SECTION 31 43 00.10
SLAB LIFTING

Basis of Design: AP Lift 475 | Revision 1 | Issued 2026-09-24

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes raising settled concrete slabs to design elevation by injection of two-component structural polyurethane foam through small holes drilled in the slab, filling voids and densifying the supporting soil.

B. Work of this Section corrects settlement of concrete slabs. Completion is judged by attainment of the design elevation, confirmed by dial indicator or level, and by filling of remaining voids beneath the slab.

C. Soil stabilization at depth and void filling where no lift is required are specified separately.

D. AP Lift 475 is intended for DOT roadway, bridge approach and departure, and parking slabs; industrial slabs with heavy equipment; airport and rail slabs; underground utility, pipe, and culvert support slabs; and slabs requiring high compressive strength.

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. Repair of asphalt paving at injection holes: As required by the Contract Documents.

1.3 REFERENCES

A. ASTM International:

1. ASTM C273 - Standard Test Method for Shear Properties of Sandwich Core Materials.
2. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
3. ASTM D732 - Standard Test Method for Shear Strength of Plastics by Punch Tool.
4. ASTM D756 - Standard Practice for Determination of Weight and Shape Changes of Plastics Under Accelerated Service Conditions.
5. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics.
6. ASTM D1042 - Standard Test Method for Linear Dimensional Changes of Plastics.
7. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
8. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
9. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
10. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
11. ASTM D4878 - Standard Test Methods for Polyurethane Raw Materials: Determination of Viscosity of Polyols.
12. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
13. ASTM D7487 - Standard Practice for Polyurethane Raw Materials: Polyurethane Foam Cup Test.

B. NSF International:

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

2. NSF/ANSI/CAN 372 - Drinking Water System Components: Lead Content.

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. Slab thickness, construction type, reinforcing and post-tension cable locations, and attachment points such as dowels and tied structures.
4. Drainage and water management conditions contributing to settlement.
5. Injection grid, hole placement, and injection sequence.
6. Design elevations, reference elevation, and monitoring method.
7. Use of mechanical slab jacks, where required.
8. Material temperature, equipment heat settings, and cold-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. Lift Plan: Drawing showing treatment area, diamond injection grid and spacing, control joints, no-drill zones, reference elevation, design elevations, and monitoring locations.

E. Where the work occurs within a drinking water source or its zone of influence, submit current NSF/ANSI/CAN 61 and 372 certification of the injected material.

1.6 INFORMATIONAL SUBMITTALS

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

B. Starting Elevation Record: Slab condition and starting elevations at each monitoring point.

C. Injection Record: For each hole, location, quantity placed, elevation change, and reason injection was stopped.

D. Final Elevation Record: Final slab elevations and any areas requiring follow-up.

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

C. Cold Weather: Crew shall understand frost and permeation limits before working in cold conditions.

D. 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. Dispose of surplus material in accordance with local regulations.

1.9 FIELD CONDITIONS

A. Material temperature shall be 60 to 90 deg F (15 to 32 deg C) at the time of injection.

B. Equipment Heat Settings: For optimal performance, set the A-side to 100 deg F (38 deg C), the B-side to 110 deg F (43 deg C), and hose heat to 105 deg F (41 deg C), or as indicated on the container tops.

C. Cold Weather:

1. Precondition material to 70 deg F (21 deg C). Maintain drums, lines, and hoses at the recommended temperatures, insulate hoses to prevent freezing, and protect the work area with concrete blankets.
2. Stop work when temperature falls below minus 4 deg F (minus 20 deg C). Frozen ground will cause post-thaw settlement. Resume only when conditions improve.
3. Below 50 deg F (10 deg C), extend wait times between injections and monitor material cure rates.

D. Water Management: Identify gutter downspouts, drainage paths, surface runoff, standing water, and grading issues contributing to settlement, and report them before work begins.

E. Excessive foam build-up can result in degraded material properties or, in rare cases, fire, due to high internal temperatures.

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 Lift 475.

B. Description: Two-component, high-strength, high-density, hydro-insensitive structural polyurethane foam. Unconfined density 4.75 lb/cu ft (76 kg/m3). Low viscosity. Closed cell. Works in wet environments and displaces water. Bonds with soil and concrete. Traffic ready in 15 minutes.

C. AP Lift 475 is also available in a slow version. Where a slower reaction is required by field conditions, identify the version in the product data submittal.

2.3 SUBSTITUTIONS

A. AP Lift 475 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 and 372 certification is not an acceptable substitution.

2.4 PERFORMANCE REQUIREMENTS

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

B. Injected material shall be hydro-insensitive, shall displace water, and shall cure in wet conditions.

C. Injected material shall bond with soil and concrete.

D. Injected material shall reach 90 percent of full strength within 15 minutes.

E. Where the work occurs within a drinking water source or its zone of influence, injected material shall be certified to NSF/ANSI/CAN 61 and 372.

2.5 PRODUCT PROPERTIES

A. AP Lift 475, cured (Technical Data Sheet Rev. 1/20/2026):

1. Density, ASTM D1622: 4.75 +/- 0.25 lb/cu ft (76.09 +/- 4.00 kg/m3).
2. A-side specific gravity: 1.23. B-side specific gravity: 1.04.
3. Viscosity at 110 deg F, ASTM D4878: 200 cP (200 mPa-s).
4. Cream time at 105 deg F, ASTM D7487: 4 seconds. Tack free time: 25 seconds. Rise time: 27 seconds.
5. Free rise compressive strength, ASTM D1621 / D1622: 110 psi (758 kPa).
6. Free rise tensile strength, ASTM D638: 100 psi (689 kPa).
7. Free rise shear strength, ASTM C273: 55 psi (379 kPa).
8. Flexural strength, ASTM D790: 165 psi (1,138 kPa).
9. Closed cell content, ASTM D6226: 91.3 percent.
10. Shrinkage, ASTM D1042 / D756: Negligible.
11. Thermal and humid aging, ASTM D2126: Dimensional change 1 percent; volume change 0.25 percent.
12. Unconfined expansion: 15 times.
13. 90 percent of full strength: 15 minutes.

B. Confined strength by compression ratio (compressive, ASTM D1621 / D1623; shear, ASTM D732):

1. 1.5 times: Compressive 171 psi (1,179 kPa); shear 81 psi (558 kPa).
2. 2 times: Compressive 252 psi (1,737 kPa); shear 126 psi (869 kPa).
3. 3 times: Compressive 406 psi (2,799 kPa); shear 203 psi (1,400 kPa).

C. Certification: NSF/ANSI/CAN 61 and 372, safe for contact with drinking water.

D. Properties will vary depending on application conditions.

2.6 ACCESSORIES

A. Injection Ports: 3/8 inch injection ports compatible with the gun in use.

B. Mechanical Slab Jacks: Anchored mechanical jacks with self-tapping masonry anchors, where required.

C. Surface Protection: Alchatek Surface Guard 125.

D. Crack Sealant: SlabSeal 142.

E. 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, reinforcing and post-tension cable locations, soil and drainage conditions, and building attachment points such as doweled slabs and tied structures.

C. Investigate with ground penetrating radar to locate voids, reinforcing, post-tension cables, in-slab conduits, and utilities.

D. Inspect drainage pipes beneath or adjacent to the slab with a sewer camera before and after the work.

E. Visually inspect and record cracks, control joints, binding points, attached structures, and drainage patterns. Document slab condition and starting elevations.

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

3.2 PREPARATION

A. Injection Grid: Lay out injection points in a diamond grid pattern to provide overlapping coverage and prevent point-loading:

1. 3 feet: Heavy industrial loads, slabs 6 inches thick or thicker, and critical or engineered projects.
2. 4 feet: Standard slabs and large areas.

B. Hole Placement:

1. Keep holes 18 to 24 inches from joints and slab edges.
2. Start at the lowest points to establish reference elevation.
3. Avoid post-tension cables as verified by ground penetrating radar.

C. Mark every injection point and likely foam emergence points at joints, cracks, and edges.

D. Place dial indicators on the slab and set up a laser level or zip level. Establish reference elevation at an adjacent slab or at the design finish height.

E. Verify the slab can move freely. Where the slab is bound by dowels, attached structures, railings, or adjacent slabs, saw cut control joints to allow independent movement.

F. Mechanical Lifting, where used:

1. Install self-tapping masonry anchors at lift points at slab edges or low corners and attach slab jacks.
2. Before foam injection, raise the slab to 80 percent of the design lift in 1 inch increments, alternating between jacks. Leave jacks in place during foam injection. Complete the final 20 percent of lift with foam.

G. Drill injection holes through the slab with a 3/8 or 5/8 inch carbide-tipped bit to suit the gun 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.

H. Surface Protection: Pre-spray injection points, joints, cracks, and edges with Alchatek Surface Guard 125 and keep them wet during pumping. Cover finished surfaces with plastic sheeting.

I. 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. AP Lift 475 is a two-component product proportioned and mixed by the injection equipment. Do not batch mix.

B. Before injection, confirm material temperature is 60 to 90 deg F (15 to 32 deg C), heater controllers are set as specified in Article 1.9, and A-side and B-side pressures are balanced.

3.4 INSTALLATION

A. Injection Equipment:

1. Plural-component proportioning rig with separately heated A-side and B-side and heated, temperature-controlled hoses.
2. Impingement mix gun with water or air purge, with buttonhead fitting and quick-connect coupler.

3. Pressure indication for A-side and B-side visible to the operator. Pressures shall remain balanced.

B. Insert an injection port in the hole and confirm it is secure before connecting the gun.

C. Injection Sequence:

1. Start at the lowest point to establish reference elevation and work systematically through the diamond grid.
2. Large slabs: Start near the equipment to avoid dragging hoses.
3. Bound or rolled slabs: Alternate sides to balance lifting forces.
4. Sidewalks and small slabs: Reduce shot length and allow more time between shots.

D. Incremental Lifting:

1. Pump material in shots of 3 to 15 seconds, with 3 to 7 seconds between shots for expansion. Use longer initial shots for larger voids and thicker slabs, shorter shots in hot weather, and longer shots in cold weather.
2. Lift no more than 1/4 inch per shot to avoid cracking.
3. Achieve approximately 1 inch of total lift at a location before moving to adjacent holes.
4. Work back and forth to balance stress. Never fully lift from one side.

E. Monitor continuously dial indicators, machine pressures, material emergence at joints and edges, slab cracking or binding, and adjacent slab movement.

F. Stop injection at a hole when:

1. The design elevation is reached, as confirmed by dial indicator.
2. Material emerges at joints or edges.
3. The hole reaches refusal.
4. The slab shows signs of stress or cracking.

G. Where a hole reaches refusal before the design elevation, drill additional holes 12 to 18 inches away and continue from the new locations.

H. Where an adjacent slab moves unintentionally, stop injection and saw cut joints to isolate the slabs before continuing.

I. Purge the gun as required by the gun in use. For water-purge guns, purge within 7 to 10 seconds of final injection or when pausing longer than 10 seconds. Where work must pause, move to a new area rather than returning to a partially completed hole.

J. Final Void Filling: After the design elevation is achieved, check for remaining voids and inject additional material through secondary holes, including hollow areas under slab edges.

3.5 FIELD QUALITY CONTROL

A. Recheck elevations periodically during the work.

B. Record for each hole the location, quantity placed, elevation change, and reason injection was stopped.

C. Record final slab elevations and identify any areas requiring follow-up.

D. Return to Service: AP Lift 475 reaches 90 percent of full strength and is traffic ready in 15 minutes.

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 mechanical jacks, where used, and patch anchor holes.

E. Remove excess foam, plastic sheeting, and empty containers from the site. Clean equipment in accordance with the proportioner manufacturer's instructions.

3.7 PROTECTION

A. Protect completed work from traffic until the return-to-service interval in Article 3.5 has elapsed.

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 00.10