

ABG GEOCOMPOSITE HIGHWAY DRAINAGE SYSTEMS

ABG DECKDRAIN 400S, 700S, 1200S AND 2500S 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 Deckdrain 400S, 700S, 1200S and 2500S Systems, a range of geocomposite systems comprising an outer geotextile material and a high-density polyethylene (HDPE) cusped core, for use in vertical applications such as behind retaining walls and bridge abutments and for the collection and/or disposal of sub-surface water from foundations.

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, sub-clause 514.4 (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.

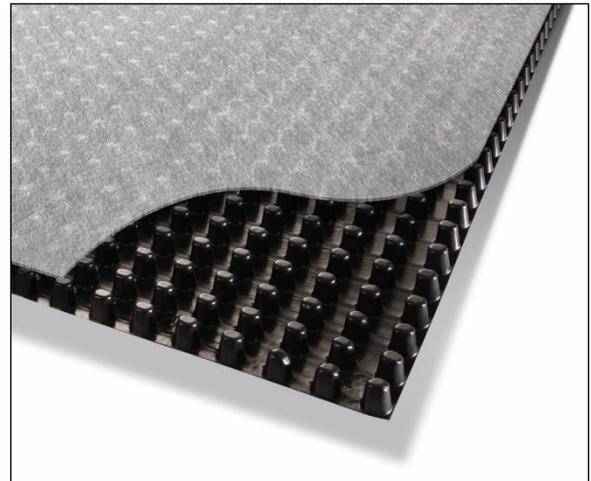
On behalf of the British Board of Agrément

Date of Second issue: 5 March 2021

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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
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Requirements

In the opinion of the BBA, ABG Deckdrain 400S, 700S, 1200S and 2500S 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 section: *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

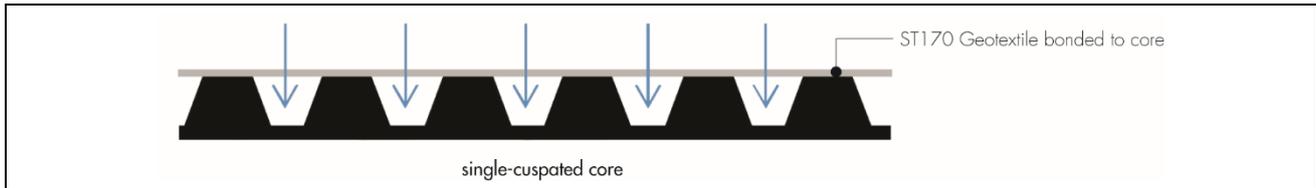
1 Description

1.1 ABG Deckdrain 400S, 700S, 1200S and 2500S Systems comprise a range of geocomposites (see Table 1) consisting of a single cusped HDPE core with a non-woven geotextile filter bonded to one side (see Figure 1). The HDPE cusped core component allows the water to flow in all directions.

Table 1 Deckdrain range

Type	Description
400S	A 0.4 mm thick, 420 g·m ⁻² membrane formed into a single cusped (4 mm dimple height) HDPE core with ST170 geotextile bonded to the dimpled side of the core only
700S	A 0.7 mm thick, 700 g·m ⁻² membrane formed into a single cusped (7 mm dimple height) HDPE core with ST170 geotextile bonded to the dimpled side of the core only
1200S	A 0.9 mm thick 900 g·m ⁻² membrane incorporating a single cusped (12 mm dimple height) HDPE core with ST170 geotextile bonded to the dimpled side of the core only
2500S	A 1.5 mm thick 1500 g·m ⁻² membrane incorporating a single cusped (25 mm dimple height) HDPE core with ST170 geotextile bonded to the dimpled side of the core only

Figure 1 Cross-section of geocomposite



1.2 The geocomposite is available in standard widths⁽¹⁾ of 1.1 and 2.2 m, and lengths of 50 and 25 m respectively.

(1) Other sizes 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 ABG Deckdrain 400S, 700S, 1200S and 2500S Systems are outside the scope of this Certificate. However, the specification of such pipes is described as: pipes to be perforated or porous or slit 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 systems 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
- ABG Jointing Tape — for sealing joints and edges of geotextile material together
- ABG Stikpins — providing temporary support on vertical applications
- angle profile.

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 cusped core component is extruded from HDPE.

2.3 During manufacture, the single cusped core and the geotextile are bonded using hot-melt adhesive to 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 including 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 system 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 Deckdrain 400S, 700S, 1200S and 2500S Systems.

Design Considerations

4 General

4.1 ABG Deckdrain 400S, 700S, 1200S and 2500S 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 behind retaining walls and bridge abutments for the conveyance of infiltration water from surrounding substrate.

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 geotextile 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 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 2 of this Certificate.

Table 2 Geotextile nominal characteristics

Tests	Test Standard	Declared values (tolerance)	Requirement ⁽¹⁾ (MCHW, Volume 1, clause 514)
Tensile strength ($\text{kN}\cdot\text{m}^{-1}$)	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
Mean 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 ($\text{l}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$)	BS EN ISO 11058	75 (-15)	(see note 1)
Breakthrough head (mm)	BS 6903-3 ⁽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 Deckdrain 400S, 700S, 1200S and 2500S 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 3 of this Certificate.

Table 3 Geocomposite nominal characteristics

Test	Test Standards	System type			
		400S	700S	1200S	2500S
Tensile strength (kN·m ⁻¹)	BS EN ISO 10319				
MD		14.4 (-1.4)	14.4 (-1.4)	14.4 (-1.4)	14.4 (-1.4)
CD		15.5 (-1.5)	15.5 (-1.5)	15.5 (-1.5)	15.5 (-1.5)
Elongation (%)	BS EN ISO 10319				
MD		65 (± 13)	65 (± 13) 70	65 (± 13) 70	65 (± 13) 70
CD		70 (± 14)	(± 14)	(± 14)	(± 14)
Static Puncture Resistance (kN)	BS EN ISO 12236	2.60 (-0.5)	2.85 (-0.6)	2.75 (-0.6)	3.6 (-0.7)
In-plane flow (l·m ⁻¹ ·s ⁻¹)	BS EN ISO 12958				
At 20 kPa, Hydraulic gradient 0.1		0.20	0.67	1.25	3.7
At 20 kPa, Hydraulic gradient 1.0		0.90	2.40	4.25	11.5
At 50 kPa, Hydraulic gradient 0.1		0.18			3.4
At 50 kPa, Hydraulic gradient 1.0		0.65			10.0
At 100 kPa, Hydraulic gradient 0.1		0.15	0.53	0.85	3.0
At 100 kPa, Hydraulic gradient 1.0		0.70	1.95	3.20	8.5
At 200 kPa, Hydraulic gradient 0.1		0.12	0.57	0.45	1.75
At 200 kPa, Hydraulic gradient 1.0		0.55	1.45	1.75	5.0
Long-term in-plane flow ⁽¹⁾ applicable where the maximum normal to the plane load 100 kPa at hydraulic gradient 1.0 (0.1)		0.43 (0.10)	1.45 (0.37)	1.75 (0.57)	5.0 (1.75)
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. 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 systems should be jointed into pipe systems or chambers for inflow and outflow purposes.

9 Maintenance

9.1 Pipe systems connected to ABG Deckdrain 400S, 700S, 1200S and 2500S Systems require regular clearing/cleaning of the pipe by rodding or jetting.

9.2 ABG Deckdrain geocomposite is confined within a soil structure and therefore, does not require 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 (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 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 system contains core and geotextile made of HDPE and polypropylene respectively, which can be recycled.

12 General

12.1 The ABG Deckdrain 400S, 700S, 1200S and 2500S Systems must be installed in accordance with the Certificate holder's instructions.

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

12.3 The systems can be cut to size using a sharp knife.

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

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

13 Procedure

13.1 The site in which the systems are to be installed must be sufficiently excavated and prepared.

13.2 A perforated pipe is normally used at the base of the wall to collect water from the geocomposite and must be placed as closely as possible and surrounded with filter stone.

13.3 The systems can either be unrolled across the wall structure with the flapped edge at the bottom, or lengthways down the wall structure and cut to length as required. The flat face of the core must be secured against the structure and the geotextile faced cusped side towards the backfill to ensure efficient water filtration across the geotextile.

13.4 Where the systems are laid against vertical structures in the vertical plane, they can be supported at the top of the wall with ballast (such as sand bags) and at the bottom with filter stone, prior to backfilling. In all situations, the geocomposite can also be supported temporarily using stick pins. Alternatively, pin shot fix or plug drill and fix plugs provide a permanent method of securing the geocomposite to the wall.

13.5 On wider or higher areas of walls, additional lengths of the systems will be required. Jointing is carried out by butting the cores together ensuring the 100 mm geotextile overlapping is located over the joint. The lapped joint is then sealed and held in place using a continuous run of ABG Jointing Tape. Subsequent rows of geotextile can be installed in the same manner with the final row overlapped using a separate geotextile piece to seal the complete installation.

13.6 All cut edges must be sealed using ABG Jointing Tape. It is essential that during the lapping process no gaps are left in the installed system that could allow the soil to enter the core.

13.7 At corners, the systems must be cut and re-sealed. For all ABG Deckdrain systems, the use of an angle profile will ensure a secure installation.

Backfilling

13.8 Prior to backfilling, the installed systems must be inspected to ensure they have been securely fitted into position and that all joints are completely sealed.

13.9 Backfill material must not contain sharp or large stones that could tear or damage the geocomposite during compaction and is normally SHW class 6 or 7 backfill material. Care must be taken to avoid damaging the geocomposite during the backfilling process.

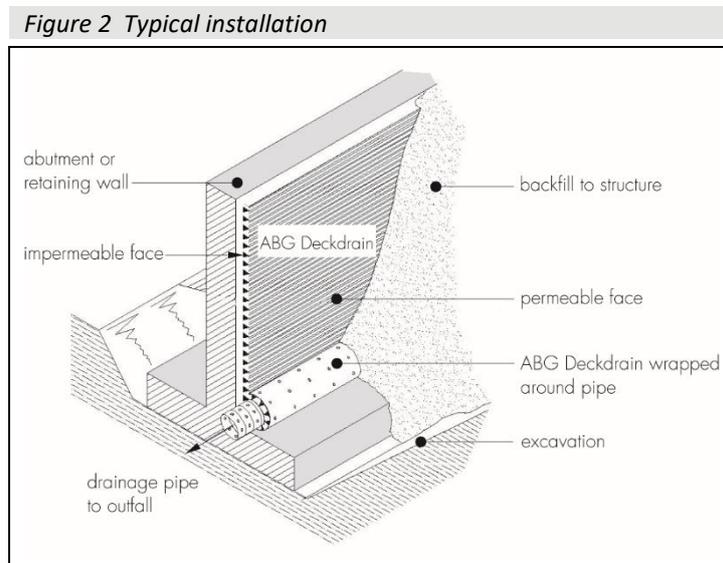
13.10 The permeability of the backfill material, when compacted, should be at least equal to that of the native soil.

13.11 Where the systems are laid as transverse strips across a wall, backfilling is brought up progressively in layers as subsequent rolls are installed. Compacting equipment can be operated closer without causing damage to the systems.

13.12 Where the systems are laid vertically in upright lengths and adequately secured (see section 12.4), backfilling can proceed in one operation.

Weep holes

13.13 Where drainage discharge is required via weep holes through a wall, holes should be cut in the core of the system to align with the weep holes. The geotextile should not be cut; if cut it should be patched in accordance with section 14.1.



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*

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

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

BS EN ISO 9001 : 2018 *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.