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HAPAS Certificate
14/H220
Product Sheet 3

ABG GEOCOMPOSITE HIGHWAY DRAINAGE SYSTEMS

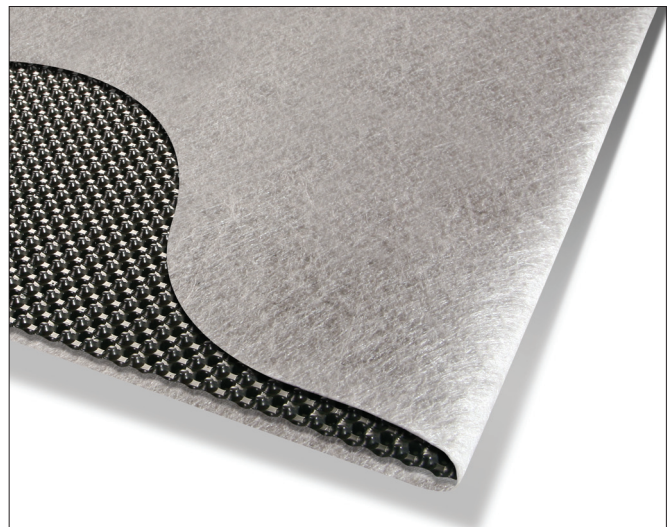
ABG FILDRAIN 7DD AND 7DHD SYSTEMS

This HAPAS Certificate Product Sheet⁽¹⁾ is issued by the British Board of Agrément (BBA), supported by Highways England (HE) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Assembly Government and the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers Group and industry bodies. HAPAS Certificates are normally each subject to a review every three years.
(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to ABG Fildrain 7DD and 7DHD Systems, geocomposites comprising an outer geotextile material and a double-cusped high-density polyethylene (HDPE) core, used horizontally to collect and transmit water and to relieve water pressure under or within embankments.

CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations 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

Geotextile properties — the geotextile component meets the requirements of the *Manual of Contract Documents for Highway Works* (MCHW) Volume 1, sub-clause 514.4 (see section 6).

Geocomposite drain — the geocomposite provides suitable flow characteristics provided the systems are correctly installed in accordance with MCHW Volume 1, clause 514.5 (see section 7).

Durability — under normal soil conditions and temperature, the systems will have a service life in excess of 50 years (see section 10).

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément



Date of Second issue: 30 September 2016

Simon Wroe
Head of Approvals — Engineering

Claire Curtis-Thomas
Chief Executive

Originally certificated on 15 January 2015

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.

Requirements

In the opinion of the BBA, ABG Fildrain 7DD and 7DHD Systems, when used in accordance with the provisions of this Certificate, will meet or contribute to meeting the requirements of the MCHW⁽¹⁾, Volume 1, Series 500, Clause 514⁽²⁾.

Further information and guidance is given in the MCHW, Volume 2 and Volume 3 (Drawing B and F series), and *Design Manual For Roads And Bridges (DMRB) Volume 4, Section 2, Part 3 HD 33/06*.

Additional site requirements may be included on particular contracts, and in general will be given in Appendix 5/4 of these contract documents.

- (1) The MCHW is operated by the Overseeing Organisations: Highways England (HE), Transport Scotland, the Welsh Assembly Government and the Department for Regional Development (Northern Ireland).
- (2) This Certificate will be fully compliant with the new version of Clause 514 expected to be published during 2016. In the meantime the BBA has evaluated the physical characteristics as defined in the current Clause 514, but the evaluation and testing has been in accordance with the appropriate BS EN test methods that have replaced the withdrawn British Standards referred to in the current Clause 514.

Regulations

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 1 Description (1.2) of this Certificate.

Additional Information

CE marking

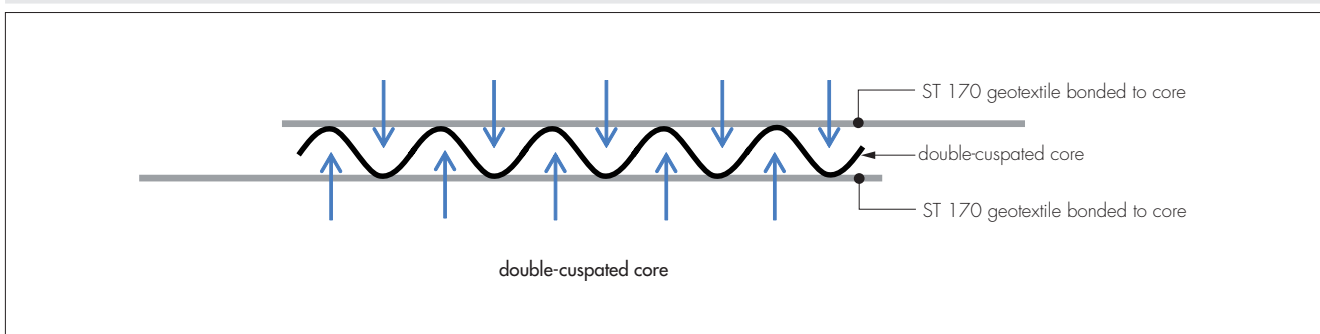
The Certificate holder has taken the responsibility of CE marking the systems in accordance with harmonised European Standard BS EN 13252 : 2014. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 ABG Fildrain 7DD and 7DHD Systems are geocomposites consisting of a double-cuspated HDPE core, 0.6 mm and 0.8 mm thick respectively, with dimple height of 7 mm, bonded on both sides with a 1.1 mm thick non-woven geotextile filter material (see Figure 1). The double-cuspated core permits the water to flow through both faces.

Figure 1 Cross-section of geocomposite



1.2 ABG Fildrain 7DD and 7DHD Systems are available⁽¹⁾ in standard widths of 1.1 m to 5.5 m, and in lengths of 50 m.

(1) Other lengths and widths can be manufactured to order.

1.3 The integral geotextile component is a 1.1 mm thick (at 2 kPa) non-woven filtration material, ST 170.

1.4 Other components used with the systems, but outside the scope of this Certificate, are:

- backfill material — any acceptable fill as defined in the MCHW, Volume 1, Series 500 and 600, subject to a maximum particle size of 125 mm
- jointing tape — for sealing geotextile material.

2 Manufacture

2.1 The non-woven geotextile fabric is formed from 100% virgin high-tenacity polypropylene, mechanically bonded by needle-punching.

2.2 High-density polyethylene is extruded to form the double-cusped core component.

2.3 During assembly, geotextiles are bonded to the dimples on both sides of the core using hot-melt adhesive. Geotextile flaps extend beyond the core on opposite edges to facilitate lapping of adjacent rolls on site.

2.4 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.

2.5 The management system of ABG Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by ISOQAR (Certificate 570/QMS001).

3 Delivery and site handling

3.1 The geocomposite is delivered to site in rolls wrapped in polythene for protection, and bearing a label which includes the Certificate holder's name, product details, batch number and the BBA logo, incorporating the number of this Certificate. In addition, information associated with the identification of the systems is supplied by the Certificate holder in accordance with MCHW, Volume 1, sub-clause 514.12.

3.2 When handling, rolls must be carried or rolled, avoiding dragging as this will damage the geotextile material.

3.3 The geocomposite must be stored on a clean, level surface and protected from direct heat and/or sunlight. The polythene wrapper must not be removed until immediately before installation.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on ABG Fildrain 7DD and 7DHD Systems.

Design Considerations

4 General

4.1 ABG Fildrain 7DD and 7DHD Systems, when installed in accordance with the requirements of MCHW, Volume 1, sub-clause 514.11, the Certificate holder's instructions and the relevant parts of this Certificate, are satisfactory as drainage layers for use in a near-horizontal plane in embankments, for the conveyance of infiltration water from underlying and overlying ground to a suitable outfall.

4.2 Fildrain 7DD is suitable for long-term applied pressures not exceeding 100 kPa and Fildrain 7DHD is suitable for long-term applied pressures not exceeding 250 kPa.

4.3 The system components are made from materials resistant to the adverse effects of short-term exposure to UV light. They are also resistant to degradation by acids, alkalis and other common chemicals, and to the effects of bacteria, fungi and mould found in soil or highway construction materials.

4.4 In the event of accidental exposure to chemicals (including spillage of oil, petrol and diesel), the installed systems must be examined and assessed for possible damage. If necessary, the geocomposite should be repaired or replaced (see section 13).

5 Practicability of installation

The systems are designed to be installed by a competent highways contractor experienced with these types of systems.

6 Geotextile properties

The ST 170 geotextile meets the requirements of the MCHW, Volume 1, sub-clause 514.4 (i), (ii), (iii), (iv), (v) and (vi). The geotextile characteristics are given in Table 1.

Table 1 Geotextile nominal characteristics

Test (unit) ⁽¹⁾	Test Standard	Declared values (tolerance)	Requirement ⁽²⁾ (MCHW clause 514)
Tensile strength* (kN·m ⁻¹)	BS EN ISO 10319	MD ⁽³⁾ 14.4 (-1.4) CD ⁽³⁾ 15.5 (-1.5)	>5.0
Elongation at maximum load* (%)	BS EN ISO 10319	MD ⁽³⁾ 65 (±13) CD ⁽³⁾ 75 (±14)	>10
Mean opening size O ₉₀ * (µm)	BS EN ISO 12956	70 (±20)	⁽⁴⁾
Resistance to static puncture* (N)	BS EN ISO 12236	2050 (±200)	1200
Dynamic perforation* (cone drop test) (mm)	BS EN ISO 13433	24 (±3)	<40
Water permeability normal to the plane* (ℓ·m ⁻² ·s ⁻¹)	BS EN ISO 11058	75 (±15)	⁽²⁾
Breakthrough head (mm)	BS 6906-3 ⁽⁴⁾	2.00	<50

(1) An asterisk (*) indicates that data shown are given in the manufacturer's Declaration of Performance under CE marking.

(2) Clause 514 requires the compiler of the site specific specification to state the required value in Appendix 5/4.

(3) Machine direction (MD) along the roll length, Cross Machine Direction across the width (CD).

(4) Refer to MCHW, Volume 1, Clause 514, Section 4 (vi) and MCHW, Volume 2, clause NG 514, section 1.

7 Geocomposite drain

ABG Fildrain 7DD and 7DHD Systems meet the requirements of the MCHW, Volume 1, sub-clause 514.5 (i), (ii) and (iii). The declared performance/test results in relation to the characteristics of the geocomposite are given in Table 2.

Table 2 Geocomposite characteristics – declared values (tolerance)

Test (unit) ⁽¹⁾	Test Standards	Fildrain 7DD	Fildrain 7DHD
Tensile strength* (kN·m ⁻¹)	BS EN ISO 10319		
MD		32 (±3.2)	39 (-3.9)
CD		31 (±3.1)	31 (-3.1)
Elongation (%)	BS EN ISO 10319		
MD		50	52
CD		53	62
Resistance to static puncture (kN)	BS EN ISO 12236	5.15 (±1.0)	5.92 (±1.0)
Cone drop hole diameter	BS EN ISO 13433	7.0	4.0
In-plane flow (ℓ·m ⁻¹ ·s ⁻¹) at:	BS EN ISO 12958		
20 kPa, hydraulic gradient 0.1		0.28	0.30
20 kPa, hydraulic gradient 1.0*		1.35	1.35
50 kPa, hydraulic gradient 0.1		0.24	—
50 kPa, hydraulic gradient 1.0		1.20	—
100 kPa, hydraulic gradient 0.1		0.18	0.25
100 kPa, hydraulic gradient 1.0		0.95	0.95
200 kPa, hydraulic gradient 0.1		—	0.20
200 kPa, hydraulic gradient 1.0		—	0.80
Long-term in-plane flow ⁽²⁾ applicable where the maximum normal to the plane load is 50 kPa at:			
hydraulic gradient 0.1		0.18	—
hydraulic gradient 1.0		0.95	—
Long-term in-plane flow ⁽²⁾ applicable where the maximum normal to the plane load is 250 kPa at:			
hydraulic gradient 0.1		—	0.07
hydraulic gradient 1.0		—	0.32
Durability* – resistance to:			
weathering	—	satisfactory	satisfactory
chemical ageing	—	satisfactory	satisfactory
microbiological degradation	—	satisfactory	satisfactory

(1) An asterisk (*) indicates that data shown are given in the manufacturer's Declaration of Performance under CE marking.

(2) The long-term flow was assessed by the BBA based on test data provided.

8 Joints

The jointing of the systems must comply with the requirements of the MCHW, Volume 1, sub-clause 514.6, and must be formed to prevent the ingress of soil particles or other extraneous material into the drain. Drain joints should, preferably, be parallel to the direction of flow, and any exposed edges must be protected from the ingress of soil by a geotextile flap or wrapping with a minimum overlap of 150 mm.

9 Maintenance

ABG Fildrain 7DD and 7DHD Systems are confined within a soil structure and therefore cannot be accessed for maintenance.

10 Durability

10.1 The systems are durable and sufficiently robust to resist the mechanical stresses imposed during installation and the design life. Under normal conditions of use (eg in soils with pH 4 to 9 at 25°C), the geocomposite will provide an effective barrier to the transmission of salts, liquid water and water vapour for in a period excess of 50 years.

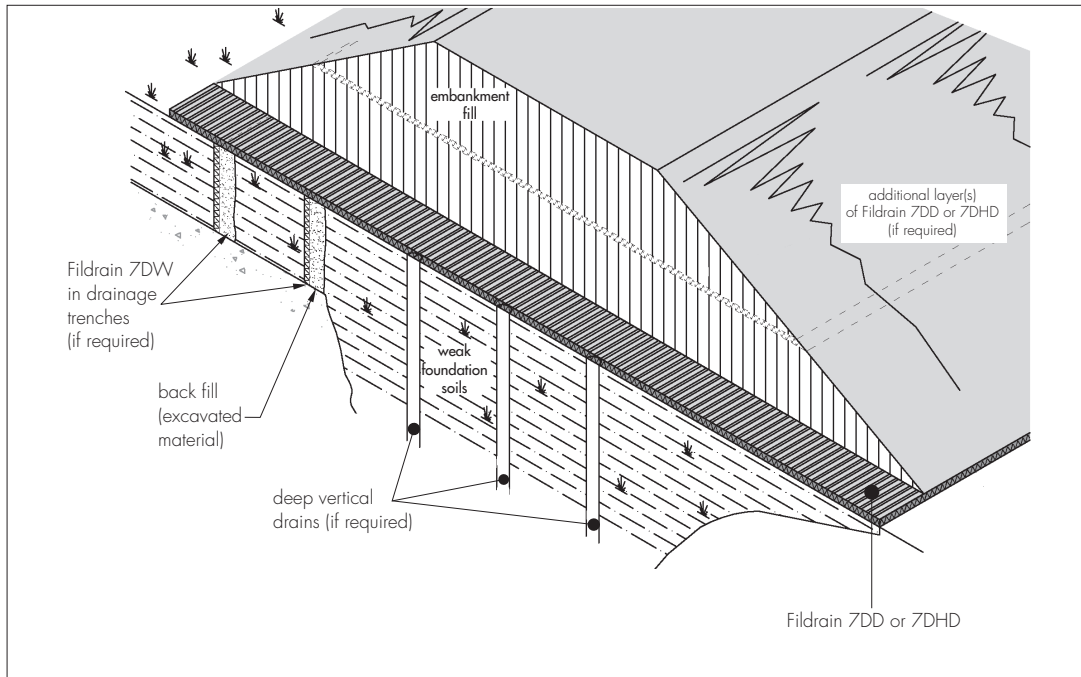
10.2 Where the systems are used in soils which could potentially be aggressive (ie outside the pH range indicated in section 10.1), guidance from the Certificate holder must be sought.

Installation

11 General

11.1 ABG Fildrain 7DD and 7DHD Systems must be installed in accordance with the Certificate holder's installation instructions and this Certificate (see Figure 2) .

Figure 2 Typical ABG Fildrain 7DD and 7DHD Systems installation in embankments



11.2 Toe drains or ditches to which the systems will discharge should be constructed prior to laying the systems.

11.3 The required extent of geocomposite is set out and the receiving surface is prepared.

11.4 Although the geocomposite is sufficiently robust to resist mechanical stresses imposed during the installation process, care must be taken to ensure that damage is avoided.

11.5 The geocomposite can be cut to size using a sharp knife.

11.6 It is essential that no gaps are left in the installed geocomposite that could allow soil to enter the core.

11.7 Once unwrapped, the geocomposite must be installed and backfilled within two weeks, to prevent damage from ultraviolet light exposure.

12 Procedure

12.1 The surface on which the systems are to be installed is excavated or filled and prepared, to provide a smooth formation.

12.2 Fildrain is unrolled onto the prepared surface and cut to length using a sharp knife or disc saw.

12.3 On a straight alignment, the end of a roll should be overlapped by a minimum of 300 mm onto the next roll such that water can flow out of the end of the top roll and onto the roll below. The rolls may be cut into triangular pieces when following curves, or narrow width rolls may be used. Overlaps at cut edges must not be less than 300 mm.

12.4 The appropriate backfill (see section 1.4) is placed in layers of a minimum of 150 mm compacted thickness over the geocomposite, ensuring that there are no gaps in the geotextile cover before placing the backfill.

13 Repair

13.1 In the event that the geotextile component material is damaged either before or after installation, it must be repaired using a patch of new geotextile material taped in position over the hole, using jointing tape.

13.2 If the core is damaged, it is cut out and a new piece inserted and securely taped in position, using jointing tape.

14 Tests

14.1 Test data on the geotextiles were assessed to determine:

- tensile strength and elongation
- puncture resistance
- tear resistance
- pore size
- water flow
- breakthrough head.

14.2 Test data on the composite drain were assessed to determine:

- flow rate through composite
- compression under shear and normal load
- short-term equivalent load
- in-plane flow.

14.3 Test data were assessed in relation to the systems' resistance to:

- the deleterious effects of short-term exposure to UV light
- degradation by acids, alkalis and other common chemicals (including oil, petrol and diesel)
- the effects of bacteria, fungi and moulds found in soil or highway construction materials.

15 Investigations

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

15.2 A visit to a site in progress was carried out to assess the practicability of the installation procedures.

Bibliography

- BS 6906-3 : 1989 *Geotextiles — Determination of water flow normal to the plane of the geotextile under a constant head*
- BS EN 13252 : 2014 *Geotextiles and geotextile-related products — Characteristics required for use in drainage systems*
- BS EN ISO 9001 : 2008 *Quality management systems — Requirements*
- BS EN ISO 10319 : 2008 *Geosynthetics — Wide-width tensile test*
- BS EN ISO 11058 : 2008 *Geotextiles and geotextile-related products — Determination of water permeability characteristics normal to the plane, without load*
- BS EN ISO 12236 : 2006 *Geosynthetics — Static puncture test (CBR test)*
- BS EN ISO 12956 : 2010 *Geotextiles and geotextile-related products — Determination of the characteristic opening size*
- BS EN ISO 12958 : 2010 *Geotextiles and geotextile-related products — Determination of water flow capacity in their plane*
- BS EN ISO 13433 : 2006 *Geosynthetics — Dynamic perforation test (cone drop test)*
- Design Manual For Roads And Bridges Volume 4 *Geotechnics and Drainage*, Section 2 *Drainage*, Part 3 HD 33/06 *Surface and Sub-Surface Drainage Systems For Highways*
- Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*
- Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works*
- Manual of Contract Documents for Highway Works, Volume 3 *Highway Construction Details*

16 Conditions

16.1 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.

16.2 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.

16.3 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.

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

16.5 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.

16.6 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.