

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 cause scaling, flaking, and surface damage.

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.

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
 - Topical Sealers (Acrylic), visible, sits on the surface
 - Reapply as needed
- Penetrating Sealers (Silanes/Siloxanes, etc.)
 - Invisible after application, sits sub-surface
 - 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 on 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