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Agrément Certificate
86/1650
Product Sheet 1

VOLCLAY WATERPROOFING SYSTEM FOR STRUCTURES

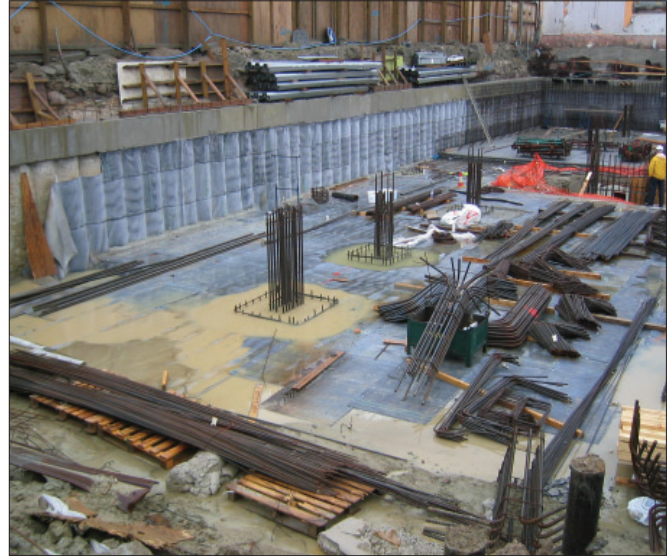
VOLTEX

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Voltex, for use in waterproofing and damp-proofing underground reinforced concrete structures.

AGRÉMENT 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 system provides an effective barrier to the passage of liquid water and water vapour from the ground (see section 5).

Resistance to puncturing — the membrane is resistant to damage and has the ability to self-heal if punctured (see section 6).

Durability — when fully protected, the system provides an effective barrier to the transmission of water and water vapour for the life of the building in which it is incorporated (see section 11).

The BBA has awarded this Agrément Certificate to the company named above for the system described herein. The system 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

Simon Wroe
Head of Approvals — Materials

Greg Cooper
Chief Executive

Date of Second issue: 14 April 2010

Originally certificated on 30 June 1997

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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Regulations

In the opinion of the BBA, Voltex, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2000 (as amended) (England and Wales)

| | | |
|--------------|--------------|---|
| Requirement: | A1 | Loading |
| Comment: | | When adequately confined, the system contributes to satisfying this Requirement. See section 8 of this Certificate. |
| Requirement: | C2(a) | Resistance to moisture |
| Comment: | | The system is an effective barrier to water and water vapour. See section 5 of this Certificate. |
| Requirement: | Regulation 7 | Materials and workmanship |
| Comment: | | The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate. |



The Building (Scotland) Regulations 2004 (as amended)

| | | |
|-------------|-----------|---|
| Regulation: | 8(1)(2) | Fitness and durability of materials and workmanship |
| Comment: | | The use of the system satisfies the requirements of this Regulation. See sections 10 and 11 and the <i>Installation</i> part of this Certificate. |
| Regulation: | 9 | Building standards – construction |
| Standard: | 1.1(a)(b) | Structure |
| Comment: | | The application of the system will not adversely affect the building's ability to transmit loadings, with reference to clauses 1.1.1 ⁽¹⁾⁽²⁾ , 1.1.2 ⁽¹⁾⁽²⁾ , 1.1.3 ⁽¹⁾⁽²⁾ and 1.1.4 ⁽¹⁾⁽²⁾ . See section 8 of this Certificate. |
| Standard: | 3.4 | Moisture from the ground |
| Comment: | | The system is an effective barrier to liquid water and water vapour, with reference to clauses 3.4.1 ⁽¹⁾⁽²⁾ , 3.4.2 ⁽¹⁾⁽²⁾ , 3.4.5 ⁽¹⁾⁽²⁾ , 3.4.6 ⁽¹⁾⁽²⁾ and 3.4.7 ⁽¹⁾⁽²⁾ respectively. See section 5 of this Certificate. |
| Regulation: | 12 | Building standards – conversions |
| Comment: | | All comments given for this system under Regulation 9, 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) 2000 (as amended)

| | | |
|-------------|-------|---|
| Regulation: | B2 | Fitness of materials and workmanship |
| Comment: | | The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate. |
| Regulation: | B3(2) | Suitability of certain materials |
| Comment: | | The system does not normally require maintenance. See section 10 of this Certificate. |
| Regulation: | C4(b) | Resistance to ground moisture and weather |
| Comment: | | The system is an effective barrier to liquid water and water vapour. See section 5 of this Certificate. |
| Regulation: | D1 | Stability |
| Comment: | | When adequately confined, the system contributes to satisfying this Requirement. See section 8 of this Certificate. |

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 obligation under these Regulations.

See sections: 2 *Delivery and site handling* (2.1 to 2.4) and 4 *Practicability of installation* (4.3).

Non-regulatory Information

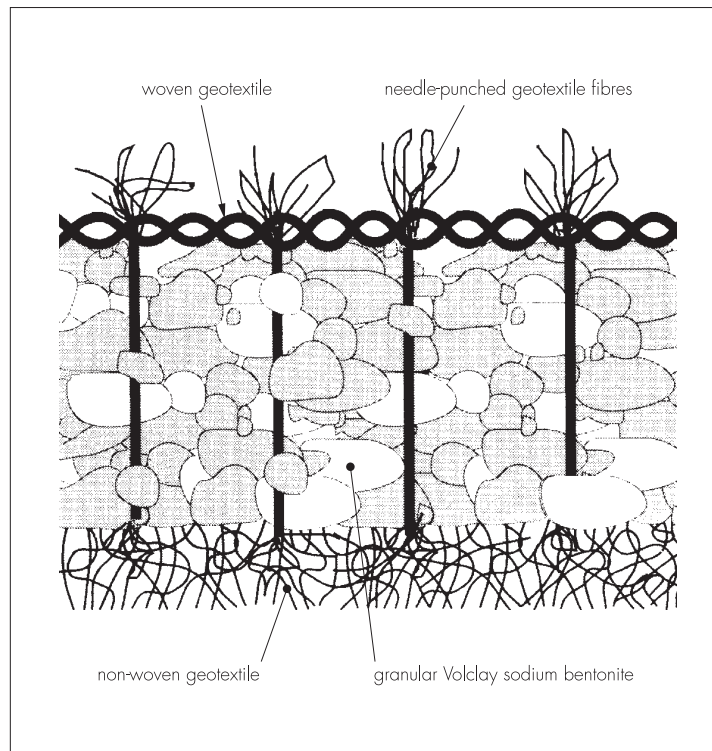
NHBC Standards 2008

NHBC accepts the use of Voltex, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 5.1 *Substructure and ground bearing floors*.

1 Description

1.1 Voltex is a waterproofing membrane, approximately 6.4 mm thick, consisting of two polypropylene geotextiles, a woven fabric and non-woven fabric, enclosing granular sodium bentonite at a minimum weight of $4.88 \text{ kg}\cdot\text{m}^{-2}$. 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 (see Figure 1).

Figure 1 Cross-section through Voltex



1.2 Voltex is manufactured in a controlled continuous process in which partially-hydrated bentonite granules are uniformly distributed between woven and non-woven geotextiles. A needle-punching process is applied, linking the geotextiles together and securing the bentonite granules within the membrane.

1.3 Other components used with Voltex include:

- Waterstop RX — a black-extruded strip of sodium bentonite/butyl rubber backed with a silicone release paper and used as a water bar in construction joints and in conjunction with Voltex
- Bentoseal — a trowel-grade sodium bentonite compound used for detailing work, eg around penetrations
- Voltex Granules — a loose form of granular sodium bentonite used to prevent the seepage of water from backfill material or mixed with water and used as a paste for sealing.

1.4 Quality control is exercised over raw materials, during manufacture and on the final products.

2 Delivery and site handling

2.1 Voltex is supplied in 1.1 m wide by 5.0 m long rolls on pallets of 35 rolls, stacked horizontally and shrink wrapped. Each roll weighs between 33 kg to 38.5 kg⁽¹⁾.

2.2 Coils of Waterstop RX, 25 mm by 19 mm are packaged in cartons. Each carton contains six coils of 5 m length⁽¹⁾, each box weighs 25 kg.

2.3 Bentoseal is supplied in 14.25 litre tubs⁽¹⁾, each tub weighs 18 kg.

2.4 Voltex Granules are supplied in 20 kg bags.

2.5 The product and components must be stored in dry conditions, under cover and away from the possibility of damage or premature contact with water. Waterstop RX should also be stored away from direct heat.

(1) Weights and sizes are subject to change, users are advised to consult current manufacturer's literature.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Voltex.

3 Use

3.1 Voltex is satisfactory for use in waterproofing and damp-proofing underground reinforced concrete structures, and is satisfactory for Type A reinforced concrete basement construction grades 2 and 3 as defined in Table 2 of BS 8102 : 2009.

3.2 The membrane stops the passage of water between the membrane and the concrete structure to which it is fixed. The membrane must be adequately confined to ensure a watertight seal is achieved in service.

3.3 Waterstop RX is satisfactory for use as a water bar in reinforced concrete construction joints, on Type B constructions as defined in BS 8102 : 2009. It is also used as an accessory in structures waterproofed with Voltex.

3.4 Waterstop RX is not designed for use in movement joints.

3.5 The product and components must never remain permanently exposed.

4 Practicability of installation

4.1 The system should only be installed by contractors who have been trained and approved by the Certificate holder.

4.2 The membrane is easy to handle and can be cut using a sharp knife.

4.3 Voltex may be applied under most normal site conditions, including subzero temperatures and during heavy rainfall. Under wet conditions the system can withstand light construction traffic without significant extrusion of the bentonite. Slight losses at the exposed edges of a lap joint will not impair the watertightness, provided the conditions given in section 12.3 are met. Any bentonite that extrudes from the membrane will become slippery when wet which can have an adverse effect on site safety.

4.4 Waterstop RX should not be applied during heavy rainfall or where there is free-standing water.

5 Resistance to water and water vapour



The system provides an effective barrier to the passage of liquid water and water vapour from the ground.

6 Resistance to puncturing

The polypropylene geotextiles containing the bentonite are robust and resistant to normal site activities. The dropping of heavy articles will normally have no damaging effect on the membrane. Any accidental cuts will self heal when the membrane is hydrated following correct installation, provided that bentonite material is not lost from the edges of the cut. If it is thought that bentonite material has been lost, Bentoseal can be applied over the damaged area or, if the damage is more extensive, the membrane should be replaced with fresh Voltex.

7 Chemical resistance

7.1 The gelling of sodium bentonite is adversely affected by the presence of electrolytes (particularly trivalent ions) and may also be affected by the presence of soluble cations such as those found in chalk or lime soils. In such cases advice should be sought from the Certificate holder.

7.2 The membrane is not affected by organic contaminants.

7.3 In chemically-contaminated areas the membrane is hydrated by deliberate soaking with mains water and leaving for two to three hours before placing the backfill or pouring the concrete.

8 Resistance to loading



Provided the membrane is adequately confined, properly hydrated and not subject to point loading, an installation beneath a foundation slab will transmit dead and imposed loads to the ground safely and without excessive deformation. In situations where point loading is anticipated the Certificate holder's advice should be sought.

9 Adhesion

When concrete is cast against the membrane the free ends of the needle-punched fibres become embedded in the concrete, creating a permanent bond between the concrete and membrane.

10 Maintenance



As the system is confined by the concrete and has suitable durability (see section 11), maintenance is not required.

11 Durability



A fully-protected Voltex membrane, when installed with the appropriate ancillary products, will provide an effective barrier to water and water vapour for the life of the building in which it is incorporated.

12 General

12.1 Voltex is installed with the woven geotextile in contact with the concrete surface to be waterproofed.

12.2 The system bonds to poured concrete to form an integral seal to prevent water migration and requires no priming, fillets or protection boards.

12.3 The formation of a continuous waterproof barrier is achieved using lap joints with a minimum overlap of 100 mm between adjoining edges and roll ends. It is recommended to stagger laps at a minimum of 300 mm to avoid four sheets overlapping in one location. All lap joints are secured by either stapling laps together, or fixing them to the base with fasteners.

12.4 Sealing around protrusions through the membrane, eg at such details as piles and service pipes, is accomplished by cutting a hole in the membrane and fitting over the protrusion, bedding the membrane onto either Bentoseal or a paste made up, in situ, by mixing Voltex Granules with water.

13 Procedure

Voltex

Vertical surfaces

13.1 Voltex can be installed either against the outside of existing walls, or preferably applied to the inside face of shuttering to be subsequently filled with poured concrete.

13.2 On cast concrete substrates, the product is aligned horizontally (although vertical alignment is possible) and fixed through the overlaps using proprietary washer-headed fasteners. When fixed to the inside face of shuttering, the product is aligned vertically (although horizontal alignment is possible) ensuring that all laps face down, away from the flow of the poured concrete. The overlaps are secured to the shuttering using nails or staples. A minimum overlap of 100 mm should be achieved between the vertical membrane and the membrane protruding from the base slab.

13.3 Backfilling should be carried out as soon as possible after placing the Voltex. Backfill material should be free from builders' debris and angular aggregate, and should be compacted to a minimum 85% Modified Proctor.

13.4 After backfilling, the application of the membrane is continued. The membrane should not be installed above the intended final ground level and Voltex is terminated on the concrete structure at ground level.

Horizontal surfaces

13.5 Surfaces to be waterproofed should be reasonably smooth and may be damp (but free from standing water). Earth and sand substrates should be compacted to a minimum 85% Modified Proctor.

13.6 At the edge of the slab the membrane should extend vertically a minimum of 300 mm above the top surface to form an overlap with the vertical membrane.

13.7 Overlaps should be stapled or nailed to prevent displacement during concrete placement.

13.8 The concrete slab to be poured should have a minimum thickness of 150 mm.

Waterstop RX

Surface preparation

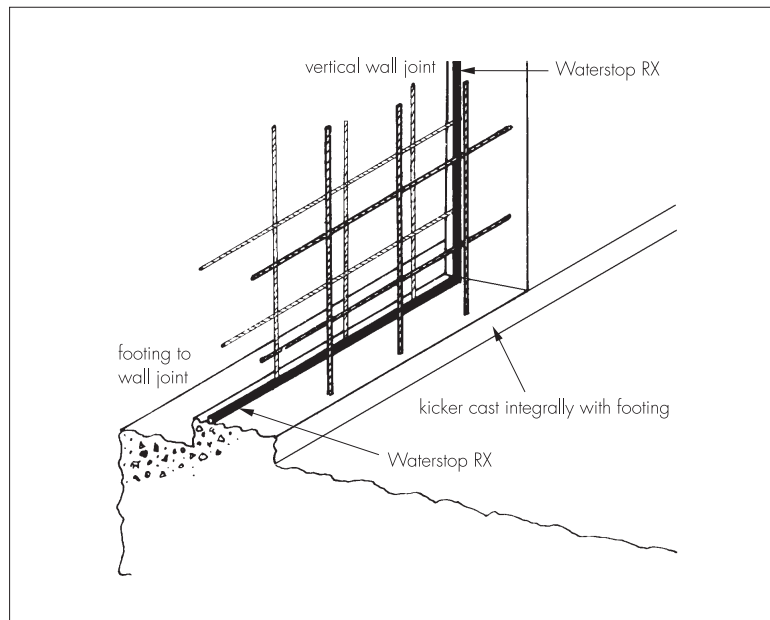
13.9 Joint surfaces should be clean, dry and free from cavities and spalling. Any irregularities in the surface do not normally need to be filled. If required, these can be filled with a suitable strength cement grout or mortar while the concrete is still green, and made smooth.

13.10 Waterstop RX is positioned in the centre of the reinforced concrete construction joint, ensuring that a minimum of 75 mm concrete cover is provided to all sides of the product.

Installation

13.11 A strip of Waterstop RX is uncoiled and placed in position leaving the release paper temporarily intact so it can be pushed firmly in place into any undulations in the concrete surface (see Figure 2). Once sufficient product is positioned, the release paper is removed.

Figure 2 Waterstop RX installation details



13.12 Continuity of consecutive strips is maintained by butt jointing.

13.13 To prevent movement during concrete placement, the strips of Waterstop RX are covered by placing Revofix mesh over the product. The successive lengths of mesh are overlapped and fixed using nails at each overlap and at a spacing of approximately 300 mm in between.

Swelling

13.14 If the material exhibits considerable swelling prior to confinement in the joint, it must be replaced with new material.

Concrete casting

13.15 Casting of retaining walls and floor slabs is carried out immediately after fixing Waterstop RX in position.

Technical Investigations

14 Tests

Voltex

14.1 A trial installation was built and observations were made of the ease of installation at corners, laps and around obstructions, and the rate and pattern of water penetration.

14.2 Tests were conducted to determine:

- resistance to electrolytes
- resistance to rainfall (natural exposure)
- resistance to rainfall (cyclic water spray with simulated traffic).

14.3 Tests were conducted (see Table 1) to determine:

- bond strength between Voltex and poured concrete
- stability of bentonite granules within the membrane during normal site handling.

Table 1 Service performance

| Test | Mean results | Method |
|--|----------------------|---------------------------------------|
| Bond strength (N-mm ⁻¹) | 4.4 | BS EN 28510-1 |
| Stability (%) | 1.75 | BBA test method |
| Hydraulic conductivity (cm-s ⁻¹) | 1 x 10 ⁻⁹ | ASTM D 5084 |
| Low-temperature flexibility (°C) | -29 | ASTM D 1970 |
| Hydrostatic pressure (kPa) | 690 | ASTM D 5385 |
| Tensile strength (N) | 329 | ASTM D 4595 |
| Puncture resistance (kg) | 61.3 | ASTM D 4833 |
| Water vapour transmission | zero transmission | University of Hertfordshire Procedure |

Waterstop RX

- characterisation
- resistance to hydrostatic pressure.

14.4 Observations were made of the ease of installation, in particular around obstructions.

15 Investigations

15.1 The manufacturing process was examined, and the raw material specifications and quality control procedures established.

15.2 An assessment was made of independent reports (with the results given in Table 1) relating to:

- hydraulic conductivity under water pressure
- low-temperature flexibility
- resistance to hydrostatic pressure
- mechanical properties of the geotextiles
- water vapour transmission through hydrated membrane.

15.3 Visits were made to sites in progress to assess the application properties of the system.

15.4 A survey of contractors was conducted to assess the practicability of application and the performance in use.

15.5 Existing data on the effectiveness and durability of natural (Wyoming) sodium bentonite as a waterproofing membrane were examined.

15.6 An assessment was made of the original data resulting in the issue of Certificate 83/1081.

Bibliography

BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*

BS EN 28510-1 : 1993 *Methods of test for adhesives — 90° peel test for a flexible-to-rigid assembly*

ASTM D 1970 : 2000 *Standard specification for self-adhering polymer modified bituminous sheet materials used as steep roofing underlayment for ice dam protection*

ASTM D 4595 : 1986 *Test method for tensile properties of geotextiles by the wide-width strip method*

ASTM D 4833 : 2000 *Test method for index puncture resistance of geotextiles, geomembranes and related products*

ASTM D 5084 : 2000 *Test method for hydraulic conductivity of saturated porous materials using a flexible wall permeameter*

ASTM D 5385 : 1993 *Test method for hydrostatic pressure resistance of waterproofing membranes*

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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 and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

16.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.