Factors that Affect Final Cement Grout Color

TDS 174

Color variation is inherent in any cement-based grout. There are many variables that can affect the final color of grout. These include uneven hydration of the cement, varying density and porosity of tile or stone, substrate conditions, over-glazed tile edges, self-spacing tile lugs, variations in water used during mixing and cleanup, jobsite conditions, mortar remaining in joints, lighting, and differences in manufacturer batch ("dye lot") numbers when multiple units of grout are used. The following sections examine these variables in greater detail:

Varying density and porosity of tile and stone - Variations in density and porosity can cause cement grouts to hydrate unevenly, resulting in inconsistent or blotchy color. Porous materials such as marble may rapidly draw moisture from the grout, while dense materials such as granite absorb far less. In some cases, even a single piece of stone may have varying absorption rates. As a result, the same grout batch may dry to different shades depending on the surrounding material. Installations where different types of stone are used, or where tile and stone are used, may show variation in grout color based solely on differences in module absorption rates. To minimize this issue, a high-performance (ANSI A118.7) calcium aluminate cement-based grout (e.g., PERMACOLOR® Select, PERMACOLOR Grout, or PERMACOLOR Select NS) is recommended.

Type of substrate – The substrate over which tile or stone are installed can also play a significant part in the final color of the cement grout. As an example, a porcelain tile which has an extremely low absorption rate (<0.5%) is installed over a very dry and highly absorbent substrate. The moisture in the grout is drawn into the substrate, which means that there is less water for the curing process of the grout. If the grout is not able to "mature" with the proper amount of water, then the color may very well be lighter than what is expected. To help prevent this from happening, it may be necessary to dampen (leave no standing water) with clean, potable water and a sponge over the tile installation just before grouting. This will add moisture to the substrate, thereby lowering the absorption rate. Dampening the surface will also clean and cool the tile or stone. As always, it is best to conduct a test area whenever possible to verify results and confirm acceptability.

Over-glazed tile edges – The presence and amount of glazing on two sides of the tile can also contribute to the appearance of grout color variation. One process used to apply glaze to tile, the waterfall method, can apply the glazing material to two sides as they go through the process. The sides of the tiles that have the glazing will not allow the grout to dry as quickly as will the porous, clay-bodied edge without the glazing. This means that the grout installed on the sides where glaze is present will dry at a slower pace than the sides with the higher absorption rate. The difference in drying time can have a significant effect on the cured grout color.

Self-spacing tile lugs - In the case of wall tile with self-spacing lugs, the lugs cause the depth of the grout in the joint to differ from areas where there are no lugs. The different depths of grout in the joints can cause a "shadowing" effect where the self-spacing lug is almost visible beneath the installed grout. Conducting a test area will help determine if color variation will occur due to the self-spacing lugs on the tile.

Water Used in Mixing- The use of too much water when mixing grout can cause it to dry lighter than anticipated. Excess water dilutes the color pigment concentration and will often cause the grout to be lighter in color. Excessive amounts of water or any water-based gauging liquid can also increase the chance of efflorescence. Efflorescence is a condition caused by water placing soluble salts (present in all portland cement products) into solution; the water and salt migrate to the surface, the water evaporates, and the salts remain behind, reacting with carbon dioxide in the air to form calcium carbonate on the surface. This appears as a white (or light-colored) powder, causing the grout to look lighter in color. For more information on efflorescence, refer to TDS 159 "Efflorescence – Causes and Prevention".

Excessive or varying amounts of water to clean grout - The use of too much water during the clean-up process can wash out some of the color pigments in the grout, causing it to dry lighter than anticipated. Too much water

used to clean grout may also lead to efflorescence issues. Use a consistent amount of water in the sponge and clean the grout using the same techniques throughout the installation. Changing the cleaning water frequently will also help achieve the best results.

Jobsite conditions – On many large jobs, there are factors which can significantly affect the installation of tile or stone and grout. Contamination caused by paint overspray, drywall dust, dirt from foot traffic or wind, insulation, and other jobsite conditions will typically adhere to grout while it is still wet. Exposure to wind, sunlight, or other heat sources—or any condition that causes uneven drying—will affect the final appearance. Controlling jobsite conditions and protecting the grout should be mandatory. Protection should include non-staining brown Kraft® paper covered by a rigid surface (e.g. plywood, OSB, etc.) to bear traffic and prevent foreign materials from embedding in the grout.

Mortar high in the joint – A common cause of uneven grout color is thin-set mortar (often grey) not being properly cleaned out of the joint during installation. If mortar is left too high, a light or medium-colored grout may appear darker than intended. The higher the mortar remains, the more pronounced the discoloration. It is very important to remove excess mortar while it is still wet.

Lighting – The effect of lighting on grout appearance can be significant. The angle, type, quality, and source of light all play key roles in how grout appears. It is not unusual for grout to appear one color during the day and a different color at night. It is also common for the same grout to appear different on floors versus walls due to light angle. Wall-washing lighting is especially known for exaggerating visual variations.

Using different manufacturer's lot numbers – Using different lot numbers without dry blending can cause noticeable shade differences between batches. When different lot numbers are used (usually found on the bottom of the bags or above the bar code), mix them together dry in a clean container to maintain consistent color. Always follow manufacturer instructions for mixing and slaking prior to grouting.

Variations in temperature, curing time, and jobsite conditions can contribute to color variation. For example, grout in direct sunlight may dry faster than grout in shaded areas, resulting in color differences. Cement grout will also appear darker when wet, even after curing, similar to how concrete appears darker when wet.

If grout color varies from what is expected, there are industry-accepted solutions. Enhancing sealers can deepen the color and provide a "wet look," which works well when grout dries uniformly light but not when it is blotchy. STONETECH® manufactures enhancing type sealers (e.g. STONETECH Enhancer Pro Sealer) which can help alleviate cement grout issues. For more information, contact STONETECH Technical Services at 1.888.786.6343. For blotchy grouts, epoxy-based grout colorants (a.k.a. grout stains) may also be applied directly to the grout joint to help restore a uniform color appearance.

Grout and sealant colors shown on LATICRETE grout color cards, chip clips, swatches, website and other tools are as accurate as the technology used can reproduce. Please note that LATICRETE does not warrant color matching to any stated color representation or to any color guide produced. Actual shade and texture will depend on job site conditions, installation techniques and types of tile or stone used and may vary from any grout color chart, grout color channel kits, grout color swatch on product packaging, or any other color representation. Verify actual appearance and compatibility with a test area before installing. Dry mix grouts with different control numbers.

For additional trouble-shooting information on causes and remedies of cement grout related issues please reference the LATICRETE Cement Grout Trouble-Shooting Guide – TDS 201. For installation, cleaning, and maintenance of LATICRETE® and LATAPOXY® grouts, reference LATICRETE Grout Guide - TDS 400.