



## BRANZ Appraised

Appraisal No. 707 [2017]

## SWELLSEAL® MS BENTONITE SYSTEM

### Appraisal No. 707 [2017]

This Appraisal replaces BRANZ  
Appraisal No. 707 [2010]



### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.

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### BRANZ

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## Product

- 1.1 The SwellSeal® MS Bentonite System is based on natural sodium bentonite contained within two layers of geosynthetic fabric with a HDPE liner on one face and other accessory products completing the system. 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.

## Scope

- 2.1 The SwellSeal® MS Bentonite 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.
- 2.2 The SwellSeal® MS Bentonite 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 SwellSeal Waterproofing New Zealand Limited [Refer Paragraph 11.1].
- 2.3 All installations incorporating the SwellSeal® MS Bentonite System must be the subject of specific design. Building designers are responsible for the incorporation of the system following the guidance details provided by SwellSeal Waterproofing New Zealand Limited. The designer must provide design and installation detailing within the contract documents.
- 2.4 The SwellSeal® MS Bentonite System must be installed by SwellSeal Waterproofing New Zealand Limited Approved and Trained Applicators.

## Building Regulations

### New Zealand Building Code [NZBC]

3.1 In the opinion of BRANZ, the SwellSeal® MS Bentonite System if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet the following provisions of the NZBC:

**Clause B2 DURABILITY:** Performance B2.3.1 [a] not less than 50 years. The SwellSeal® MS Bentonite System meets this requirement. See Paragraph 13.1.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.3. The SwellSeal® MS Bentonite System meets this requirement. See Paragraphs 15.1 – 15.3.

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

## Technical Specification

4.1 Components and accessories for the SwellSeal® MS Bentonite System supplied by SwellSeal Waterproofing New Zealand Limited are:

- **SwellSeal® MS/HP Multi-Layer/High Pressure Bentonite Membrane System** is a waterproofing membrane comprising sodium bentonite granules encapsulated between two polypropylene geotextiles by needle punching across the length and width, one face has a HDPE film incorporated. The membrane contains 5.5 kg of Sodium Bentonite per square metre, primarily used as waterproofing below grade horizontal and vertical surfaces, underslabs, footing and property line construction, soldier pile and lagging, metal sheet piling and concrete caisson retention. The SwellSeal® MS/HP Multi-Layer/High Pressure Bentonite Membrane is supplied in rolls of 1.65 m wide x 20 m long [33 m<sup>2</sup>] and a 1.65 m wide x 4 m long [6.6 m<sup>2</sup>] roll.
- **SwellSeal® MS Multi-Layer Bentonite Membrane System** is a waterproofing membrane comprising sodium bentonite granules encapsulated between two polypropylene geotextiles by needle punching across the length and width. The membrane contains 5.5 kg of Sodium Bentonite per square metre, primarily used as waterproofing below grade horizontal and vertical surfaces, underslabs, footing and property line construction, soldier pile and lagging, metal sheet piling and concrete caisson retention. The SwellSeal® MS Multi-Layer Bentonite Membrane is supplied in rolls of 1.65 m wide x 20 m long [33 m<sup>2</sup>] and a 1.65 m wide x 4 m long [6.6 m<sup>2</sup>] roll.
- **SwellSeal® WA** is a single component hydrophilic mastic, designed for sealing smooth to very irregular construction joints and pipe penetrations in wet or under water applications. It is supplied in a 10.5 oz cartridge or 20 oz sausage.
- **SwellSeal® Mastic** is a one component, hydro swelling mastic for sealing smooth and rough construction joints and pipe penetrations. It is supplied in a 310 ml cartridge or 600 ml sausage.
- **Bentorub®+** is a hydrophilic bentonite waterstop strip used for sealing construction joints in concrete. It is supplied in rolls 5 m long.
- **Bentorub® Salt** is a hydrophilic bentonite waterstop used for sealing concrete joints in contact with salt and brackish water. It is supplied in rolls 5 m long. [Refer Paragraph 11.1 for exceptions.]
- **Bentostic** is a hydrophilic levelling/detailing putty for use with Bentorub®+ or where extra detailing of the SwellSeal® MS Bentonite System is required. It is supplied in 5 kg pails.
- **Bentoglue** is a caulk applied adhesive for gluing Bentorub strips in vertical and horizontal positions.
- **SwellSeal® Bentonite Granules** are used to detail areas [penetrations etc] that may require additional SwellSeal® protection. They are chemically treated and supplied in 25 kg bags.

## Handling and Storage

- 5.1 Handling and storage of all materials whether on or off site is under the control of the SwellSeal Waterproofing New Zealand Limited Approved and Trained Applicators. 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 SwellSeal Waterproofing New Zealand Limited.

## Design Information

### General

- 7.1 Every installation of the SwellSeal® MS Bentonite 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 SwellSeal Waterproofing New Zealand Limited.

### 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 may use open ended, depressed web units; i.e. 1516, 2016 or 2516 and be solid filled.
- 8.2 Soil substrates must be prepared in accordance with the requirements of SwellSeal Waterproofing New Zealand Limited. 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 All substrates 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 SwellSeal Waterproofing New Zealand Limited.

### Control Joints

- 9.1 Where control or construction joints are formed in the substrate, SwellSeal Waterproofing New Zealand Limited must be consulted regarding the use of the membranes over these joints.

### Backfilling and Drainage

- 10.1 SwellSeal® MS Bentonite System must be confined and protected against damage.
- 10.2 Backfilling should be undertaken as soon as possible after placing the SwellSeal® MS Bentonite System. 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 such include a subsoil drainage system of at least a 100 mm 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 200 mm below the floor level and sloped a minimum 1: 200 to an outlet.
- 10.4 When being used as tanking membrane, the backfill material must be free from builders debris and angular aggregate and must be compacted to 85% Modified Proctor. Further advice regarding backfilling is available from SwellSeal Waterproofing New Zealand Limited.
- 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.

## Chemical Resistance

11.1 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 trivalent ions). Calcium bentonite may be formed in hard waters and has inferior gelling properties. Therefore if there are any concerns regarding contaminated ground water or salt water conditions, SwellSeal Waterproofing New Zealand Limited offer conductivity tests on soil and water and from these tests make a recommendation on the appropriate system specification. One potential solution to contaminated water is outlined in Paragraph 17.6. The membrane is unaffected by organic contaminants.

## Resistance to Loading

12.1 Providing SwellSeal® MS Bentonite System is 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

13.1 The SwellSeal® MS Bentonite 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

- 14.1 Annual inspections must be made of the membrane top edge seal and protection, the backfill capping and subsoil drainage system ensuring all are functioning as originally designed.
- 14.2 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

- 15.1 The SwellSeal® MS Bentonite 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 and floors.
- 15.2 The membranes have a vapour flow resistance of not less than 90 MN s/g.
- 15.3 The system forms sealed joints and seals at penetrations.
- 15.4 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

- 16.1 Installation of the membranes must be completed by SwellSeal Waterproofing New Zealand Limited Approved and Trained Applicators that have waterproofing application experience.
- 16.2 Substrates must be completed by tradespersons skilled in the relevant construction method chosen and in accordance with instructions given within the SwellSeal Waterproofing New Zealand Limited Technical Literature and this Appraisal.

## System Installation

### Substrate Preparation

17.1 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

- 17.2 For poured in situ concrete the SwellSeal® MS Bentonite System is installed with the non-woven [Grey] surface facing the pour. For precast concrete SwellSeal® MS Bentonite System is installed with the non-woven [Grey] surface facing the concrete.
- 17.3 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 SwellSeal® Mastic or a paste made up insitu by mixing SwellSeal® Bentonite Granules with water.
- 17.4 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 with a flashing or other technique as shown in the Technical Literature.
- 17.5 Backfilling must commence immediately after the membrane is installed to ensure the membrane is confined correctly.
- 17.6 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 back-filling or pouring concrete.

### Inspections

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

### Health and Safety

- 18.1 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

- 19.1 The following is a summary of the more significant tests completed on the SwellSeal® MS Bentonite System:
- Hydraulic Conductivity Determination
  - Hydrostatic pressure resistance
  - Swell Index
  - Fluid Loss
  - Long term durability by measuring hydraulic conductivity

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

### Other Investigations

- 20.1 A durability opinion has been given by BRANZ technical experts.
- 20.2 Practicability of installation has been assessed by BRANZ and found to be satisfactory.
- 20.3 The Technical Literature has been examined by BRANZ and found to provide satisfactory guidance to designers for the use of the SwellSeal® MS Bentonite System.



### Quality

- 21.1 The manufacture of the membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were found to be satisfactory.
- 21.2 The quality management system of the manufacturer has been assessed and accredited as meeting the requirements of ISO 9001: 2000.
- 21.3 The quality of materials supplied is the responsibility of SwellSeal Waterproofing New Zealand Limited.
- 21.4 Quality of installation on site is the responsibility of SwellSeal Waterproofing New Zealand Limited Approved and Trained Applicators.
- 21.5 Building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of SwellSeal Waterproofing New Zealand Limited.
- 21.6 Designers are responsible for the building design and the design and installation details for the SwellSeal® MS Bentonite System.
- 21.7 Building owners are responsible for the maintenance of the top edge of the membrane system in accordance with the instructions of SwellSeal Waterproofing New Zealand Limited.

### Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- NZS 3101: 2006 Concrete structures standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4210: 2001 Masonry construction: Materials and Workmanship.
- NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of reinforced concrete masonry structures.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.





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20 December 2017

SWELLSEAL® MS BENTONITE  
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In the opinion of BRANZ, the **SwellSeal® MS Bentonite 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 **SwellSeal Waterproofing New Zealand Limited**, 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. **SwellSeal Waterproofing New Zealand Limited:**
  - 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 **SwellSeal Waterproofing New Zealand Limited**.
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 **SwellSeal Waterproofing New Zealand Limited** or any third party.

For BRANZ

**Chelydra Percy**

Chief Executive

Date of Issue:

20 December 2017