Kiln Release
Problems with Engobe
By Scott Worthington

Current ceramic manufacturing (both porcelain and non-porcelain wall and floor tile) utilizes clay bodies and ceramic glazes fired in a cycle of approximately 1 hour. To enable clay to fire so quickly the industry has perfected materials that fire at higher temperatures shortening the process that used to take up to 17 hours. One of the problems that had to be overcome was creating a kiln that could fire tiles at 1200 degrees Celsius on a continuous basis.

The main type of kiln used today is a roller hearth kiln. This uses ceramic rollers to transport tiles through the 45-60 minute firing cycle. However the chemists had to ensure that the tiles did not stick to the heated ceramic rollers. The solution involves; ceramic rollers with a threshold temperature higher than the kilns; the creation of a pressed pattern on the bottom of each tile that reduces the amount of surface area that contacts the rollers; and the application of a ceramic coating (alumina-silicate engobe) that is applied to the back of the tile. It is the latter that is referred to as the kiln release. Excess kiln release is commonly visible as a white residue on the back of the tile. In many cases most of the kiln release is removed by the factory. However sometimes there is a reasonable amount of loose kiln release residue left on the bottom of the tile, easily visible when you wipe the bottom of a dry tile with your hand. This is the first problem, because it can interfere with the adhesives ability to bond. The loose particles must be removed before installation to ensure a proper adhesive bond between the tile and substrate.

The second problem relating to kiln release concerns surface marking. In some instances the white residue can also be seen on the surface of the tile, having been transferred from the back of the tile underneath during packaging. In many cases it is easily removed, most commonly during the grouting process. However sometimes after removal a ghosting effect of the pressed pattern is still visible after cleaning and this is much more problematic because in some instances it cannot be removed at all.
The kiln release marks, in the form of the pressing on the back of the tile, are visible in the area highlighted by the reflected light (picture right). These were removed using NanoScrub and Heavy Duty Tile and Grout Cleaner.

This happens mainly when the kiln release has been partially fused to the tile surface due to one or a combination of things such as kiln temperature fluctuation, inconsistency in the kiln release formulation or over application to name a few. The problem can be exasperated if the packaged tile gets wet during storage as the water partially dilutes the loose particles enabling them to create an even

Can you remove these marks and if so how?

Up until recently the success of removing these marks was very low, because the alumina-silicate kiln release is very chemical resistant rendering most acid and alkaline cleaners ineffective. Also the surface of unpolished and polished porcelain tiles have microscopic pores and textured flaws that trap the smaller kiln release particles, making conventional cleaners and household abrasives ineffective at dislodging these contaminants. With the advent of Nano-molecular cleaners such as Aqua Mix NanoScrub the success of removing these marks has increased immensely. Pre-wetting the marks with an alkaline cleaner such as Aqua Mix Heavy Duty Tile and Grout Cleaner before using NanoScrub achieves the best results. It works in about 80% of cases. However when the marks have been created by a kiln release that has been either formulated or exposed to a temperature too close to that of the tiles firing temperature they cannot be totally removed.

Featured Product

Aqua Mix NanoScrub®

An abrasive cream cleaner designed to work where other cleaners won’t. It utilizes Nano-sized particles to penetrate into small surface pores where it can effectively work to remove surface stains and residues. Effective for cleaning all stone and tile surfaces. Also removes factory applied waxes and floor finishes, coating sealers, light grout residue (including epoxy), rubber and pencil marks, light mineral deposits, ground-in dirt and most sealer residues. NanoScrub® is non-toxic, non-flammable and non-acidic.

For use on:

Porcelain, ceramic, polished and unpolished natural stone (such as granite, limestone, marble, slate, and travertine), grout, quarry, saltillo, terra-cotta, cement pavers, masonry surfaces, and other stone, tile and grout surfaces.