

TRAINING & INSTALLATION MANUAL

WELCOME

PC Plastics Pty Ltd offers you a most sincere welcome to the team of pest management technicians installing Biofilm Termite Management System.

PC Plastics Pty Ltd insists on the highest standards of workmanship. This Training and Installation Manual will provide you with the essential knowledge and skills to be able to attain these standards.

As an installer your performance will be monitored through our Quality Assurance Program to determine that your training has been competently interpreted for installations on site.

Deliberate deviations from the accepted specifications will result in an adverse result, and may place in jeopardy your accreditation as an installer.

All Installers of the Biofilm Termite Management System are expected to introduce their own quality assurance program consistent with the requirements of the Warranty and those relevant procedures detailed in the Operational and Policy Manual.

PC Plastics Pty Ltd.

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PURPOSE

This Training and Installation Manual has been prepared for installers as a reference on the various techniques associated with the installation of Biofilm Termite Management System.

This Manual is the standard by which PC Plastics Pty Ltd will accredit installers and conduct quality assurance programs. Quality assurance ensures the highest standards of performance are maintained as there can be no compromising on either the quality of workmanship or the materials used.

This Manual is also the vehicle by which advances in installation techniques are communicated consistently to all those involved in installation of the Biofilm Termite Management System through regular updates.

Installers are encouraged to offer comments, concerns, problems, and wherever possible, solutions on any aspect of the process of building out termites with the best Termite Management System – Biofilm.

SESSION OBJECTIVES

The objective of this Manual and associated training program is to ensure the participants are able to:

Session One develop an appreciation of the importance of termite damage to in-service timber, the concept of building out termites in the construction phase of buildings by combining various products and techniques to create a complete Termite Management System to deter concealed entry by termites into a structure.

Session Two develop the essential skills and knowledge necessary to competently install Biofilm to specification in a variety of building situations.

Session One

Termites and Biofilm

Objective:
To develop an appreciation of the importance of termite damage to in-service timber, the concept of building out termites in the construction phase of buildings by combining various products and techniques to create a complete Termite Management System to deter concealed entry by termites into a structure. The role that Biofilm and concrete play as an integral part of a Termite Management System is explained. Only accredited installers may apply Biofilm.

Damage caused by termites in Australia

"Termites are the cause of the greatest economic losses of timber in-service in Australia. Independent data compiled by State Forestry shows 1 in every 5 homes is attacked by termites at some stage in its life. More recent data would indicate that this is now as high as 1 in every 3. Australia's subterranean termite species are highly destructive timber pests causing around $1 billion worth of damage and treatment costs each year. Under the right conditions, it can take only a matter of months for a termite colony to severely damage almost all the timber in a home."
https://www.archicentreaustralia.com.au/wp-content/uploads/Your-Home-Termites-Borers_factsheet.pdf

Insurance companies in Australia providing home and contents insurance traditionally do not cover against termite attack due to the frequency and cost of termite damage. The cost of maintaining protection of a house against termite attack on an annual basis is typically equivalent to the cost of insuring the house against all other damage that may occur.

Termite entry into buildings



Nearly all termite damage of buildings in Australia occurs from subterranean termites. Worker and soldier termites, even though blind, are ingenious at finding ways into buildings without being detected. Subterranean termites can build galleries or mud tubes underground with relative ease. The depth of the galleries is typically in the top 30cm of soil. It is believed that about 80% of termite attack of buildings originates from termites gaining entry from the perimeter and attacking wet areas (e.g. laundry, bathroom). The entry point is typically at, just below or within a couple of bricks of the surface of the ground.

Finding potential entry points of termites could be considered an art or skill and is developed with experience and knowledge (and the use of equipment). There are various reference books that may be useful to consult about entry points of subterranean termites into buildings including:

1. Building Out Termites, R. Verkerk, Pluto Press Australia Ltd (1990)

2. Approved Reference Procedures for Subterranean Termite Control, National Press Control Association, Inc. (U.S.A) (1991). Cost - $150

B*uilding Out Termites* by Verkerk has many diagrams showing potential entry points of termites. It is extremely important that the Biofilm Termite Management System is installed and protects the potential entry points of termites into buildings that it is aimed to protect.

This Manual presents the correct techniques for the use of Biofilm for most construction designs. Every building design should be carefully checked to determine all potential entry points and a suitable Termite Management System used to protect the building in each of these areas.

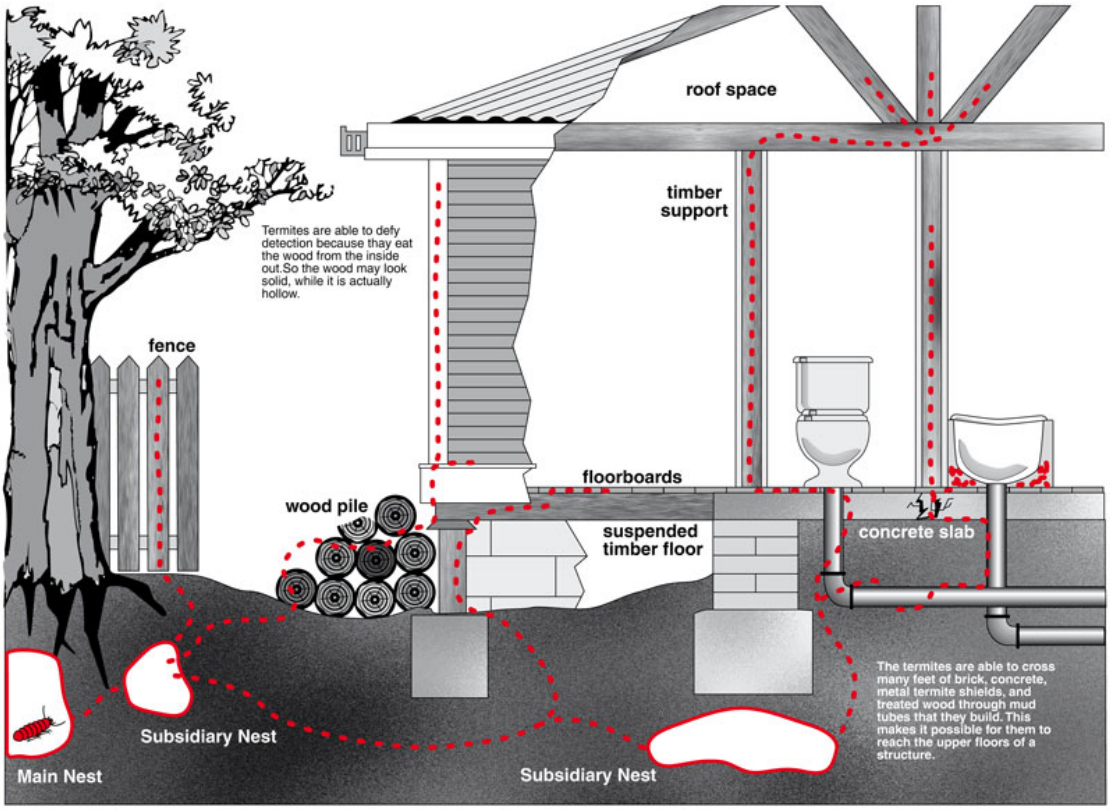
Common entry points include:-

- wet areas – bathroom and laundry – commonly following the moisture gradient and pipes into the area.
- retaining walls and step-downs inside buildings.
- penetrations (including on the inside of pipework).
- cold joints
- entry underground, especially in in-fill slabs.

Vigilance Is a key to termite protection

Termites are attracted to areas of moisture because they cannot survive or expand their colony without it. In the majority of houses wet areas such as laundries and bathrooms are not tanked or waterproofed which allows moisture to penetrate the concrete slab and seep into the soil. Termites are attracted by this moisture and will investigate potential food sources above.

Wet areas also have many penetrations through the concrete slab, which may also allow termite access. When termite attack does occur in a house it is commonly in the laundry or bathroom areas. Other areas of high moisture, like leaking downpipes, leaky taps or overflows from air conditioners are also very attractive to termites. Anywhere there may be a regular supply of moisture is especially prone to termite entry.



Requirements to deter concealed entry by termites during construction

The Building Code of Australia (BCA) publishes the National Construction Code (NCC). The main section on termite management is found in Volume 2 (Class 1 – habitable such as houses, town houses etc and Class 10 – non-habitable structure such as a shed). Section 3 details Acceptable Construction requirements and Section 3.1.3 details the information for Termite Risk Management.

The NCC requires that Termite Management Systems are required if any Class 1 or 10 building is constructed in an area where subterranean termites are known to present a potential risk of attack and a primary building element of the building is considered to be susceptible to termite attack.

In most jurisdictions 'Primary Building Element' is defined as 'a member of a building designed specifically to take part of the building loads'. In Queensland PBEs include 'door jambs, window frames and reveals, architraves and skirtings'. (NCC 2016)

Most commonly the Termite Management Systems of concrete slab Class 1 and 10 buildings have the slabs constructed to AS2870-2011, protection of penetrations and a perimeter system. Biofilm is an ideal choice to deter entry of termites around the perimeter of the structure.

Principles of Biofilm

What Is Biofilm?

Biofilm is a professional Termite Management System for new structures and extensions to existing structures. The purpose of Biofilm is to deter concealed entry by subterranean termites from the soil into a structure above the termite barrier as per AS 3660.1 – 2014. It is a once only treatment that is designed to last the economic life of the building. Biofilm is not designed as a remedial treatment for existing termite damage.

Biofilm is both a physical and chemical exclusion termite risk management measure made of a high resistance polyethylene film containing 1g/kg bifenthrin. It is flexible in nature and is classed as a chemical in a non-soil matrix. Bifenthrin is dispersed fully throughout the plastic sheeting. There is no top or bottom to the sheet – it may be installed effectively no matter which side is up. Products containing bifenthrin and used for pre-construction are designated Restricted Chemical Products by the APVMA and must only be used by licensed Pest Management Technicians.

Biofilm Perimeter Protection

The most common use of chemical sheet in a Termite Management System (TMS) for a concrete slab building is to protect the perimeter of the building. The TMS of a slab on ground building commonly consists of the concrete slab (constructed to AS2870-2011 Residential slabs and footings), protection of penetrations and a perimeter system. Biofilm is an ideal product to deter concealed entry by termites around the perimeter of a building. There is an onus on the owner to maintain a clear 75mm (one brick) visual inspection zone (see maintenance and guidelines) below the film in conjunction with regular competent inspections from a qualified Biofilm accredited inspector at time periods not exceeding 12 months to comply with warranty terms and conditions.

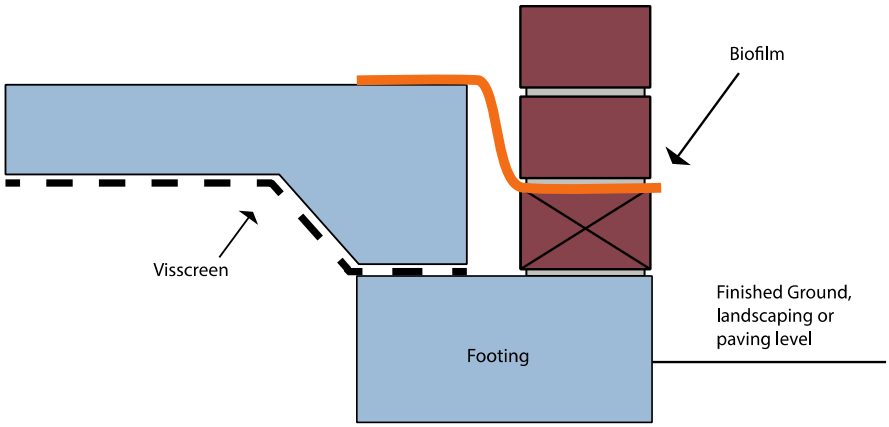
Biofilm can also be used

- as a full under slab treatment
- under suspended floors
- at step downs of slabs
- under paths and additions
- against retaining walls
- at construction joints and saw cuts
- to protect at cyclone tie-down rods
- when there is external cladding
- to protect zero boundaries
- to protect at penetrations

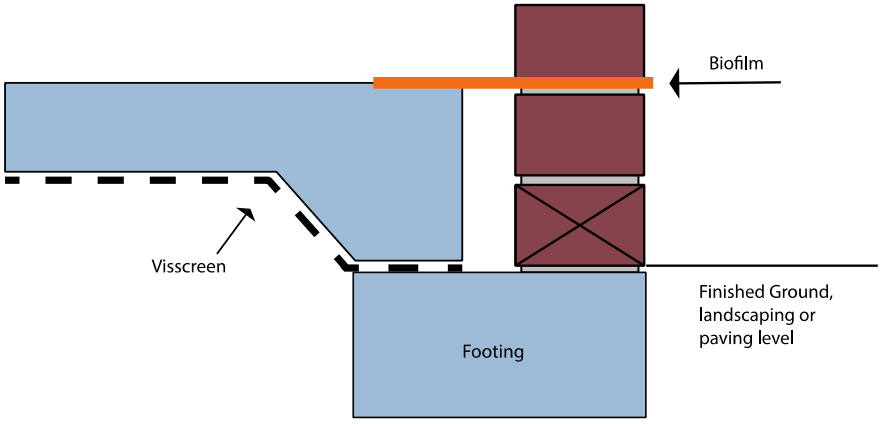
Biofilm in Cavity Walls for Typical Strip Footings & Raft Slabs



Option A



Option B



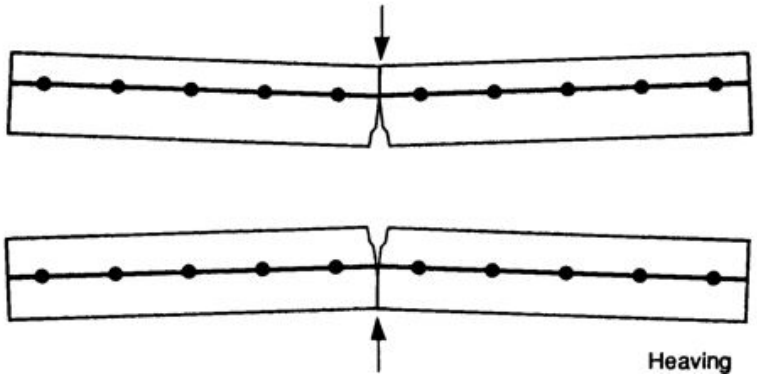
Concrete

Evidence of Slab Cracking

In most parts of Australia, the extent of significant slab cracking due to shrinkage or flexion is minimal. Most shrinkage cracks are 0.3mm or less. It is believed cracks greater than 1.0mm are required to enable termite access.

Many shrinkage cracks are much larger at the top of the slab than further down. This is due to a range of reasons including:

- shrinkage greater at the top
- damage to the crack at the top making it wider
- reinforcing lower down stops or tapers the width of the crack



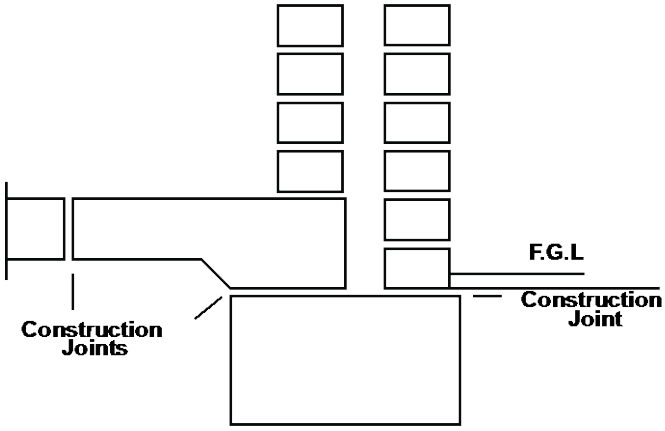
Flexional cracking due to either upwards or downwards movement produces only a hairline crack at the stress point.

Such cracks have been verified by taking a profile of the crack using a diamond saw. One slab in South Australia that underwent heaving had a crack of 4mm at the top but only a hairline crack below the level of the reinforcing.

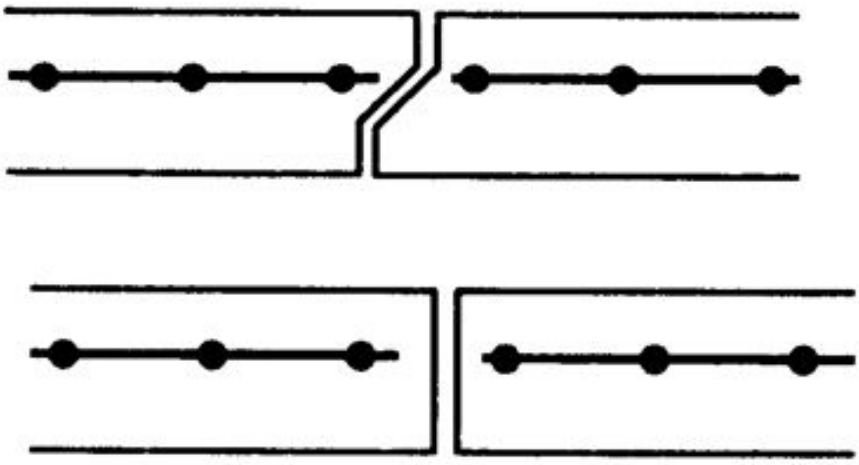
Termite Access Through Cracks

The only evidence that can be found of termites entering building via a crack has been through construction or control joints. The entry of termites through construction or control joints is common, accounting for many termite attacks in Australia.

Example of a construction joint:



Example of control joints:

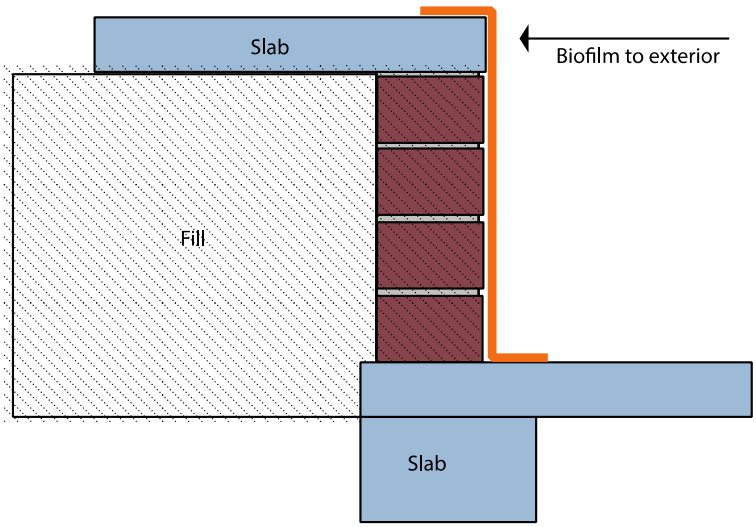


Retaining Walls and Termite Access

Another significant entry point of termites is through imperfections in retaining walls. Termites are attracted to retaining walls because of moisture build-up and the loose soil behind the retaining wall.

Retaining walls of houses are built in many different ways and using a wide variety of materials. Usually the quality of the mortar joints is not high because the wall is normally rendered on the inside. Once termites enter the retaining wall they may be able to gain access to the rest of the building without detection.

It is important retaining walls are protected with Biofilm installed over all the area of the retaining wall externally. An example is given below:



Simply rendering the wall may not be sufficient to deter concealed access by termites due to the potential of delamination or cracking of the render.

Session Two

Installing Biofilm

Objective: Develop the essential skills and knowledge necessary to effectively install Biofilm to specification.

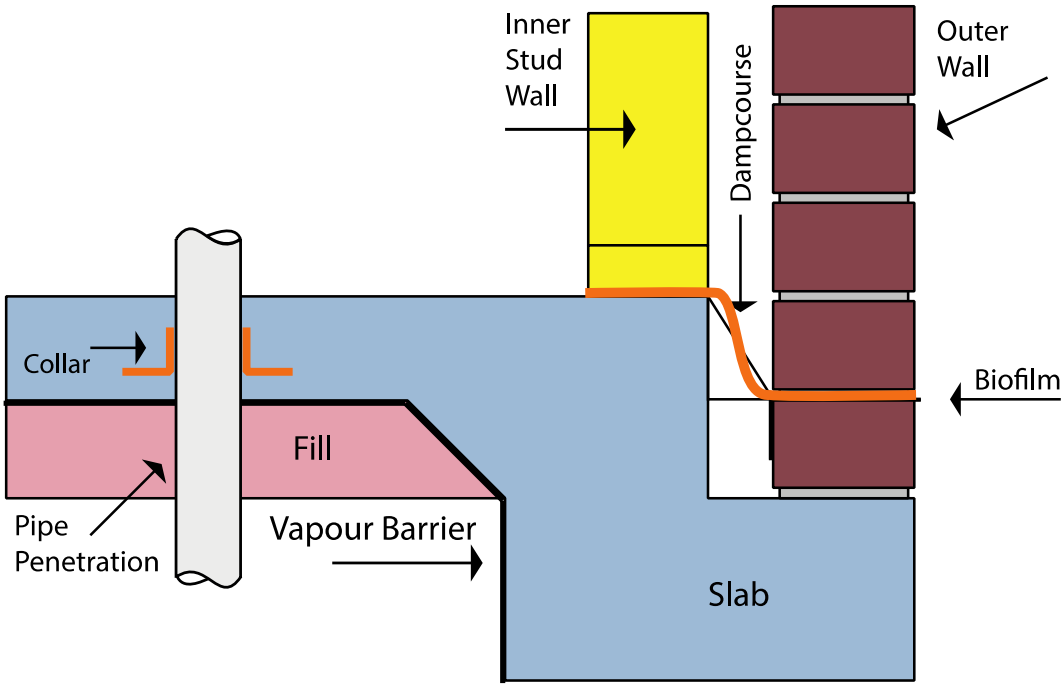
Biofilm Termite Management System

The Biofilm system has been designed to deter concealed entry of subterranean termites into buildings. Biofilm contains an insecticide, which can either kill or repel termites that contact it. The objective of Biofilm is to prevent concealed access from subterranean termites. Termites can still crawl around the barrier, but if this occurs, a visual mud trail (often referred to as a tunnel or lead) will be evident and regular inspections will identify this.

This Biofilm Training and Installation Manual illustrates the installation measures to deter termite entry from potential concealed entry points into the building. The system combines various partial measures with maintaining perimeter inspection zones so any termite entry is forced out into the open where their presence may be detected more readily.

The following drawings and instructions, when read in conjunction with the relevant Codes and Standards, will provide a comprehensive guide to the correct installation and maintenance of the Biofilm Termite Barrier System.

NB: A range of options is provided so that part may be used either singly, or in combination to provide a complete termite management system.



Biofilm has been assessed and registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA) to be an effective Termite Barrier when installed to specifications. Any tears, rips, or holes in the Biofilm sheeting must be repaired as per this Manual.

The Biofilm Termite Management System has been tested to the requirements with the Building Code of Australia 2016. Biofilm has been shown to conform as indicated by achieving the requirements of the building product certification scheme, CodeMark.

This CodeMark Certificate is issued based on the compliance to this Manual. Any deviation from specifications contained in this Manual is outside the scope of this Manual or CodeMark certification and the installation of the product will not be covered by CodeMark certification. This may result in the product being classified as a non-conforming building.

Applications

Biofilm can be used to provide protection for buildings in the following ways:

- as an external perimeter system
- as a full under slab treatment
- under suspended floors
- at step downs of slabs
- under paths and additions
- against retaining walls
- at construction joints and saw cuts
- around cyclone tie-down rods
- when there is external cladding
- at zero boundaries
- at penetrations

Pre-installation

Prior to installing Biofilm, it is recommended that a site inspection is performed and the following precautions are followed out:

- elimination of any active nest of an economically important wood feeding species of subterranean termite (as per AS 3660.1) found within the property boundary up to a distance of 50m from the proposed new building work.
- all tree stumps, logs and roots shall be excavated and removed from the building footprint.
- all timber off-cuts, building debris, removeable framework and other waste materials shall be removed from the area where the Biofilm is to be installed.
- all structural material below the ground should be made from termite resistant material such as masonry, concrete, steel etc.

Joining sheets

In almost all use situations Biofilm is held in place by construction materials as the structure is built. In such cases adhesives or bonding agents used to join sheets are required until these construction components are installed. In situations where construction materials do not exert pressure on sheet overlaps such as perimeter cavities a permanent bond must be created. Such a bond can be made of high strength construction adhesives or heat-sealing using a portable heat sealer.

Appropriate adhesives are those designed to provide a construction grade impervious bond between the two plastic sheets, allowing the system to meet AS

3660. If unsure of the suitability of the adhesive to be used contact the adhesive manufacturer for technical support. Ensure that a minimum 200mm overlap is achieved when joining.

Repairing tears or gaps

If the plastic sheeting is ripped or torn it must be repaired by applying a single sheet piece of sufficient size to fully cover the gap or tear plus a minimum overlap of 200mm. The repair sheet is to be bonded into the tear/gap as detailed above in 'Joining sheets'.

Corners

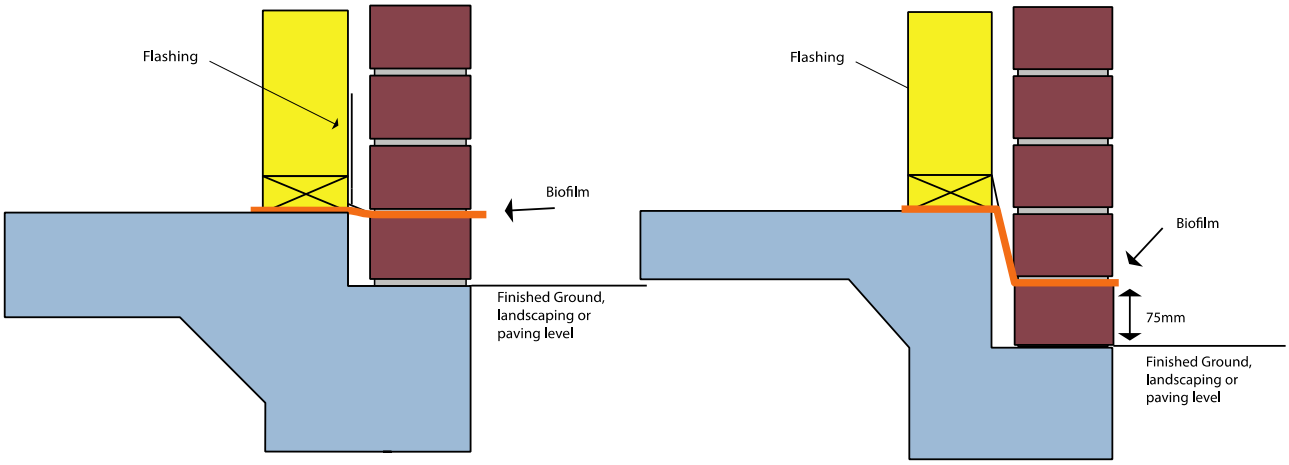
Corners must be carefully installed ensuring the finished corner is smooth and sheeting is continuous. Make slits from the edge of the sheet into the corner of the slab to allow folding of the sheet around the corner. At a corner two sheets must be joined and sealed using an appropriate adhesive or bonding agent designed by the manufacturer to provide a construction grade bond between the sheet and the material it is being bonded to with a minimum of 200mm overlap.



External Perimeter Treatment

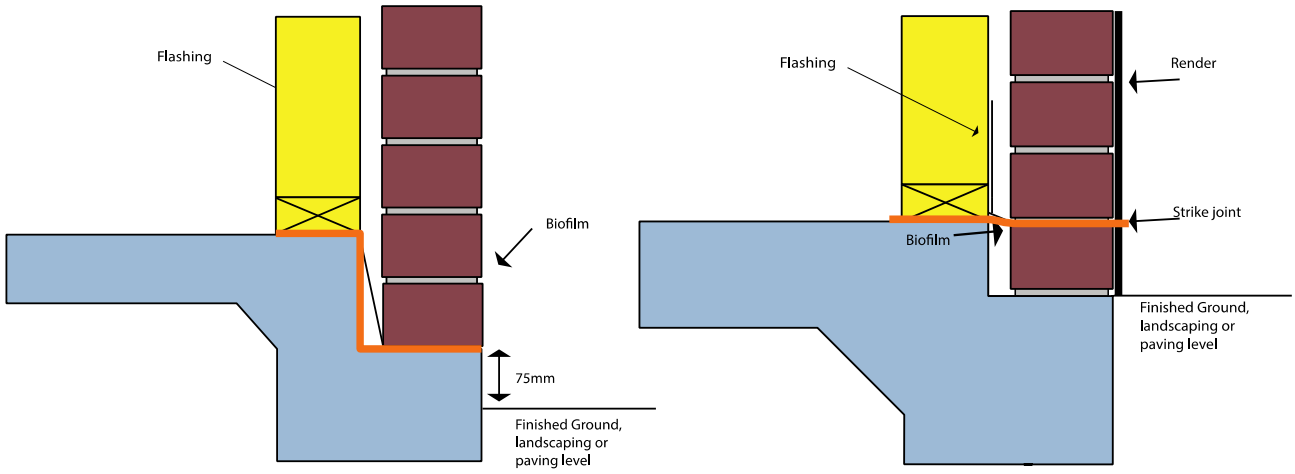
Rebated slab edge

Biofilm should be installed before the timber frame has been raised. Attach one edge of the sheet to the slab to ensure the frame bottom plate will be placed on top of the sheet using an appropriate adhesive or bonding agent. The second edge is fixed to the upper surface of the brickwork with the outside leading edge being visible in the damp proof course (DPC) horizontal mortar joint using an appropriate adhesive or bonding agent designed by the manufacturer to provide a construction grade bond between the sheet and the material it is being bonded to. Any excess Biofilm sheet is installed into the cavity.



Single Rebate Multi Rebate

Biofilm Perimeter System with Cavity Detail



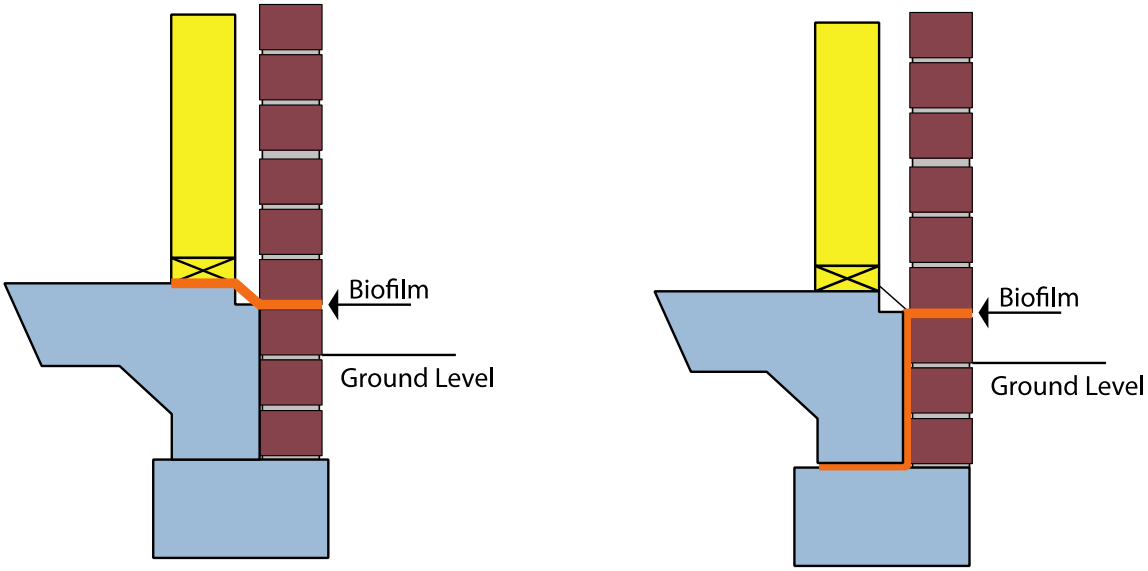
Multi Rebate (V2) Render

Biofilm Perimeter System with Cavity Detail

NOTE: Only Rendered Bricks are required to have a strike joint. Bagged Bricks do not require a strike joint to be present.

In-fill slab

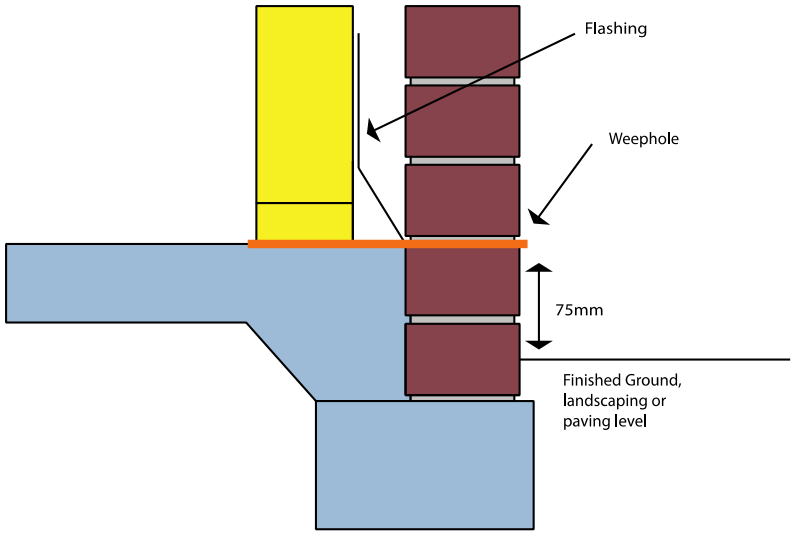
Secure the plastic sheeting to the outer edge of the brickwork and fold the sheet over the top of the brickwork securing it to the internal brickwork toward the footings. Ensure that prior to the slab being poured that the sheet is securely held in place using an appropriate adhesive or bonding agent designed by the manufacturer to provide a construction grade bond between the sheet and the material it is being bonded to. If a separate damp proof course material is being used it is installed above the Biofilm level.



Option A Option B

Biofilm Perimeter System with Cavity Detail – Non-Monolithic Infill

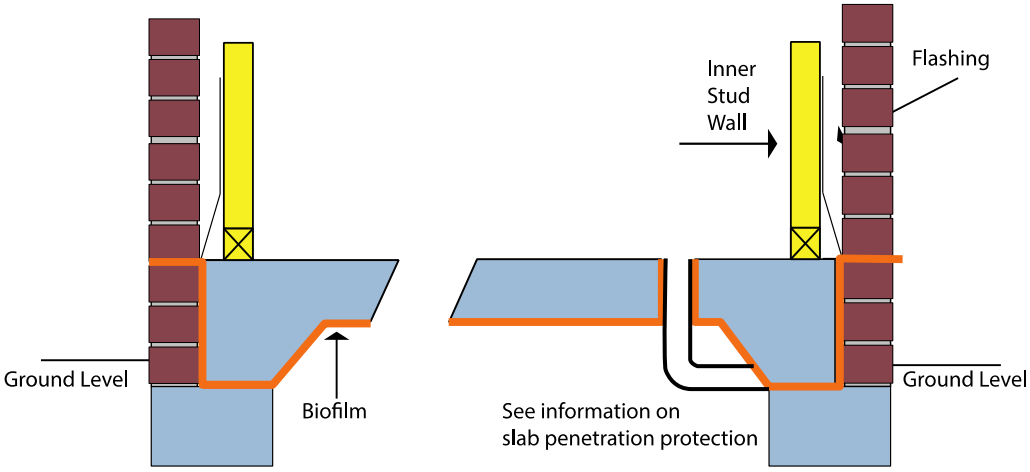
Biofilm Perimeter System at Slab on Ground with no cavity with separate footing



Full Under Floor Treatment

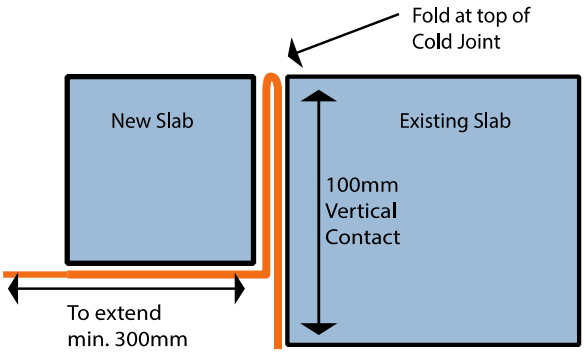
Biofilm can provide full under floor protection to the property by creating a full and continuous barrier when installed to specifications:

- install after the concrete pouring of all internal and edge beams.
- lay as a continuous system beneath the slab, with care taken to cover the top of all internal and edge beams.
- adhere to the interior wall of the formwork using pins and/or spray adhesive. Alternatively Biofilm can be laid to extend past the interior wall of the formwork.
- allow enough loose sheeting to accommodate the concrete pour
- extend Biofilm a minimum of 200mm beyond the perimeter of the slab to allow for any slab rebates, exposed slab edges, or similar perimeter attachments.
- lay on top of bedding sand and up any vertical faces.



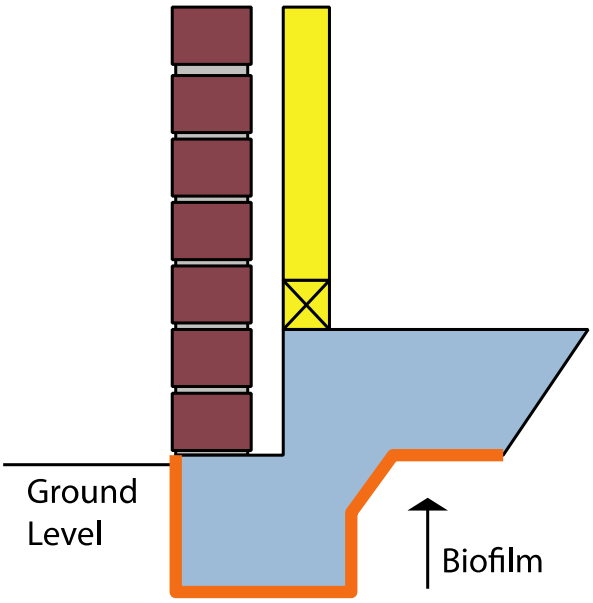
NOTE

When Biofilm is used as the Termite Management System between a joint of two separate concrete slabs (*cold joint*), the Biofilm sheet is to be folded over on itself with the fold at the top of the joint between the two slabs.

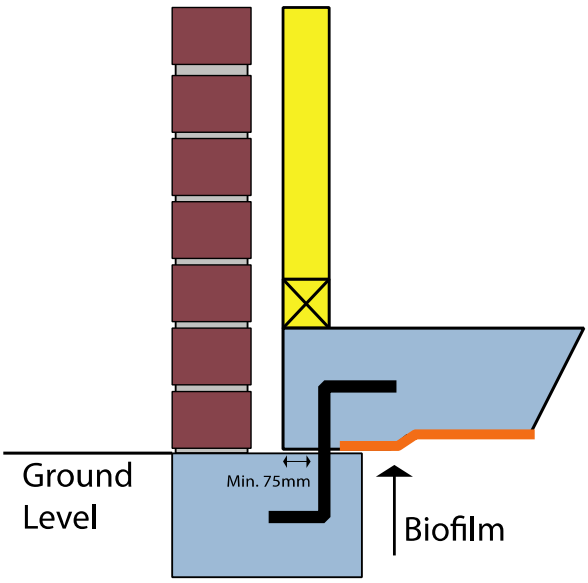


Adhere the sheet to the face of the original slab using pins and/or an approved adhesive, ensuring the vertical section is in contact with the original slab a minimum of 100mm in depth.

Extend the Biofilm a minimum of 300mm under the new slab horizontally.

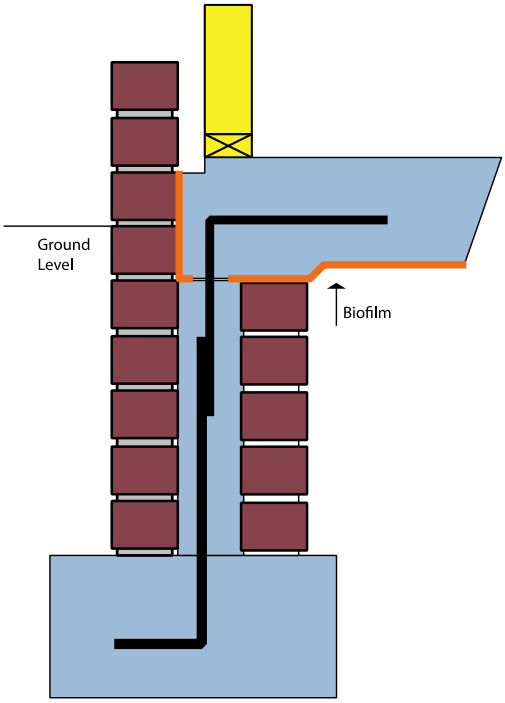


Monolithic Slab

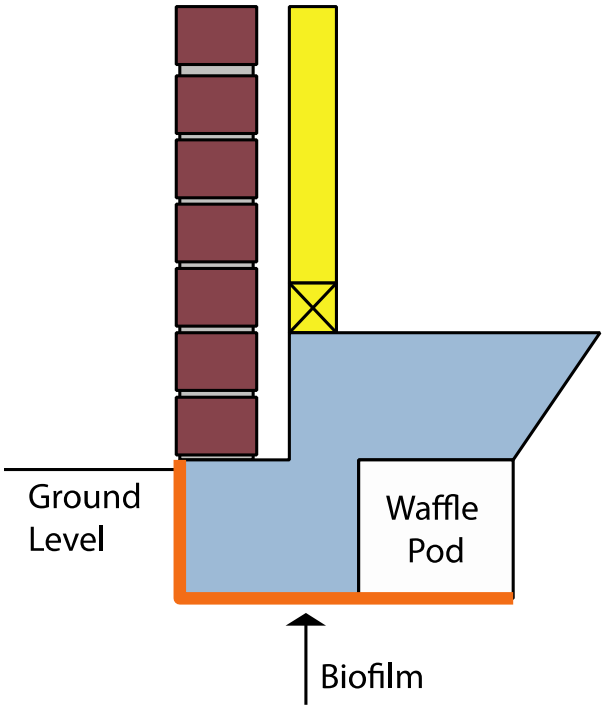


Tied Monolithic Slab

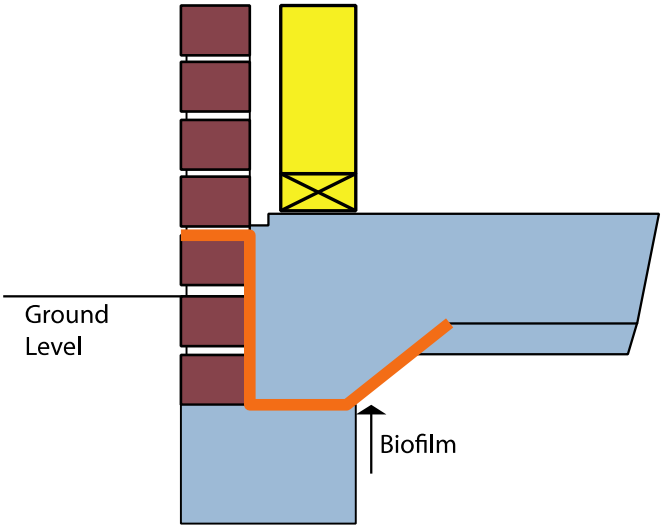
Full Under-slab



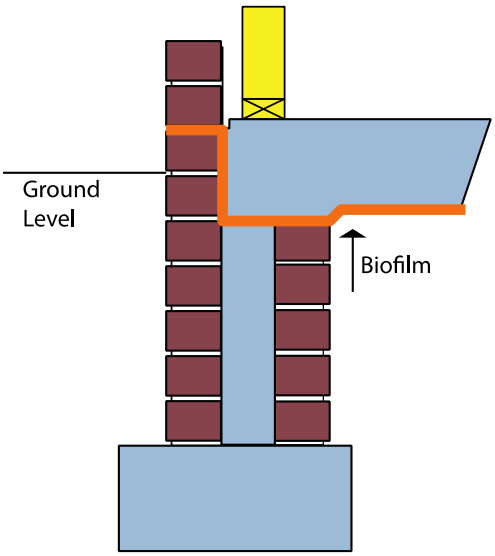
Stiffened Slab with Edge Beam (Monolithic)



Waffle Pod Full Under Slab



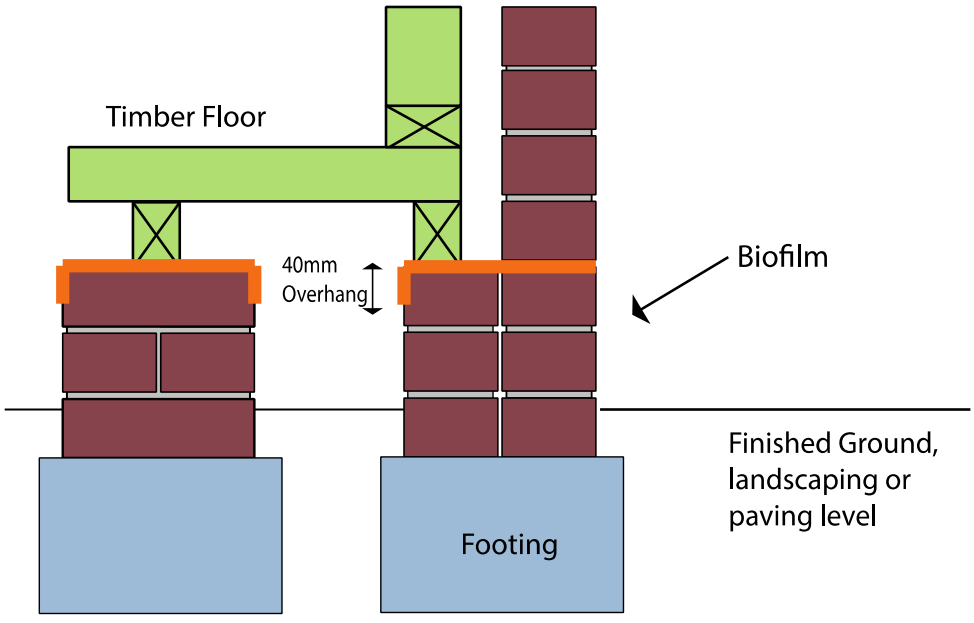
Full Under Slab Infill Non-Monolithic



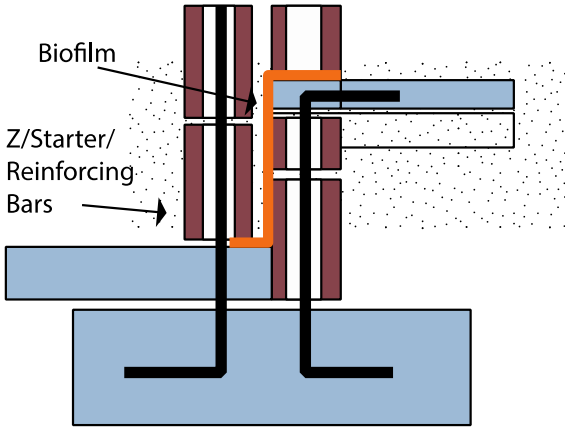
Stiffened Slab with Edge Beam

Suspended Floors

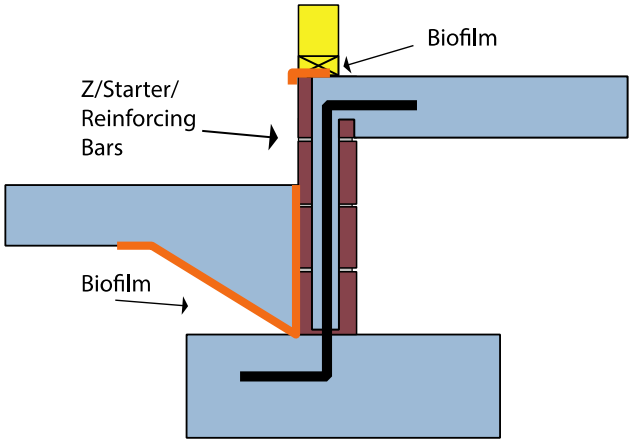
- when installing, Biofilm is to overhang stumps by a minimum of 40mm
- to accommodate an existing pin or thread in a stump, a small hole can be made in the Biofilm to allow it to be forced over the pin and installed.
- only an approved adhesive should be used to attach the Biofilm to the stump; no nails/pins etc.
- Biofilm can be installed between the stump and traditional aluminium or tin termite shield if required.



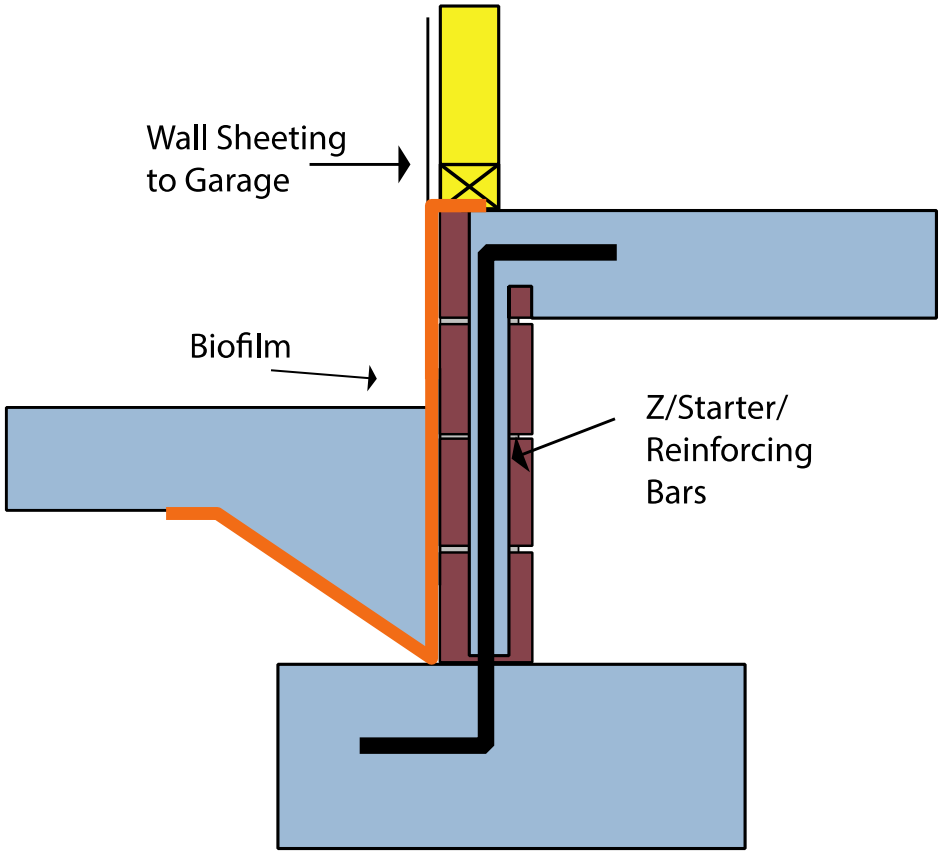
Step Down of Slabs



Garage Step Down
block construction



Garage Step Down
block construction (Var. 1)

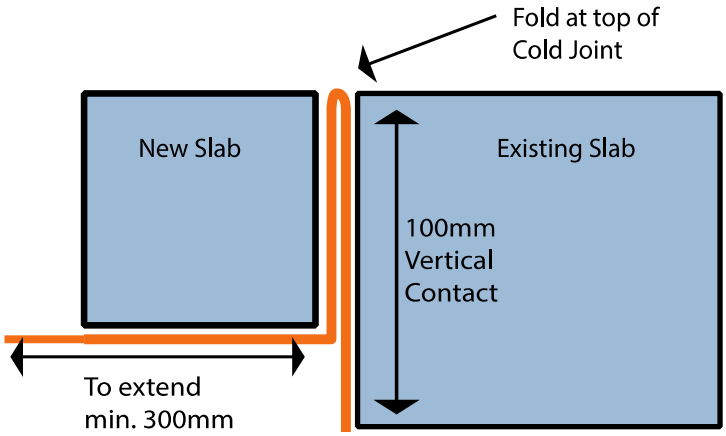


Garage Step Down
Block construction (Var. 2)

Paths and Additions

For existing slabs/masonry to new concrete joints (*cold joints*).

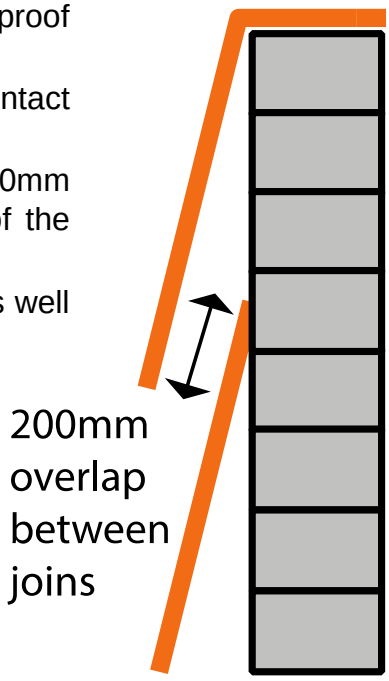
- ensure existing concrete is clean and the surface is even prior to installing.
- adhere one edge of Biofilm to the vertical edge of the existing surface with an approved adhesive with the cut facing downwards so a fold is made at the top of the joint. Ensure a minimum of 20mm is allowed over the upper edge of the new slab.
- adhere all joints with an approved adhesive.
- ensure the Biofilm sheeting runs continuously along the footing and extends a minimum of 300mm horizontally beneath the new slab.

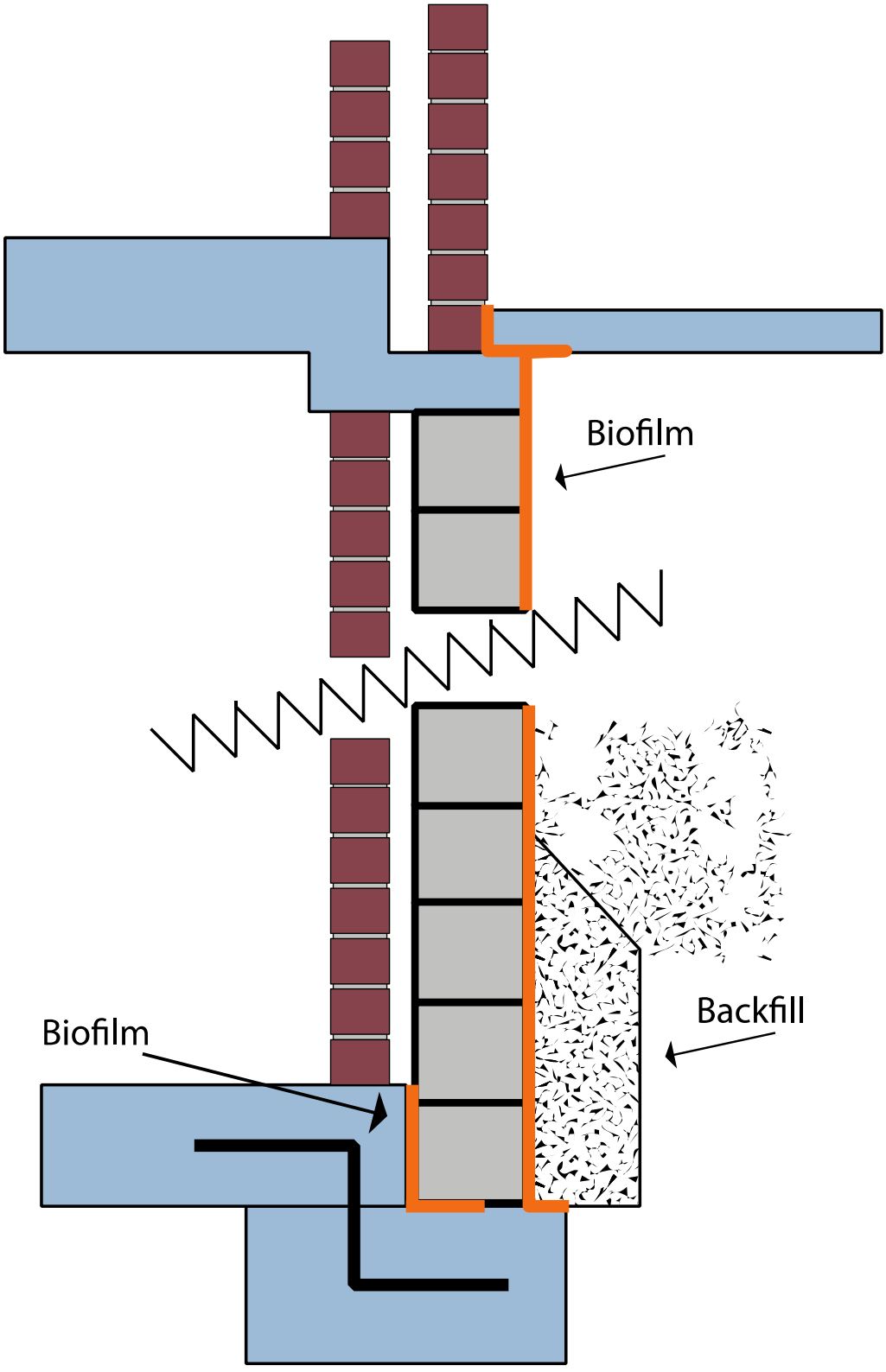


Retaining Walls

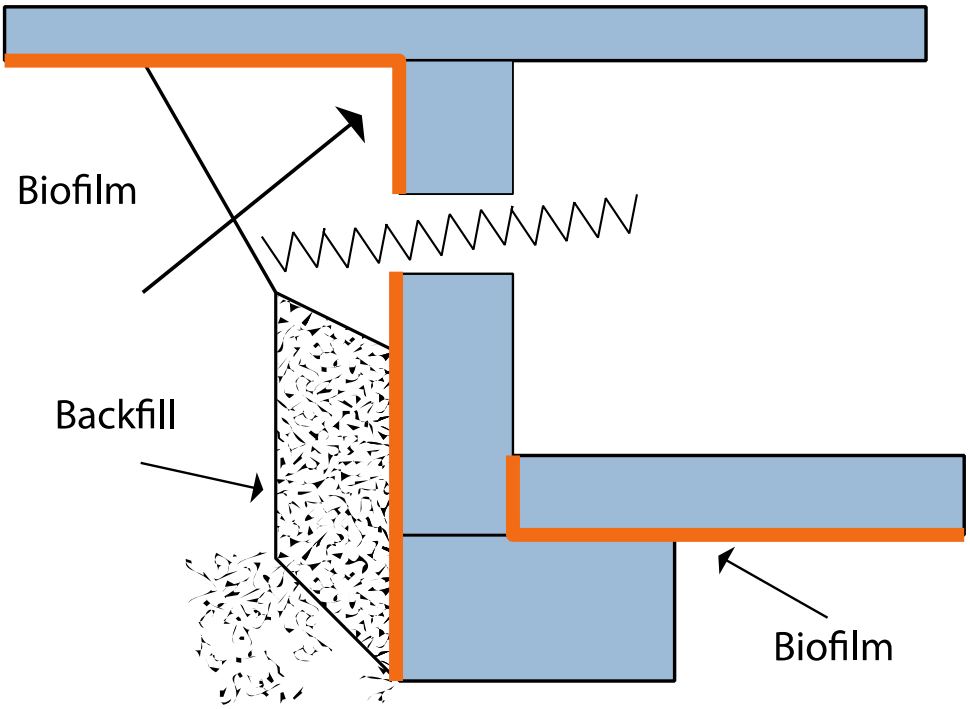
Biofilm is an effective termite protection for use in construction of retaining walls. Any size of Biofilm can be used for such installation, provided that all joins are installed to specification with an approved adhesive and cloth tape.

- Biofilm is installed following the builders' waterproof material's installation to the rear of the wall.
- secure the Biofilm to the top of the wall using contact adhesive.
- ensure all joins of Biofilm have minimum of 200mm overlap and that the upper sheet falls on top of the lower.
- install Biofilm to the base of the retaining wall, as well as across the footing a minimum of 200mm to ensure the base course mortar joint is covered, before being secured to the concrete / brickwork.
- apply the Biofilm to the bottom of the wall and work upwards to ensure any water is voided outside the structure.
- ensure the top section of Biofilm is adhered to the top of the wall with an approved adhesive and/or pins.

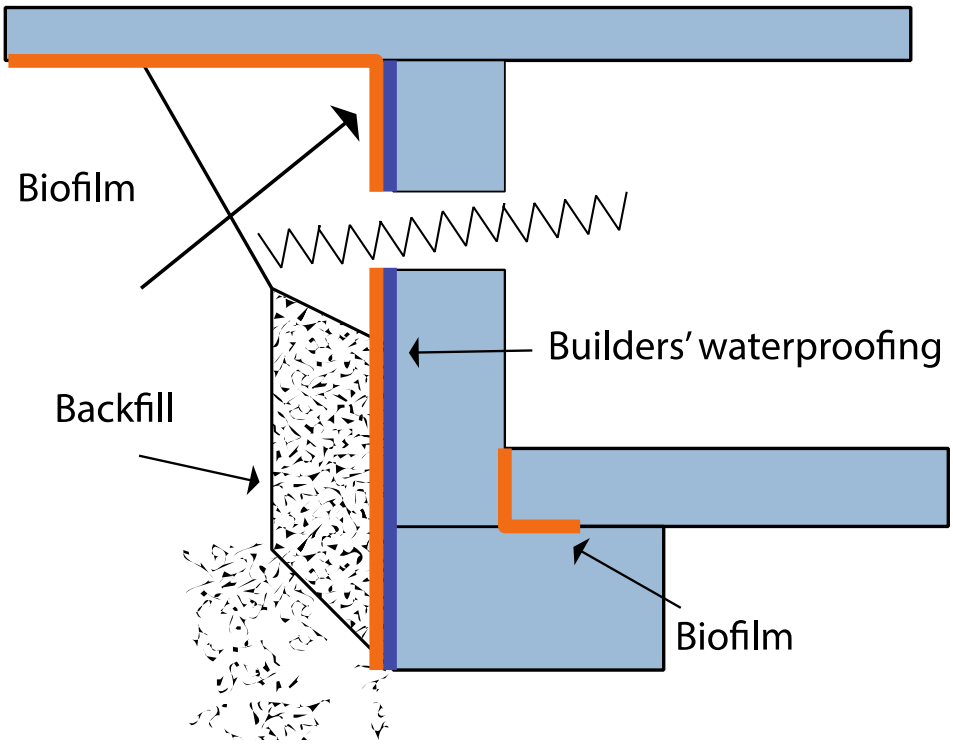




Retaining Wall Biofilm Installation



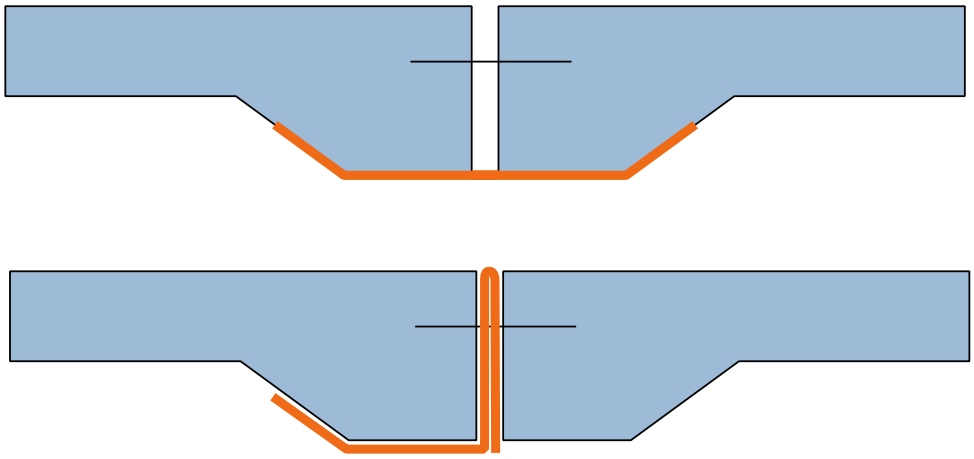
Retaining Wall Biofilm Installation (Var. 2)



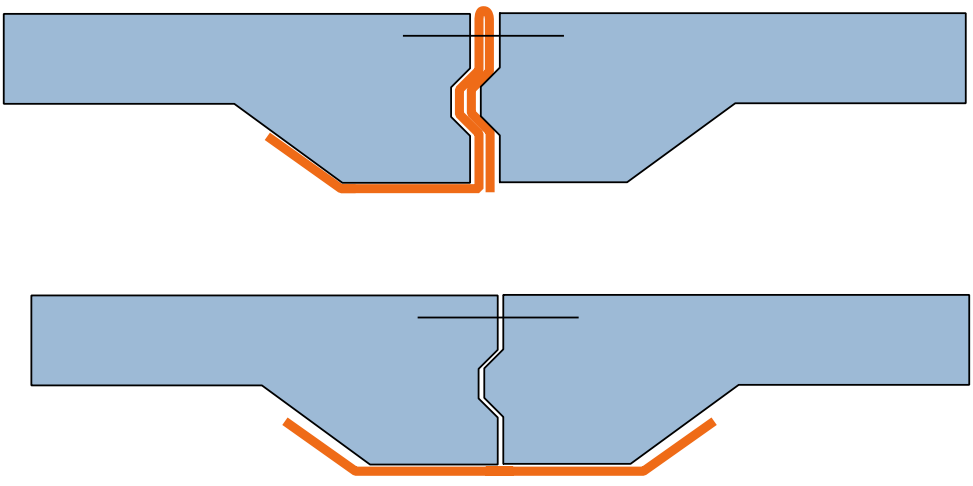
Retaining Wall Biofilm Installation (Var. 3)

Construction Joints & Saw Cuts

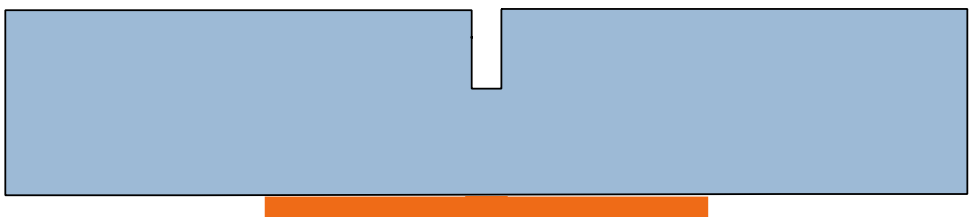
- a minimum of 300mm wide strip of Biofilm is installed directly under the joint using an approved adhesive to attach to the moisture membrane.
- all vertical joints are protected by ensuring the Biofilm is folded over on itself with the fold at the top of the joint between the two joining slabs.



Dowel Joint



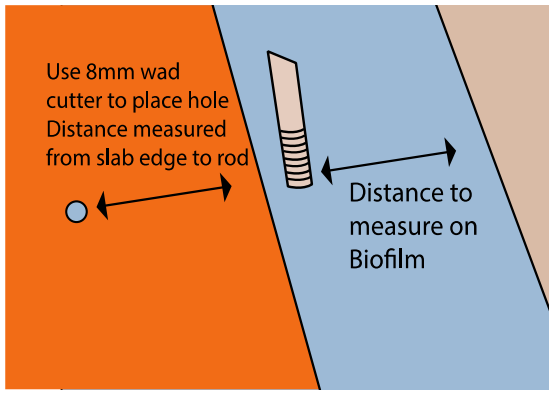
Key Joint

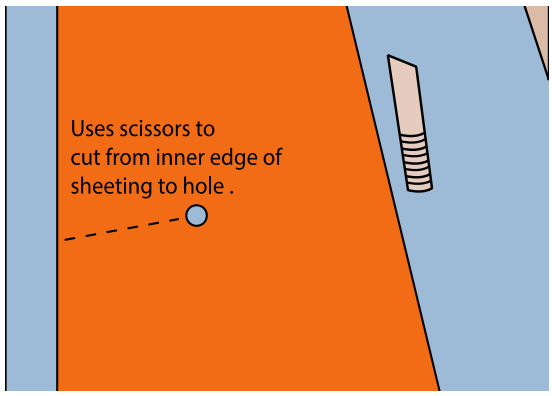


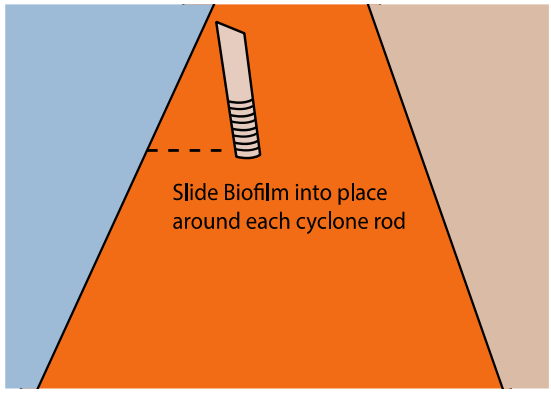
Saw Joint

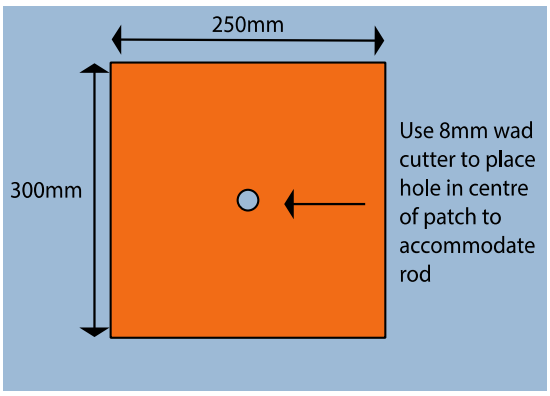
Cyclone Tie-down Rods

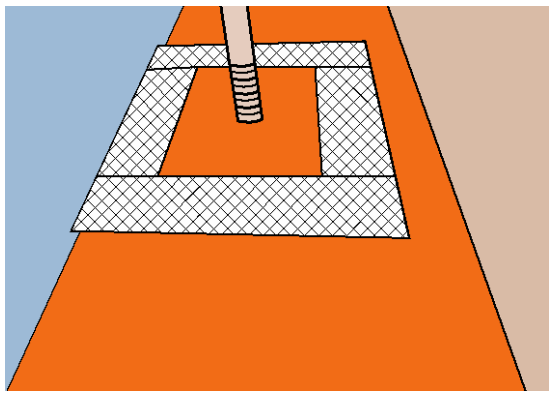
- ensure all loose/rough concrete along the perimeter is removed, paying particular attention to the area around the tie-down rod.
- lay out the Biofilm on top of the slab along the intended installation area.
- mark out each of the tie-down rods locations on the Biofilm.
- measure the distance between the outer edge of the block wall and the rod and mark out on corresponding Biofilm.
- cut a hole in the required area of the Biofilm sheeting at the marks using an 8mm wad cutter.
- from the inner edge of the sheeting, use scissors to slice to the holes.
- starting from the external side edge of the block wall, slide the Biofilm sheeting into place.
- use the 8mm wad cutter to create a hole in the centre of 200mm x 150mm strips of Biofilm to create patches.
- slide the patch over the tie-down rod and flush to the installed Biofilm.
- use cloth tape to secure all edges of the patch to the installed Biofilm.





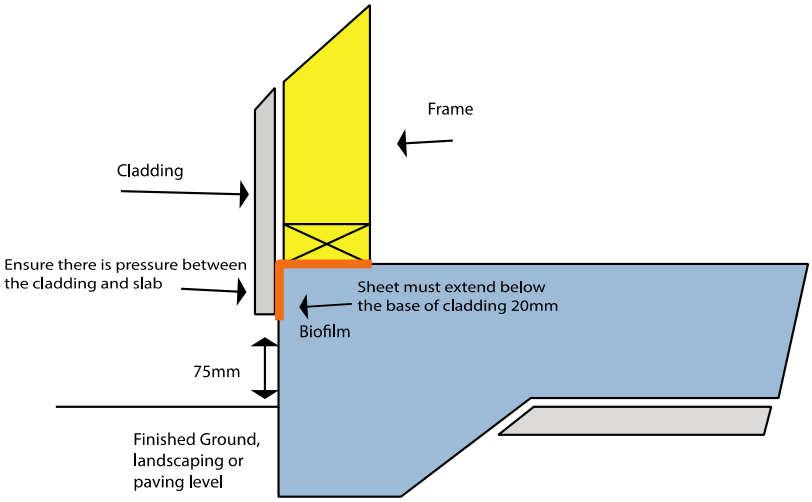


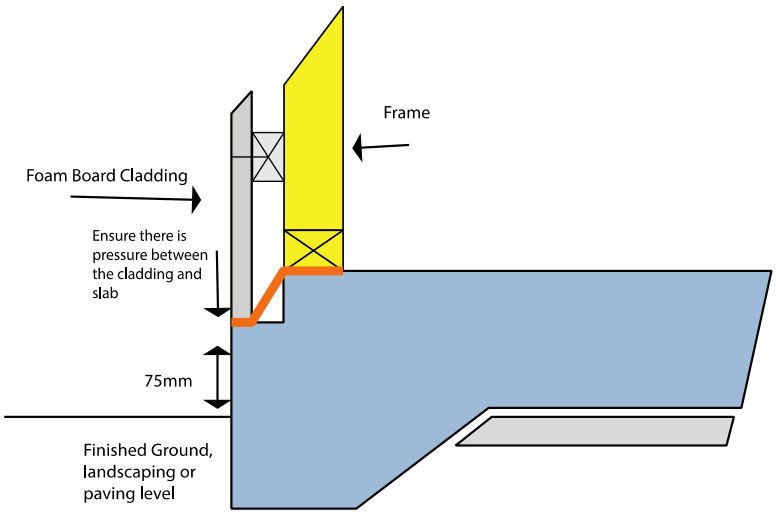


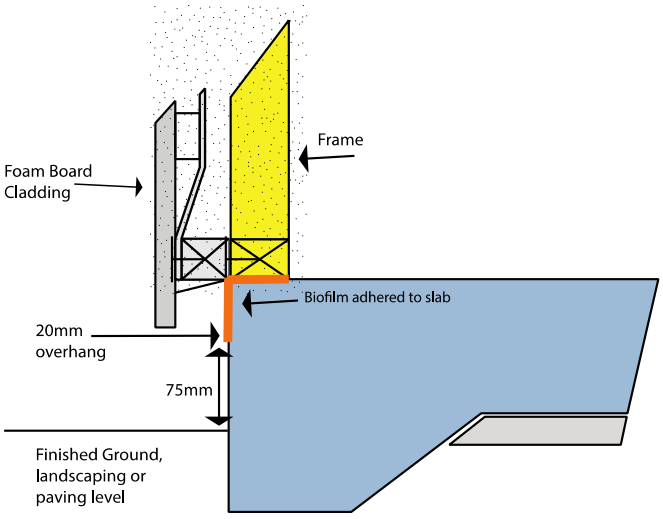


External Cladding

When using Biofilm in conjunction with cladding, ensure there is pressure between the cladding and the slab of the house, and/or adequately adhered to the slab with an approved adhesive/pins.





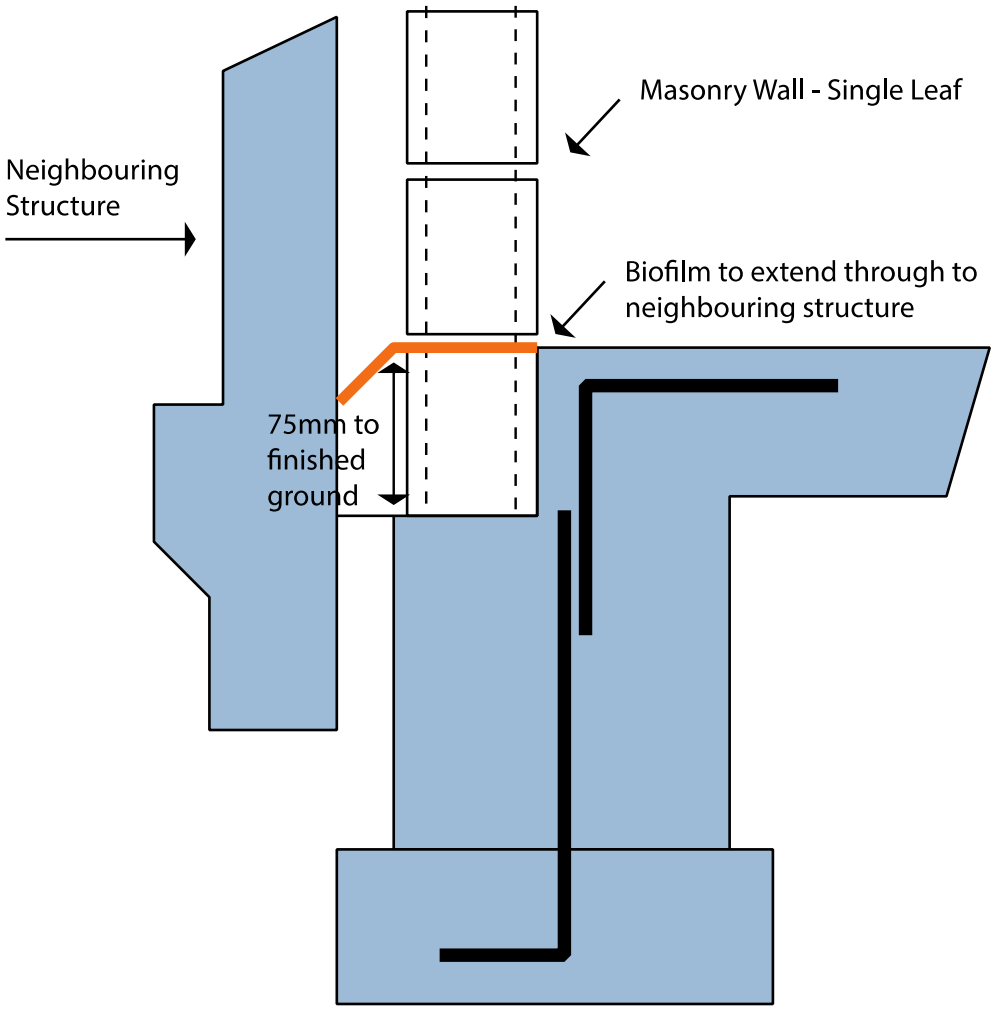


Zero Boundary – Single Leaf Masonry Wall

When using Biofilm to protect a single leaf, zero boundary masonry wall install to the specifications as shown below in the diagram provided.

Note: Refer Appendix A (A1) of AS3660.1 in reference to construction at or near boundary.

Also ensure clear and uninterrupted visual inspection across the inspection zone is maintained as per AS3660.1 Section 2.2.



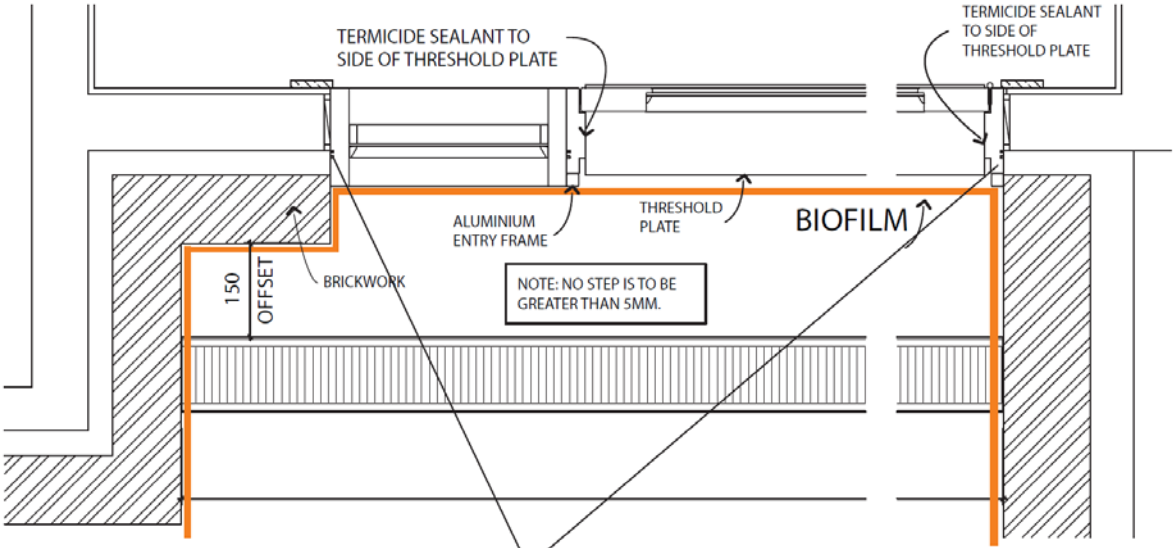
Reduced Inspection Zones

- Australian Standard AS 3660.1, which is called up by the Building Code of Australia as a deemed to satisfy solution for termite barriers, has a requirement for a 75mm inspection distance between a physical barrier and ground level.

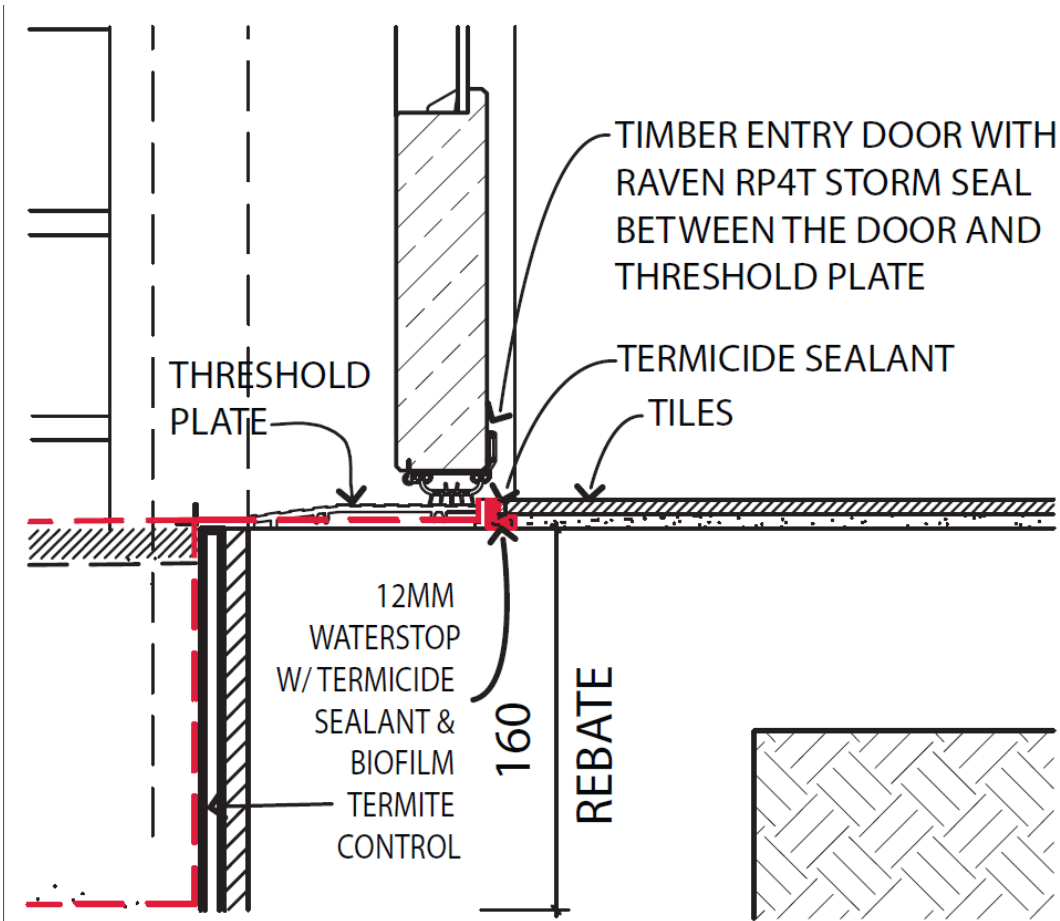
- The surface to which this 75mm clearance relates can be a garden bed. With clearance to a hard surface this distance can be reduced as in a garden bed this clearance of 75 mm could be obscured with garden debris. In several Technical Assessments published by either CSIRO or ABSAC this clearance was reduced to either 25mm or 20mm at doorways and under recessed window sills.

- A further reduction to 5mm can be made where used in conjunction with a secondary barrier, i.e. termite resistant silicon or Biofilm, which is placed under the hard surface. This secondary barrier to be effective would need to extend at least 150mm each side beyond the barrier with the 5mm clearance to the hard surface. It would also need to extend at least 500mm out from the wall where the 5mm height barrier is terminated. This secondary barrier under the hard surface would require the subterranean termites to build mud tubes over the hard surface to gain access the building, thus enabling easy visual inspection of their activity in obtaining access to the building.

- The construction method in the detail attached below will provide a suitable termite proofing solution for the front and rear door access necessary to meet the Australian Standard 3660.1.2014 provided that a secondary barrier Termicide sealant is applied continuously from the aluminium entry frame and threshold plate with attention given to the sheet barrier being terminated at both sides of the threshold plate. This will allow the visible inspection zone to be reduced to 5 mm.



Level Threshold Detail



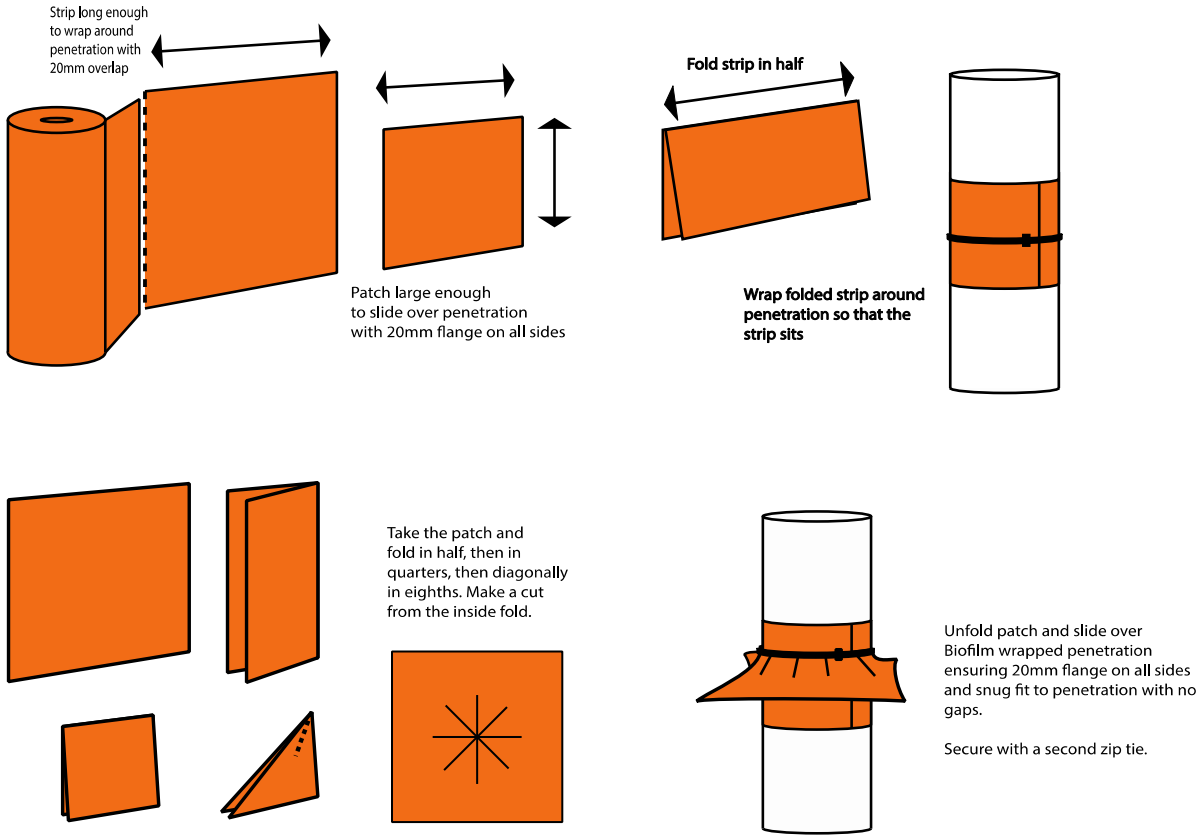
Level Threshold Detail

Penetrations

Using Biofilm Sheeting

When using Biofilm to protect slab penetrations, it is imperative that the Biofilm be in contact with the penetration (pipe or service) a minimum of 20mm and have an annular flange with a minimum width of 15mm on all sides. There is to be no gap larger than 0.4mm between the Biofilm and the penetration at any point. More details can be found in AS3660.1:2014 Section 5.3.6 *Concrete Slab Penetrations.*

- cut a section of Biofilm to wrap around penetration with a minimum of 20mm overlap.
- cut a patch of Biofilm large enough to slide over the Penetration with a minimum of 20mm flange on all sides.
- fold the wrap section in half and wrap around penetration with the fold at the top. Secure with a zip tie.
- fold the patch in half, then in quarters, then diagonally in eighths to create a point.
- make a cut in the Biofilm so that when you unfold the patch you can slide over the penetration to sit snugly on the wrap.
- secure with a second zip tie.
- ensure an annular flange of 20mm is on all sides of the biofilm and that there are no gaps greater than 0.04mm.



Using Biofilm Collars

Biofilm Collars are a physical-chemical barrier for termites for use on slab penetrations. They are a collar made from Biofilm consisting of an annular flange of sheet material with a minimum width of 15mm and minimum height against the pipe or service of 20mm.

How Do Biofilm Collars Work?

The Biofilm Collar is placed onto the service or pipe and cast into the concrete slab.

When used in conjunction with the concrete slab being poured to AS 2870-2011, the Biofilm Collar is a once only treatment designed to be effective for the economical life of the building without re treatment.

Installation Steps

- Ensure the pipe is free from oil and/or dirt.
- Without removing the cap, push the Biofilm Collar over the top of the pipe and slide down to the level of the reinforcing mesh.
- Ensure that there is a minimum of 20mm of concrete surrounding the collar.

