SWELLSEAL® MS

Bentonite Waterproofing: Multi-layer Systems

SCOPE OF USE

SwellSeal® MS SwellSeal® MS/HP

SwellSeal® MS is an advanced waterproofing membrane designed for belowground applications. The membrane, in standard form, is supplied without a P.E liner – **SwellSeal® MS** or with a P.E liner – **SwellSeal® MS/HP (high pressure)** bonded to the non-woven geotextile. The membrane consists of two high-strength geotextile fabrics and 5500 grams of high quality granulated sodium Bentonite per square metre (the most of any needle punched membrane on the market). The P.E liner provides superior chemical resistance and extremely low permeability for water vapour and gas transmission. Needle punching with fine American needles delivers a high strength interlocked geotextile fabric that binds the high swelling, low permeability sodium Bentonite between the two geotextile fabrics. When hydrated this results in an impervious membrane that will be maintained for the life of the structure.

SwellSeal® MS is a highly effective waterproofing membrane ideal for below-grade vertical and horizontal foundation surfaces. **SwellSeal® MS** is manufactured from all new materials by one of the largest textile companies in China under an ISO9001: 2000 Quality Assurance Program ensuring the quality, uniformity and robustness of the liner. Installation is fast and easy, requiring no primers or special tools. **SwellSeal® MS** can be installed in virtually any weather (down to -29°C as per ASTM D 1970) including high temperatures and dry conditions.

When concrete is poured against it **SwellSeal® MS** forms a strong mechanical bond as the geotextile fibres are locked into place within the concrete itself. Independent laboratory testing was performed at Precision Geosynthetic Laboratories in the U.S. **SwellSeal® MS** was tested by PGL for over 20 different (ASTM standard) tests. **SwellSeal® MS** returned excellent results on every test (conducted in accordance with ASTM) and as a result has been able to contribute valuable and accurate test data to the BRANZ Appraisal.

SwellSeal® MS works by forming a low permeability membrane (4.6×10^{-12} as per ASTM D 5084) upon contact with water. Upon hydration, unconfined Bentonite can swell up to 15 times its dry volume. When confined under pressure the Bentonite swells, forming a dense, impervious waterproofing membrane. The swelling action of the **SwellSeal® MS** self-seals small cracks caused by ground settlement, concrete shrinkage, or seismic action – problems over which there is normally no control. This swelling action also occurs in saline environments.

Over 150 million square metres of Bentonite liner has been successfully installed on projects worldwide. With the specification & design experience and the technical capacity of one of the largest textile companies in China, you can be assured of a waterproofing system that works.

APPLICATIONS

SwellSeal® MS is designed for belowground vertical and horizontal structural foundation surfaces. Typical applications include backfilled concrete walls, structural slabs, tunnels, and property line construction. Property line construction applications include piling, skin wall, shotcrete and stabilised earth retention walls. Applications may include structures under continuous or intermittent hydrostatic pressure (tested to 70m ASTM 5385). **SwellSeal® MS** is particularly useful where the ground water is slightly saline or contaminated. SwellSeal is also suitable for use on Green-roof applications.

SwellSeal® MS can be installed directly over a properly prepared soil substrate without a working mud slab. Additionally, **SwellSeal® MS** can be installed onto freshly poured concrete as soon as the forms are removed.

Features and Benefits

- Durability: withstands inclement weather and resists construction-related damage
- Superior Adhesion: mechanical bond secures product and prevents water migration
- Long Service Life: provides waterproofing protection for the life of the structure
- Easy to Install: quick and easy installation without adhesives or special equipment
- Self-Sealing: active, swelling properties of sodium Bentonite seal small cracks, including in saline environments.
- Uniformity: minimum 5500 grams of sodium Bentonite granules per square metre
- Insured Warranty: Manufacturers warranty

INSTALLATION

GENERAL

Install **SwellSeal® MS** in strict accordance with the manufacturer's installation guidelines. Install **SwellSeal® MS** with the grey (woven) geotextile side against the concrete to be waterproofed. Install Bentonite paste in all applicable horizontal and vertical concrete construction joints. Schedule waterproofing material installation to permit the prompt placement of the backfill material or concrete. To comply with warranty requirements SwellSeal waterstops are be used in all construction joints, please consult your applicator for recommended accessory products such as Bentonite granules etc.

SwellSeal® MS is not designed to waterproof expansion joints with out a properly engineered expansion joint system to be used in conjunction with **SwellSeal® MS**, please consult your local representative or email us at office@geotexnz.co.nz.

STORAGE

Store **SwellSeal® MS** and all accessory products in a dry shelter. If stored outside, protect the liner with a weatherproof cover on all sides and on top. Ensure that the Bentonite liner avoids contact with ground surface water.

PREPARATORY WORK

The substrate should be smooth and compacted to a minimum density of 85% Modified Proctor. Concrete surfaces should be free of voids and sharp projections. Surface irregularities should be removed before installation. Honeycombing and other surface voids must be filled with mortar or Bentonite Sealant, and tie-bolt holes must be filled with non-shrink mortar/grout.

UNDER CONCRETE FLOOR SLABS

SwellSeal® MS is recommended for use under structural reinforced concrete slabs 100 mm thick, or greater, over a compacted earth/gravel substrate, or 50 mm lean-mix concrete. Install **SwellSeal® MS** around all foundations (ground beams pads, pile caps etc). Place **SwellSeal® MS** over the properly prepared substrate with the grey (woven) geotextile side facing the concrete to be waterproofed. Overlap all adjoining edges a minimum 100 mm and stagger ends a minimum 300 mm. Staple or nail edges together as required to prevent any displacement before and during concrete placement. **SwellSeal® MS** should not extend into foundation bearing planes (i.e. pile caps, ground beams, pads etc.,) but should completely envelop them. Where this is not possible / desirable a cementitious waterproofing sealant can be used as a continuity 'membrane' through the bearing plane, to which **SwellSeal® MS** can be sealed using a 100 mm lap, incorporating a 5 mm X 50 mm fillet of Bentonite Sealer.

SwellSeal® MS is cut to provide a snug fit around all relevant objects (pipes, piles etc). Place a 40 mm fillet of Bentonite Granules or Bentonite Paste (granules & water) around the penetration on top of the **SwellSeal® MS**. Where a concrete under blinding is not used,

add an additional 50 mm border of SwellSeal Bentonite Granules around the penetration under the **SwellSeal® MS**. Where property line construction, such as secant/contiguous piling, metal sheet piling, skin wall etc., is used as the outside concrete form, continue the under slab **SwellSeal® MS** installation up the property line a minimum 250 mm above the top edge of the finished floor slab foundation, or kicker level. The extra 250 mm is very important since there is no access to the outer edge after the concrete pour, and the top 100 mm needs to be kept free of concrete splashes to enable a clean lap later.

BACKFILLED CONCRETE WALLS

SwellSeal® MS can be applied to backfilled walls in two ways: mechanically fastening to cast concrete just prior to backfilling (post-applied), or preferably, by utilizing the peel-adhesion properties of the **SwellSeal® MS** (pre-applied).

The needle-punched geotextile fibres, which have been forced from the non-woven side through the Bentonite and the grey (woven) side, will be trapped within the wet concrete. These allow the **SwellSeal® MS** to remain firmly attached to the concrete after the formwork has been removed.

Concrete tie holes, etc., must be filled, from the outside, using a proprietary non-shrink grout or similar, covered in a 'mushroom' of Bentonite Paste or Bentonite Sealant, either prior to **SwellSeal® MS** (post-fix) application, or prior to backfilling (pre-fix/peel-adhered application), where additional **SwellSeal® MS** patching will be required.

Detail all pipe penetrations with SwellSeal Bentorub+ (or Bentorub Salt) Waterstops as a 'puddle flange' within the concrete (or use SwellSeal Mastic). Ensure a minimum of 75 mm concrete cover to all sides. Where penetrations pass through **SwellSeal® MS**, ensure that **SwellSeal® MS** is cut to provide a snug fit, and detail with a 40 mm X 40 mm fillet of Bentonite Paste (granules & water) or Bentonite Sealant, prior to backfilling.

Backfill material shall be compactable soils and free of construction debris. Backfill shall be clean, well grounded, and compacted every 300mm to 85% modified proctor (as defined by ASTM 1557), and meet these general specifications:

- No rocks, stones or boulders larger than 50 mm
- 90% minimum soil particles smaller than 5 mm
- 10% maximum soil particles finer than 74 micron (200 mesh)

Terminate **SwellSeal® MS** 100 mm below ground level with a Swell-Seal termination bar or similar apply a liquid membrane (single pack polyurethane) to overlap the termination bar and continue to grade. The **SwellSeal® MS** lap should be enhanced by the inclusion of a 5 mm X 50 mm fillet of SwellSeal Bentonite Mastic, centrally located.

BELOW GRADE MASONRY BLOCK WALLS

When installing **SwellSeal® MS** (or MS/HP) to masonry block walls, please ensure the outside face of the blocks are flush with each other and that the mortar between the blocks is also flush with the block face (i.e. not pointed).

The block surface should be free of any debris and in 'constant hydrostatic' conditions, skim coated with a suitable exterior grade plaster (please contact office@geotexnz.co.nz for details).

The membrane should then be installed as per standard **SwellSeal® MS** details.

The **SwellSeal® MS** membrane does not require protection from the backfill if the backfill is less than 20mm (please contact office@geotexnz.co.nz for a list of suitable aggregates).

In 'constant hydrostatic' conditions, a Geotex Dimpled Wall Drain may be installed against the HDPE liner on the outside of the membrane prior to the placing of the back fill.

Backfilling should be completed by the contractor to include visual inspection by the Geotex NZ Ltd 'Approved and Certified Applicator' and compaction of the backfill should be completed in 300mm 'lifts' to 95% modified proctor.

PROPERTY LINE CONSTRUCTION

SwellSeal® MS is used to waterproof various types of property line construction, including metal sheet piling, secant and contiguous piling, skin wall, shotcrete and stabilized-earth retention walls. Shotcrete can be applied directly against **SwellSeal® MS**. Concrete surfaces shall be free of large voids or projections. Voids, pits, and cracks in excess of 20 mm, shall be levelled flush using cement grout, Bentostic leveling/detailing sealer or Bentonite paste (granules & water). Projections greater than 20 mm shall be removed or smoothed flush. Generally, gradual undulating surfaces are acceptable, sudden changes in level, i.e. ridges and hollows, are not. When working against the property line, always start with the vertical installation, prior to installing **SwellSeal® MS** under slab. Apply the bottom run of **SwellSeal® MS** lengthways/horizontally against the property line, approximately 1,100 mm from the substrate/blinding level, allowing 150 mm of **SwellSeal® MS** to extend under the slab. On profiled property line (metal sheet piling, secant and contiguous piling, etc) the 150 mm base 'flap' will need to be cut and splayed as necessary, to allow the material to lay flat.

LIMITATIONS

Horizontal installation surfaces shall be free of excessive standing water, particularly where a concrete blinding is not utilised.

SwellSeal® MS is not designed for unconfined above ground waterproofing applications. **SwellSeal® MS** is engineered for use under reinforced structural concrete slabs of 100 mm thick or greater. Do not install **SwellSeal® MS** in horizontal split-slab, plaza deck and roof applications that will receive a poured concrete wear surface or other solid topping.

SwellSeal® MS is not designed to waterproof expansion joints. Expansion joints require a properly engineered expansion joint sealant product; please email us at office@geotexnz.co.nz.

SIZE & PACKAGING

SwellSeal® MS is supplied in rolls 1.65m wide by 20m (33m^2) or 1.65m wide by 4m (6.6m^2) on cardboard tubes and packed in polythene wrappers for protection or we can supply according to our customer's requirements. Every roll has a factory applied batch number for ease of identification.