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Agrément Certificate
97/3373
Product Sheet 2

FORTERRA FORMPAVE PAVING BLOCKS

FORMPAVE AQUAFLOW ML PAVING BLOCKS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Formpave AquafLOW ML Paving Blocks, concrete pavers for use in storm-water control systems to provide a surfacing for domestic driveways, patios, pedestrian areas, lightly-trafficked car parks, low-speed roads and lightly-trafficked areas liable to surface ponding from rainwater.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Strength and stability — the product has adequate impact resistance and can withstand the normal loads associated with handling, laying and the light traffic conditions for which it is designed (see section 6).

Rainwater drainage — the product provides sufficient rainwater drainage to eliminate surface ponding (see section 7).

Chemical resistance — the product is resistant to chemicals likely to be spilt on road surfaces or parking areas (see section 8).

Skid resistance — the product has satisfactory skid resistance (see section 9).

Durability — the product will retain its integrity as a storm-water drainage system for a period of up to 20 years (see section 11).



The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Simon Wroe
Head of Approvals — Materials

Claire Curtis-Thomas
Chief Executive

Date of Third issue: 22 May 2014

Originally certificated on 21 December 2001

Certificate amended on 30 September 2015 to update front page information.

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Formpave Aquaflo ML Paving Blocks, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	H3	Rainwater drainage
Comment:		The product will contribute to the dissipation of rainwater from pavement areas, and minimise the risk of ponding. See section 7 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The product can contribute to a construction satisfying this Regulation. See sections 10 and 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.6	Surface water drainage
Comment:		The product will contribute to meeting the relevant requirements for rainwater drainage in this Standard, with reference to clauses 3.6.2 ⁽¹⁾⁽²⁾ , 3.6.3 ⁽¹⁾⁽²⁾ , 3.6.4 ⁽¹⁾⁽²⁾ , 3.6.5 ⁽¹⁾⁽²⁾ , 3.6.6 ⁽¹⁾⁽²⁾ , 3.6.8 ⁽¹⁾⁽²⁾ , 3.6.9 ⁽¹⁾⁽²⁾ , and 3.6.10 ⁽¹⁾⁽²⁾ . See section 7 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for these systems under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012

Regulation:	23a(i)(ii)(iii) b(i)	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	82(a)(b)	Rainwater drainage
Comment:		The product will contribute to the dissipation of rainwater from pavement areas, and minimise the risk of ponding. See section 7 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 1 *Description* (1.2) of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of Formpave Aquaflo ML Paving Blocks, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 9.2 *Drives, paths and landscaping*.

CE marking

The Certificate holder has taken the responsibility of CE marking the Formpave Aquaflo ML Paving Blocks, in accordance with harmonised European Standard BS EN 1338 : 2003. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Formpave Aquaflow ML Paving Blocks are 80 mm thick concrete pavers for surface rainwater drainage. The blocks provide drainage through vertical channels in the end of each block.

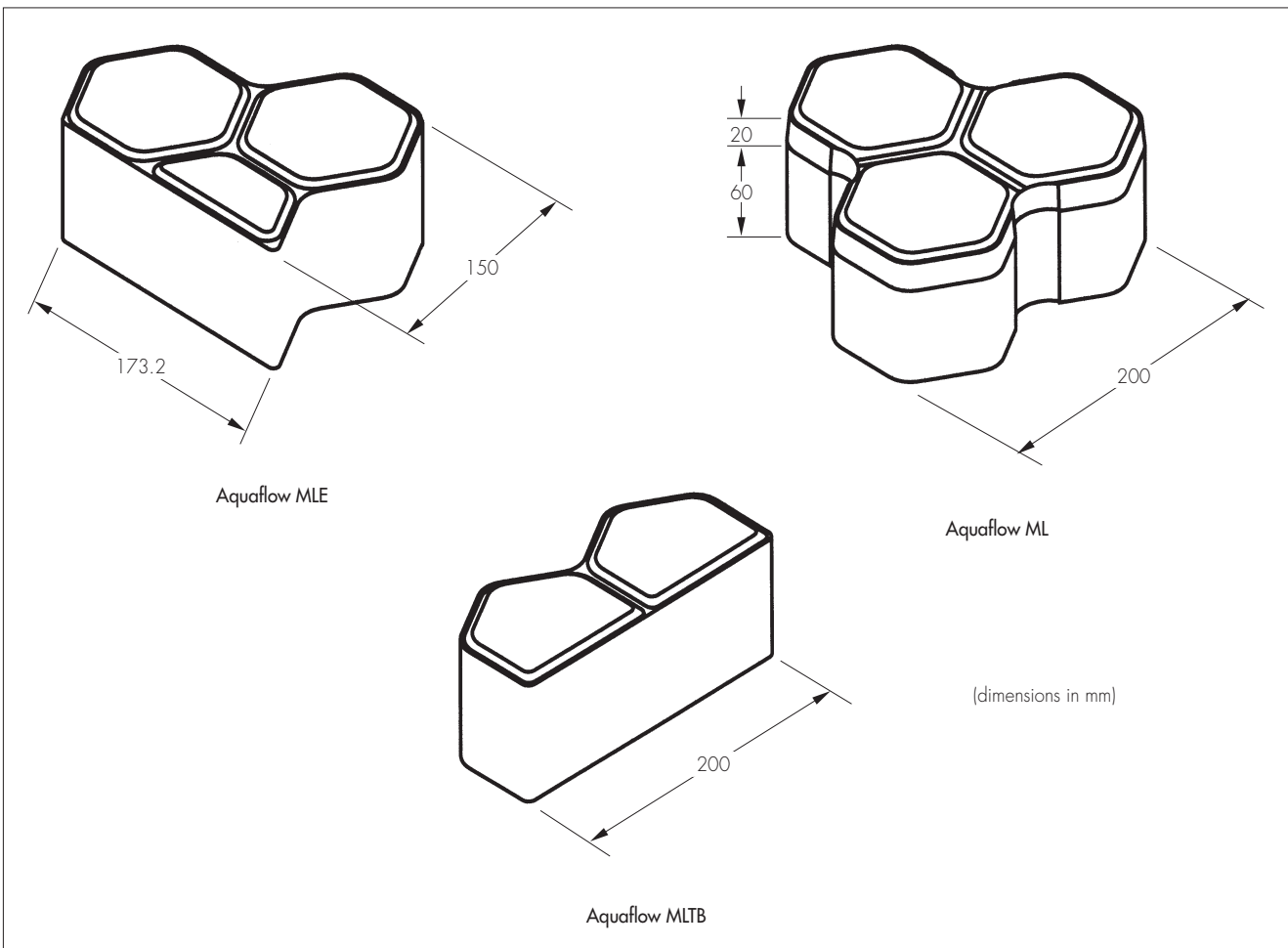
1.2 The blocks have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Value
Dimensions (mm)	see Figure 1
Width (mm)	100
Thickness (mm)	80
Weight (minimum) (kg per block)	4.2
Coverage per pallet (m ²)	6.5
Colour ⁽¹⁾	charcoal, natural, red brindle, burnt red, golden brindle

(1) Other colours are available to special order.

Figure 1 Block detail



1.3 The blocks are for use in conjunction with Formpave Aquaflow MLE end blocks, Formpave Aquaflow MLTB top and bottom blocks and Formpave Aquaflow (rectangular) paving blocks (for edging purposes).

1.4 The blocks are designed for machine- or hand-laying and their interlocking shape makes them especially suitable for heavy-duty applications.

1.5 Ancillary items available for use with the products, but outside the scope of this Certificate, include:

- thermally-bonded, non-woven geotextile membrane for use as a filter/separation layer
- SC membrane — an impermeable membrane for use as a waterproof lining
- SC seal — to seal the SC membrane at pipe penetrations
- SC Intergrid — to stabilise and strengthen sub-base aggregate.

2 Manufacture

2.1 Formpave Aquaflo ML Paving Blocks are manufactured from concrete, using weigh-batched materials complying with the requirements of BS EN 1338 : 2003 and pigments to BS EN 12878 : 2005, in a traditional vibratory blockpress and left to cure.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Hanson Building Products Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 and BS EN ISO 14001 : 2004 by CPC (Certificate No CP00183).

3 Delivery and site handling

3.1 The blocks are delivered on banded or wooden pallets or in shrink-wrapped standard packs, each carrying a label bearing details of the block type, block size, and date of manufacture.

3.2 Blocks should be stored on a firm, level base and retained in the original packaging until ready for laying.

3.3 Care should be taken during handling to avoid damaging the blocks' corners.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Formpave Aquaflo ML Paving Blocks.

Design Considerations

4 General

4.1 Formpave Aquaflo ML Paving Blocks, when installed with suitable edge restraints (see section 15.1), are satisfactory for use as a surfacing for domestic driveways, patios, pedestrian areas, lightly-trafficked car parks, low-speed roads and lightly-trafficked areas. For areas where the surface is subject to heavy axle weights, eg industrial estates, retail centres, motorway services, airport service areas and garages, the advice of the Certificate holder should be sought regarding the specification of the sub-base.

4.2 When laid on a common sub-base consisting of a thickness of between 2 mm and 6 mm of crushed stone to BS EN 13242 : 2002, bedded on a geotextile membrane with a minimum depth of 350 mm of granular material comprising crushed gravel, rock or concrete as specified by the Certificate holder, the blocks will dissipate surface rainwater in areas liable to ponding.

4.3 When designing an area to be surfaced with the blocks, the Certificate holder's laying specification must be followed.

5 Practicability of installation

The products are designed to be installed by a competent general builder, or contractor, experienced with these types of product.

6 Strength and stability

6.1 The tensile splitting strength of the individual block, when tested in accordance with BS 1338 : 2003, is not less than 3.6 MPa.

6.2 The blocks have adequate impact resistance and can withstand all normal loads during handling and laying, and under light traffic conditions.

6.3 The blocks provide a surfacing that can withstand displacement and remain stable when used in the situations described in section 4.1. However, where surface settlement occurs owing to failure of the supporting structure, some localised edge spalling may result.

7 Rainwater drainage



Results of tests conducted on a 1 m² Aquaflo pavement indicate that, during periods of heavy rain, water will drain through the pavement's surface and into the basecourse material at a rate of 4500 mm·h⁻¹, eliminating surface ponding.

8 Chemical resistance

The concrete blocks are resistant to most chemicals likely to be spilt on road surfaces or parking areas, such as oil or petrol. In common with most porous materials, oily spillage will eventually stain the surface.

9 Skid resistance

The wet-skid resistance value, measured in accordance with TRL Report 176, Appendix E, gave a mean reading of 67, and also meets the requirements of BS EN 1338 : 2003.

10 Maintenance



10.1 Provided the base does not deteriorate and the blocks are used for applications described in section 4.1, only twice-yearly cleaning using a mechanical suction brush is necessary, in the spring and following clearance of leaf fall in the autumn.

10.2 In some lightly-used pedestrian areas, eg embankments, weed or moss growth in the joints may take place, but this can be overcome with normal proprietary weedkiller.

11 Durability



The blocks are resistant to weathering, including freeze/thaw, and trafficking in the situations described in this Certificate. They will retain their colour⁽¹⁾ and integrity and act as a storm-water drainage system for a period of up to 20 years provided maintenance is conducted.

(1) Except where affected by oil staining.

Installation

12 General

12.1 Formpave Aquaflo ML Paving Blocks must be installed strictly in accordance with the Certificate holder's laying instructions and the *Formpave Storm Water Control Brochure*.

12.2 All construction of porous pavements must be carried out after general site works and top-soiling of adjacent areas have been completed.

12.3 During construction, the porous pavements must be protected from silt, sand and other fine particles. Contrary to normal block laying practice, sand must not be brushed into the finished surface since this will reduce the flow capacity (see section 15.4).

13 Sub-grade

13.1 Excavation is carried out to the required level to provide a fall of between 1% and 3% to a pipe drain. The sub-grade is compacted with a vibrating roller or plate, and all soft spots are removed and filled with suitable material.

13.2 The bottom and sides of the excavation are lined with SC membrane, with joints overlapped by 300 mm, and sealed with waterproof tape. The membrane should extend by 100 mm beyond the height of the walls.

13.3 If the sub-grade is very coarse, to minimise the risk of puncture a 50 mm deep layer of sand capping should be applied before the membrane is laid.

13.4 If drainage by infiltration into the sub-grade is required, the membrane and sand capping may be omitted. However, the thermally-bonded, non-woven geotextile should be incorporated between the sub-base stone and the sub-grade.

14 Sub-base

14.1 A minimum depth of 350 mm of stone is spread in layers not more than 200 mm thick, taking care not to puncture the underlying membrane. The base layer is compacted with a vibrating plate.

14.2 The geotextile membrane is laid on top of the sub-base, with all joints overlapped by 200 mm and sealed with waterproof tape.

14.3 Crushed stone (2 mm to 6 mm) to BS EN 13242 : 2002 is spread to a depth of approximately 50 mm and screeded level, ensuring that it is not more than 80 mm below the required finished level.

14.4 The 2 mm to 6 mm stone will compact much less than sand under vibration and therefore a small trial area of approximately 2 m² should be laid to determine the final level(s) of the blocks.

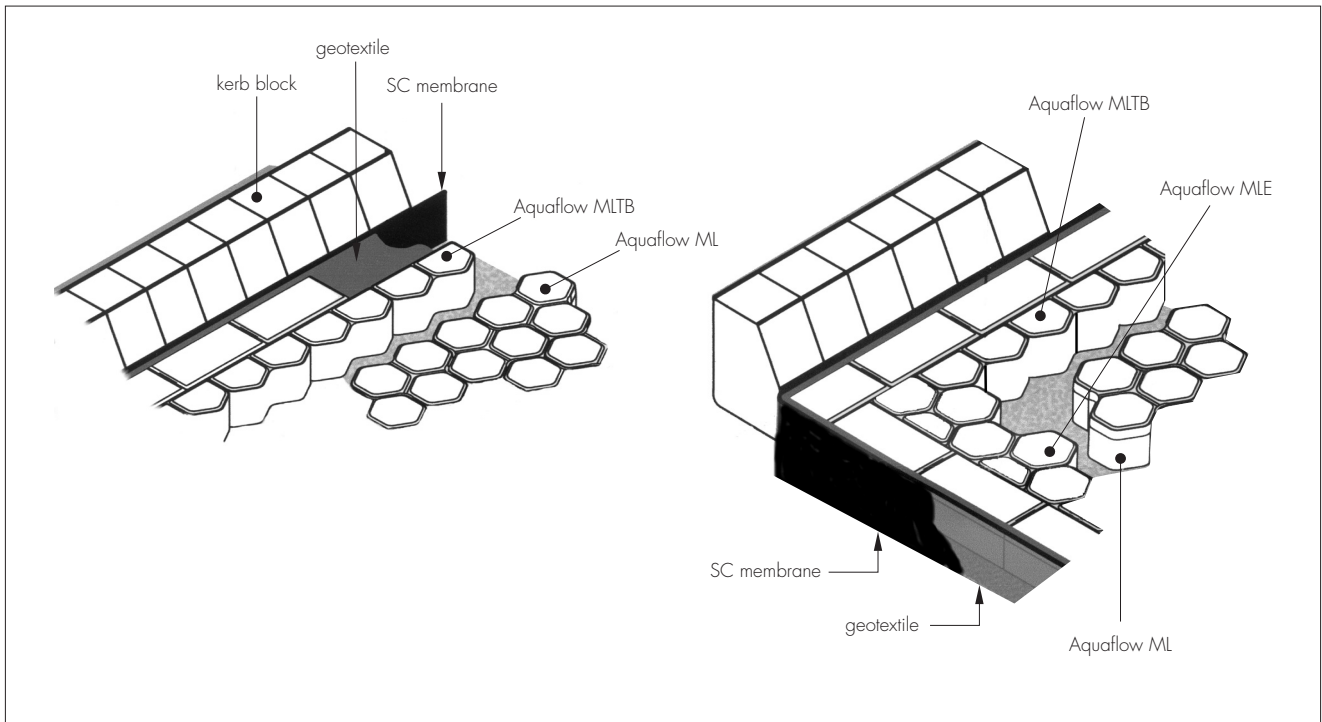
15 Block laying procedure

15.1 Edge restraints (such as kerb blocks haunched in concrete) must be provided to restrict lateral movement of the paving blocks during service.

15.2 ML blocks are laid butt jointed, hand-tight, sequentially across the whole area. At the edges, MLTB and MLE blocks are used to square off the paved area (see Figure 2).

15.3 A single or double row of Formpave Aquaflow rectangular blocks are laid in a stretcher bond formation against the MLTB and MLE blocks, compressing the geotextile between the blocks and the kerbing (see Figure 2).

Figure 2 Typical installation



15.4 To hold the blocks tightly in place at the edges of the paved area, kiln-dried sand should be applied to fill the joints for an approximate distance of 300 mm from the restraining edges (including tree pit surrounds).

15.5 The blocks are compacted with two passes of a vibrating plate compactor fitted with a rubber foot.

15.6 The projecting geotextile and membrane are trimmed as close to the blocks as is practicable, and the surface is brushed clean.

16 Repair

If required, blocks can be replaced using standard installation methods.

Technical Investigations

17 Tests

17.1 Tests were conducted on Formpave Aquaflow ML Paving Blocks and the results assessed to determine:

- density
- water absorption
- compressive strength
- dynamic friction
- dimensional accuracy and squareness.

17.2 An assessment was made of existing data in relation to:

- freeze/thaw resistance
- resistance to staining and chemicals
- resistance to abrasion.

18 Investigations

18.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of materials used.

18.2 An assessment was made of test data on the flow rate of water through the system.

Bibliography

BS EN 1338 : 2003 *Concrete paving blocks — Requirements and test methods*

BS EN 12878 : 2005 *Pigments for the colouring of building materials based on cement and/or lime — Specifications and methods of test*

BS EN 13242 : 2002 *Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*

Conditions of Certification

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.