BUILDING WITH TIMBERCRETE

SUPER INSULATING SERIES

In recognition of our commitment to continuous improvement, this document is subject to change without notice. Please check our website for the latest version.

SAFETY ~ *the same care, precautions & professional conduct should be exercised when building with Timbercrete as when building with any other brick or masonry product. In particular, always wear hearing & eye protection when cutting, nailing, and fixing or otherwise working with Timbercrete blocks.*

Index

Introduction 1

The Super Insulating Series Product Range & Function 2
- The Standard Non-Reinforced Super Insulating Series 3
- The Super Insulating Reinforced Series 4
- Functions of the Reinforced Super Insulating Series 5

Building Wtih Timbercrete 7
- Tolerences 8
- Design Considerations 8
- Calculating Window Sizes 10
- Wall Movement 10
- Timbercrete Product Stability 10
- Articulated Wall System 11
- Control Joints 11
- Placement of Control Joints or Articulation Joints 13

Mortar 15
- Mortar Thickness & Compressive Strength 17
- Mortar Flexural Strength or Bond Wrench Strength 17
- Mortar Mixes 17
- Mortar Additives 18
- Selecting & Testing Sand Suitability 19
- Problem Solving 20

Types of Joints 21
- Cleaning & Pointing 21

Positioning Blocks 22
- Batch Colour Variations in Timbercrete 22

Window & Door Lintels 23
- Angle Steel Lintel 23
- Concrete Bond Beam Lintel 24
- Timber Lintel 26
- Timber Sag 27
- Other Lintel Types 27

Window Sill Details 28

Top Plate & Tie down Rod Details 29

Intersecting Walls 29

Slab Details 30

Bond Beam Course 31

Cutting, Splitting and Drilling Timbercrete 31

Nailing and Screwing Timbercrete 31

Stain Removal 32
- Calcium (Lime) and Efflorescence Stains 32
- Hardwood Stains 32

Curing Block & Moisture Content 33

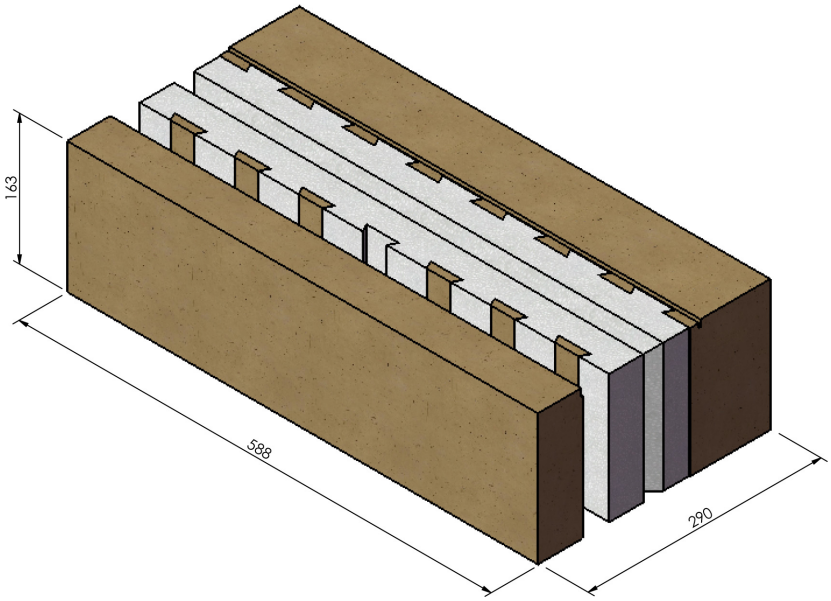
Joinst Hangers 33
Wet Areas 34
Architectural Features 34
Wall Treatments 34
    Internal Wall Clear Sealed 35
    Painted 35
    Lightly Bagged 35
    Heavily Bagged 35
    Rendered 35
Water Tightness 35
Termite Prevention 35
Installing Electrical Services 37
    Power Points & Light Switches 37
Sub-Floor Ventilation 37
Subterranean Blocks 37
Other Timbercrete Brick & Block Types 38
Site Audit on Timbercrete Installation 40
On-Site Audit Checklist (Appendix 1) 41
Notes (Appendix 2) 42

Context

The “Building with Timbercrete” manual should be considered in the context of the recommendation that Timbercrete houses be designed in accordance with AS 3700.

Timbercrete Super Insulating Series Manual

This building manual focuses primarily on Timbercrete’s Large Super Insulating Series Block. We have also included basic specifications on other Timbercrete bricks blocks and panels in the event that you plan to incorporate other types of blocks from our range in your building project.



Introduction

Timbercrete’s super insulating series block is a unique product offering many features and benefits not normally associated with typical double brick or full brick style construction.

The super insulating series block is in effect an insulative double brick or full brick wall system. The patented unique design system incorporates two large veneer bricks connected by a dovetail, high density styrene laminate. Some of the benefits derived from this unique patented design are as follows:

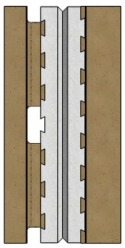
- Superior insulation value (approximately R4) when compared with other masonry insulative double brick wall systems.
- Greater wall stability due to the increased width at 290 mm, compared to 260 mm for a standard double brick wall system.
- The added benefit of each parallel brick being fully interlocked with the styrene core laminate.
- Obvious enhanced structural performance in racking loads and lateral stability especially when incorporating the partly hollowed concrete and steel reinforced series. (Refer to the Super Insulating Reinforced Series).
- Faster installation due to the larger size. There are only 9.52 blocks per square metre whereas a standard double brick wall system requires 98 bricks per square metre. This means that for every Timbercrete Super Insulating Block laid the bricklayer has effectively laid the equal of 10.3 standard clay bricks.

The Super Insulating Series
Product Range & Function

Module: 600 L × 175 H × 290 W. **Joint:** 12mm. **Grid:** 288 + 12mm

Standard Series: Length - 588mm (600 module) & 288mm (300 module)

Standard Block
SIS



Notes:

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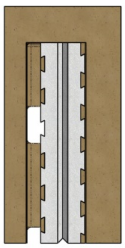
1 End Closed
SIL



Corners & Terminate Openings

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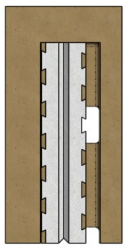
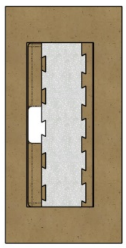
SIR

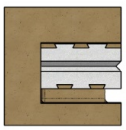


Return Block
Both Ends Closed
SIP

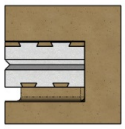


Stacked Piers etc.

Return, Left
1 End Closed
SIL H



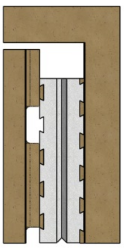
Return, Left
1 End Closed
SIR H



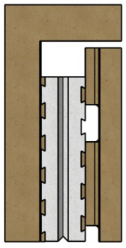
Stacked Piers etc.

Reinforced Series: Length - 588mm (600 module)

Corner Return
Left
SIL CR

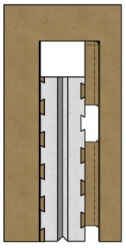


Corner Return
Right
SIR CR



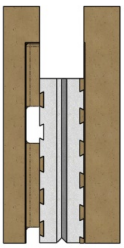
Reinforced Tie Down Corner Cavity.

Reinforced End
1 End Closed
SIER



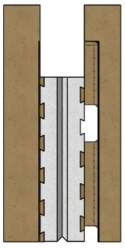
Reinforced End
Closed

Reinforced
Left Side
SI LR



Reinforced Left
Side

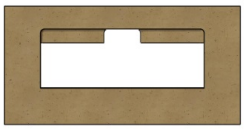
Reinforced
Right Side
SI RR



Reinforced Right
Side

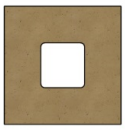
Reinforced Stacked Pier

Stacked Pier Full Block
Reinforced
SI PR



Stacked Piers etc.

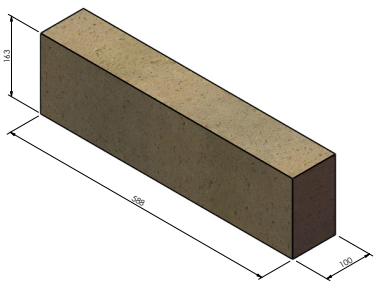
Stacked Pier Half Block
Reinforced
SIH PR



Stacked Piers etc.

Companion Products

Please see 'Smooth Stone Series" for use as an interchangeable veneer brick



1. The Standard Non-Reinforced Super Insulating Series

This series provides an alternative solution for a typical clay fired double brick wall. All blocks in this series are laid with the trough up and closest to the inside.

Horizontal Service Trough

The horizontal trough is designed to accommodate horizontal running services such as:

- Water pipes
- Electrical conduits
- TV antenna cables
- Intercom cables
- Fibre-optic cables
- Hydraulic heating pipes
- or any other horizontal running service

The trough must always be facing towards the inside of the structure and must always be core filled with mortar. Never leave any horizontal trough or vertical core empty. All troughs and hollows must be filled with mortar, even if there is a service conduit in the trough. Filling the troughs will provide an improved and superior structural outcome.

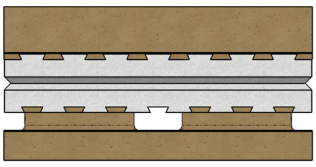
Vertical Services Cavity

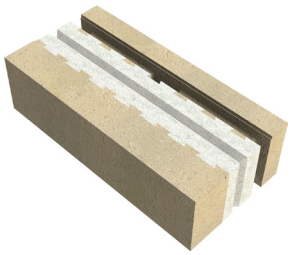
All the Timbercrete super insulating series blocks provide room for a vertical service. The vertical cavity is designed to accommodate the following:

- Vertical tie-down rods, typically 12 mm diameter 'All-thread'
- Electrical conduits
- Vertically running water pipes
- Vertically running hydraulic heating pipes
- TV antenna cable and the like

All vertical service cavities must be core filled with mortar mud. Do not leave the vertical service cavities open. The end of each block has a vertical service hole that acts as an interlocking key when filled with mortar. The interlocking system improves structural integrity.

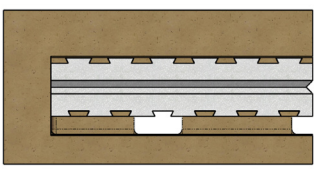
Standard Block (SIS)

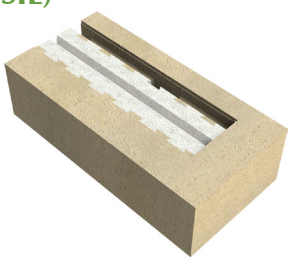




This block typically represents the most common and predominantly used in the series. It is used in every place except where a half brick is required or where walls end at corners, windows, doors, and openings.

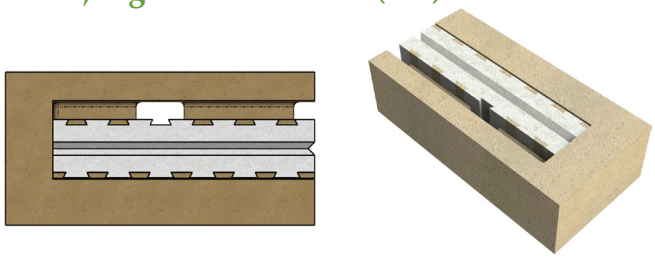
Return, Left 1 End Closed (SIL)





Standing inside the house with trough closest to the inside (or closest to you) facing inwards, this block is a corner block used in left-hand corners. It is also used on the left-hand side of windows, doors, or openings.

Return, Right 1 End Closed (SIR)



Standing inside the house with trough closest to the inside (or closest to you) facing inwards, this block is a corner block used in right-hand corners. It is also used on the right-hand side of windows, doors, or openings.

Return, Both Ends Closed (SIP)

This block is used as a stacked pier. It is a stand-alone block with both ends closed. Always have the trough facing closest to the inside of the house and core filled with mortar.

2. The Super Insulating Reinforced Series

The reinforced series blocks are designed for situations that require extreme structural demands. These blocks contain a hollow core opening measuring 110 mm x 110 mm for corners. Other blocks such as SI LR or SI RR contain a hollow core measuring 200 mm x 110 mm for core filling creating reinforced concrete post supports in walls. If structurally necessary the SI LR and SI RR can be placed opposing each other creating a hollow core cavity measuring 392 mm x 110 mm.

These blocks are to be core filled with concrete using standard practices taught in the BCA as is typical for core filling standard hollow core concrete blocks.

Situations that require higher structural demands include:

- Buildings constructed in areas subjected to very high wind loading such as the cyclonic area of Northern Australia.
- Multi-storey buildings such as apartment blocks where there are higher load bearing, racking loads, and lateral pressures.
- Subterranean walls. All subterranean walls need to be treated to conform to standard practices taught in the BCA. Adopting the same method as other masonry wall systems, being sealed with an approved watertight sealer, covered with a watertight rubber membrane, covered with geo-tech fabric, agg lines put in place and backfilled with gravel and sand.

  Please refer to the Australian Standards and or the BCA (Building Code of Australia).
- Where structures require suspended concrete slabs. In this situation the concrete slab load bears on both:

  1. The inner layer of the Timbercrete block (All troughs and vertical service cavities are core filled with mortar mud to improve load-bearing capacity)
  2. The steel reinforced concrete posts provided by the large hollow core cavity of the SI LR & SI RR.

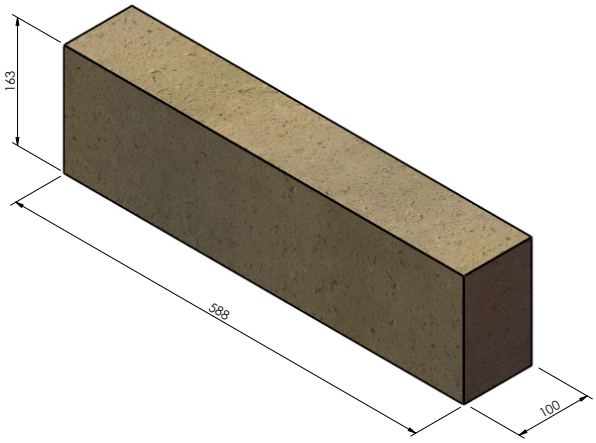
The overall dual composite load-bearing characteristic of the Timbercrete veneer inner leaf and the concrete post will provide exceptional load-bearing capacity. Refer to your engineer as to the number or spacing of the hollow core blocks to be core filled.

Veneer bricks for Horizontal Lateral Reinforcing

Timbercrete's super insulating reinforced series block can be laterally reinforced if necessary. This is achieved by laying two veneer bricks running parallel over the insulating block. The veneer bricks in this series share the same external measurements of 588mm long by 163mm high, however they are only 100mm wide which creates a bond beam course.

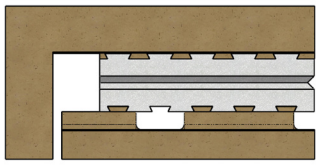
Two veneer bricks laid on the super insulating series block will create a cavity width of 90mm. This cavity (called a bond beam course) can be subsequently core filled with concrete and steel reinforcing rods. The concrete reinforced perimeter trough will be in effect 90mm wide by 175mm high, skirting the structure.

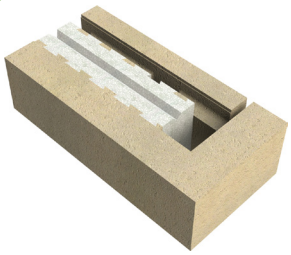
Structurally, the bond beam course works best in conjunction with the Reinforced Super Insulating Series creating a reinforced concrete post and beam structure within the Timbercrete block wall.



Functions of the Reinforced Super Insulating Series

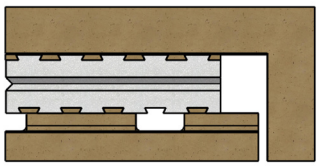
Corner Return Left (SIL-CR)

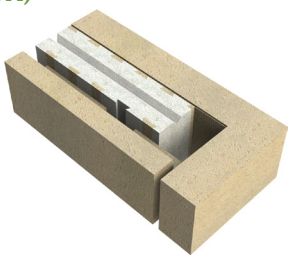




Standing inside the house with trough facing closest to the inside (to you), this block is a corner block used in left-hand corners. It has a 110mm x 110mm hollow core. There is also a handy 17mm wide vertical slot which means that blocks do not need to be lifted up and over the steel reinforcing rod, simply slide the rod through the slot.

Corner Return Right (SIR-CR)



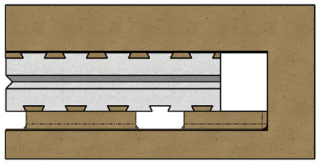


Standing inside the house with trough facing closest to the inside (inwards to you), this block is a corner block used in right-hand corners. It has a 110mm x 110mm hollow core. There is also a handy 17mm wide vertical slot which means that blocks do not need to be lifted up and over the steel reinforcing rod, simply slide the rod through the slot.

Reinforced End Left-Hand Closed (SIE-LR)

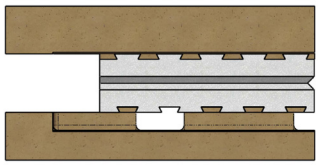
Standing on the inside of the house with the trough facing closest to the inside (to you), this block has a hollow core on the left-hand side of the window, door, or opening. When the block work is completed up to window height or door height, the hollow core will need to be filled with concrete and a centrally located steel reinforcing rod. The column or pier travels the full height of the opening, or up to the window or door height where it can be used to provide structural reinforcing to the lintel course.

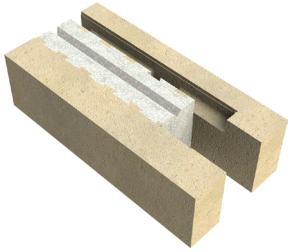
Reinforced End Right-Hand Closed (SIE-RR)



Standing on the inside of the house with the trough facing closest to the inside (to you), this block has a hollow core on the right hand side of the window, door, or opening. When the block work is completed up to window height or door height, the hollow core will need to be filled with concrete and a centrally located steel reinforcing rod. The column or pier travels the full height of the opening, or up to the window or door height where it can be used to provide structural reinforcing to the lintel course.

Reinforced Left Side (SI-LR) & Right Side (SI-RR)

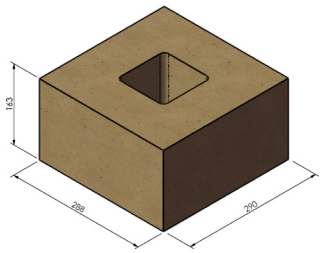


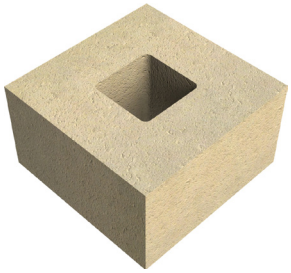


This block creates a cavity for a steel reinforced concrete column or pier measuring 110mm wide by 190mm long (202mm including the mortar joint). This concrete pier provides extra load-bearing capacity for suspended concrete slabs and a bond beam course, as well as providing improved lateral bracing strength. It is a necessary block type for subterranean walls.

When the reinforced left side and right side are placed opposing each other the cavity doubles in size measuring: 110mm wide by 392mm long.

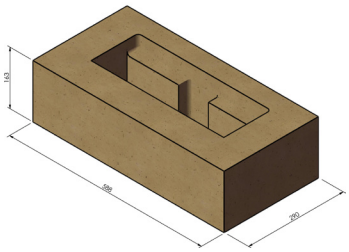
Reinforced Stacked Pier Half Block (SIH-PR)

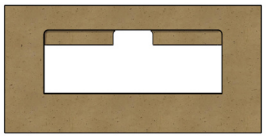




The Hollow Core Stacked Pier Half Block has a cavity measuring 110mm wide by 108 mm long. The half block measures 288mm long by 290mm wide. It is used between windows or doors or when a narrow reinforced pier is required. The hollow cavity must be filled with concrete housing a centrally located steel reinforcing rod.

Reinforced Stacked Pier Full Block (SIF-PR)





The Hollow Core Stacked Pier Full Block has a cavity measuring 110mm wide by 408 m long. The block measures 588mm long by 290mm wide. It is used between windows or doors or when a narrow reinforced pier is required. The hollow cavity must be filled with concrete housing 2 centrally located steel reinforcing rods. The centrally located position of the steel rods is determined by the half blocks. Reinforcing rods must be placed in the centre of the half block cavity.

Building With Timbercrete

‘Clean’ bricklaying can make a difference to your dream home.

Incorrect laying of Timbercrete Bricks

Correct laying of Timbercrete Bricks

Your bricklayer’s and builder’s performance is vital to the final quality and aesthetics of your Timbercrete home. It is essential that they are fully acquainted with all aspects of the enclosed document prior to commencement. In particular, please ensure the block layer is following the simple “On-Site Audit & Checklist” that is attached to this document.

The four fundamentals in achieving the best possible results are:

1. **Observe incremental block laying procedure**
2. **Cleaning off excess mortar during block laying every day**
3. **Use correct timbercrete mortar mix; not you’re favorite mortar**
4. **Only lay blocks after the “use after” date on each pallet**

Ignoring these issues will result in a second rate effect.

All tradesmen should fully acquaint themselves with BCA building procedures. The accompanying recommendations are in no way meant to supplant BCA procedures or good engineering recommendations, but are given as a guide after years of practical experience in the installation of this product.

If ever in doubt ~ please ask us!

Building With Timbercrete

Tolerances

Timbercrete Bricks and Blocks can be manufactured in accurately fabricated steel, plastic and ply moulds. As such we can achieve a tolerance of AS/NZS 4455 tolerance DW1.

However, because some of our products require a 'rustic' visual effect (as in the 'Cobblestone' series), there are no specific tolerances on this range of product, such units are manufactured to AS/NZS 4455 tolerance DW0 (no requirement).

Design considerations

The key to successfully building Timbercrete walls is to work to incremental benchmarks.

That is, both the horizontal and vertical courses need to be laid out in increments of 'one block plus one mortar joint', as per the chart below.

By strict observance of these increments, the finished wall aesthetics will be maximized, waste eliminated and cost minimised.

To design your house to suit the Super Insulating Series increment size, the 300mm/600mm increment should be reflected in:

- Wall length
- Distance between openings
- Distance between corners and openings
- Window sizes
- Door sizes (where possible)

The chart on the following page provides a horizontal and vertical measurement example:

Window or Door Sizes for Super Insulating Series

Timbercrete® **SUPER INSULATING SERIES (.600 Long x .175 High ~ Joint included)**

Actual Block size : .588 Long x .163 High x .290 Wide.
Actual Block size : .588 Long x .163 High x .100 Wide. **Veneer Series Counterpart**

Note; the Textured Stone series shares the same measurements as the smooth stone series, however it comes in a veneer brick only.

Vertical Increments 175mm

Vertical Increments include Block height of 163 mm + 1 mortar joint of 12 mm. = 175 mm

	Block Course	Vertical Increments	
	1	0.175	
	2	0.350	
	3	0.525	
	4	0.700	
	5	0.875	Bench Height
	6	1.050	
	7	1.225	
	8	1.400	
	9	1.575	
	10	1.750	
	11	1.925	
Lintel	12	2.100	Door Height
	13	2.275	
	14	2.450	
	15	2.625	
	16	2.800	
	17	0.350	

Horizontal Increments 400mm

Horizontal Increments include length of block 588 + 1 mortar joint of 12 mm = 600 mm
The mortar joint has been deducted at the end of each wall Increment length.

No of Blocks	Horizontal Increments		No of Blocks	Horizontal Increments
0.5	0.288	No Mortar Joint	9.0	5.388
1.0	0.588	No Mortar Joint	9.5	5.688
1.5	0.888		10.0	5.988
2.0	1.188		10.5	6.288
2.5	1.488		11.0	6.588
3.0	1.788		11.5	6.888
3.5	2.088		12.0	7.188
4.0	2.388		12.5	7.488
4.5	2.688		13.0	7.788
5.0	2.988		13.5	8.088
5.5	3.288		14.0	8.388
6.0	3.588		14.5	8.688
6.5	3.888		15.0	8.988
7.0	4.188	Place control joint	15.5	9.288
7.5	4.488	at every	16.0	9.588
8.0	4.788	4m to 6m Intervals	16.5	9.888
8.5	5.088		17.0	10.188

Using these incremental measurements you will avoid having to cut any blocks.

Window or Door Sizes for single skin or single leaf structures

Window Heights

For window heights select any of the above vertical increment measurements and deduct a 10mm.This is to create a gap between window and the bottom of the lintel. This gap will accommodate vertical movement such as: Expansion, Contraction, or Sagging in the Lintel.

Example:

Courses	8	1.400	Vert Increment
Deduct		0.010	Gap
Deduct		0.090	Sill Brick
Deduct		0.010	Mortar Joint
		1.290	Window Height

Sill thickness can be adjusted to suit standard windows

Window or Door Widths

Multiply any of the FULL 600mm "Horizontal Increments" and add 12mm, representing the mortar joint.

Example : A ~ 2 Full Block Increments

2 blocks	1.200	
add	0.012	(mortar joint)
	1.212	Opening width

Example: B ~ 2.5 Block Increments.

2 blocks	1.200	
1/2 Block	0.288	
add	0.012	(mortar joint)
	1.500	Opening width

Door Openings must be a minimum of 865 mm to suit a standard 810 mm Door

***** Control joints in walls are placed every 4 to 6 metres, depending on the proximity of the nearest window or door.**

Calculating Window Sizes

Where necessary, having your Windows custom-built to work the module of the brick should save you time and money. Remember every time you cut a brick or block, you lose the cost of the area that is discarded as well as adding the cutting costs. Therefore keep cutting to a minimum.

Window width: to calculate the window width, simply multiply any of the module lengths (see chart above) and add the thickness of one mortar joint. The chart demonstrates this in relation to the Large Super Insulating Series.

Window height: to calculate height of windows, multiply any of the module heights (see chart above) and deduct the various amounts for a lintel gap, sill brick and mortar joint. The chart above demonstrates this in relation to the Large Super Insulating Series.

- **Deduct a 10mm gap** between the top of the window and the bottom of the lintel beam. This 10mm gap accommodates vertical masonry shrinkage, or the sagging of the lintel beam.
- **Deduct** the thickness of the **Window sill brick** or tile.
- **Deduct** the thickness of the **Mortar joint** (between the sill brick and the block below).

Wall Movement

ACCOMMODATING WALL SHRINKAGE

It's common knowledge that all concrete masonry products, including Timbercrete, are subject to shrinkage.

The reason is that all cement products are manufactured 'wet'. As moisture is lost over time shrinkage occurs. Clay fired products such as bricks expand over time; because clay fired products are manufactured and then fired. When they come out of the kiln they are completely dry, but take up moisture from rain and humidity, and then expand. As a result walls made with clay fired bricks grow in size; that is, expand. This problem is addressed by the installation of expansion joints.

Timbercrete is a cement based product manufactured wet. Because shrinkage in cement based products is three dimensional, provision needs to be made to accommodate these phenomena. Most movement will be seen on the horizontal plane (length) and some on the vertical (height) and a fraction on the width (depth). Walls tend to be longer than they are in height, and higher than they are wide, which means that shrinkage is mostly seen in the horizontal, and then the vertical, planes. Therefore houses and walls must be designed and constructed to accommodate movement especially with regards to contraction or shrinkage.

Timbercrete Product Stability

Providing all Timbercrete blocks used in construction are completely cured (as indicated by the "Use After" date clearly indicated on every pallet of blocks), and providing the correct mortar mix and other procedures in accordance with this document are followed closely, there is no reason to anticipate wall movement other than that caused by potential movement of slab or foundations.

Confidence in wall stability is based on 4 points:

- The Timbercrete product is fully cured before laying
- Timbercrete recommended blended Sands demonstrate no shrinkage cracks
- No unauthorised additives are being used in the mortar
- Control joints or articulation joints are being placed in the wall every 4 to 6m.

Articulated Wall System

Timbercrete recognises the Achilles heel of building with masonry products is cracking. This can be a result of movement typically caused by a change in weather conditions from wet to dry or vice versa, called 'Ground Swell' or 'Ground Heave' generally caused by increased moisture content in reactive soils.

The expression 'Dishing' or 'Doming' describes the phenomena caused by a 'Ground Swell'. With increased water content in the soil a raft slab can be hydraulically forced into a dish shape. Conversely during an increased or prolonged dry period the perimeter of the slab is contractually forced into a dome shape as reactive soils contract around the perimeter while remaining moist in the centre of the slab.

Other forces that cause wall cracking include:

- Brick expansion or 'Brick Growth' which occurs as clay fired bricks take on moisture.
- 'Creep' which occurs as cement masonry products such as concrete blocks or Timbercrete contract minutely and consecutively as a result of dehydration and curing. This causes the wall to contract causing a crack in the wall typically above door openings and window openings (above and below). The amount of shrinkage in cement masonry products is miniscule (fractions of a millimetre) and individually does not pose a problem, however the cumulative effect of fractional shrinkage can result in a significant crack.
- Mortar shrinkage or contraction. Mortar shrinkage poses the most severe shrinkage issue in cement masonry products. Unlike the masonry blocks you have purchased which have time to contract as they dry out or cure, mortar is laid wet and shrinks subsequently after blocks are laid, especially when using fine particle sands or sands that have a high clay content (more than 5%).

Due to the above influencing factors and others not mentioned here that lead to wall movement and cracking, Timbercrete recommends that all walls be constructed with articulation joints (such as control joints or expansion joints) to accommodate movement and minimise or eliminate cracking. Design and build using an articulated wall system.

With articulated wall systems, footings and foundations can be reduced in size saving you money. These systems allow various parts of the wall to move in a segmental or panel like fashion, the wall in effect will flex in the joints rather than crack.

Simply put with regards to foundation and wall designs it is a choice between an expensive stiffened raft slab and a rigid or non-flexible wall, or a less expensive articulated foundation and slab design with an articulated flexible wall.

For further information please refer to: Cement Concrete & Aggregates Australia
www.ccaa.com.au (http://www.ccaa.com.au/publications/pdf/TN61ArticulatedWalling.pdf)

Control Joints

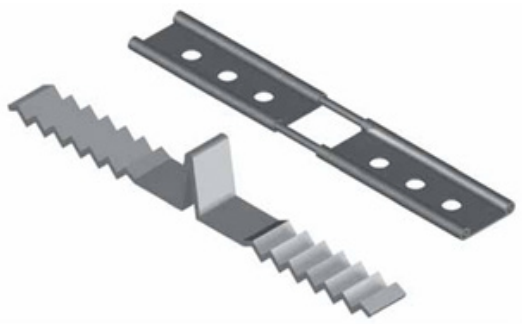
You will need a vertical control joint which is strategically placed in the wall to accommodate shrinking on the horizontal plane. The joint will need to be placed at approx 4 metres apart where there are windows or doors , and up to six metres apart in walls where there are no windows or doors. This is commonly achieved by creating a 12mm gap in the wall where the mortar is not placed in the perpendicular joint, and every alternative course utilising the half block.

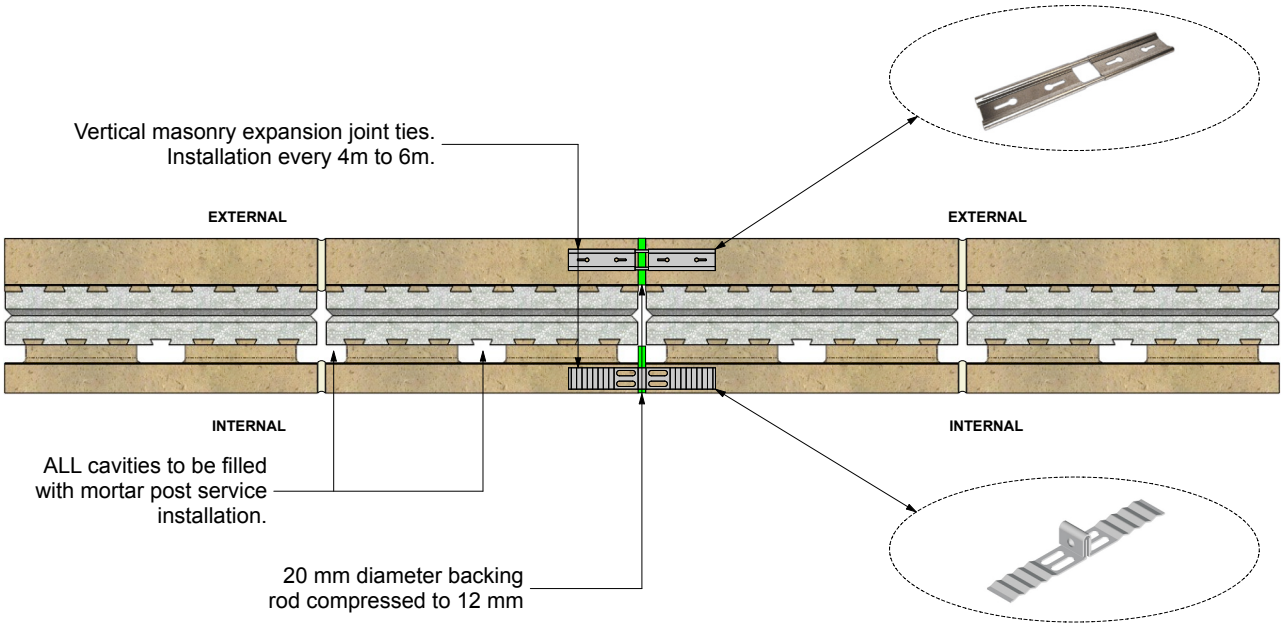
The 'gap' will tend to open rather than close because typically the wall will not expand, only contract.

Control joints are installed as follows:

- The M.E.T.s (type 3-3) should be screwed into position using 30mm Tec screws.
  Timbercrete can be easily screwed into (just like timber), without the need to pre-drill. Mortar is then laid across the top of the M.E.T. tie.

There are several types of control joint ties , illustration here:>





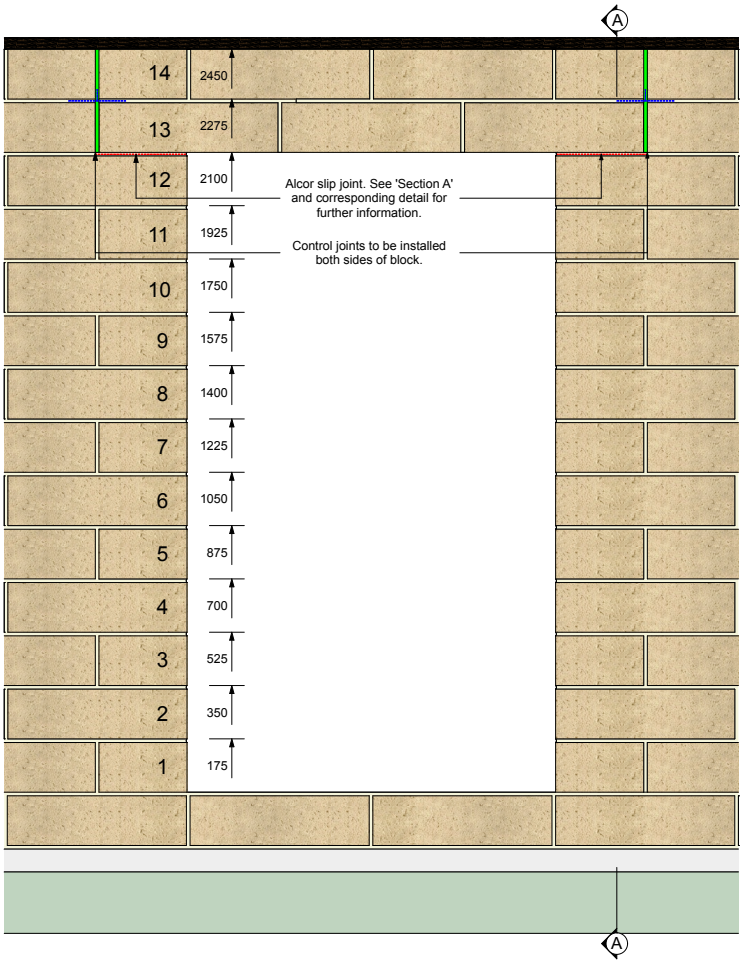
Purpose designed waterproof flexible control joint filler should be used to fill in the gap. The colour matched compound is forced into the control joint on both sides of the Block to seal off against water ingress.

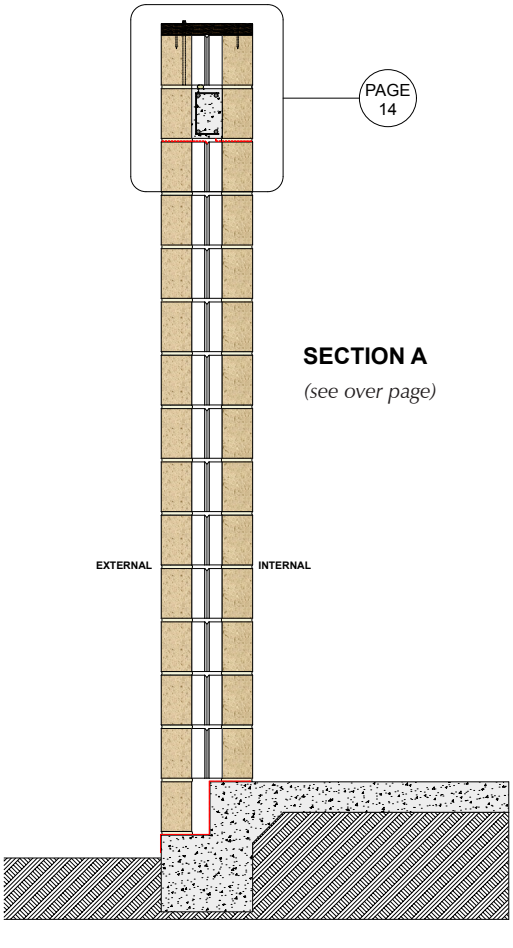
To save using large amounts of Flexible Joint Filler, a compressible 20mm diameter foam strip can be jammed into the 10 or 12mm wide control joint cavities prior to adding the flexible joint filler.

Placement of Control Joints or Articulation Joints

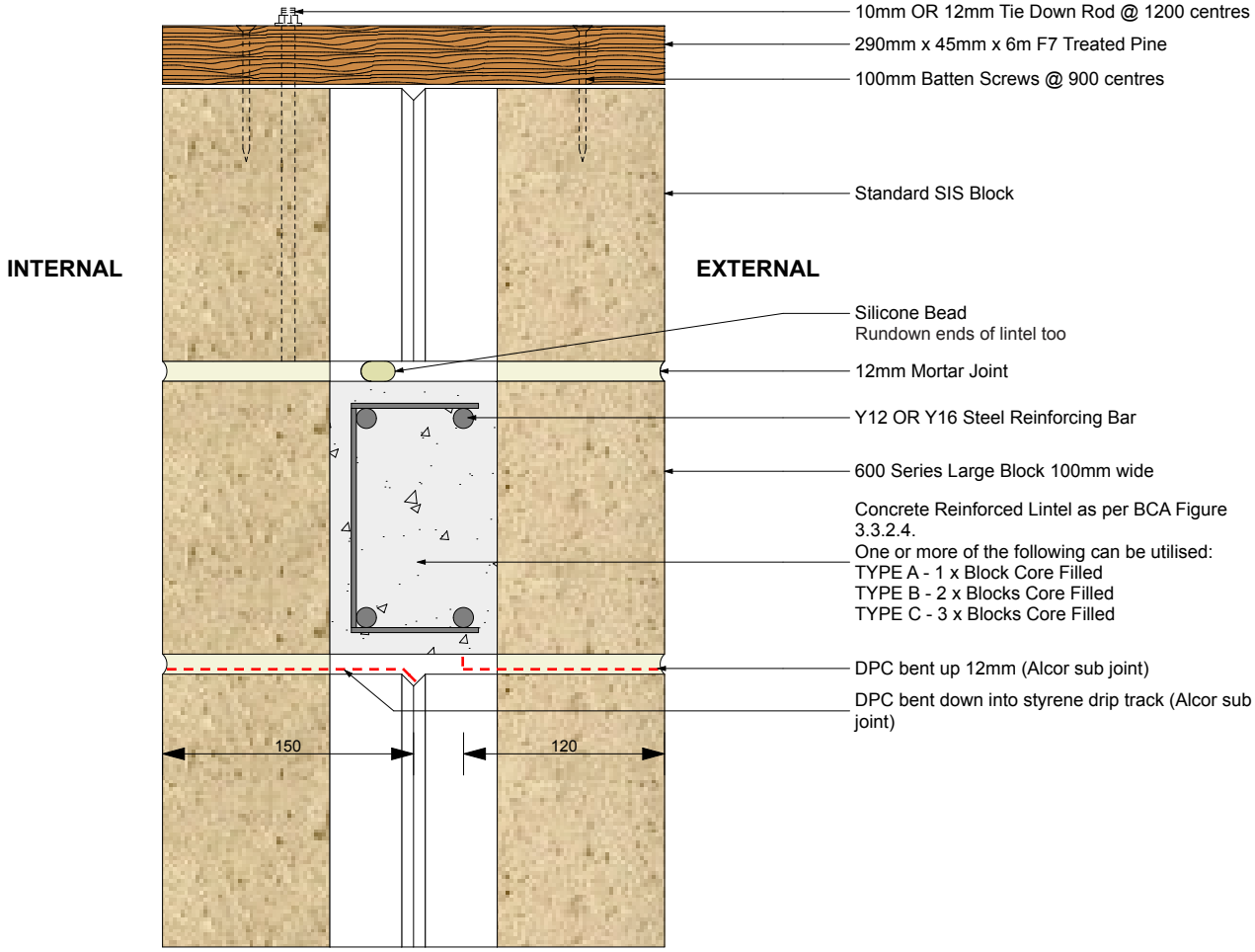
Windows and doors can be a handy and unobtrusive position and represent a natural joint location. For example, a control joint could be installed from the top of a door to the top of the wall, allowing the door space to form part of the control joint. The same principle applies for above and below windows. Remember, when using timber lintels, run the control joint to the outside edge of the timber lintel.

An aesthetically pleasing and cost-effective way to place a control joint is to end all the block work at the door openings or window openings. A timber frame can be constructed above windows and doors which can subsequently be clad with decorative products such as mini orb, colour bond or other cladding products. This practice is widely adopted throughout New Zealand where severe ground movement is prevalent.





SECTION A



For further information please refer to: Cement Concrete & Aggregates Australia
www.ccaa.com.au (http://www.ccaa.com.au/publications/pdf/TN61ArticulatedWalling.pdf)

Ensure your Engineer is satisfied with the above information relating to Control Joints, and incorporates the appropriate standards in your particular plans and Specifications.

Mortar

Mortar Sands can be very problematic, with some sand types exhibiting severe shrinkage issues leading to cracks in the mortar joint. Tests have shown that a standard M3 grade mortar (6 sand, 1 lime, 1 cement) will shrink a staggering 16 mm per lineal metre. While other sand types can be highly porous and difficult to work with.

This photo shows a typical M3 grade mortar (6:1:1) with a fine or fatty (loamy) brickies sand, shrinking as much as 16mm over 1m. Note the darker colour sample.

The white sample is also a typical M3 grade mortar (6:1:1) however this sample only shrunk about 6 mm over 1 m. This is still enough to cause severe cracking in walls.

This photo shows a shrinkage comparison test between the Timbercrete mix (the lighter colour sample) and a standard M3 grade mortar (6:1:1) using a fine or fatty brickies sand.

Note: in this test the Timbercrete sample showed no shrinkage whatsoever. Although shrinkage cannot be seen in this test, other tests have confirmed that Timbercrete does shrink fractionally over a three month period.

To remedy the shrinkage issue resulting from fine or fatty Sands, your local Timbercrete manufacturer can recommend or supply tested blended sands that are far less likely to shrink and crack.

The following statement is an excerpt from the Concrete Masonry Association of Australia; MA 45 Concrete Masonry Handbook 2013:

1.3 Mortar

The sand used in making the mortar used for blockwork should not be the same as commonly used in mortar for brickwork. 'Brickies loam' contains clay particles which make the mortar more workable, but also causes high shrinkage in the mortar. Clay masonry units tend to expand, which compensates for the shrinkage in the mortar. Concrete masonry units shrink, so that if they are used with a mortar with high shrinkage, cracking may result.

For this reason, the sand used in mortar for concrete blockwork should be clean sharp sand, such as clean pit sand, masonry sand or plasterer's sand.

Tests have shown that the sand can contain up to 10% fines but it should not contain any clay particles. (See Clause 3 Mortar and Mortar Joints).

3.1 Mortar

- *The mortar should be batched accurately using some consistent form of volume measurement.*
- *The sand used in the mortar should be clean pit sand, masonry sand or plasterer's sand. Clayey loam or sand containing organic impurities will affect the mortar strength and should not be used.*

• Mortar should be discarded and not retempered, after the initial set of the cement has taken place.

• Admixtures. Caution should be exercised when using plasticisers or workability agents. They should only be used if specified by the architect or engineer and then strictly in accordance with manufacturer's instructions.

Detergent should never be used.

Notes:
1 Methyl Cellulose water thickener is used to prevent the rapid drying out of the mortar thus improving its workability as well as increasing bond strength. It does not have the detrimental effect of the plasticisers. It is available under the trade name of DYNEX or similar.

Talk to your local Timbercrete supplier for the availability of pre-blended Sands, off-white cement, and mortar additives. Ideally these products should be sent out on the truck along with your bricks or blocks. Some Timbercrete manufacturers can supply our pre- tested recommended Sands in Bulka bags on pallets.

The recommended mortars are both M3 mortars. This is based on AS 3700.

We also acknowledge that construction in some locations (e.g. severe marine environments within 1km of a surf coast or 100m of a non-surf coast) will require M4 mortar.

** Note when changing the cement/lime proportions to reflect a M4 grade, be sure to use the same sand selection and testing procedure. (See below)*

Mortar Thickness and Compressive Strength

- AS 3700 Clause 4.9.1
- Independent tests demonstrate that the Characteristic Compressive Strength ($f'uc$) of Timbercrete Masonry is over 5MPa.
- For your engineer: The Characteristic Compressive Strength of Masonry, f'm, determined from AS 3700 Clause 3.3.2 and Table 3.1 should be modified by appropriate adjustment to km.

Mortar Flexural Strength or Bond Wrench Strength

Mortar Mixes A & B (below) are a 'M3 Grade' and have a Flexural Strength or Bond Wrench Strength of 0.36MPa.

Even though test strength of 0.36MPa has been previously determined, it is recommended that design be based on a Characteristic Flexural tensile Strength, f'mt of 0.2MPa. This is because design based on 0.2MPa does not require any further site control, but design based on 0.36MPa would need to be treated as 'special masonry', with increased site control in accordance with AS 3700 Clause 11.7.

Mortar Mixes

Important - Use the same mortar mix for all Timbercrete bricks and blocks regardless of the size or type.

Warning! Fine particle sands and Fatty sands are the main cause for shrinkage cracks in mortar joints. This can be simply eliminated by observing the following:

There are two mortar mixes listed below. If Aalborg White cement/lime mix is available, use Mix A. If not, use Mix B. Both these mixes are M3 grade.

Mortar Mix A.

- One 20kg bag of Aalborg White* mortar mix (cement & lime combo).
- Four 20 litre buckets of mixed sand (the sand should be a 50/50 mix of two types: 50% pre-washed coarse sand, and 50% local yellow fine Brickies sand. Most sand suppliers will deliver this sand pre-mixed if requested).

Waterproof Mortar Additives

- For a waterproofing agent use TECDRYAD mortar additive as per the recommended dosage.

Mortar Retardants

- During hot/windy conditions add Dynex or Pozz 400 RI, to prevent the mortar from going off too quickly. (Use the cup that comes with Dynex). Or Dynex may also be used as a water thickener.

Colour Additives

- 1½ to 2 cups (500ml total) of yellow oxide to each batch, alternatively other colour as per colour taste.

* Aalborg 'Bricklayers White' is a mixture of white cement and lime and is normally available from your local Timbercrete supplier.

Mortar Mix B.

- One 10 litre bucket off-white cement (13kg)
- One 10 litre bucket lime (6.6kg)
- Three 20 litre buckets of mixed sand (the sand should be a 50/50 mix of two types: 50% pre-washed coarse sand, and 50% local yellow fine Brickies sand. Most sand suppliers will deliver this sand pre-mixed if requested).

Waterproof Mortar Additives:

- For a waterproofing agent use TECDRYAD mortar additive as per the recommended dosage.

Only use Timbercrete recommended admixtures (such as) 'Techdryad Mortar Additive' (available from your nearest Timbercrete supplier).

WARNING ~ Be certain to BATCH the ingredients into buckets first – don't just throw shovelfuls into the mix, or the proportions will be inaccurate and the mortar strength and colour will vary.

- **Note – The sand particle size can be up to 6mm diameter. As a general rule the thicker the mortar joint the larger the particles. Ideally, particle size of the sand mix should be variegated from very fine to very coarse, up to 1/3 of the thickness of the joint.**
- **Note – When using our veneer bricks such as the Smoothstone Series or Texturedstone Series with a 12mm joint, the sand particle size variegates up to 1/3 of the thickness of the joint (up to 4mm in diameter). The larger particle size up to 6mm in diameter is also workable with these thinner joints providing that you iron the joints.**

Do NOT use a fatty (or predominantly fine) Brickies' sand straight, as this will result in high shrinkage and joints cracking.

Hot Weather Mortar Additives

To maintain the workability of the mortar, especially in hot or windy weather, **DYNEX** (Mortar flex) or **Pozz 400Ri** may be added to the mortar mix. These additives will not compromise the structural integrity or bond wrench-ability, and are normally available from your local Timbercrete manufacturer.

Dynex can also be used as a water thickener when using clean washed sand with no clay content.

WARNING: DO NOT USE FATTY BRICKIES SAND STRAIGHT with Timbercrete

WARNING: DO NOT USE BICOL or any other detergents in mix with Timbercrete

WARNING: DO NOT USE any MORTAR ADDITIVES unless approved by Timbercrete

Selecting & Testing Sand Suitability for Timbercrete Mortar

- Test the sand/mortar mix for excess shrinkage BEFORE you lay a block.

Procedure

1. Select a very coarse washed (river) sand 2.1 litres by volume. Note - the ideal large particle size is up to 1/3 the size of the mortar joint. Therefore if the mortar joints are approximately 20mm (as per the cobblestone series) the large particle sizes need to range from 6mm or 7mm down. This is typically a washed River Sand.

2. Select a typical brickies Loam (sand), 2.1 litres by volume.

   Note - this sand will be smaller in particle size and contain some clay, approximately 10% of total fines is standard. (see photo above)

3. Cut out a piece of ply board (not laminated) 15mm thick by .500mm by .500mm. Nail four strips of timber around the outside of the ply to a height of 15mm. **Do not seal or coat the board**. (see photo below)

This is a simple tried and proven method that has been used throughout Europe.

4. Knock up a small batch of mud with the selected sands intended to be used.
5. The mix being; Mortar mixes A. (4.1.) or B. (6.1.1.) both are a M3 grade.

Mortar Mix A

- 2.1 litres of Coarse washed sand
- 2.1 litres of brickies sand
- 1.05 litre of Aalborg White mortar mix (1 litre + 50ml) (cement/lime mix)
- enough water to make a workable mix

Mortar Mix B

- 2.1 litres of Coarse washed sand
- 2.1 litres of brickies sand
- 700ml of off/white cement
- 700ml of Builders lime
- enough water to make a workable mix

Place the mortar mud on the test board and level with a screeding tool, screed off any excess. Place the test sample inside for one week. If there is going to be a cracking problem it will show up within the week. (Do not cover the test sample).

To contrast the performance of difference sands select a fine or a fatty sand and repeat the exercise.

Fine and fatty sands will crack severely as in the tray on the right, whereas the correct sand exhibits no cracking or shrinkage.

Problem Solving

If cracks still appear after blending the two sands then the overall (average) particle size is too small, or the clay content of the fatty sand is too high. Remedy - try a 3 part blend:

- 1 part coarse washed sand (1.4 litres)
- 1 part washed sand (1.4 litres)
- 1 part fine or fatty sand (1.4 litres)

It will take up to a week for a result.

Finally, your local Timbercrete manufacturer will have already spoken with his local sand supplier to arrange what we refer to as 'The Timbercrete Blend' that you should be able to purchase. However it is still advisable to carry out this test because sands have a habit of changing without notice.

Types of Joints

Several different visual effects can be achieved by varying the technique for 'raking' or 'ironing' joints (or a combination of both) after blocks have been laid.

When ironing joints, we recommend a plastic teaspoon. The size and flexible nature are ideal for the wider joints of our cobblestone series. Ironed Joints leave the mortar slightly concave to the blocks.

When building with our single skin range we recommend smooth 'ironed joints' on internal and external walls. Ironed joints are far more water tight than raked joints, plus the fact that dirt and dust will not be trapped in the joints.

- **Flush Joint** - only to be used if the wall is to be rendered or bagged.
- **Struck Joint** - a good alternative for external or internal walls, because it sheds water dust and dirt well.
- **Ironed Joint** - works well inside or outside because they are the most waterproof and also shed water, dust and dirt well.
- **Raked Joint** - looks great externally and makes the blocks appear more defined and rustic, but is does tend to collect more dust and dirt therefore it is not recommended internally.

  Note -If using raked joints externally we recommend ALWAYS ironing the joints after raking. This will make the joint more water proof, heal over any separation cracks and smooth out the rough appearance. The mortar can be raked out of the joints between blocks to a depth of (say) 8mm, allowing the blocks to stand out as a feature. A standard Bricklayer's raking tool can be used for this purpose.

Cleaning & Pointing

Timbercrete blocks must be brushed clean approximately three hours after they are laid (depending on the weather). This normally happens immediately after final ironing or raking the joints, when the mortar is stiff. If done when the mortar is too wet it will result in smearing the walls. A 'Java Fill' broom or a stiff bristle or banister brush works best. An alternative method is sponging the wall with a wet sponge. **Ensure the water is not too dirty as it will leave smears**. Take great care NOT to leave mortar smears on the blocks overnight, as removing the marks later becomes very hard work. If mortar smears are allowed to set on the blocks, they can only be removed with a carborundum grinding stone (as used for sanding rough concrete) or a wire brush and lots of elbow grease. However this procedure will expose cellulose material within the block. **It is therefore critically important that the Bricklayer cleans the block faces thoroughly, before the mortar is set, as this will save a lot of heartache, work and expense to remedy it later.**

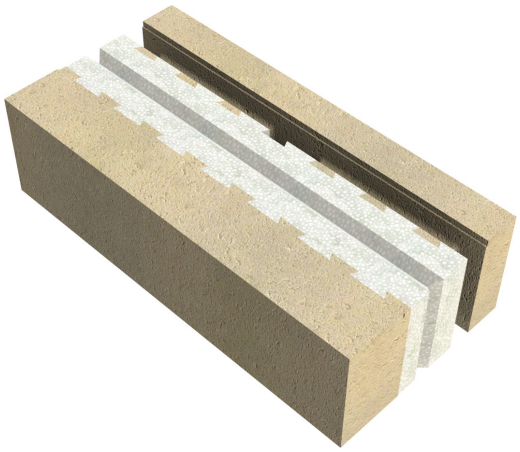
Timbercrete walls cannot be cleaned later with hydrochloric acid & high pressure cleaners.

Positioning Blocks

Most Timbercrete Super Insulating Series Blocks have a handy horizontal and vertical service trough or cavity. The horizontal trough always faces the inside of the structure and must be completely filled with mortar so as not to compromise the total load bearing quality of the wall system. If any horizontal services are laid in these troughs, then they must be bedded in mortar mud.

All the vertical service cavities provided in the Timbercrete blocks must also be filled with mortar mud. Regardless of whether or not there is a vertically running service such as electrical conduit, plumbing pipes, or tiedown rods.

The end of most blocks in this series have a vertical key, the opposing keys create a locking system that both improves the structural outcome as well as providing a water barrier.



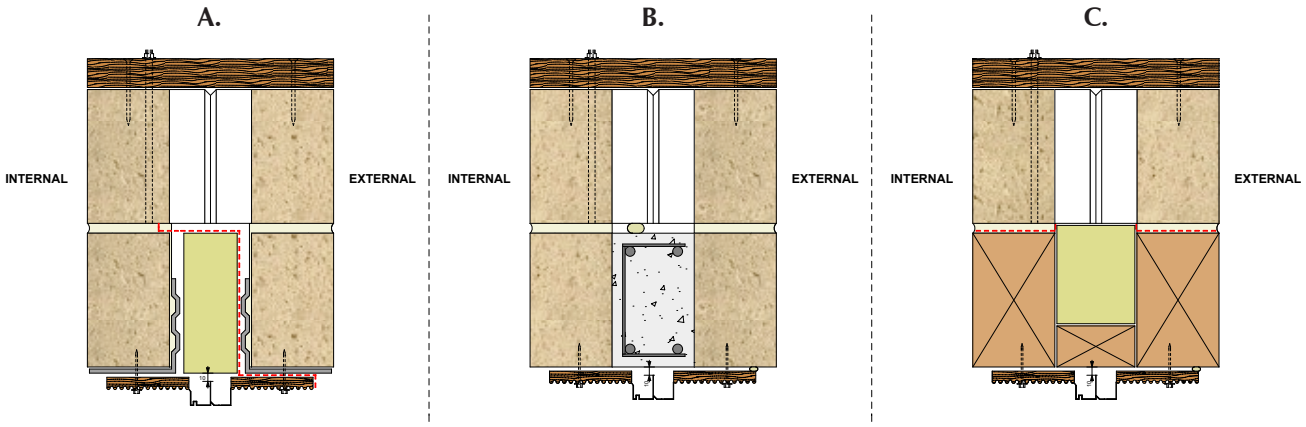
Batch Colour Variations in Timbercrete

There is a possibility that Timbercrete bricks and blocks may change slightly in colour from batch to batch, especially if several months separate consecutive orders. To eliminate this possibility order the entire batch at one time.

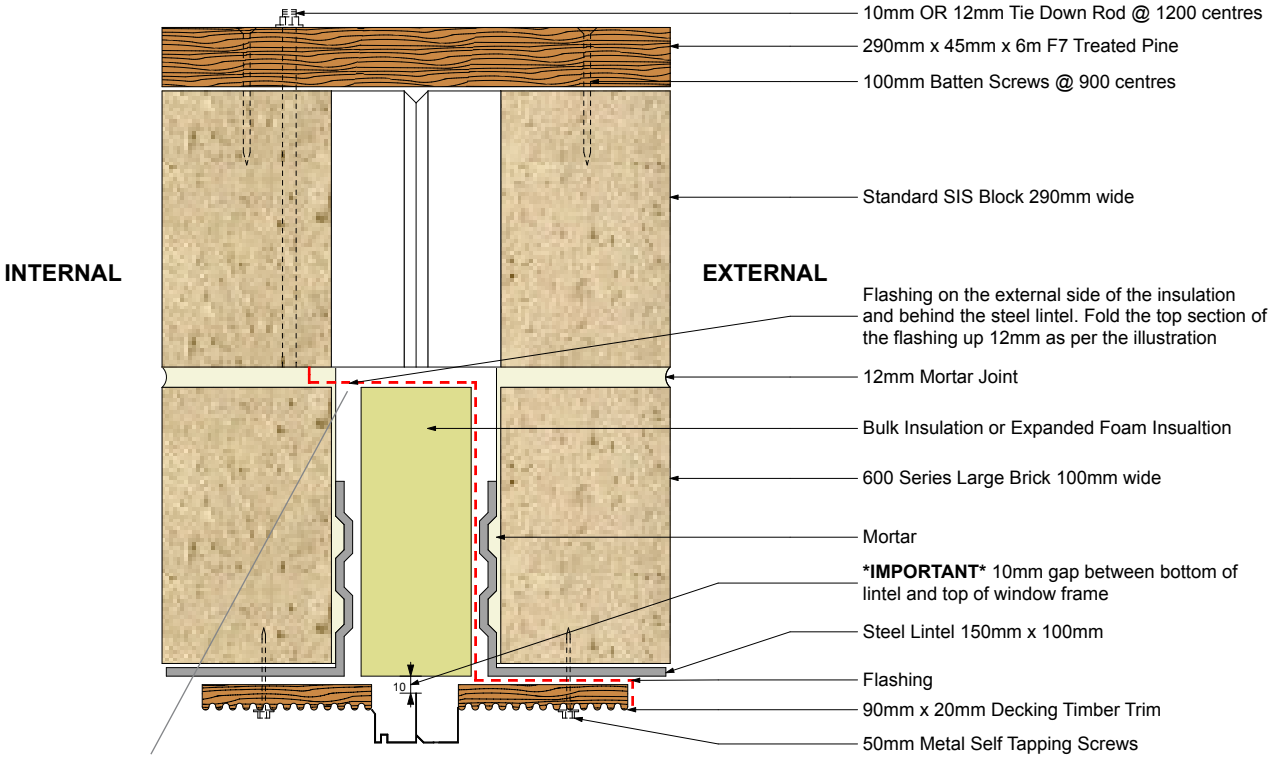
If this is not possible then remember to keep a few pallets of bricks or blocks aside and blend them in with the newly ordered batch.

Window & Door Lintels

There are numerous types of Lintels that can be used, and four popular configurations are sketched below. Your Designer or Engineer needs to specify the lintels for your home, taking into consideration the width of the door or window openings, the number of courses above the lintel and the load being carried.



A. Angle Steel Lintel

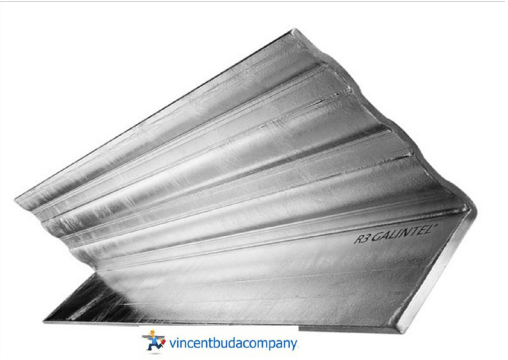


Flashing on the external side of the insulation and behind the steel lintel. Fold the top section of the flashing up 12mm as per the illustration.

'A' shows the cross section of two pieces of galvanised steel angle (100mm wide, 150mm high and 10 mm thick) with 600mm long X 163mm high X 100mm wide veneer bricks laid along the top. This system maintains the 'stretcher bond' block laying pattern.

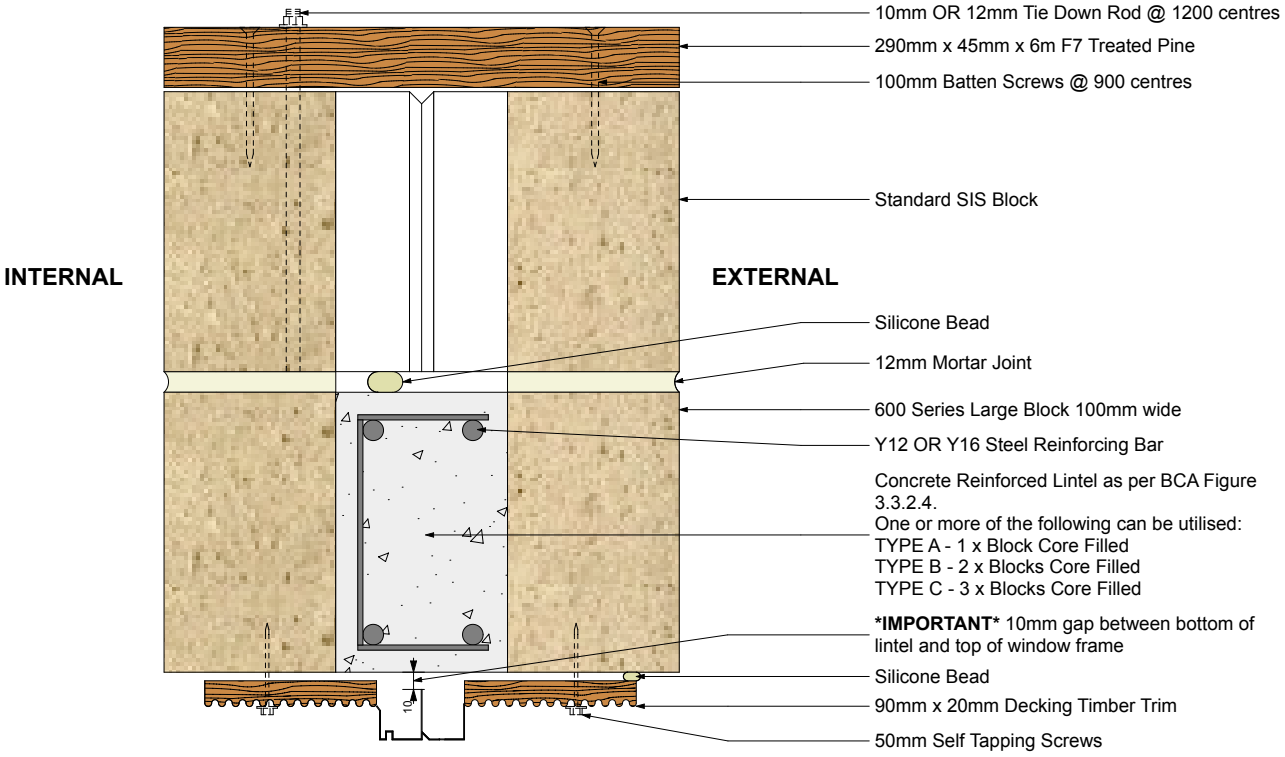
Note: Ensure that all key cavities between the steel angle and the Timbercrete brick are filled with mortar.

Additional technical information on lintels, spans and loadings can be obtained from a number of web sites, including www.grahamgroup.com.au



150mm X 100mm Galintel

B. Concrete Bond Beam Lintel



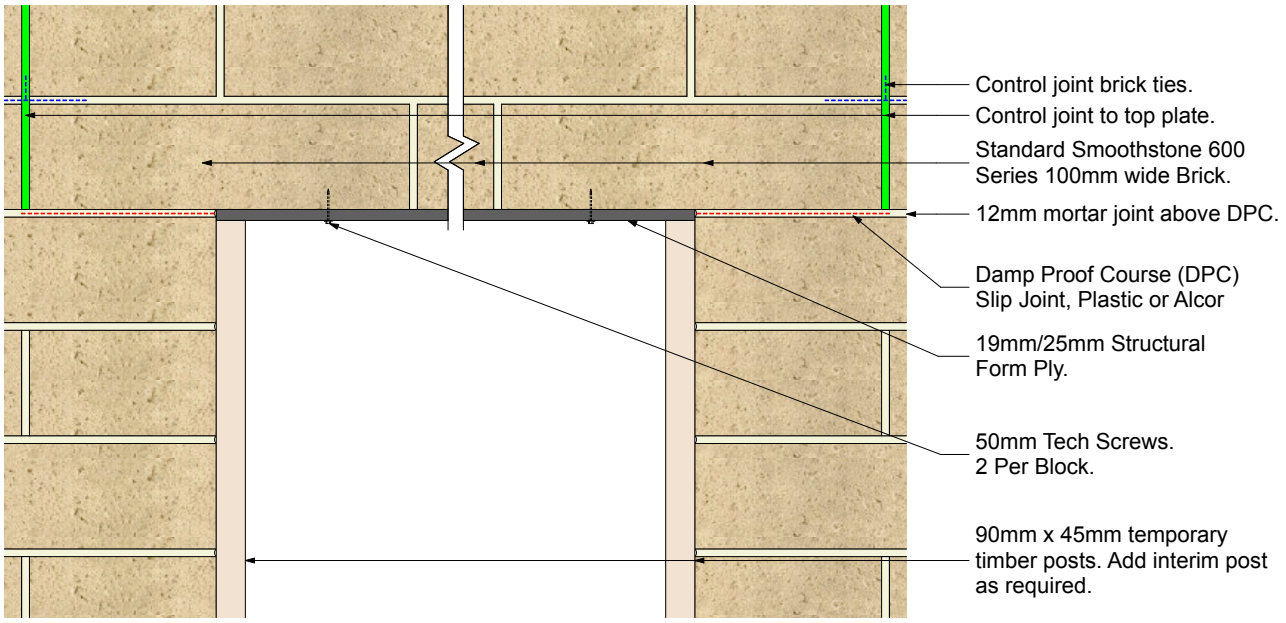
'B' shows the cross section of a concrete and steel reinforced bond beam course. One or more courses of bricks can be core filled with concrete and steel reinforced as per your specific engineering requirements.

Constructing a Bond Beam Lintel Course

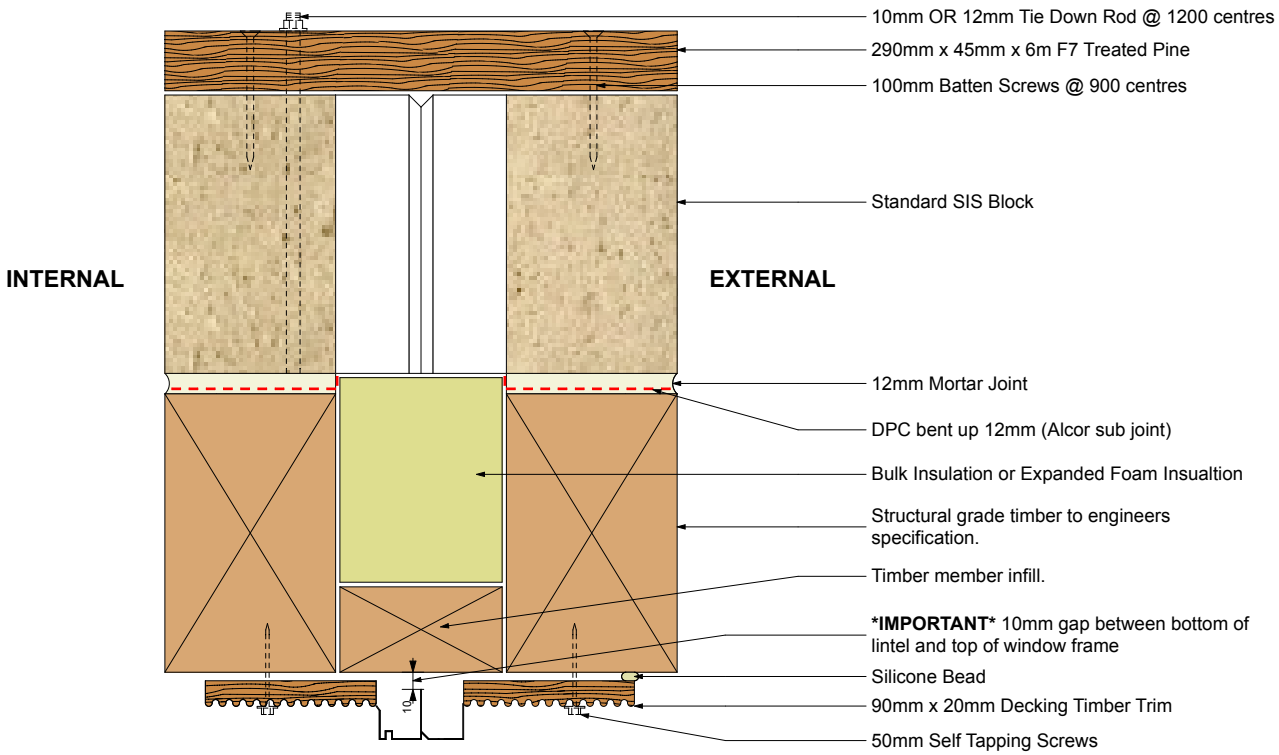
To create a bond beam lintel course above windows and door openings, follow these simple steps:

1. Cut a piece of 19mm or 25mm thick plywood at 290mm wide to fit neatly in the opening length.
2. Support the plywood bridge at both ends and in the middle so as to prevent sagging under load. (Several supporting posts will be necessary on larger openings).
3. Attach two rows of the veneer series counterpart (588mm long by 100mm wide by 163mm high) make certain that the perpendicular ends are filled with mortar mud.
4. The two rows of bricks can be attached with 50mm long tech screws, screwed in from underneath through the ply. At least two screws per brick.
5. After the mortar mud perp ends have set fill the cavity with concrete and steel (as per your specific engineering requirements)

It may be necessary,for longer spans (consult with your engineer) to have two or more courses of bricks laid on top of each other to create a concrete trough with Rio of 90mm wide by 338mm deep (2 courses).



C. Timber Lintel



'C' shows the cross section of a timber lintel (made from graded cypress pine, treated pine F7 or hardwood, typically 2 X 100mm wide and 163mm high). Join at the bottom by stud frame (or similar) timber measuring 90mm x 45mm.

1. Ensure timber lintels are sealed with varnish, paint or sealer to guard against leaching of tannins and stains on the Timbercrete blocks below.
2. Install a slab of builder's foam (same size as the lintel ends) on both ends of the lintels to allow expansion and contraction of the timber.
3. To create a slip joint, lay tar coated aluminium sheet (Builders Alfoil) or similar along the top of the timber lintels to prevent the mortar/blocks adhering to the lintel. This will allow movement of the timber without causing the mortar to crack. It is critical to install the Alcor so as to prevent the ingress of water along the top of the lintel.
4. On the top side of the timber lintel lay two sheets of Alcor bend up 12mm on the inside to prevent water ingress.
5. On the bottom side of the timber lintels lay two sheets of Alcor bend up 12mm on the inside to prevent water ingress.
6. Fill the internal cavity created by the parallel timber lintels with foaming insulation (available in a can from most hardware stores).

Timber Sag

To allow for timber sag and downwards vertical shrinkage in the masonry wall, allow a gap of 10mm between the top of all windows and doors and the bottom of the corresponding lintels.

***Failure to follow the above procedure may result in the timber or walls bending or shrinking down onto the window and door frames, which causes them to become load bearing.*

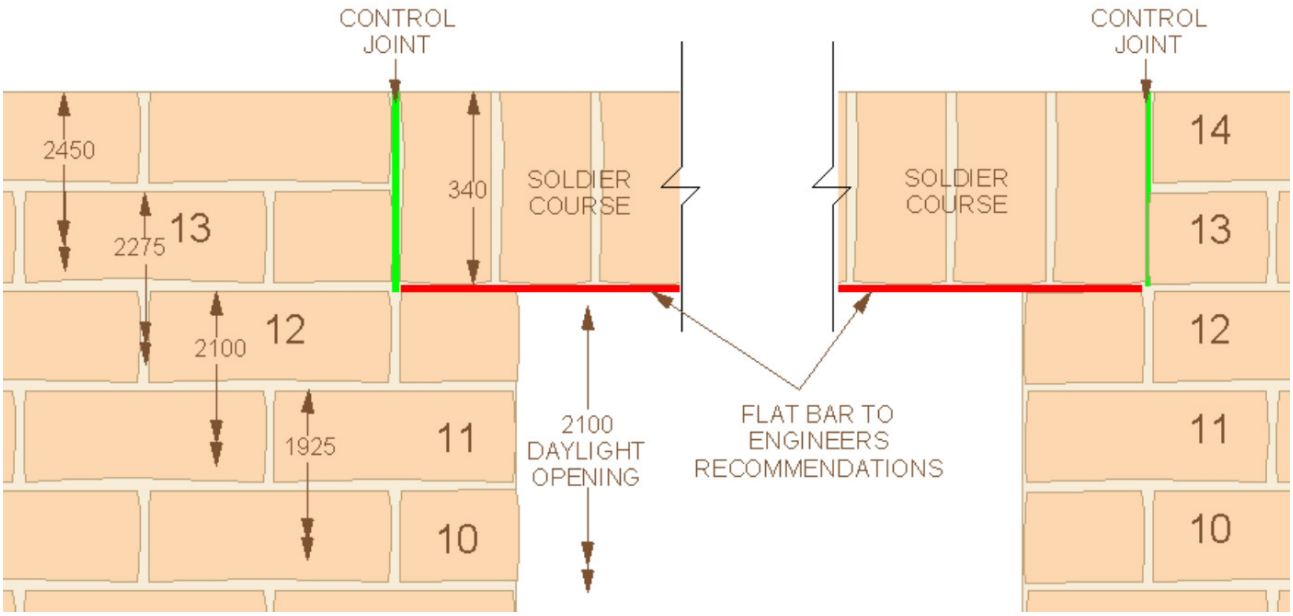
Note: Do not under any circumstances place the lintel on top of the window or the door without allowing for this 10mm gap.

Other Lintel Types

Soldier course bricks on 150mm x 100mm steel angle lintel supports

The veneer series block measuring 600mm long x 100mm thick can be cut to size to create a soldier course spanning 2 to 3 courses.

- For two courses cut brick to 340 mm long.
- For three courses cut brick to 515 mm long.



Most Timbercrete blocks such as the large Cobblestone series (as seen in the illustrations) are designed so that the vertical increments work door heights without the need for a packer block. The vertical increment height is 175mm and 12 large Cobblestone blocks equals 2.1m, a standard door height.

Header Course Arch Opening

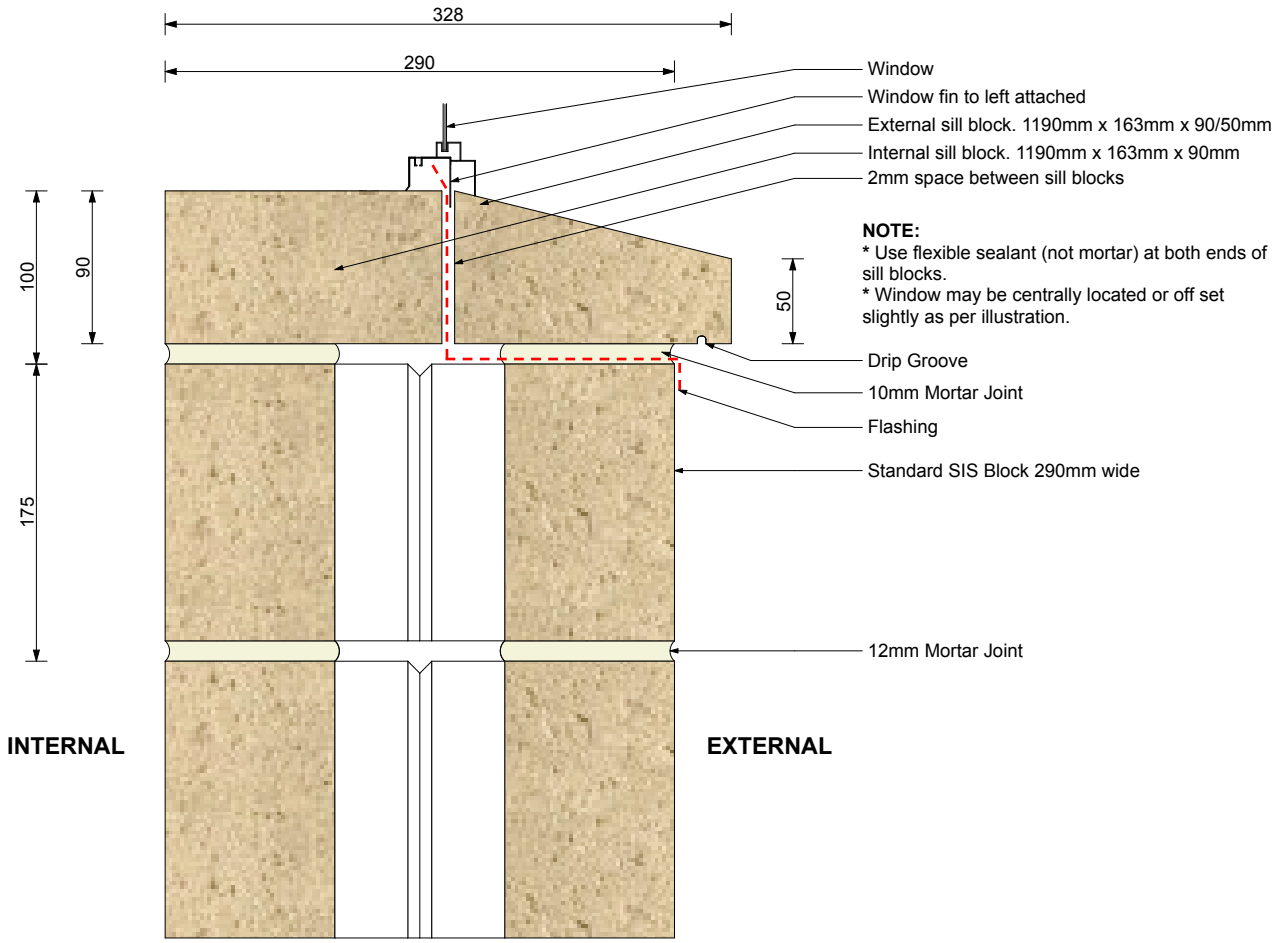
Photo of Cobblestone series blocks with a header course and arch opening.

Custom-made Arch lintel

Photo of Super Insulating Series Blocks, with made to order Arch lintel.

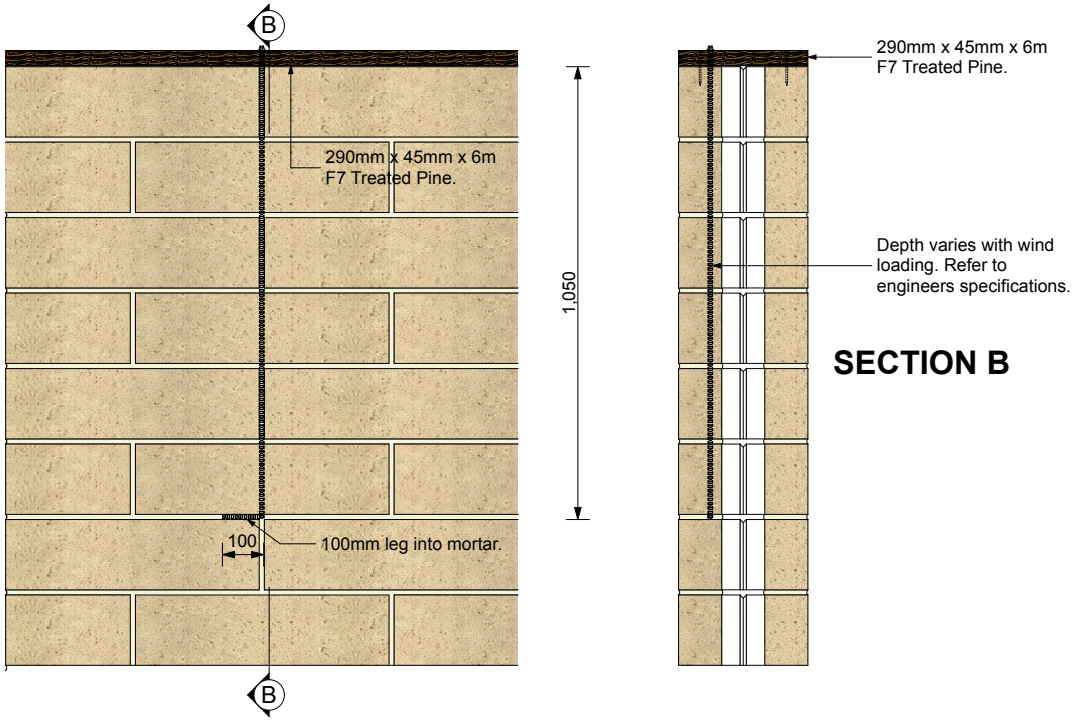
Window Sill Details

Timbercrete manufactures purpose-built sill blocks for the super insulating series block. There is an inner and outer sill brick both measuring 1.190mm long by 90mm high. These sill bricks can be cut to length for window openings less than 1.2m, or join together for larger openings.



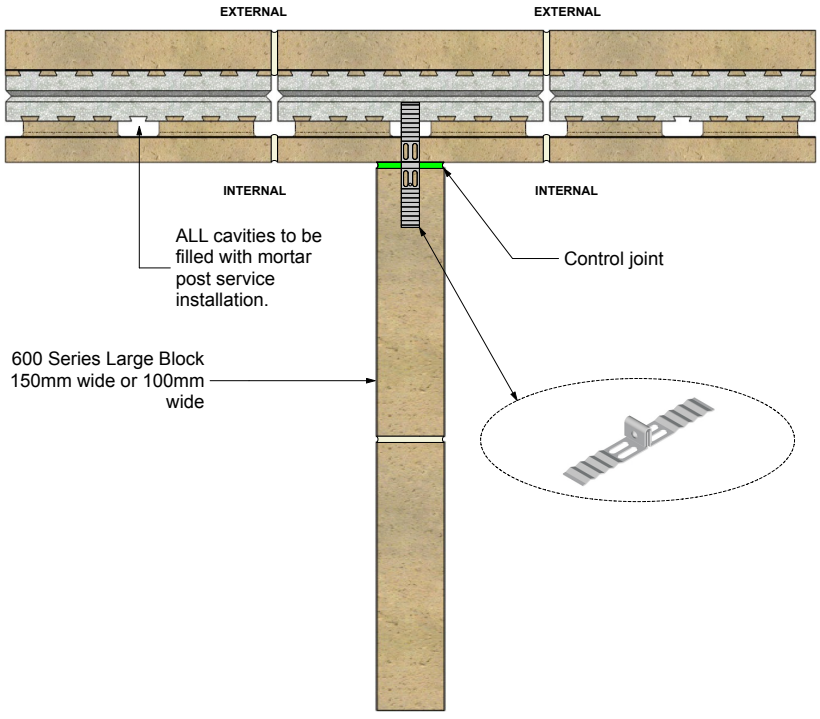
Top Plate & Tie down Rod Details

Top plate and tie down rod details are installed as per the diagram below. Wind loading categories vary throughout Australia, consult with your building designer, Council Inspector, specifier, builder or engineer, to specify the correct depth for your location.



Intersecting Walls

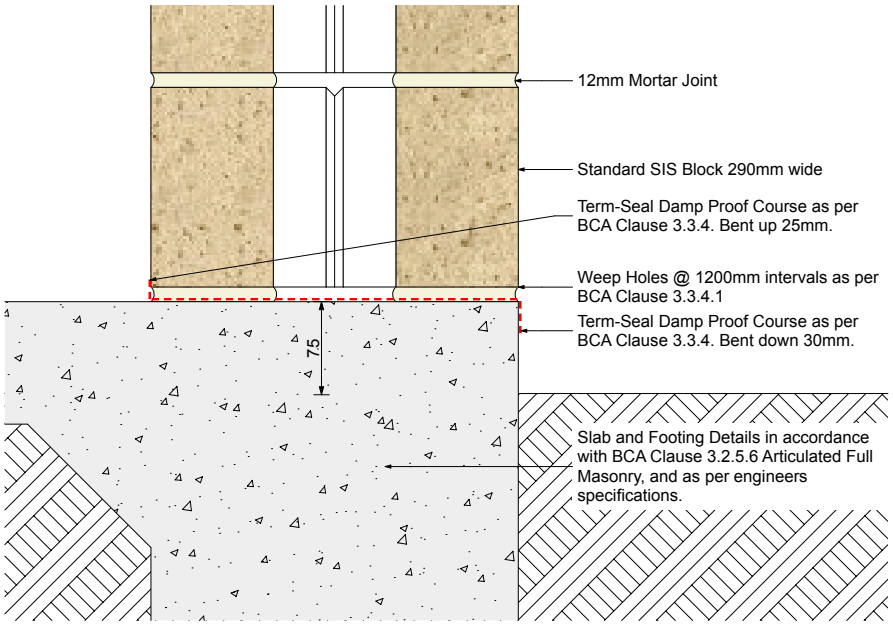
Intersecting internal walls are to be treated as per the illustration below.



Slab Details

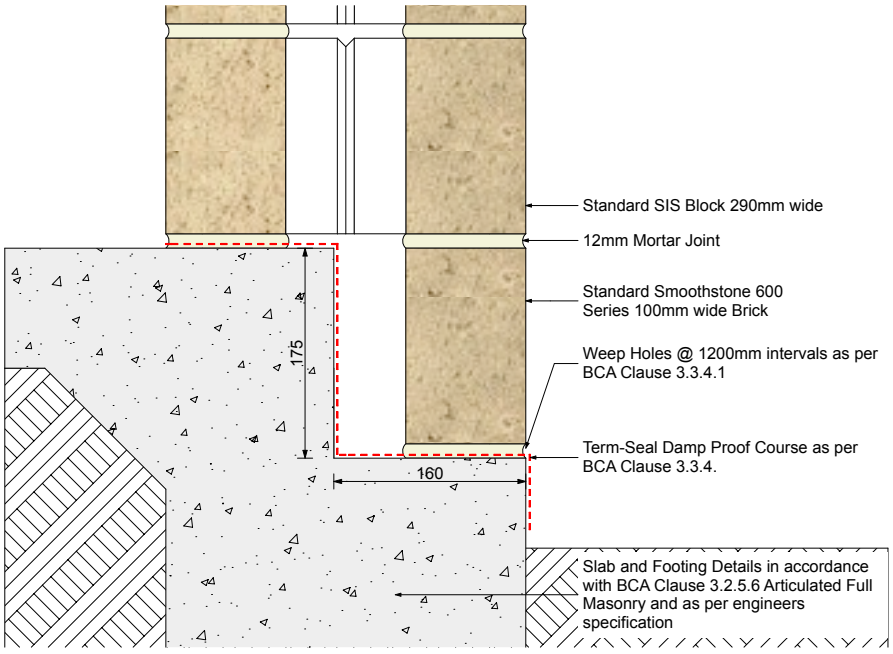
Coat the perimeter of the slab first (at 290mm wide) with a waterproof termite barrier such as Term-seal. This will also protect the coating on the steel Z section.

A flat level slab detail can be adopted providing there is a Z section flashing creating a mechanical water barrier in the step designed. The Z section flashing can be created with thin gauge colour bond, galvanised sheet metal, or Alcor 350mm wide bent up and bent down.



A step can be created in the slab as per standard brick veneer or full brick construction. The step must be in vertical increments of 175mm (175mm or 350mm or 525mm and so on).

Ensure that the entire step: top, side and bottom; are coated with a waterproof, termite proof coating such as Term-Seal.



Bond Beam Course

A bond beam course can be created by running two parallel veneer series bricks on top of the standard super insulating series block.

It is important that the bricks have at least 48 hours to set before filling the cavity with concrete and steel reinforcing.

If there are articulation joints in the slab, make certain that the bond beam course is installed with a sliding joiner aligned with the articulation joints in the wall and slab.

Consult with your engineer for detailed drawings.

Cutting, Splitting and Drilling Timbercrete

One of the advantages of choosing Timbercrete is its trade friendly attributes. Timbercrete can be cut and drilled just like timber; however you will need to use masonry blades and masonry drills.

To prevent excess dust use a standard watercooled masonry block saw. Alternatively Timbercrete blocks can easily be cut with a:

- masonry blade on an angle grinder (dusty but effective)
- handheld hebel saw
- reciprocating saw (with a masonry blade)
- jigsaw (with a masonry blade)
- or shaped and split with a chisel (splitting is not so easy because Timbercrete is not as fragile or brittle as standard concrete and clay masonry)

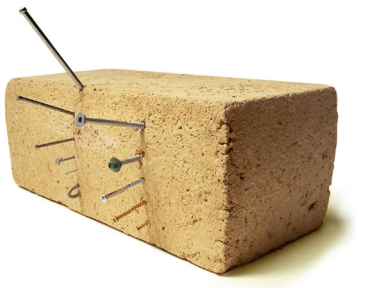
If a home has been designed around the dimensions of Timbercrete blocks, virtually no block cutting will be required. However, some cutting may be required for special features such as portholes or arches. (Check with your local Timbercrete Licensee for availability or pre-made arch blocks).

Timbercrete blocks cut and split and rarely run off line by using the following procedure:

1. First score around the entire surface with an angle grinder with a masonry blade, leaving a score approximately 10mm to 20mm deep.
2. Separate the scored areas by hitting with a lump hammer and bolster chisel. If there are any protruding pieces then the blade of a scutcham hammer will easily remove these.
3. Alternatively use a block saw water lubricated.
4. Use a hand held Hebel saw.

Nailing & Screwing Timbercrete

One of the unique features of Timbercrete is that it can be nailed and screwed directly into without the need for pre-drilling or wall plugs. Nailing or screwing into Timbercrete feels just like pine timber, and nails and screws go in and come out with the similar amount of resistance.



Stain Removal

Calcium (Lime) and Efflorescence Stains

It is extremely rare that Timbercrete bricks and blocks suffer from any efflorescence, however if freshly laid walls receive a heavy rainstorm, occasionally a white powdery substance may appear on the surface, emanating from the fresh mortar joints running down the face of the blocks. This is calcium oxide (efflorescence) and can usually be brushed off. If staining is persistent, a liquid efflorescence remover can be brushed or sprayed on and then gently pressure washed off. Try this first on a small area of the affected wall.

Efflorescence Remover can be purchased from;

- your local hardware
- your local licensed Timbercrete manufacture, or
- Enviro Pacific 'Efflorescence Remover' Helpline: 1800 04 1144

Blocks with Efflorescence

Cleaned with Enviro Pacific Efflorescence Remover

Hardwood Stains

If blocks get stained by leaching of tannins or vanadium from hardwood materials, apply Oxalic Acid followed by a light pressure wash (as per directions on the pack). If stains are particularly deep and the above fails to remove all the marks, then rub with a carborundum stone followed by a very light pressure wash.

Blocks and Bricks will be stained with leaching tannins during wet weather, if they are placed under gum trees, under hardwood pallets, under hardwood roof trusses, timbers rafter or floor joists. (As shown below).

Where hardwood roof timber has to be installed on top of Timbercrete walls, it is advisable to either:

- Seal timber lintels before installing them
- Seal the walls prior to the timber installation
- or lay sheets of plastic temporarily along the top of walls during construction

Hardwood Stains

Curing Blocks & Moisture Content

As soon as Timbercrete blocks arrive at your building site, they should be unwrapped (plastic removed) so as to allow free flow of air around each block. **WARNING: If blocks are built into walls prior to the "USE AFTER" date as detailed on every pallet label, or not unwrapped from the plastic so as to continue drying, walls may develop cracks as block shrinkage takes place.** If you are in a period or area of high rainfall, it would be wise to cover the top of each pallet with a sheet of corrugated iron or similar. The intention is to prevent the blocks from becoming soaked, but still allow free air flow to the sides of all pallets so that the curing process may continue uninterrupted. This is particularly important in wet or freeze/thaw conditions. (See photos below)

Warning: Wetting Down Pre-layed Blocks

The wetting down of blocks is something that Timbercrete STRONGLY advises NOT to do for the following reasons.

1. If blocks are moist or wet then they will have INFERIOR bond strength.
2. Small separation cracks often appear between blocks and mortar if the blocks are pre-moistened.

If weather conditions are hot and windy then the wall may be moistened AFTER the blocks are laid NOT before. If the mortar is setting too fast then ask your Timbercrete supplier for an additives. We sell 'Pozz400 RI' or Dynex (methyl cellulose). Your local Timbercrete supplier may recommend an alternative additive once it has been tested.

Joist Hangers

Timbercrete offers a custom-made range of Joist Hangers for use when installing timber floor joists, bearers and rafters with Timbercrete walls.

The Joist Hangers come in 3 sizes:

- 300mm drop
- 250mm drop
- 180mm drop

While off-the-shelf joist hangers are made from 0.6mm material, Timbercrete Joist Hangers are made from 2mm thick galvanised steel, providing a much stronger supporting system. Contact your local Timbercrete Franchisee for supply. (Always show your Engineer a sample of our Joist Hanger to ensure it is adequate for your application.)

Wet Areas

There are 2 options for wet areas:

- Glue and nail an approved wet area board such as villa board first, then tile over the board.
- The no tile approach. Simply seal the wall with our recommended sealers, then apply several coats of clear resin until all nooks crannies and small holes are filled up. This makes cleaning easier. (Check with your local building inspector for local guidelines and approval on this method.)

Architectural Features - Build Something Beautiful

Bullseye Window

Wall Treatments

Timbercrete walls can be:

- Untouched, showing their natural beauty
- Clear Sealed
- Painted
- Lightly Bagged
- Heavily Bagged
- Rendered

Internal Wall Clear Sealed
For a clear sealed internal coating we recommend Shalex Glaze This coating will render the wall washable, stain and dust resistant, and also hold any loose particles in the mortar. This sealer is a semi gloss membrane type sealer. While not recommended as an exterior coating, its great for sealing internal walls if you want to maintain the beautiful colour and tone variation. Application; apply one coat, diluted 50/50 with water.

Painted
Timbercrete has a relatively low porosity (initial rate of absorption), compared to other cement masonry products therefore it makes an ideal and economic surface for painting.

Lightly Bagged
There are a range of stone finish renders suitable on Timbercrete. We have trialled Wattyl's Solar Guard Natural Stone, which initial testing demonstrated good adhesion to Timbercrete. Natural stone comes in a vast range of colours and three different textures : 1. Natural Stone Finish. 2. Fine/Medium Finish. 3. Course Finish.

Heavily Bagged
Heavily bagged is simply a thicker coating or covering than a lightly bagged solution. Products such as SHIELDCOAT or NaturalTex provide a thick acrylic textured finish similar to cement bagging render. It can be tinted to your choice of colours and applied with a lamb's wool glove.

Rendered
Timbercrete can be rendered utilising the same method and treatment as any other masonry surface.

Water Tightness

The Timbercrete Super Insulating Series block provides a three tiered approach to a water tight wall system.

1. The centrally located styrene insulation provides a moisture barrier.
2. The V shape perimeter trough in the styrene provides a drip groove for small amounts of water that may penetrate the mortar joint.
3. A cavity free wall system. There are no empty cavities in the Timbercrete block or mortar beds, therefore there is nowhere for water to accumulate other than the purpose-built drip groove in the styrene.

If in the unlikely event that moisture is able to penetrate through the 100mm thick solid mortar joint, the drip groove in the styrene allows moisture to work it's the way down to a wicking rope or a series of weep holes on the first course of blocks.

Termite Prevention

The termite resistance of Timbercrete has not been independently tested. However 13 years of anecdotal evidence and in house testing has demonstrated that to this day no termite has ever penetrated a Timbercrete block. Samples have been placed in, on and near various types of termite nests. Timbercrete has been used for Retaining walls and pavers for many years without any sign of Termite ingress.

Details of Australian practice are set out in AS 3660.1. Also BCA 3.1.3

Termites generally enter the walls close to the footings and access the timber superstructure via paths hidden from view, e.g. at control joints, tie-down anchorages and door jabs. The aim of most termite barriers is to force the termites to the surface of the structure where they are visible and can be easily eradicated. Some termite barriers also include:

- A chemical barrier system that deter the termites from passing.
- A chemical baiting system. This system baits and kills termites in the nest dealing with a cause of the problem.

- graded stone barriers

The BCA teachers the installation of a 75mm above ground level visual perimeter barrier Such a barrier would need to extend from the outside of the masonry (and up the inside to beyond the level of the floor slab, in the case of a drop-edge beam). Such a barrier need only be physical, but could also include chemical impregnation if this is available. Options are:

- Sheet metal barrier, similar to a metal flashing.
- Stainless steel mesh barrier, joined and fixed by resistant adhesive.
  Proprietary system - Termimesh
- Non-toxic waterproof compound impregnated into a geotextile.
  Proprietary system - Term Seal
- Internal non-woven fibre blanket impregnated with deltametherin crystals (low toxicity to warm blooded animals) which both strongly repels and (where necessary) kills termites, bonded within casing layers, top plastic layer (200 microns), which doubles as a moisture vapour layer, and bottom plastic layer (50 microns) prevents termicide leaching into soil. Proprietary system - Trithor Termite Protection.

Phone: **(02) 6583 6699**
Fax: **(02) 6583 5699**
Email: **info@termseal.com.au**
Mail: **P.O.Box 5649 – Port Macquarie – NSW - 2444**

Term seal and damp course coating being applied, prior to laying Timbercrete bricks.

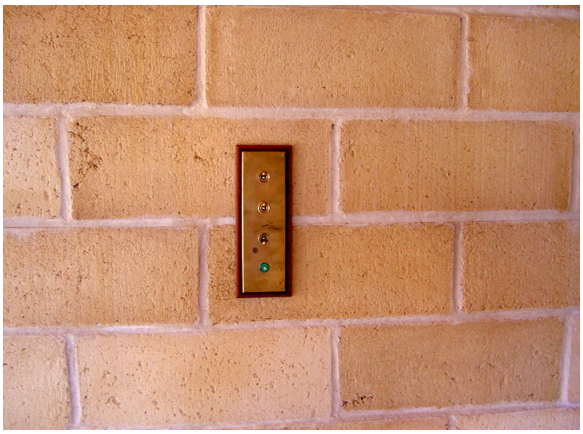
Installing Electrical Services

Timbercrete super insulating blocks provide a horizontal and vertical service cavity to install electrical service conduit's or cables. "To lay conduits or not to lay conduits?" Due to the thickness of the wall we have been advised by several electricians that either is acceptable. The advantage of no conduit is lower costs, but using a conduit means that if necessary more cables can be installed later.

However this is a decision that you will need to make in consultation with the electrician.

Power Points & Light Switches

To fix the faceplate for power points or electrical light switches to the blocks. Simply screw directly into Timbercrete (without pre-drilling) with self tapping timber screws, just like screwing into timber. Drill a hole large enough to house the protruding mechanisms behind the power point or light switch.



Sub-Floor Ventilation

Subfloor ventilation is to be installed according to 'acceptable construction practices' outlined in the BCA volume 2 part 3.4.1.

- Install piece of fire resistant fly screen on the basement side (inside) of the wall. The screen will prevent insect's rodents and flying embers from getting under the house.

Subterranean Blocks

If you are planning to backfill against Timbercrete blocks with soil, make sure you specify and order the higher strength grade of Timbercrete for this purpose. Below grade bricks and blocks are subjected to various types of acids and salts leaching from the soil, therefore it is important to request specialty blocks for this purpose.

All subterranean work must be coated with a salt attack resistant waterproof coating as per standard practices taught in the BCA.

SM = Smoothstone: Mortar Joints are **12mm**
TF = Texturedstone: Mortar Joints are **12mm**
CS = Cobblestone: Mortar Joints are **15mm**

SS = Single Skin: **FB** = Full Brick: **V** = Veneer	Available in:	Style or Texture	Actual Length	Actual Height	Actual Width	Mortar Height	Module Length	Module Height	Weight Kg	Bricks m2
Small Brick	FB, V	SM, TF, CS	348	163	100	12	360	175	5.80	15.9
Small Corner Brick	FB, V	SM, CS	348/170	163	170	12	360/180	175	7.10	
Small Half Brick	FB, V	SM, TF, CS	168	163	100	12	180	175	2.90	31.7
Medium Brick	FB, V	SM, TF, CS	388	163	100	12	400	175	6.46	14.3
Medium Corner Brick	FB, V	SM, CS	388/190	163	190	12	400/190	175	8.17	
Medium Half Brick	FB, V	SM, TF, CS	188	163	100	12	210	175	3.23	28.6
Medium Block	SS	SM, CS	388	163	190/200	12	400	175	12.45	14.3
Lintel Soldier Block (LSC 200 CS)	SS	SM, CS	164	325	200	12	175	350	10.10	5.7 LM
Medium Half Block	SS	SM, CS	188	163	190/200	12	200	175	6.22	28.6
Large Brick	V or FB	SM, TF, CS	588	163	100	12	600	175	10.00	9.5
Large Corner Brick	V or FB	SM, CS	588	163	290	12	600	175	13.26	
Large Half Brick	V or FB	SM, TF, CS	288	163	100	12	300	175	5.00	19.0
Super Insulating Series: 300mm	SS/FB	SM	588	163	290	12	600	175	17.00	9.5
Super Insulating Corner Block	SS/FB	SM	588	163	290	12	600	175	18.00	9.5
Super Insulating Half	SS/FB	SM	288	163	290	12	300	175	9.00	19.0
Cladding Panel: 60mm	VP or FP	SM, TF	895	295	60	5	900	300	15.84	3.7
Insulating Panel: 135mm	VP	SM, TF	895	295	135	5	900	300	14.50	3.7
Insulating Corner Panel	VP	SM, TF	895	295	135	5	900	300	15.50	3.7
Insulating Lintel Panel	VP	SM, TF	895	295	135	5	900	300	15.50	3.7
Insuliting Base Panel	VP	SM, TF	445	295	135	5	450	300	17.00	3.7
Lightweight Insulating Panel	VP	SM	1.195	295	110	5	1.200	300	10.80	2.8

 # Note: Mortar Thickness for the ***Cobblestone Series*** varies from 10 mm to 20 mm **(15 mm average)** this is intentional. The cobblestone blocks also vary slightly in size and shape, this too is intentional.The horizontal and vertical increment remain the same.

 # Note:Thickness of Timbercrete in Panel = 50/60 & Styrene = 75/85 mm thick, = 135mm

Timbercrete manufactures several different types/styles of brick and blocks. All are made from the same raw material. Most bricks and blocks are available in veneer, double brick (cavity brick wall) or single skin (single leaf) type construction.

3 Sizes

- Small: Increment size ~ 360mm long X 175mm high
- Medium: ~ 400mm long X 175mm high
- Large: ~ 600mm long X 175mm high

3 Textures

- Cobblestone Series
- Smoothstone Series
- Texturedstone Series

4 Types

- Veneer Brick ~100 mm thick
- Double Brick ~ 250mm thick (2 of 100mm bricks with a 50mm cavity)
- Single Leaf ~ 200mm thick solid block
- Double Brick/Single Leaf construction ~ 290mm thick with a 100mm thick centrally located styrene laminate.

These types/styles include:

- **Cobblestone Series**
  The Cobblestone Series is our most popular style featuring a smooth curved face with a river stone/cobble stone appearance. These bricks and blocks vary slightly in size; this variation is intentional and the mortar joints accommodate this variation by ranging 10mm to 20mm thick.
- **Smoothstone Series**
  This series features a smooth flat face like a diamond cut sandstone in colour and texture with a Travertine marble like finish. It comes in a vast range of sizes. The mortar is approximately 12mm thick, more formal in their thickness.
- **Texturedstone Series**
  The Texturedstone Series features a textured face like rough cut limestone or weathered sandstone. The mortar is approximately 12mm thick.
- **Super Insulating Series**
  This is the latest invention from Timbercrete with patent protection granted around the world. This large block comes in a double brick style wall utilising a single skin method of construction. Boasting exceptionally high insulation. Total R value, as a result of the 110mm thick styrene centre and 2 Timbercrete outer layers, equals approximately R4. The mortar is 12mm thick.

- **Smoothstone Series**
  The super insulating series has the same finish as the Smoothstone Series. This block comes with cavities for all types of services as well as cavities for structural reinforcement. It is also available in a narrow veneer or internal brick counterpart as well as an external veneer brick.
- **Subterranean Bricks & Blocks**
  When using Timbercrete products below grade (below soil level) make certain that you specify the high strength formula for this purpose. Inform your local manufacturer of your required quantities or m2 area. Below grade bricks and blocks will also need to be sealed before backfilling.

Site Audit on Timbercrete Installation

A top quality home requires not only top quality products, but also top quality installation.

We provide documentation for an ON SITE AUDIT which is aimed at detecting any deficiencies in installation at the early stages of construction. (A check list of audited items is contained over the page for your information.) The Audit Check List should be given, carried out and signed by the Owner, the Builder and the Bricklayer. The Audit is designed to identify and eliminate problems that may occur during the construction.

If your audit is showing problems please contact your local Timbercrete manufacturer for advise or assistance with the audit.

It should be noted however Timbercrete bears no responsibility for the quality of construction before, during or after the Audit.

Thank You for Choosing Timbercrete...

If you are unclear about any of the teaching in this manual, please contact your nearest Timbercrete representative.

www.timbercrete.com.au

On-Site Audit Checklist

This audit checklist is intended to highlight building practices that do not conform to the Building with Timbercrete manual. Any items bearing a "NO" tick require immediate and urgent attention and rectification.

(Tick the Appropriate Box)

		YES	NO
1.	The builder has a copy of the Building with Timbercrete SI 300 manual.	☐	☐
2.	The bricklayer has a copy of the Building with Timbercrete SI 300 manual.	☐	☐
3.	All pallets have been unwrapped and spaced at 1m to maximise drying.	☐	☐
4.	Blocks being used have passed the 'use after date' (as per the pallet label).	☐	☐
5.	All the directions on the pallet label are being followed.	☐	☐
6.	The bricklayer has completed a mortar test on the sand (mortar test board sighted) and there is no cracking or evidence of shrinking.	☐	☐
7.	The sand mix and particle size are as per the teaching in the BWTC manual.	☐	☐
8.	There is no unapproved mortar additive being used, or on the building site.	☐	☐
9.	The bricklayer is batching the mortar into buckets first.	☐	☐
10.	The sand and cement and lime volumes and portions is correct.	☐	☐
11.	A full bed of mortar is applied to all Timbercrete brick and block surfaces.	☐	☐
12.	All service block cavities are filled with mortar or concrete grout.	☐	☐
13.	A damp course barrier is used between the slab and the first course of blocks (as per BWTC).	☐	☐
14.	Control joints are installed above all articulation joints in the slab.	☐	☐
15.	Control joints are being installed at the appropriate intervals at 4m to 6m.	☐	☐
16.	A 10mm gap has been left between the top of windows and doors and the bottom of lintels or, the building has not reached this stage but the matter has been discussed with the bricklayer.	☐	☐

The on-ste audit was conducted, and all agree with the results.

Bricklayer ..... / / .....
(NAME) (SIGNATURE) (DATE)

Builder ..... / / .....
(NAME) (SIGNATURE) (DATE)

Owner ..... / / .....
(NAME) (SIGNATURE) (DATE)

Timbercrete ..... / / .....
(NAME) (SIGNATURE) (DATE)

Building Site Address .....

Extra Comments .....

.....

.....

.....

Notes