

CASE STUDY: CS 05

SALT PROBLEMS IN EGYPTIAN AND TURKISH MARBLES

INTRODUCTION TO EGYPTIAN & TURKISH MARBLES

Egyptian marbles are the oldest and the finest marble products in the world and are available in abundance while Turkey has many assorted types and large volumes of marble reserves due to its geographical position on the Alpine Belt. Both marble types are famous for high lustre and visual appeal in terms of quality, appearance, designs and patterns of numerous sizes and utility. The marble of superior grade do not need any chemical reinforcement like other marble products But, there are certain types of marbles which do have high salt content.

In India, there has been significant increase in the use of such marbles owing to different qualities and factors. But, we have explored some serious problems while installing these stones.

MARBLE PROPERTIES

1. These marble slabs have very low percent of iron content
2. They have some disadvantages like the cracks, salt, efflorescence and discolouration & low polish durability in certain marble tiles but this can be avoided by using various chemical products
3. The qualities and attributes of the various varieties of marble can be identified from the patterns and grains on them
4. Densifiers (**RachTR Stone Power**), Penetrating Sealers (**RachTR Top Seal & Back Seal**) & Epoxy Systems are main products to look for while consolidating and finishing the marble slab

EFFECT OF SALT ON MARBLE SURFACES

The degradation of Egyptian, Turkish or other stones is due to several types of water-soluble salts of minerals such as iron, copper etc. Salt crystallization in porous materials constitutes one of the most frequent causes of decay, in a wide range of environments. These salts can be observed directly as efflorescence and appear and disappear periodically according to the presence or absence of moisture sources.

Pressures created by crystallization of salt in pores weaken the substrate until its mechanical strength is diminished and damage occurs. Inhibiting or reducing the salt crystallization would therefore prevent or slow down the degradation. This problem represents aggressive deterioration forms that take place on all stone surfaces, mortars and renderings through salinity solutions that are transferred to the stone pores.





This may be understood from the salt concentration that can be attributed to repeated dissolution and crystallization. When water evaporates, the salt will deposit either on stone surfaces "efflorescence", beneath the surfaces "sub- efflorescence" or within the pore of the stone itself "crypto efflorescence", especially with repeated wetting and drying cycles which finally lead to stone deformation.

The formation of salt crusts on calcareous stone is the most important chemical reaction involving salinity ground water to cause stone degradation. When these crusts are formed on a porous stone, it disintegrates to a powdered material, while limestone and marble develop thick crusts instead. Furthermore, they are formed when calcite in calcite-cemented sandstone, limestone and marble react with different oxides in the presence of moisture sources through several kinds of chemical reactions.

Salts manifest themselves in different ways depending on the type of marble used. The problem is not confined to Egyptian marble only. The manifestation of the problem depends on the type of marble used. For example, if the marble has veins, the veins open up when attacked by minerals. On the other hand, if the marble does not have veins, sometimes a layer of white powder can be formed on the surface. Luckily, the powder can be easily wiped off, but could reform again every now and then. Salt forms are aggressive deterioration problems, which occur on all stone surfaces, mortars and renderings through saline solutions transferred to the stone pores. Deterioration of Egyptian & Turkish stones is primarily due to water-soluble salts. The formation of these salts on calcareous stone is the most important chemical reaction involving saline water to cause stone degradation. The studies show that there are aggressive forms of salt affecting the weathered samples; especially those subjected to Na_2SO_4 followed by samples exposed to 1:1 NaCl and Na_2SO_4 . The high level of Cl and SO_4 , concentrations found on the decayed stone surfaces give an accurate evidence of salt migration. The degradation phenomena resulted from salty decay actions occurs directly through complex mechanisms depending on certain specific factors such as mineralogical composition of stones, stone reactivity and adsorption of some salty ions as Cl -and SO_4 .

SOLUTIONS FOR SALT PROBLEMS

Before Tiling

1. Marbles being natural products variations in color and veining must be expected
2. Prior to laying any tiles inspect the tiles for any defects, correct quantity, color, shape and size
3. Experienced tillers /stonemasons are strongly recommended to avoid damage to the material

During Tiling

1. All natural stone must be sealed with impregnator such as **RachTR Back Seal** & laid using specialized stone/marble adhesives. Always clean any adhesive, grout and wax from the surface area of stone
2. Adhesives/sand or cement with salt content will re-act with some natural stone and should not be used for stone applications
3. Natural Stone should not be cleaned with acid or acid based industrial cleaners
4. During the laying process, adhesives and grout must be cleaned off the stone immediately

Polishing Procedure for Turkish & Egyptian Stones

1. Grind the marble using Grit no's 60 or 100 in Diamond Polish or Grit No. 1 in Granite Polish (Diamond and Granite Polish are two prevalent polishing methods)
2. Apply **RachTR Back Seal** (<http://rachtr.com/images/pdf/protection/rachtr-back-seal.pdf>) to the substrate so as to harden the surface, enhance the adhesion between stone constituents & make the surface water repellent
3. Apply **RachTR Epoxy 201L** (<http://rachtr.com/images/pdf/epoxy-systems/rachtr-201-l.pdf>), on the substrate to fill microscopic minor pinholes, cracks and fissures
4. Apply Grit no. 200 (Diamond Polish) or no. 2 (Granite Polish)
5. Apply second coat of **RachTR Back Seal**
6. Apply Grit No. 400 (Diamond Polish) or 3 (Granite Polish)
7. Apply **RachTR Stone Power** to further strengthen the stone (<http://rachtr.com/images/pdf/polish-systems/rachtr-stone-power.pdf>).
8. Use next grit, i.e. Grit no. 800 (Diamond Polish) or no. 4 (Granite Polish)
9. Apply second coat of **RachTR Stone Power**
10. Use further Grits (no. 1600, 3000 etc. in Diamond Polish) & Grit No. 5 & 6 (Granite Polish)
11. Apply **RachTR Top Seal** (<http://rachtr.com/images/pdf/protection/rachtr-top-seal.pdf>) to prevent absorption of oil, water and other stain causing things
12. **Apply RachTR Pro-Shine+** (<http://rachtr.com/images/pdf/polish-systems/rachtr-pro-shine+.pdf>), to further enhance gloss and surface finish



STONE MAINTAINENCE

Proper care and maintenance ensures beautiful appearance of natural stone

Cleaning

Only use a mild cleanser such as **RachTR XC 1** as harsh chemical cleansers can eventually breakdown the sealer.

Acids

Products such as fruit and fruit juice, milk (lactic acid), coffee and teas, household cleaners contain either natural acids or harsh chemicals that eat away natural stone and the sealers that are used to protect them. Whenever spills occur wipe them up. Always use coasters under glasses to prevent unseen spills from remaining on the stone.

Protection from Heat

Never place a hot dish directly from an oven onto the natural stone - always use protective mats or trivets. This also protects the stone from chipping that could occur.

Stain Removal

1. Wipe up spill immediately
2. Try to identify what caused the stain
3. Use a mild detergent or soap first to try and remove the stain
4. Call for professional advice if you are not sure what to do
5. No usage of vinegar, lemon juice or other acid based cleaners on natural stone. Be aware of "Natural" and "Organic" products – always read the labels.
6. Avoid cleaners that contain acid. Read product labels carefully of any bathroom or grout cleaners.
7. Don't use abrasive cleaners or scourer pads or household grade steel.
8. Don't mix chemicals together. Some combinations could create a toxic gas