Permeable Paving

Paving Factsheet 2 - June 2023



THOMAS ARMSTRONG (CONCRETE BLOCKS)



In October 2008, legislation was introduced which required householders to gain planning permission to pave their front gardens using traditional impermeable driveways which allow uncontrolled runoff of rainwater to roadways, sewers and local watercourses.

Systems have been devised which will comply with regulations and permit the laying of driveways without the need for planning permission and yet offer the same aesthetic properties of traditional methods.

One such system is Thomas Armstrong's Permeable Paving system.

What is Permeable Paving?

Traditional paving methods divert the rainwater quickly towards the edges and then to the local drains. A permeable paving driveway deliberately diverts the water into the paving structure which allows for a controlled release of rainwater into the environment. Therefore the paving blocks, jointing, laying course and bedding materials used for permeable paving differs slightly from conventional block paving, the details of which are given below.

Types of Permeable Paving Systems

There are 3 types of Permeable Paving design (as defined in 'The SUDS Manual' by CIRIA) all of which are suitable for use with Thomas Armstrong's Permeable Paving blocks. These are:

System A - full infiltration:

Where all of the rainwater soaks into the sub base and eventually into the ground which is gradually released into the natural environment. The water is not sent to drains so there is no need for drainage pipes or gulleys making this the simplest and most economical system available.

System B - partial infiltration:

Used where the ground may not be capable of absorbing water very well and the rainwater soaked into the sub-base is diverted via outlet pipes to other drainage systems such as swales, ponds and sewers.

System C - no infiltration:

Suitable for contaminated land in particular where all of the rainwater is captured in the subbase and diverted away via outlet pipes to other drainage systems such as swales, ponds and sewers. An impermeable, flexible membrane is placed beneath the sub-base and up the vertical sides effectively forming a storage tank for the rainwater soaked through the paving layer. This prevents contaminants in the ground from being washed into watercourses. Our Permeable Paving blocks are materially the same as traditional paving blocks offering the same durability, strength and range of styles and colours as traditional paving.

1 612 1 612 1 612 1 612 1 612 1 612 1 612 1 612 1 612

The schematic diagram above shows

the make-up of the layers of a Type A

system the details of which is described in the following pages.

Thomas Armstrong Permeable Paving Blocks

Our Permeable Paving blocks are materially the same as traditional paving blocks offering the same durability, strength and range of styles and colours as traditional paving. They are manufactured to BS EN 1338:2003 and have a permeability exceeding the minimum required flow rate of 1800 litres / second / hectare, provided that the sub-base below the blocks is correctly specified and has similar flow-rate capabilities

They are available in 60mm and 80mm thickness, with a range of colours and styles including rectangular and beamish cobbles. We are continually adding to our Permeable Paving range so please contact us for further up to date details.

Our Permeable Paving blocks include 4.5mm vertical 'nibs' on their sides so that when they are laid, the correct width void is immediately formed between the blocks which is then filled with a suitable permeable material grit resulting in an aesthetically pleasing permeable surface.

This surface complies with flow rates carried out by the British Research Establishment (BRE) and where surfaces are in excess of 200m² it is recommended that additional back-up drainage is incorporated into the design (see Interpave website www.paving.org.uk).

How to Install Thomas Armstrong Permeable Paving

Block laying in general should be carried out in accordance with BS 7533 - 101:2021 and for permeable paving BS 7533-13:2009. The details here describe a 'Type A - Full Infiltration' system which is the simplest and most economical of the 3 recognised types (see above).

Nevertheless the same basic installation method and materials apply to all 3 system types. Constructing permeable driveways on sloping sites is permissible. The maximum gradient of the paver surface should be about 5% (1 in 20) to avoid water running over the surface and failing to enter the pavement.

When designing for sloping sites, the relationship between pavement surface and subgrade levels is key. Without design measures, the water within the permeable construction could simply run to and collect at the lowest point, reducing the available storage

General Site Practice

- Segregation of sub base materials during transport and during construction can occur and should be avoided.
- Soil and mud must be prevented from mixing into the sub-base material during construction which will lessen its ability to store rainwater until it soaks away.
- Keep muddy equipment away from the area when laying the sub base and laying base.
- If necessary, create temporary drainage swales to divert away from the area run-off from surrounding areas, contaminants and mud during the construction phase.
- The aggregates must be kept clean and contaminant-free during construction.

The Sub-Base and Laying Base:

- For 60mm Permeable Paving, use 200mm deep sub-base, for 80mm Permeable Paving, use 275mm deep sub-base.
- The sub-base is 10 20mm angular clean Type 3 material.
- A 50mm layer of Type 3 6mm open graded (no fines) gravel is used as the laying surface for the blocks.
- The Permeable Paving blocks are then laid in situ and an angular 2 4mm grit is then brushed across the surface and into the voids between the blocks. As with conventional paving, the jointing used between the individual blocks is critical to the stability and strength of the driveway as a whole.
- Do not use dry kiln sand in between the blocks as this will severely restrict the rainwater flow into the sub-base. A course of 2 4mm angular no-fines aggregate is used as a jointing medium which is supplied by Thomas Armstrong Limited.





It is absolutely essential that the correct materials as specified here are used in order to provide the correct permeable surfaces between and beneath the blocks!



The joint is only required to have a permeability of 1800 ltrs/sec/hectare. Our permeable paving blocks substantially exceed this required flow-rate.

Definitions:

SUDS - Sustainable Urban Drainage System/Scheme

This is the overall scheme under which permeable paving is one of several solutions to comply with SUDS.

SUDS schemes are all designed to attenuate rainwater and release it back into the natural environment in a controlled manner, ideally replicating a natural cycle.

This helps control pollution, replenish natural aquifers and groundwater courses and reduce ongoing costs of maintenance of drainage infrastructure.

SUDS compliant schemes include:

- Permeable Paving Systems
- Porous / Pervious Paving
- Ponds, Wetlands and Swales
- Infiltration, collection, distribution

Porous /Pervious Paving

This is very different to Permeable Paving because this system allows water to soak through the paving block itself. We do not supply such products.

Permeable Paving

The water flows into the gaps between the paving blocks and into the layers beneath where it is slowly released in a controlled manner. The paving blocks themselves do not allow water to pass through them.

Maintaining Permeable Paving

Permeable Paving systems will require minimal ongoing maintenance as long as the above general site practice guidelines for avoiding contamination during construction have been followed. Nevertheless, the only significant difference between conventional paving and permeable paving surfaces is the need to prevent the permeable filled gaps between the blocks becoming 'blinded' by soil and other fine material.

It is recommended that permeable surfaces be kept as free of mud, soil and other materials as far as possible and regularly swept clean. By doing so, the effectiveness and life of the system will be maintained.

Weeds should be removed by hand or any other method which avoids the use of weed killer and subsequent contamination of the permeable layers beneath the paving.

Flow Rates of Thomas Armstrong Permeable Paving

The joint is only required to have a permeability of 1800 ltrs/sec/hectare. Our permeable paving blocks substantially exceed this required flow-rate. The figures here were originally derived from research carried out by the BRE (British Research Establishment).

60mm Permeable Paving

Derbyshire Agg Top Grit: 20/60 x 10,000/(0.31 x 0.31) = 34,686 ltrs/sec/hectare Francis Flower Agg Top Grit: 20/60 x 10,000/(0.40 x 0.40) = 20,833 ltrs/sec/hectare

80mm Permeable Paving

Derbyshire Agg Top Grit: 20/80 x 10,000/(0.31 x 0.31) = 26,014 ltrs/sec/hectare Francis Flower Agg Top Grit: 20/80 x 10,000/(0.40 x 0.40) = 15,625 ltrs/sec/hectare



Key Points:

- Regulations require that any newly constructed driveway or paved area diverts water away from local drains, watercourses and sewers to minimise flood risk.
- Planning permission is required to construct non-permeable paved areas in which rainwater is allowed to run off to drains.
- Using a permeable paving system avoids the need for planning permission.
- The correct sub-base and jointing materials must be used to successfully construct a permeable driveway, path or patio.
- Good workmanship is essential to success and keeping all aggregates and materials clean and free of debris is essential.
- Keeping the driveway in good condition through regular cleaning and sweeping prevents 'blinding' on the jointing material and the permeable paving functioning correctly.

Paving North East:

Park Road, Blackhill, Consett, County Durham DH8 5SP Tel: 01207 505655 Fax: 01207 592345

Paving North West:

North Lakes Industrial Park, Flusco, Penrith. CA11 oJB Tel: 017684 83617 Fax: 017684 83890