
2. Pre-flush the pump with Alchatek Pump Flush at the start of each day so the pump is primed and free of moisture.

B. Grid Injection, Incremental Method:
    1. Insert a port at the first grid point and inject a controlled volume. Use short shots of 3 to 5 seconds for open voids.
    2. Move systematically to the next grid point and rotate through all grid points.
    3. Wait 10 to 15 minutes for cooling before returning to the starting point.
    4. Repeat the rotation until the void is filled.
    5. Never fill an entire void from a single point or inject continuously without cooling intervals.
C. Free-Spray Application, Accessible Voids:
    1. Spray a controlled layer 6 to 12 inches deep into the void.
    2. Allow 10 to 15 minutes for cooling and expansion.
    3. Apply the next layer and continue in lifts until the void is filled.
D. Monitor continuously for material emergence at joints and edges, pump pressure, dial indicator movement showing lifting, and smoke or excessive heat.
E. Stop injection if smoke or excessive heat appears, if dial indicators show lifting of overlying construction, or if material emerges at joints or edges.
F. Where an adjacent slab moves unintentionally, stop injection and saw cut joints to isolate the slabs before continuing.

3.5 FIELD QUALITY CONTROL

A. Confirm cavity fill by borescope, probing, or refusal at each injection point.
B. Record for each hole or lift the location, quantity placed, catalyst percentage, cooling interval, and any movement or emergence.

3.6 CLEANING

A. Remove foam that surfaced at joints, cracks, or edges before it cures.
B. Seal cracks in the slab with SlabSeal 142.
C. Clean injection holes of debris and patch with hydraulic cement in concrete, cold patch in asphalt, or epoxy in interior slabs. Match the surrounding surface texture.
D. Remove excess foam, plastic sheeting, and empty containers from the site.
E. Flush the pump and lines with Alchatek Pump Flush at the end of each day. Never rinse the pump with water.

3.7 PROTECTION

A. Protect completed work from traffic and loading until the injected material has cured.
B. Conduct a final walkthrough to confirm all holes are patched, surfaces are clean, and all equipment is accounted for.

END OF SECTION 31 43 00.20