

How Concrete Acid Stain Works



Concrete Acid Stain is a water-based liquid bearing minerals and acid. The acid stain penetrates the pores of the concrete forcing a chemical reaction between the muriatic acid and the available lime in the surface. Once acid stained, the color of the concrete is permanently altered. When sealed with an appropriate concrete sealer and for indoor applications, sealed and waxed, acid stain produces the unique, variegated finish associated with this process.

Before Acid Staining: Surface Preparation

Surface preparation is the most important step in the acid staining process. Prior to staining, a slab must meet the following criteria:

- ✓ The concrete must be free of debris, dirt and oils, paint, dry wall mud, adhesive, sealers, stains of any kind or similar materials. Acid stain cannot react properly with the concrete if these conditions are present.
- ✓ The slab should not have been treated with a **waterproofing agent**, cleaned with **muriatic acid** or a heavy **tri-sodium phosphate (TSP)** solution. The acid stain reaction cannot occur on surfaces treated with these products.
- ✓ Newly poured concrete can be acid stained anytime from 20-28 days after the pour or once the concrete has achieved a uniform light gray color.
- ✓ For older, excessively power-washed, or mechanically-profiled concrete, the surface must be completely intact with no exposed aggregate or sand particles. Concrete acid stain does not stain rocks, sand or aggregate. Exposed aggregate or otherwise depleted concrete may cause the acid stain to take irregularly, react weakly or produce a color inconsistent with the acid stain color chart.
- ✓ Slick, machine-troweled concrete requires mechanical or chemical etching for a complete acid stain reaction to occur. If water beads on the surface or dark gray areas caused by excessive troweling are visible caused by excessively troweling, DCI Hard Troweled Floor Prep should be sprayed on the concrete or the surface should be sanded using an 80-grit sanding pad prior to application.
- ✓ Newly poured concrete slabs and countertops should include less than 10% fly ash to insure a good chemical reaction with the acid stain. Check with your ready mix company or read the countertop mix MSDS for concrete additive information.
- ✓ Concrete poured with excessive water in the mix can create a thin, unstable layer of concrete on the slab surface. To test for instability, press the tip of nail into the concrete. If breaking or damage of any kind occurs, the slab must be profiled with a concrete grinder or a high-speed buffer using a 60-80 grit sanding disc before staining.
- ✓ Spray Foam Insulation will interfere with the acid staining process. If spray foam was used in the walls or ceiling without covering the floors, sanding the floor using a 50 grit sanding disc is required for successful staining. Cover the floors with overlapping cardboard before spraying insulation if the building is under construction.

Notice: *NOTHING* takes the place of pre-application testing, particularly if you do not know the history of your slab. Always prepare a test area on the slab intended for staining prior to beginning a project. Direct Colors is not responsible for application problems resulting from a failure to start projects with a sample test.



Often, concrete surfaces will have dry wall mud, paint, wood stains, tile adhesives, carpet adhesives, grease, pet stains, etc. on the concrete. [Concrete Acid Stain](#) is not an over coat, but is an opaque, penetrating color that permanently changes the appearance of the concrete. Areas where debris remains on the surface will likely not accept the stain leaving color imperfections on the floor, particularly mastic, dry wall mud and paint. Use [Bean-E-Do](#), for the removal of adhesives. Apply [Soy Gel](#)

[Professional Paint Stripper](#) to remove epoxy, sealers, varnish or paint. For more information on these and other concrete cleaning products, visit [surface preparation](#) at www.directcolors.com. Xylene can also be used to remove solvent-based sealers and clean up sprayers or tools. Soap and hot water can be used to remove water-based sealer from applicators immediately after application. Cleaning floors that have been heavily soiled or have been previously tiled or carpeted to a stainable level is a considerable amount of work, but not impossible. [Concrete overlay](#) is an excellent solution for patched surfaces, exposed aggregate or otherwise unsightly concrete to provide a more attractive final result using acid stain. Find out more about overlaying concrete and countertops on our [website](#). The vast majority of slabs only require minimum cleaning with an organic degreaser diluted at a medium concentration with water. Scrub the surface with a soft nylon bristle brush or power wash on a low setting to prepare most

floors for staining. Thoroughly rinse the surface with clear water to remove any remaining cleanser and leave the floor to dry. For interior projects, use a shop vacuum, mop and/or squeegee to contain the water and aid with drying.

For best acid stain results on indoor slabs, sand the floor with a 150-200 grit pad applied with a floor buffer to properly prepare the surface for staining. Sanding will remove most if not all debris from the surface and correctly profile the concrete for staining.

Applying the Stain

Safety First! Remember to use goggles, gloves and a dust mask while working with concrete acid stain. A respirator may be required for applications with poor ventilation. The appearance of the finished product is very much influenced by the manner in which the acid stain is applied. We recommend spraying the stain on the surface using an all-plastic pump sprayer. If a darker, more even tone is desired, brush the acid stain into the surface using consistent circular strokes. If using a brush, spray on a second coat to eliminate any brush strokes on the surface unless that is the desired finish. Though new concrete may not always require a second coat of acid stain, older concrete does require two coats of stain for complete coverage. For a more diffuse look, spray the stain onto the surface without brushing.

Keep in mind that it is your responsibility, as the stain applicator, to make sure the slab is ready to accept the stain, whether you poured the concrete or not. Take the time to look at the batch tickets to see what's in the concrete mix, and always do a sample prior to stain installation to ensure that the color is as anticipated.

To produce a "marbled" effect, spray enough stain on the surface to allow the color to naturally run and pool in the lower areas of the slab. This technique is particularly effective on outdoor concrete slab as they are generally poured on a slope. Applying the [Concrete Acid Stain](#) with the sprayer nozzle close to the floor will also produce "pooling" effects whether indoors or out. To produce a multi-colored effect with distinct areas of color, begin with your lightest color as a base coat. Base coat colors can either be a light acid stain color such as Azure Blue, Malayan Buff or one of the darker stains cut with water. Apply one heavy coat of your base color and immediately apply accent coats while the stain is still wet to encourage a more natural appearance on the slab. Continue to apply the lighter to darker colored accents until satisfied with the results. If walking on wet acid stain, wear acid resistant spiked shoes, golf shoes or similar cleats to avoid leaving foot impressions on the floor. For a veined appearance, spray your secondary or "veining" color on the surface first. While still wet, feather the primary color into and around the secondary color allowing it to flow together at the edges. Be careful not to cover your secondary color completely especially if it is a lighter shade. Contact a Direct Colors decorative concrete technician for additional information on application techniques.



No two finished floors are exactly same as acid staining is an artistic process. Always complete small test patches on your surface or prepare sample boards to practice with the sprayer and determine which look you prefer. Each of our acid stain colors can be cut with water to produce an array of different colors and shades. Keep in mind if the water content is too high, the chemical reaction between the stain and the concrete will be significantly reduced and may not be strong enough to produce the desired color, especially on older slabs. We do not recommend cutting our acid stains by more than 4 parts water to 1 part acid stain. Some colors vary more than others when increasing the water content and many factors determine how dark the final stain color will be such as age of concrete, cement content and weathering. As the acid stain dries, a chalky residue will likely form on the surface of the concrete and is a normal part of the staining process. Each stain has different activation times to fully color the concrete, generally from four to eight hours. However, the stains can be left on for longer if a darker color is desired.

Summer Tip: *Hot, dry conditions can cause acid stain to prematurely dry before properly reacting with the concrete. For best results, slightly dampen the surface before applying acid stain to outdoor concrete. Sealers should not be applied to concrete over 90 F. For outdoor projects, apply sealers either late in the evening or early in the morning when concrete temperatures are at their lowest.*

Notice:

- Check your stain's activation time before beginning the job. Stains can be left on the surface for longer but not less than the activation time. If you are working on a concrete countertop project or attempting to stain separate rooms the same color, use a timer to insure equivalent activation times for each countertop section or room. For more on acid staining countertops, visit our [design blog](#).
- Remember to spray a second coat of stain over the dried residue of the first coat to assure complete coverage.
- **Do not walk on wet residue.** If you must walk on the processing surface use [acid stain resistant spiked shoes](#) to prevent marks or shoe impressions on the surface. Golf shoes, football cleats or plastic bags over sock feet can also be used.
- Avocado, Azure Blue, Sea Grass and Shifting Sand [concrete acid stain](#) are **not** recommended for outdoor use. For more information on the use of copper-based acid stains, listen to our [podcast](#) at directcolors.com/listen.

Color	1st Appearance of Color	Final appearance	Minimum Activation Time	Maximum Activation Time
Azure Blue	Light Blue	Robin's Egg Blue	4-6 hours	12 Hours
Coffee Brown	Greenish Brown	Medium to Dark Brown	4-6 hours	12 Hours
Cola	Greenish Brown	Reddish Brown with Warm Orange Tones	4-6 hours	12 Hours
Avocado	Greenish Brown	Bluish Green with Brown Accents	4-6 hours	12 Hours
Black	Dark Brown	Black, Dark Brown Accents	4-6 hours	12 Hours Required for Darkest Black Color
Malayan Buff	Greenish Black	Golden Tan with Warm Orange Tones	8 hours	12 Hours
English Red	Greenish Brown	Reddish Brown	4-6 hours	12 Hours
Desert Amber	Greenish Brown	Straw Color with Warm Orange Tones	8 hours	12 Hours
Shifting Sand	Greenish Brown	Olive Green with Reddish Brown Accents	4-6 hours	12 Hours
Sea Grass	Greenish Brown	Sea Foam with Dark Brown Accents	4-6 hours	12 Hours

Neutralizing the Surface and Removing the Residue

Once the residue has dried and the stain has been given at least the recommended minimum time to react, the surface should be neutralized and all debris or excess stain removed in the following manner:

1. Prepare a baking soda and water solution using 1-2 tablespoons of soda per gallon of water. Thoroughly spread the solution across the slab, scrubbing with a soft nylon bristle scrub brush where needed to remove residue. A shop vacuum can also be used for indoor projects. For applications including the [DCI Penetrating Lithium Hardener/Sealer](#), consider repeating this step to be absolutely certain all concrete acid stain has been neutralized before cleaning.
2. Wash the surface carefully using clean water until nothing but clear water is visible. All residue and excess color must be removed from the floor BEFORE leaving to dry. For stubborn residue or porous surfaces, use a floor soap or organic degreaser to aid in the removal. The clean, wet surface will be the approximate color of the final sealed surface.
3. Leave to dry. After the surface has completely dried, the floor should be ready to seal.

Sealing the Surface

After the surface has been neutralized, cleaned and has thoroughly dried, the acid stained floor must be sealed with an appropriate concrete sealer. See accompanying how-to guide specific to your sealer purchase.

Notice: DO NOT apply masking or duct-tape to a stained and sealed surface. The tape will adhere to the sealer and damage the acid stain finish.

Waxing Indoor Surfaces

Applying [DCI Concrete Floor Wax and Polish](#) to your surface is a critical final step in maintaining interior decorative concrete. Wax protects the finished surface but does not replace the need for sealer on your floor. While sealer penetrates into the pores of your concrete and maintains your floor's color, wax is a topical coat designed to serve as a barrier between daily wear and tear and your floor's sealed surface. If properly waxed and maintained, you'll never need to seal again! Remember, floor polish is intended for interior applications only and should not be applied outdoors. **Allow for 48-72 hours dry time for floors sealed with solvent based sealers before applying Residential or Commercial Wax.*

Before waxing thoroughly clean all dirt and debris from the surface using warm soapy water or water mixed with a light organic degreaser. Do not use harsh chemicals such as xylene, lacquer thinner, adhesive remover or similar products. These chemicals will remove your sealer and ruin the finish on your decorative concrete. First mop the floor with the cleaning solution then mop again using water only. Finally, leave the floor to dry making certain all residues have been removed from the floor.

After the surface has dried, apply either the residential or commercial wax with either a sponge mop with wringer attachment or [Trim Pad](#). Pour the floor polish into a paint tray and apply a thin, milky coat avoiding streaking and overlap lines. For the first application, apply 2-3 thin coats floor polish allowing each coat to dry completely before applying the next. Before allowing traffic on the floor, test the wax by applying pressure to the surface with your fingernail. If the surface dents the wax will require more

time to dry. Select commercial wax over residential wax if large dogs will routinely be on the floors. Buffing in this instance would be optional. Depending traffic conditions, the floor should be waxed approximately every 3-8 months.

Cold Temperature Warning: DO NOT apply water-based concrete sealers or floor waxes when surface temperatures are below 65°F. Turn on the central heat and air etc. to 75°F before applying to raise the floor temperature. Lay a flat thermometer covered with a towel on the floor for 5-10 mins or use an infrared thermometer to confirm floor temperature. All heating sources and overhead fans must be turned off during application. In-floor heating should be set at 60-65 degrees before and turned off during the application process. Fans and heat can be turned on after application to aid with drying. Do not allow to freeze.