



BRANZ Appraised

Appraisal No.507 [2012]

BRANZ Appraisals

Technical Assessments of products
for building and construction

**BRANZ
APPRAISAL
No. 507 (2012)**

This Appraisal replaces BRANZ
Appraisal No. 507 (2006) issued
11 April 2006.

**VOLCLAY®
WATERPROOFING
SYSTEM**

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Product

1.1 The Volclay® Waterproofing System consists of products that are based on or use sodium bentonite as the principle waterproofing component. The system is used as a damp-proofing or waterproofing membrane below ground to protect basements and other underground structures against water penetration and water vapour transmission from the ground. The system is also used to waterproof plaza decks where they act as a roof to spaces below.

1.2 The system is based on two membranes, Voltex® and Swelltite®, with other accessory products completing the system.



Scope

2.1 The Volclay® Waterproofing System has been appraised for use as:

- an external waterproof tanking membrane to in-situ concrete, precast concrete and concrete masonry basement constructions subject to hydrostatic pressures of up to 2 bar (20 metres); and,
- a damp-proof membrane (DPM) to slab-on-ground and basement constructions; and,
- a waterproof membrane to plaza deck roof structures.

2.2 The Volclay® Waterproofing System must:

- be used adequately confined and protected against damage during construction and in service; and,
- not be used where ground water conductivity exceeds $2,500 \mu\text{S}/\text{cm}^{-1}$ except on advice from Allco Waterproofing Solutions (Refer Paragraphs 12.1 and 12.2).

2.3 All installations incorporating the Volclay® Waterproofing System must be the subject of specific design. Building designers are responsible for the incorporation of the system following the guidance details provided by Allco Waterproofing Solutions Ltd. The designer must provide design and installation detailing within the contract documents.

2.4 The Volclay® Waterproofing System must be installed by Allco Waterproofing Solutions Ltd Approved and Trained Applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the Volclay® Waterproofing System if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. The Volclay® Waterproofing System meets this requirement. See Paragraph 14.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.3. The Volclay® Waterproofing System meets this requirement. See Paragraphs 16.1 – 16.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Volclay® Waterproofing System meets this requirement and will not present a health hazard to people.

3.2 This is an Appraisal of the Volclay® Waterproofing System as an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

4.1 Components and accessories for the Volclay® Waterproofing System supplied by Allco Waterproofing Solutions Ltd are:

Voltex® Membrane

- Is a sheet membrane manufactured from two geotextile membranes which are needle punched together and contain 5.3 kg/m² of granular Sodium Bentonite. The membrane bonds to poured concrete to form an integral seal in the form of a tenacious bond to prevent water migration. The Voltex® membrane is supplied in 1.2 m wide x 4.5 m long and 1.5 m wide x 40 m long rolls.

Voltex® DS Membrane

- Is a sheet membrane manufactured from two geotextile membranes which are needle punched together and contain 5.3 kg/m² of granular Sodium Bentonite with an HDPE liner integrally bonded to one of the woven geotextile sides. The Voltex® DS membrane is a heavier duty form of the standard Voltex® membrane. The Voltex® DS membrane is supplied in 1.2 m wide x 4.5 m long and 1.5 m wide x 40 m long rolls.

Voltex® SWR Membrane

- Is a sheet membrane manufactured from two geotextile membranes which are needle punched together and contain 5.6 kg/m² of granular Sodium Bentonite. The membrane bonds to poured concrete to form an integral seal and is used in areas of higher water contamination (refer Paragraph 12.2). The Voltex® SWR membrane is supplied in 1.6 m wide x 40 m long rolls.

Swelltite® Membrane

- Is a sheet membrane made up of a blend of Sodium Bentonite and Butyl Rubber integrally bonded between geomembrane and a clear poly-siliconised release liner. It is used primarily for waterproofing foundation walls and plaza roof decks. The Swelltite® membrane is supplied in a 1 m wide x 11.6 m long roll.

Waterstop RX®

- Is a flexible strip waterstop manufactured from 75% Sodium Bentonite and 25% Butyl Rubber. It is primarily designed to stop water infiltration through both vertical and horizontal concrete construction joints, junctions between new and existing construction, irregular surfaces and around wall penetrations such as plumbing and electrical conduits. It is supplied in 10.2 m and 6.1 m long rolls.

WB-Adhesive™

- Is a non-flammable, latex, water based adhesive used to temporarily secure Waterstop RX® to concrete, metal, wood and PVC surfaces in vertical and horizontal applications. It is supplied in 1 US Gallon cans.

Bentoseal®

- Is a trowel grade sodium bentonite compound used as detailing mastic around penetrations and corner transitions. It is supplied in 3 US Gallon pails.

Aquadrain®

- Is a prefabricated drainage composite consisting of a heavy filter fabric adhered to a high strength plastic drainage core. It is supplied in 1.2 m wide x 15.6 m long rolls.

Waterstoppage

- Is granular Volclay® Bentonite used to detail areas that may require additional Volclay® protection. It is supplied in 25 kg bags.

Volclay® Seamtape

- Is a tacky butyl rubber tape used to seal Swelltite® overlap seams and membrane edges from inclement weather and construction debris. It is supplied in 12.5 m long rolls.

Volclay® M-2000 Liquid Flashing

- Is trowel grade bitumen modified polyurethane waterproofing mastic used to detail around penetrations, drains and at corner transitions. It is supplied in 7 litre tins.

Cetcoat™

- Is a two part polymer modified, cement based system used to detail ground level terminations. It is supplied in 18 kg units and is coloured grey.

Handling and Storage

5.1 Handling and storage of all materials whether on or off site is under the control of the Approved and Trained Applicator. Dry storage must be provided for all products and the membranes must be protected from UV radiation.

Technical Literature

6.1 The Technical Literature which provides guidance for designers is available from Allco Waterproofing Solutions Ltd.

Design Information

General

7.1 Every installation of the Volclay® Waterproofing System must be the subject of specific design. The designer is responsible for incorporating all design and installation details within the construction documentation based on the guidance documents provided by Allco Waterproofing Solutions Ltd.

Substrate Design

8.1 Substrate design must be in accordance with the NZBC to relevant standards, such as, AS/NZS 1170 for design loadings, NZS 3101 for insitu or precast concrete and NZS 4210, 4229 and 4230 for concrete masonry. All concrete block masonry walls will use open ended, depressed web units; i.e. 1561, 2016 or 2516 and be solid filled.

8.2 Soil substrates must be prepared in accordance with the requirements of Allco Waterproofing Solutions Ltd. In general a minimum requirement is well-levelled soils without voids and debris, compacted to a minimum of 85% Modified Proctor density for uniform support.

8.3 The substrate must be solid and have a surface finish that is smooth, clean and free from defects or irregularities which may damage the membrane.

8.4 The membrane must be confined to ensure a watertight seal is achieved and maintained. For specific installation details refer to the Technical Literature or Allco Waterproofing Solutions Ltd.

Control Joints

9.1 Where control or construction joints are formed in the substrate, Allco Waterproofing Solutions Ltd must be consulted regarding the use of the membranes over these joints.

Backfilling and Drainage

10.1 Voltex® and Swelltite® membranes must be confined and protected against damage. It is recommended that Aquadrain® is placed between the membrane and the granular fill.

10.2 Backfilling should be undertaken as soon as possible after placing the Volclay® Waterproofing System. Swelltite® must be backfilled the same day or whenever rain is imminent. Exposed laps must be protected from the weather and termination bars must be sealed with an approved sealant.

10.3 When being used as a DPM, the drainage will include a subsoil drainage system of at least a 100mm diameter pipe with openings to collect water, a geotextile fabric or other filter material to prevent silting of the pipe, have access for cleaning the subsoil pipe and be a minimum of 200mm below the floor level and sloped a minimum 1: 200 to an outlet.

10.4 For DPM or tanking application the backfill material must be free from builders debris and angular aggregate and must be compacted to 85% Modified Proctor density. Further advice regarding backfilling is available from Allco Waterproofing Solutions Ltd.

10.5 After backfilling in either situation, the installation is completed with a flashing in accordance with the details contained within the Technical Literature to protect the upper edge of the membrane.

Plaza Roof Deck

11.1 The Swelltite® membrane using Volclay® seamtapes to seal Swelltite® over the lap joints is laid directly over reinforced concrete plaza roof deck slabs. Aquadrain® drainage composite is then laid fabric side up over the Swelltite® membrane. The Swelltite® system is then covered and protected by a minimum of 75 mm thick concrete wearing slab or clay, concrete or stone pavers at least 50 mm thick laid on a bed of sand or cementitious grout. For system details contact Allco Waterproofing Solutions Ltd.

Chemical Resistance

12.1 Specialist advice should be sought where the groundwater conductivity exceeds 2,500 $\mu\text{S}/\text{cm}^{-1}$, the gelling of sodium bentonite is adversely affected by the presence of electrolytes (particularly divalent ions). Calcium bentonite may be formed in hard waters and has inferior gelling properties. Therefore if there are any concerns regarding ground water contamination (hardness or salinity), Allco Waterproofing Solutions Ltd offer conductivity tests on soil water, and from these tests make a recommendation on the appropriate system specification. One solution to contaminated area treatment is outlined in Paragraph 18.6. The membrane is not affected by organic contaminants.

12.2 Voltex® SWR membrane may provide a solution for conductivity up to a maximum of 10,000 $\mu\text{S}/\text{cm}^{-1}$ (1,000 mS m^{-1}), but use should be subject to verification of adequate performance when hydrated with a sample of the groundwater in question.

Resistance to Loading

13.1 Providing Voltex® membranes are adequately confined, properly hydrated, and not subject to point loading, an installation beneath a foundation slab will transmit dead and imposed loads safely without excessive deformation.

Durability

Serviceable Life

14.1 The Volclay® Waterproofing System when used as a tanking, waterproofing and DPM material is expected to have a serviceable life of at least 50 years provided it is installed and maintained in accordance with this Appraisal and is continually confined and protected from UV radiation and physical damage.

Maintenance

15.1 Annual inspections must be made of the membrane top edge seal and protection, the backfill capping, subsoil drainage system and plaza deck finishing ensuring all are functioning as originally designed.

15.2 If required, the drainage system must be cleared to remove any sediment or silt build-up. The slope of the backfill capping must be maintained at all times.

External Moisture

16.1 The Volclay® Waterproofing System, when installed in accordance with this Appraisal, will provide an effective barrier to liquid water and water vapour penetrating to the interior face of basement retaining walls, floors and plaza roof decks.

16.2 The membranes have a vapour flow resistance of not less than 90 MN s/g.

16.3 The system forms sealed joints and seals at penetrations.

16.4 Building designers must ensure junctions with other membranes, such as at the floor/wall junction, form a waterproof joint. Junctions with other membranes have not been assessed and are outside the scope of this Appraisal.

Installation Information

Installation Skill Level Requirement

17.1 Installation of the membranes must be completed by Allco Waterproofing Solutions Ltd Approved and Trained applicators that have a minimum 3 years waterproofing application experience.

17.2 Substrates must be completed by tradespersons skilled in the relevant construction method chosen and in accordance with instructions given within the Allco Waterproofing Solutions Ltd Technical Literature and this Appraisal.

System Installation

Substrate Preparation

18.1 All substrate surfaces must be checked to ensure they are clean, smooth and free from sharp edges, loose or foreign materials, oil, grease or other deleterious material that may damage the waterproofing membrane. Horizontal surfaces must be free from standing water.

Membrane Installation

18.2 Voltex® is easy to handle and can be cut using a craft knife. It is installed with the darker coloured face in direct contact with the substrate to be waterproofed. Swelltite® is installed with the sodium bentonite compound in direct contact with the substrate to be waterproofed. In the case of Swelltite®, sodium bentonite is exposed by removing the clear siliconized release sheet and side laps overlapped by a minimum of 50 mm and ends of sheets a minimum of 300 mm. Internal corners must be reinforced with an 18 mm thick bead of Bentoseal.

18.3 Sealing around penetrations through the membrane, such as pile caps, service pipes and wall penetrations is performed by cutting a hole in the membrane, fitting it around the penetration and detailing with an 18 mm cant of Bentoseal or a paste made up insitu by mixing Bentonite granules with water.

18.4 Termination bars and any exposed laps must be temporarily sealed until the finished ground level is determined. The membrane should not finish above the finished ground level and must be completed as shown in the Technical Literature, detail ST-208C.

18.5 Aquadrain® must be installed before backfilling. Backfilling must commence immediately after the membrane is installed to ensure the membrane is confined correctly. Compact backfill, approved by Allco Waterproofing Solutions Ltd, in 300-400 mm lifts compacted to 85% Modified Proctor density. With plaza roof decks the Aquadrain® is used under an approved wear layer system. Contact Allco Waterproofing Solutions Ltd for "Technical Reference 205" a full specification on backfilling requirements and approved wear layer systems.

18.6 Voltex® may be applied under most normal site conditions, including sub-zero temperatures and during heavy rainfall. Under wet conditions Voltex® 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. In chemically contaminated areas the membrane can be pre-hydrated by deliberately soaking with clean, cold mains water and leaving to soak for 2-3 hours before backfilling or pouring the concrete.

18.7 The Voltex® membrane being a needle-punched product has free ends which form a permanent bond when concrete is poured against the membrane. Volclay Swelltite should be used where the substrate has been already formed, i.e masonry block walls or precast walls.

Inspections

18.8 The contract documents must be referred to during the inspection of substrate and membrane installations.

Health and Safety

19.1 Safe use and handling procedures for the membrane system are provided in the Technical Literature.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

20.1 The following is a summary of the supplied testing information on Volclay® Waterproofing System:

- Hydraulic Conductivity Determination to ASTM D-5084.
- Low Temperature Flexibility to ASTM D 1970.
- Tensile Strength to ASTM D 4632.
- Puncture Resistance to ASTM D 4833.
- Concrete adhesion to ASTM D 903.
- Hydrostatic pressure resistance to ASTM D 5385.
- An investigation of the effectiveness of Voltex® as a Water Vapour Barrier by University of Hertfordshire.

Test methods and results have been reviewed by BRANZ and found to be satisfactory.

20.2 The Volclay® Waterproofing System has held a valid BBA Agrément Certificate (UK) since 1986.

Other Investigations

21.1 A durability opinion has been given by BRANZ technical experts.

21.2 Practicability of installation has been assessed by BRANZ and found to be satisfactory.

21.3 The Technical Literature has been examined by BRANZ and found to provide satisfactory guidance to designers for the use of the Volclay® Waterproofing System.

Quality

22.1 The manufacture of the membranes have not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

22.2 The quality management system of the membrane manufacturer, Cetco Building Materials Group, USA has been assessed and accredited as meeting the requirements of BS EN ISO 9001: 2000 by BSI Management Systems, USA, Registration Number FM 67591.

22.3 The quality of materials supplied is the responsibility of Allco Waterproofing Solutions Ltd.

22.4 Quality of installation on site is the responsibility of the installer.

22.5 Building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of Allco Waterproofing Solutions Ltd.

22.6 Designers are responsible for the building design and the design and installation details for the Volclay® Waterproofing System.

22.7 Building owners are responsible for the maintenance of the top edge of the membrane system and plaza deck finishes in accordance with the instructions of Allco Waterproofing Solutions Ltd.

Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- British Board of Agrément Certificate No. 86/1650, Volclay® Waterproofing System for Structures.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4210: 1989 Masonry construction: Materials and Workmanship.
- NZS 4229: 1999 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of reinforced concrete masonry structures.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 (Amendment 5, 1 August 2011).
- New Zealand Building Code Handbook Department of Building and Housing, Third Edition (Amendment 12, 10 October 2011).
- The Building Regulations 1992.



BRANZ

In the opinion of BRANZ, Volclay® Waterproofing System is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Allco Waterproofing Solutions Ltd, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the technical literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. Allco Waterproofing Solutions Ltd:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by Allco Waterproofing Solutions Ltd.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Allco Waterproofing Solutions Ltd or any third party.

For BRANZ

P Burghout
Chief Executive

Date of issue: 31 October 2012