

Pozzolan-Enhanced Concrete Floor/Casting Slab Mix Designs (Fly Ash, Blast Furnace Slag and Silica Fume)

Pozzolan-containing mix designs can improve the durability and sustainability of tilt-up construction projects, but they require careful management with respect to strength development and surface properties. The primary pozzolans used in tilt-up concrete are fly ash, blast-furnace slag and silica fume. These supplementary cementitious materials (SCMs) partially replace portland cement to enhance concrete properties, reduce costs and lower a project's carbon footprint.

While SCMs are not cementitious on their own, they react with calcium hydroxide—a byproduct of portland cement hydration—to create additional calcium silicate hydrate (C-S-H). This is the "glue" that gives concrete its strength and durability. Proper curing is essential to maintain adequate moisture for this pozzolanic reaction.

Although pozzolan-containing mixes support green building goals by using recycled materials like fly ash or slag, they can delay strength gain, requiring a longer waiting period before tilting panels. Additionally, these mixes produce less bleed water, which increases surface porosity and the risk of plastic shrinkage cracking. To counter these challenges, applying an evaporation reducer, finishing aid, curing compound and/or additional bondbreaker on the casting slab may be necessary.

This bulletin provides updated guidance from Nox-Crete on using pozzolan-containing concrete mixes with Nox-Crete's Silcoseal bondbreakers.

- **Casting slab (floor) vs. wall panel considerations.** Pozzolans are commonly used in casting slab concrete mixes but are generally avoided in wall panel mix designs. This is because they can delay the strength development needed to lift a panel without cracking. Balancing the benefits of SCMs with the need for sufficient early strength is critical for successful lifting.
- **Managing hydration with evaporation reducers.** Concrete mixes with pozzolans tend to produce less bleed water than conventional mixes, making casting slabs more prone to plastic shrinkage cracking, surface crusting and increased porosity. To minimize these issues and potential future problems with bondbreaker application and performance, use an evaporation reducer like Nox-Crete's Monofilm or Stage 1 finishing aid. These products help retain surface moisture to slow evaporation rates and reduce the risk of cracking, resulting in a smoother, more durable finish. Contact Nox-Crete for specific product usage details.
- **The importance of a curing compound.** Applying a curing compound is critical for pozzolan-containing slabs, which are more prone to surface porosity and cracking due to reduced bleed water. A curing compound helps retain moisture, ensuring proper hydration and strength development. For best results, apply the cure immediately after final finishing in a way that produces a uniform and adequate film across the slab. Nox-Crete's Silcoseal bondbreakers are formulated to serve a dual purpose—as both a curing compound and bondbreaker—eliminating the need for separate applications and streamlining the process.
- **Bondbreaker application.** Bondbreaker must be applied at a rate that creates a uniform, visible film across the entire casting slab surface to facilitate proper panel separation from the slab. Proper application is indicated by a uniformly dark surface color and a dry, soap-like feel to the touch. Pozzolan-containing slabs tend to have more porous surfaces, requiring more bondbreaker than is typical for a standard casting slab to achieve adequate coverage (Refer to the Nox-Crete Silcoseal Select product data sheet, page 3.)

Consult the Experts

Work with your ready-mix supplier and technical experts to develop a mix design that balances strength, workability and sustainability. Nox-Crete representatives are available to help develop a tailored plan for successful finishing. Contact us today: customerservice@nox-crete.com or call 402-341-2080.