Paving Stones Direct UK LTD

Natural Stone Paving Installation Guide

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Introduction

Natural stone paving offers a timeless and durable solution for outdoor spaces, combining beauty with strength to create patios, paths, and garden features that stand the test of time. However, to ensure its longevity and visual appeal, correct installation is critical. Unlike manufactured paving products, natural stone can vary in colour, texture, and thickness, making proper handling and preparation essential from the outset.

This guide is intended for professional landscapers and experienced DIYers aiming to achieve a high-quality, long-lasting finish. When installed correctly on a full mortar bed with appropriate jointing, natural stone paving delivers a robust and visually appealing surface that withstands the demands of outdoor use.

Time Frame

When placing an order for any garden renovation product, it is important to receive delivery in advance of the project starting, rather than receiving delivery the day of. This is to ensure that if there are ANY issues with your order, you have ample time to notify the supplier, avoiding any lost time from installation.

Initial Checks

Before any work can commence on installing your natural stone slabs, initial checks are required such as checking the colour/batches of the paving received as for damages.

- **Colour/Batch Variation:** Subject to if you are installing a whole new patio or replacing some of your existing, you want to make sure that the colour, shadings and veinings match as much as possible. It is important to note that with natural stone, some slight variations are to be expected.
- **Damages:** While it can be quite a task, it is important to check each paving slab for cracks, chips and any other relevant damages. If any are found, please contact your supplier ASAP so this can be rectified.
- **Shape & Size:** It is also just important to check that the size and shape of the slabs are correct based on your chosen design. Speak to your landscaper regarding this.

Considerations

There are several factors to consider regarding design and Installation factors. This will be covered by your landscaper if you are not opting for the DIY route.

- **Random Patterns:** When laying random patterns, no straight lines over 1800mm, No cross joints, keep the joints tight and no more than 15mm, no less than 10mm and don't lay two slabs the same size adjacent to each other. Also, cross joints are not random in a random pattern, so avoid cross joints.
- **Half bond or 1/3 offset bond:** When laying in rows such as half bond or 1/3 offset bond, set out the area so as not to have small cuts of less than 1/3 at the edge of the paved areas: this is important not only for aesthetic reasons but also for the structural integrity of the paving.

- **Sawn and riven natural stone:** When installing sawn and riven natural stone, a minimum fall of 1-60 should be installed to each of the subgrade, the MOT type 1 base, the bedding mortar and the surface course. British Standard BS7533: 102 recommends 1-60 as a minimum.
- **Drainage:** Drainage must also be considered, especially where paving meets a lawn. If there is no drainage at the bottom of the end of the fall, this can often cause a wet, boggy lawn. For large patios, drainage should be installed at every 10m of fall.

Before Installation

Before installation commences, there are several checks that need to be performed to ensure the success and long lasting installation of your project.

- Prior to installation, ensure the finished level of the paving is 150mm below the damp proof course of the house and preferably falling away from the building.
    - Should there be no option of falling the paving away from the house the best practice would be that the first row of paving falls away from the building, then a channel drain installed, and the rest of the paving fall towards the channel drain.

Excavation (assuming 20mm slabs to be laid)

- The minimum excavation depth is 150mm to accommodate 100mm compacted depth of MOT type 1, 30mm bedding mortar and 20mm for the paving slab. Bedding mortar should be no deeper than 40mm.
    - If you are unsure about the strength of the subgrade conduct the heel/boot test as outlined in British Standard BS7533:102, and adjust the depths of excavation accordingly to meet British Standard BS7533:101.

The fall of the formation level should match that of the surface course and compact the subgrade.

Sub-base Installation

Sub base installation is an important part of creating a stable and long lasting foundation. It provides essential benefits such as even weight distribution, improved drainage and prevents shifting or settling.

- **Installing sub base:** When installing your patio base, it is best practice to first lay a geosynthetic non-woven membrane to prevent fine particle migration into the subgrade. The geosynthetic membrane should overlap by a minimum of 300mm.
    - Good practice, especially on poor subgrades, is to install geogrid/biaxial mesh. This is specifically designed for soil stabilisation and reinforcement. Again geogrid should be overlapped by a minimum of 300mm and suitable zip ties installed to connect them together.
- **Edge Restraints:** Best practice would be to install edge restraint on to a concrete race and haunch to a minimum of 50% up the side of the edge restraint. The edge restraints vertical face should be level with or below the underside of the laying course.

- **MOT type 1:** Upon delivery of your MOT type 1, a close inspection should be carried out to its moisture content. It should be moist but not saturated. If it is too dry, it will not be lubricated sufficiently and will lack interlocking capacity. If it is too wet, it can lose its load-bearing capacity.
    - Next, install MOT type 1 to a minimum and consistent compacted depth of 100mm, and at the same fall as the subgrade. The MOT type 1 should be installed in layers no more than 70mm in depth which will compact to approximately 50mm depth. Compaction should consist of 5 passes both horizontally and perpendicular. A good indication that sufficient compaction has been achieved is there will be no lines in the MOT type 1.
    - It is good practice to 'dip' the base, which is a method of installing parallel string lines. Usually the first string line would be 150mm below the damp proof course, and the second running horizontally parallel at the bottom of the patio 150mm from the subgradel. The string line is pulled taught every 1m to ensure there is an even distribution of MOT type 1 with no humps or hollows. Should there be low spots they can be filled with MOT type 1 and compacted, high spots may be raked to low spots or levelled.

Laying Course - Bedding Mortar

A crucial part of installing natural stone paving is the bedding mortar, which is also known as the laying course. It provides a stable, even base for paving to rest on which ensures proper support, helping to prevent future issues.

- **Lining Up:** Set out string lines to levels and falls. The string line should not touch the edge of the pavers and should be 1-2mm away to ensure it is not displaced. String lines should have a tingle or intermediate line pin every 6m to prevent line sag.
- **Bedding Mortar Options:** Bedding mortar should consist of 1-4 Ordinary Portland Cement (OPC) and one of the following aggregates: 2-6mm, 1-4mm or 0-6mm crushed rock. Sharp sand is also an option: do not use builders' sand as it lacks the strength of crushed rock, often has a clay content and acts like a sponge with moisture, which can cause freeze/thaw issues. The mortar mix should have sufficient water added to hydrate the cement and form a ball that holds its shape in your hand when compressed with your fingers. A wet or semi-dry mix is more than acceptable, but not a dry mix.
- **Bedding Mortar Prep:** The mortar beds should be prepared flat with no trowel marks, as this will provide a full contact mortar bed. Full contact mortar beds are essential to provide full surface area adhesion between the back of the slab and the mortar bed: voids may cause reflective staining in natural stone and occasionally concrete slabs, and may also cause weak spots. Under no circumstances should paving be laid to dot-and-dab or spots.
    - The thickness of a mortar bed should be a minimum of 30mm and no more 40mm. As an approximate guide, mostly depending on the moisture content of your mortar mix, 35-40mm will compress to 30mm. It is important to compress the mortar sufficiently when using your rubber maul to achieve sufficient strength.
    - A good practice is to install geogrid/biaxial mesh to the mortar bed, especially on poor subgrades. This is in addition to that that may have been installed beneath the MOT Type 1 base.

- **Work Time:** Mortar in ambient temperatures is workable for approximately 2 hours, after that a new mix is required. It is considered bad practice to keep adding water to rehydrate the mortar as the mortar loses strength.

There should be no organic matter such as leaves on the type 1 base prior to laying mortar.

Laying Paving Slabs

Once all of the above is prepared, laying the paving slabs shouldn't be an issue.

- Wash the calibration dust, loose debris off the back paving slab, in some cases a brush or sponge may also be necessary to remove thicker layers. If dust and dirt are not removed this can affect adhesion. It is important to also remove any wrapping or packaging material from the slabs.
    - Paving slabs should always be stacked vertically on timber skids to avoid chipping or damage.
- The back of the paving slabs should be fully coated with a British Standard BS7533 certified bonding mortar/slurry primer, such as simply prime primer and applied with a grout flat or with a brush at 1-2mm thickness.
    - The British Standard BS7533:102 tolerance for level variation between two paving units is 2mm.
- A consistent joint width of 10-15mm is best practice as there are generally dimensional tolerances of +/- 5 so it is good practice to use a string line to check, periodically, that joint lines are straight horizontally and perpendicular. Measuring back to the base line, to make sure the paving is square or parallel is good practice. Usually measuring back would involve measuring at either end and in the middle as a minimum.
- Using a washboy, clean the paving of mortar or bonding mortar as you lay. Rake the joints out of mortar as you lay the paving, so a full joint of grout may be installed. Do not wait until the end of the day as the mortar is likely to have hardened.

The paving should not be walked on for a minimum of 24 hours. Clients should be made aware of this and paved areas cordoned off.

Jointing

Correct Jointing allows for thermal expansion and contraction, prevents chipping and cracking and helps stabilize the stone slabs against movement. It is important to check that the grouting purchased accounts for the climate the paving is being installed in, such as Rompox Easy jointing compound.

- Allow the mortar bed to cure sufficiently prior to grout installation. Read the grout manufacturer’s specifications and follow carefully or contact their helpline for guidance as needed.
- Check the weather forecast. If rain or freezing temperatures are imminent then delay grouting.
- Check the joints are of sufficient depth to receive the grout, usually a minimum 20mm depth.
- Clean the surface of the paving to ensure there is no contamination of the grout.
- Using a leaf blower removes excess water from the joints and surface of the paving.

Install the chosen grout as per manufacturers' specifications, ensuring the joints are full with no voids.

Aftercare

Regular maintenance is key, not only to the aesthetics but also to the longevity of the patio. A light power washing, proprietary cleaners are recommended. Regular brushing/sweeping to remove dirt and debris build up and proprietary cleaners are recommended.

The most common maintenance points for a natural stone paving patio are:

- **Organic matter:** Organic matter such as leaves, when left to decompose on your patio, can cause staining.
    - **Required Maintenance:** If you catch the leaves before decomposition sets in, the best way to prevent staining is to simply sweep them away. If not then, then sweep and rinse the area with warm water, taking care not to put too much pressure on the slab while sweeping. If this isn't enough, then a specialised cleaner may be required.
        - **Note:** Always follow the instructions on the cleaner to ensure best effectiveness.
- **Algae Build-up:** The green haze that can sometimes be found on natural stine is an algae buildup. This is usually caused by the slab being laid in an area with damp and shade. This can be more pronounced after wet winters and in poor circulation areas.
    - **Required Maintenance:** Sweep away any loose debris and then clean the paving with water. If that isn't enough, then use a specialised natural stone algae cleaner to remove the green haze.
        - **Note:** It is important to follow the instructions precisely to ensure the effectiveness of the cleaner.
- **Oil Stains:** Oil stains can be difficult to remove from your natural stone patio so it is important to act quickly to reduce the initial stain as much as possible.
    - **Required Maintenance:** Start by absorbing as much of the oil spill as possible, using something such as paper towels or absorbent materials such as cat litter, baking soda or corn starch. Once absorbed, the next step is to clean the area with warm water and washing-up liquid and scrub until gone. For oil stains that have soaked and dried, you may need to use a dedicated oil cleaner however, please be aware that this may not lift the stain fully.
        - **Note:** The longer you leave the spill, the harder it will be to rome the stain.
- **Rust Marks:** Rust marks typically appear in areas where furniture is used and there is direct contact between the furniture and the paving, instead of a buffer such as a plastic ;layer or a rubber layer.
    - **Required Maintenance:** Clean the area with warm water and washing-up liquid and scrub until gone. If the stain persists after this, a specialised cleaning solution will be required.
        - **Note:** It is important to follow the instructions precisely to ensure the effectiveness of the cleaner.

Some of these stains can be quite stubborn and even with dedicated cleaners, it isn't enough to remove the stain. In these situations, there are typically 2 options:

- **Remove the slab with the stain (If possible):** A great rule of thumb is, when ordering your paving, order around 10% more than what you need and keep in storage (tightly wrapped and dry), just in case anything happens to your paving, the affected slab(s) can be replaced with one(s) you have in storage.
- **Hire a Professional Cleaner:** Professional cleaners may have access to stronger cleaners and equipment which could remove the stubborn stains however, as with everything, there are no guarantees.

Sealants

Sealing your patio is an option, but only after you have waited a time frame of 3 to 6 months. This timeframe allows for efflorescence (a white, powdery deposit) to appear and be cleaned away, and also for the bedding material to fully cure. Sealing too early can trap moisture and efflorescence, potentially causing problems later.

Pros of sealing your natural stone patio:

- **Increased Stain Resistance:** Sealers create a barrier that helps to prevent spills, oils, and other substances from penetrating the stone, making it easier to clean and maintain.
- **Increased Protection from Acidic Substances:** Sealers can help protect against acid erosion, which can damage certain types of natural stone.
- **Water Resistance:** Sealing can help prevent water damage, especially in outdoor applications, by reducing water absorption.
- **Enhanced Color and Finish:** Sealers can deepen or enhance the natural colour of the stone, making it look more vibrant.
- **Easier Cleaning:** Sealed surfaces are generally easier to clean, as dirt and grime are less likely to adhere to the stone.

Cons of sealing your natural stone patio:

- **Requires Reapplication:** Sealers don't last forever and need to be reapplied periodically, typically every few years, depending on traffic and environmental conditions.
- **May Alter Appearance:** Some sealers can slightly change the stone's natural look. Cost: Sealing can be an added expense, especially for large areas or when professional application is required.
- **Not Always 100% Stain Proof:** While sealers offer protection, they don't guarantee complete stain resistance. Spills should still be cleaned up promptly.
- **Potential for Improper Application:** If not applied correctly, sealers can trap moisture, cause discoloration, or create a hazy appearance.

Ultimately sealing is personal preference however, it is important to research this as much as possible.

Summary

Installing natural stone paving requires careful planning, correct materials, and strict adherence to best practices at every stage—from initial checks and sub-base preparation to laying, jointing, and ongoing maintenance. When these steps are followed, the result is a durable, structurally sound surface that maintains its natural beauty over time.

Whether you're a professional landscaper or a confident DIY installer, taking the time to prepare properly and follow recognised standards will ensure a long-lasting finish that performs well in all weather conditions and enhances the overall aesthetic of any outdoor space.

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