

The use of a permeable bedding is intended to relieve any water that may enter the pavement during the jointing process (depending on the jointing material being used) and any water that may seep through any hairline cracks and/or imperfections between the jointing and the paving. This allows any water to escape and prevents any possible damage due to the water freezing. Surface water runoff is still intended and should be allowed for. The overall pavement is not intended to be used as a permeable pavement, such as a part of a sustainable drainage system. Thought should be provided for the use of thermal expansion joints which should be installed in both directions at centres of between 2.7 to 3.0m, or against adjoining structures.

Step 1: Ground Preparation:

- Determine the finished paving level, ensuring it is 150mm below the DPC (Damp Proof Course) level.
- Excavate the ground to a depth to accommodate the chosen Sub-base method, this can either be 225mm of MOT Type 1 or 100mm of C20/25 Concrete. If using a Type 1 base then excavate 285mm from finished paving level to allow for 225mm of base, 40mm of bedding and 20mm of porcelain. If using the Concrete base then excavate 160mm from finished paving level to allow for 100mm of C20/25 concrete, 40mm of bedding and 20mm of porcelain.
- Create falls in the sub-grade level with cross falls at 1.25% (1 in 80) and longitudinal falls at 1% (1 in 100). This will allow the water to run off and avoid ponding on the finished pavement.
- Compact the formation level to ensure a stable foundation.

Step 2: Sub-base Installation:

- If installing onto weak ground, such as clay, lay a geotextile directly on the ground below the sub-base to prevent material from being forced under compaction. (Note: a geogrid can be used instead of geotextile, this can perform the same function but will also provide better stability to the sub-base material).
- If using the Type 1 Sub-base a final compacted thickness of 225mm needs to be achieved, replicating the falls which have been constructed at the sub-grade level. (Note: Install the sub-base in 100mm layers and compact each layer for final levels (Note: Think about the amount of surcharge required to achieve a compacted thickness of 100mm. If you are not familiar with a material, trial an area to see how much surcharge is required. As a rough guide, 125mm of uncompacted Type 1 will compact down to 100mm when fully compacted.)
- If using the C20/25 Concrete base has been chosen then a final thickness of 100mm needs to be achieved, replicating the falls which have been constructed at the sub-grade level. Generally, the concrete should be left to cure for 28 days to achieve a 90% cure therefore mitigating any significant shrinkage of the concrete after this time.
- When using permeable jointing and bedding mortars, thought should be taken to the draining of the bedding mortar through the concrete base. 50mm holes should be drilled on a 2m grid and require filling with a 2-6.3mm permeable chipping prior to the installation of the mortar bed.

Step 3: Edge Restraint:

- Securely install edge restraints around the perimeter of the patio area before laying the bedding course and paving units.
- The restraints should be robust enough to withstand the desired traffic for the paving and should present a vertical face level with the underside of the bedding course and require haunching in concrete to the base and rear, to mitigate lateral movement.

Step 4: Bedding Course Preparation:

- A suitable bagged permeable mortar should be used, this mix is essential for frost resistance and to support the weight of the porcelain. Suggested suppliers are Parex, Fuga-Pave, Sika and Instarmac.
- Ensure a full contact mortar bed, with no bedding on dabs.
- Place sufficient mortar for the paving unit which is to be laid and only likely distress the mortar's surface. Permeable mortar moves a lot less than a traditional mortar, so any 'rippling', 'slicing through', etc should be minimal but a full contact mortar bed after tamping down is still required.
- The final thickness of the mortar should be 40mm, so adjust the surcharge accordingly. Due to the grading of the aggregates, the initial placing of the mortar needs to be much more accurate as there isn't the ability to tamp down the depth of mortar in the same way a traditional sand cement mortar performs. (Note: Think about the amount of surcharge required to achieve the final thickness of 40mm. If you are not familiar with a mortar, trial an area to see how much surcharge is required).
- The working time for a permeable mortar is approximately 30 to 45 minutes; after that, use fresh mortar.

Step 5: Placing Porcelain Paving:

- If installing more than one pack of paving, ensure that the batch codes on each pack correspond and select paving from a minimum of 3 packs when installing.
- Clean the backs of the slabs to remove any dust from the manufacturing process that could interfere with the bond between the bonding mortar, or primer, and paving unit. (Note: this dust contains magnesium oxide which is part of the releasing agent from the manufacturing process. This chemical compound can interrupt the bond.)
- Coat the back of each porcelain unit with a cementitious bonding mortar, or slurry primer. This is to increase the adhesion of the porcelain to the mortar bed for long-term performance. (Note: this is required due to the low water absorption characteristics of the porcelain. Slabs should not be wet prior to the slurry primer being applied as this may negatively impact the bond between primer and paving unit).
- Immediately place the porcelain paving on the mortar bed and tamp it to ensure it is level. (Note: when tamping into final position, use a rubber maul and we would suggest using a lighter coloured maul for lighter paving colours, to avoid leaving any marks on the tamped paving).
- Use spacers between adjacent paving units to maintain a consistent 5 to 6mm joint width. (Note: never butt joint, this is when the adjacent units are in contact with each other).
- Clean off any mortar or slurry stains from the face of the paving as you work, rather than waiting until the end of the day.
- Allow at least 24 hours before walking on the surface.

Step 6: Cutting Porcelain Paving:

- Use a continuous diamond cutting blade on a bench-mounted saw with sufficient water being applied for cooling and dust suppression during cutting.
- Mark out the cuts on the face of the unit and cut on the top surface, starting with low RPM and increasing to 10,000 RPM for a clean-cut face.

Step 7: Jointing:

- Carefully fill and finish the joints according to the manufacturer's recommendations.
- Avoid leaving any jointing residue on the face of the paving, as it can compromise the final appearance. If in doubt, we would suggest seeking advice on how to apply from the manufacturer and carry out a trial in a discreet area before committing to the entire installation. Don't underestimate the effort that may be required to remove any residue!
- Consideration should be given to the working method (for any preferences you may have) and working times of the different jointing materials.
- Grouting – wide range of colour options are available, ensure a suitable product is used for external applications and any other features (e.g., swimming pools, etc.)
- Cementitious Jointing – various colour options from different suppliers. These products can be either slurry applied, or gun applied.