TECHNICAL BULLETIN CP-31

PROTECTING EXTERIOR CONCRETE FOR WINTER DURABILITY

EUCLID CHEMICAL

Protecting exterior concrete exposed to winter conditions requires more than a surface treatment. Long-term durability depends on a combination of sound mix design, proper placement and curing practices, appropriate sealer selection, and responsible maintenance. This bulletin explains the roles of cure & seal products and penetrating sealers, addresses common misconceptions, outlines their limitations, and provides best practices for achieving durable, winter-resistant concrete.

Understanding Concrete Sealers

Concrete sealers fall into two primary categories: **film-forming** cure & seal products and **penetrating sealers**. Each serves a distinct purpose and must be applied at the appropriate stage to deliver effective performance.

Cure & Seal Products

Cure & seals are typically acrylic-based materials applied immediately after finishing fresh concrete. Their primary function is to support proper curing by retaining moisture within the concrete. Benefits of cure & seals include:

- Form a thin membrane that slows moisture loss and promotes hydration
- Improve early-age strength development and surface durability
- Provide short-term protection against dirt and mild staining
- Enhance appearance with a clear gloss or color-enriched finish

Cure & seal products have some limitations also:

- Susceptible to abrasion from foot traffic, snow removal equipment, and deicing materials
- Provide limited resistance to water and chloride intrusion
- Not intended for long-term winter protection
- Overapplication or moisture entrapment may cause whitening, peeling, or delamination

Key Takeaway: Cure & seal products aid curing and initial protection, but they are not a substitute for long-term moisture and chloride defense.

Penetrating Sealers (Silane and Siloxane)

Penetrating sealers absorb into the concrete and chemically react within the pore structure, creating a hydrophobic barrier beneath the surface without forming a film. These sealers:

- Significantly reduce water and chloride absorption
- Minimize freeze–thaw damage by limiting internal moisture
- Preserve natural appearance with no added gloss
- Maintain surface traction
- Provide long-lasting protection—typically 5 to 10 years when properly applied

Key Takeaway: For exterior concrete exposed to freeze–thaw cycles and deicing chemicals, penetrating sealers are the preferred solution for long-term durability and moisture protection.

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Dispelling a Common Myth: Do Sealers Cause Winter Damage?

A common misconception is that sealers contribute to winter-related damage, including scaling or spalling; in reality, sealers are not the cause of this type of deterioration. Freeze–thaw deterioration occurs when water enters concrete, freezes, and expands, generating internal stress that exceeds the material's strength. Properly applied sealers reduce water ingress and help mitigate this damage. When surface deterioration appears after sealer application, the underlying causes typically include:

- Inadequate concrete mix design, particularly lack of proper air entrainment
- Improper finishing practices that destroy the air-void system
- Early or repeated exposure to deicing chemicals

Key Takeaway: Sealers themselves do not create conditions that lead to concrete deterioration.

Best Practices for Winter-Resistant Concrete

Long-term durability of concrete in winter environments starts with proper design and placement, rather than relying only on surface protection.

Use Proper Admixtures

- Specify air-entraining admixtures to create microscopic air voids that relieve pressure from freezing water
- Use admixtures that improve workability and finishability, especially with Type IL cement
- Apply evaporation reducers during placement to prevent rapid moisture loss and surface weakening

Follow Proper Finishing Techniques

- Never finish concrete while bleed water is present
- Avoid steel troweling on exterior slabs, which reduces surface air content
- Use broom or float finishes to preserve the air-void system
- Follow industry guidance such as ACI 201.2 – Guide to Durable Concrete

Avoid Deicing Chemicals on New Concrete

- Do not apply deicing salts (e.g., sodium chloride, calcium chloride) during the first winter
- Deicers accelerate scaling and surface deterioration
- Use sand to provide traction without damaging the concrete surface

Long-term winter performance of concrete depends on a holistic approach: sound mix design, proper placement and curing, appropriate sealer selection, and responsible maintenance. Understanding the roles and limitations of both cure & seal products and penetrating sealers is essential to maximizing durability and protecting concrete in harsh winter environments.