

Here are some of the major areas where finished concrete floors can help earn LEED® credits.

Sustainable Sites Prerequisite 1: *Construction activity pollution prevention.*

Hardening/densifying with lithium silicate products helps prevent pollution during construction, because unlike older sodium-, potassium-, and magnesium-silicate densifiers, they don't create large amounts of wastewater.

Environmental Quality Credit 3.1

This credit requires construction to be sequenced to "avoid contamination of absorptive materials such as . . . carpet." Finished concrete floors help meet this requirement, because they're not absorptive.

Environmental Quality Credit 3.2: *Construction IAQ Management Plan: Before Occupancy.*

This credit requires certain levels of Formaldehyde, particulates, VOC, and 4-Phenylcyclohexene (Fennel-cyclo-hex-een) aren't exceeded. You might find these in wood finishes, stains and shellacs but finished concrete floors are unlikely to have any, particularly ones with water-based colors and sealers.

Environmental Quality Credit 4.2: *Low-emitting materials: Paints & coatings*

This references VOC regulatory limits and standards to lessen the impact of paints and coatings on indoor air quality. Water-based, VOC-compliant treatments and colorants for finished concrete flooring makes it easy to meet this requirement.

1. Liquid-applied silicate hardener/densifiers can make concrete floors up to five times more abrasion-resistant than they become on their own.
2. Untreated concrete floors always "dust."
3. Dusting results from unreacted calcium hydroxide.
4. Silicate hardener/densifiers react with the calcium hydroxide to create calcium silicate hydrate.
5. Calcium silicate hydrate is the same tough substance that makes concrete hard to begin with.
6. Magnesium fluorosilicates and sodium and potassium silicate hardener/densifiers must be scrubbed and flushed as part of the application.
7. Lithium silicates penetrate on their own and don't need scrubbing and flushing.
8. Grinding and polishing creates gloss levels from matte to highly reflective.
9. There are finished concrete floor gloss and design levels appropriate for any building — from industrial to highly aesthetic.
10. Finished concrete floors and the products for creating them should measure up to objective test standards.
11. Owner expectations of "no maintenance" should be managed to the understanding of "low maintenance."
12. Finished concrete flooring has great potential for helping to meet the U.S. Green Building Council's goals for buildings that improve occupant well-being; environmental performance; and economic returns.



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3741 Greenway Circle • Lawrence, KS 66046
1-800-255-4255 • www.prosoco.com



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Hardening & Densifying

Advantages of hardening/densifying

- Prevents dusting
- Resists abrasion
- Resists stains and water penetration
- Polishes more quickly and easily
- Maintenance cleaning is faster and easier

Types of liquid-applied hardener/densifiers

- Magnesium Fluorosilicate
- Potassium Silicate
- Sodium Silicate
- Lithium Silicate

Application procedures

- Applied with low-pressure airless or pump sprayer, or brush or mop.
- Magnesium, potassium and sodium products are scrubbed into the concrete to increase penetration and reaction. Residue is water-flushed away. Handle waste stream in accordance with local, state and federal regulations.
- Lithium products penetrate and react without scrubbing and flushing. No waste stream.
- Let floor dry. Lithium-treated floors usually dry within an hour of treatment. Magnesium, potassium and sodium-treated floors usually dry within an hour of flushing.



Grinding & Polishing

Advantages of grinding/polishing

- Levels the floor
- Removes blemishes
- Opens pores for better penetration of hardener/densifiers or other treatments
- Creates gloss levels from matte to highly reflective

How grinding and polishing works Like sandpaper

The idea behind grinding and polishing concrete is similar to that of sanding wood. You start with your coarser grits to level the surface and remove blemishes. Each successive step removes deep scratches left by the previous more aggressive grit.

The finer the grit, the shinier the floor

The finer the grit, the shinier the floor becomes. Grits higher than 400 enter the realm of polishing. 400 and lower are sometimes referred to as "honed" floors.

Whether you grind or polish depends on the size of the diamonds in the diamond grinding pads, just like the size of the sand grains on the different grades of sand paper.

This technology came from stone and terrazzo polishing, but has since proved perfect for concrete flooring.

Apply the densifier at any grit-level

Densify at any grit level in the process, including before the grinding begins. The best time is in the early stages of grinding, from 100 grit to 400 grit. The floor is most open and the densifier can penetrate most effectively.



Coloring

Advantages and disadvantages of common concrete colorants

- **Acid stains**
Durable, unique, mottled color effect. Hazardous material. Spills/drips can blemish the floor. New installation or retrofit.
- **Acetone dyes**
Fast drying, vivid colors. Flammable, toxic, strong odor. Usually needs a protective treatment. New installation or retrofit.
- **Shake-on color**
Powdered pigments and cement, hand-broadcast onto freshly placed concrete. Bleed water bonds color to the surface, so grinding and polishing can remove. New installation only.
- **Integral color**
Creates uniform color throughout the slab. Expensive, because it colors the entire depth, not just the surface. Monochrome, new installations only.
- **Water-based dyes**
Odorless, safe, easy to apply. Fast drying. Mix and match colors. Can create translucent, gemlike effects. Water-soluble — must be used with a protective coating. New installations or retrofit.

