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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

HAPAS Certificate
14/H220
Product Sheet 2

ABG GEOCOMPOSITE HIGHWAY DRAINAGE SYSTEMS

ABG FILDRAIN 7DW, 7DWF, 7DWP, 12SW, 12SWP AND 25SW SYSTEMS

This HAPAS Certificate Product Sheet(1) is issued by the British Board of Agrément (BBA), supported by the Highways Agency (HA) (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 Certificate Product Sheets are normally each subject to a review every three years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems, a range of geocomposite Systems for the collection and/or disposal of surface and sub-surface water from road verges and foundations. The Systems comprise an outer geotextile material and a cuspated high density polyethylene core for use in vertical applications such as cut-off drains and verge drains.

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 Manual of Contract Documents for Highway Works (MCHW) Volume 1, sub-clause 514.4 (see section 6).

Geocomposite — the geocomposite provides suitable flow characteristics provided the Systems are correctly installed in accordance with MCHW Volume 1, clause 514 (see section 7).

Durability — under normal soil conditions and temperatures, 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 [redacted] [redacted]

Date of First issue: 15 January 2015

Brian Chamberlain
Head of Approvals — Engineering

Claire Curtis-Thomas
Chief Executive

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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Requirements

In the opinion of the BBA,ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems, when used in accordance with the provisions of this Certificate, will meet or contribute to meet the requirements of the Manual of Contract Documents for Highway Works (MCHW)[1], Volume 1, Series 500, Clause 514.

Further information and guidance is given in the MCHW, Volume 2 and Volume 3 (Drawing B and F series), DMRB Volume 4, Section 2 (HD 33/06 document).

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: the Highways Agency (HA), 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 2015. 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 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 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 is given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems comprise a range of geocomposite drainage Systems (see Table 1) consisting of a single- or double-cuspated HDPE (high density polyethylene) core bonded to a non-woven geotextile filter on one side and fully wrapped over the opposite side. Double-cuspated products permit the water to enter the geocomposite through both faces, single-cuspated composite permits water to enter via one face only. The HDPE cuspated core component allows the water to flow in all directions.

1.2 The Fildrain HDPE core components are available in standard widths of 0.3 m to 1.1 m and length[1] of 50 metres.

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

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

1.4 The specific pipes used with Type 7DWF, 7DWP and 12SWP Systems are outside the scope of this Certificate.

1.5 Details of other components used with the Systems outside the scope of this Certificate are:

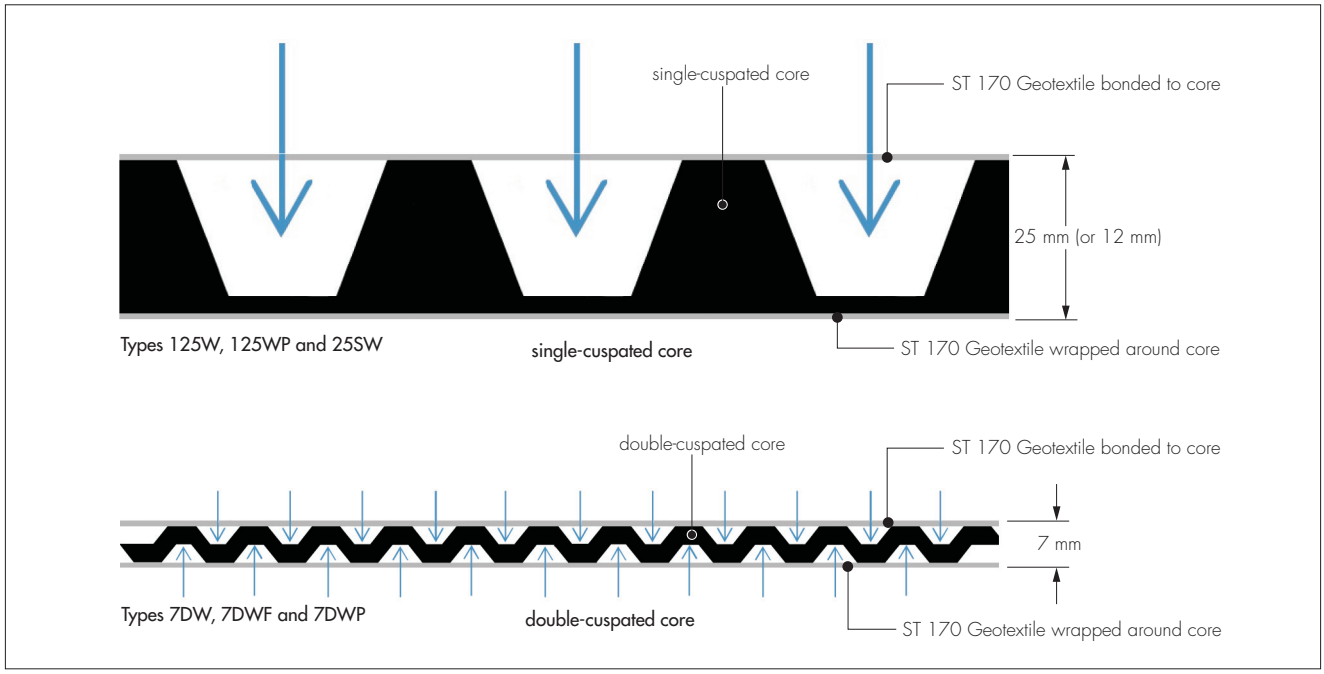
- backfill and surround material to pipe — granular material to a suitable specification compatible with the System type flow rate and CE marked to BS EN 13242 : 2013 and must comply with the requirements of the MCHW, volume 1, sub-clause 514.9. Trench backfill must be the original as dug material unless otherwise stated in Appendix 5/4
- jointing tape — for sealing geotextile material
- gulley bypass fittings or geotextile hoods.

Table 1 Fildrain range (see Figure 1)

Type	Description
7DW	A 0.6 mm thick, 600 g·m^{-2} membrane formed into a double-cuspated (7 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the other side of the core and bonded to itself to hold the product together
7DWF(1)	A 0.6 mm thick, 600 g·m^{-2} membrane formed into a double-cuspated (7 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the other side of the core and bonded to itself to hold the product together. Two flaps are sewn at the base of the System to enable wrapping of a perforated carrier pipe
7DWP(1)	A 0.6 mm thick, 600 g·m^{-2} membrane formed into a double-cuspated (7 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the other side of the core and bonded to itself to hold the product together. A geotextile sleeve is stitched at the base to accommodate a perforated carrier pipe
12SW	A 0.9 mm thick, 900 g·m^{-2} membrane formed into a single-cuspated (12 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the rear (flat) side of the core and bonded to itself to hold the product together
12SWP(1)	A 0.9 mm thick, 900 g·m^{-2} membrane formed into a single-cuspated (12 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the rear (flat) side of the core and bonded to itself to hold the product together. A geotextile sleeve is stitched at the base to accommodate a perforated carrier pipe
25SW	A 1.5 mm thick, 1500 g·m^{-2} membrane formed into a single-cuspated (25 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the rear (flat) side of the core and bonded to itself to hold the product together

(1) Type 7DWF, 7DWP and 12SWP are for use in conjunction with perforated or porous carrier pipe to MCHW Volume 1.

Figure 1 Cross section of geocomposite



2 Manufacture

2.1 The ST 170 component is a non-woven geotextile fabric comprising 100% virgin high tenacity polypropylene material mechanically bonded by needle-punching.

2.2 The cuspated core component is extruded from high-density polyethylene.

2.3 During assembly, the core is fully wrapped with the geotextile and bonded using hot-melt adhesive to the core dimples on one side only.

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 specification and quality control operated by the manufacturer are being maintained.

2.5 The management System of ABG Limited 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 with a polythene protective wrapper, bearing a label including the manufacturer's name, product details, batch number and the BBA identification mark, incorporating the number of this Certificate. In addition, information associated with the identification of the System 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 the ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems.

Design Considerations

4 General

4.1 ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems, when installed in accordance with the requirements of the MCHW, Volume 1, sub-clause 514.11, the Certificate holder's instructions and the relevant parts of this Certificate are satisfactory as a drainage layer for use in a vertical plane adjacent to the edge of the carriageway for the conveyance of infiltration water from surrounding surfaces or substrates.

4.2 The Systems 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 the effects of bacteria, fungi and mould found in soil or highway construction materials.

4.3 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 replaced.

5 Practicability of installation

These Systems are designed to be installed by a competent highways contractor, experienced with using these types of products.

6 Geotextile properties

The ST 170 geotextile meet 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 2.

Table 2 Geotextile nominal characteristics

Test (units)[1]	Test Standard	Declared values (tolerance)	Requirement[2] (MCHW clause 514)
Tensile strength* ($kN \cdot m^{-1}$)	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)	(see note 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* ($l \cdot m^{-2} \cdot s^{-1}$)	BS EN ISO 11058	75 (±15)	(see note 2)
Breakthrough head (mm)	BS 6906-3[4]	2.00	<50

(1) An asterisk (*) indicates that data shown is 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, Cause 514, Section 4 (vi) and MCHW Volume 2, Clause NG 514, Section 1.

7 Geocomposite

ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW 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 3.

Table 3 Geocomposite characteristics — Declared values (tolerances)

Test[1]	Test Standards	System type		
		7DW/7DWF/7DWP	12SW/12SWP	25SW
Tensile strength* (kN·m^{-1})	BS EN ISO 10319			
MD		32 (±3.2)	28 (±2.8)	40 (±4.0)
CD		31 (±3.1)	31 (±3.1)	31 (±3.1)
Elongation (%)	BS EN ISO 10319			
MD		50	45	63
CD		53	65	73
Static Puncture Resistance (kN)	BS EN ISO 12236	5.1 (±1.0)	4.5 (±0.9)	5.0 (±1.0)
Cone drop hole diameter (mm)	BS EN ISO 13433	7 (±3)	6 (±2)	3 (±1)
In-plane flow (l·m^{-1}·s^{-1})	BS EN ISO 12958			
At 20 kPa, Hydraulic gradient 0.1		0.28	1.25	3.7
At 20 kPa, Hydraulic gradient 1.0*		1.35	4.25	11.5
At 50 kPa, Hydraulic gradient 0.1		0.24	1.05	3.4
At 50 kPa, Hydraulic gradient 1.0		1.20	3.75	10.0
At 100 kPa, Hydraulic gradient 0.1		0.18	0.85	3.0
At 100 kPa, Hydraulic gradient 1.0		0.95	3.20	8.5
Long-term In-plane flow[2] applicable where the maximum normal to the load is 50 kPa at HG 1.0 (0.1)		0.95 (0.18)	3.20 (0.85)	8.5 (3.0)
Durability* resistance to				
weathering		Satisfactory	Satisfactory	Satisfactory
chemical ageing		Satisfactory	Satisfactory	Satisfactory
microbiological degradation		Satisfactory	Satisfactory	Satisfactory

(1) An asterisk (*) indicates that data shown is given in the manufacturer's Declaration of Performance under CE marking.
(2) The long-term flow assessed by the BBA based on test data provided.

8 Joints

8.1 The jointing of Fildrain 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 must be parallel to the direction of flow and any exposed edges must be protected from the ingress of soil by a geotextile wrapping with a minimum overlap of 150 mm.

8.2 The Fildrain Systems should be jointed into pipe Systems or chambers for inflow and outflow purposes through purpose made attachment pieces for forming continuous drain lengths.

9 Maintenance

9.1 For Fildrain Systems, regular clearing/cleaning of the pipe by rodding or jetting may be necessary.

9.2 Pipeless Systems are confined within a soil structure and therefore, do not require 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 a design life 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 10.1), guidance from the Certificate holder must be sought.

Installation

11 General

11.1 ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems must be installed in accordance with the MCHW, volume 1, sub-clause 514.11; volume 3, Drawing numbers F18 and F19.

11.2 The main surface water drainage is installed with junctions at gully positions prior to laying Fildrain.

11.3 The line of the Fildrain is set out with the horizontal and vertical tolerances allowed taking into account any possible trench over-break on the capping layer.

11.4 Although the geocomposite is sufficiently robust to resist mechanical stresses imposed during the installation process, care must be taken to ensure 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 Fildrain that could allow the soil to enter the core.

11.7 Once unwrapped, the Systems must be installed and backfilled within two weeks to prevent damage from ultra-violet sunlight.

12 Procedure

12.1 A trench is excavated and prepared using an excavator with a narrow bucket with a rounded invert to eliminate the use of bedding stone. Alternatively, trenching machinery may be used.

12.2 The Fildrain is unrolled alongside the trench and cut to length using a sharp knife or disc saw.

12.3 When unrolled, the upper side of Fildrain 12SW, 12SWP and 25SW is the permeable side intended for the water flow (ie the dimpled side placed facing the carriageway side).

12.4 The Fildrain must be lifted into the trench and held in a vertical position, ensuring the top edges of the Fildrain Systems are level with the top of the sub-base. Care must be taken to avoid damaging the trench excavation. Usually, Fildrain is placed against the capping layer side of the trench.

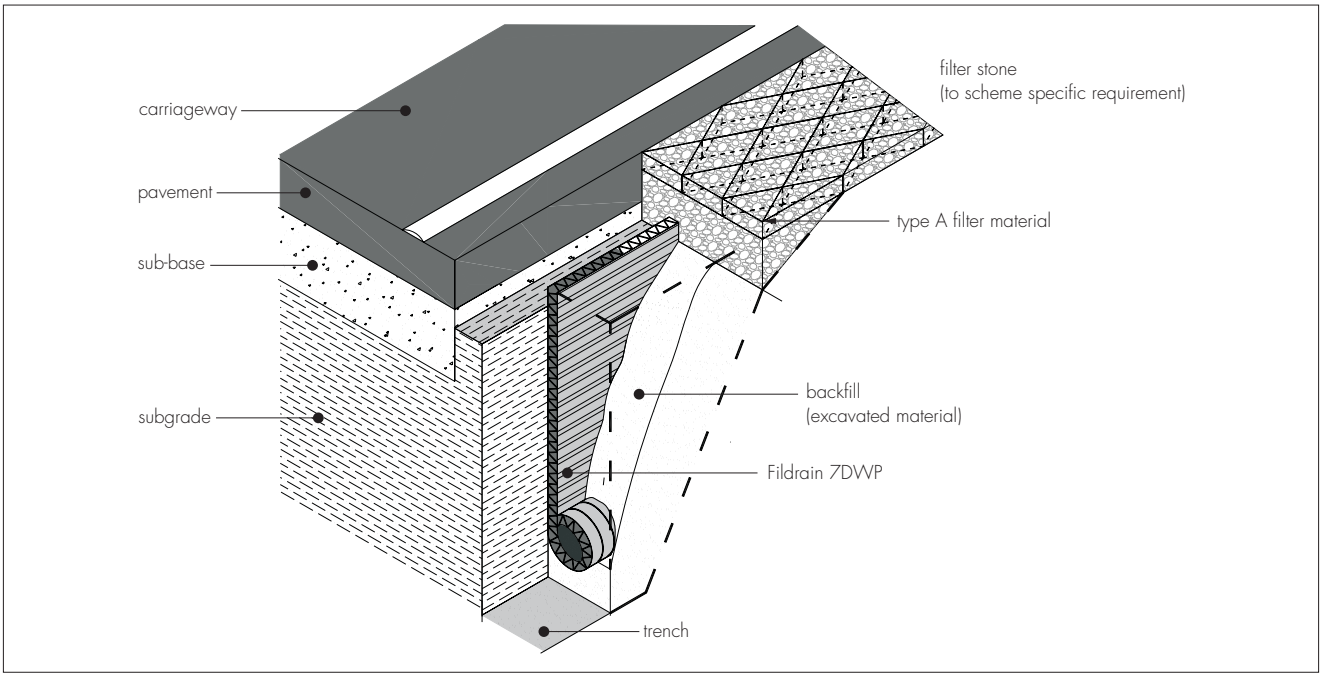
12.5 For Fildrain 25SW, special fittings are available for joining rolls and outfalls.

12.6 For 7DWF, 7DWP and 12SWP Fildrain Systems, where Fildrain sleeves join, they must be sealed together with jointing tape to prevent the ingress of soil. The pipe is inserted into the sleeve using a built-in draw cord and adjoining pipes connected together with standard couplings. The perforated or slotted pipe is installed at the base and connected to a suitable outfall.

12.7 The appropriate backfill (see section 1.4) is placed in layers max of 300 mm over the trench and, if filter stone is to be used should be to a depth of 300 mm. At least 100 mm of the Fildrain should project into the course of filter stone.

12.8 To accommodate crossing pipes, gully connections or ducts, special fittings may be used to maintain the longitudinal flow capacity. For more information, the advice of the Certificate holder should be sought.

Figure 2 Typical installation (Fildrain 7DWP shown)



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, this is cut out and a new piece inserted and securely taped in position, using jointing tape.

Technical Investigations

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 product's 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 compositions of 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 12224 : 2000 *Geotextiles and geotextile-related products — Determination of the resistance to weathering*

BS EN 13242 : 2013 *Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction*

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)*

DMRB, Volume 4, Section 2 (HD 33/06 document)

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.

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