LL-TEQ

Pavement construction and rehabilitation

STANDARD OPERATING PROCEDURE · LL-TEQ™ SYSTEM · COLD IN-PLACE PROCESS

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STANDARD OPERATING PROCEDURE (SOP)

Pavement construction and rehabilitation

LL-TEQ™ system — cold in-place process · LL30 (structure) + in-place material + LL25 (seal coat)

REFERENCE

SOP_LLTEQ_Chaussee

REVISION

Rev. M — May 2026

PROCESS

Cold in-place — construction & rehabilitation

COMPONENTS

LL30 (structure) + in-place material + LL25 (seal)

01 Purpose & scope

LL-TEQ™ system — cold in-place process

Method for the **supply and installation of the LL-TEQ™ system** in pavement construction and rehabilitation, by a cold in-place process with standard road equipment.

The process applies equally to **construction** (soil or granular base) and **rehabilitation** (recycling the existing asphalt).

Key requirement

Integration of LL30 through the full thickness specified for the project (**product range 50 to 200 mm**), compacted to **95%+**, then surface sealing with **LL25**.

Scope

This document describes **product supply and the installation method**. Sizing, thickness, geometry (profile, slope, cross-fall), drainage and the work-acceptance criteria are the responsibility of the **project designer**, not LL-TEQ™.

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Definitions

Terms and abbreviations used in the procedure

TERM	DEFINITION
LL-TEQ™	Complete system (LL30 + LL25).
LL30	Structural product, integrated into the soil.
LL25	Seal coat, applied on the surface.
OMC	Optimum moisture content of the material.
Stabilizer / cold recycler	Milling, mixing and in-place integration machine.
RAP	Reclaimed asphalt pavement (milled asphalt).

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Roles & responsibilities

Qualification, supplier and contractor

- **Required qualification:** the work must be carried out by an **LL-TEQ™-accredited contractor**.
- **LL-TEQ™ supplier:** provides the products; trains and accredits contractors; supervises and teaches the parameters on the first jobsites; technical support.
- **LL-TEQ™-accredited contractor:** once accredited, independently determines and applies the dilution and dosage; executes the procedure in accordance with this SOP; provides the OMC and site conditions; operates the equipment; validates preparation, compaction and reopening.

Execution responsibility

The performance of the LL-TEQ™ system depends on full compliance with this procedure. Any deviation (dilution, depth, compaction, cure) may compromise the result; responsibility for compliant execution lies with the accredited contractor, including jobsite safety and regulatory compliance.

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Materials & equipment

Constituents and machinery of the process

Materials

- **LL30:** structural product, integrated into the soil. No mixing before use; visual inspection before use.
- **LL25:** seal coat, applied on the surface.
- **In-place material:** compatible native soil or granular base (construction); milled asphalt (RAP) + existing base (rehabilitation). Not frozen, free of harmful organic matter.

Equipment (or equivalent providing a compliant finish)

- **Stabilizer / cold recycler** with a computerized emulsion system required (e.g. CAT RM400 or RM500).
- **Grader** (e.g. Caterpillar 140).
- **Water truck / tanker** of about **15,000 L (4,000 gal)** (e.g. Freightliner M2 106), fitted with a pump, 3 in or larger hose/outlet. Connected to the stabilizer for integration, then surface spraying of LL25 via the rear bar.
- **Push bar** on the stabilizer to push the water truck.
- **3 in trash pump** to transfer LL25 and LL30 into the water truck.
- **Compact loader (skid steer)** with a 5 ft bucket (e.g. Bobcat S450) for areas the stabilizer cannot reach.
- **Double steel drum roller.**
- **Vibratory plate, pumps, hand tools** (manual areas).

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Storage & handling

Storage conditions for LL30 and LL25

On receipt, **cover the products** and protect them from sun and frost. Conditions for LL30 and LL25:

- Original or compatible container, clean, labelled, hermetically sealed.
- **Out of direct sunlight**; cover the products on receipt.
- **Protect from frost** (products are frost-sensitive before installation); store **> 5 °C and < 44 °C**.
- Away from excessive heat and any contamination.
- Shelf life: **12 months** unopened / **6 months** after opening.
- No mixing or re-mixing before use, even after prolonged storage.
- **Before use:** visual inspection; product in good condition, unaffected by frost or a freeze-thaw cycle.
- Any visibly contaminated or altered product must not be used without supplier approval.

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Dosage & dilution

Determined and applied by the accredited contractor

The contractor determines and applies the dilution and dosage per LL-TEQ™ procedures. On the **first (supervised) jobsites**, these parameters are given and taught by LL-TEQ™; the contractor then applies them independently once accredited.

- OMC measured per the **ASTM** method.
- **Moisture target:** at OMC for most soils; **below OMC** for clay soils (depending on the concentration to be adjusted).
- OMC check **every 25 m** behind the stabilizer.
- As a guideline: about **75% of the time**, the OMC is between **6 and 12%**.

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Field procedure

Phases 1–2: preparation & installation

Before starting

Check the execution conditions (§8): substrate **not frozen** and **> 5 °C**.

Phase 1 — Preparation

- Strip vegetation and organic matter (*clear & grub*).
- Excavate as needed: remove excess soil or poor material to reach the target rough grade.
- Import and place a granular base as needed (construction). In rehabilitation: recycle the asphalt and existing base with the stabilizer, with no import.
- Condition the moisture if required.
- **The substrate must be stable, validated by a proof-roll.** If there is deflection, compact until stable. On a new road, if the structure is already stable, it need not be compacted before stabilization.

Phase 2 — Installation

- **Integration:** integrate LL30 with the stabilizer to the target depth (**50 to 200 mm** depending on the project). Work on a stable substrate.
- **Shaping:** the grader follows directly behind the stabilizer; shape according to the project geometry.
- **First compaction:** double drum roller; it protects the surface, particularly in case of rain. In case of rain, push this first compaction to **95%+** without delay.
- **Finish grading:** a further grader pass for final surface adjustment.
- **Final compaction:** compact in cross passes to **95%+**. Compaction verification is the accredited contractor's responsibility, by appropriate means.

- **Delay before sealing:** wait **2 h** after final compaction before applying the seal coat, to let the surface harden, since the water truck is heavy and would mark a surface that is too fresh.
- **Sealing (LL25):** apply the seal coat to uniform saturation, over the whole surface including the manual areas.

Field procedure (continued)

Jobsite contingencies · Phases 3–4: cure & cleaning

Areas the stabilizer cannot reach (around catch basins, manholes, curbs, sidewalks)

- Place the material **in front of the stabilizer** with the compact loader (skid steer); after the stabilizer passes, pick up and replace it in the spots it could not reach.
- Mixing, integration and compaction **by hand** where the machine cannot reach. Small adjustments with a shovel, with people as needed. Suggested equipment: concrete mixer, vibratory plate, hand tools.

Rain

- **Do not work in the rain.**
- **Sudden rain on an LL30 surface not yet sealed:** immediately compact the entire treated surface to 95%+ to protect it.
- **LL25 needs at least 3 h without rain** after application to work. Do not apply the seal coat if rain is possible within 3 h: rain dissolves LL25 and prevents its integration, and rework is required.

Phase 3 — Cure and reopening to traffic

- **LL-TEQ™ cures by evaporation:** the time depends on conditions. Humid, rainy or overcast: longer cure; hot and dry: faster cure.
- **Minimum 12 h** before reopening to traffic, and more depending on conditions, typically on the order of **24 to 72 h** if drying is slowed.

- **Reopening criterion:** the surface is no longer at all tacky to the touch. As long as it stays tacky, extend the cure.
- Reopening at the accredited contractor's judgement.

Reopening threshold

No numerical reopening threshold (% residual moisture or hardness) is defined; if a project requires one, it is provided by LL-TEQ™.

Phase 4 — Equipment cleaning

- **Water truck:** wash with water, hoses included.
- **Stabilizer:** drain and rinse with water for 5 to 10 minutes for a complete cleaning.
- The products are water-based: rinse before drying (dried product forms a film that is hard to remove).
- **Rinse water:** may be sprayed onto the verges (sides) for dust control if desired. Never rinse or spray water onto the freshly treated surface: curing is about driving off moisture.

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Execution conditions

Environmental and substrate preconditions

- Substrate **not frozen and stable**.
- Ambient and substrate temperature **> 5 °C** during operations.
- **Do not work in the rain.**
- **LL25 requires at least 3 h without rain** after application.
- Do not work on a saturated or waterlogged substrate.

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Verification points

Verified by the LL-TEQ™-accredited contractor

REF.	VERIFICATION POINT	BENCHMARK
V-1	Preparation	Stable substrate (proof-roll), shaped
V-2	Dilution	Determined and applied by the accredited contractor (supervised by LL-TEQ™ at first)
V-3	LL30 integration	Uniform mix through full depth (50 to 200 mm depending on the project)
V-4	Shaping	Per the project geometry
V-5	Final compaction	95%+; verified by the accredited contractor
V-6	LL25 seal	Uniform surface saturation
V-7	Cure / reopening	Surface non-tacky; min. 12 h

Ref.: LL30 (TECH-21) and LL25 (TECH-20) Technical Manuals. Implementation example: SOW Rue Scapa, Joliette.

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