

## Re-Crystallization

The subject of Re-Crystallization, how it works and most importantly, is it a good system for the maintenance of polished calcium based stones (marble and limestone) has come up a number of times in the last year so we thought it was worth revisiting this subject.

To answer the central question of whether Re-Crystallization is a safe and efficient way to maintain polished marble and limestone firstly we need to determine exactly what is happening when the Re-Crystallization process is applied.

The descriptive term Re-Crystallization used by many of the companies selling Re-Crystallization implies that a second crystal is formed on the surface of the stone. As crystals require heat, great pressure and long cooling periods to form, we can take it that the term Re-Crystallization as used by these companies involves a lot of "creative license". As you will see there is certainly modification to the calcium on the surface but this does not constitute a new crystal structure.

The majority of Re-Crystallization chemicals are made up of a blend of fluorosilicate and acidic compounds as well as other components such as waxes and polymers such as acrylics. The active ingredients work by reacting with the calcium carbonate in the marble or limestone. The lower the calcium content the less effective they are and hence is the reason why they don't work very well (or at all) on silica rich stones like granite. We all know that when an acid is dropped on to the surface of marble it etches the surface damaging it. The bond between the calcium and the carbonate is broken destroying the calcium carbonate in the exposed area releasing water and carbon dioxide gas. Once the calcium and carbonate bond is broken the calcium ion is free to bond to the fluorosilicate. So in short Re-Crystallization involves using acids to break the calcium carbonate down then in a secondary reaction attaching the fluorosilicates to the free calcium ion to form a new surface compound namely a calcium fluorosilicate. It is the formation of this new compound that the exponents of Re-Crystallization hark as being the main advantage to the stone and its ongoing maintenance. This new surface is purportedly harder (improving long term durability), less porous (decreasing water absorption and in doing so improving stain resistance) and of course very glossy (hence the ability to use Re-Crystallization as both a restorative and maintenance material for polished calcium based-stones).

If these claims were totally true then the industry would really be on to something and most, if not all marble or limestone floors would use Re-Crystallization for any restoration and more importantly ongoing maintenance. However the main claims require further investigation.

**Re-Crystallization makes the surface harder:** this is in fact true. The resulting thin layer of calcium fluorosilicate is harder than calcium carbonate. However this harder surface is still supported by the softer natural calcium carbonate rich inner core and so over time under load (foot traffic for example) the harder surface cracks and chips much more easily than the natural stone itself. One of the main ways you can tell a floor is using Re-Crystallization is to look for premature surface cracks most evident around the edges of the stone and the veins. The veins in stone are in most cases other minerals and some of these do not react well to either the acid or fluorosilicate. Iron compounds for example can be dissolved and weakened by the acid but not being reactive to the fluorosilicate are not strengthened. This explains in part why the veins on many marbles and limestone are prematurely damaged after Re-Crystallization. Damaged veins therefore are another indicator of the possible use of Re-Crystallization.

**Re-Crystallization reduces water absorption:** this is also true. In fact the calcium fluorosilicate film fills the surface micro-pores blocking them. This appears to have the positive effect of increasing stain resistance by reducing overall water absorption. However this is not the really important issue. What is important is that by blocking the pores the film dramatically reduces the ability of the stone to allow critical vapour transmission. In other words it stops the stone from breathing. The long-term effect is that the stone (that needs a degree of moisture and its free passage to maintain its solidity) starts to "rot" from the inside out. This is a well-known and documented phenomenon experienced as far back as the late 1800's when fluorosilicates were first used to preserve decaying stone art works in Italy. They soon stopped using them because of the damaging effect. Many articles and books have been written documenting this issue with one of the best being a book by Giovanni G Amoroso and Vasco Passins titled "Stone Decay and Conservation".

**Re-Crystallization creates a "factory finish" gloss:** this is also not totally true. If the stone is in good condition before Re-Crystallization then the resulting polish is very high. However Re-Crystallization cannot remove major surface deviations such as scratches, these can only be removed by traditional grinding prior to final polishing.



Long term this inability to remove surface deviations also means that after several applications high and low points exhibit different degrees of reflectivity (this is also exaggerated by those Re-Crystallization systems that use steel wool). This eventually manifests itself as an “egg-shell” appearance, a common symptom of a re-crystallized stone. This is a very good reason not to use Re-Crystallization as the only on-going maintenance program.

So in summary, most Re-Crystallization chemicals contain two main ingredients that can damage calcium based stones. The degree of damage depends totally on the quantity and formulation of the individual chemical. In most cases the Re-Crystallization chemicals are sold for both restorative and maintenance requirements and in most cases offer the same formulation for both. It is this fact that we disagree with the most. When formulating a Re-Crystallization chemical to work as a restorative product you must have a relatively aggressive formula using higher quantities of acids and fluorosilicates to work on what could be a very dull, worn or weathered surface. This means the resulting calcium fluorosilicate film is denser, harder, blocking the pores more effectively and in the process exaggerating the problems of vapour transmission and a brittle surface. When this same formula is used for maintenance as well (as is the case with most systems) the stone is on a fast track to destruction. If however the formula for a maintenance program is much milder (it can be because the surface to re-polished is still in reasonably good condition) then the degree of damage is much lower with the ultimate life of the stone also being much longer.

In conclusion our opinion is that we do not like any Re-Crystallization processes because they do damage the stone as outlined and there are other traditional methods that can re-polish stone just as effectively but without the damaging side effects. However we also accept that the damage can be over a number of years and some clients are happy to balance this against the ease, speed and lower cost of application (compared to traditional abrasive and non-fluorosilicate chemical based systems for re-polishing).

The real problems occur when:

1. Clients do not understand exactly what the Re-Crystallization system is doing when analysing their initial maintenance requirements;
2. An aggressive formula really meant for one-off restoration is used also for regular maintenance of the polished surface ;

It is Point 2 that really answers our initial question of whether Re-Crystallization systems are safe for maintaining calcium-based stones. The more common formulations are not – they should be used for one-off restorative work at best. If you are going to use a Re-Crystallization system for maintenance these should only be milder versions and these are hard to find. What you cannot escape is that all Re-Crystallization systems do damage stone to some degree. You have to balance the issues of speed and ease of application (that can translate to lower cost per m2) to how long you want your stone installation to last. If you install stone to last a lifetime then Re-Crystallization is not the system to use – traditional systems will offer the best long-term solution to stone restoration and maintenance.

Reviver is our calcium based stone re-polishing product. It does not suffer from the same issues as the re-crystallizing products I described in the technical article. However it should not be used for constant maintenance either as it will also not remove high and low points which eventually create an egg-shell effect. On-going maintenance of polished marble or limestone should and will include some grinding to address inevitable scratches and high and low points. Reviver is a good way to gain final shine as well as interim re-polishing between scheduled grinding or abrasive polishing. Sealers of course are the best and safest way to increase stain resistance.

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Aqua Mix will be participating at Full Frontal Tile & Stone Expo which will be held at Sydney Convention & Exhibition Centre at Darling Harbour from 20-22 August 2009.

We will be doing demonstrations on honing and polishing of stone at Stand G7



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This comprehensive classroom and hands-on workshop is designed and taught by professionals in the Care and Maintenance business. The curriculum includes the newest techniques and information on the latest products for hard surface cleaning and maintenance. Instructors will provide the practical step-by-step training needed to begin an applicator business or to expand the services of your existing business.

### Aqua Mix now offers IICRC continuing education credits (CEC)



Aqua Mix, the industry leader in delivering innovative, water-based products for stone, tile, masonry, and grout, announces that its Independent Applicator Program (IAP) now offers IICRC Continuing Education Credits (CECs) for IICRC registered technicians in the cleaning and restoration industry.

Aqua Mix's IAP training program received CEC approval by the Institute of Inspection, Cleaning and Restoration Certification (IICRC). By attending Aqua Mix's IAP Training Program registered technicians will qualify to earn two CEC units.

### Course Dates, Time & Location

Tuesday 18th & Wednesday 19th August 2009 (8:30am–5:00pm both days)  
Unit 7, 38 Waratah St, Kirrawee NSW 2232

### Testimonials

*"Aqua Mix have set the standard. They are the University & everyone else is the High School. Before the course, we thought we knew everything. Now we do"*

Shaun Roberts, The Marble Man, Mermaid Waters QLD

*"The most comprehensive tile & stone course I have ever attended. With our new knowledge & skills, we have now added a new division to our company to do cleaning & sealing"*

Marlon Marescia, Tileco Tilers, Baulkham Hills NSW

*"A professional & eye opening course. It had all the answers to all my question. I now have the confidence & knowledge to take on all jobs"*

Tony Morrissey, Osprey Floor Care, Box Hill North VIC



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- Cleaning & Maintenance
- Sealing
- Wax Removal
- Stain Removal

#### Grout

- Cleaning & Maintenance
- Sealing
- Re-colouring
- Stain Removal

#### Natural Stone

- Natural Stone Identification
- Cleaning & Maintenance
- Sealing
- Stain Removal
- Natural Stone Restoration (Re-polishing & Honing)

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## Aqua Mix Trained Independent Care & Maintenance Applicator Course – Sydney NSW – August 2009

Applicants Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Suburb: \_\_\_\_\_ State: \_\_\_\_\_ Post Code: \_\_\_\_\_  
Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ Mobile: \_\_\_\_\_  
E-mail: \_\_\_\_\_ Website: \_\_\_\_\_

1. How did you hear about our seminar? \_\_\_\_\_
2. How long have you been in the tile industry or hard surface business? \_\_\_\_\_
4. What do you or your company specialize in? \_\_\_\_\_
5. What do wish to gain from this seminar? \_\_\_\_\_
7. Where do you plan to offer this new service? \_\_\_\_\_
8. Do you currently work with the Aqua Mix Products? \_\_\_\_\_
9. Course allocations will be on a first paid first choice basis.

**IAP Course:** Tuesday 18th & Wednesday 19th August 2009 (8:30am–5:00pm both days)  
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10. If you require accommodation, please contact on of the following Hotels:

- A. **Quest Apartments**, Cronulla Beach Ph: 02 8536 3600      B. **Rydges Cronulla Beach** Ph: 02 9527 3100  
C. **Cronulla Motor Inn**, Cronulla Ph: 02 9523 6800      D. **Metro Inn**, Miranda Ph: 02 9525 7577

(Shuttle bus will **only** pick-up from outside Quest Apartments at **8.00am sharp** daily for transport to Course facility)

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### Cost

\$540.00 plus GST = \$594.00 Total

Includes: Training & Technical Manual, Morning & Afternoon Tea, Lunch.

Should a cancellation occur, a \$200.00 plus GST cancellation fee will apply.

### Payment

Payment must be received **in full** at time of booking to confirm your place.

Course allocations will be on a first payed first choice basis.

Please forward your completed application form and full payment (cheque/money order or direct deposit) to:

Aqua Mix (Aust)  
PO Box 3001  
Kirrawee NSW 2232

### Bank Details for payment

**Bank** ANZ Sutherland NSW

**BSB** 012-430

**Account Number** 108 748 563

**Account Name** Aqua Mix (Aust)

(Please fax confirmation of transaction to 02 9521 5222)



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### For more information contact

A'ngé Kokkiliaris at Aqua Mix (Aust) on 02 9521 4000 or 0413 059 935 or email [info@aquamix.com.au](mailto:info@aquamix.com.au)  
[www.aquamix.com.au](http://www.aquamix.com.au)