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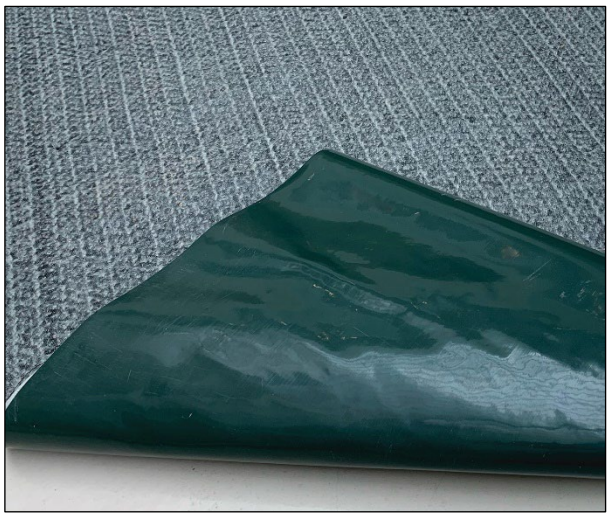
Agrément Certificate
86/1650
Product Sheet 10

BENTONITE WATERPROOFING SYSTEM FOR STRUCTURES

VOLTEX GB-500

This Agrément Certificate Product Sheet(1) relates to VOLTEX GB-500, an active core geotextile membrane with polythene EVOH membrane liner, for use as a damp-proof and waterproofing membrane and to protect the building from the ingress of radon, methane and carbon dioxide from the ground.

(1) Hereinafter referred to as 'Certificate'.



CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

Resistance to water and water vapour — the membrane provides an effective barrier to the passage of liquid water and water vapour from the ground (see section 6).

Resistance to underground gases — the membrane is capable of restricting the ingress of radon, methane and carbon dioxide into a building (see section 7).

Resistance to puncture — the membrane has a high resistance to puncture and over a smooth or blinded surface will not be damaged by foot or site traffic (see section 8).

Durability — under normal service conditions, the membrane will remain effective against the ingress of water and water vapour and will restrict the ingress of radon, methane and carbon dioxide for the lifetime of the flooring construction in which it is installed (see section 11).

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

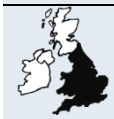
On behalf of the British Board of Agrément

Date of First issue: 11 November 2022

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, VOLTEX GB-500, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



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

Requirement:	**C1(2)**	**Site preparation and resistance to contaminants**
Comment:		When properly installed in a correctly designed structure, the membrane forms an effective barrier to radon, and can contribute to satisfying this Requirement. See sections 7.1 and 7.2 of this Certificate.
Requirement:	**C2(a)**	**Resistance to moisture**
Comment:		When properly installed in a correctly designed structure, the membrane forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Requirement. See sections 6.1 and 6.2 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The membrane is of an acceptable material. See section 11.1 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)**	**Fitness and durability of materials and workmanship**
Comment:		The membrane can contribute to a construction satisfying this Regulation. See section 11.1 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.1	Site preparation – harmful and dangerous substances
Standard:	3.2	Site preparation – protection from radon gas
Comment:		The membrane will enable a floor to satisfy the requirements of these Standards, with reference to clauses 3.1.2(1)(2), 3.1.6(1)(2), 3.1.7(1)(2), 3.1.8(1)(2), 3.2.1(2) and 3.2.2(1)(2). See sections 7.1 and 7.2 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		When properly installed in a correctly designed structure, the membrane forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Standard, with reference to clauses 3.4.2(1)(2), 3.4.4(1)(2) and 3.4.6(1)(2). See sections 6.1 and 6.2 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The membrane can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		Comments in relation to the product under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1(1)(2) and Schedule 6(1)(2).

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23(1)(i)**	**Fitness of materials and workmanship**
Comment:	**(iii)(b)(i)**	The membrane is acceptable. See section 11.1 and the *Installation* part of this Certificate.
Regulation:	**26**	**Site preparation and resistance to contaminants**
Comment:		When properly installed in a correctly designed structure, the membrane forms an effective barrier to radon, enabling compliance with this Regulation. See sections 7.1 and 7.2 of this Certificate.
Regulation:	**28**	**Resistance to moisture and weather**
Comment:		When properly installed in a correctly designed structure, the membrane forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Regulation. See sections 6.1 and 6.2 of this Certificate.

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

NHBC Standards 2022

In the opinion of the BBA, VOLTEX GB-500, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapters 4.1 *Land quality – managing ground conditions*, 5.1 *Substructure and ground-bearing floors* and 5.4 *Waterproofing of basements and other below ground structures*.

Where Grade 3 protection is required, and the below ground wall retains more than 600 mm (measured from the top of the retained ground to the lowest finished floor level), the membrane should be used in combination with either a Type B or C waterproofing protection.

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard BS EN 13491 : 2004.

Technical Specification

1 Description

1.1 VOLTEX GB-500 is a composite 500 micron thick, multilayer, polyethylene membrane with integral EVOH layer with integrated active core geotextile. The joints can be heat welded or taped to provide resistance to methane, carbon dioxide and radon.

1.2 The membrane has the following nominal characteristics:

Thickness (mm)	5 typical
Roll length (m)	10
Roll width (m)	1.66
Mass per unit area ($g \cdot m^{-2}$)	3200

Tensile strength (N·50 mm^{-1})	
Machine direction	550
Cross direction	400
Nail tear resistance (N)	
Machine direction	300
Cross direction	300.

1.3 Ancillary products for use with the membrane include:

- DS-80 tape — for securing laps and joints
- SS-80 tape — for use at joints and laps.

1.4 The Certificate holder recommends the following ancillary items for use with the product, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- PROTECTION FLEECE GB — for well compacted ground or gravel substrates, VOLTEX GB-500 is installed over PROTECTION FLEECE GB
- BLACKSEAL TG — trowel-grade mastic for detailing
- SS-400 FLASHING - gas-proof single side adhesive flashing membrane.

2 Manufacture

2.1 The membrane is manufactured in a controlled continuous process in which partially hydrated bentonite granules are uniformly distributed between woven and non-woven geotextiles. The two geotextiles are interlocked by a needle-punching process pushing fibres from the non-woven layer through and beyond the woven layer. This process links the geotextiles and contains and confines the bentonite.

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

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

2.3 The manufacturer's management system has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by Bureau Veritas (Certificate PL011888/P).

3 Delivery and site handling

3.1 Rolls are individually wrapped with stretch foil and bear a label with the product name.

3.2 The rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on VOLTEX GB-500.

Design Considerations

4 Use

4.1 VOLTEX GB-500 is satisfactory for use as a gas-resistant barrier to restrict the ingress of radon into buildings from naturally occurring sources. The membrane can also contribute to restricting the passage of methane and carbon dioxide (see section 7).

4.2 Buildings in areas of risk should be constructed in accordance with the recommendations of BRE Report BR 211 : 2015 and following the guidance set out in BS 8485 : 2015.

4.3 The membrane is also satisfactory for use as a damp-proof and waterproofing membrane for solid concrete floors and underground structures for internally or externally applied tanking below ground, in accordance with CP 102 : 1973 Section 3, BS 8000-0 : 2014, BS 8000-4 : 1989 and BS 8102 : 2022, provided it is fully supported and protected.

5 Practicability of installation

The membrane is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Resistance to water and water vapour

6.1 The membrane, including joints, provides an effective barrier to the passage of liquid moisture from the ground.

6.2 The membrane will comply with the minimum sheet thickness required by the documents supporting the national Building Regulations.

6.3 The membrane is impervious to water and provides a waterproof layer capable of accepting minor structural movements without damage.

7 Resistance to underground gases

7.1 The membrane will restrict the ingress of radon, methane and carbon dioxide into buildings from landfill and naturally occurring sources.

7.2 Measured gas permeability/diffusion values on an unjointed membrane are given in Table 1.

Table 1 Gas permeability of VOLTEX GB-500

Gas	Method	Result
Radon	K124/02/95	7.1×10^{-14} $m^2 \cdot s^{-1}$
Methane(1)	BS ISO 15105-1	≤ 0.1 $ml \cdot m^{-2} \cdot d^{-1}.atm^{-1}$
Carbon dioxide	BS ISO 15105-1	0.85 $ml \cdot m^{-2} \cdot d^{-1}.atm^{-1}$

(1) BS 8485 : 2015 requires that the methane transmission measured in accordance with BS ISO 15105-1 : 2007 for gas-resistant membranes is <40 $ml \cdot m^{-2} \cdot d^{-1}.atm^{-1}$.

7.3 In the opinion of the BBA, the membrane satisfies the criteria for as radon gas resistant membrane of BRE Report BR 211 : 2015.

8 Resistance to puncture

8.1 The membrane can be punctured by sharp objects, and care should be taken when handling building materials over the exposed surface.

8.2 Provided there are no sharp objects present on the membrane's surface prior to and during installation of the protective layer, the membrane will not be damaged by normal foot traffic.

9 Underfloor heating

There will be no adverse effect on the membrane from underfloor heating under normal service conditions. In other circumstances, the Certificate holder's advice should be sought.

10 Maintenance

As the membrane is confined under concrete and has suitable durability (see section 11), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 15).

11 Durability

11.1 The membrane will, under normal circumstances, remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane and carbon dioxide during the lifetime of the building.

11.2 Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane.

12 Reuse and recyclability

The membrane comprises polyethylene, which can be recycled.

Installation

13 General

13.1 VOLTEX GB-500 must be installed and fixed in accordance with this Certificate, the Certificate holder's instructions and the relevant clauses of BRE Report BR 211 : 2015 and BS 8485 : 2015. Additional guidance on the use of damp-proof membrane material is available in BS 8000-4 : 2014.

13.2 The membrane can be installed in all normal site conditions, including sub-zero temperatures and during heavy rainfall. Under wet conditions the exposed edges of a lap joint should be dry to allow welding or taping procedure.

14 Procedure

14.1 The membrane must only be applied to surfaces that have a smooth finish, ie they should be free from voids, projections and mortar deposits. Surfaces should be dry and free from dust and frost.

14.2 Concrete surfaces should be smooth, free from voids and sharp protrusions. Vertical surfaces of brickwork and blockwork must be dry and rendered to provide an even surface. Brickwork or blockwork not rendered must be flush pointed to give a smooth surface without sudden changes in level.

14.3 The membrane is rolled out with the geotextile side up to allow geotextile fibres to bond to concrete after the concrete is poured over the installed VOLTEX GB-500. All end and side overlaps should be a minimum of 150 mm and prepared in accordance with the Certificate holder's instructions.

14.4 When the membrane is laid below the concrete slab, it should be loose-laid to accommodate any small movements.

14.5 All surfaces must be dried thoroughly prior to the application of the tape. A strip of the DS-80 tape is unrolled over the membrane centred within the 150 mm overlap. Rolls should be installed in the longest practical lengths with butted roll ends lapped a minimum of 50 mm. A silicone roller is used to press along the entire DS-80 tape line to bond the tape to both VOLTEX GB-500 films. Taping is completed by installing SS-80 tape centred over the exposed top PE liner of VOLTEX GB-500 lap edge. Using silicone roller, press SS-80 tape to PE liner of VOLTEX GB-500. Alternatively, joints can be welded by folding back the geotextile edge and heat welding the PE/EVOH liner overlapped a minimum of 100 mm.

14.6 All service penetrations and direction changes should be properly detailed in accordance with the Certificate holder's instructions using BLACKSEAL TG. Service ducts should be vented to prevent the possibility of gas accumulating in confined spaces.

14.7 The continuity of the gas protection must extend over the footprint of the building and the gas membrane must be sealed to a gas-resistant damp-proof course.

14.8 The membrane should be covered by a screed or other protective layer as soon as possible after installation. If blockwork protection is used, care must be taken to avoid damage to the membrane during construction.

14.9 When used in vertical applications the membrane is mechanically fixed in accordance with the Certificate holder's instructions. For backfilled walls the evacuated area should be backfilled and compacted promptly.

15 Repair

Any damage to the membrane must be repaired using a patch of the membrane, and laps sealed with double-sided tape and secured with the SS-80 tape. All patched areas must extend a minimum of 100 mm from the damaged area. If required by the local authority, repair work should be confirmed by an independent validation report, as all gas membrane installations should be subject to third-party validation, in accordance with BS 8485 : 2015.

Technical Investigations

16 Tests

Tests were conducted and the results assessed to determine:

- resistance to electrolytes
- resistance to rainfall (natural exposure)
- resistance to rainfall (cyclic water spray with simulated traffic)
- bond strength between VOLTEX GB-500 and poured concrete
- stability of bentonite granules within the membrane during normal site handling
- hydraulic conductivity
- low-temperature flexibility
- hydrostatic pressure
- tensile strength
- puncture resistance
- water vapour transmission.

17 Investigations

17.1 An evaluation was made of the results of the test data regarding permeability of radon, methane and carbon dioxide.

17.2 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.

Bibliography

BRE Report BR 211 : 2015 *Radon : Guidance on protective measures for new buildings*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*
BS 8000-4 : 2014 *Workmanship on building sites — Code of practice for waterproofing*

BS 8102 : 2022 *Protection of below ground structures against water ingress. Code of practice*

BS 8485 : 2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*

BS EN 13491:2018 *Geosynthetic barriers. Characteristics required for use in the construction of tunnels and associated underground structures*
BS ISO 15105-1 : 2007 *Plastics – Film and Sheeting – Determination of gas transmission rate – Part 1: Differential Pressure methods.*

ČSN EN ISO 9001 : 2016 *Quality management systems — Requirements*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

K124/02-95 *Radon diffusion coefficient by Czech Technical University to test number 124-11 – Measurement of radon coefficient*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.