Sealing and maintaining NATURAL STONE

CDK Stone Calacatta benchtop and splashback

BAM Stone bluestone

Melocco Stone, Snowy River Pearl

Cairns Marble & Granite, Pilbara Cream

ASAA™ Australian Stone Advisory Association Ltd

Sealing and maintaining NATURAL STONE

The Australian Stone Advisory Association (ASAA) produced the 'ASAA Natural Stone Design Manual' in association with the Marble Institute of America (MIA). The ASAA manual was modified to reflect local industry practices. Over 300 copies have been sold to specifiers and members of industry. Our guide to sealing and maintenance of stone is based on the content of a number of MIA publications. The content has been amended to highlight local industry practices and to provide contemporary advice and best industry practice.

The ASAA board and members extend their gratitude to the MIA for their highly valued support.

MARBLE INSTITUTE of America

ASAA™ Australian Stone Advisory Association Ltd

Victorian Bluestone Quarries, Lara Bluestone

Cairns Marble & Granite, Australian Emperador Brown

Gosford Quarries, Helidon Sandstone

Melocco Stone, Austral Black

CDK Stone, Calacatta

Get to know
YOUR STONE

The first step in proper stone care and maintenance is to understand your stone's geological classification and composition. This information will help you to identify what cleaning products to use and how best to care for your natural stone.

Natural stone is categorized into three basic geological classifications by their respective formation processes: **sedimentary, metamorphic** and **igneous**. Additionally, stones in each category can be either **calcareous** or **siliceous**.

Calcareous stone is composed mainly of calcium carbonate, a chemical compound commonly found in natural stone, shells and pearls. Calcium carbonate is sensitive to acidic solutions so mild, non-acidic cleaners are recommended.

Siliceous stone, as the term implies, is one composed primarily of silicates, such as quartz, feldspar, mica, etc. As such, a siliceous stone is generally resistant to most acids found in kitchen settings. Acidic cleaners are still not recommended, as siliceous stones may contain trace levels of minerals that are acid sensitive.

The following chart will be a helpful guide:

	Sedimentary	Metamorphic	Igneous
Calcareous	Limestone Travertine Onyx	Marble Serpentine	
Siliceous	Sandstone	Slate Quartzite Soapstone	Granite Bluestone/ Basalt

Some varieties of hard dark green stone, marketed as green marble, contain white veins of magnesium silicate that softens and disintegrates after many cycles of wetting and drying. It is unlikely that this decay can be permanently prevented by sealing the stone.

Protect your stone
– SIMPLE STEPS

To preserve and prolong the beauty of your natural stone, follow these simple tips:

Coasters: Use coasters under all glasses, particularly those containing alcohol or citrus juices.

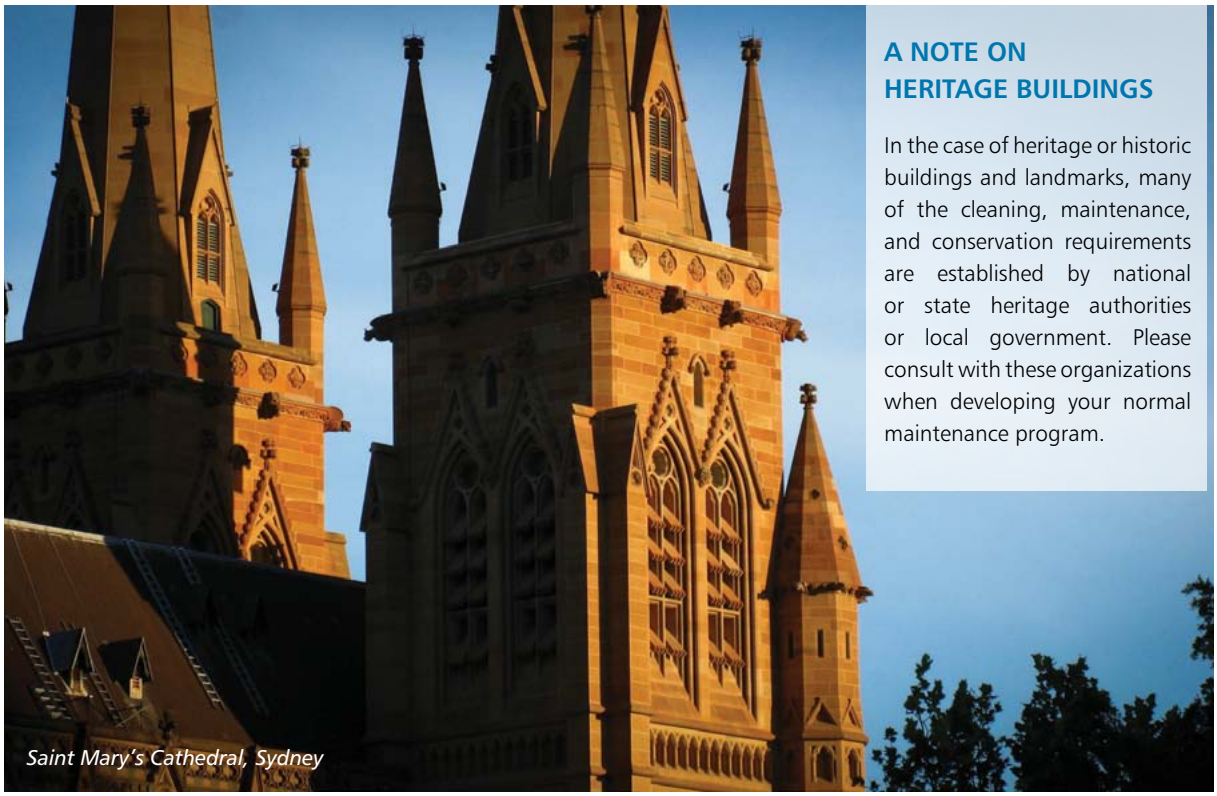
Avoid Heat: While many stones can withstand heat, the use of trivets or mats is recommended.

Mats/rugs: Mats or area rugs inside and outside an entrance will help to minimize the sand, dirt and grit that may scratch the stone floor. Be sure that the underside of the mat or rug is a slip resistant surface. Clean the mat or rug regularly.

Dust Mopping: Frequently dust mop interior floor finishes using clean micro-fibre wipes. Prompt removal of dirt, grit, sand and any other abrasive material will protect natural stone finishes from scratching.

Vacuum cleaners: If used, be sure the metal or plastic attachments or the wheels are not worn as they can scratch the surface of some stones.

Spills: Blot the spill with a paper towel immediately. Don't wipe the area, it will spread the spill. Flush the area with water and mild soap and rinse several times. Dry the area thoroughly with a soft cloth. Repeat as necessary.



Saint Mary's Cathedral, Sydney

A NOTE ON HERITAGE BUILDINGS

In the case of heritage or historic buildings and landmarks, many of the cleaning, maintenance, and conservation requirements are established by national or state heritage authorities or local government. Please consult with these organizations when developing your normal maintenance program.

Cleaning

General cleaning can be carried out with pH neutral cleaners like stone soap, or mild liquid dishwashing detergent and warm water. However, the effectiveness of these methods will vary depending on the type of stone, its porosity, location and the amount of foot traffic it is subjected to. Care needs to be taken when applying soap, which can damage some marbles. Use of ammonia can be unpleasant. Some bleaches can harm the sealer, and damage the stone. Some natural stone products do not require sealing, but if a decision is made to proceed, it should be done in consultation with the stone supplier, an experienced applicator, or the manufacturer or supplier of the sealer.

The same criteria should be applied to choosing an appropriate cleaning and maintenance programme. Many local suppliers of sealers also supply tried-and-tested products for general cleaning and maintenance which will not damage the stone and are compatible with the sealer. If in doubt, seek independent advice, from a professional applicator, or a supplier of sealers. The latter may provide free advice and conduct tests to ascertain the suitability of a specific product.

Avoid use of cleaning products which contain lemon, vinegar, or other acidic products, which may dull or etch the surface of calcareous stones. Some scouring powders or creams contain abrasives that may scratch certain natural stone products.

Many commercially available rust removers (e.g. laundry rust stain removers and toilet bowl cleaners) contain trace levels of hydrofluoric acid (HF). This acid attacks silicates in addition to other minerals. All stones – including granite and quartzite – will be attacked if exposed to HF.

NEVER mix ammonia and bleach, this combination creates a toxic and lethal gas

Before applying sealer or using cleaning products always conduct a trial on a sample piece of the stone, or in an inconspicuous area of the finished tiling, before proceeding.

LARGE EXTERNAL AREAS

The large expanses of stone generally found on exterior applications may make it impractical to perform normal maintenance on a frequent basis. Large installations, however, should be given periodic overall cleaning as necessary to remove accumulated pollutants. Easily accessible stone surfaces such as steps, walkways, fountains, etc., should be kept free of debris and soiling by periodically sweeping and washing with water.

Normal maintenance should include periodic inspection of stone surfaces for structural defects, movement, deterioration, or staining.

Sealing

One of the first considerations to address prior to buying a particular stone is 'does it require sealing?' Some products age and develop an attractive natural patina, other products require protection. Some natural stone products that do not require sealing in one environment may require sealing in another location.

ASAA and the MIA recommend:

- Careful review of multiple factors (i.e. type of stone, its finish, its location, and how it will be maintained) be taken into consideration when determining how to protect the stone.
- If the choice has been made to protect the stone with a sealer or impregnator, always consult with the Manufacturer/Distributor to advise and choose the appropriate sealing product.

Before reaching a decision, consult with the stone supplier or installer, and carefully consider the following:

- What is the hardness, density, and durability of the stone?
- How porous is the stone and how fast will it absorb a liquid (also referred to as the absorption coefficient)?
- Is the stone expected to be in frequent contact with a staining agent?
- What type of finish was applied to the surface? For example, a polished surface is more resistant to staining than a honed surface.
- Will the sealant affect the color or other aesthetics of the stone?
- If a resin was applied to the stone during fabrication, how will the sealant react with the resin?
- Where is the stone located (e.g. countertop, floor, wall, foyer, bathroom, etc.)? Residential or commercial?
- What type of maintenance program has the stone been subjected to? How will it be maintained in use?

The type of stone, its finish, its location, and how it is maintained all need to be considered when determining how to protect the stone.

WHICH TYPE OF SEALER

If you have decided to treat your stone, make sure you understand the differences between the types of sealers available on the market:

- **Topical Sealers** are coatings (film formers) designed to protect the surface of the stone against water, oil, and other contaminants. They are formulated from natural wax, acrylic, and other plastic compounds. When a topical sealer is applied, the maintenance program often shifts from a program focused on stone care to a program focused on the maintenance of the sealer (for example: stripping and reapplication).
- **Impregnators** are water or solvent-based solutions that penetrate below the surface and are designed to repel staining agents. Impregnators have the advantage of being vapour-permeable (breathable) allowing water to evaporate from the stone. They are generally hydrophobic (water-repelling), but may also be oleophobic (oil-repelling) depending on their chemical composition. It is important to ensure that the stain-

resistant properties of the sealer match the staining agents that the stone surface may be exposed to.

Vanity tops and food preparation areas may need to have an impregnator applied. Check with your installer for recommendations. If an impregnator is applied, be sure that it is safe for use on food preparation surfaces. If there are questions, check with the product manufacturer.

TOPICAL SEALERS VS. IMPREGNATORS (ADVANTAGES AND DISADVANTAGES)

How do you decide whether to use a coating or an impregnator to protect the stone? Both have advantages and disadvantages. The following summary should be studied carefully to help you choose the right product.

Topical Sealers – Advantages

- Topical sealers typically provide a sacrificial layer on the stone. This layer will take most of the wear on the stone.
- Certain topical sealers may provide added slip resistance.
- These products provide various degrees of lustre (gloss).
- Topical sealers are generally economical. The initial application cost is relatively small.
- They're usually easy to apply. Unskilled laborers can learn to apply them with a reasonable amount of training and practice.
- Some topical sealers can be applied below grade.

Topical Sealers – Disadvantages

- Since most topical sealers are typically softer than the stone itself, they will usually scratch, mark and scuff very easily, showing traffic patterns soon after application. This will require frequent buffing, burnishing, or reapplication.
- Some topical sealers require frequent stripping and reapplication. The chemicals and abrasives used in the stripping process may cause damage to the stone. Typically, certain stripping pads and brushes can scratch softer stones. Some wax strippers can harm agglomerate stones by eating through the polyester resin binders they contain.
- Topical sealers may make the surface of certain materials more slippery, especially in areas affected by moisture.
- Certain topical sealers block the "breathing" capability of a stone. Moisture can become trapped below the surface and may lead to spalling.
- Topical sealers can build up and cause an unsightly appearance, giving an unnatural, wavy, plastic look to the stone.
- Poor quality topical sealers can turn yellow. This is especially true if the stone is exposed to ultraviolet (UV) light.
- Generally not recommended for vertical surfaces as stripping and application can be problematic.

Impregnators/Penetrating – Advantages

- Water based impregnating sealers have no odour, are non-flammable and generally have low VOCs.
- Generally do not alter slip resistance characteristics.
- Most impregnators won't change the appearance of the stone.
- Suitable for wet areas and external areas.
- Impregnators are typically hydrophobic, and some of them are oliophobic as well.
- Impregnators typically don't require frequent applications. Since the impregnator is below the surface, it will generally last several years before reapplication is necessary.
- Most impregnators are not affected by UV light because they are absorbed below the surface where light can't penetrate.
- Can be used on polished stone, whereas topical sealers typically cannot.

Impregnators/Penetrating – Disadvantages

- The initial cost of most impregnators can be relatively high.
- Proper application of impregnators is generally more difficult than that of coatings. In many cases, training or professional consultation is recommended.
- Stones with low porosity (some granites and marbles) require careful selection and application of impregnators.
- Generally, impregnators cannot be used below grade to resist hydrostatic pressure. Because the stone is still capable of breathing, water can be forced through the stone by pressure.

Impregnators that are solvent-based produce vapors during application. In some cases these vapours can be noxious and flammable.

Some varieties of solvent-based impregnators are harmful to the environment, releasing large amounts of volatile organic compounds (VOCs). For this reason, the use of these impregnators is restricted in certain states. Also, some water-based impregnators may also contain harmful or toxic chemicals. Always check the material safety data sheet (SDS) of the product before deciding whether to use it.

Pilbara Dreamtime Q2 marble by Cairns Marble features at Jimmy's on the Mall restaurant in Brisbane.

For example, a growing number of designers and homeowners are attracted to using marble on kitchen benchtops, in spite of the fact that some marbles are quite porous by comparison with denser materials. Marble benchtops will certainly require sealing and careful maintenance, which will include protection against scratching and abrasion.

While some granites are more absorbent than others and may benefit from being sealed, others require no special maintenance or sealing. However, a sealed granite benchtop will be easier to clean. It will be much easier to remove a potentially harmful spill from a sealed granite benchtop than a sealed marble surface. Simple porosity tests can identify if a product requires sealing. If in doubt, contact the stone supplier or installer.

BEFORE SEALING ALWAYS:

- Read the Manufacturers Warranty and Instructions.
- Contact the manufacturer prior to application if you are unsure or need clarification. The woodworking analogy of 'measure twice, cut once' applies.
- Consider the life span of the application (1-year, 2-years, 5-years, etc.) – keep a log of each application.
- Don't switch from one product to another without fully understanding any potential issues with compatibility. Not all products are alike – again, consult with the manufacturers.
- Consult with your stone professional as necessary.
- Ask yourself, does the stone need to be treated in the first place?

KEY CONSIDERATIONS

Specifiers and consumers must recognise that sealers act as a barrier which is designed to prevent immediate ingress of liquid contaminants into the stone, providing the user with an opportunity to remove the substance before it stains or **etches** the stone. Sealers do not supply complete protection, but they certainly assist in protecting the integrity of the stone and generally making the surface easier to clean and maintain.

Coatings

Clear resin coatings are considerably more expensive than regular impregnating and topical sealers and they are more difficult to apply. This task should only be attempted by an experienced professional applicator. Coatings are designed to be totally clear, providing complete protection against liquids or chemicals. Typically, coatings are used in commercial or public environments (such as bars or restaurants) where surfaces may be subjected to constant spills.

WHAT IS AN ETCH?

Marble is a soft material which is prone to marking as a consequence of its calcium carbonate structure. Acidic liquids react with calcium carbonate and literally eat away a tiny piece of the surface, creating dull spots which are typically called an etch. Contact from acidic materials like lemon juice, wine, coffee, fruit juice etc can create an etch almost immediately.

An etch is not a stain; like a scratch it effectively changes the surface of the stone. It generally appears as a light, dull mark. The popularity of porous materials like marble on kitchen benchtops, versus harder, denser surfaces like granite, has created increased concern about etching. However, if the stone is effectively sealed, protected and carefully maintained instances of scratching, abrasion and etching can be minimised.

Keep these potential CONTAMINANTS AWAY!

While it is possible to remove stains and clean natural stone products using products like soap, mild dishwashing liquid, acetone, mineral salts and bleach there is no guarantee that these methods will work effectively in every environment. Therefore ASAA recommends that you contact a reputable manufacturer, distributor, or applicator for project specific advice. All of the companies listed in the attached **'Sealer Selection Guide 2015'** can make recommendations based on practical experience gained in commercial and residential environments.

Oil-Based Stains (grease, tar, cooking oil, cosmetics) — Will darken the stone and normally must be chemically dissolved so the stain's source can be rinsed away. This is often done with the aid of a poultice to help draw the oil out of the stone.

Organic Stains (coffee, tea, fruit, tobacco, paper, food, urine, leaves, bark, bird droppings) — May cause a pinkish-brown stain and may disappear after the source of the stain has been removed. Outdoors, with the sources removed, normal sun and rain action will often bleach out the stains. Hydrogen peroxide is often effective in removing organic stains.

Inorganic Metal Stains (iron, rust, copper, bronze) — Iron or rust stains are orange to brown in color and leave the shape of the staining object, such as nails, bolts, screws, cans, flowerpots, or metal furniture. Copper and bronze stains appear as green or muddy brown and result from the action of moisture on nearby or embedded bronze, copper, or brass items. Deep-seated, metal stains are extremely difficult to remove and the stone may be permanently stained.

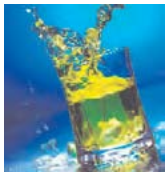
Biological Stains (algae, mildew, lichens, moss, fungi) — Rain and general weathering will often mitigate or remove this type of staining. It is also possible to dilute 120 grams of ammonia, bleach or hydrogen peroxide in 4 litres of water, however mixing bleach and ammonia can create a toxic gas, so it is advisable to seek professional advice about use of a suitable stain remover. Commercial biocides can be effective.

Ink Stains (magic marker, pen, ink)— Clean light-colored stones with bleach or hydrogen peroxide. Use lacquer thinner or acetone for dark-colored stones.

Paint Stains—Small amounts can be removed with lacquer thinner or scraped off carefully with razor blade. Heavy paint coverage should be removed with a commercial liquid paint stripper. DO NOT USE ACIDS OR FLAME TOOLS TO STRIP PAINT FROM STONE.

Water Spots and Rings (surface accumulation of hard water)—Buff with dry 0000 steel wool.

Fire and Smoke Damage — Older stones and smoke- or fire-stained fireplaces may require a thorough cleaning to restore their original appearance. Commercially available smoke removal products may save time and effort.



Etch Marks (calcareous stones) — Caused by acids (typically from milk, fruit juices, alcohol, etc.) left on the surface of the stone, some will etch the finish but not leave a stain; others will both etch and stain. Once the stain has been removed, wet the surface with clear water and sprinkle with marble polishing powder. Rub the powder into the stone with a damp cloth or by using a buffing pad with a low-speed power drill or polisher. Continue buffing until the etch mark disappears and the marble surface shines. Honing may be required for deep etching. This process may require the services of a stone maintenance professional.

Efflorescence — A white powder that may appear on the surface of the stone, caused by water carrying mineral salts to the surface of the stone. When the water evaporates, it leaves the powdery salt residue. If the installation is new, dust mop or vacuum the powder. Repeat as necessary as the stone dries out. Do not use water to remove the powder (adding water will only add to the problem). If the problem persists, contact the stone contractor to identify and remove the cause of the moisture.

Many of these stains can be easily avoided by sealing potentially porous stones that have been installed in high-risk environments. Use of a sealer will either provide enough time to remove the spill before any staining can occur, or minimise the extent of the damage.

We remind you that if staining occurs most suppliers of sealers also provide high quality products designed to remove stains from stone surfaces.

ABOUT THE AUSTRALIAN STONE ADVISORY ASSOCIATION

The Australian Stone Advisory Association (ASAA) represents the broad interests of local quarries, manufacturers of allied products, processors, wholesalers and resellers of these products, and stonemasons.

Our goal is to promote the successful use of natural stone in our built environment, by providing advice on related aspects of selection, installation, care and maintenance.

ASAA regularly organises seminars, participates in Standards Committees and provides related information at www.asaa.com.au, and in the pages of *Discovering Stone* magazine.

ASAA also produces a comprehensive 390-plus page 'Natural Stone Design Manual' in a licensed digital format (a CD is also available). The manual was based on a similar publication produced by the MIA. The ASAA board thanks the MIA for its highly valued support.

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