SURFACE SOLUTIONS

Cement Has Changed.

How is this affecting your installation?

The cement changed. Your installs are paying for it.

What every flooring contractor needs to know about Type IL portland-limestone cement.

01 / THE STANDARDS

The cement under your floor changed. Nobody told you.

THEN / THROUGH ~2020

What you used to install on

Portland cement • ASTM C150 • Types I, II, I/II

The slab you knew.

Pure portland cement. The chemistry every flooring spec sheet, adhesive data sheet, and prep guide was written around for decades. Predictable bleed water. Predictable cure. Predictable surface to bond to. Forgiving of a tight schedule.

NOW / THE NEW DEFAULT

What's showing up now

Portland-limestone cement • ASTM C595 • Type IL

The slab you're getting today.

Type IL replaces 5–15% of the cement with finely ground limestone. Same look on the truck. Different chemistry at the surface. Less bleed water, denser top millimeters, surface alkalinity that doesn't drop the way it used to. The default cement shipped in the US today.

Same trade. Same tools. Same schedule. Different concrete.

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How the new cement compares

What you'll see	Old portland (C150)	Type IL (today's default)
Cement chemistry	Pure portland	Portland + interground limestone
Limestone content	≤ 5% (incidental)	**5–15% (designed in)**
Bleed water at surface	Predictable	**Less; finishes earlier**
Surface tightness	Open enough to bond	**Denser top millimeters**
Surface alkalinity over time	Drops as concrete ages	**Stays high longer**
Cure margin before flooring	Industry-known	**Less than you think**
Your adhesive TDS written for it?	✓	**No**

Source: ASTM C150-23, ASTM C595-23 (cement specifications). Surface-behavior and cure-margin items reflect S3 PRISM field observation and PCA position.

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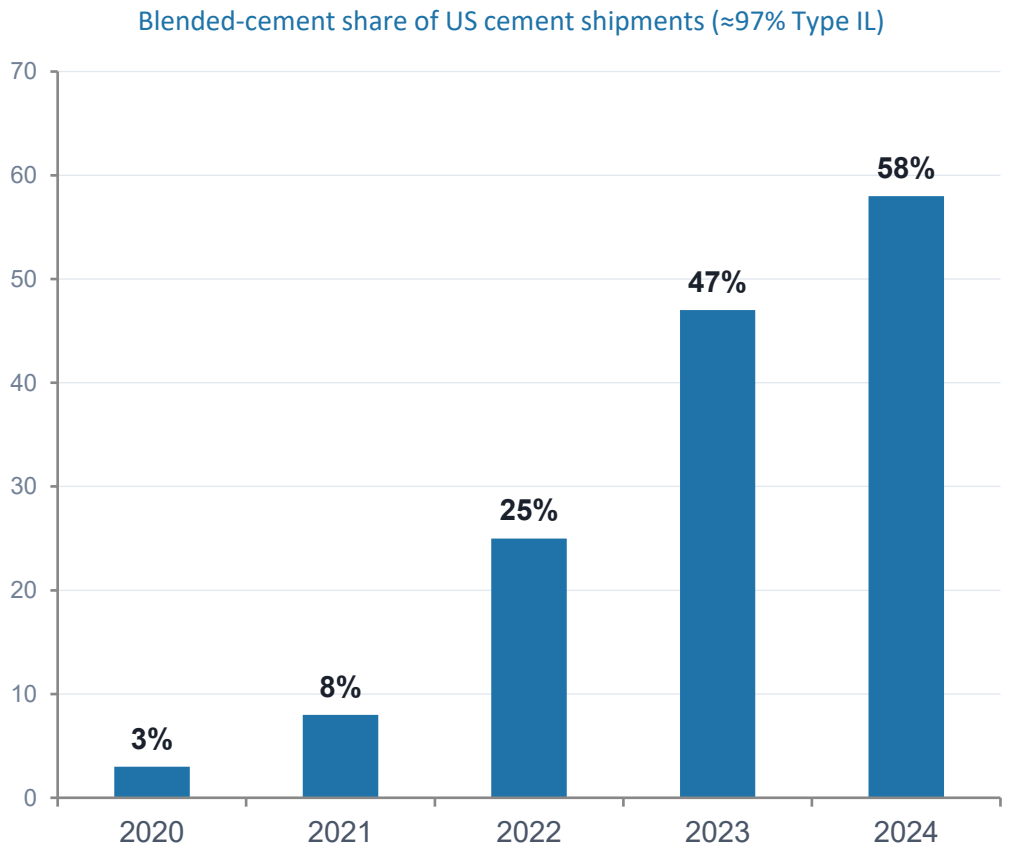
From niche to default in 36 months



97%

of blended cement shipped in 2025 was Type IL.

50 + DC

All US states + DC approved Type IL for DOT use as of April 2024.

June 2023

Type IL surpassed conventional portland in monthly US shipments.

Sources: USGS MCS 2025 — blended cement = 58% of US shipments (Jan–Aug 2024), 97% Type IL (so Type IL ≈ 56% of total). PCA/ACA — IL surpassed portland mid-2023; 50 states + DC approved Type IL for DOT use by April 2024. Current (USGS MCS 2026): blended = 63% of shipments (Jan–Sep 2025), 95% Type IL.

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What changes when you show up to install

Tendencies, not guarantees. Verify on every project — but expect these shifts.

What you'll see	Old portland	Type IL (today)	What it means for your install
Bleed water at the surface	Moderate, easy to see	Less; can be hard to spot	Don't wait — the window is closing earlier
Finishing window	Familiar timing	Shorter; arrives earlier	Crew may be late to first trowel pass
Trowel feel	Familiar grab	Tightens faster under the blade	Train newer crew on the new feel
Surface after finishing	Open enough to bond	Tighter, denser, "burnished"	Profile / prep more — don't assume natural openness
Set time	Industry-known	Often faster	Less working time. Stage finishers tighter.
Slump retention	Industry-known	Can drop faster between trucks	NEVER add jobsite water. Adjust admixture within dosage limits, or redesign the mix.

Sources: PCA, NRMCA, ASCC 2024 contractor survey, FHWA tech briefs on PLC.

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Why this matters at the surface

01

Smaller grains, less open space

Type IL is ground finer, so it demands more mix water, and the limestone fills the space between cement grains. The result: more water held in the slab, and a denser surface from the top down.

02

The surface seals itself faster

The top few millimeters knit tighter. Less bleed water rises. The slab looks ready sooner than it actually is — that's the trap.

03

The surface stays wet — so it stays alkaline

Finer particles and a denser pore structure slow drying at the top. While the pores stay wet, CO_2 can't move through them to carbonate and neutralize the surface — so surface pH stays high much longer than the old slabs you knew.

The result: a slab that looks ready to bond — and isn't.

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Why bonds fail when the tests say they shouldn't

THE CHAIN

1. Type IL fines + better particle packing
2. Densified surface zone (top few millimeters)
3. Surface dries slowly — pores stay wet
4. Wet pores block CO_2 — carbonation can't neutralize the surface
5. Surface pH stays high — longer
6. **Adhesive bond exposed to sustained alkalinity**
7. **Temp/humidity swings pull moisture and ions to the bond line**

All contribute to an installation failure

THE BOND LINE PROBLEM

pH 11.5–13.5

Every portland slab reaches this range — what's changed with Type IL is how long the surface holds it. Once sealed and re-wetted, high pH re-establishes and persists longer than historical Type I/II behavior would predict.

Modern low-VOC adhesives
can't handle the alkalinity that solvent-based products used to laugh off. The substrate got harsher. The adhesive got more sensitive. Both trends meet at the bond line — where your warranty lives.

Mechanism described in S3 PRISM technical disclosure (provisional patent pending). Carbonation/alkalinity dynamics consistent with peer-reviewed PLC carbonation studies.

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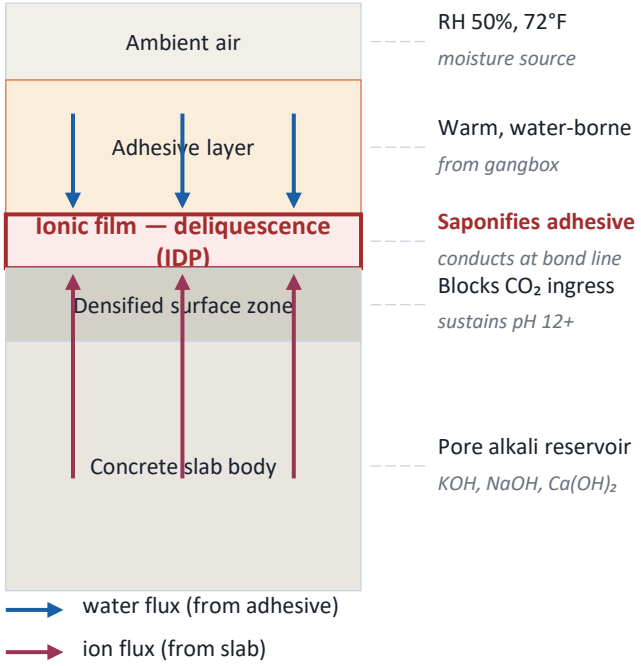
Where alkalinity becomes a weapon

Adhesive moisture meets slab alkalinity at the bond line. Temp and humidity swings finish the job.



WHAT YOU SEE

Type IL surface, chalky from too-fast top drying

5-second field check: rub the surface. Chalky residue = run a surface pH test before bonding (residue may be alkali, carbonate, or laitance).

Current ASTM tests measure moisture. Not this.

Four ASTM tests every flooring spec calls for. They miss two things — and those two things are what's killing your installs.

ASTM F1869

Calcium Chloride MVER

MEASURES

Surface moisture vapor emission rate

ASTM F2170

In-situ Relative Humidity

MEASURES

Internal slab RH at depth

ASTM F710

Concrete Floor Preparation

MEASURES

RH ≤ 75%, MVER ≤ 3 lb / 1000 sf / 24 hr

NO STANDARD

Sustained surface alkalinity

MEASURES

No ASTM test predicts the alkalinity risk created by the shift to Type IL

NO STANDARD NEW

Ionic Dew Point (IDP)

MEASURES

S3 predictive framework (patent-pending), anchored to deliquescence chemistry. No ASTM test yet measures bond-line ionic activity at install conditions.

THE DIAGNOSIS IS WRONG

The meter is right. The remediation will be aimed at the wrong cause.

The moisture meter reads high. The crew installs vapor mitigation. The bond still fails. The real cause — denser surface, sustained pH, an ionic film at the bond line — activates below the moisture threshold the spec assumes. Mitigating to a 75–85% RH limit calibrated on C150 can miss it.

ASTM F1869, F2170, and F710 measure moisture; none measures sustained bond-line alkalinity or ionic activity at install conditions. Their threshold values (RH ≤ 75%, MVER ≤ 3 lb) were calibrated on C150-era concrete and have not been re-derived for the denser, finer-pored C595 surface. IDP is an S3 predictive framework (patent-pending), not yet an ASTM method.

Pre-pour: where Type IL risk gets baked in

Decisions made weeks-to-months before the truck shows up.

ARCHITECT / MIX DESIGNER

DECISION POINTS

- Cement type selection (Type IL vs OPC vs blended)
- SCM type and dosage (fly ash, slag, silica fume)
- W/C ratio target
- Aggregate sourcing & reactivity (ASR risk)
- Aggregate alkali buffering capacity
- Gradation & paste content

WHAT GETS LOCKED IN

Cement type
Type IL vs OPC — sets sensitivity baseline

SCM blend Supplementary Cementitious
Amplifies or buffers densification

W/C ratio Water to Cement Ratio
Drives capillary structure

Aggregates
ASR risk + alkali buffering

Why it matters: Once the truck arrives, these are locked in. No field correction is possible — Type IL's sensitivity is set here.

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Cure & finishing: where good pours go to die

Schedule pressure rules. The trades behind concrete won't wait.

GENERAL CONTRACTOR / FINISHER

DECISION POINTS

- Trowel timing (wait for bleed water to dissipate)
- Cure regime: wet cure / membrane / nothing
- Cure duration vs. industry norm
- Temperature swings during cure
- Construction loads & foot traffic
- Dry-down conditions before flooring

CURE DAYS

ACI MINIMUM	TYPICAL FIELD	S3 RECOMMENDED
7 days	3 days	10+ days

FINISHING: PREMATURE TROWELING

Premature troweling locks in failure

Troweling before bleed water dissipates locks it under a densifying surface skin. The bond failure that follows looks like moisture damage but isn't.

TYPE IL NOTE *Less margin for the same outcome — smaller buffer before surface densification kicks in.*

Why it matters: Failures attributed to "moisture" are often actually premature finishing or incomplete cure interacting with Type IL surface chemistry. The fix is upstream of the moisture meter.

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Last trade in. First to take the call.

When the slab passes every test and the floor still fails, the call comes here.

FLOORING CONTRACTOR / INSTALLER

WHAT'S AT STAKE

- Callbacks land here first — substrate decisions were made months ago
- ASTM-passing slabs still fail at the bond line
- Adhesive and prep selection depend on chemistry you can't see
- Schedule pressure vs. cure status — bad bet either way
- Warranty escalation runs through your manufacturer rep
- Tear-out absorbs your margin, your timeline, your reputation

WHAT YOU NEED TO KNOW

What was poured
Cement type (Type IL vs OPC), SCM blend, W/C ratio, aggregate source

How it was handled
Trowel timing, cure regime, duration, densifiers or curing compounds applied

What's at the bond line now
Surface alkalinity + IDP at install conditions, it's not just internal RH/MVER

What the risk says
Project risk score + recommended remediation + compatible adhesive system

Why it matters: The contractor is making bond-line decisions with depth-meter data. PRISM closes the gap.

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The S3 1L System

Isolating the finished floor from Type 1L's alkalinity and moisture — new construction and renovation.

NEW INSTALLATION

MoistureShield™
In-slab moisture & pH barrier

↓

S3 4151 (Optional)
High-pH adhesive, when installing flooring

Requires a porous finish (broom / wood-float). Can be applied as soon as the slab is walk-on.

RENOVATION

UnGlu'd™
Strip existing adhesive

Surface Prep EXT™
Profile & buffer surface pH

MoistureShield™
In-slab moisture & pH barrier

S3 4151
High-pH adhesive for install

Why it matters: Type 1L changed the substrate — these systems isolate the floor from it, new or existing.

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What you need before flooring & adhesive selection

The substrate intel that should sit on top of the spec sheet.

MIX DESIGN *what was poured*	Cement type (Type IL vs OPC vs blended) • SCM blend & dosage • Mill-cert total alkalis (Na_2O-eq) • W/C ratio • Aggregate source & ASR risk • Admixtures (PCE, accelerators, retarders) • Limestone % (secondary)
PLACEMENT & FINISH *how the pour was handled*	Pour date • Grade • Slab thickness • Lightweight vs. normalweight aggregate • Under-slab vapor retarder & location • Slab temp • Slump & air • Trowel timing vs. bleed water • Finish (trowel / burnish / broom)
CURE *what happened next*	Cure method (wet / membrane / chemical / none) • Cure duration (days) • Ambient temperature swings • Construction loads & foot traffic • Drying time before flooring
SURFACE TREATMENT *what was put on it*	Curing compound (type & chemistry) • Densifier applied? (yes/no, type, coverage) • Sealer applied? (type, residue impact) • Mechanical prep history • Surface profile (CSP)
AT INSTALL *conditions today*	RH (F2170) • MVER (F1869) • Surface pH / alkalinity • IDP screening • Visible condition (chalkiness, residue, water-bead test) • Specified adhesive system • Map surface/alkalinity tests at F2170 density (3 per first 1,000 ft^2)

RFACE
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Glossary of terms

Acronyms and technical references used in this deck.

ACI — American Concrete Institute.

ASR — Alkali-Silica Reaction; internal expansion/cracking from reactive aggregate plus high alkalinity.

ASTM — American Society for Testing and Materials.

C150 — ASTM portland cement standard (Type I/II OPC).

C595 — ASTM blended hydraulic cement standard; includes Type IL.

CLīMIT — IoT slab monitoring system integrated with PRISM.

CSP — Concrete Surface Profile; ICRI roughness rating (CSP 1–9).

F710 — ASTM standard for concrete floor preparation.

F1869 — ASTM Calcium Chloride MVER test (surface moisture).

F2170 — ASTM in-situ Relative Humidity test (internal slab RH).

IDP — Ionic Dew Point; S3's term for the deliquescence threshold at the bond line — the (mutual) RH at which concentrated surface alkali salts dissolve into an aggressive high-pH film. Predictive framework (patent-pending); not yet an ASTM-measured value.

MVER — Moisture Vapor Emission Rate (lb / 1000 sf / 24 hr).

OPC — Ordinary Portland Cement (Type I/II under ASTM C150).

PCE — Polycarboxylate Ether superplasticizer.

pH — Measure of acidity/alkalinity intensity (hydrogen-ion activity), 0–14. Distinct from reserve alkalinity (buffering capacity). On Type IL, sustained surface pH is driven mainly by slow drying suppressing carbonation, not by a larger alkali reserve.

PRISM — Predictive Risk Intelligence for Substrate Materials (S3).

RH — Relative Humidity.

SCM — Supplementary Cementitious Materials (fly ash, slag, silica fume).

TDS — Technical Data Sheet (product specifications).

Type IL (1L) — Portland-limestone cement, 5–15% interground limestone.

VOC — Volatile Organic Compounds.

W/C — Water-to-Cement ratio.

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