

GLOBAL STONE

LANDSCAPING SUPPLIES



TROUBLESHOOTING GUIDE
www.globalstonepaving.co.uk

WELCOME TO THE GLOBAL STONE TROUBLESHOOTING GUIDE

This guide has been designed to be an easy to use reference for any landscaper or DIY enthusiast, to help identify natural occurrences and installation issues when using natural stone and porcelain paving. You can also find downloadable PDFs of our laying patterns, step by step laying guides and other useful information on our website at www.globalstonepaving.co.uk

ISSUE IDENTIFICATION	04	SURFACE MARKS	22
BEFORE YOU BEGIN	06	RUST SPOTS (OXIDATION)	23
CASE STUDIES		NATURAL FORMATIONS	24
LAYING SLABS ON A FULL BED OF MORTAR	07	VEINING	25
SLABS NOT LAID ON A FULL BED OF MORTAR	08	MOISTURE TRANSPARENCY	26
EXAMPLES OF STAINING DUE TO SLABS NOT BEING LAID ON A FULL BED OF MORTAR	09	LICHENS	27
LAID UPSIDE DOWN	11	GREEN STAINING/STAINS OVER VOIDS	27
TEXTURED STONE LAID UPSIDE DOWN – SAFETY	12	DIMENSIONS	30
UNEVEN WEATHERING DUE TO BUTT JOINTING	13	DELAMINATION	31
OPC STAINING (LEACHING)	14	CORRECT THICKNESS MEASURING	32
PICTURE FRAMING	15	HANDLING & PREPARING PORCELAIN	33
NATURAL WEATHERING – LIMESTONE	16	PORCELAIN: TILES “POPPING UP”	34
COLOUR BLENDING NATURAL STONE	17	PORCELAIN: BUTT JOINTING PAVING	35
EFFLORESCENCE	18	PORCELAIN: TILE FINISHES/ COLOUR BLENDING	36
CHEMICAL REACTION (OXIDISATION)	20	PORCELAIN: MANUFACTURING PROBLEMS	37
WHITE BLOOM (CALCIUM CARBONATE DEPOSITS)	21	USING ACID BASED CLEANERS ON PORCELAIN	38
		PORCELAIN: JOINTING COMPOUND RESIDUE	39
		PORCELAIN STAINING	40

ISSUE IDENTIFICATION – NATURAL OCCURRENCES

While it is impossible to outline all potential problems here, we have outlined below some of the most frequent issues which may occur.



1 NATURAL FORMATIONS

Various marks including brown/black areas (fossil crystallisation, pictured right) and lines running across the paving (veins, pictured left)



2 MOISTURE TRANSPARENCY

Paving has dark and light patchy areas



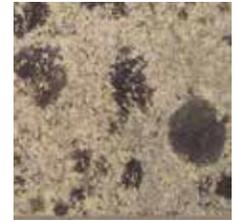
3 EFFLORESCENCE

White, cloudy bloom marks across the surface



4 PICTURE FRAMING

Darker colouration around the edges of the slabs



5 LICHEN

Black, red and/or orange stains across the surface

HAS THE PRODUCT RECENTLY BEEN LAID?

YES

NO

ARE THE SYMPTOMS

ARE THE SYMPTOMS

1 NATURAL FORMATIONS (p24)
If the product has marks on the flags prior to being laid these are likely to be a naturally occurring characteristic of the stone, and should be considered part of the beauty of natural stone rather than a defect. (see p5 and p23 – 24 for more information about natural formations)

Advice:
The marks can be in the form of natural veins, fossils or crystallisation. These are permanent features and are a natural characteristic of the stone.

2 MOISTURE TRANSPARENCY (p26)
Occurs when moisture from the wet mortar mix is absorbed through the stone. This should disappear over time.

Advice:
The best course of action is to let the patio dry out naturally. As previously mentioned both issues should disappear over time, although there is no knowing how long it may take.

3 EFFLORESCENCE (p18–19)
This is a process where salts are drawn through the natural stone from the mortar, and presents itself as a white substance on the surface. This should disappear over time and is by no means a fault in the product or laying. It can appear in both natural and man made paving/walls.

Advice:
Efflorescence should dissipate over time by natural weathering. Abrasive activities such as walking on the surface will also aid in shifting the deposits.
A stiff broom and frequent brushing coupled with clean water can also help accelerate the disappearance of efflorescence.
Acid or acidic based cleaners should not be used. Any chemical treatment should be carefully considered.

4 PICTURE FRAMING (p15)
It is the product drying out naturally and should disappear over time.

Advice:
The best course of action is to let the patio dry out naturally. As previously mentioned both issues should disappear over time, although there is no knowing how long it may take.

5 LICHEN (p27)
This is a form of algae or bacteria that naturally occurs mainly due to the environment of the surrounding area.

Advice:
Specialised products are advised to help remove the marks. Always check with the cleaning product manufacturers and test on a small discreet area.



ISSUE IDENTIFICATION – INSTALLATION ISSUES



1 LAID WRONG SIDE UP

Long cut grooves or saw marks visible, smaller face of the slab facing up



2 LAID ON MORTAR SPOTS

Patchy marks across surface of the slab, usually in the form of brown/green stains



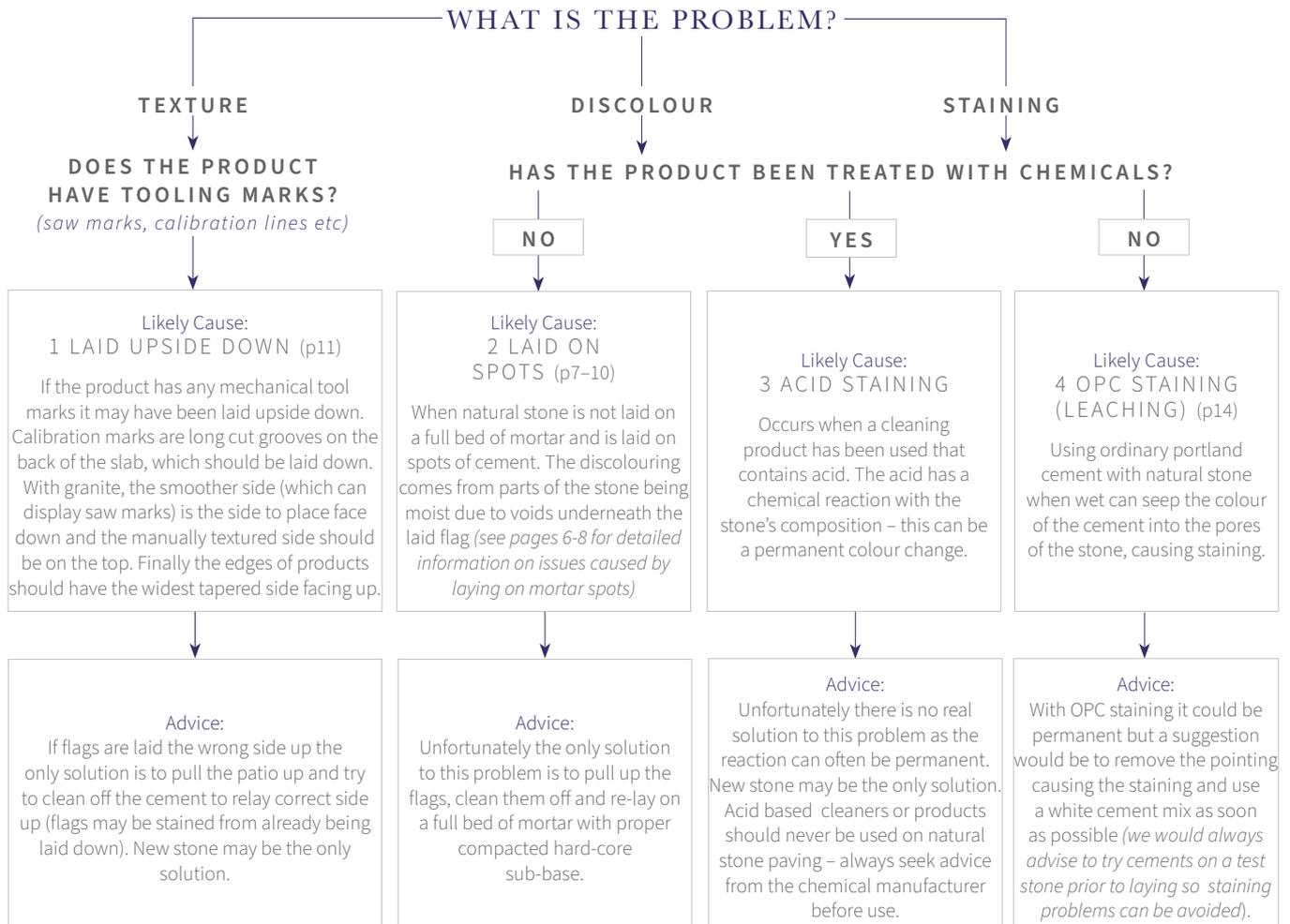
3 ACID STAINING

Beige marks on paving, usually as squares in the middle of the slab



4 OPC STAINING

Discolouration of light coloured paving, brown markings on surface



BEFORE YOU BEGIN...

When choosing natural stone or porcelain, it is important that you consider and thoroughly check the product you are thinking of using to ensure it is right for you. We strongly recommend that you visit a stockist to view a large amount of the paving in real life at one of our merchants that has displays. Please check our website Stockist Locator for more information. While photographs and digital images are a great way to show the visual aspects of the stone, it is important to view it to get a true representation of all aspects of the product (we also suggest that you view the paving wet and dry). You can also order small samples of our products via our website at www.globalstonepaving.co.uk

When your chosen product has arrived, it is important that you thoroughly check over your slabs to ensure that you are happy with the

paving. Every environment is different, and so it is important to ensure that you are happy that the paving you have chosen is right for your project. Once Stone/Porcelain is laid, it is difficult to rectify issues in regards to personal taste, especially when the product is in otherwise perfect condition.

There are many features of natural stone which may at first appear to be faults with the product, however many of these occurrences are natural formations and should be considered a part of the beauty of the stone. Below are some examples of characteristics in stone that you might expect to see dependant on your chosen product (see p24 for more detail on natural formations, and p25 for more information specifically on veining).

Banding



BANDING: Products that feature banding can vary in their patterns – while most banding is fairly subtle there can be occurrences where the banding is more dramatic – this example shows a very dramatic example of banding in our Sandstone

Veining



VEINING: While the surface may appear to display hairline fractures in the stone, these lines are actually natural veins that run through the stone. This example shows veins in a Premium Sandstone. (See p25 for more information and further examples of veining).

Crystallisation

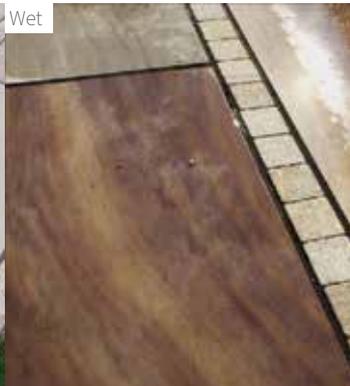


CRYSTALLISATION: Some of our products may display areas of crystallisation, particularly in Premium Sandstone Mint. The above is an extreme example of the crystallisation that you might expect in natural stone.

Dry



Wet



WET/DRY VARIATION: Dependant on the product, there can be strong variations between colour depending on whether the stone is wet or dry. We strongly recommend seeing the stone in real life to see this difference.



LAYING SLABS ON A FULL BED OF MORTAR

WHY IS A FULL BED OF MORTAR SO IMPORTANT?

When natural stone is laid using spot laying method issues can also occur with staining which can be difficult (and sometimes impossible) to rectify once the damage has occurred. This is the most frequent issue with installation that we encounter when dealing with complaints.

As the heat of the sun warms up the surface of the natural stone slab, the heat begins to evaporate water from the cool damp air below, forming water droplets on the underside of the slab. The water, which contains impurities drawn up from the damp air and the materials below, travels up through tiny capillaries which naturally occur within the stone. The water reaches the surface, creating damp patches. When this water evaporates out of the slab into the air, the heavier materials (impurities) that were in the water are left as a visible mark on the slab.

When the natural stone is applied to a full bed of mortar with no voids, the moisture from below the stone cannot penetrate through and there is no space for the moisture and impurities to gather, therefore the surface of the stone will be protected from staining.

The use of Global Stone Slurry Primer, or equivalent SBR bonding agent, on the back of the slab can reduce this type of staining, as this creates a barrier between the slab and the mortar below.

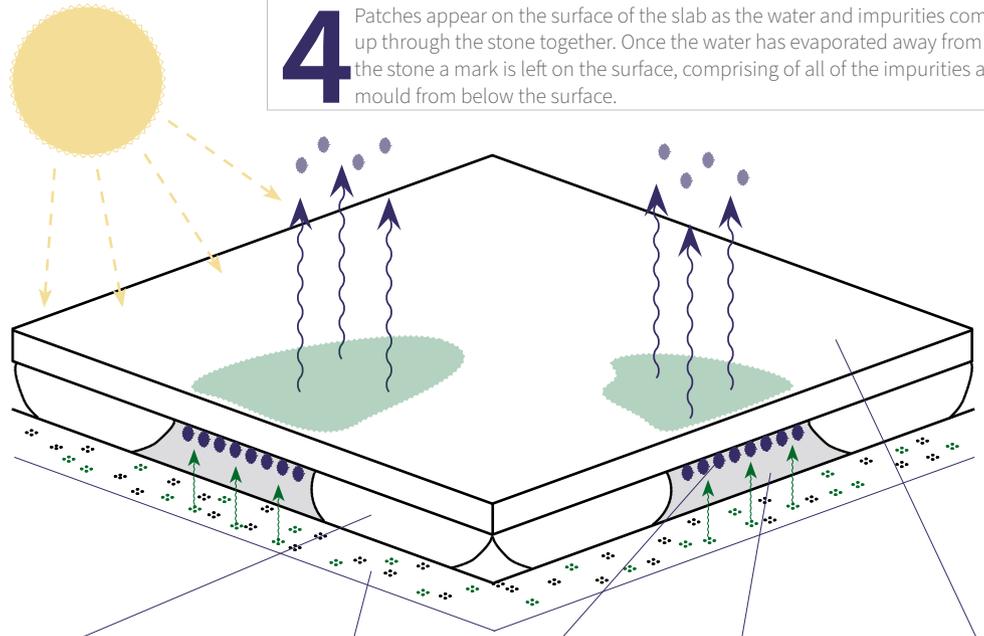
Due to the minimal moisture absorption rates of our porcelain paving, this type of staining will not affect porcelain products. However it is still imperative that porcelain is laid on to a full bed of mortar to provide a suitable supportive bed for the paving.

1 Heat from the sun warms up the surface of the slab, reacting with the cool air of the ground underneath and encouraging a “sweating effect” – the creation of water vapour.

2 Impurities from beneath the slab are drawn up with the water as the heat from the stone radiates downwards, evaporating the water. Water droplets then form on the bottom of the slab. The warm damp conditions also encourage the growth of mould within the void, further adding to the problem.

3 Water containing impurities from materials below evaporates through tiny capillaries in the stone and up through to the surface.

4 Patches appear on the surface of the slab as the water and impurities come up through the stone together. Once the water has evaporated away from the stone a mark is left on the surface, comprising of all of the impurities and mould from below the surface.



Mortar applied in spots – the areas where the stone is in full contact with mortar will not show any signs of moisture from below as the water resists penetrating through – the direct contact with the mortar reduces the natural porosity of the stone in those areas that are in contact with the mortar.

Core – cool and damp, containing moisture and impurities

Water droplets which form on the underside of the slab

Void area – spaces underneath slab where there is no mortar

Natural stone slab laid on mortar spots

SLABS NOT LAID ON A FULL BED OF MORTAR

CAN AFFECT ALL NATURAL STONE SLABS, PARTICULARLY SANDSTONES

The issue of staining caused by the spot laying (also know as “dot and dab”) method can affect all natural stone slabs, but can be particularly prominent on our Sandstone depending on the colour and natural properties of the stone.

ADVICE:

The only solution to this issue is to pull up the flags, clean the slabs of cement as much as possible and re-lay them on a full bed of mortar with a proper compacted hard-core sub-base and adequate drainage. Once the product has been re-laid, it may take time for the staining to disappear. In some instances the staining may be too extensive, so unfortunately new stone may be the only option.

Further to the issues of staining, a spot laying method can also cause rocking slabs and cracked slabs, as the spots of mortar do not provide adequate support for the stone – meaning your patio will be more vulnerable to damage over time.

It is imperative that laying guidelines are followed to ensure that this problem does not occur. **Always lay slabs on a full bed of mortar.** Applying Global Stone’s Slurry Primer (or other SBR bonding agent) to the back of slabs as you lay them is also recommended, as it will help to create a barrier between the flag and the mortar.

See overleaf to see why stains develop in this way when stone is laid on spots.

Sandstone with stain in the middle of the slab



The same slab lifted up to show void directly underneath stain



EXAMPLES OF STAINING DUE TO SLABS NOT BEING LAID ON A FULL BED OF MORTAR

Slab with areas of SBR on the back



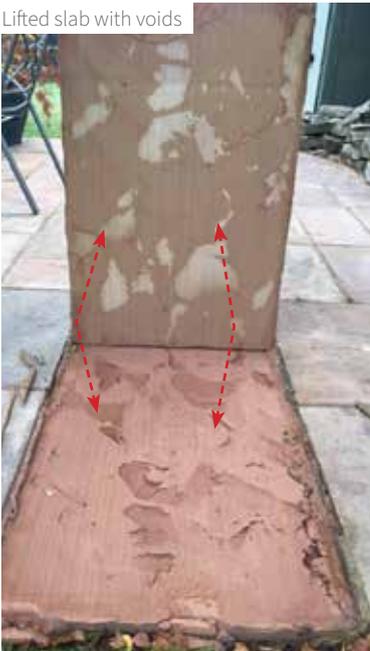
The back of this slab has some SBR applied to it – the areas where there is condensation is where the moisture cannot pass through the slab due to the barrier which the SBR has created. The dark space is where there is no SBR, where moisture will pass through the slab to the surface.

Dark patches showing areas where there are voids underneath



An example of what a slab affected by this issue can look like – patchy marks across the surface. The dark areas across the surface are areas where there are voids below the slabs.

Lifted slab with voids



The void areas are mirrored in shape on the base of the slab when lifted, which in turn are the areas showing staining on the surface of the slab.

Top of the slab showing staining



When you view the staining on the surface of the slab next to the pattern of the mortar below, you can clearly see that the voids in the mortar match in shape the areas of dark staining on the surface of the slab.

The same slab lifted showing mortar with voids underneath



FURTHER EXAMPLES OF STAINING DUE TO NOT LAYING SLABS ON A FULL BED OF MORTAR



This image shows slabs that have been laid on spots – we can see the effects clearly as the damp patches on the slabs are a telltale sign of this issue.



The dark patches across these slabs are another example of staining of this kind – you can see that impurities and damp have risen through the slab and left a mark on the surface.



LAIID UPSIDE DOWN

CAN AFFECT ALL PRODUCTS

THE ISSUE:

All Global Stone products are designed to be laid a specific side up. If a slab has been laid upside down, visible indicators may include a rougher discoloured surface, calibration marks showing (*which are long cut grooves*) or a smooth surface with saw marks on it, dependant upon which product is being laid.

ADVICE:

The edges of products (especially sandstones) should have the widest tapered side facing up. If flags are laid the wrong side up the only solution is to pull the patio up and try to clean off the cement to relay (but they may be stained from already being laid down). Unfortunately, new stone may be the only solution. Always refer to laying guidelines which are available in our literature and on our website. Laying guides for natural stone are also available to view on the product crate labels (attached to the side of the crates) which must be read prior to product installation. Specific laying guides for porcelain products are available on our website – we also have a number of case studies toward the end of this guide specific to porcelain.

WHICH IS THE RIGHT WAY UP?

Always lay larger face upwards.

CORRECT WAY UP



INCORRECT WAY UP



Sandstone which has been laid upside down (with widest tapered side facing down)



Calibration marks – the straight lines which run across the slabs seen here are on the bottom of the slab and should be laid down



The white marks seen here are characteristic signs of saw marks



Saw marks – sweeping lines or grooves seen in this example



TEXTURED STONE LAID UPSIDE DOWN – SAFETY

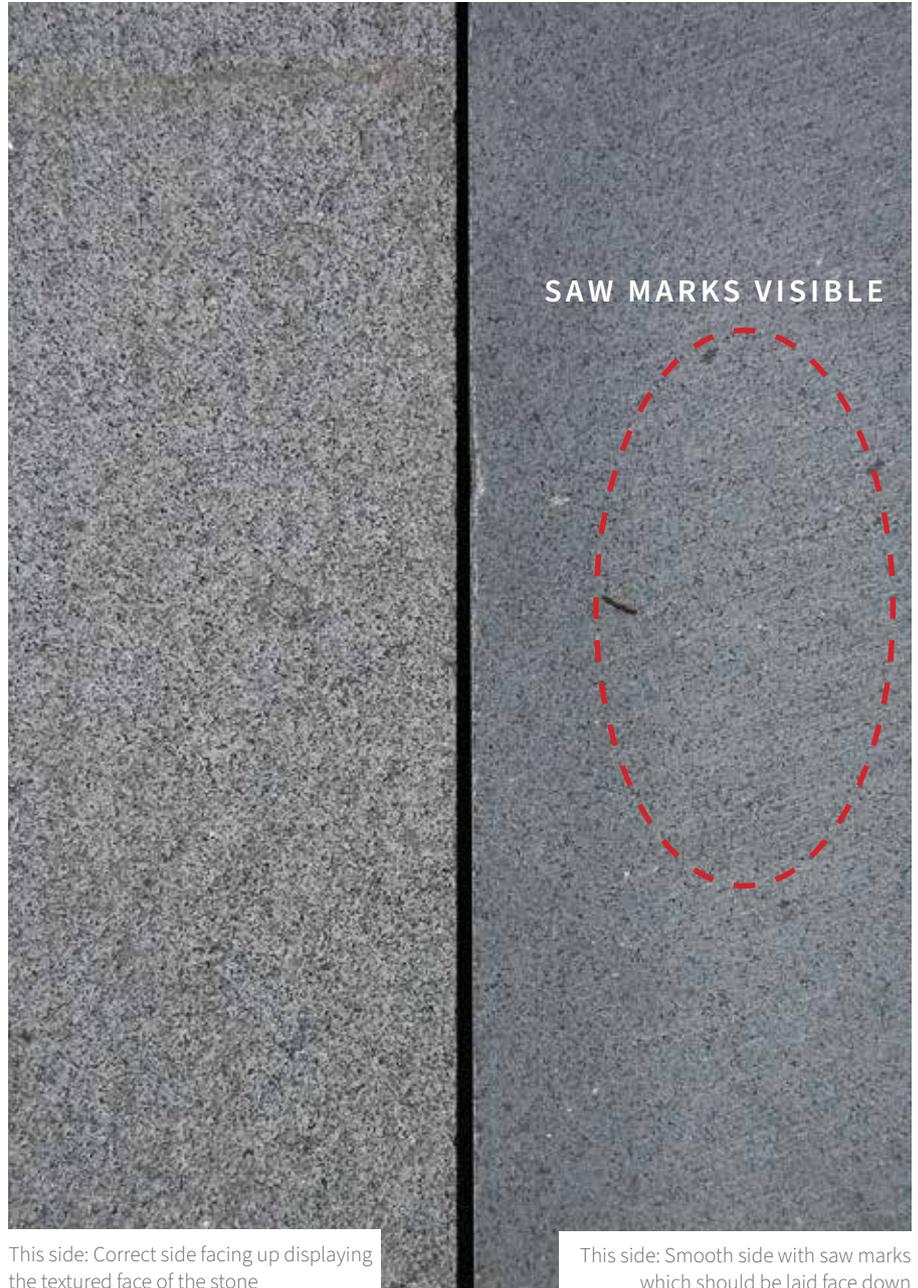
CAN AFFECT ALL PRODUCTS WITH A TEXTURED SURFACE, PARTICULARLY IMPORTANT WITH GRANITE

THE ISSUE:

Problems with safety can occur if any of our textured products are laid upside down. Our granite products and steps in particular are textured on the right/facing side to assist with slip resistance when laid, and are smooth (sometimes with saw marks) on the back which is the side that should be laid down. If the product is laid upside down the patio will be significantly less slip resistant.

ADVICE:

As this issue concerns the safety of the patio, it is important that the problem is corrected. If flags are laid the wrong side up the only solution is to pull the patio up and try to clean off the cement to re-lay (but they may be stained from already being laid down). Unfortunately, new stone may be the only solution.



UNEVEN WEATHERING DUE TO BUTT JOINTING

CAN AFFECT ALL PRODUCTS, PARTICULARLY LIGHT COLOURED GRANITE

WHAT IS IT?:

The uneven weathering effect can be seen when the slabs are laid without sufficient joints, causing the edges of the slabs to have no seal. This allows moisture in to the joints, which will then be displayed as darker areas around the edges of the slabs.

ADVICE:

The effects from this problem will weather out over time but as this is a natural product it is impossible to estimate how long it will take to weather out evenly.

It is important to follow laying instructions as none of our products are designed to be butt jointed – we recommend a 10mm approx joint is used when laying.

Laying the patio using sufficient joints and jointing material will provide a protective seal around the edges of the slabs, which will prevent excess moisture entering the patio via the joints.



Damp patches around some of the joints are visible in this example



Clearly visible example of uneven weathering – notice the obvious damp which has collected around the edges of the slabs

OPC STAINING (LEACHING)

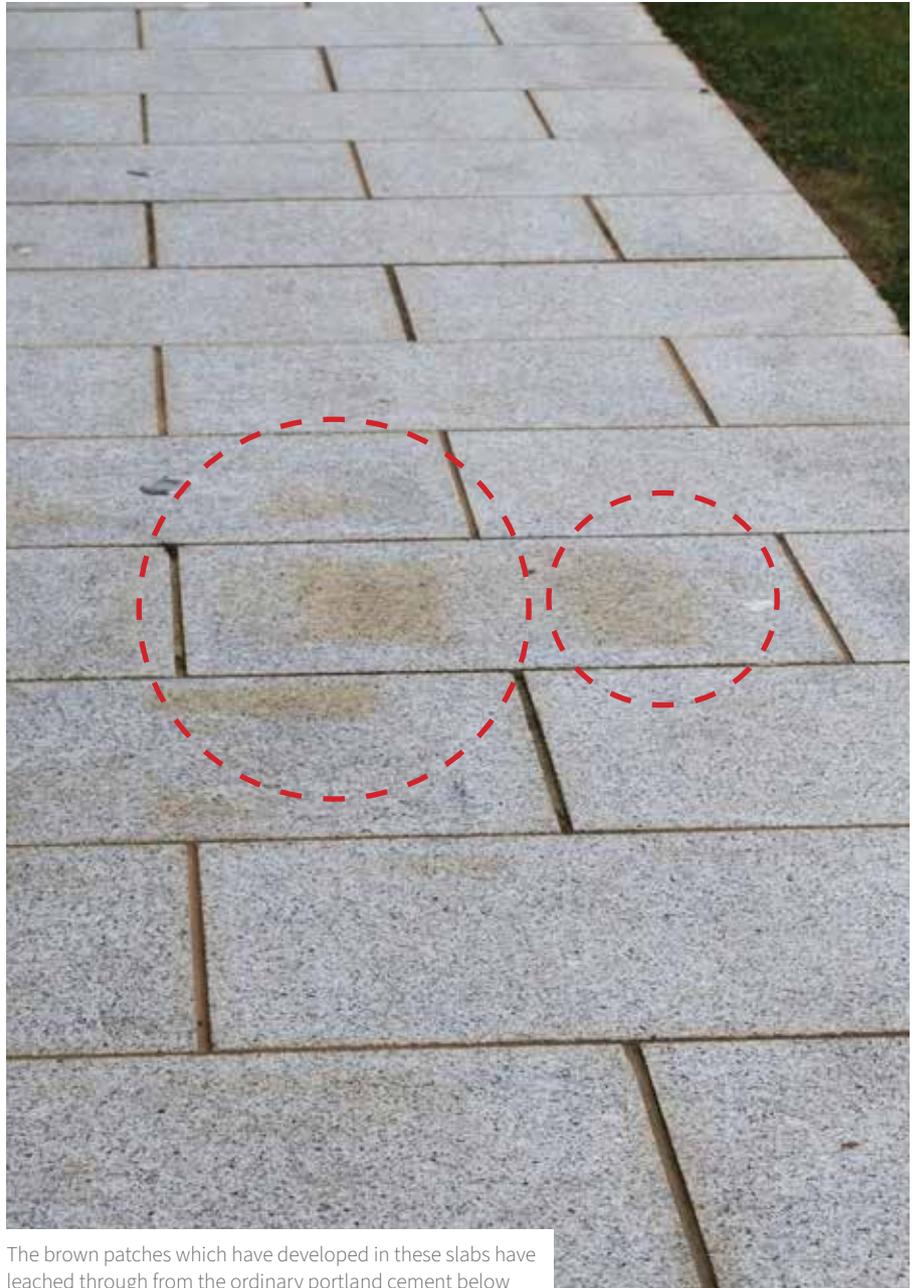
CAN AFFECT ALL PRODUCTS, ESPECIALLY LIGHTER COLOURS

WHAT IS IT?:

OPC (ordinary portland cement) staining is the appearance of beige marks on the surface of the paving. This is caused by using an ordinary portland cement with a natural stone, which may leach the colour/impurities of the cement into the pores of the stone, thus creating stained areas.

ADVICE:

If ordinary portland cement is used and staining occurs, the only course of action is to let nature take its course and allow the stone to weather naturally over time. In the instance of OPC staining we don't advise the use of chemical cleaners on the paving. We strongly recommend that you use a white cement mix when laying light coloured stones like granite.



The brown patches which have developed in these slabs have leached through from the ordinary portland cement below



PICTURE FRAMING

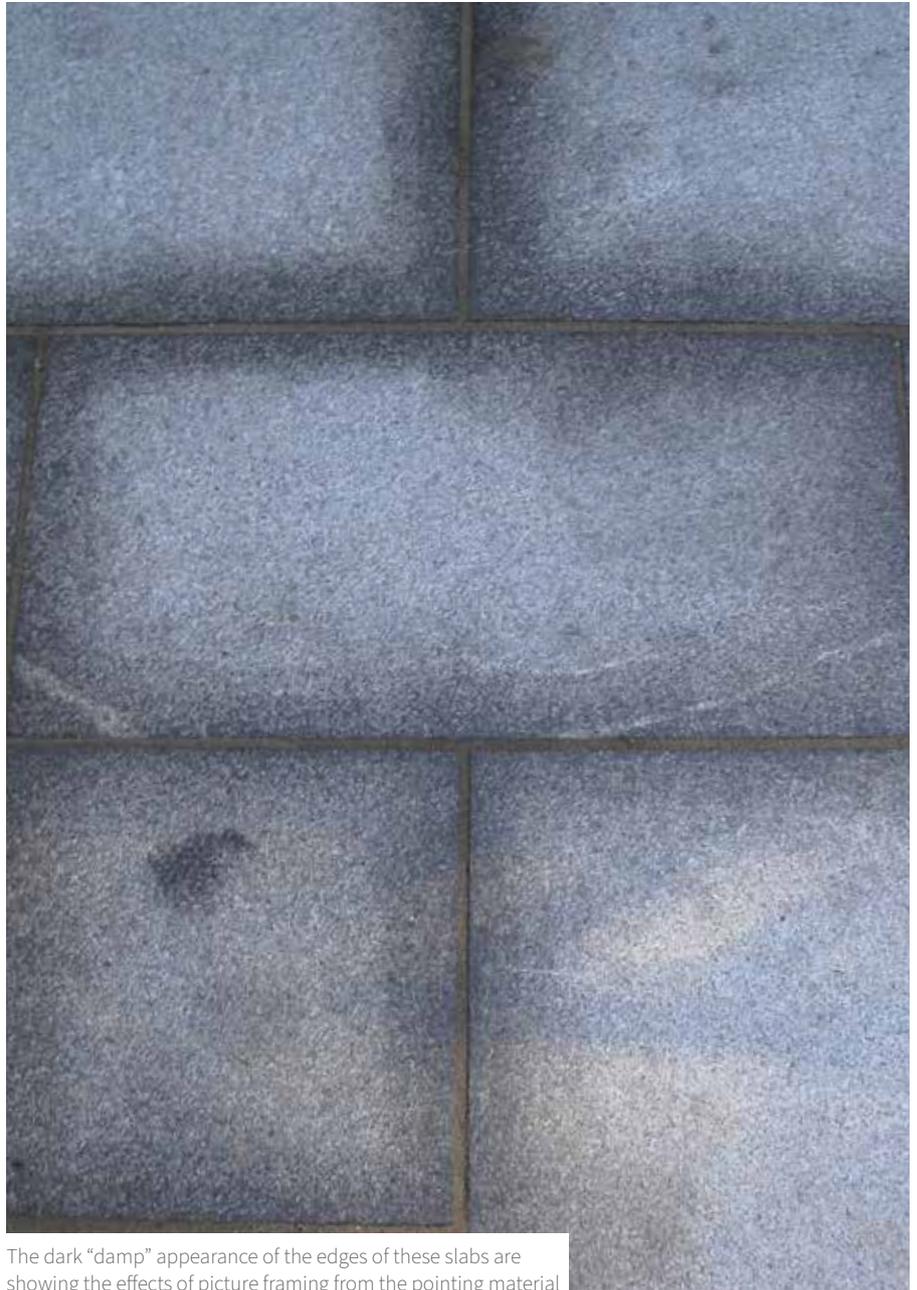
CAN AFFECT ALL PRODUCTS, PARTICULARLY GRANITE AND SAWN PRODUCTS.

WHAT IS IT?:

A staining effect around the edge of each paving slab after pointing. Picture framing may also look like a damp patch around the edge of the slabs. The 'staining' is caused by the use of 'self hardening' pointing mix resins.

ADVICE:

There is no permanent staining and therefore the only action required is to let the effects of the pointing material weather off. No cleaning solutions are required. If in doubt, speak to the manufacturer of the jointing material for further advice.



The dark "damp" appearance of the edges of these slabs are showing the effects of picture framing from the pointing material



WARNING: Always check the suitability of **ANY** cleaning solution with the manufacturer prior to use. Failure to do so may result in permanent damage to the product.

NATURAL WEATHERING – LIMESTONE

CAN AFFECT MIDNIGHT

WHAT IS IT?:

Natural weathering has caused lighter patches to appear on the stone. The visible change does not affect the durability of the slabs and happens gradually over time. Natural gradual weathering is a common occurrence with all dark coloured limestones.

ADVICE:

As this is a result of natural weathering, the durability of the stone is not affected and is purely a cosmetic issue.

If you are keen to maintain the dark colour of your paving, a stone sealer may be used to assist with this.

It is important that you speak to your merchant regarding the most suitable sealant for the effect you wish to achieve, as there are many products available which can be used. Always ensure that you follow the manufacturer's instructions carefully when applying any sealer to your stone.



Lighter areas on these slabs display natural weathering



COLOUR BLENDING NATURAL STONE

CAN AFFECT ALL PRODUCTS

WHAT IS IT?:

Where several packs are used on a project and are laid from one pack at the time. Projects using multiple packs should be blended by using packs simultaneously, giving an intermixed appearance and overall blended hue. This avoids colour groupings and bandings, which can be exaggerated when wet.

ADVICE:

Unlike a manufactured paving slab, natural stone is quarried and produced from large stone blocks, which will have a variation in colour. If your project requires more than one pack to complete you must mix packs whilst laying. This should give a blended appearance, but if in doubt always consult your stockist.



You can see that the bottom half of this patio is a slightly darker shade than the top half, as the packs have been laid one at a time. The difference in the shades would be minimised if this patio had been laid from multiple packs at once.

EFFLORESCENCE

CAN AFFECT NATURAL STONE

WHAT IS IT?:

Efflorescence is a naturally occurring process where calcium hydroxide is released (and when exposed to air creates calcium carbonate), which presents itself as a white substance on the surface of the stone. This often turns translucent when wet. It can occur on both natural or man made paving/walling.

ADVICE:

Efflorescence will normally dissipate over time by natural weathering. To speed up the removal process of efflorescence a stiff broom and frequent brushing coupled with clean water can also help. There are also products on the market that claim to help dissipate the effects of efflorescence, which are available at your local builders merchants.

Always seek advice from the chemical manufacturer on the suitability of their products before use.

Please note efflorescence does not affect the long term performance of natural stone paving.

Efflorescence is not limited just to paving – it can also be seen on newly built walls.



Efflorescence (white markings) appearing in slab



The same patio pictured as above with numerous white marks





In this example, the efflorescence effect has been exaggerated – this patio has been laid without adequate drainage, causing water build up both below and on the surface of the patio. The areas which appear white here are the areas which have been affected by excess water, which has accelerated the effects of efflorescence. The effect has arisen from the ingredients within the cement and impurities below the patio, and is not a fault with the paving itself. This effect should naturally dissipate over time.

CHEMICAL REACTION (OXIDISATION)

CAN AFFECT NATURAL STONE, ESPECIALLY LIGHTER COLOURS

WHAT IS IT?:

The appearance of beige marks on the surface of the paving (often in the shape of squares) that appear after the paving has been laid.

The product has been treated with an acid based cleaner, which in turn has reacted with the iron content in the stone. The effect is often made worse when the product is not laid on a full bed of mortar.

ADVICE:

The effects of this type of reaction will tend to dissipate over time, but unfortunately there is no immediate solution to this problem.

REMEMBER:

Acid based cleaners or products should **never** be used on natural paving. Always seek advice from the chemical manufacturer on the suitability of their products before use on any paving.



Rectangular beige marks on the slabs here are characteristic of chemical reaction



A large amount of the surface of these slabs have been stained by the chemical reaction to brick acid



WHITE BLOOM (CALCIUM CARBONATE DEPOSITS)

CAN AFFECT ALL SLATE PRODUCTS

WHAT IS IT?:

A white bloom appearing on the surface of the product, often as 'spots'. White bloom is the result of calcium carbonate deposits within the slate coming to the surface, due to weathering.

ADVICE:

White bloom is a natural phenomenon that will dissipate over time by natural weathering. To speed up the removal process of white bloom, a stiff broom and frequent brushing coupled with clean water may also help. There are also products on the market that claim to help dissipate the effects, available at your local builders merchants.

Always seek advice from the chemical manufacturer on the suitability of their products before use.

Please note white bloom does not affect the performance of the paving.



A different appearance to efflorescence, the white bloom seen here appears as "spots" on the paving



A number of white bloom spots seen here affecting this slate slab

SURFACE MARKS – SCUFFS OR ABRASIONS

CAN BE FOUND ON NATURAL STONE PRODUCTS

WHAT IS IT?:

Surface marks can appear as scuffs or marks from the manufacturing process. Marks can be acquired during the packing, manufacturing and transportation processes.

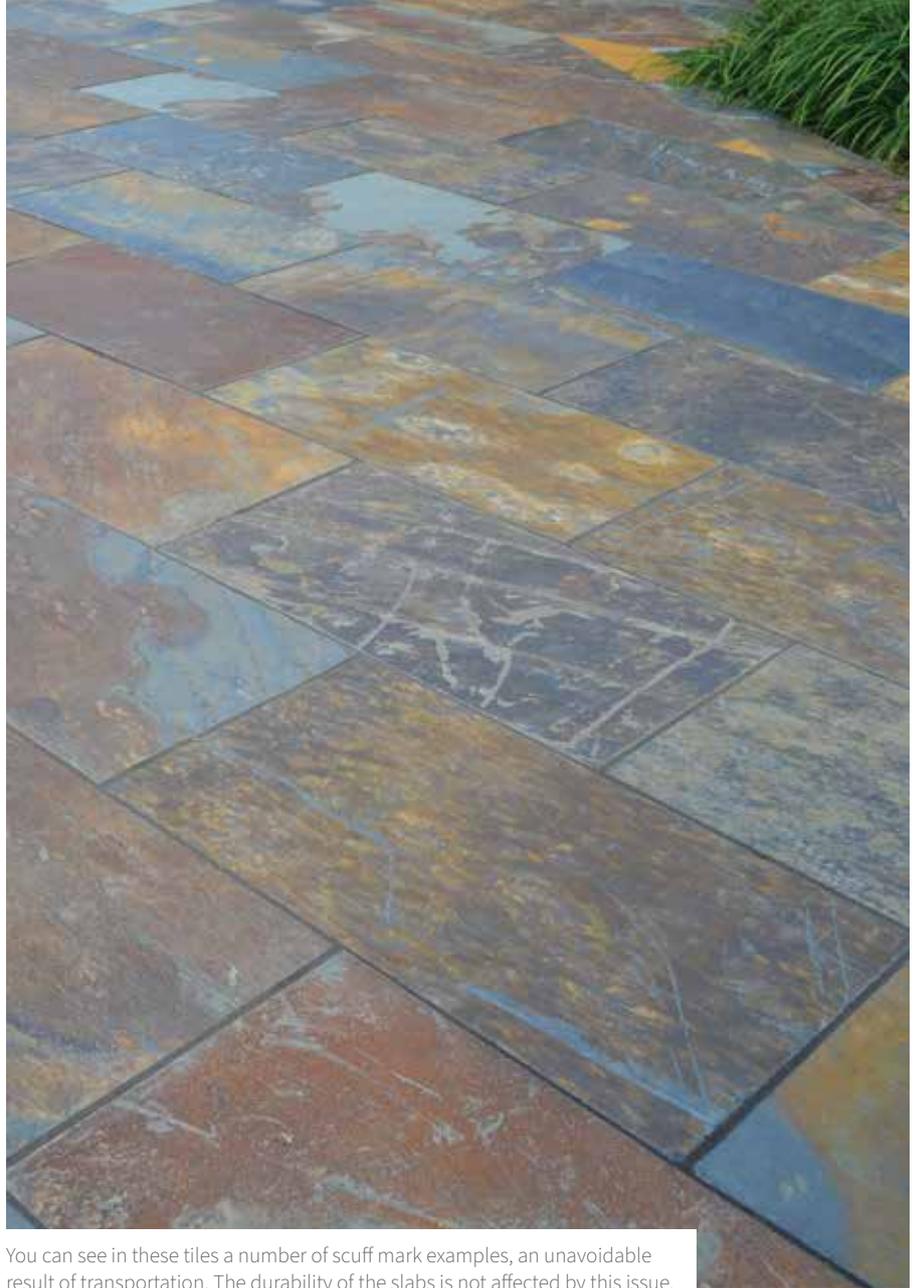
When being loaded into a crate, during crate transportation and when being unloaded from the crate the stone can come into contact with other stone, which may result in some surface marks.

ADVICE:

Minor surface marks visible on slabs will dissipate over time and will not affect the durability or performance of the stone. Unfortunately transportation marks are unavoidable.

However, being produced in a natural material the colours are inherently within the stone (unlike concrete manufactured flags) and they will weather in.

Occasionally, deep gouges in the surface from the manufacturing process can occur. In this instance, if the product is deeply marked (up to a few mm) and not laid, we will be able to provide replacement pieces.



You can see in these tiles a number of scuff mark examples, an unavoidable result of transportation. The durability of the slabs is not affected by this issue.



RUST SPOTS (OXIDISATION)

CAN AFFECT NATURAL STONE

WHAT IS IT?:

Oxidisation can appear as spots/flecks of rusty colours. When the natural mineral content of the stone is exposed to different types of weathering and certain cleaners it can encourage the process of oxidisation, which can appear as rust-like marks.

ADVICE:

Mineral oxidisation is a natural phenomenon that will not affect the durability or performance of the stone. The visible effects of this process will dissipate over time.

There are also products on the market that claim to help dissipate these effects, which are available at your local builders merchants. Always seek advice from the chemical manufacturer on the suitability of their products before use.



A clear example of a rust spot in granite paving



Brown marks seen in this sandstone slab indicate the effects of rust

NATURAL FORMATIONS

CAN BE FOUND IN NATURAL STONE

WHAT IS IT?:

Natural formations can be in the form of natural veins, patterns, 'fossils' or crystallisation; all of which can appear in a multitude of colours. Natural formations are not cracks or defective pieces, and are part of the stone when formed. These are permanent features/characteristics of natural stone and are often highlighted when the stone becomes wet or weathered. We encourage you to view your chosen stone both wet and dry as these natural elements can be exaggerated when wet.

(For more detailed information about veining please see the next case study overleaf).

ADVICE:

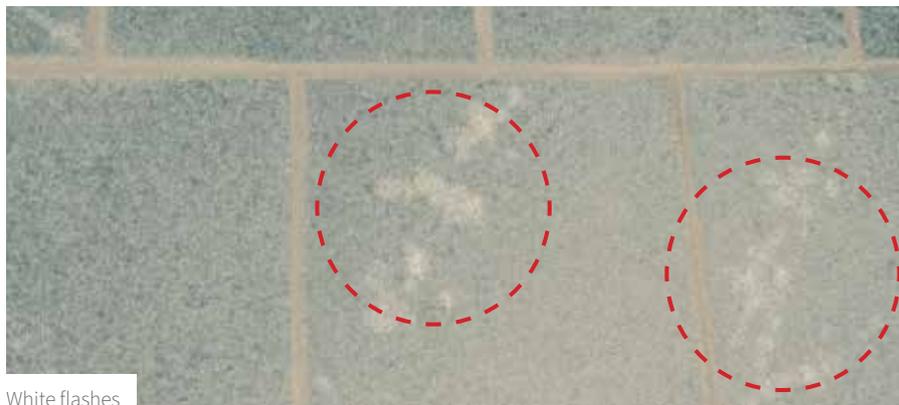
Natural formations form part of the characteristics of the stone – they may only appear on some flags and should be considered part of its beauty as no two pieces are alike.

If a particular flag is not to your liking, it would be advisable to lay the slab in a more discreet area, or use the piece as a cut in.

If you're looking for a more even finish without natural features such as these, why not try porcelain? Our porcelain range is designed to display variety and texture without the natural formations you would expect in natural stone. See our product brochure for more details.



Crystallisation



White flashes



Natural patterns



NATURAL FORMATIONS – VEINING

CAN BE FOUND IN NATURAL STONE, PARTICULARLY LIMESTONE AND GRANITE

WHAT IS IT?:

Examples of veining, a natural formation in stone, can be found across our natural stone ranges but in particular may be more prevalent in Limestone and Granite Products. These veins display as “lines” on/through the paving flags, and are often incorrectly identified as cracks in the paving.

ADVICE:

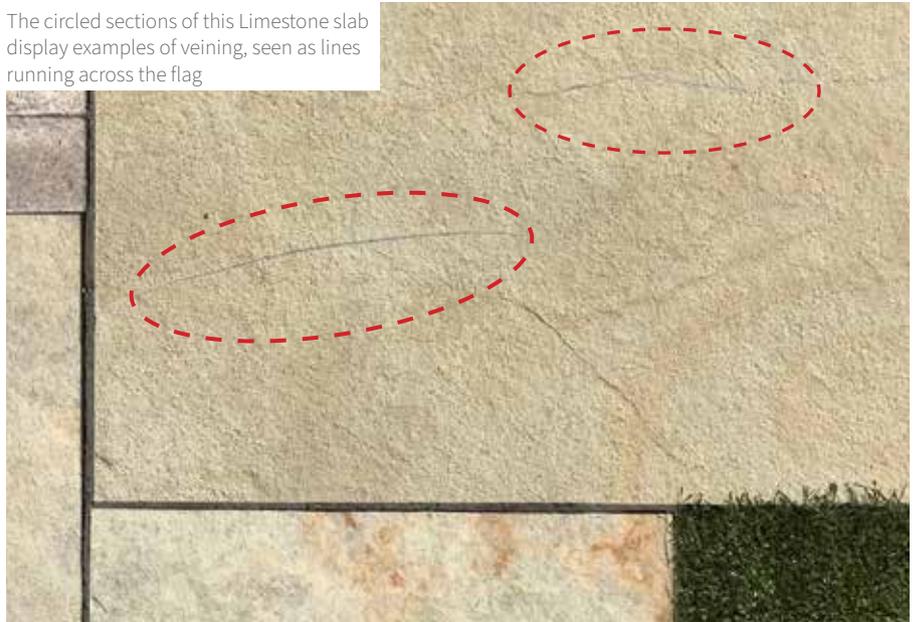
Natural formations form part of the characteristics of the stone – they may only appear on some flags and should be considered part of its beauty as no two pieces are alike. Veining should not be considered to be a flaw in the paving as it is a natural formation. Equally, examples of veining will not affect the longevity and durability of the slab.

In some instances, there may be veining present within the flags which is not apparent initially – due to variations in weathering, some veining may only become visible after the product has been laid and has weathered in.

If a particular flag is not to your liking, it would be advisable to lay the slab in a more discreet area, or use the piece as a cut in.

If you're looking for a more even finish without natural features such as these, why not try porcelain? Our porcelain range is designed to display variety and texture without the natural formations you would expect in natural stone. See our product brochure for more details.

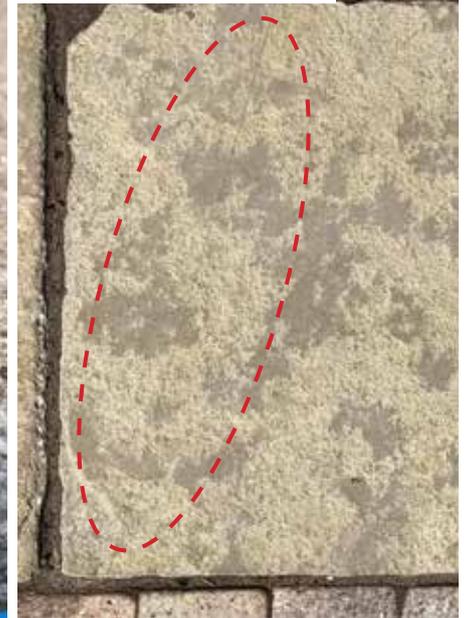
The circled sections of this Limestone slab display examples of veining, seen as lines running across the flag



This Granite bull-nosed step has a white vein running across and through the depth of the flag



A vein on a Limestone Tumbled flag



MOISTURE TRANSPARENCY

CAN AFFECT NATURAL STONE, PARTICULARLY GRANITE AND SAWN PRODUCTS

WHAT IS IT?:

Appearance of dark and lighter areas on the stone, not necessarily after it has rained.

ADVICE:

Moisture transparency occurs when a product is drying out naturally and should disappear over time. The best course of action is to let the patio dry out naturally.

NOTE:

This problem can be more prominent when the product has not been laid on a full bed of mortar. Please refer to pages 7–10 for more information about issues with spot laying.



On these slabs, you can see the darker areas around the edges of the slabs are damp. This should weather out over time.



LICHENS

CAN AFFECT NATURAL STONE

WHAT IS IT?:

Marks appearing on the surface of the slabs as black, red and/or orange staining. Lichens are a form of algae or bacteria that naturally occur mainly due to the environment of the surrounding area. They can be more prominent in damp, shaded areas such as beneath a tree which creates a perfect environment to aid the growth of lichens.

ADVICE:

This is a natural weathering occurrence. Using a pressure washer may not work on lichens and could do more damage than good. A specialist cleaning service may be required, but there are also specific products available off the shelf to aid removal.

You must always check with the manufacturers to assess the suitability of their product – test on a small discreet area and leave for a period of time to analyse results/effects.

REMEMBER:

Acid based cleaners or products should **never** be used on natural paving as this will cause permanent damage to the stone. Always seek advice from the chemical manufacturer on the suitability of their products before use.



The black speckled staining across this patio is a clear example of lichen build up on the tiles.

GREEN STAINING

CAN AFFECT NATURAL STONE

WHAT IS IT?:

Paving slabs can become stained due to the natural build up of algae on the surface of the stone.

ADVICE:

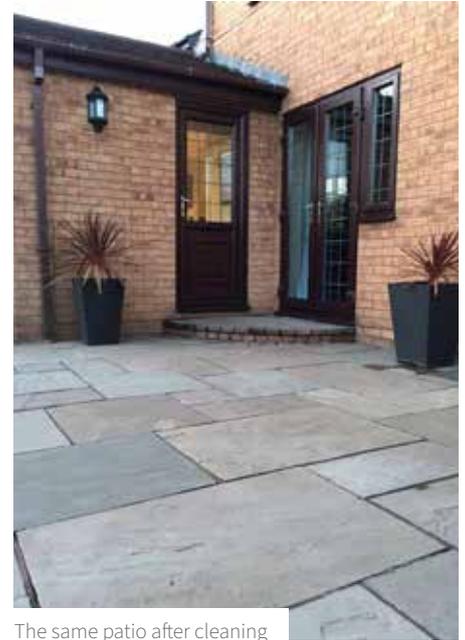
Much like the build up of lichens mentioned opposite, the process of algae build up on natural stone is completely natural. The patio can simply be cleaned using warm soapy water and a stiff brush, or with more extensive staining there are many cleaning products on the market which can be used, provided that they are formulated specifically for natural stone. It is advised that you test cleaners in a small discreet area before proceeding with use and always follow the chemical manufacturer's instructions.

REMEMBER:

Acid based cleaners or products should **never** be used on natural paving as this will cause permanent damage to the stone. Always seek advice from the chemical manufacturer on the suitability of their products before use.



Extensive green stains before cleaning



The same patio after cleaning



Before



After



GREEN STAINING OVER VOIDS

CAN AFFECT ALL PRODUCTS, PARTICULARLY SANDSTONE

WHAT IS IT?:

Paving slabs can become stained due to the natural build up of algae. In this example the staining is in patches, which is due to the growth of algae being encouraged by excess moisture accumulating where there are voids below the slabs.

ADVICE:

The staining shown here is highlighting areas which have voids below the slabs – in order to prevent further issues it is advised that the patio be re-laid on a full bed of mortar.

The staining shown here has penetrated the stone, so it will be more difficult to fully remove – the appearance of the staining can be improved by cleaning using warm soapy water and a stiff brush. With more extensive staining there are many cleaning products on the market which can be used, provided that they are formulated specifically for natural stone.

If the laying issues of the patio are not rectified however there is a strong chance that the issue will re-occur. For more information about the importance of laying on a full bed of mortar, see pages 7 – 10.

REMEMBER:

Acid based cleaners or products should **never** be used on natural paving as this will cause permanent damage to the stone. Always seek advice from the chemical manufacturer on the suitability of their products before use.



The green marks on these slabs are mirroring voids below, with the algae making the spots more obvious.

DIMENSIONS

CAN AFFECT NATURAL STONE

WHAT IS IT?:

Unlike the production of BS (British Standard) man made slabs that are mould created, natural stone is hand tooled for its shape. All natural stone whether hand-cut or machined has a greater tolerance than BS (British Standard) counterparts. Therefore, due to these manufacturing processes, all quoted sizes within our literature are nominal. The tolerances are lessened in the cases of machined natural stone by comparison to hand-cut stone.

ADVICE:

Though product dimensions may have minor discrepancies, this will not affect the product durability or performance. We always advise to check the slabs over before laying, and although some products may be laid closely please be aware none of our products are designed to be butt-jointed. All products are designed to be laid with 10–15mm joints (approximately).



DELAMINATION

CAN AFFECT SANDSTONE, LIMESTONE AND SLATE

WHAT IS IT?:

When the riven surface of a stone becomes loose and can break away in small pieces. This can be caused by environmental factors and the layers of the stone sheeting-off (due to the natural formation of the stone in layers). It usually occurs before and after laying the product down, generally appearing near riven parts of slabs where the layers change.

ADVICE:

Delamination is a natural phenomenon that will not affect the product durability or performance. Once the initial delamination has occurred the stone's structure is generally stable, resulting in no more sheeting-off. This can be more common in more heavily riven sandstones, limestones and slate. The long term durability of the slabs is not affected.

Please be aware when using a pressure washer to clean a patio that the pressurised force of the water can exploit minor cracks/weaknesses and dislodge loose stone or weak joints.



On this slab, the areas in the middle that look like “cracks” are areas where some of the upper layers of the stone have flaked away leaving an uneven surface.

CORRECT THICKNESS MEASURING

CAN AFFECT CALIBRATED NATURAL STONE WITH A RIVEN SURFACE

THE ISSUE:

Natural stone is hand split to create paving slabs, this inevitably leaves it with an uneven thickness. To ensure that there is more consistency we put it through a calibration process, whereby the stone is put face down on the conveyor of the calibration machine. The calibration heads measures the point of maximum thickness, due to the natural undulations of the stone the thickness will be less on other points of the surface. On entrance and exit the head will move about 5mm due to the sudden pressure of the machine, as a result stone depth is always state +/- 3mm tolerance either way.

ADVICE:

Though the product depth may differ in places, this will not affect the product durability or performance. But if you do want to measure the depth there is a correct way to measure this. You need to measure an area of the product that is amongst the thickest part of slab. You will need the correct instrument to do this as it can measure from inside. Some instruments will only measure the outside and corners, which will not give you the correct depth measurement.



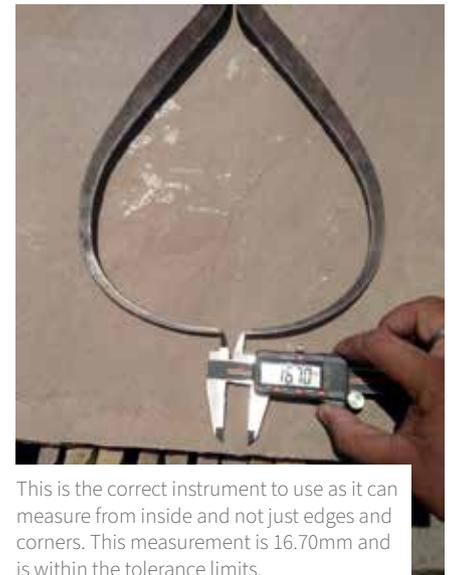
This stone has been calibrated at 18mm and should be (+/-3mm) but this is from the thickest point. It will show different results if checked at different places. On this image it's measuring at 17mm.



And on this image it's measuring at 13mm. This is the incorrect way of measuring the product.



The correct way to measure the thickness is to use an area that is amongst the thickest part of the slab.



This is the correct instrument to use as it can measure from inside and not just edges and corners. This measurement is 16.70mm and is within the tolerance limits.



HANDLING & PREPARING PORCELAIN

APPLIES TO ALL PORCELAIN PRODUCTS

ADVICE:

There are several suggestions we make in order for you to get the most out of your porcelain products.

HANDLING:

Paving slabs may need to be handled by 2 people (in particular the larger sized slabs).

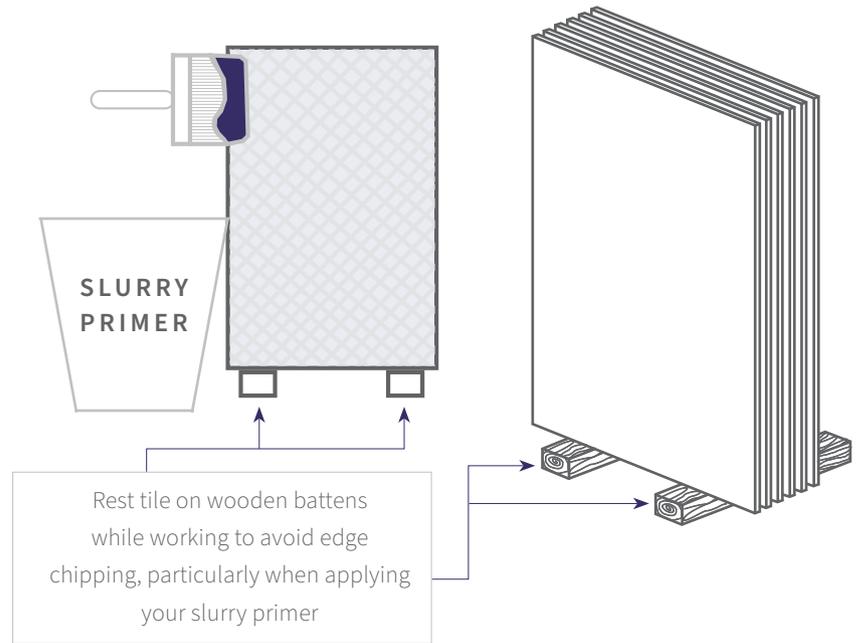
When working with porcelain tiles, in particular when applying Slurry Primer (or a slurry primer alternative – see overleaf for the importance of using slurry primer), ensure that you rest the tile on wooden battens. Working with wooden battens will minimise the chance of edge chipping.

CUTTING:

Porcelain can be cut with a disc cutter fitted with a suitable-for-porcelain diamond blade (this must be a petrol disc cutter as you must feed the disc with water to cut). However, for neater and more accurate cutting, we recommend using a suitable water-fed tile bridge saw. Ensure that appropriate protective clothing is worn while operating machinery.

IMPORTANT:

If the appropriate cutting method is not employed this can lead to edge chipping or tile breakages.



PORCELAIN – TILES “POPPING UP”

CAN AFFECT ALL PORCELAIN PRODUCTS

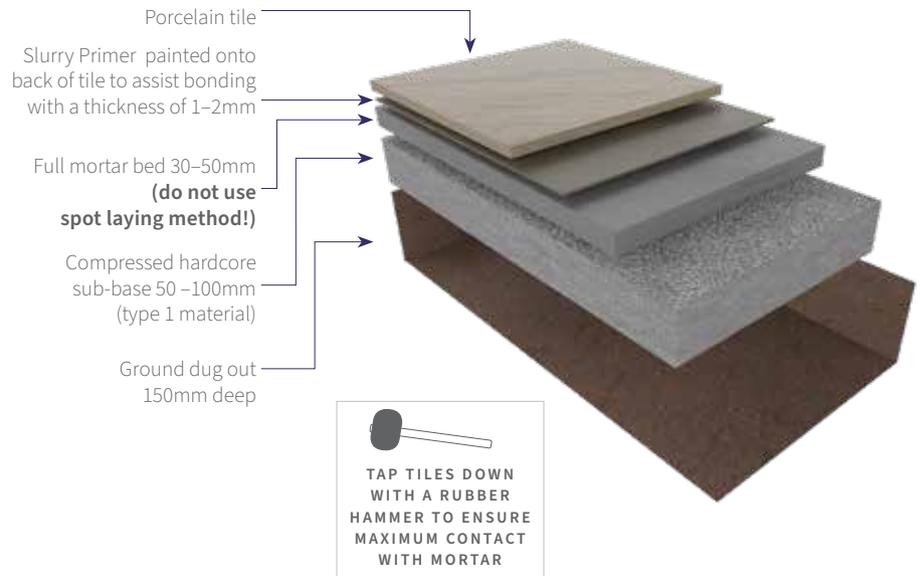
WHAT IS IT?:

In cold weather, water can find its way underneath porcelain tiles and then when the water freezes it expands, pushing the tile up away from the mortar bed and making the tile loose. Porcelain tiles which are laid without the application of slurry primer to the back of the slab are prone to this issue.

ADVICE:

With all Global Stone products it is important to follow our laying guidelines, particularly with our porcelain products. Our diagram opposite shows an “expanded view” of how our porcelain tiles should be laid.

Global Stone’s Slurry Primer (or a slurry primer alternative – mixed using cement powder, water and an outdoor based SBR bonding agent to a creamy consistency) must be painted on to the back of each tile before it is laid to help the paving adhere to the bed. Paint each tile with slurry primer/adhesive as you lay them, not all at once before you begin laying. The slurry primer must be wet when the tile is laid down. This extra step is **essential** to ensure that tiles have a strong bond with the mortar bed.



BUTT JOINTING – PORCELAIN

CAN AFFECT ALL PORCELAIN PRODUCTS

WHAT IS IT?

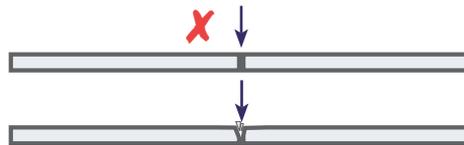
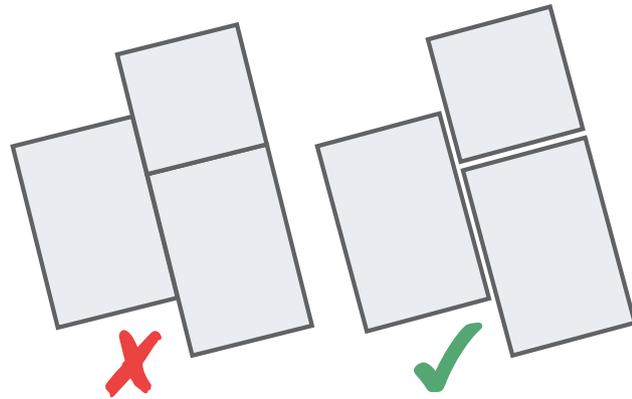
Butt jointing is when paving is laid with the edges of the tiles touching, with no joint in between the tiles.

ADVICE:

Nothing in our range is designed to be butt jointed. While it may be preferred to have a minimal joint of 2/3mm, we recommend that as a rule a joint of 4-8mm should be used when laying our porcelain paving products. This is to help avoid a variety of problems which may arise from using a closer joint.

Any paving that is butt jointed is prone to spalling, which is where the natural minimal movement of slabs can cause pressure on tile edges which are touching and cause edge chipping, therefore damaging the product.

It is particularly important to use the suggested joint when using more than one size.



Butt jointed tiles – tiles are laid with no space in between, meaning that edges are touching. The tiles have no protection therefore with movement tiles would chip.



Tiles with sufficient 4-8mm joint – the jointing compound provides extra protection for the edges of the slabs meaning that chipping is minimised.

PORCELAIN TILE FINISHES/COLOUR BLENDING

CAN AFFECT ALL PORCELAIN PRODUCTS

WHAT IS IT?

In porcelain tiles, there can be subtle differences in surface texture and finish between tiles. These differences may appear exaggerated in direct sunlight. This is due to minor variations in conditions which may occur during the manufacturing process.

ADVICE:

As with all manufactured products, our tiles are produced in batches. Each batch production may be subject to slight variances as previously mentioned, which may affect the finish on the surface of the tile. This affect, as outlined above, may only be apparent in direct sunlight, and any difference between tiles will not affect the slip rating or durability of the product and is purely aesthetic.

You must also consider the possibility of variation between batches when purchasing your porcelain tiles, particularly if you are purchasing for the same project on separate occasions. In order to ensure that your patio has an overall blended appearance, always mix from multiple pallets when laying rather than laying one pallet at a time.

In this example, the tile in the foreground has a slightly different finish to the tiles surrounding it, making it appear darker. As the sun shines onto the tiles in this image, the variation is highlighted.



PORCELAIN – MANUFACTURING PROBLEMS

CAN AFFECT ALL PRODUCTS

WHAT IS IT?:

There are a few issues that can arise with porcelain paving that are a result of the manufacturing process. The first is where there is a printing error on the paving and the second is where the surface is slightly bowed.

ADVICE:

When a printing error happens it generally occurs where one of the colour jets being used in the process fails and results in the pattern having defects, which may include splodges or lines on the tiles. Please check all tiles before laying and if you notice any printing errors then please then let your supplier know as soon as possible so that the issue can be investigated and products replaced if appropriate.

Bowing (called planarity) is a natural occurrence of the firing process and as such there is a tolerance of 0.5% that is worked to under EU tests, which means the products could have a bow up to 0.5mm over a 100mm length of the tile. We recommend laying with a 1/3 bonding on larger pieces to minimise any impact.



You can see that the slab has bands of different colours due to a printing error.

USING ACID BASED CLEANERS

CAN AFFECT PORCELAIN PRODUCTS USED IN CONJUNCTION WITH NATURAL STONE

WHAT IS IT?:

When porcelain tiles are laid in conjunction with natural stone and cleaned with an acid based cleaner display discolouration to the natural stone parts of the project.

ADVICE:

Suitable mild acid based cleaners can be used to clean porcelain paving (it is important to check with the manufacturer the suitability of the cleaner – strong acids are not suitable for porcelain). However, it is vital to remember that acid based cleaners **will** cause damage to natural stone products. It is advised that acid based cleaners are not used when porcelain is laid in conjunction with natural stone. Any acid which comes into contact with natural stone may cause irreversible damage to the product!

One of the many practical benefits of porcelain is its stain resistant properties due to its low porosity. Many stains can be cleaned easily without the use of acid based cleaners by simply using a jet washer or a brush. We demonstrate this in our online videos which can be found on our website, including removing a variety of stains and showing the method which we used to clean them.



JOINTING COMPOUND RESIDUE

CAN AFFECT ALL PORCELAIN PRODUCTS

WHAT IS IT?:

When applying jointing compound to a porcelain project, residue left over from the compound itself can remain stuck to the tiles. It may not be immediately noticeable, but over time dirt can attach itself to this residue left on the surface of the tile from the jointing compound which can cause staining.

ADVICE:

It is vital to clean as you go when laying porcelain. When using jointing compound it is important to remove all residue from the surface of the tiles as soon as the job is completed. If any residue remains there are products available which can remove it – it is important to first identify which type of jointing compound has been used (whether it is mortar based or epoxy based) before choosing the cleaner for the job.

REMEMBER:

If porcelain is laid in conjunction with any natural stone products (e.g. borders/setts) acid based cleaners should not be used as acid will cause damage to natural stone.



PORCELAIN STAINING

CAN AFFECT PORCELAIN PRODUCTS

WHAT IS IT?:

Staining where patio pots have been sitting directly onto the porcelain. Porcelain is impossible to stain and the “staining” will only be sitting in the micropores of the surface. The staining will have more likely to have come from the feeders in the soil/peat inside, through the drainage holes and not the actual container.

ADVICE:

One of the many practical benefits of porcelain is its stain resistant properties due to its low porosity. Many stains can be cleaned easily without the use of acid based cleaners by simply using a jet washer or a brush. We demonstrate this in our series of online videos which can be found on our website, including removing a variety of stains and showing the method which we used to clean them.

Suitable mild acid based cleaner or in this instance try a paint stripper can be used to clean porcelain paving (it is important to check with the manufacturer the suitability of the cleaner – strong acids are not suitable for porcelain). However, it is vital to remember that acid based cleaners will cause damage to natural stone products. It is advised that acid based cleaners are not used when porcelain is laid in conjunction with natural stone. Any acid which comes into contact with natural stone may cause irreversible damage to the product!



IMPORTANT:

If using an acid based cleaner or paint stripper, it's important that you do a test area first and then wait for results before attempting to do the whole area.



GLOBAL STONE

LANDSCAPING SUPPLIES

www.globalstonepaving.co.uk

Global Stone Ltd, Tey Gardens, Church
Lane, Little Tey, Colchester, Essex CO6 1HX
(Distribution Centre Only)

Email: sales@globalstonepaving.co.uk

 [@GlobalStonePaving](#)

 [@GlobalPaving](#)

 [@globalstonepaving](#)

This publication should not be reproduced in any form
without prior written agreement of Global Stone.

© Copyright Global Stone 2023.

