

ABG GEOCOMPOSITE HIGHWAY DRAINAGE SYSTEMS

ABG FILDRAIN TYPE 5, 6, 7 AND 10 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 Government and the Department for Infrastructure, 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 Type 5, 6, 7 and 10 Systems, a range of geocomposite systems for the collection and/or disposal of sub-surface water from road foundations. The systems comprise an outer geotextile material and a cusped high-density polyethylene (HDPE) core, for use vertically as edge-of-pavement drainage (Types 5 to 7) and horizontally as under channel drainage (Type 10).

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 satisfies the requirements of the *Manual of Contract Documents for Highway Works* (MCHW), Volume 1, Clause 514 (see section 6).

Geocomposite properties — the geocomposite provides suitable flow characteristics provided the systems are correctly installed in accordance with the 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

Date of Second issue: 5 March 2021

Originally certificated on 15 January 2015



Hardy Giesler
Chief Executive Officer



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 **MUST** check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

Requirements

In the opinion of the BBA, ABG Fildrain Type 5, 6, 7 and 10 Systems, when used in accordance with the provisions of this Certificate, will meet or contribute to meeting 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, Volumes 2 and 3 (Drawing B and F series), and the *Design Manual for Roads and Bridges* (DMRB), CG 501.

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 Government and the Department for Infrastructure (Northern Ireland).

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 sections: 3 *Delivery and site handling* 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 : 2016.

The manufacturer has taken the responsibility of CE marking the geotextile in accordance with harmonised European Standard BS EN 13252 : 2016.

Technical Specification

1 Description

1.1 ABG Fildrain Type 5, 6, 7 and 10 Systems comprise a range of geocomposite drainage systems (see Table 1) consisting of a single- or double-cusped HDPE core bonded to a non-woven geotextile filter to either one or both sides. Double-cusped products permit water to enter the geocomposite through both faces, single-cusped permits water to enter via one face only. The HDPE cusped core component allows the water to flow in all directions.

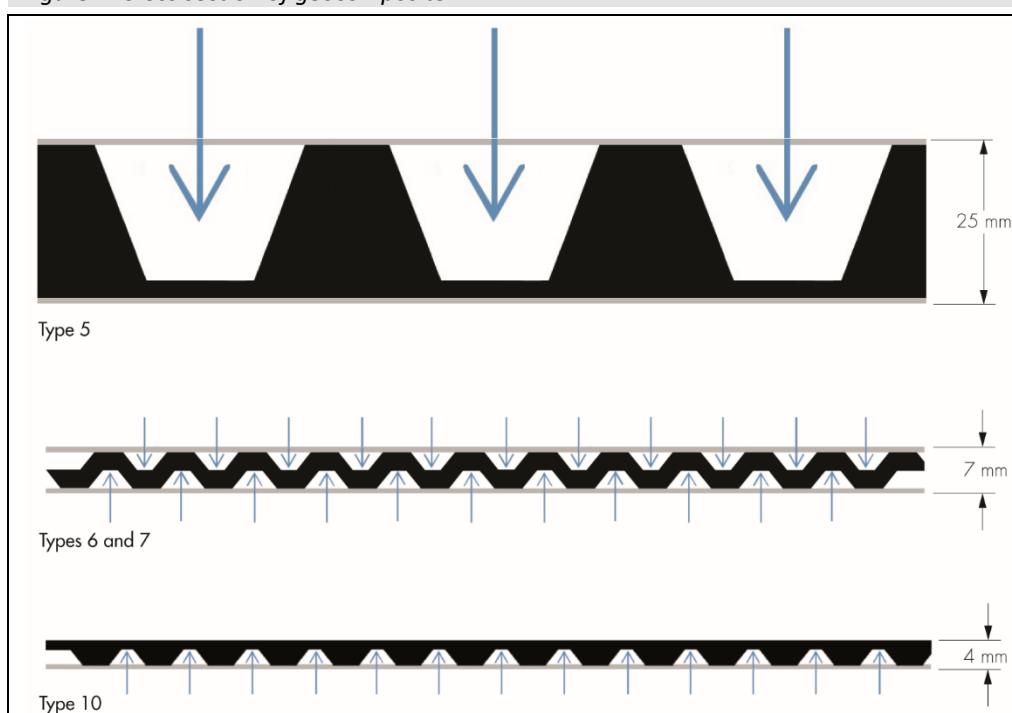
Table 1 Fildrain range (see Figure 1)

Type	Description
5	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 (permeable face), wrapped over the rear (flat — impermeable) side of the core and bonded to itself to hold the product together
6 ⁽¹⁾	A 0.6 mm thick, 550 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 at the base of the product a geotextile sleeve is stitched to accept a carrier pipe
7 ⁽²⁾	A 0.6 mm thick, 550 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
10	A 0.4 mm thick, 420 g·m ⁻² membrane formed into a single-cuspated (4 mm dimple height) HDPE core with ST 170 geotextile bonded to the dimpled side of the core only

(1) Type 6 system is for use in conjunction with perforated or porous carrier pipe to the MCHW, Volume 1.

(2) Type 7 system is for use in conjunction with solid thermoplastic pipe slit longitudinally along the top surface to the MCHW, Volume 1.

Figure 1 Cross section of geocomposite



1.2 The Fildrain HDPE core components are available in standard sizes as given in Table 2.

Table 2 Fildrain standard sizes

Fildrain type	Dimensions	
	Roll width (mm) ⁽¹⁾	Length (m) ⁽¹⁾
5	300, 450, 600, 750 and 900	50
6	300 to 1100	50
7	300 to 1100	50
10	550 to 2200	25

(1) Other sizes may 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 The specific pipes used with Types 6 and 7 systems are outside the scope of this Certificate. However, the specification of such pipes is described as:

- Type 6 system — pipes to be a maximum of 100 mm diameter and perforated or porous in accordance with the requirements of the MCHW, Volume 1, sub-clause 514.7
- Type 7 system — pipes to be a maximum of 100 mm diameter unperforated thermoplastic pipe slotted in accordance with the requirements of the MCHW, Volume 1, sub-clause 514.7.

1.5 Details of other components used with the systems, but 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
- ABG Jointing Tape — for sealing geotextile material
- staples — for fixing lengths of geocomposite together in horizontal applications and used in conjunction with ABG jointing tape
- gulley bypass fittings or geotextile hoods
- outfill fittings.

2 Manufacture

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

2.2 The cusped core components are extruded from HDPE sheet.

2.3 During manufacture, the core of Types 6 and 7 systems is fully wrapped with the geotextile and bonded using hot-melt adhesive to the core dimples on one side. Type 5 and 10 systems have geotextile bonded on the dimple 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 specifications and quality control being 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 : 2015 by ISOQAR (Certificate 570-QMS-001).

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 manufacturer'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 the MCHW, Volume 1, sub-clause 514.12.

3.2 When handling, rolls must be carried or rolled to avoid 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 Type 5, 6, 7 and 10 Systems.

4 General

4.1 ABG Fildrain Type 5, 6, 7 and 10 Systems, when installed in accordance with the requirements of the MCHW, Volume 1, sub-clause 514.11, the Certificate holder's instructions and this Certificate are satisfactory as a drainage layer for use in the:

- vertical plane — as an edge-of-pavement drainage (Types 5, 6 and 7 systems) collecting infiltration water from the road foundation, or
- horizontal plane — as a structural underlay drainage system (the Type 10 system) for the collection and/or disposal of sub-surface water penetrating through the road surface from highways for conveyance to the outfall.

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 systems should be replaced.

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 satisfies 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 3 of this Certificate.

Table 3 Geotextile nominal characteristics

Tests	Test Standard	Declared values (tolerance)	Requirement ⁽¹⁾ (MCHW, Volume 1, clause 514)
Tensile strength (kN·m ⁻¹)	BS EN ISO 10319	MD ⁽²⁾ 14.4 (-1.4) CD ⁽²⁾ 15.5 (-1.5)	>5.0
Elongation at maximum load (%)	BS EN ISO 10319	MD ⁽²⁾ 65 (±13) CD ⁽²⁾ 70 (±14)	>10
Characteristic opening size O ₉₀ (µm)	BS EN ISO 12956	70 (±20)	(see note 3)
Resistance to static puncture (N)	BS EN ISO 12236	2200 (-220)	>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)	(see note 1)
Breakthrough head (mm)	BS 6906-3 ⁽³⁾	2	<50

(1) MCHW, Volume 1, Clause 514 requires the compiler of the site-specific specification to state the required value in Appendix 5/4.

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

(3) Refer to the MCHW, Volume 1, Cause 514, Section 4 (vi) and Volume 2, Clause NG 514, Section 1.

7 Geocomposite properties

ABG Fildrain Type 5, 6, 7 and 10 Systems satisfy 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 4 of this Certificate.

Table 4 Geocomposite nominal characteristics

Tests	Test Standards	System type			
		5	6	7	10
Tensile strength (kN·m ⁻¹)	BS EN ISO 10319				
MD		28.8 (-2.8)	28.8 (-2.8)	28.8 (-2.8)	14.4 (-1.4)
CD		31 (-3.0)	31 (-3.0)	31 (-3.0)	15.5 (-1.5)
Elongation (%)	BS EN ISO 10319				
MD		65(±13%)	65(±13%)	65(±13%)	65(±13%)
CD		70(±14%)	70(±14%)	70(±14%)	70(±14%)
Static Puncture Resistance (kN)	BS EN ISO 12236	5.00(-1.0)	5.15 (-1.0)	5.15 (-1.0)	2.60 (-0.5)
Cone drop hole diameter (mm)	BS EN ISO 13433	3.00	7.00	7.00	14.00
In-plane flow (l·m ⁻¹ ·s ⁻¹)	BS EN ISO 12958				
At 20 kPa, Hydraulic gradient 0.1		3.7	–	–	0.20
At 20 kPa, Hydraulic gradient 1.0		11.5	1.35	1.35	0.90
At 50 kPa, Hydraulic gradient 0.1		3.4	–	–	0.18
At 50 kPa, Hydraulic gradient 1.0		10.00	1.20	1.20	0.84
At 100 kPa, Hydraulic gradient 0.1		3.00	0.18	0.18	0.15
At 100 kPa, Hydraulic gradient 1.0		8.50	0.95	0.95	0.70
At 200 kPa, Hydraulic gradient 0.1		–	–	–	0.12
At 200 kPa, Hydraulic gradient 1.0		–	–	–	0.55
Long-term in-plane flow ⁽¹⁾ applicable where the maximum normal to the plane load is 50 kPa at Hydraulic gradient 1.0 (0.1)		8.50 (3.0)	0.95 (0.18)	0.95 (0.18)	–
Long-term in-plane flow ⁽¹⁾ applicable where the maximum normal to the plane load is 100kPa at Hydraulic gradient 1.0 (0.1)		–	–	–	0.55 (0.12)
Durability resistance to					
weathering		Satisfactory	Satisfactory	Satisfactory	Satisfactory
chemical ageing		Satisfactory	Satisfactory	Satisfactory	Satisfactory
microbiological degradation		Satisfactory	Satisfactory	Satisfactory	Satisfactory

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

8 Joints

8.1 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 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 Type 5 to 7 systems should be jointed into pipe systems or chambers for inflow and outflow purposes through purpose made attachment pieces for forming continuous drain lengths. Type 10 system must be jointed directly on to a vertical Type 5, 6 or 7 system.

9 Maintenance

9.1 For Type 6 and 7 systems, regular clearing/cleaning of the pipe by rodding or jetting may be necessary.

9.2 Type 5 and 10 systems are confined 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 service life. Under normal conditions of use (e.g. 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 service life in 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.

11 Reuse and recyclability

The systems contain core and geotextile made of HDPE and polypropylene respectively, which can be recycled.

Installation

12 General

12.1 ABG Fildrain Type 5, 6, 7 and 10 Systems must be installed in accordance with the MCHW, Volume 1, sub-clause 514.11 and Volume 3, Drawing numbers F18, F19 and F21, and the Certificate holder's instructions.

12.2 The main surface water drainage is installed with junctions at gully positions prior to laying the systems.

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

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

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

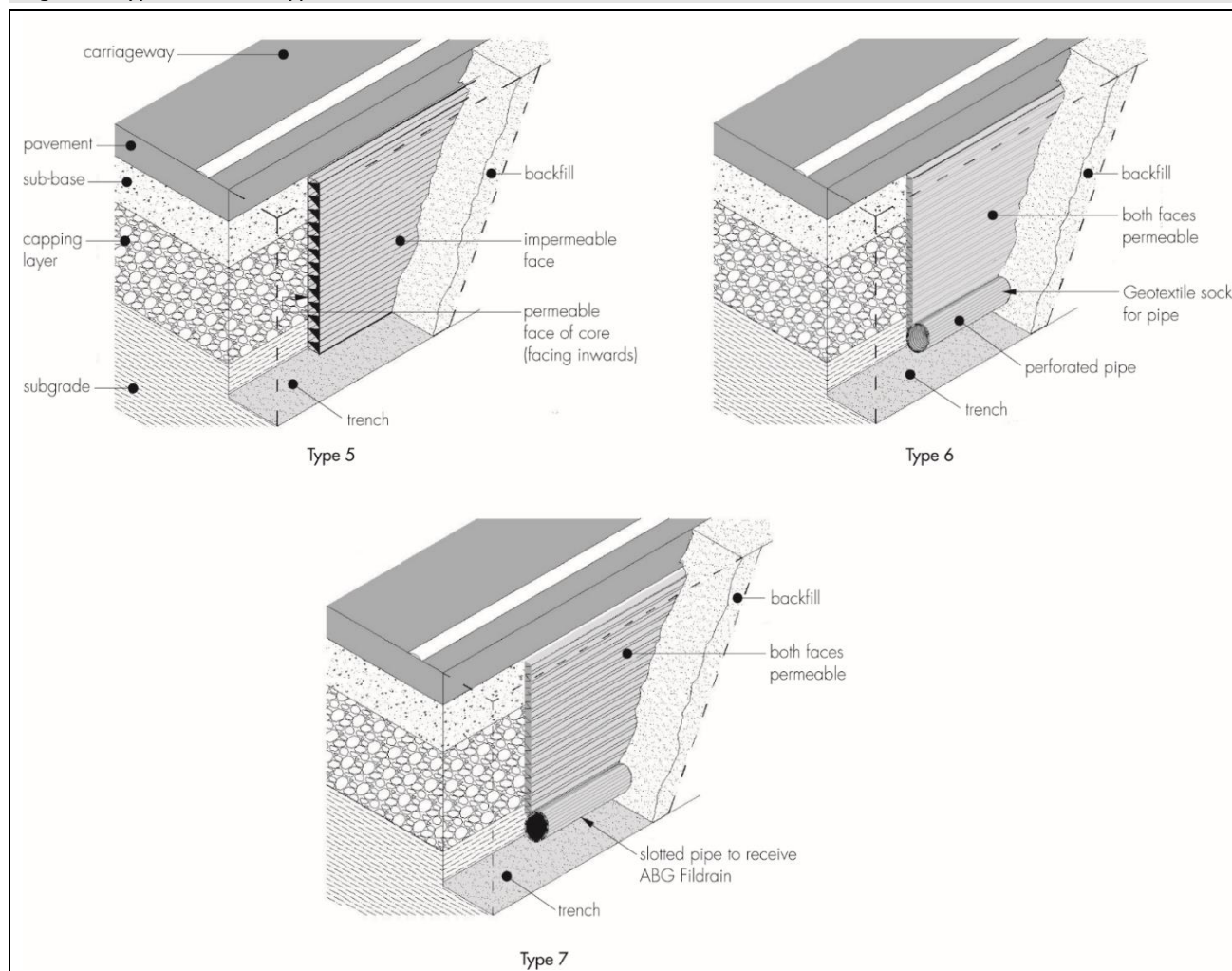
12.6 It is essential that no gaps are left in the installed systems that could allow the soil to enter the core.

12.7 Once unwrapped, the systems must be installed and backfilled within four weeks to prevent damage from ultra-violet exposure.

13 Procedure

Vertical applications (see Figure 2)

Figure 2 Typical Fildrain Type 5, 6 or 7 trench installations



13.1 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.

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

13.3 When unrolled, the upper side of the Type 5 system is the permeable side intended for the water flow (ie the dimple side placed against the capping/sub-base).

13.4 Type 5, 6 and 7 systems must be laid into the trench and held in a vertical position, so that the top edges of the systems are level with the top of the sub-base. Care must be taken to avoid damaging the trench excavation. Usually, the system is placed against the capping layer side of the trench.

13.5 For the Type 5 system, special fittings are available for joining rolls and outfalls.

13.6 For the Type 6 system, where Fildrain sleeves join, they must be sealed together with ABG 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 pipe is installed at the base and connected to a suitable outfall.

13.7 The appropriate backfill (see section 1.5) is placed in layers of 300 mm over the trench and, if filter stone is to be used at the surface, this should be to a depth of 300 mm. At least 100 mm of the system should project into the course of filter stone.

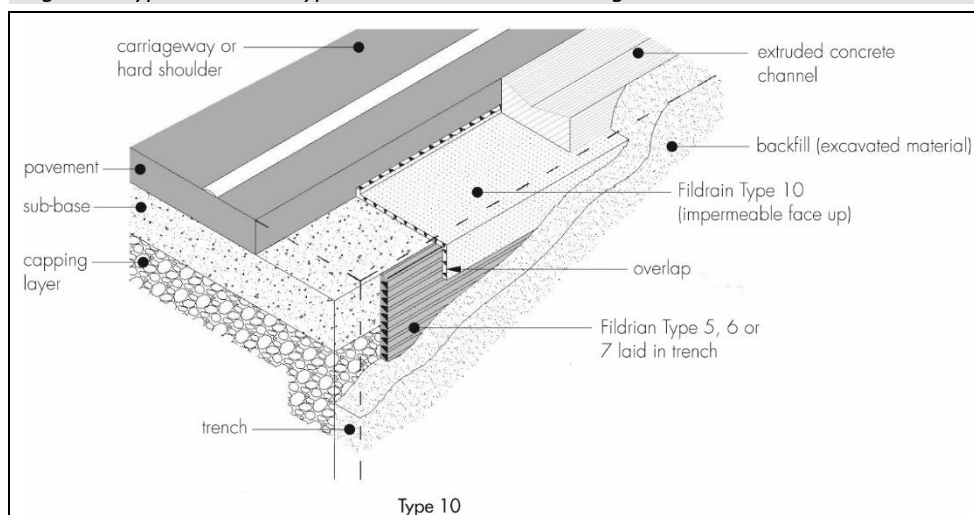
13.8 To accommodate crossing pipes, gully connections or ducts, special fittings may be used to maintain the longitudinal flow capacity. For more information, the advice of the Certificate holder should be sought.

Horizontal application (see Figure 3)

13.9 The Type 10 system is unrolled into position with the black side (ie impermeable side) facing upward to accept the concrete topping. One edge must extend 50 mm into the carriageway beyond the line of the channel edge to overlap 200 mm onto vertical Fildrain (Type 5, 6 or 7 system). In windy conditions, the laid material may need to be held down using ballast blocks or sandbags.

13.10 On straight alignments, the rolls are laid out end to end but on curving alignments the rolls are cut to length on site with each length positioned to the horizontal curve. The lengths are stapled together to secure the material together and joints sealed using ABG Jointing Tape.

Figure 3 Typical Fildrain Type 10 under channel drainage installation



14 Repair

14.1 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 ABG Jointing Tape.

14.2 If the core is damaged, this should be cut out and a new section of the geocomposite must be placed over the damaged area, overlapped by a minimum of 150 mm to prevent soil ingress and taped securely in position using ABG Jointing Tape.

Technical Investigations

15 Tests

15.1 Test data on the geotextiles were assessed to determine:

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

15.2 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.

15.3 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.

16 Investigations

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

16.2 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 (withdrawn Standar)*

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

BS EN 13252 : 2016 *Geotextiles and geotextile-related products — Characteristics required for use in drainage systems*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN ISO 10319 : 2015 *Geosynthetics — Wide-width tensile test*

BS EN ISO 11058 : 2019 *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, CG 501 – Design of highway drainage systems

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*

17 Conditions

17.1 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.

17.2 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.

17.3 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.

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

17.5 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.

17.6 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.