



INSTALLATION GUIDELINES NATURAL STONE

TOP TIPS FOR NATURAL STONE

Below are some of our experts' suggestions to help you with your project:

- Please read the installation guidelines before laying paving
- Always check the paving thoroughly before laying
- Always use a full bed of mortar under the paving, not spot bedding, as this leaves voids that can affect the performance of the paving.
- When using multiple packs of paving, randomly select slabs from each pack to give an even mix of colour shades for your project.
- Do not use acid based cleaners with natural stone as this can severely damage the paving. Mild detergents are the preferred cleaner. Take care if using power cleaners as they can damage the surface of the paving and take out the pointing.
- If you intend to seal your paving, make sure it is completely dry and free from efflorescence. It may take a period of time to ensure that the bed underneath has fully dried out. Always use a quality natural stone sealer and follow the instructions as recommended by the manufacturer.
- Natural stone for internal projects would need to be sealed and again a quality sealer should be used and all manufacturer instructions followed.
- We recommend that you visit your local stockist to view the paving as the brochure colours are only as accurate as the printing process allows. Natural stone, by its nature, has considerable colour variations which cannot always be visible in a brochure.
- Where indicated, the dimensions of the paving are those achieved when using the appropriate joints. This will make it easier for you to plan and order the correct quantities for your project.
- Maintaining your paving from the start is key to ensuring your paving always looks its best

Please note that Natural Stone products are not manufactured; they are natural products that are dug out of quarries in the earth. Each piece is absolutely unique with variations in colour and texture, which may also include minor natural markings within the stone, such as fossilisation. No responsibility will be accepted if customers knowingly lay paving with an apparent defect.

1. LAYING GLOBAL STONE FLAGSTONES

INTRODUCTION

Global Stone supply many types of paving materials and the most suitable laying method is determined by two principal factors: the type of paving unit (eg: paving stones, setts, kerbs) and the planned use (eg: patio, driveway, roof terrace). The following information is intended as a guide to the more usual projects that are likely to be undertaken by the more experienced DIYer.

PREPARATION

Before laying, all products should be carefully inspected, so that time is available for products to be replaced if found to be defective. No responsibility will be accepted for any delays, re-laying or removing costs if this has not been done.

ESSENTIAL TOOLS

Professional landscapers would consider the following list of items essential for any paving project: Gloves, goggles, spade and/or shovel, wheelbarrow, brick trowel, pointing trowel, lump hammer, bolster chisel, rubber mallet, long spirit level, string line, line pins or stakes, soft brush, tape measure, straightedge timber, small cement mixer, plate compactor ('wacker' plate) and an angle grinder. However, it would probably be more appropriate for a DIYer only planning a single project at home to hire the larger, powered equipment.

SETTING-OUT

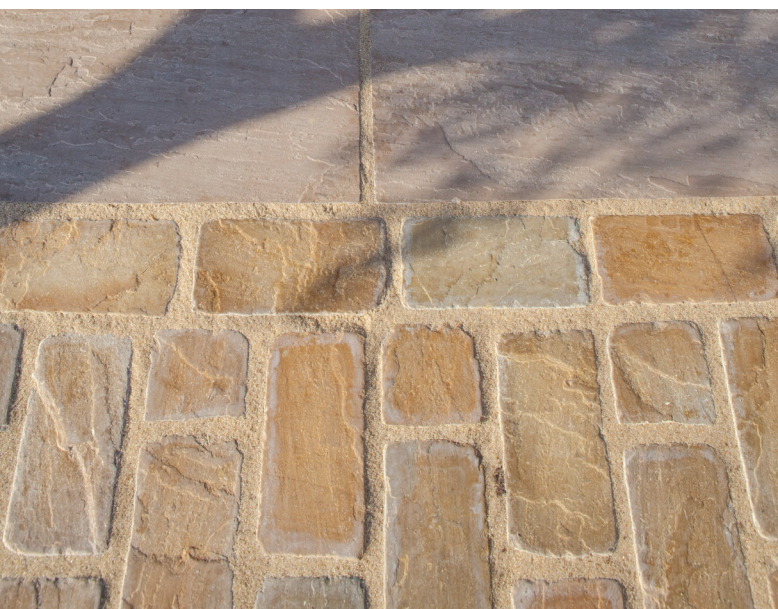
Paving should be laid at a level that is at least 150mm below the damp proof course (DPC) of any adjacent building except where level access is required at a doorway (eg: for disabled access). If working against a building, it may be possible to use the horizontal brickwork jointing as a guide to level. Alternatively, a taut string line or a temporary chalk line can be used as a guide.

FALLS

All paving must be drained. This is usually achieved by sloping the paving in one direction or another to direct the surface water towards a suitable disposal point, which might be a gully, a linear drain, or the edge of the garden. Whenever possible, surface water is directed away from any buildings. The riven texture of many natural stone paving materials means that water can sit on the surface more easily than might be the case with some manufactured paving materials. Consequently, it's recommended that natural stone paving should be laid to a fall of not less than 1:60 - this means that for every 60 measure along the paving, there is a drop (or a rise) of at least 1 measure. This might be 1cm in 60cm or 1 metre in 60 metres: all these generate a fall of 1:60. For ease of calculation, 1:60 means a fall of 17mm per metre. When determining levels away from a building, a taut string line set between driven ranging stakes is a good guide to both level and alignment. The simplest way to create an accurate perpendicular (90° or right angle) line from a building is to use a 3-4-5 triangle.

BASE

All paved areas, whether they be used as driveways, paths or terraces, require a stable base. The depth/strength requirement of this base varies according to the planned use of the paved surface. For example, a private driveway will require a base layer of concrete at least 100mm thick, and this may need to be spread over a strengthening layer of compacted stone or hardcore, whilst a mortar bed approximately 50mm thick, laid directly onto firm ground could be sufficient for a lightly trafficked walkway. Every project site is different and a judgement will have to be made at the start of the project as to the long term stability of the existing ground. Please bear in mind that it is always best to err on the side of caution and lay a stronger base at the outset, than have to lift and reinstate a sunken area in the future.



2. GLOBAL STONE TYPES OF PAVING

Global Stone supply two different types of paving; variable and calibrated thickness. We carefully select the variable thickness paving to ensure the natural variation is not excessive, so most of these paving stones will have a thickness of 18-25mm. The calibrated paving has been processed to a uniform thickness of 18-25mm depending on the type of product. This difference dictates on how the paving is best laid. The variable paving needs to have each stone's bed prepared individually to accommodate their slight difference in depth, while the calibrated paving can be laid onto a larger area of pre-levelled (landscapers call it 'screeded') bed. We find that best results are obtained when our paving is laid onto a bed of coarse sand and cement, though on projects involving variable thickness paving, some professionals like to incorporate a small percentage of soft building sand to aid the pliability of the mortar mix and increase its adhesive properties. Using a small mixer, put a half bucket of clean water into the empty drum. Add four or five shovelfuls of coarse sand and one shovelful of cement. Allow this to mix, and then add another four or five shovelfuls of sand and a further shovelful of cement. Let this turn over for a couple of minutes, by which time the cement should be completely stirred through the sand, creating a uniform colour. The mixture should be damp, but not wet, creating what we call a 'moist mix'. The exact amount of water added will vary with the dampness of the sand, but the end mix should be damp enough to cling together when squeezed into a ball, but no water should dribble out when squeezed. When mixed, this bedding material has a working life of approximately one to four hours, depending on the time of year. It is best practice to only mix as much material as you can be sure of using in about one hour.

VARIABLE THICKNESS PAVING

Use a shovel or a brick trowel to spread the freshly-mixed bedding material in a layer that is roughly 25-40mm thick and extends over an area just larger than the paving stone that is to be laid. Ripple the surface of the bed so that there is some 'give' when the paving stone is placed. Position the stone, allowing for the appropriate joint thickness, and tap it down to the correct fall with a rubber mallet, checking the level with a spirit level.

CALIBRATED PAVING

The technique known as 'screeding' is used to prepare the bed for calibrated paving. Use a shovel to spread the freshly-mixed bedding material over the area, large enough for several paving stones in a layer that is roughly 40-60mm thick, and pat it with the back of the shovel to lightly compact it. It is important to use 'not too much' of the bedding, because it has to be scraped off, using a long, straight board to remove the excess bedding material, leaving a smooth and level surface onto which the paving can be placed. To achieve the correct level for the screeded bed, a reference level is required. This might be an existing edge (or kerb or edge course) or it can be a 'rail' set at the level of the underside of the paving.

GLOBAL STONE PAVING ON DRIVEWAYS

Although best suited for patios and pathways, Global Stone paving can be used for light-use driveways. The paving will need to be laid onto a bed of concrete that is at least 100mm thick, and this may need to be laid over a sub-base (strengthening layer) of crushed stone or hardcore. The paving can be directly bedded onto the fresh concrete, as described earlier, but contractors often prefer to separately place the concrete and allow it to set before bedding the paving onto a mortar bed spread over the hardened concrete.

HANDLING THE PAVING

Paving stones can be heavy and cumbersome so take care when handling them. As a rough guide, any paving stone 570 x 570mm or larger is best handled by two people, stood on one edge and carefully lowered into position. Smaller paving stones can be lifted into place by one person. It is important to note that paving stones have a definite 'face' and a 'base'. This means that there is a right way up, and a wrong way. The 'face' on all Global Stone hand cut sandstone paving has four neatly trimmed edges and the sides taper inwards towards the base (ask for help if you are unsure). Although the paving will not break or fall apart if laid upside-down, the face has been specifically chosen to present an attractive, safe surface that shows off the natural beauty of the stone. The base may be more uneven and unattractive, and laying upside-down will definitely result in joints that are much wider than normal.

GLOBAL STONE INSTALLATION GUIDELINES

At the outset of the project, think about how the paving will be jointed. In most cases, a joint width of 8-15mm is used, our suggested layouts allow for an average joint of 10mm, with the joint being filled with a mortar or other pointing material. However, some people prefer to use narrow joints (sometimes referred to as 'butt-jointing') which rely on 2-5mm wide joints that are filled with Kiln Dried Sand.

COMPACTING THE PAVING

Ideally, when first positioned, the paving will sit approximately 6-12mm proud and will need to be knocked down to the correct level. This steadies the paving, ensuring it lies flat and is evenly supported, as well as 'keying' it into the bedding material. Once the paving is in the correct position, (remembering the chosen joint width), it should be tapped down using a rubber mallet until it is at the correct level. Aim the blows at imaginary points that are halfway between the centre and each corner of the paving stone, and use firm but not heavy blows to 'persuade' the stone down to the desired level. If the flagstone refuses to go down to the level, then it is better to lift the stone, scrape out some of the excess bedding and re-lay rather than risk breaking the stone by hitting it with too much force. However, if the paving stone goes down too far, it will have to be lifted and extra bedding added to the existing bed.

CHECKING THE LAID PAVING

Once laid, paving stones should be stable (ie: they should not 'rock' from corner to corner) and there should not be any dangerous 'lips' between adjacent units. Some smaller paving stones (285 x 285mm) can be awkward to stabilise due to their size. Using a slightly wetter bedding mix will usually overcome this problem by causing the paving stone to adhere to the bed. When checking levels and surface profile regularity, use a long spirit level or a straight-edged length of timber to ensure adjacent paving stones are relatively level, with no high spots or hollows. If there is any doubt, correct the problem at this stage - it is much easier to put it right now, before the joints are filled.

3. LAYING GLOBAL STONE SETTS AND COBBLES

Setts are usually laid one-at-a-time to accommodate the slight variation in thickness that is found with many natural stone paving products. The setts should be laid onto a bed of mortar or concrete and 'keyed' in by gently tapping to level in a similar fashion to the variable thickness flagstones. For pathways and light-use patios, the setts can be laid onto a 40-75mm thick bed. Driveways or areas subject to heavier use will need to be constructed using a 100mm thick bed of concrete, and it may be necessary to include a sub-base (strengthening layer) of selected crushed stone or hardcore. The bedding mortar described above for use with paving stones, can be used to lay setts into patios and along pathways, but for driveways,



a concrete comprising four measures of 10-14mm chippings with two measures of coarse sand and one measure of cement should be used.

PLACING THE SETTS

Stacked or coursed layouts are laid using a taut string line as a guide to both level and alignment. The bedding material is roughly graded using a shovel, laying out sufficient material to support a linear course of 2-4 metres of setts to be laid. It is levelled out using a trowel, and each set is individually placed, aligned and compacted using a rubber mallet, before placing the next. Ideally, when placed, each set should be 10-20mm proud of the desired level, so that it can be tapped down using the mallet, embedding the set into the mortar or concrete in the process. Using a short piece of 10mm timber can help ensure regular joint widths are maintained between the somewhat rough hewn edges of the setts. This rough hewn texture can make set laying quite a challenge. To improve the final appearance, a tip is to lay the forward edge of the setts to a taut string line, allowing any variation in width to be taken up by the joint created between the newly laid setts and those of the preceding course.

CHECKING THE LAID SETTS

Working to a taut string line ensures the setts are fairly accurately positioned for alignment and level. The riven texture can result in unexpected high spots or hollows within a course, so it is essential that the surface level is regularly checked using a long spirit level or a timber straightedge, and any problems corrected before proceeding. It is a good idea to check in both directions, along the courses (transverse) and across several courses at a time (longitudinal), as well as standing back and visually assessing the laid setts from several positions.

LAYING GLOBAL STONE COBBLES

The calibrated thickness of the Global Stone Granite Cobbles allows the landscaper to lay them onto a screeded, bed prepared in the same way as for the calibrated flagstones. As with the small setts, these small pavers will need to be laid onto a mortar bed suited to the proposed use of the finished surface, (ie: 40-75mm in light pedestrian areas, but increasing to 100mm with the possible addition of a compacted sub-base in tougher driveway conditions).



4. CUTTING AND JOINTING OF PAVING MATERIALS

CUTTING PAVING

Paving stones are best cut using a power saw or angle grinder, fitted with a diamond blade specifically rated for cutting stone (or concrete). These can be hired locally and the hire depot will provide you with full instruction on how to use them safely. Bear in mind that saw cutting of stone generates lots of harmful dust. Ask the hire depot about a water suppression kit to dampen down the dust and make sure you wear a suitable dust mask and safety eyewear. Smaller paving units, such as setts, can also be cut using a bolster or pitching chisel. Make sure eye protection is worn as small scalplings or shards are likely to fly up when the stone is struck. Align the bolster on the face of the set where the cut is required and strike firmly with a lump hammer. It may take several blows to break the stone and it may be necessary to trim the cut edge in order to make it fit the gap.

JOINTING

The joints between paving units can be filled with various materials. Traditionally, most paving and setts would be jointed (or pointed) with a sand/cement mortar. While this is still a popular option, it can be slow and messy, especially if you are not familiar with pointing techniques. Happily, there are alternative strategies that might be suitable for your project.

MORTAR JOINTING

This traditional method uses a strong mortar (four parts sand to one part cement) to fill the joint. The mortar should be mixed in small quantities, say one 25kg bag of sand at a time, because pointing is a slow process and the mortar has a fairly short working life (20-60 minutes depending on time of year). The same coarse sand used for the bedding, though the softer 'building sand' gives a smoother, more adhesive mortar and is generally considered to be easier to work. The mortar should have a workable but flowing consistency, something akin to the mix for a rich fruit cake, and able to stand in 'peaks' without slumping too much. Adding a plasticiser to the mix water makes the mortar far more workable. It is worth noting that some bags of cement contain a built-in plasticiser, so there is no need to add one to the mix water - check the packaging on your cement.

POLYMERIC JOINTING MATERIALS

This group of products is a modern development, and despite being somewhat costly when compared to traditional mortar, they are much, much faster. The polymeric mortars are made from selected sand mixed with a special resin that starts to harden when exposed to the air or to moisture. The products are simply brushed into the joints, any excess is swept off the surface of the paving, and in 12-24 hours, the material will have hardened to form a perfect joint. Always read the manufacturer's instructions.

KILN DRIED SAND

This is only used with narrow joints, (less than 5mm), and caution is required before opting for this style of jointing material because the sand is likely to be washed out by wind and/or rain over time, as well as the risk of it providing the ideal home for weeds and mosses.

5. HISTORICAL INSTALLATION PRACTICES TO BE AVOIDED

'Five-Dot Paving', ie laying flagstones onto individual dots, dabs or spots of mortar is sometimes shown in older text books as a suitable method for laying paving, but it really ought to be avoided and it is no longer an approved laying technique amongst modern landscapers. There are several good reasons for this:

Firstly, it doesn't provide full and uniform support for the flagstones. Some parts are supported; others are left 'bridging' two spots, which makes them

more prone to breaking. Next, those empty spaces between mortar spots are a recipe for disaster. They allow water to pool underneath the paving, which encourages the growth of algae on the surface, but also destabilises the sub-layers, causing some of the finer material to be washed away. This, in turn, undermines those mortar spots, and the flag will start to rock, pivoting on the spots that haven't settled or shifted. Furthermore, the spaces underneath the flagstones also provide an ideal hidey-hole for invertebrates and small mammals that will mine or tunnel through the sub-layers, again destabilising the paving and resulting in uneven settlement or broken flagstones. Finally, with some types of flagstone, the bedding will alter the porosity of the flagstone and visibly affect the surface appearance. This is especially apparent should the Global Sandstone flags be laid in this manner.

SEALING YOUR PAVING

Many homeowners choose to seal their new paving to protect it from accidental staining and to reduce the risk of allowing algae and lichens to establish themselves on the surface and joints, discolouring the paving and masking the natural beauty of the completed work. There are many different sealants on the market, providing different finishes and often changing the appearance of the paving. High gloss sealants rarely look 'natural' and can sometimes make the treated surface slippery and unsafe. Polyurethane sealants are best suited to concrete block paving rather than natural stone. If you intend to seal your paving, make sure it is completely dry and free from efflorescence. It may take a period of time to ensure that the bed underneath has fully dried out. Always use a quality natural stone sealer and follow the manufacturer's instructions. See website for further information.

6 MAINTAINING YOUR NEW GLOBAL STONE PAVING

Despite what is claimed by some suppliers and installers, there is no such thing as maintenance free paving. All paving needs a little bit of care and attention to keep it in tip-top condition. By choosing Global Stone Paving, you have started with the very best, so the maintenance requirements will be lesser than those of cheaper offerings.

WEEKLY BRUSHING

The simplest maintenance is brushing. Regular sweeping will remove detritus before it has a chance to accumulate and stain or damage the paving. Autumn leaves may look stunning on the trees, but when they fall and land on the paving, they may stain if allowed to lie there over the winter. This is even more important for berries, hips, drupes and other fruits. Remove these as soon as they are spotted.

STAINS

Where stains have occurred there are many and varied proprietary products that are claimed to be the perfect cleaning solution. However, care is required as some of these cleaning products, particularly those that are based on, or include hydrochloric acid, can damage the paving surface, make worse the existing stain, or even create a whole new stain! As with all surface treatments, test the product on a discreet corner before using it elsewhere. Most stains can be removed with soap and water. Hot water sometimes is more effective than cold, and many experienced cleaning contractors prefer to use a mild soap, such as those found in baby shampoos, rather than a harsh, floor-cleaning type product, which may adversely affect the colouring of the stone.

POWER WASHERS

While hosing down a paved area every few weeks is unlikely to do any long-term damage to the paving, power washers can, and do, seriously damage some pavements. The force of the water exploits any minor cracks

or weaknesses and blasts out loose stone or slightly weak jointing. While they can rejuvenate tired, dirty paving, regular use will often do more harm than good. If you find that your paving gets dirty very quickly (overhanging trees or close to a busy road) consider using a quality sealant to protect it rather than abrade the surface on a weekly basis with a power washer.

RUNNING REPAIRS

Regular brushing also offers the opportunity to inspect the paving for any minor defects. The jointing is the most likely element of the pavement to suffer. Cement mortars degrade over time, while sand jointing can be lost due to scour from wind and water. Lost jointing may allow damaging surface water to find its way into the sub-layers and further weaken the structure, so it makes sense to repair as soon as a problem is identified. Cut out any damaged mortar jointing, and replace it with fresh 3:1 mortar to a depth of not less than 25mm (any less is unlikely to bond properly). Polymeric-filled joints rarely degrade or come loose, but if it was to happen, the affected area should be cut out and replaced to full depth.

ALGAE, MOSSES AND LICHENS

Where lichens (black spots) and/or algae (green discolouring) are a problem, regular swilling of the surface using a weak bleach is often beneficial. Wet the paving first, then apply diluted bleach via a fine rose from a watering can, and allow 10-20 minutes before washing off. Don't allow the bleach to dry on the surface: wash off sooner if the surface is drying out more quickly than anticipated, and repeat the treatment. This regime has been found to be very effective at keeping algae, lichens and mosses off unsealed stone paving, without damaging the surface and at minimal cost.

EFFLORESCENCE AND PICTURE FRAMING

Efflorescence was traditionally a problem associated with concrete products but the growth in use of stone paving has seen an increased incidence of efflorescence, and efflorescence-like problems, occasionally affecting several different types of stone paving. The phenomenon has only come to prominence in the last few years and as research into its causes is still ongoing, and given the vast collection of stone now being supplied to the residential paving market, there is no definitive answer for how it is caused. It is thought by most to be related to the porosity of the stone, which would partly explain why it affects some stones and not others. It is advisable to use light coloured or washed sands with light colour limestone, sandstone and granite paving. Most of the problems involving discolouration and picture framing occur with relatively porous stone types (many of the sandstones plus silvergrey granite) when they have been allowed to dry out completely. Having stone sat in the summer sun causes it to lose all of its moisture content by evaporation. When it is then laid on a wet mortar bed or pointed with a wet mortar, it 'sucks in' moisture, bringing cement particles, clay fines and iron minerals with it, which are later deposited on the surface as further evaporation dries out the paving once more. Regardless of which stone is being used and regardless of technique, it's important to remember that stone is a wholly natural product and as such there is an inherent variation in porosity, colour, texture and grain size. It's not unknown for one flagstone to discolour while its immediate neighbour remains completely unaffected. This does not mean there is a problem with the stone: it's just the way things are with natural stone paving. While discolouration and picture framing can look unattractive when first encountered, the effect and its visual impact do lessen over time and it is quite likely that in 12 months the problem will have lessened significantly or disappeared completely. Don't be panicked into ripping up and replacing affected paving immediately. Give it time, allow nature to run its course and review the situation the following year.