



CPG Tools for Success

Exterior Concrete Flatwork - Protection from Deicer Damage

Resources:

- Federal Highway Administration (FHWA), Chemical Deicers and Concrete Pavement: Impacts and Mitigation, <https://www.fhwa.dot.gov/pavement/pubs/hif17008.pdf>
- American Concrete Institute (ACI), Guide to Durable Concrete. ACI 201-16. https://www.concrete.org/store/productdetail.aspx?ItemID=201216&Language=English&Units=US_AND_METRIC
- American Concrete Institute (ACI) 318-19 & 318-25 Building Code for Structural Concrete <https://www.concrete.org/topicsinconcrete/topicdetail.aspx?search=318>

Problem: Winter deicers are one of the leading contributors to concrete surface deterioration. It's important to understand that deicers themselves are not always the sole cause. Surface damage is usually the result of a combination of deicing chemicals, freeze-thaw cycles, concrete quality, curing, and the timing of deicer application.

Good Mix Design (Pre-placement, Ready-Mix provider)

- Air entrainment: 6% ± 1.5%
- Freeze/thaw tested aggregate (KCMMB or equivalent)
- Water-cementitious ratio ≤ 0.45 per ACI 318
- Minimum 4500 psi
- Durability admixtures:
 - Water reducers, super plasticizers
 - Integral curing agent and/or integral sealer

Concrete Placement (Contractor)

- Avoid overworking the surface
- Evaporation retarders (ER) are 90% water, not to be worked into the surface, allow to fully evaporate before final finishing
- New finishing aids (colloidal silicas & other chemicals) meant to be used and finished into the surface. Not to be confused with evaporation retarders. Refer to "CPG 2025 Concrete Language Alert: the Phrase Finishing Aids".

Curing Concrete (Contractor)

- Mandatory
- Start curing immediately, post-finishing
- Follow proper rate, method, and application equipment

Sealing Concrete (Contractor 1st application, Owner subsequent applications)

- Seal concrete exterior flatwork
- Wait 28 days post-placement to apply the sealer (unless an integral sealer is used)
- Sealer Types:
 - Admixture Sealer
 - Mixed in the plastic concrete at the ready-mix plant
 - Penetrating Sealers (Silanes/Siloxanes, etc.)
 - Invisible after application, sits sub-surface
 - Topical Sealers (Acrylic), visible, sits on the surface
 - Reapply as needed
 - Reapply as needed (usually 5 – 7 years)

Deicers (Owner)

- Avoid deicers the 1st winter of the pavement's life → Use sand instead
- Avoid harsh deicer types:
 - Magnesium, Potassium, Ammonium products
 - "Super salts" (blended salts)
- Known deicers in the market: (educate yourself before making a choice.)
 - Sodium Chloride
 - Potassium Acetate
 - Calcium Chloride
 - Ammonium Sulfate
 - Magnesium Chloride
 - Ammonium Nitrate

Alternatives to deicers:

- Sand, then broom off after the weather event
- Radiant heating system
- If deicers are used, broom off excess after the weather event

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