

SECTION 03 35 16

CONCRETE JOINT FILLING AND SPALL REPAIR

DTI JointSeal System

PART 1 - GENERAL

1.1 SUMMARY

A. This Section covers filling of saw-cut control joints and contraction joints in concrete slabs on ground with semi-rigid polyurea joint filler, and repair of spalls, popouts, and surface defects with polyurea repair mortar, using the DTI JointSeal System:

1. DTI JointSeal 85: semi-rigid polyurea filler, Shore A 85 hardness class, for warehouse and industrial floors subject to hard-wheeled traffic.
2. DTI JointSeal 45: semi-rigid polyurea filler, Shore A 45 hardness class, for floors subject to lighter traffic, softer wheels, or where a more flexible fill is specified.
3. DTI SpallPatch: polyurea repair mortar for spalls and surface defects, finished flush with the surrounding slab.

B. The work ranges from localized repair scopes to full warehouse joint filling programs of tens of thousands of lineal feet. The work includes joint preparation, backer and bond breaker installation where required, filler placement, shaving flush, spall repair, and cleanup.

C. Related work specified elsewhere: elastomeric sealant for moving joints, where scheduled, is covered in 3.5 of this Section when DTI JointSeal Flex is used, and by others where noted.

1.2 REFERENCES

- A. ACI 302.1R - Guide for Concrete Floor and Slab Construction, including guidance on joint filling materials, fill depth, and timing relative to slab shrinkage.
- B. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
- C. ASTM D2240 - Standard Test Method for Rubber Property, Durometer Hardness.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants.

1.3 DEFINITIONS

A. Semi-Rigid Filler: a polyurea or epoxy filler with sufficient hardness to support joint edges (shoulders) under traffic while retaining limited flexibility. Hardness is stated as a Shore A class per ASTM D2240.

B. Shoulder Support: full contact between the filler and both vertical faces of the joint, for the full fill depth, so that traffic loads crossing the joint are carried by the filler and not by unsupported concrete edges.

C. Flush Finish: filler finished level with the adjacent slab surface, neither crowned above nor recessed below the surface. Crowned filler is worn and torn by traffic; recessed filler leaves the joint edges unprotected.

D. Spall: a fragment of concrete broken away from the slab surface, typically at a joint or crack, leaving a shallow depression with unsound edges.

E. Dormant Joint or Crack: a joint or crack that is not measurably moving. Isolation, expansion, and other joints designed to move are not dormant.

1.4 SUBMITTALS

- A. Product data for DTI JointSeal 85, DTI JointSeal 45, DTI SpallPatch, and DTI JointSeal Flex where scheduled.
- B. Installer qualifications: minimum five years of concrete joint filling and repair experience, with completed warehouse or industrial projects of similar lineal footage.
- C. Mock-up approval record (see 1.6).
- D. Traffic return schedule for the products proposed, including adjustments for slab temperature (see 3.7).

1.5 QUALITY ASSURANCE

- A. Pre-installation conference with the Owner, General Contractor, and joint filling contractor to confirm filler class by area, joint inventory and lineal footage, slab age and fill timing (see 3.3), facility operations and access windows, and traffic return requirements.
- B. Slab age and shrinkage: joint filler installed in new slabs is subject to continued joint opening as the slab shrinks and curls. Where the project schedule allows, filling of new slabs shall be deferred per 3.3. The Owner's decision to fill earlier shall be recorded at the pre-installation conference.
- C. Temperature: filler and repair materials shall be installed only when slab and ambient temperatures are within the manufacturer's stated range. Cold slabs materially extend set, shave, and traffic return times; see 3.7.

1.6 MOCK-UP

- A. Before production work, complete a mock-up consisting of not less than 50 lineal feet of filled joint and one spall repair, in an area designated by the Owner, carried through the full specified sequence including shaving flush.
- B. The approved mock-up establishes the standard for joint preparation, fill depth, flush finish, and repair blending for the project. Production work shall match the approved mock-up.

1.7 DESIGN LIMITATIONS AND EXCLUSIONS

- A. Joint filler protects joint edges and restores a smooth riding surface. It does not restore structural load transfer, correct slab curl, settlement, or lippage, or prevent future joint movement or cracking.
- B. Filler in new slabs will separate from one joint face or split cohesively if the joint continues to open from shrinkage after installation. This is a slab behavior, not a material defect, and is excluded when filling is performed before the timing in 3.3 at the Owner's direction.
- C. Moving joints, including isolation joints, expansion joints, and joints at column blockouts and dissimilar materials, shall not be filled with semi-rigid filler. They receive elastomeric sealant per 3.5 or are by others.
- D. Hidden voids beneath the slab, delaminations, and unsound concrete beyond the visible spall perimeter are excluded. Where sounding or preparation reveals voids or unsound material beyond the scheduled repair limits, notify the Owner before proceeding; additional removal and fill are a change in scope.
- E. Pour-backs, patches, and new concrete within or adjacent to the work shall cure a minimum of 28 days before joint filling or repair work over them.
- F. Filler and repair mortar color will not exactly match the slab and will vary with slab age and exposure. A visible line at filled joints and a visible patch outline at repairs are expected and are not defects.
- G. On uneven slabs, filler cannot strike perfectly flush at every point; isolated minor deviations where the slab surface itself rises or falls across the joint are acceptable where the filler has been shaved per 3.4.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Semi-rigid joint filler, warehouse and industrial: DTI JointSeal 85, a two-component semi-rigid polyurea joint filler, Shore A hardness class 85 per ASTM D2240, self-leveling, formulated to support joint shoulders under hard-wheeled forklift and pallet jack traffic while retaining limited flexibility for slab movement.
- B. Semi-rigid joint filler, light duty: DTI JointSeal 45, a two-component semi-rigid polyurea joint filler, Shore A hardness class 45 per ASTM D2240, for retail, light industrial, and softer-wheel traffic, and where greater flexibility is preferred.
- C. Repair mortar: DTI SpallPatch, a two-component polyurea repair mortar, trowelable, fast setting, capable of being placed in shallow lifts at feathered perimeters prepared per 3.5, and of being ground, shaved, or polished flush with the surrounding slab after cure.
- D. Elastomeric joint sealant (moving joints, where scheduled): DTI JointSeal Flex, a single-component elastomeric polyurethane sealant meeting ASTM C920, for isolation and expansion joints excluded from semi-rigid filling.
- E. Backer rod: closed-cell polyethylene foam backer rod, diameter approximately 25 percent greater than the joint width, for depth control in joints deeper than the specified fill depth and for elastomeric sealant joints.
- F. Bond breaker: polyethylene bond breaker tape, for the base of joints where backer rod is not used and three-sided adhesion must be prevented.
- G. Joint cleaning materials: oil-free compressed air, vacuum equipment, and stiff brushes. Solvent cleaning only where permitted by the facility and the material manufacturer.

2.2 EQUIPMENT

- A. Joint preparation: walk-behind joint saw or joint router with vacuum dust collection, capable of producing clean, vertical, sound joint faces; wire wheel and hand tools for detail preparation.
- B. Dispensing: dual-component pump or cartridge dispensing equipment with static mixing, sized for continuous placement at production rates without cold joints within a joint run.
- C. Shaving: long-handled razor shaver or floor scraper with replaceable blades, and grinders fitted with vacuum dust collection for flush finishing and repair blending.
- D. Moisture and temperature checks: slab surface thermometer and moisture indicator as required by 3.1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inventory the joints and defects: measure lineal footage by joint type, note widths, existing filler condition, spalls, and edge deterioration, and record photographically before starting.
- B. Verify joints and repair areas are structurally sound at the surface. Sound suspect areas by hammer or chain drag; report voids, delamination, and rocking slabs to the Owner per 1.7.
- C. Verify the slab is dry at the joint. Do not install filler in standing water, on frost, or where moisture is actively wicking through the joint.
- D. Verify slab age against the fill timing in 3.3 and record the Owner's direction where filling proceeds earlier than specified.

3.2 PREPARATION

- A. Remove existing filler, sealant, backer, and debris from joints to the full specified fill depth. Remove failed filler completely; do not bridge new filler over old material.
- B. Saw-cut or rout each joint as required to reach sound, vertical concrete faces on both sides. Widen deteriorated or raveled joints until both shoulders are sound. The resulting joint faces, not the original cut, define the fill width.
- C. Clean joints by vacuum, stiff brushing, and oil-free compressed air, working immediately ahead of filling. Joint faces shall be clean, dry, and free of dust, laitance, curing compounds, oils, and loose material at the moment of filling. Dust left in the joint is a bond breaker and is the most common cause of filler separation.
- D. Protect adjacent floor surfaces, racking, goods, and equipment from dust and material spills. Maintain dust control for the duration of the work.

3.3 JOINT FILL DEPTH, SUPPORT, AND TIMING

- A. Fill depth: fill saw-cut control and contraction joints to the full depth of the saw cut, and not less than 2 inches deep, so the filler supports both shoulders for the full depth of the traffic-bearing zone.
- B. Deep joints: where the joint extends deeper than the specified fill depth, install closed-cell backer rod or bond breaker tape at the base of the fill zone to establish the specified depth, prevent three-sided adhesion, and preserve a supported filler section.
- C. Shoulder support: filler shall bond to both joint faces for the full fill depth. Joints prepared with rounded, raveled, or undercut faces shall be re-cut per 3.2 until full support is achievable; filler placed against unsound faces will fail at the shoulder.
- D. Fill timing, new slabs: where the project schedule allows, defer filling of new slabs a minimum of 60 to 90 days after slab placement so the majority of drying shrinkage and joint opening has occurred. Filling earlier is at the Owner's direction per 1.5 and carries the separation risk stated in 1.7.
- E. Fill timing, existing slabs: joints may be filled at any slab age provided they are clean, dry, and dormant. Active or moving cracks and joints are excluded and treated per 3.6.
- F. Temperature: condition material and verify slab temperature per 1.5. Cold slabs extend gel, shave, and cure times; do not force the shave or traffic schedule on a cold slab.

3.4 FILLING AND SHAVING FLUSH

- A. Mix and dispense filler per the manufacturer's instructions through static mixing equipment. Discard the initial discharge of each cartridge or mix cycle until the material is uniform in color.
- B. Fill from the bottom of the joint upward, keeping the dispensing tip in the material, and overfill each joint slightly above the slab surface to allow for shaving. Avoid air entrapment, skips, and pinholes; refill voids immediately while the material is fluid.
- C. Allow the filler to cure to shaving hardness. Shave the overfill flush with the slab surface in one continuous pass with a razor shaver. Shave within the manufacturer's shaving window: shaving too early smears the filler; shaving too late leaves ridges and torn edges.
- D. The finished filler shall be flush per 1.3: not crowned, which traffic will catch and tear, and not recessed, which leaves the shoulders unprotected. Inspect by straightedge and by hand; re-fill and re-shave low or damaged sections.
- E. Remove shavings and debris the same day. Shavings left on the floor are ground into the surface by forklift traffic.

3.5 SPALL REPAIR

- A. Delineate the full unsound area by sounding; the repair perimeter shall extend into sound concrete on all sides, which is normally beyond the visible spall.
- B. Sawcut the repair perimeter a minimum of 1/2 inch deep, square or rectangular to the extent practical, to provide a defined edge and prevent a feathered, weak repair boundary.
- C. Remove all unsound, delaminated, and broken concrete within the perimeter to sound material. Where removal reveals voids beneath the slab or deterioration deeper than the scheduled repair, stop and notify the Owner per 1.7.
- D. Clean the cavity by vacuum, brushing, and oil-free compressed air. The cavity shall be clean and dry at placement.
- E. Place DTI SpallPatch per the manufacturer's instructions, slightly overfilling the cavity. For repairs deeper than the product's single-lift limit, place in lifts as directed by the manufacturer.
- F. After cure, grind, shave, or polish the repair flush with the surrounding slab so no lip remains to catch traffic. Blend the repair edges into the adjacent surface.
- G. Where a joint passes through a repair, re-establish the joint through the cured repair by saw cutting, and fill per 3.3 and 3.4. Do not bridge a working joint with rigid repair material.

3.6 MOVING JOINTS AND CRACKS

- A. Isolation joints, expansion joints, and joints designed to move shall not receive semi-rigid filler. Where scheduled in this Section, prepare and seal them with DTI JointSeal Flex elastomeric sealant over backer rod, at a width-to-depth ratio of approximately 2 to 1, tooled to a smooth, slightly concave profile per ASTM C1193. Where not scheduled, moving joints are by others.
- B. Dormant cracks narrower than joint width may be filled with DTI JointSeal 85 or DTI JointSeal 45 as scheduled, routed or opened as needed for full-depth fill per 3.2.
- C. Moving or structural cracks are excluded from cosmetic filling and shall be reported to the Owner.

3.7 FIELD QUALITY CONTROL

- A. Inspect filled joints for full-depth fill, bond to both faces, and flush finish. Probe for voids, soft spots, and unbonded lengths; remove and replace defective sections.
- B. Inspect repairs for bond, flush finish, and smooth transition to the surrounding slab under raking light and by hand.
- C. Verify filler hardness is developing per the product data for the class installed before opening to traffic per 3.8.

3.8 TRAFFIC RETURN AND TURNOVER

- A. Typical traffic return for DTI JointSeal and DTI SpallPatch products at moderate slab temperatures: foot traffic in approximately 30 minutes, and hard-wheeled forklift traffic in approximately 1 to 2 hours after placement, or per the product data for the installed material, whichever is longer.
- B. Cold slabs extend these times materially. The contractor shall verify set and hardness before releasing areas to traffic and shall not release on the clock alone.
- C. Protect filled joints and repairs from traffic until released. Barricade or plate repair areas within operating facilities and coordinate phased release with the Owner's operations.
- D. Turnover cleaning: vacuum and sweep the work areas, remove all shavings, debris, and material containers, and deliver care instructions noting that filled joints are wear surfaces to be inspected

periodically, with localized re-fill of damaged sections as routine maintenance.

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