Care Procedures for Natural Stone Specifications

The use of natural stone continues to grow in popularity. Hardly any new building is designed and built without including marble, granite or limestone for interior or exterior application.

There is, however, a serious lack of knowledge about proper care and maintenance of natural stone. The purpose of this article is not to make anyone an "instant expert", but rather to provide an introduction to stone and marble, to confront some of the problems and to describe basic maintenance methods.

Synthetic building materials such as ceramic, terrazzo, agglomerate, brick and masonry are developed in a controlled and closely regulated environment. The resulting uniformity of these synthetics means their care is fairly straightforward and uncomplicated. Natural building materials – such as stone and marble – bear nature's many complexities and unpredictable characteristics. They are more handsome in appearance and require specialized care.

Natural stones vary in their mineral composition (calcium carbonate, iron feldspar, silicate, etc.) and also show large variations in their absorption, density, abrasive hardness, modulus of rupture and compressive strength. Both the mineral composition and the individual characteristics of the natural stone have an important impact on its use and on the selection of its surface finish.

By choosing the inappropriate stone or surface texture for a particular application, the architect/ designer/ builder creates an irreversible problem, which the contractor is frequently expected to ease or solve.

Following are some examples of why it makes sense not to make certain choices:

It makes sense not to use a stone, which is not frost proof, on the exterior of a building in Chicago

It makes sense not to use a polished stone in a wet area, where slipping is a danger

It makes sense not to use a stone, which is not acid resistant on a countertop, where fruit juices (critic acids) are often served

It makes sense not to use black marble in any well-trafficked area, since it scratches to white

Distinguishing Natural Stones

The first step towards successful maintenance is to know and understand the different basic types of stone. To be able to choose specific products, one has to be able to recognize the different stones and know their properties.

Granite: The strongest and most commonly used natural stone. High density and abrasive hardness, frost proof, citric acid resistant, long weathering.

Marble: There are big differences in the quality (usage-quality) of marbles. The Marble Institute of America (MIA) classifies marble into 4 groups: A, B, C & D. Only grade A material which has a high resistance to foot abrasion and low water absorption, is recommended for commercial areas. Unfortunately, the MIA leaves the classification decision pretty much up to the quarrier/manufacturer/ distributor, so that the results are often biased. Still, the list is helpful. Marble is less resistant to foot abrasion than granite and will therefore show "wear pattern" (polish-shine will wear off) a lot faster. Marble also stains more easily and fruit juices "eat" right into the surface, leaving permanent etch marks that are often perceived as shadows.

Limestone/Dolomite: A popular definition of marble is: "every natural stone which can be polished (take a natural shine) and is not granite". What this means is, that most marbles are limestones and most limestones are marbles.

Limestone is made up of lime or calcium carbonate. Since there is no significant difference between marble and limestone in regard to maintenance and protection, there is no need to further discuss the physical difference.

Sandstone: It is well to distinguish between sandstone and quartzitic sandstone. The latter ranks a lot higher in "usage quality". Absorption and abrasive resistance are the weak properties of sandstone which is why it is rarely used as a flooring material.

Granite and marble account for over 90% of all natural stones used for building purposes.

Once one is able to distinguish between marble, granite, limestone and sandstone an understanding of the different surface finishes used for natural stone is needed.

Three major surface finishes are being used by architects/ designers/ builders:

polished - smooth and high light reflective

honed - smooth but little shine

textured - rough surface. These include flamed, bushhammered, sandblasted, split-face (natural cleft) and chiseled.

Steps in a Care and Maintenance Program

GROUT/CONSTRUCTION DIRT CLEAN-UP

Let's take the following scenario: A building manager calls and describes a new marble installation. The floor looks dirty and has a grayish film on the surface. All one needs to know is the surface finish to determine the correct cleaning product to use. Why do we have to know the finish of the natural stone? Depending on the finish – whether smoother or textured – the grout, cement residue and other construction dirt may be more or less easily removable. A stronger cleaner is necessary for textured finishes.

In addition, a polished surface (in case of marble) is very easily destroyed and requires a very mild cleaner for grout film removal. A slightly alkaline (pH-8.5 or thinner) or acidic cleaner will permanently reduce the shine (it etches the surface) of the marble.

PROTECTION

The second step in a complete stone care system is Protection. This step is of utmost importance for the longevity of the natural stone installation.

All natural stones are porous (granite less than ½% water absorption; marble up to 1%; limestone between 1% and 7%; sandstone up to 20% water absorption).

As long as we have an absorption factor, stone will stain and deteriorate over time since the regular tap water used in maintenance contains salt, minerals and chlorine – which are all detrimental to natural stone. In addition, more and more "decorative" marbles are being selected and used for their beauty and not their strength. These marbles are generally very prone to foot abrasion and staining.

Impregnators, often called "penetrating sealers" in the industry, help to chemically solve these problems by closing the pores of the stone and hardening its surface. Dirt is no longer able to penetrate deep into the stone causing stains and deterioration.

With a properly applied, good impregnator, there is absolutely nothing remaining on the surface to affect the appearance and beauty of the stone. For all polished and smooth surfaces an impregnator is recommended since sealers, which are surface coats, will not bond and will

be easily abraded (wear pattern will develop). To restore floors showing wear patterns, stripping and re-coating – which harms the natural stone – will be necessary.

In case of a textured surface – such as flamed granite – sealers may be recommended. Sealers always enhance the color and texture of natural stone. For a textured surface, a sealer also has the advantage of slightly leveling the uneven surface, thereby reducing maintenance costs. But keep in mind: should the architect/designer/building owner insist on "no color change" only an impregnator can be offered. Often though, after preparing a sample or doing a test area, the decision-maker likes the "color improvements".

Other important requirements for Impregnators/ Sealers for natural stone are:

Solvent base versus water base. Only solvents con dissolve the silicone or acrylic to a degree where it still effectively penetrates the natural stone surface. In addition, water base silicones have a pH of 13, i.e. they are too high in alkalinity, for use on stone and marble.
UV Resistant impregnator/ sealer won't turn yellow and "discolor" the natural stone when exposed to sunlight.

Permeability or Moisture Vapor Transmission (MTV) is in every building – in back of walls and under floors. Humidity is present and if the humidity gets sealed in, the marble will deteriorate. Marble is, by and large, calcium carbonate or chalk and with the addition of humidity it will turn to dust. Impregnators should be about 95% - 100% permeable in order not to harm the natural stone; sealers about 85%. Other "breathable" coatings maintain from 42% - 78% of the substrates natural vapor permeability.

Weather Resistance (acid rain, freezing temperature, fungus, ice melters, etc.). In case of exterior applications this is an important factor.

Improvement of resistance to foot abrasion. The protection step is a must for natural stone.

ONGOING MAINTENANCE

The next step in a complete Stone Care System is Ongoing Maintenance. The Protection Step prevents the physical deterioration of the stone. Ongoing Maintenance guarantees the long lasting beauty and appearance of the stone.

Floors:

An entrance mat is the most basic requirement for any stone or marble floor. Without it, even the best maintenance system will be unsuccessful!

Dust mopping is important to remove particles from polished stone surfaces to avoid scratches. Damp mopping removes surface dirt.

Conditioning:

Only a pH-7 neutral, 100% natural –no rinse- product should be used. The "no rinsing" guarantees the conditioning, which is very important for all natural materials such as wood, leather, etc.

"Industry Neutral" (pH8-9) cleaners are too harsh. They destroy the natural polish of the stone and will discolor it overtime.

Protection Against Foot Abrasion:

Cleaning and conditioning is sufficient for a honed or textured stone, but not for a polished or shiny surface. In order to preserve the natural polish, a no-rinse product is needed, which is applied (highly diluted with water) and which leaves a slight, invisible and highly permeable film. Your feet abrade the film rather than the natural polish.

Periodic Thorough Cleaning:

A mild pH 7.5 cleaner will clean off any residue of the Conditioner and Maintenance Protector.

To summarize, Natural Stone Floor Maintenance – once the stone is protected with impregnator/sealer – only requires a simple damp mopping of the surface with the two different products and without rinsing.

WALLS AND COUNTERTOPS

With a wall, vanity countertop, one does not face the "foot abrasion" problem. A paste – instead of a liquid – is recommended for ease of work. The paste should be wax free in order not to smear and should not leave any build up on the surface. 95% - 100% permeability is also required.

Restoration of the polished surface becomes necessary only when proper care and protection procedures have been neglected. Unfortunately, too many service contractors, not really knowing or understanding stone and marble, try to perform this work and often do more harm than good to the surface. Choose your service contractor carefully (cheap is not better). Insist on references and on seeing previously completed work.
Today, three different methods are used to restore a marble floor.

GRINDING

Different grid screens are used with heavy grinding machines to resurface the natural stone and bring back the natural high gloss. This method is still the best, but also the most expensive one. Only professionals can do the job. Grinding is a must with all severely damaged surfaces.

1. **Re-Surfacing (Factory Method)**

This method is similar to the one used in the factory and has proven successful over the last 25 years. Fine abrasives mixed with oxalic acid or tin oxide are used in conjunction with a floor machine and a polishing pad.

This method allows you to safely bring back the natural polish without harming the marble or stone. It is less expensive than the grinding, but does not work on granite or cracked marble surfaces.

It is worth nothing that some companies sell pure oxalic acid to do the restoration. Pure oxalic acid is too "hot" and will permanently harm the marble! I urge you to choose approved, ready to use products, specifically developed for this purpose.

2. **Crystallization**

This method had been used in Europe for the last 10-15 years, but lost its importance due to labor intensity, the need for trained professionals, its extremely harmful acidic ingredients and, finally, the improvement in re-polishing compounds available today.

The American market still does not completely realize all the negative effects of crystallization, since it has only been used here for the last few years. It often takes 6-8 months before the floor starts to disintegrate due to the constant pumping of acids into the floor.

3. **Stripping and Stain Removal**

Since natural stones consist of minerals, the use of chemicals may easily affect them. The wrong chemical may not only change the color of the natural stone but also may permanently and adversely, affect the stone. As an example: Texas Pink Granite turns to a beige color if treated with a Stain Remover which also removes rust – since granite often contains iron as a mineral.

Building Stone Institute has published a Guideline to Stain Removal, which can be followed, step-by-step, by most homeowners. Deep Stain Removal should be left to a professional. Still, contractors successfully perform general stain removal by using a good solvent base Stain Remover specifically developed for stone with or without a poultice.

A stone care system which includes a complete, comprehensive and interrelated series of products for natural stone and marble – from initial clean-up to outgoing maintenance and protection – is a worthwhile follow-up investment in the long-life of marble, granite and other stone floors.