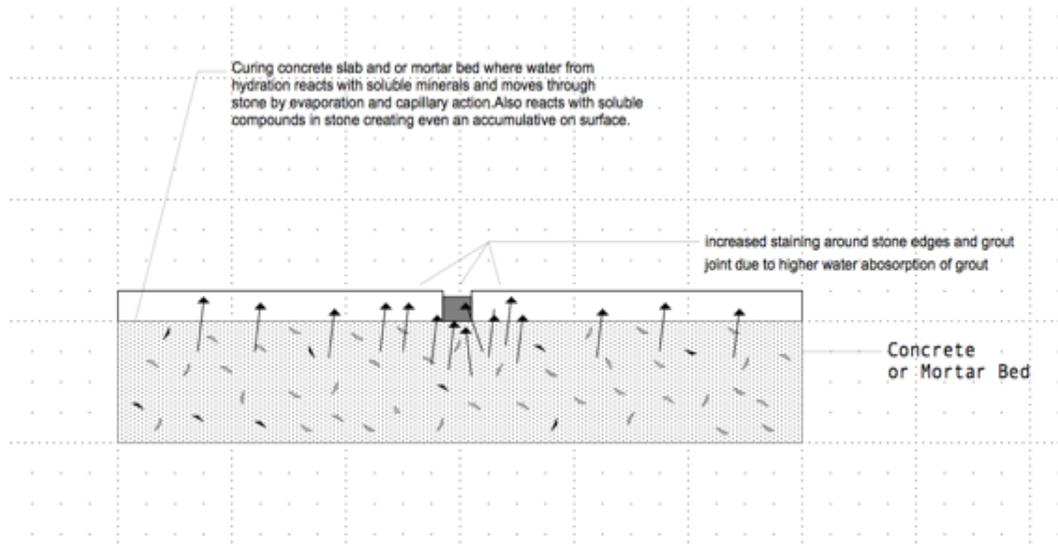


Six side Sealing of stone – Breaking myths of Debonding

For years the use of sealers has been expressly for the protection of the stone or tile surface. Most, if not all, adhesive companies warranty their adhesives only if the back of the stone is free from any sealer as sealers are seen as “bond breakers” adversely affecting the integrity of the adhesives ability to bond to the stone or tile surface. However this situation has meant that many of the problems created by water absorption through the back and the sides of stone have gone unresolved. New and current technology now offers sealers that can successfully be applied to the bonded surfaces of stone without becoming bond breakers. To look at these and how they work I firstly want to investigate the problems and issues relating to porous stone and specifically water absorption through the sides and back.

Picture framing, efflorescence, soluble mineral contamination (for example iron sulphides such as Pyrite) and prolonged water marking are some of the problems created when water is absorbed by the back and sides of some types of stone. The mechanics are as follows. When a stone is installed over a concrete substrate the concrete can contain potential soluble contaminants such as salts and other minerals. The underlying cement based screed or topping as well as the cement based adhesive and grout also have the potential to hold some of these contaminants. In most cases the contaminants will not react unless there is water present. Water is both the catalyst as well as the transport mechanism. The initial and most important source of water that triggers much of the reaction originates from the hydrating adhesive or mortar bed that is even more aggressive due to its high ph. With water the soluble minerals travel to the surface by way of evaporation and capillary action working their way through the stone and grout. In many cases the grout is more porous having higher water absorption than the stone creating an easier exit for the evaporating soluble minerals. This explains why in many cases the resulting stains are revealed as picture framing or at least concentrated around the sides of the stone and grout joint. Once on or near the surface the contaminants further react with the increasing rate of oxygen and ambient air temperature to form various compounds or simply evaporate or dissolve only partially leaving behind the unwanted stain or compound.



A good example of this mechanism at work is the soluble iron salts found in the granites and marbles across various projects.

The water from the thick mortar bed under the stone once absorbed into the stone body easily reacted with the soluble salts to form highly visible iron blooms. In some cases the iron salts would turn the complete stone a light shade of yellow. The solution to this problem is simple – if the stone's natural water absorption could be reduced close to zero then the risk of iron contamination would be similarly reduced. The best and most cost effective way to reduce the stones water absorption is to seal the stone on all six sides.

We have all known for many years that the trick to managing many of the water related problems of soluble mineral staining such as the iron salts is to lower the stones natural water absorption by sealing it on all six sides while still maintaining good vapor transmission. (The ability for the sealer to breath is very important as any trapped water can create other issues such as surface debonding by way of excessive moisture expansion. However the formation of the contaminants is not only due to the presence of water but also the quantity of water and rate of evaporation. If the amount of water is reduced and the rate of evaporation high enough that the water does not condense then the soluble minerals will also exhaust through the surface rather than solidify). The problem however is that most sealers either did a poor job of repelling water in a high alkaline environment as that found at the interface between stone and cement mortar, or reduced the bond strength of the adhesive system. The latter is the reason why most adhesive manufacturers only warranted their adhesives when applied to clean unsealed stone. This claim in turn made clients reject any sealer solution to the problem as well as making sealer manufacturers uninterested in developing specific sealer technology. However as stone's use increased globally so did the problems related to the high water absorption and chemistry of certain stones. All of this at last led to the development of sealers that could in fact both reduce a stone's water absorption as well as maintaining the adhesive's bond.

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TA 03

info@rachtr.com

RachTR

An IIM Alumni Venture

RachTR has designed the sealer specifically for application to the back and sides of stone called **RachTR Back Seal**. It is designed to hit the main market requirements for such a product – low cost per m² (or sq ft), highly water repellent, good vapour transmission and of course not being a bond breaker for the adhesive. However we realized that the best way to apply sealers to the sides and back in a cost effective manner was to dip the entire stone. However this presented a problem in that many clients wanted a low cost sealer for the back and sides such as **RachTR Back Seal** but wanted a premium product for the actual surface, which would be exposed to long-term dirt and contamination. Therefore any specialized back applied sealer had not only to be compatible with a premium sealer but also needed to allow the premium sealer to penetrate it so the correct quantity of premium sealer could be applied to the surface. **RachTR Top Seal** is designed to satisfy both these conditions. The sub surface sealers will penetrate right through the **RachTR Back Seal** enabling the complete and correct quantity of premium sealer to be applied guaranteeing the long term performance of the final sealer.

Both of these sealers are tested regarding shear bond to ensure they do not act as bond breakers.

The contemporary existence of sealers that can be applied to the sides and back of a stone or tile now help to manage and greatly reduce the risk of the long endured problems created by moisture moving through the stone especially during installation and the process of final cure. The argument by both clients and adhesive manufacturers to not seal all sides due to the possibility of the sealer being a bond breaker is no longer valid now the technology exists to do so.

Using a suitable sealer on all six sides is part of a total water management system that should be implemented to fully control the uses around leaching of soluble minerals. These include for example the use, where appropriate, of waterproof membranes, epoxy remediation systems, proper falls, factory prepared adhesives and grouts etc.

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