

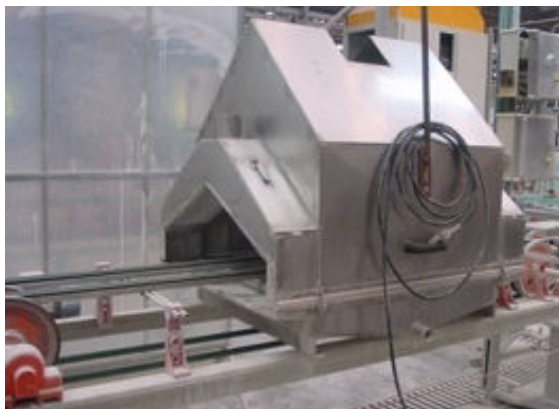
Removing Kiln Release Marks

What are kiln release marks?

If you deal with porcelain tiles on a regular basis you will know exactly what we mean by this term. What we are referring to are the marks left on the top of a porcelain tile that are in the shape of the pattern used on the bottom of the same tile. To understand how these occur you need to understand a little about the modern process of fast firing ceramics.



Applying Kiln Release



Kiln release easily visible on back of tile

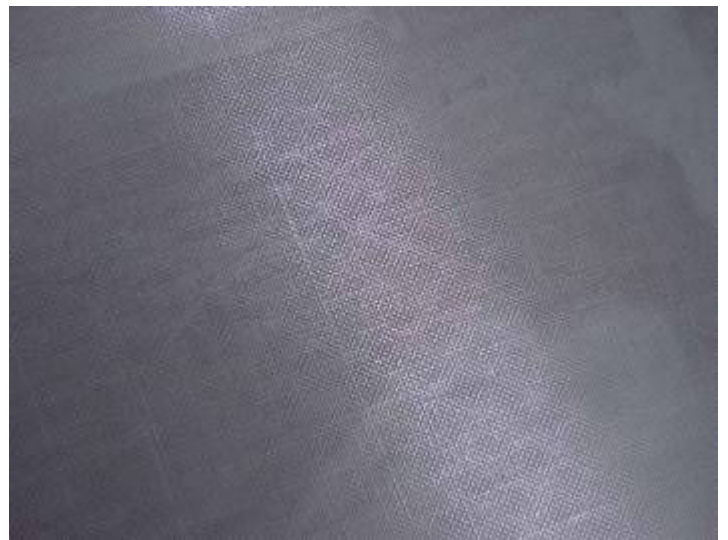
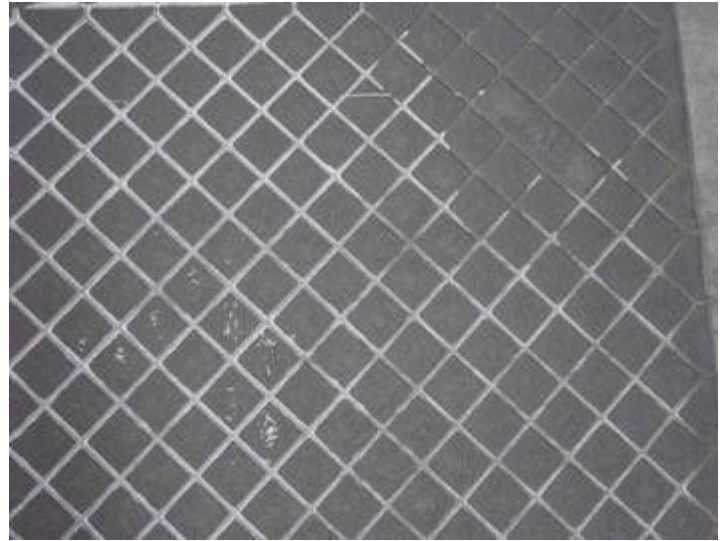
The current ceramic process (both porcelain and non-porcelain wall and floor tile) utilizes clay bodies and ceramic glazes that fire in a cycle no greater than 1 hour. In many cases the cycles are down to 45 minutes. To enable clay to fire so quickly the industry has perfected materials that fire at higher temperatures compressing 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 for contemporary manufacturing of ceramic tiles is a roller hearth kiln. This uses ceramic rollers to continually move tiles through the 45-60 minute firing cycle. However the

chemists had to overcome another problem, that of tiles sticking to the ceramic rollers. The solution was to firstly create ceramic rollers with a threshold temperature higher than the kilns, secondly create a pattern on the bottom of each tile that reduced the amount of surface area that contacted the rollers and thirdly create a ceramic coating that could be applied to the back of the tile working as a buffer layer. It is the latter that we are discussing and refer to as a kiln release coating.

The kiln release is comprised of refractory elements and is basically a calcined alumina-silicate engobe (clay slip) with a threshold temperature higher than the kilns. If you look at the back of most ceramic tiles you will see a white material which is the remaining kiln release still left on the tile after firing. In many cases most of the kiln release is removed by the factory. However sometimes there is a reasonable amount of loose residue left on the bottom of the tile and this should be removed before installing as it can interfere with the adhesives ability to bond. In some instances this white residue can also be seen on the top of the tile. This has come from the bottom of the tile that was stacked on top of it in the box. It is this situation that has the potential to create problems.

The problem occurs when the marks are visible on the top of the tile and do not appear to be able to be removed. The first thing to note is that this problem is almost always confined to unpolished and (especially) polished por-



*The kiln release marks in the form of the pressing on the back of the tile are visible in the area highlighted by the light. These were removed using **NanoScrub and Heavy Duty Tile and Grout Cleaner***

celain. We know why they appear, (white kiln release from the tile in the box above) but why are they so difficult and sometimes impossible to remove? The answer is complex and in most instances is a combination of things that conspire to create the specific problem. The first thing that can go wrong is that the engobe itself is manufactured

perature too close to the kiln. This causes the kiln release to reach its glasseous phase sooner, hold more heat and therefore be hotter when it comes out of the kiln. This makes the kiln release more prone to fusing onto the top of the tile below once stacked. Incorrect formulation where by the engobe has too high a temperature threshold or in fact too much is applied is however in our opinion the main reason for the problem. When this occurs you are left with a fairly high quantity of loose engobe particles on the back of the tile. This in itself does not create the marking. However when the tiles are boxed and palletized they are then shrink wrapped and in many instances stored outside. The problem occurs when the boxes and tiles get wet. The water dilutes the loose engobe particles and then transports them into the surface of the tile over a period of time.

This explains a number of facts that surround the problem of these types of marks.

1. Marks are almost always on unpolished and especially polished porcelain. Both these products have water absorption as compared to glazed ceramic tiles. More importantly polished porcelain has higher water absorption than unpolished as well as larger surface pores as well as flaws created by the polishing process.
2. Lower quality porcelain tiles have a higher ratio of this problem. Greater water absorption is usually one of the main characteristics of lower quality porcelain tiles.

3. Tiles delivered in weathered, wet or faded boxes have a higher ratio of this problem. They have been exposed to more water and longer cycles of wetting and drying which exaggerate the process.

4. Tiles exported have a higher ratio of this problem. This is a fact supported by numerous factories we have dealt with over the years. In many cases samples of the same batch kept for purposes of quality control show no signs of marking compared to the same batch exported into the field. The element at work here is the sweating of the tiles in the cardboard boxes under the tight shrink wrap. This is especially a problem for export over the equator.

5. Tiles that have almost complete cover by their cardboard boxes exhibit a higher ratio of this problem. The cardboard holds the water longer allowing a prolonged wetting of the tile.

Can you remove these marks and if so how?

Up until recently the success of removing these marks was very low. This is because an alumina-silicate refractory is very chemical resistant making the use of acids and alkalines almost useless. Also the surface of unpolished and polished porcelain tiles are littered with very small pores and flaws which normal cleaning and household abrasives cannot penetrate to dislodge contaminants because their surface or ingredients are simply too large.

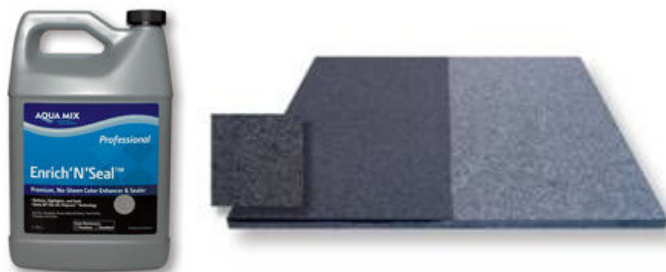
However with the advent of Nano-molecular cleaners such as Aqua Mix **NanoScrub** the success of removing these marks has increased immensely.

NanoScrub's nanomolecular formulation allows it to work on the surface of polished and unpolished porcelains where both the micro surface texture and tile surface tension combine to make regular cleaning difficult.

In our experience using something like **NanoScrub** (an inert abrasive cleaner) alone does not always work. In most instances 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. Does this mean we now have a solution for this problem that works in every case? No. It works in about 80% of cases. Where the marks have also been created by additional heat or an engobe with a threshold temperature too close to the tiles they cannot be totally removed. These tiles have to be replaced.

Product of the Month



Enrich'N'Seal

Premium Enhancer & Penetrating Sealer

- Premium stain resistance
- Rejuvenates and darkens natural stone
- Below surface, NO Sheen look
- Ideal for interior & exterior applications
- Recommended for unsealed natural stone, grout, terrazzo etc

Xmas Holiday Closing Period



The management & staff at Aqua Mix wish all our customers and their families a Merry Xmas and safe holiday period. Your support in 2007 is appreciated and we all look forward to a prosperous 2008. Our office will be closed from 12.00pm Thursday 20th December 2007 and re-open on Monday 14th January 2008

Aqua Mix 2 Day IAP - Sydney November 2007

Aqua Mix Australia held its final 2 day Independent Applicator Course for 2007 on Wednesday—Thursday 7th-8th November 2007 at our Kirrawee Training Facility.

The course, with 16 attendees from Sydney, Canberra, Melbourne, Hawks Nest, Brisbane & Gold Coast included tilers, cleaners, applicators, building maintenance staff, retail sales staff and teachers from TAFE. Everyone enjoyed two days of intense hands on training for care & maintenance on Tile, Stone & Grout.

The next IAP courses will be on:
Wednesday 27th - Thursday 28th February 2008.

To register for the 2008 course please download the form from our website www.aquamix.com.au

