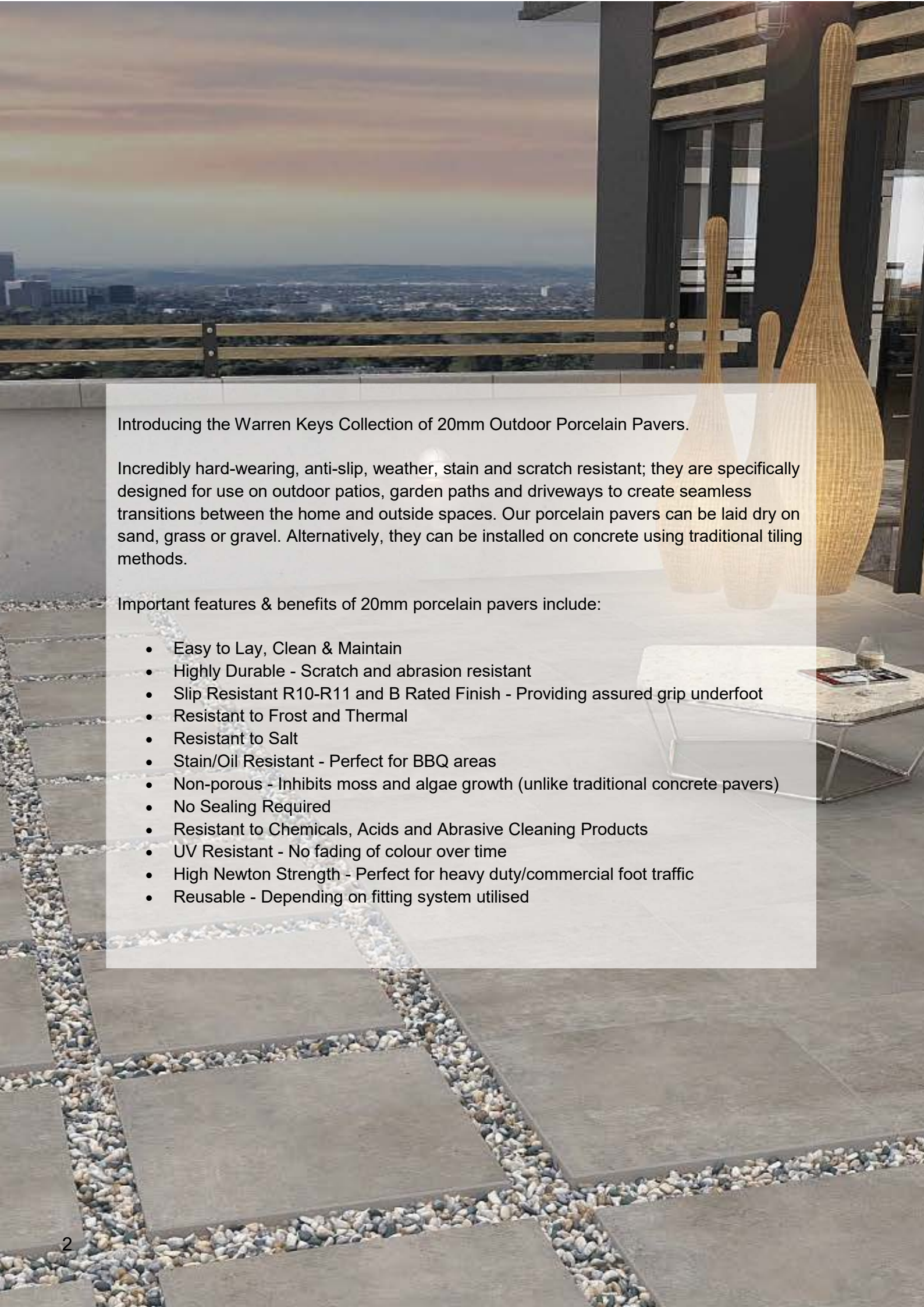




WARREN KEYS
BATHROOMS OF MAN



Introducing the Warren Keys Collection of 20mm Outdoor Porcelain Pavers.

Incredibly hard-wearing, anti-slip, weather, stain and scratch resistant; they are specifically designed for use on outdoor patios, garden paths and driveways to create seamless transitions between the home and outside spaces. Our porcelain pavers can be laid dry on sand, grass or gravel. Alternatively, they can be installed on concrete using traditional tiling methods.

Important features & benefits of 20mm porcelain pavers include:

- Easy to Lay, Clean & Maintain
- Highly Durable - Scratch and abrasion resistant
- Slip Resistant R10-R11 and B Rated Finish - Providing assured grip underfoot
- Resistant to Frost and Thermal
- Resistant to Salt
- Stain/Oil Resistant - Perfect for BBQ areas
- Non-porous - Inhibits moss and algae growth (unlike traditional concrete pavers)
- No Sealing Required
- Resistant to Chemicals, Acids and Abrasive Cleaning Products
- UV Resistant - No fading of colour over time
- High Newton Strength - Perfect for heavy duty/commercial foot traffic
- Reusable - Depending on fitting system utilised

Slip Resistant

Our porcelain pavers have excellent slip-resistance qualities for assured support underfoot. Each range has been scientifically tested for both shod foot and bare foot conditions (DIN51130 & DIN51097) and found to offer excellent R10/11-B slip resistance. You can be confident you are getting the best surfaces for your patio, hot tub/pools surround and BBQ areas.



Stain Resistant

Because the hard surface of our porcelain pavers is virtually non-porous (less than 0.05%) all spillages sit on the surface and do not soak in. During stain resistance testing our porcelain pavers received the highest rating of 5. This means that, in most cases, all spillages can be washed and removed with clean, warm water.

Low Maintenance

With very low water absorption rates (less than 0.05%) the opportunities for moss and algae growth is significantly reduced and provides you with longer lasting, low maintenance, attractive outside spaces.



No Sealing Required

Our porcelain pavers are fired in a kiln (above 1200°C) until they reach a stage of non-porous vitrification and complete water-proofing. The surface will not absorb materials and sealing is not required.

Abrasion & Deep Scratch Resistant

In internationally used deep abrasion testing methods (EN ISO 10545-6) in the Warren Keys Collection performed exceptionally well. It's compact, hard, non-porous body has also been tested for its resistance to wear caused by heavy foot traffic and rubber wheeled vehicles (EN ISO 10545-7). Each porcelain paver is found to have the highest rating (PEI V) and suitable for heavy traffic areas.



Strong, Robust Material (55 N / mm²)

Our porcelain pavers are dense, strong materials designed to withstand heavy loads and continuous use without compromising the surface or finish. They are ideal for making your garden an extension of your home by creating a decorative extra room for entertaining and socialising.

Frost Proof & Salt Resistant

Due to the strong, dense nature and low water absorbency characteristics the Warren Keys Collection of porcelain pavers is highly frost resistant. They are the perfect alternative to porous materials, such as concrete pavers, which absorb water and salts that can cause efflorescence and may damage both the structure and surfaces by splintering, crazing or fractures.



Fade Resistant

The Collection is UV resistant to fading in all weathers and strong sunlight conditions. The manufacturing process of firing the pavers at 1200°C effectively locks in the finished surfaces to produce a product with exceptional durability and reduces the potential for fading over time.

Fire Resistant

Our porcelain pavers are Classified A1 of Reaction to Fire (BS EN13501-1). They are completely resistant to fire and the surface spread of flame. They will not contribute to any phase of a fire including a full developed one.



GENERAL

Slip Resistance R10-B



GREY
60x60 (AKGGEN02T)

ANTHRACITE
60x60 (AKGGEN01T)



GLENSTONE

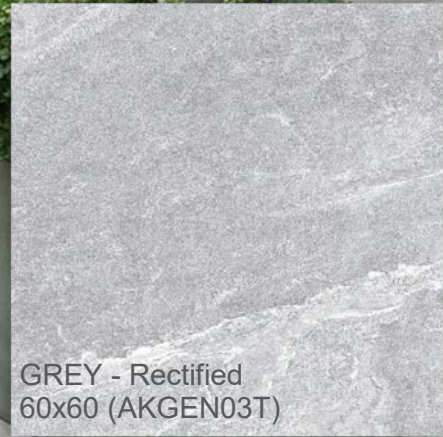
Slip Resistance R10-B



Also available in Modular Mix Pattern



SABBIA - Rectified
60x60 (AKGEN01T)



GREY - Rectified
60x60 (AKGEN03T)



ANTHRACITE - Rectified
60x60 (AKGEN02T)

Also available in Modular Mix Pattern

BAZALT 60x90

Slip Resistance R11-B





BLACK - Rectified
60x90 (RPTBAZ02T)

GREY - Rectified
60x90 (RPTBAZ01T)

Quartz 60x60

Slip Resistance R10-B





Quartz Grey - Rectified
60x60 (AKGQUA01T)

Fabricated Stair Treads and Kerbing

Complementary Stair Treads can be fabricated with a variety of additional anti-slip grooves and inserts (resin or metal options) to suit individual design and tiling schemes.

Fabricated stair treads and surfaces are designed to meet specific performance requirements.

From the earliest design stage we will advise on material properties, slip resistance, strength and durability, to ensure the best fabricated solution for individual project needs.

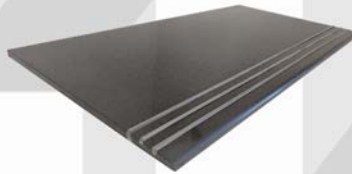
3 Anti-Slip Grooves (3G)



3 Anti-Slip Resin Inserts (3GR)



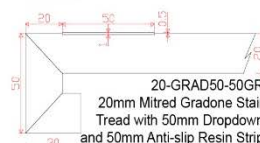
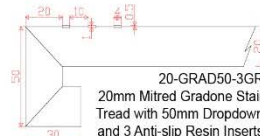
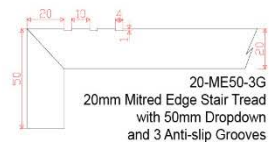
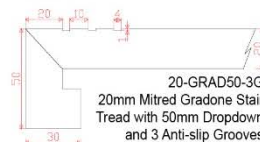
3 Anti-Slip Metal Inserts (3GM)



50mm Anti Slip Resin Strip (50GR)



Paver Stair Treads and Edges - Fabricated Options

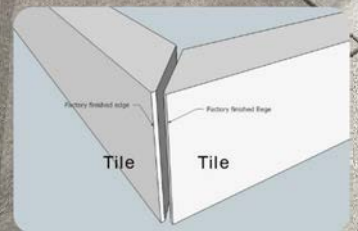




Wall coping with
mitered & returned
edges

Mitered corners
fabricated to specific
measurements

Product Featured:
Marazzi Beola 100x50x2cm



Garden Planters made
from matching
porcelain pavers



Installation Methods

The Warren Keys Collection of Porcelain Paving is a range of high performance hard-wearing, anti-slip outdoor products that combine exceptional strength and technical consistency. These porcelain paving flags absorb little or no moisture providing exceptional stain resistance, and allow moss and algae little opportunity to grow. This means minimal maintenance is required to keep your outside spaces looking stunning.

Our porcelain pavers can be easily laid dry on sand, grass or gravel. This process is fast to install without the need for highly skilled labour and the pavers can easily be lifted, moved and repositioned if required. Alternatively, they can be installed on raised adjustable height pedestals over new or existing surfaces that will allow access below for substrate maintenance, pipework, electrics etc. This is ideal for installations on balconies or patios where access to waterproofing membrane or pipework may be required.

For more permanent placements the porcelain pavers can be installed using traditional paving methods with a standard sand/cement mortar on a hardcore substrate. For areas with regular heavy foot traffic or loads from cars etc. they can be laid onto a concrete base using highly deformable external grade adhesive such as Mapei Adsilex P4 (Class C2FTS2).

Even if you plan to have your pavers professionally installed it is a good idea to be familiar with the process. Here is a quick guide for installing our porcelain pavers in variety of areas:

- **Directly On Grass**
- **Directly On Gravel/Pebbles**
- **With Sand/Cement Mortar on Hardcore**
- **With Pedestals**
- **With Tile Adhesive on Concrete Substrates**

In all cases refer to professional advice and instruction for proper installation methods to maintain the long term integrity of the installed surfaces.

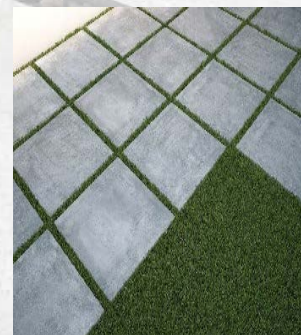
Installing the Warren Keys Porcelain Paver Collection on Grass/Lawn

Installation on grass can be performed in two ways:

A) Direct: Dry set the paver on to grass leaving 4-5cm wide joints to allow the grass to grow through. Results will be long lasting but stability of the surface will be subject to soil movements.

B) On Small Gravel Bases to Minimise Movement:

- Remove the grass from the area underneath the Porcelain Paver Slab.
- Dig out to 5cm deep in warm and dry climate, or deeper in cold or wet climates.
- Compact the soil.
- Fill the excavated area with gravel/aggregate (size 4-8 mm) or sand and compact it to create a solid base.
- Dry set the Porcelain Paver directly on top of the compacted base.



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Installing the Warren Keys Porcelain Paver Collection on Sand

- Remove the grass from the area underneath the Porcelain Paver Slab.
- Dig out 5-7cm deep in warm and dry climate, or deeper in cold or wet climates. Ensure the area is approx. 15cm wider than the finished installed surface.
- Compact the soil.
- Lay Geotextile permeable fabric on the compacted soil (if required for weed control).
- Fill the excavated area with gravel/aggregate (size 4-8mm) and compact it to create a minimum 2-3cm solid base.
- Fill with sand and compact the material to create a firm surface, allowing a 1.5-2° slope away from any building. Do not compact the pavers.
- Install exterior edging restraints where necessary to minimise peripheral movement.
- Space and dry set the Porcelain Paver directly on top of the compacted sand base, ensuring to leave a 4mm space between each one. Never install with paver to paver contact.
- Level the pavers with necessary using a rubber mallet. Never compact the pavers with a vibrating plate. Simply fill the joints with sand to complete.



Installing the Warren Keys Porcelain Paver Collection on Gravel/Pebbles

- Remove the grass from the area underneath the Porcelain Paver Slab.
- Dig 5cm deep in warm and dry climate, or deeper in cold or wet climates.
- Ensure the area is approx. 15cm wider than the finished installed surface.
- Compact the soil.
- Lay Geotextile permeable fabric on the compacted soil (if required for weed control).
- Fill the excavated area with gravel/aggregate (size 4-8mm) and compact it to create a minimum 2-3cm solid base.
- Install exterior edging restraints where necessary to minimise peripheral movement.
- Dry set the Porcelain Paver directly on top of the compacted sand base.
- If installing with wide joints, simply fill the space with decorative pebbles.



Installing the Warren Keys Porcelain Paver Collection on a Mortar Bed

- Remove the grass from the area underneath the Porcelain Paver Slab.
- Dig 15cm deep in warm and dry climate, or deeper in cold or wet climates.
- Ensure the area is approx. 15cm wider than the finished installed surface.
- Compact the soil.
- Lay Geotextile permeable fabric on the compacted soil (if required for weed control).
- Fill the excavated area with gravel/aggregate (size 4-8mm) and compact it to create a minimum 10cm solid base.
- Install exterior edging restraints where necessary to minimise peripheral movement.
- Blend a 4:1 mortar mix using sharp sand and ordinary cement. Avoid using building sand or white cement.
- Shovel or trowel approx. 30mm bed of mortar and ripple to help spread once the paver is placed. It is important to maximise the contact between the mortar and paver (creating a solid bed and reducing air pockets beneath the surface). Only install one paver at a time ensuring the bed is wider than the paver.
- Using a slurry primer (such as SBR) and coating the back of each paver immediately prior to installation will help the product to bed in the mortar.
- Use a rubber mallet to tap down the paver to remove any high/low spots and maximise the contact with mortar mix. Do not walk on for at least 24 hours.



Installing the Warren Keys Porcelain Paver Collection on a Concrete Base with Tile Adhesive

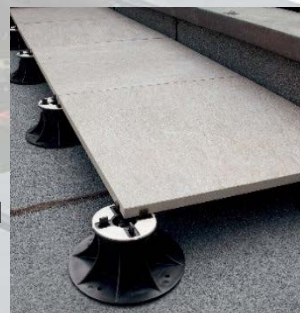
Where there is likely to be persistent foot traffic or heavy loads from cars driving on the pavers it is recommended to install them with highly flexible exterior grade tile adhesive to ensure the long term integrity of the product. In this method the pavers are laid in the same manner as laying floor tiles inside the house:

- The paver can be laid on a suitable pre-installed concrete base. This base should have had at least 3-4 weeks 'drying out' period after installation.
- A suitable exterior grade highly flexible floor adhesive, such as Mapei Adsilex P4 (Class C2FTS2), should be used to install the Porcelain Pavers. Always refer to the manufacturer's technical instructions.
- The adhesive should be spread evenly over the whole of the rigid base using a notched trowel.
- The underside of the paver should be back-buttered with adhesive to create a bridging bond when the paver is laid (creating a solid bed and reducing air pockets beneath the surface).
- The paver is then pressed down onto the adhesive and settled.
- For installation on smaller concrete bases where thermal expansion will be minimal then use 4mm joints. On larger concrete bases seek advice on the need and use of movement control joint between the tile areas.

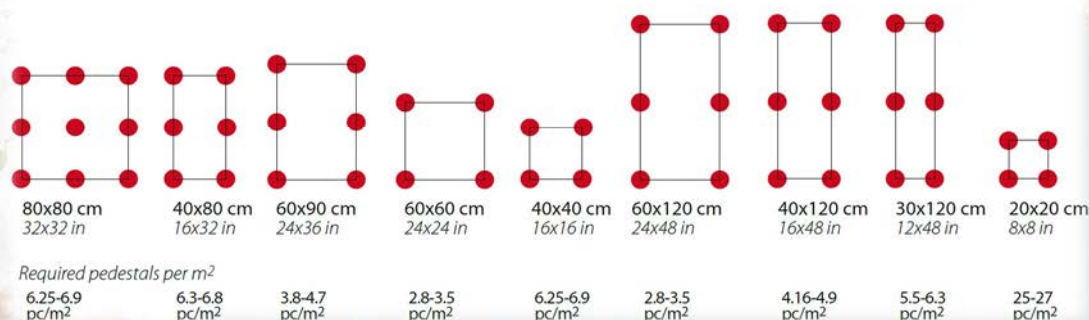


Installing the Warren Keys Porcelain Paver Collection with Adjustable Pavers

- Measure the total area to be paved to determine the number of pavers required and mark the intersections of the corners of each paver being installed to prepare a layout grid guide.
- Position the first pedestal in one corner of the area and position subsequent pedestals along one wall edge. If necessary cut the bases of the pedestals along the scored lines to ensure the pedestals are as close as possible to the wall. Snap off any spacer tabs that are not required.
- Place a second row of pedestals parallel to the first and carefully position the pavers with each corner resting on the top of a pedestal head and tightly butted against the spacer tabs.
- Adjust the height of each pedestal to ensure each paver is level.
- If extra support is required simply place an additional pedestal (with all tabs removed) under the centre of the paver.



For a correct installation, for non-vehicular usage, place the pedestals as follows:



Joint Filling Information

When pavers are installed in sand, mortar or tile adhesive you may fill the 4mm joints with:

- **Traditional Sand**

Dry traditional sand is swept into the open joints until they are completely filled. Excess sand should be swept off of the pavers. Please note mind that sand joints may need to be occasionally topped up or re-sanded over time as wind and rain can cause some erosion.

- **Cement Blended Sand**

Dry cement blended sand (typical 3 parts sand to 1 part cement) is swept into the open joints until they are completely filled. It is essential that excess cement blended sand is swept off the pavers (blowers can also be used for final dust removal). Please note any residual dust or sand remaining on the surface may make the pavers difficult to keep clean after installation. After joints are full and the surface is clean the pavers can be misted with water to activate the cement and cure/harden the mixture. For final clean use a cementitious residue remover such as Fila Deterdek (pictured right).



- **Ready Mixed Jointing Compound**

When installing pavers on a compacted base you can use ready mixed resin-bound jointing compounds such as 'Joint-It Simple' to provide a maintenance free, long lasting professional finish. With working times of up to four hours ready mixed jointing compounds are easy to use, cement-free formulations designed for use in all weathers. Simply brush the compound diagonally across the paving joints working it in until they are full. Remove any excess jointing compound and sweep the pavers with a soft brush to clean the surface. Completed installations should not be walked on for at least 24 hours and should also be protected from rain, frost and freezing temperatures during this time. Residual jointing dust can be simply brushed off after 24 hours.

- **Flexible Tile Grout**

If installing pavers on a concrete base using tile adhesive it is advisable to use flexible exterior grade tile grout such as Mapei Ultracolor Grout in the joints. In warm weather avoid working in direct sunlight. Protect the area from rain, frost and freezing temperatures for several days after grouting. Never allow grout to remain on the surface of the pavers for an extended length of time before completing the initial cleaning. Make sure that all tiles are thoroughly cleaned using a cementitious residue remover such as Fila Deterdek to prevent residual grout remaining on the surface.

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Cutting the Warren Keys Collection of Porcelain Pavers

Porcelain Pavers can be cut using a number of different methods. For the best cut use a water fed bench saw a diamond tipped blade specifically made for cutting porcelain pavers slabs. Alternatively a power saw fitted with a water feed unit to cool the blade and suppress dust.

- **A bench power wet-saw**



- **A power saw with water feed**



- The cutting blade should always be water suppressed whenever cutting the porcelain paver to control dust and cool the blade. The diamond tipped blade should have a full interrupted circular edge and have no gaps.
- Never cut porcelain pavers with a fibre blade.
- Always use a good quality diamond blade. Such is the compact hardness of porcelain pavers that a blunt or worn diamond blade is likely to create edges.
- Paving installers unfamiliar with working with porcelain paving should practice cutting with the material prior to carrying out final installations.

- **A small angle grinder with thin diamond blade for dry cutting**



- This technique is slower, more challenging and can be difficult to achieve a clean cut. However it is very useful for cutting awkward angles to accommodate the placement of the pavers.

TECHNICAL PERFORMANCE

TEST		STANDARD	TSE EN 14411	TEST VALUES
Dimensions	Length - Width	TSE EN ISO 10545-2	$\pm 0.6 \% \pm 2.0 \text{ mm}$	$\pm 0.15 \%$
	Thickness	TSE EN ISO 10545-2	$\pm 5 \% \pm 0.5 \text{ mm}$	$\pm 0.5 \%$
	Straightness of Sides	TSE EN ISO 10545-2	$\pm 0.5 \% \pm 1.5 \text{ mm}$	$\pm 0.3 \%$
	Rectangularity	TSE EN ISO 10545-2	$\pm 0.5 \% \pm 2.0 \text{ mm}$	$\pm 0.3 \%$
	Center Curvature	TSE EN ISO 10545-2	$\pm 0.5 \% \pm 2.0 \text{ mm}$	$\pm 0.15 \%$
	Edge Curvature	TSE EN ISO 10545-2	$\pm 0.5 \% \pm 2.0 \text{ mm}$	$\pm 0.1 \%$
	Warpage	TSE EN ISO 10545-2	$\pm 0.5 \% \pm 2.0 \text{ mm}$	$\pm 0.15 \%$
Water Absorption		TSE EN ISO 10545-3	$\leq 0.5\%$	$\leq 0.5\%$
Bending Strength		TSE EN ISO 10545-4	$R > 32 \text{ N} / \text{mm}^2$	$55 \text{ N} / \text{mm}^2$
Modulus of Rupture		TSE EN ISO 10545-4	$> 1300 \text{ N}$	3000 N
Slip Resistance	General/Glenstone/Quartz	DIN 51130, 51097	Determined by Manufacturer	R10, B
	Bazalt 60x90	DIN 51130, 51097	Determined by Manufacturer	R11, B
	Bushhammered	DIN 51130, 51097	Determined by Manufacturer	R11
	Mat & b/h	ASTM C 1028	$> 0.60 \text{ Dry \& Wet}$	$0.60 \text{ Dry \& Wet}$
Deep Scratch Resistance		TSE EN ISO 10545-6	$> 175 \text{ mm}^2$	130 mm^2
Resistance to Abrasion		TSE EN ISO 10545-7	Determined by Manufacturer	PEI 5
Thermal Expansion		TSE EN ISO 10545-8	Determined by Manufacturer	Max. 6×10^{-8}
Scratch Hardness		DIN 18155	Determined by Manufacturer	MOHS 7
Thermal Shock Resistance		TSE EN ISO 10545-9	Necessary	Resistant
Crazing Resistance		TSE EN ISO 10545-11	Necessary	Resistant
Frost Resistance		TSE EN ISO 10545-12	Necessary	Resistant
Chemical Resistance		TSE EN ISO 10545-13	Determined by Manufacturer	Class A
Stain Resistance		TSE EN ISO 10545-14	Determined by Manufacturer	Resistant = 5
Colour Resistance to UV		DIN 51094	Determined by Manufacturer	No Change Observed

Supplied by



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