



BUILDING WITH **TIMBERCRETE**

MANUAL 2021

BUILDING^{WITH} TIMBERCRETE

Your bricklayer, Installer, or builder's performance is vital to the final quality and aesthetics of your Timbercrete Project. It is essential that they are fully acquainted with all aspects of the enclosed document prior to commencement. In particular, please ensure that the installer is following the simple "On-Site Audit & Checklist" at the end of this document.

The fundamentals in achieving the best possible results are:

1. Observe incremental (modules) brick and block measurements.
2. Clean off excess mortar during brick or block laying every day.
3. Use correct Timbercrete mortar mix; not your favorite mortar.
4. Only lay bricks or blocks after the "use after" date on each pallet.
5. Ensure that sufficient control joints are installed.

IGNORING THESE FUNDAMENTALS WILL RESULT IN A SECOND RATE EFFECT

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

If this information is not clear please consult your supplier.

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 and eye protection when cutting, nailing, and fixing or otherwise working with Timbercrete products.

This manual deals mainly with the 200mm wide single skin series. However the fundamentals apply to all of our Timbercrete products.





INTRODUCTION

CONTEXT

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

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).

BRICK & BLOCK TYPES AND SIZES

Timbercrete manufactures several different types/styles & sizes of bricks 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.

4 SIZES

SMALL Increment size (module) ~ 300 mm long X 130 mm high

MEDIUM Increment size (module). ~ 400 mm long X 175 mm high.

LARGE Increment size (module) . ~ 600 mm long X 175 mm high.

MUDBRICK SERIES Increment (module). ~ 400 mm long x 140 mm high.

2 TEXTURES



**COBBLESTONE
SERIES**



**SMOOTHSTONE
SERIES**

4 TYPES

VDNEER BRICK ~100 mm thick.

DOUBLE BRICK ~ 250 mm thick. (2 of 100 mm bricks with a 50mm cavity)

SINGLE LEAF ~ 200 mm & 250 mm thick (Mud Brick Size) solid block.

DOUBLE BRICK/SINGLE LEAF construction ~ A total of 290 mm thick with a 110 mm thick centrally located styrene laminate (Refer to the SI series manual for construction methods).

“COBBLESTONE SERIES”

The Cobblestone series features 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”

features a smooth flat face like a smooth cut sandstone in texture with a Travertine marble like finish. This series comes in a range of sizes. **The mortar is approximately 12 mm** thick, resulting in a more formal appearance.

“SUPER INSULATING SERIES”

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 110 mm thick styrene centre and 2 Timbercrete outer layers, equals approximately **R4**. **The mortar is approximately 12 mm** thick.

This series has the same finish as the “Smoothstone Series” and comes with cavities for all types of services and structural reinforcement.

SUBTERRANEAN BRICKS AND BLOCKS:

When using Timbercrete products 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. Subterranean bricks and blocks will also need to be sealed before backfilling.

The key to successfully building with Timbercrete 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 on the following page.

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

For Information regarding specific sizes and specifications, please refer to the charts on the following page.

BRICK & BLOCK TYPES, SIZES, & THEIR INCREMENTAL BENCHMARKS

SS = Single Skin: FB = Full Brick: V = Veneer	Available in:	Style or Texture	Actual Length	Actual Height	Actual Width	Mortar Thickness	Module Length	Module Height	Weight Kg	Bricks m2
Small Brick	FB, V	SM, CS	288	115	100	12 to 15	300	130	3,64	25,6
Small Corner Brick	FB, V	SM, CS	288	115	100/145	12 to 15	300/150	130	4,50	25,6
Medium Brick	FB, V	SM, CS	388	160	100	12 to 15	400	175	6,80	14,3
Medium Brick	FB, V	SM, CS	388	160	120	12 to 15	400	175	8,20	14,3
Medium Corner Brick	FB, V	SM, CS	388	160	100/185	12 to 15	400/200	175	8,32	21,4
Medium Corner Brick	FB, V	SM, CS	388	160	120/185	12 to 15	400/200	175	9,60	21,4
Medium Block	SS	SM, CS	388	160	190/200	12 to 15	400	175	13,50	14,3
Lintel Soldier Block (LSC 200 CS)	SS	SM, CS	160	330	200	12 to 15	175	350	11,80	5,7 LM
Medium Half Block	SS	SM, CS	188	160	190/200	12 to 15	200	175	6,50	28,6
Large Brick	V or FB	SM.	585	160	100	12 to 15	600	175	10,60	9,5
Large Corner Brick	V or FB	SM	585	160	100/285	12 to 15	600	175	15,50	9,5
Large Half Brick	V or FB	SM.	285	160	100	12 to 15	300	175	5,30	19,0
Super Insulating Series: 300mm	SS	SM	585	160	285	12 to 15	600	175	18,63	9,5
Super Insulating Corner Block	SS	SM	585	160	285	12 to 15	600	175	20,26	9,5
Super Insulating Half	SS	SM	285	160	285	12 to 15	300	175	10,78	19,0
Hollow Core Standard	SS	SM	585	160	285	12 to 15	600	175	20	9,5
Hollow Core Troughed	SS	SM	585	160	285	12 to 15	600	175	14	9,5
Hollow Core Troughed & Ends Open	SS	SM	585	160	285	12 to 15	600	175	12	9,5
Hollow Core Half Block	SS	SM	285	160	285	12 to 15	300	175	10	19,0
Cladding Panel: 50mm	Cladding	Textured	895	295	50	5	900	300	14,50	3,7
Cladding Panel Half	Cladding	Textured	598	295	50	10	600	300	9,70	5,5

SM = "Smoothstone": Mortar Joints are 12 to 15mm CS = "Cobblestone ": Mortar Joints are 15 to 20mm

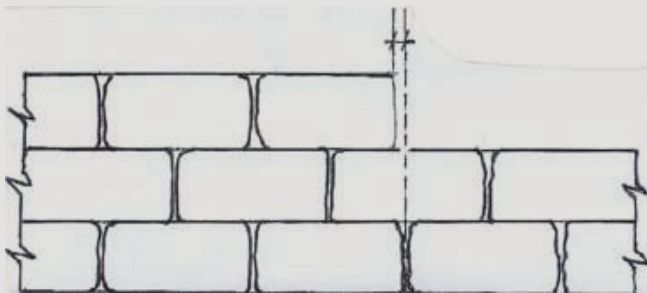
Note: Cobblestone bricks and blocks vary in length due to their rounded shape. Their height may also vary slightly this variation is intentional.

Note: Mortar Thickness for the cobblestone series varies from 10 mm to 25 mm (18 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.

TIPS FOR LAYING COBBLESTONE BLOCKS

The vertical increment of 175mm set by the Bricklayers string line will ensure the correct thickness of horizontal mortar joints throughout the entire Timbercrete brick and block product range. Ensure that you are laying the blocks to the horizontal increment to avoid unnecessary cutting. Windows and doors must be positioned to suit the horizontal increment.

The bricklayers' professional training may prompt them to reject a proportion of Timbercrete Cobblestone blocks due to the size, surface or colour irregularities. It is therefore vital that they be made aware of any significant differences from conventional concrete blocks and straight sided Timbercrete blocks (which are normally all identical in size).



The depth of the mortar bed is varied 10mm to 20mm to account for the variation in the height and length from one cobblestone block to the next.

The mortar bed should NOT be a perimeter Shell as with traditional hollow core concrete blocks.

Instead, all Timbercrete bricks and blocks must have a solid, full bed of mortar (in both horizontal & vertical joints), as per BCA requirements.

This is important for 2 reasons.

1. To ensure maximum bond and load bearing strength.
2. To prevent cavities in which water can pool and ultimately leak through the mortar joint.



LAYING SINGLE SKIN COBBLESTONE BLOCKS



TIP 1

By running a string line on the inside of the wall rather than the outside, the inside wall will be more accommodating for the cornice, skirting or rendering (if applicable). Also the outside wall will have a little more “character” as blocks will vary slightly in thickness.



TIP 2

Flatter faced blocks (that is, with less protruding cobblestone curves) can be used on the top and bottom courses, as well as around window and door openings, to ensure flat internal surfaces to abut cornices, door & window frames, and skirting (if installed).

Note: With regard to the Cobblestone series, Timbercrete should automatically supply a proportion of flatter blocks in every order.



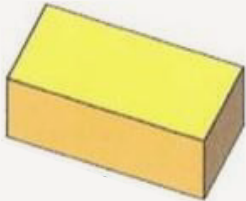
TIP 2

“Specialty” blocks (those with grooves, slots or cut-outs) should only be used in positions where they are required to perform their specific function. They should not be used in general block laying or you may run short where specialty blocks are needed.

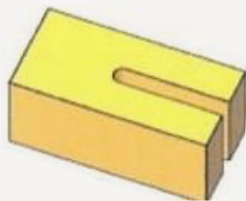


LAYING SINGLE SKIN COBBLESTONE BLOCKS

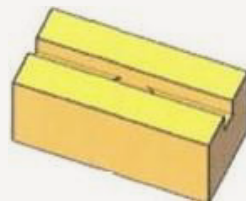
Below is a sheet detailing the range of specialty blocks provided for the Large Single Skin Cobblestone Series



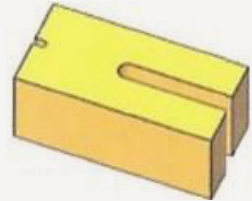
STD 200 CS
Standard 200 mm



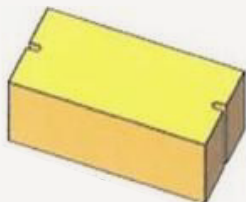
VS 200 CS
Vertical service block



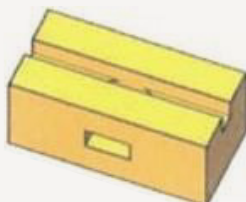
HVS
Horizontal and vertical
service block



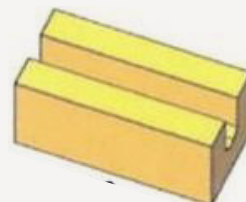
GVS
Grooved vertical
service block



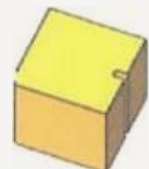
GS 200 CS
Grooved solid block



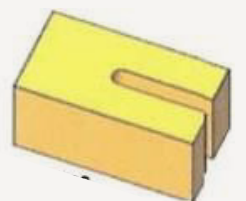
PB 200 CS
PowerPoint and
light switch block



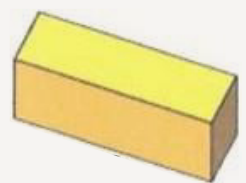
L BB 200 CS
Lintel bond
beam block



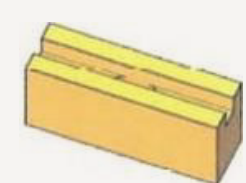
G 1/2
Grooved half block



LSC 200 CS
Lintel soldier course
block



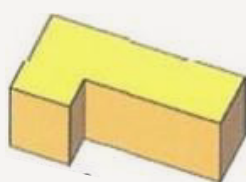
STD 120 CS
Standard 120 mm
brick



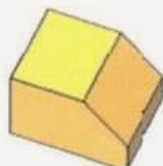
HVS 120
Horizontal and vertical
service 120 mm brick



1/2 120 CS
Half 120



C 120 CS
Corner brick



LBSB 200
Large bevelled sill
block 170 mm high
by 200 mm wide

BNSB 200
Bullnose sill block 110
mm high x 200 mm wide



TIP 4

Cobblestone series blocks, being hand-crafted, vary slightly in height, length and width. All sizes are an average.

The purpose for this variation is to create the unique Timbercrete “cobblestone” appearance. The bricklayer needs to appreciate that the variation in block dimensions and shapes is intentional, and is compensated by the varying thickness of mortar joints.

Some Timbercrete blocks will feature our signature “Travertine marble” appearance (most prominent in our smooth stone series), and other variations of surface and colour “irregularities”. These are all standard Timbercrete features created during the hand-crafted production process.



Travertine Marble image



Timbercrete smooth face Sandstone series
(Travertine Marble Appearance)

BATCHCOLOUR VARIATIONS



TIP 5

There is a possibility that Timbercrete bricks and blocks may vary slightly in colour from batch to batch. To eliminate this possibility order the entire batch at one time.

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

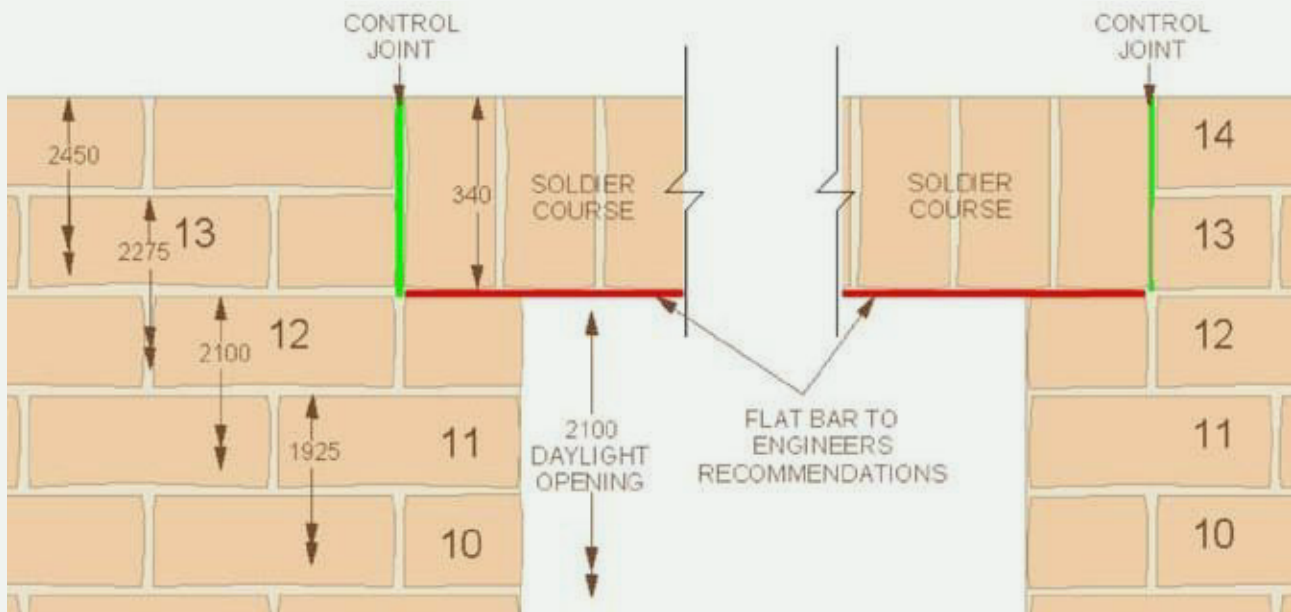


Custom bricks, long and low

DOOR AND WINDOW

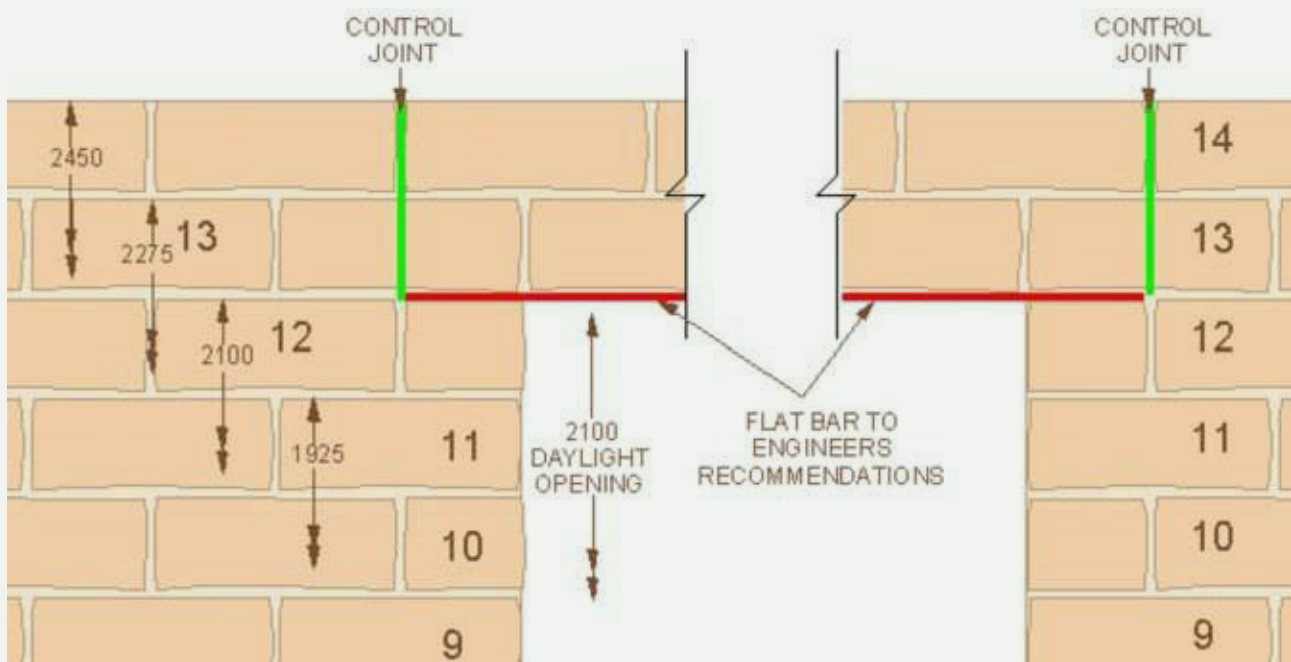
LINTEL BLOCK PATTERNS

Soldier Course



Many 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 175 mm. 12 large Timbercrete blocks equals (2.1m) a standard door height.

Stretcher Bond



Calculating Window Sizes

In many cases standard windows will fit within the Timbercrete brick or block increment. If standard windows do not fit our increment, (module) having your Windows custom-built to work the increment (module) of the brick should save you time and money. Remember every time you cut a brick or a block, you lose the cost of the area that is discarded as well as adding the cutting costs.

Window Width - to calculate the window width, simply multiply any of the increment (module) lengths (see chart over) and add the thickness of one mortar joint.

Window Height - to calculate height of windows, multiply any of the increment module heights (see chart over) and deduct the various amounts for a lintel gap, sill brick and mortar joint. Deduct a 10mm gap between the top of the window and the bottom of the lintel beam, this gap accommodates vertical masonry shrinkage, or the sagging of the lintel beam.

Also deduct the thickness of the sill and the sill mortar joint.

As demonstrated below:

TIMBERCRETE SMALL SERIES

(.300 Long x .130 High ~ Joint included)

Small series include: Cobblestone Series, Smooth Stone Series.

Approximate Brick size: .288 Long x .115 High x.100 Wide. Note; The Cobblestone Series varies in size.

Approximate Brick size: .285 Long x .115 High x.100 Wide. Note; The Smoothstone Series varies slightly in size.

VERTICAL INCREMENTS 130mm

Vertical Increments include Block height of 115 mm + 1 mortar joint of 15 mm. = 130 mm

	Block Course	Vertical Increments	
	1	0,130	
	2	0,260	
	3	0,390	
	4	0,520	
	5	0,650	
	6	0,780	
	7	0,910	Bench Height
	8	1,040	Example:W
	9	1,170	
	10	1,300	
	11	1,430	
	12	1,560	
	13	1,690	
	14	1,820	
	15	1,950	
Lintel	16	2,080	Door Height
	17	2,210	
	18	2,340	
	19	2,470	
	20	2,600	
	21	2,730	

HORIZONTAL INCREMENTS 300mm

Horizontal Increments include length of block 288 + 1 mortar joint of 12 mm = 300 mm

Half Brick Increment = 138mm + 1 mortar joint of 12mm + 150mm.

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	0,138	No Mortar Joint	11,0	3,288
1,0	0,288	No Mortar Joint	11,5	3,438
1,5	0,438		12,0	3,588
2,0	0,588		12,5	3,738
2,5	0,738		13,0	3,888
3,0	0,888	Example: A	13,5	4,038
3,5	1,038		14,0	4,188
4,0	1,188		14,5	4,338
4,5	1,338		15,0	4,488
5,0	1,488	Example: B	15,5	4,638
5,5	1,638		16,0	4,788
6,0	1,788		16,5	4,938
6,5	1,938		17,0	5,088
7,0	2,088		17,5	5,238
7,5	2,238		18,0	5,388
8,0	2,388		18,5	5,538
8,5	2,538		19,0	5,688
9,0	2,688		19,5	5,838
9,5	2,838		20,0	5,988
10,0	2,988		20,5	6,138
10,5	3,138		21,0	6,288
NOTE ~ Place control joint at every 4m to 6m Intervals.				

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

WINDOW OR DOOR SIZES FOR TIMBERCRETE SMALL SERIES BRICKS

WINDOW HEIGHTS

For window heights select any of the above vertical increment measurements and deduct 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: W

Courses	8	1,040	Vert Increment
Deduct		0,010	Gap
Deduct		0,050	Sill Brick
Deduct		0,015	Mortar Joint
		0,965	Window Height

Sill thickness can be adjusted to suit standard windows.

WINDOW OR DOOR WIDTHS

Select any of the above “Horizontal Increments” and add 12mm, representing the mortar joint deduction.

Example: A ~ 3 Full Brick Increments

3 bricks	0,888	
add	0,012	(mortar joint)
	0,900	Opening width

Sill thickness can be adjusted to suit standard windows.

Example: B ~ 5 Block Increments

5 Bricks	1,488	
add	0,012	(mortar joint)
	1,500	Opening width

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 the proximity of the nearest window or door.

TIMBERCRETE MEDIUM SERIES

(.400 Long x .175 High ~ Joint included)

Medium series include: Cobblestone Series, Smooth Stone Series, and Textured Stone Series.

Approximate Block size :

.388 Long x .160 High x.200 Wide. Note; The Cobblestone Series varies in size.

Approximate Block size :

.388 Long x .163 High x.190 Wide. Note; The Smoothstone Series varies slightly in size.

Approximate Veneer Brick size :

.388 Long x .160 High x.110 Wide. Note; The Cobblestone Series varies in size.

Approximate Veneer Brick size :

.388 Long x .163 High x.100 Wide. Note; The Smoothstone Series varies slightly in size.

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 388 + 1 mortar joint of 12 mm = 400 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	0,188	No Mortar Joint	9,0	3,588
1,0	0,388	No Mortar Joint	9,5	3,788
1,5	0,588		10,0	3,988
2,0	0,788		10,5	4,188
2,5	0,988		11,0	4,388
3,0	1,188		11,5	4,588
3,5	1,388		12,0	4,788
4,0	1,588	Place control joint	12,5	4,988
4,5	1,788	at every	13,0	5,188
5,0	1,988	4m to 6m Intervals	13,5	5,388
5,5	2,188		14,0	5,588
6,0	2,388		14,5	5,788
6,5	2,588		15,0	5,988
7,0	2,788		15,5	6,188
7,5	2,988		16,0	6,388
8,0	3,188		16,5	6,588
8,5	3,388		17,0	6,788

NOTE ~ Place control joint at every 4m to 6m Intervals.

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 5mm to 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: W

Courses	8	1,400	Vert Increment
Deduct		0,010	Gap
Deduct		0,163	Sill Brick
Deduct		0,012	Mortar Joint
		1,215	Window Height

Sill thickness can be adjusted to suit standard windows.

WINDOW OR DOOR WIDTHS

Select any of the above “Horizontal Increments” and add 12mm, representing the mortar joint deduction.

Example: A ~ 2 Full Block Increments

2 blocks	0,800	
add	0,012	(mortar joint)
	0,812	Opening width

Sill thickness can be adjusted to suit standard windows.

Example: B ~ 2.5 Block Increments

2 blocks	0,800	
1/2 block	0,200	
add	0,012	(mortar joint)
	1,012	Opening width

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 the proximity of the nearest window or door.

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**

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 600mm

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.

Sizes also applied to: Large Hollow Core Series and Large Smooth Stone Series

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 5mm to 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: W

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

Select any of the above “Horizontal Increments” and add 12mm, representing the mortar joint deduction.

Example: A ~ 2 Full Block Increments

2 blocks	1,200	
add	0,012	(mortar joint)
	1,212	Opening width

Sill thickness can be adjusted to suit standard windows.

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 the proximity of the nearest window or door.

WALL MOVEMENT

Accommodating Wall Shrinkage

It is well known that all concrete masonry products, including Timbercrete, are subject to shrinkage. This is because all cement products are manufactured “wet” or moist and as moisture is lost over time shrinkage occurs. This problem is addressed by control or articulation joints.

Clay fired products such as bricks expand over time because they are manufactured and then fired, coming out of the kiln completely dry. In time they take up moisture from rain and humidity, and expand. This problem is addressed by the installation of expansion joints.

Due to the possibility of shrinkage in cement based products is three dimensional, provision needs to be made to accommodate this phenomenon. 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 most noticeable and problematic in the horizontal, and then the vertical plane.

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



Lightly bagged medium cobblestone series

Confidence in wall stability is based on the following:

- The AS/NZS 4455.12 shrinkage tests and previous NATA Laboratory tests;
- In-house shrinkage monitoring;
- The use of hoop iron strapping to control shrinkage in the 200 mm thick single skin series;
 - Blended mortar Sands with variegated coarse particle size and low clay content.
- The resilient nature of timber aggregate, when compared to stone aggregate.

Control Joints

If in doubt always err on the side of caution and place extra control joints, which will prevent shrinkage cracks from occurring in the wall and minimise cracking as a result of ground movement.

Control joints must be installed in every wall every 4m to 6m, or as per your Engineer's specifications.

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 lintel.

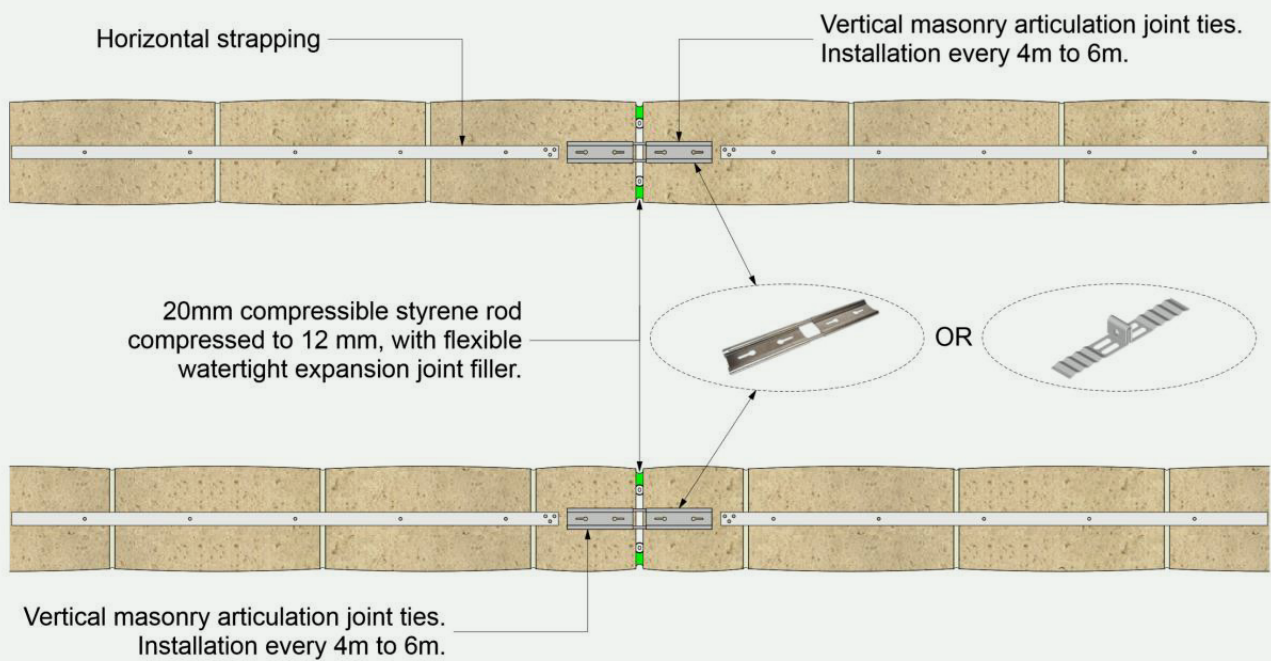


Timbercrete recommends a wall span of no greater than 4m to 6m without an expansion or control joint. All masonry products, including Timbercrete, may be subject to movement, and therefore require “expansion” or “control” joints.

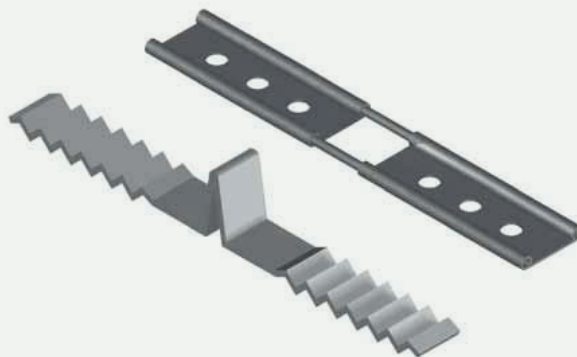
Control joints are installed as follows:

- Where ever a control joint is required, a break needs to occur in the wall. This is achieved by utilizing the natural break at the perpendicular end of one full block, and then selecting a half block in the course above so that the break continues up the wall. The gap will tend to open rather than close because typically the wall will not expand; only contract.
- Blocks are laid in the normal manner, except that masonry expansion or control joint ties **MUST** be installed to rejoin blocks across the mortar free perpendicular gap. This retains the lateral stability of the wall.
- The control joint ties should be screwed into position using 50mm Hex Head 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 expansion ties as the next course of blocks is laid.
- After the blocks are laid you will need to fill the breaks with a 20 mm compressible polythene foam backing rod and then fill with a colour matched Flexible Joint Filler. Please refer to BCA Figure 3.3.1.9

WALL MOVEMENT



Typical Control Joint Ties



Articulated Wall System

Timbercrete recognises the Achilles heel of building with masonry products is cracking as a result of movement typically caused by a change in weather conditions from wet to dry or vice versa. This is caused by an increased moisture content in reactive soils and called “ground swell or ground heave”

Ground swell creates the problem called “Dishing”. With increased water content in the soil a raft slab can be hydraulically forced into a dish shape. Another problem called “Doming” occurs conversely, during an increased or prolonged dry period where 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, window openings (above and below). The amount of shrinkage in cement masonry products is fractions of a millimeter 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 because unlike the masonry blocks you have purchased and have had 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 other factors 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. Articulated wall 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 if there were no articulation joints.

Simply put with regards to foundation and wall designs it is simply 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.

Vertical Shrinkage

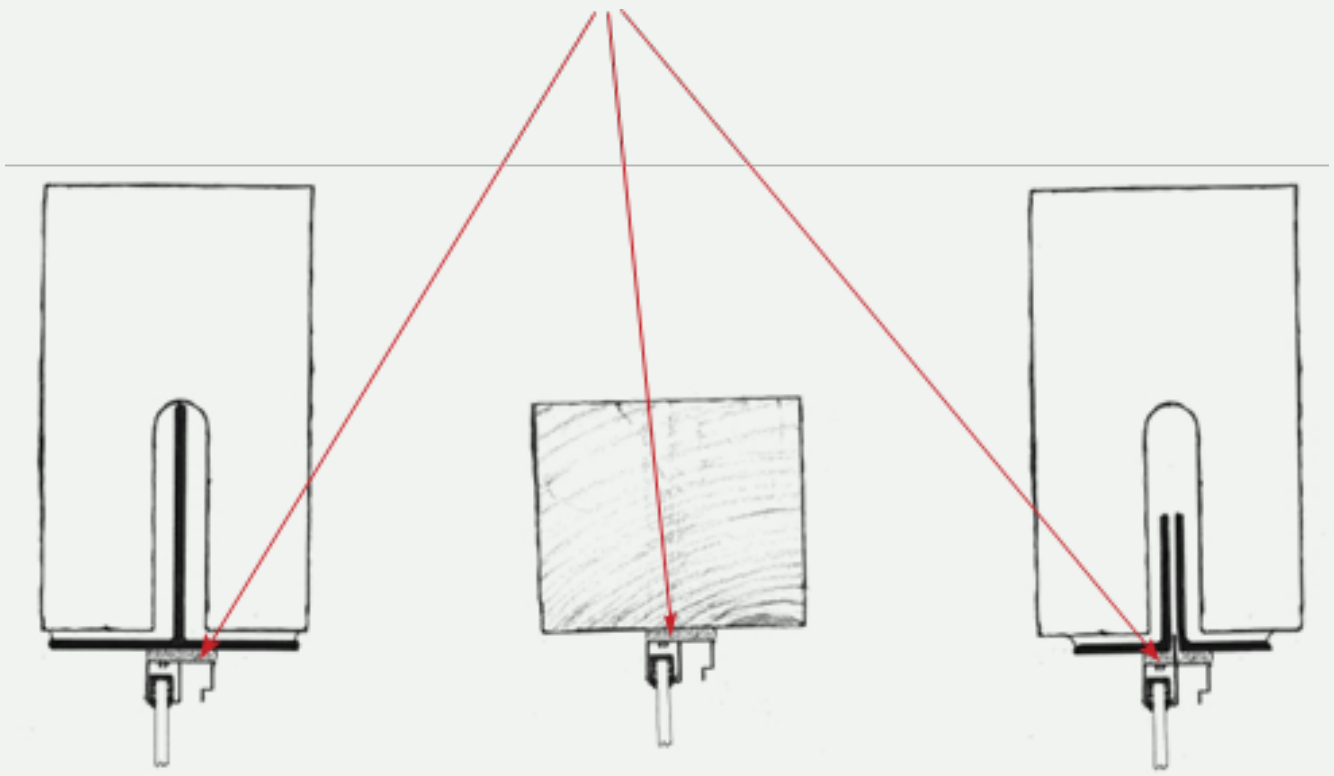
Due to the fact that vertical shrinkage often goes unnoticed (due to the relatively short heights of most walls) allowance for shrinkage is often overlooked. Allowance for vertical shrinkage can be accommodated as follows:

- Allow a gap of at least 10mm between the top of all windows and doors and the bottom of the corresponding lintels.

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

Failure to follow the above procedure may result in the walls “shrinking down” onto the window and door frames, which causes them to become load bearing. (See diagram below).

Leave a 10mm gap with builders foam sandwiched between lintel & top of sill.



MORTAR

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 of Timbercrete Masonry exceeds 5 Mpa and therefore is “deemed to comply” according to the BCA for load-bearing masonry units in a domestic application.



Mortar Flexural Strength or Bond Wrench Strength (For the Engineer)

Mortar Mixes A & B (below) are an “M3 Grade” and have a Flexural Strength or Bond Wrench Strength of 0.36 MPa. Even though test strength of 0.36 MPa has been previously determined, it is recommended that design be based on the lesser value of a Characteristic Flexural Tensile Strength, f_{mt} of 0.2 MPa. This is because design based on 0.2 Mpa does not require any further site control, but design based on 0.36 MPa 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 eliminated by observing the following:

Choosing the Correct Mortar Sand

Mortar Sands can be very problematic to say the least, 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.

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



The white sample is also a typical M3 grade mortar (6:1:1) and only shrank about 6 mm over 1 m, which is still enough to cause severe cracking in walls.

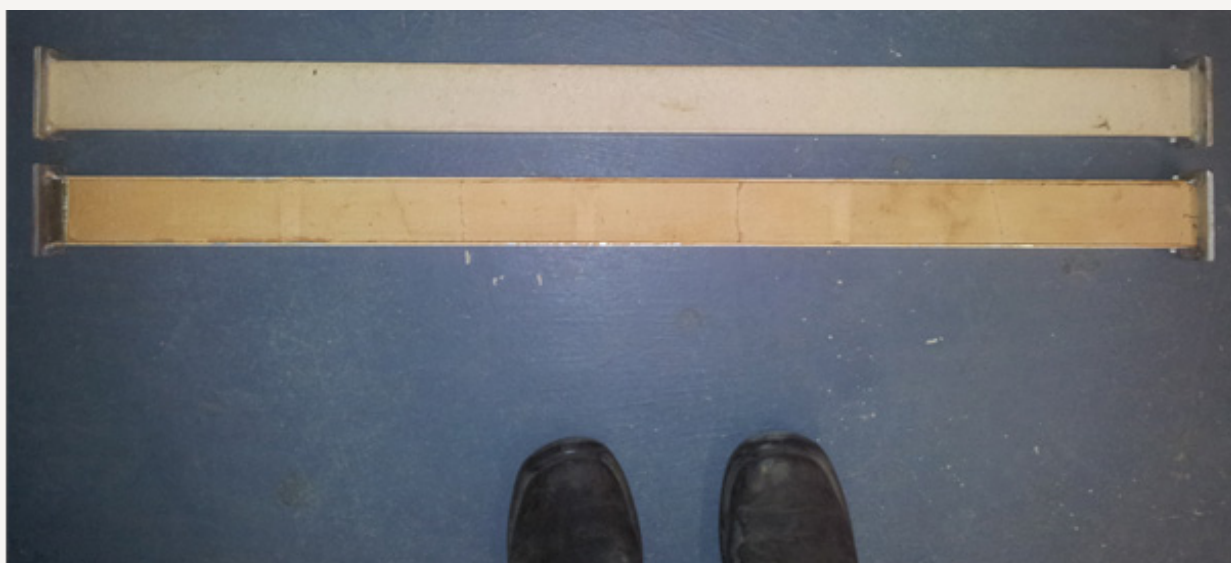


Photo above shows a shrinkage comparison test between the Timbercrete mix (the lighter colour sample) and a standard M3 grade mortar (6:1:1) using a fine or fatty brickies sand.

Note: in this test the Timbercrete sample shows no shrinkage, although it cannot be seen in this test, other tests have confirmed that Timbercrete does shrink fractionally over a three month period. To address this 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.

Mortar 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 X Lime or similar.

Talk to your local Sand 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. The recommended mortars are both M3 mortars. This is based on AS 3700.

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

Produces approx 82L of mortar mud

- 20kg (20L) bag of Aalborg White* mortar mix cement & lime combo.
- 80 litres of mixed sand. In most cases a 50/50 mix of pre-washed coarse sand and local yellow brickies sand with a low clay content 5% or less is acceptable. In some areas such as the Sydney area, where clay content is exceptionally high, a 3 part blended mix of 1 part brickies sand, 1 part washed Sydney sand and 1 part coarse river sand is necessary. Most sand suppliers will deliver this sand pre-mixed if requested.

Waterproof Mortar Additives mix A

For a waterproofing agent add 500ml of "Mortar Shield" to 20kg of "Bricklayers White Cement". For use when building with single skin or single leaf blocks. Veneer bricks or double brick wall systems do not need a waterproofing admixture.

Mortar Retardants and water thickeners

- During hot/windy conditions add Boral X Lime or X-Lime, to prevent the mortar from going off too quickly. (Use the cup measure that comes with Boral X Lime).
- Boral X Lime is a water thickener.

Colour Additives

- Normally 1 to 2 cups of oxide to each batch to achieve desired colour.

* Aalborg "Bricklayers White" is a mixture of white cement and lime and is normally available from your local Cement 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 1 – 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, up to 1/3 of the thickness of the joint.

Note 2 – When using our veneer bricks 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 fine) brickies' sand straight, as this will result in high shrinkage and joints cracking.

MORTAR MIX B

Produces approx 63L of mortar mud

- 10 litres off-white cement (13kg)
- 10 litres lime (7kg)
- 60 litres of mixed sand. The sand should be a 50/50 mix of two types: 50% pre-washed coarse sand, and 50% local yellow brickies sand with low clay content (5% or less). Most sand suppliers will deliver this sand pre-mixed if requested.

Waterproof Mortar Additives mix B

For a waterproofing agent add 500ml of “Timbercrete Mortar Shield” to 20kg of “Bricklayers White Cement”. For use when building with single skin or single leaf blocks. Veneer bricks or double brick wall systems do not need a waterproofing admixture.

Mortar Retardants and water thickeners

- During hot/windy conditions add Boral X Lime, to prevent the mortar from going off too quickly. (Use the cup measure that comes with Boral X Lime).
- Boral X Lime is a water thickener and a retardant.



Colour Additives

- Normally 1 to 2 cups of oxide to each batch to achieve desired colour.

* Aalborg “Bricklayers White” is a mixture of white cement and lime and is normally available from your local Cement supplier.

Buy Boral X Lime here:

<https://www.boral.com.au/products/cement-and-lime/packaged-products/related-products/x-lime>

Check X-Lime MSDS Data Sheet here:

https://www.boral.com.au/sites/default/files/media/field_document/X-Lime%20Safety%20Data%20Sheet.pdf

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 1 – 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, up to 1/3 of the thickness of the joint.

Note 2 – When using our veneer bricks 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 fine) brickies’ sand straight, as this will result in high shrinkage and joints cracking.

Boral X-Lime is a concentrated powder additive for cement based mortars. Designed to provide improved workability and water retention characteristics for mortars used for bricklaying and blocklaying.

Features and Benefits

X-Lime replaces the need to use Typical Fatty Sands and air entraining agents, water retention additives and clay in cement based mortars, which are often used to enhance sands that exhibit poor grading and particle shape, and thus require additional materials to provide performance improvements.

Both clay bricks and masonry blocks absorb water from mortars, effectively causing the mortar to prematurely dry where it interfaces with the brick/block, thus reducing the bond strength. X-Lime contains a water retention additive that reduces this water absorption and allows longer board life, plus an Air Entraining Additive (AEA) in powder form to provide workability and replace the use of liquid AEAs.

Another way of looking at X-Lime is that one 2kg pail can be used with 25 x 20kg bags of cement. Alternatively, 10kg of X-Lime can replace approximately 1000kg of Hydrated Lime (Plaster Lime).

Using approximately 80gms of X-Lime per 20kg bag of normal GP, Builders, or Off White Cement will enhance mortars and provide performance improvements suggested by Australian Standard 3700 Masonry Structures Code, without resorting to the use of any other additives. Depending on the sand quality the dose rate may be modified by +/- 20gms per 20kg bag of cement, to optimise performance.

Mixing

Mix the required amount of X-Lime with cement by using the plastic cup provided, then mix in other materials. One cup contains about 50gms of un-compacted X-Lime.

Yield

10 kg of X-Lime replaces 1000 kg of hydrated lime. Alternatively, 80 grams of X-Lime can be used per 20kg bag of cement as a guide.

Availability

2kg plastic pails with a measuring scoop for convenience, plus 10kg paper bags for the trade.

Cleanup & Storage

Sweep up all spills using an absorbent material or industrial vacuum. Store sealed container in a cool dry place.

Safe Handling

Use dust mask, goggles and gloves at all times. For further information consult the Material Safety Data Sheet for the product.

Waterproofing Mortar Additives

Use “Mortar Shield” as a waterproofing agent for all single skin structures. Your local Timbercrete manufacturer may specify an alternative waterproofing admixture once testing proves its performance capabilities.

Description

Mortar Shield is a water repellent additive for enhancing water and salt resistance in cement/sand mortars. It also improves the adhesion of the mortar to Timbercrete products and assists in the workability of the mortar mixture.

Recommended Uses

Mortar Shield is designed as a water repellent additive for mortar.

Features & Benefits

- Non-toxic water-based formulation.
- Improves workability of cement/sand mortars.
- Increased adhesion of cement/sand mortars.
- Reduces water penetration, efflorescence and water-borne staining.
- Does not significantly affect the breathability of cement/sand mortars.
- Economical & user friendly.

Instructions for Use

For laying Timbercrete products, we recommend to use .500ml of MORTAR SHIELD per 20kg of “Bricklayers White” cement/lime blend. Bricklayers White is available from your local Cement supplier.



For a data sheet and MSDS on Timbercrete’s recommended mortar shield contact Tech-Dry:-

7/18 Abel Street, Penrith, NSW 2750,
AUSTRALIA

Telephone: 1800 832 437 (1800 TechDry).

Facsimile: 02 9423 4621.

Website: www.1800techdry.com.au.

E-mail: info@1800techdry.com.au

Hot Weather Mortar Additives and water thickener

To maintain the “workability” of the mortar, in hot or windy weather or when using hungry washed Sands, “METCELL” may be added to the mortar mix.

This additives will not compromise the structural integrity or bond wrench-ability,

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



Lightly bagged Cobblestone Series Blocks

Selecting and 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 yellow brickies sand (not too fatty), 2.1 litres by volume.

Note - this sand will be smaller in particle size and contain some clay, approximately 5% is standard.



Course washed river sand (left), Brickies sand (right)

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)

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

4. Mix 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.



3. Plyboard Assembly

Procedure

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).



Testing mortar mixes with cracking appearing on the right

Mortar 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 approximately 2 to 7 days for a result.

Finally, your local Timbercrete manufacturer should 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.

It is the Builder / owner builder responsibility to ensure that this test is carried out.

MORTAR

Mortar Mix A

- 2.1 litres of Coarse washed sand
- 2.1 litres of yellow brickies sand
- 1.05 litres of Aalborg White mortar mix (equals 1 litre + 50 ml)
- Enough water to make a workable mix

Mortar Mix B

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



Dark Mortar

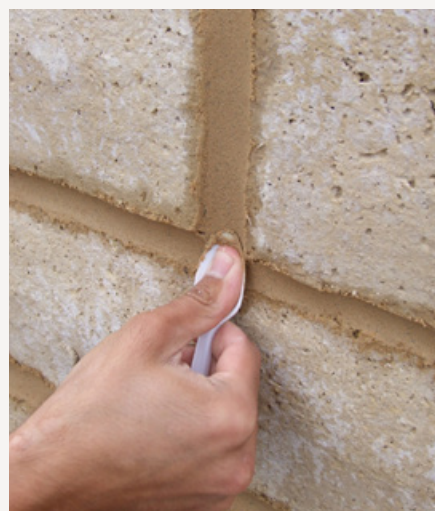


Light Mortar

MORTAR JOINTS TYPES

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.

- **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.
- **Raked Joint** - looks great externally and makes the blocks appear more defined and rustic, but it 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 in single skin structures. 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.

- **Ironed Joint** - works well inside or outside because they are the most waterproof and also shed water, dust and dirt well.

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. Due to the varying thickness of the mortar joint, traditional ironing tools are in most cases unsuitable. A spoon is an excellent improvisation.

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 of 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 bannister brush works best. An alternative method is sponging the wall with a wet sponge. Ensure the water is not too dirty or 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 later.

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

“Clean” bricklaying can make a difference to your dream home



Sample of Incorrect laying of Timbercrete



Correct laying of Timbercrete

TIMBERCRETE

CUTTING , SPLITTING AND DRILLING

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 with hammer and chisel is difficult 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 should be required. However, some cutting may be required for special features such as portholes or arches. (Check with your local Timbercrete Licensee for availability of pre-made arch or lintel blocks).

Timbercrete blocks cut, 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.

Alternatively special “arch” & “key stone” blocks can be made to order. This will eliminate the need for cutting (see photo below Cobblestone series).

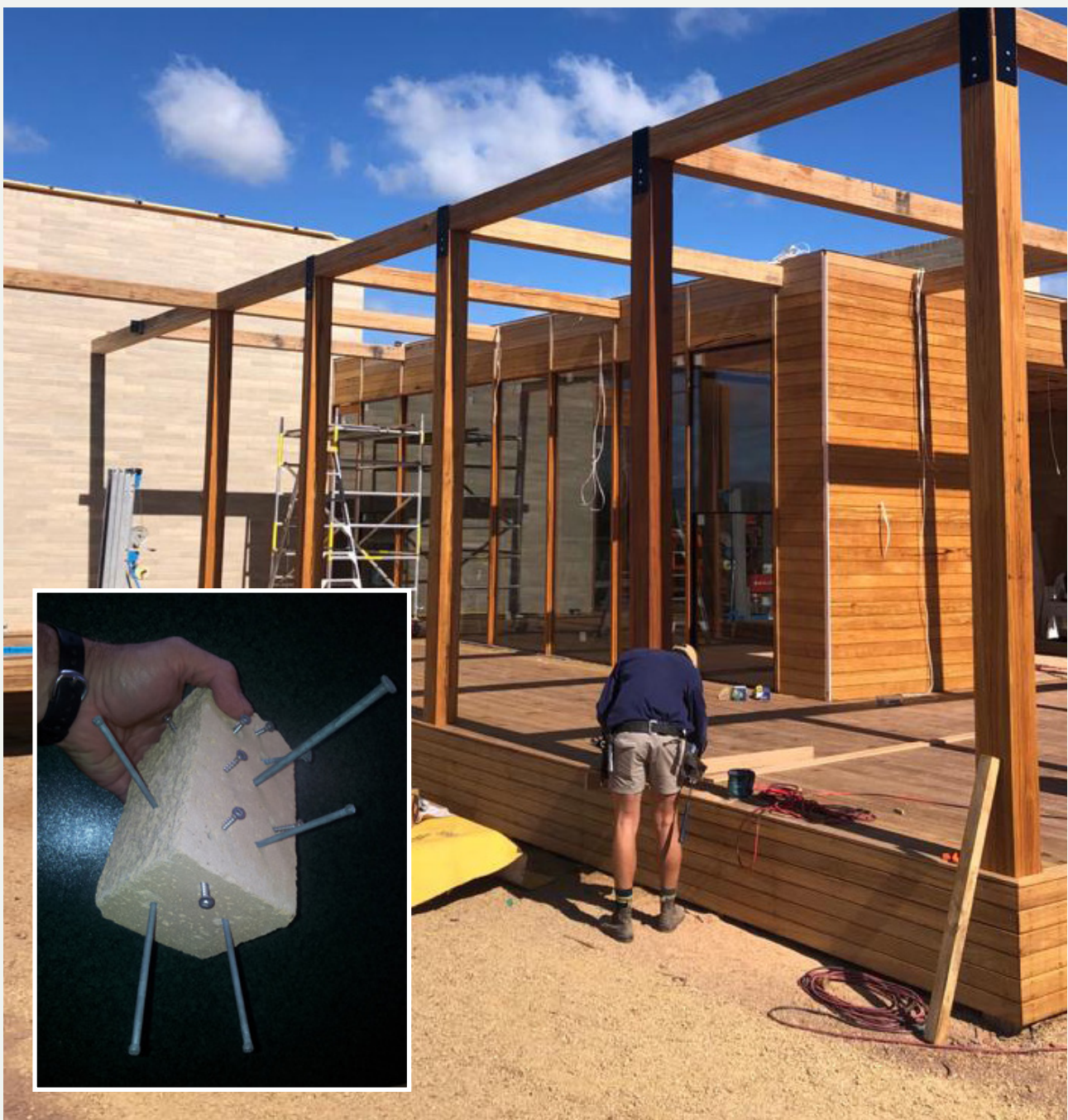


TIMBERCRETE CUTTING , SPLITTING AND DRILLING

Nailing and 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.

The blocks feel just like pine timber, and nails and screws go in and come out with the similar amount of resistance.



Calcium, Lime or 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.



Block with efflorescence cleaned with Enviro Pacific efflorescence remover.

Hardwood Stains

If blocks get stained by leaching of tannins or vanadium from hardwood materials, apply either Oxalic Acid or bleach diluted in water 10 to 1 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 here).



Hardwood stains

Where hardwood roof timber has to be installed on top of Timbercrete walls, it is advisable to either seal the walls prior to the timber installation, or to lay sheets of plastic temporarily along the top of walls during construction.

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)



Spacing the pallets

Ensure that the pallets are spaced out on the building site with approx 1m between each pallet. This will allow air flow between the pallets to facilitate drying as well as providing easy access to the bricklayer to find appropriate bricks and blocks as required.

The system described below must be used with all types of single skin Timbercrete blocks. A lighter variation of this system can also be used in our veneer range instead of brick mesh, as it offers a superior structural outcome that will manifest itself in two areas.

- It increases bracing strength (racking strength)
- It increases lateral strength (face loading)

Longer, un-interrupted walls benefit most from this strapping, whereas shorter runs benefit little. Therefore strapping is unnecessary for any length of wall that is less than 1.8m, (unless your engineer specifies to the contrary).

When building with our single skin (single leaf) blocks use hoop iron strapping (30mm wide x .8mm thick). This is the same strapping commonly used to brace roofs and timber frames, and is to be used instead of traditional brickies mesh. The hoop iron strapping should be screwed directly into the Timbercrete blocks on every 2nd or

3rd course. A 50mm timber hex head screw should be screwed through the SMALL hole in the strapping at each end of the block (two per block) to affix the strapping.

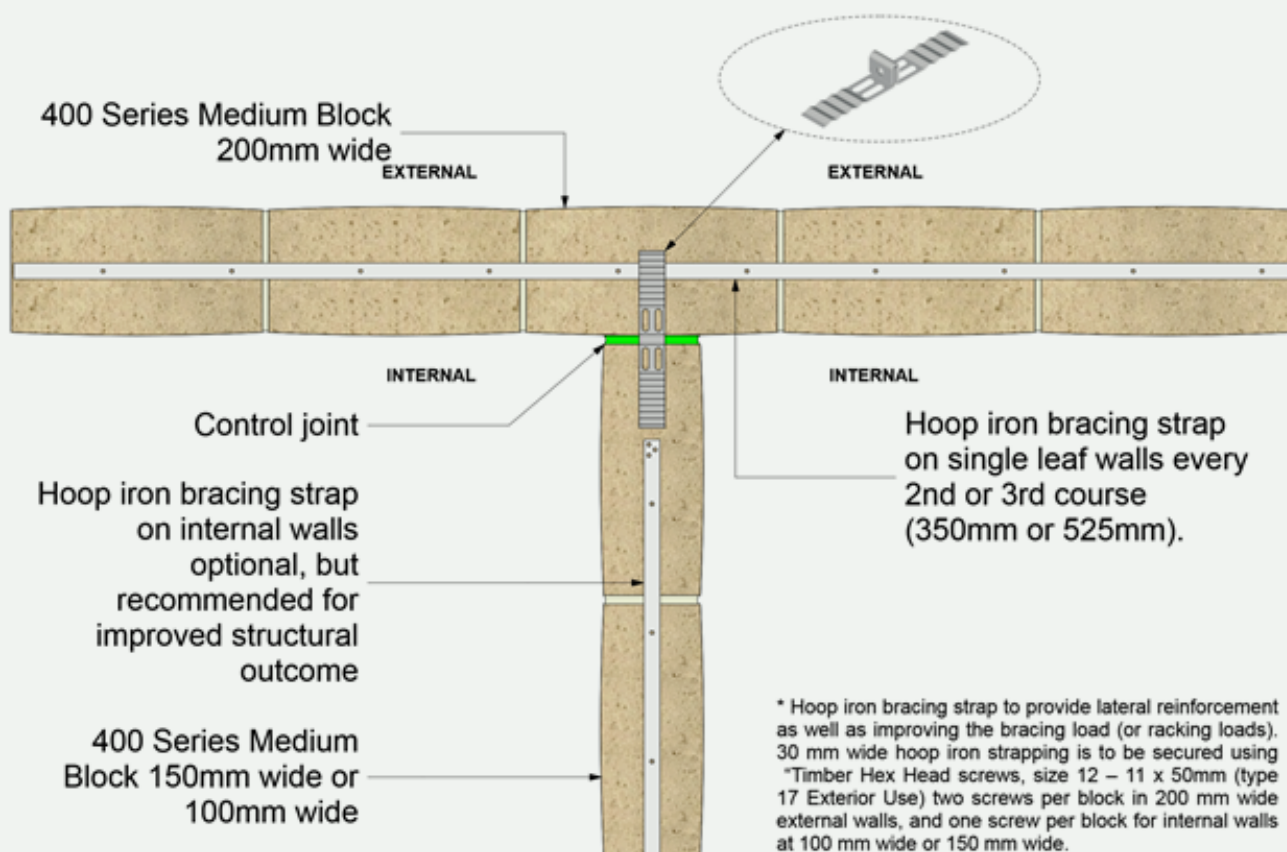
Tensioning the Strapping

- Lay out the full length of strapping from end to end i.e. from corner to corner or from window to window door to window etc. Cut to length.
- Fix the strapping with a screw directly into the first block or brick at one end.
- At the other end of the wall section place the screw all the way through the LARGE hole in the strapping into the end block
- Simply screw into the block or brick at a 45 degrees angle this will cause the strapping to stretch out taut. (See photo)
- Finally, just screw through the SMALL holes into each brick 2 screws each block.



INTERSECTING WALLS

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



Intersection Wall Junction (Gyprock Walls with Cobblestone Series)

When using Gyprock sheeting with the Timbercrete Cobblestone series, the following 2-step technique is effective: Due to the curved uneven surface of the cobblestone series, special treatment must be given to creating a neat transition.

- Cut a groove into the block wall where the gyprock needs to abutt. The groove needs to be about 10mm deep and 10mm wide. Remember to paint along the outside edge of the gyprock as this will eliminate the need to have to carefully cut in with painting later.
- Alternatively run a small timber cornice or beading to partially conceal the joint, and then grout with a colour matching flexible gap filler (such as Shelleys mortar works or no more gaps) into the nooks and crannies.

DO NOT WET PRE-LAYED BLOCKS

WARNING! The wetting down of blocks is something that Timbercrete **STRONGLY** advises **NOT** to do for the following reasons:

- If blocks are moist or wet they will have **INFERIOR** bond strength
- Single skin walls may exhibit problems with water ingress once the house is complete due to inferior bond
- Small separation cracks often appear between blocks and mortar if the blocks are pre-moistened

All masonry products (clay concrete and Timbercrete) expand slightly when they take on moisture. Shrinkage will occur on drying.

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 one of 2 mortar additives - "X Lime" or "Pozz400 RI". We do not approve any other mortar retardant additive.



Windows & Doors (single skin series)

With our single skin series our recommendation is to install windows and door jambs as the blocks are being laid. This is the only way to ensure a perfect fit. If using aluminium windows then the fin will need to be left ON with the 200mm series and OFF with the 300mm series.

Installing Sill Blocks & Windows

Special “grooved vertical service blocks”, “grooved solid blocks” and “grooved half blocks” should be straight sided in the 200mm wide series to facilitate abutting straight surfaces such as window frames. They also feature a small groove to accommodate the window fin (see Block Range Sheet).



Speciality “large bevel sill blocks” can be ordered for positioning under windows as sills and can be cut to length or joined where necessary. These blocks are 90mm high and 1.2m long. See below illustrations for installation details.



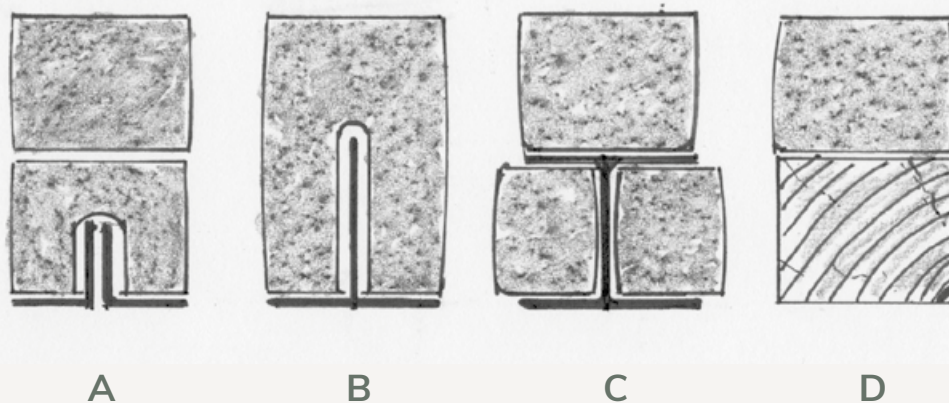
Custom made large beveled sill block

Skirting Boards and Cornices (Fix Out)

When considering the Skirting Boards and Cornices with the Cobblestone Series remember to run a course of straight sided blocks behind the skirting or cornice. If you don't like the look of a flatter or different shaped course of blocks, simply use the standard blocks and apply a colour matched gap filler to fill in the gaps. If you run the string line on the inside of the blocks rather than the outside, this will minimize the size of the gaps needing to be filled.

Lintel Types (200mm wide single skin series)

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** shows the cross section of two pieces of gal steel angle (typically each 75mm wide, 100mm high and 10mm thick) with “lintel bond beam” blocks laid along the top. This system maintains the stretcher bond block laying pattern.
- B** shows the cross section of a “T bar” gal steel lintel (typically 200mm wide, 200mm high, and 7mm or 9mm thick). This system maintains the soldier course block laying pattern.
- C** shows the cross section of an “I” beam lintel (typically 200mm wide, 180mm high, and various thicknesses) with 100 Or 120mm wide Timbercrete blocks on either side of the central “I” section. Standard 200mm Timbercrete blocks are laid on top of the “T” section to maintain the stretcher bond block laying pattern.
- D** shows the cross section of a timber lintel (made from graded cypress pine or hardwood, typically 190mm wide and 175mm high).

Installing Lintels

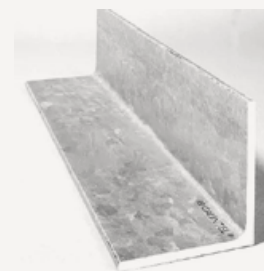
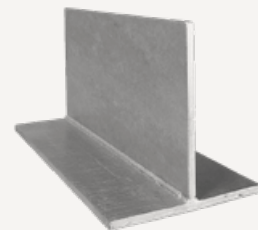
- Ensure timber lintels are sealed with varnish, paint or sealer to guard against leaching of tannins and stains on the Timbercrete blocks below.
- Install a flexible control joint on both ends of the lintels to allow expansion and contraction of the timber. This will also accommodate any movement between the timber and the Timbercrete blocks.
- Lay tar coated aluminium sheet (Alcor) or similar along the top of the timber lintels to prevent the mortar/ blocks adhering to the lintel. This acts as a slipjoint and flashing. 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.
- On the outside of the lintel bend the Alcor DOWN approx 20mm, over the timber edge, and indoors bend the Alcor UP, approx 20mm above the timber edge along the Timbercrete wall.

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

Note: When using any of the above systems, ensure that all cavities are filled and bedded with mortar.



Timber Lintels



Typical Gal Steel Lintels

INSTALLING

Installing Services in Blocks - (Single Leaf Walls)

NOTE - All Specialty Blocks have a groove, trough or cut-out. When these blocks are laid, the cavities (that is, grooves, troughs or cut-outs) **MUST** be filled with mortar. Otherwise, if water enters the wall through imperfect mortar joints, it may pool in these cavities

Please note that the relevant tradesmen should place the various services (eg electrical cable, water pipes, TV cables, telephone lines etc) along the grooves in the various Service Blocks while the walls are being constructed. After services have been placed in the grooves, mortar should fill all cavities as subsequent blocks are laid on top. This will ensure the structural integrity of the walls. (See Photos below)



Installing Electrical Services

Due to the thickness of the wall we have been advised by several electricians that to run conduits or not to run them are both 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.



TIMBERCRETE

JOIST AND RAFTER 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 6 sizes:

1. 200mm drop.
2. 220mm drop.
3. 240mm drop.
4. 300mm drop.
5. 360mm drop.
6. 400mm drop.

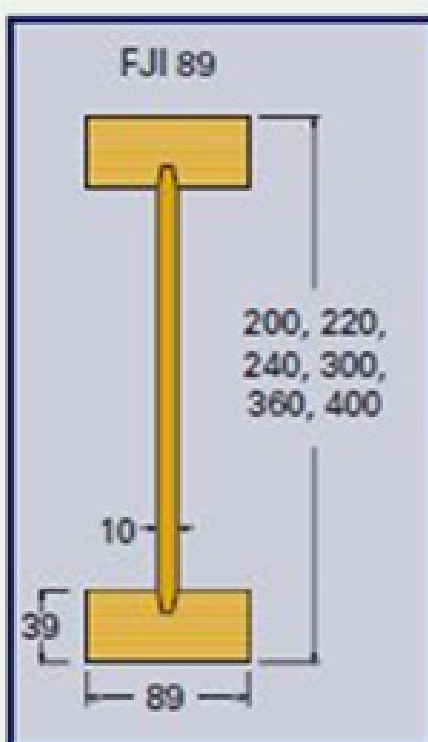
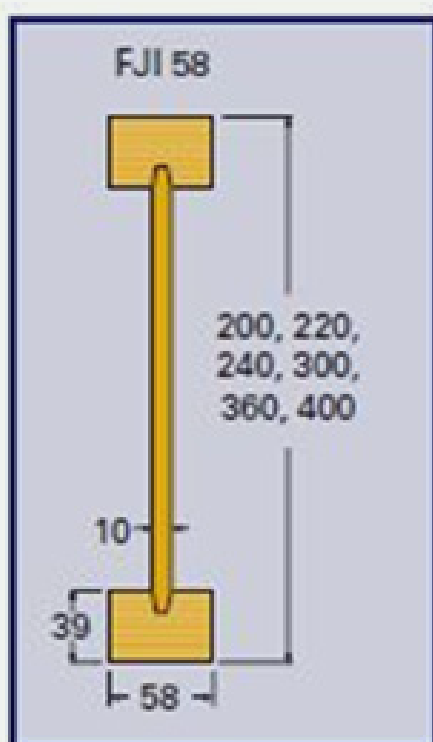
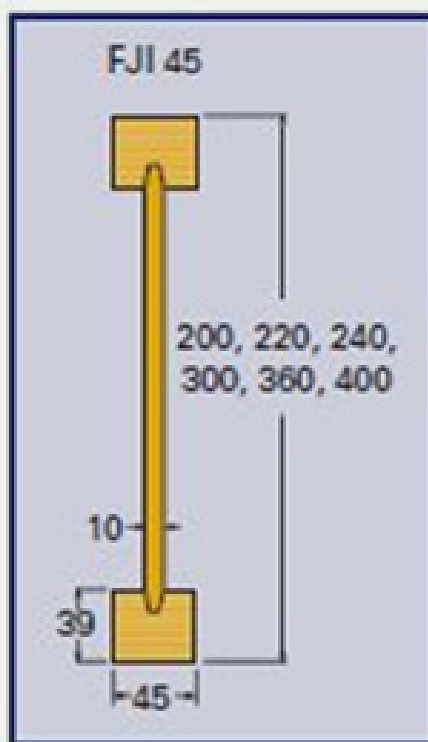
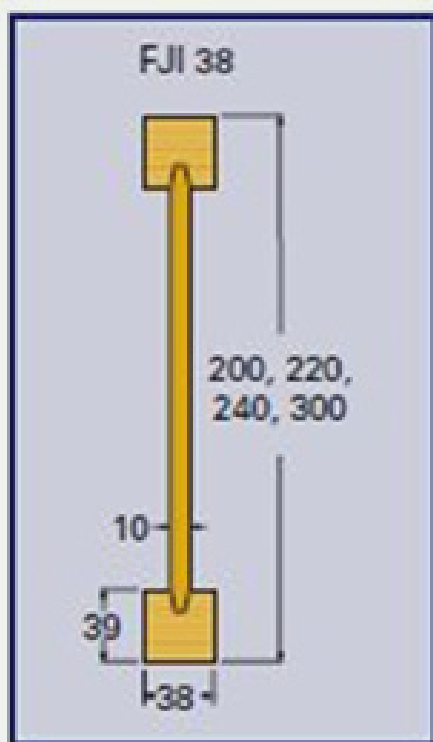
While off-the-shelf joist hangers are made from 0.6mm material, Timbercrete Joist Hangers are made from 2mm thick galvanised steel, providing a much stronger supporting system. Utilising these purpose-built joist hangers will result in considerable cost savings compared with traditional engaged Piers. (Always show your Engineer a sample of our Joist Hanger to ensure it is adequate for your application.)

All Timbercrete joist hangers are ordered from head office with the intellectual property belonging to Peter Collier ~ Phone: 0427 671149. Email: peter@timbercrete.com.au

Small orders work out much more expensive than ordering larger amounts and supplying them from stock, as orders of over 100 can half the price providing a larger profit margin and a cheaper price for the customer. Remember to allow for shipping costs in your quote.

TIMBERCRETE JOIST AND RAFTER HANGERS

We can arrange a quote for your joist hangers and the manufacturer requires 10 working days plus shipping time. Payment is required at time of order. Timbercrete joist hangers are manufactured in the above mentioned sizes to suit standard timber I beams. (see illustration below.)



Sub-Floor Breathing Holes

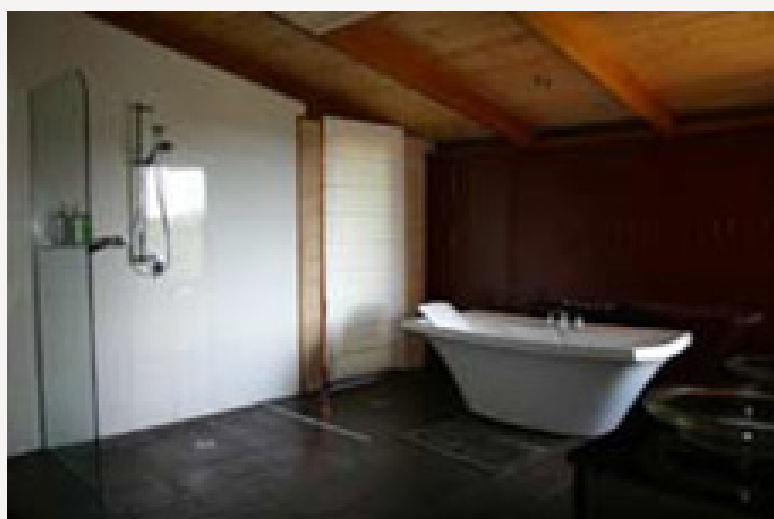
Under floor ventilation per BCA 3.4.1 is required. Use of proprietary vents usually per 1.2m span of wall and 600mm to each corner is a guide. Variations occur for damp climates and certain councils / various states. Where bushfire requirements need to be met the vents must comply with the BCA: Bushfire 3.7.4 & AS3959 and relevant state requirements.

For vents, use a galvanized proprietary vent purchased from a building hardware supplier. Glue a 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.

Wet Areas

There are 3 options for the wet areas in your home:

- Glue and nail an approved wet area board such as villa board first, then tile over the board (see photo)
- 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)
- Batten the wall first, then sheet and tile



ARCHITECTURAL FEATURES

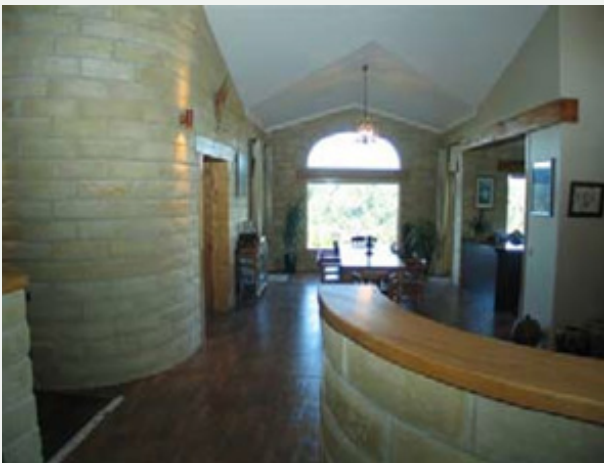
BUILD SOMETHING BEAUTIFUL



Bullseye Window



Keyhole Entry Way



Curved Walls



Split Faced Corner Block



Arched Window

ARCHITECTURAL FEATURES

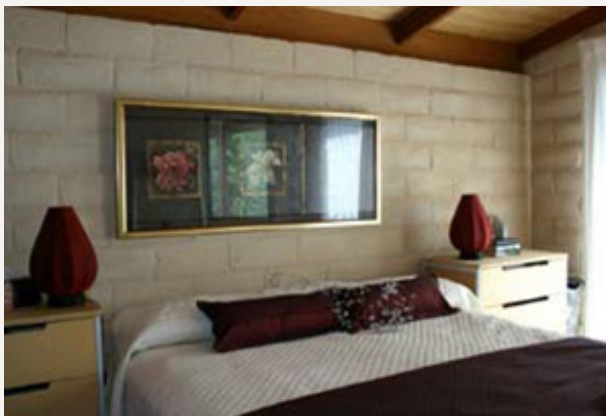
WALL TREATMENTS



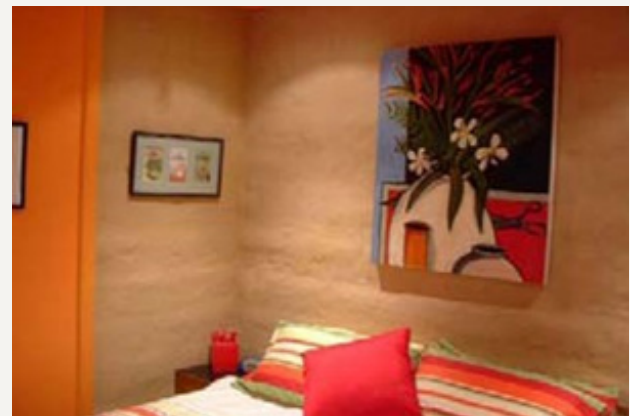
Untouched - showing their natural beauty



Painted



Lightly Bagged



Heavily Bagged



Combination, showing a Gyprock wall with a Timbercrete wall

Timbercrete product is inherently more waterproof (has a lower absorption rate) than other masonry products made from concrete. This is because unlike other concrete masonry products Timbercrete has a closed structure. This closed structure is a result of removing air pockets during the manufacturing process, as well as the nature and function of the various raw ingredients.

Since approximately 2000, with thousands of houses being constructed in Australia as well as USA and New Zealand, has demonstrated that to date, water has never penetrated through a single skin 200 mm wide solid Timbercrete block. The same cannot be said of typical bricklaying mortar, and it is for this reason that we have introduced a threefold waterproof process:

Single Skin or Single Leaf Timbercrete walls uses three lines of defence against water ingress

1. Despite the fact that under normal wet or dry conditions water does not penetrate through Timbercrete blocks, standard mortar is significantly more porous than Timbercrete hence the need for a waterproofing admixture in the mortar.
2. The second line of defence is to generously apply an external wall sealer. Timbercrete recommends Grimes & Sons Water Repellent Sealer with application after the walls are clean and dry.
3. The third line of defence is generous eaves (at least 450mm) or wraparound verandas.

External Sealers (available from Your nearest licensed Timbercrete supplier)

For the past 10 years, Timbercrete has researched and tested many different brands of sealers, with a view to being confident that you have the best possible outcome, at the least possible expense. As a result we suggest the Timbercrete blend silicon water repellent, a dry non glossy look sealer.

1L covers up to 8m² depending on porosity of the surface. One coat should be sufficient; however a second coat can be applied in problem areas if needed. Comparison tests in the Timbercrete laboratory sampling over a dozen sealers have shown that this sealer is one of the most effective and value for money waterproof barriers on the market.

Internal Sealers (available from Your nearest licensed Timbercrete supplier)

Use a water-based acrylic emulsion: This type of sealer is a semi gloss membrane. While it is not recommended for water proofing, it has some other great qualities for sealing internal walls. This coating will render the wall washable, stain and dust resistant, and hold loose particles in the mortar.

SEALING TIMBERCRETE SINGLE SKIN WALLS

Typically only one coat is required, this Coat should be applied diluted 50/50 with water.

Note - The recommended method of application is to “flood coat” the walls, starting at the top and working down. This involves using a high volume spray (such as typical garden variety 15 litre back pack pump). The sealer should be applied so that it runs down the walls.

WARNING: to prevent over spray, mask and cover all windows and doors before spraying.

Building Code Requirements for Weatherproofing All Single Skin Walls

Timbercrete single skin masonry walls are typically treated in accordance with the BCA section 3.3.4.12 (C).

“Acceptable external waterproof finishes are - ...(C) “clear water repellent” provided the wall is protected by a roof overhang.”

Generous Eaves Recommended for Single Skin Walls

An acceptable overhang is at least 450mm on a single-storey building (walls of less than 3 m high). However, if walls are greater than 3 m high we recommend that overhanging eaves extend to 900mm.

Ideally single skin masonry walls should have a verandah surrounding the entire structure.

We strongly recommend our approved waterproof admixture in the mortar joint called “Timbercrete Mortar Shield” in all single leaf or single skin structures.



TERMITE PREVENTION

The termite resistance of Timbercrete is scientifically unknown. However many years of anecdotal evidence has demonstrated that no termite has ever penetrated a Timbercrete block or paver. Samples have been placed in, on and near various types of termite nests and have 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.

Termites generally enter a structure through 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 jambs. 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.

One solution cited in the BCA is to place a visible termite barrier in the masonry, at least 75 mm above finished ground level. For Termite risk management refer to the BCA part 3.1.3:

Some of these solutions include:

- 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 deltamethrin 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



Term Seal and dampcourse coating being applied prior to laying Timbercrete bricks

Manufacturers Details

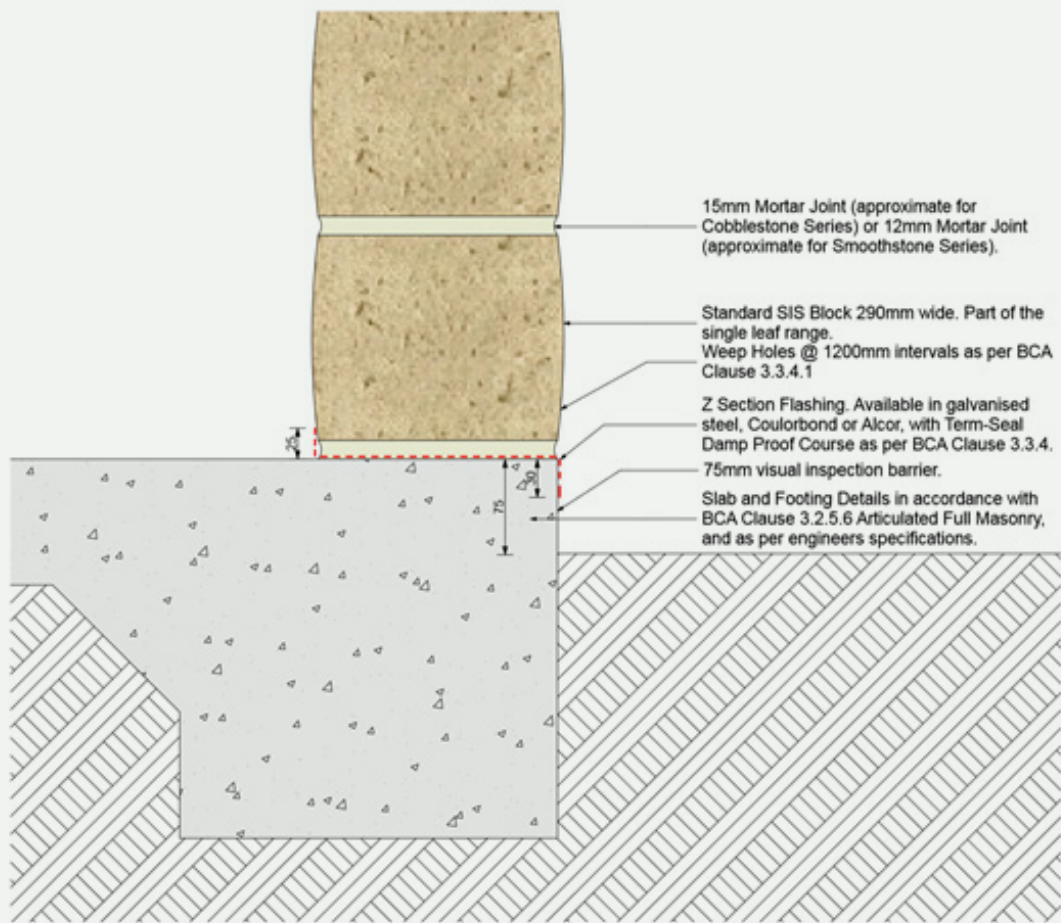
Term-Seal

Phone: 1300 657822

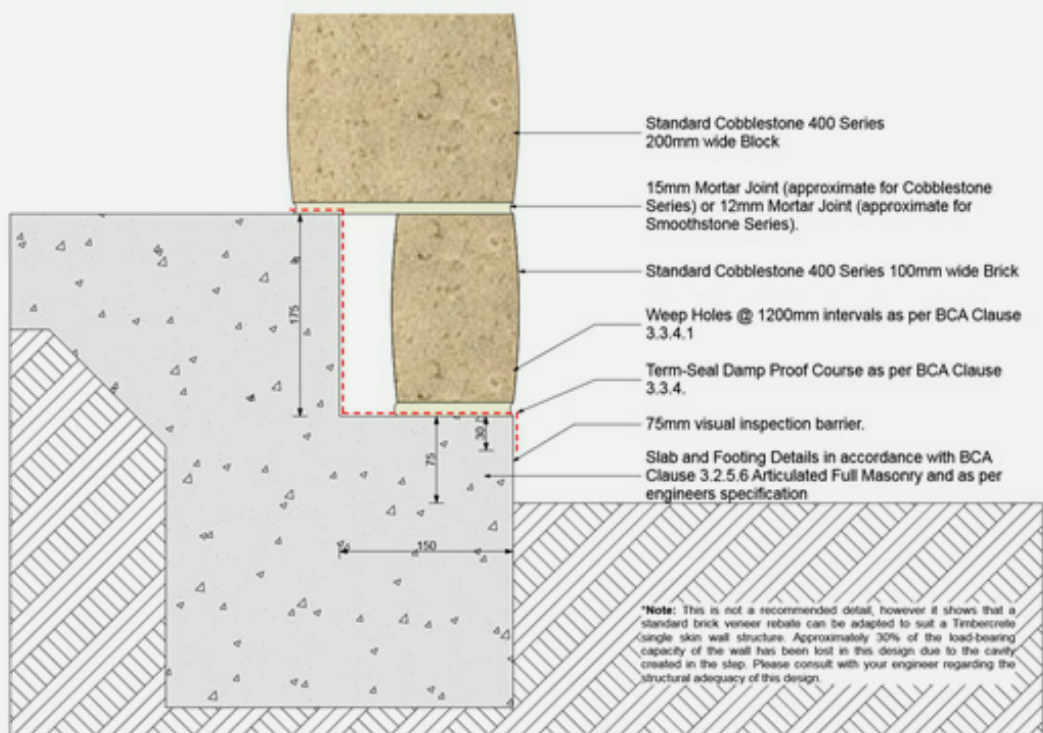
Or Network Building Supplies

Phone: 02 8316 5000

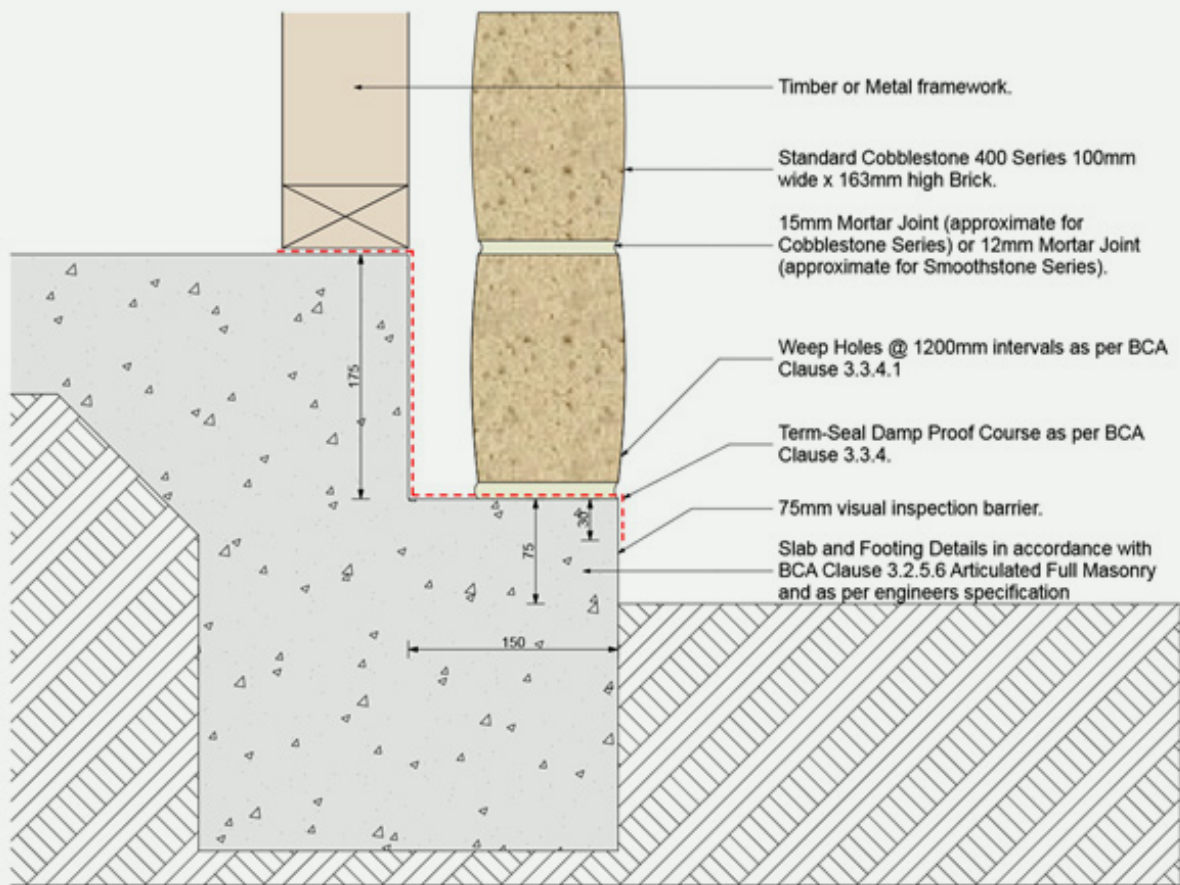
FOOTING DETAILS



Standard Single Skin Detail



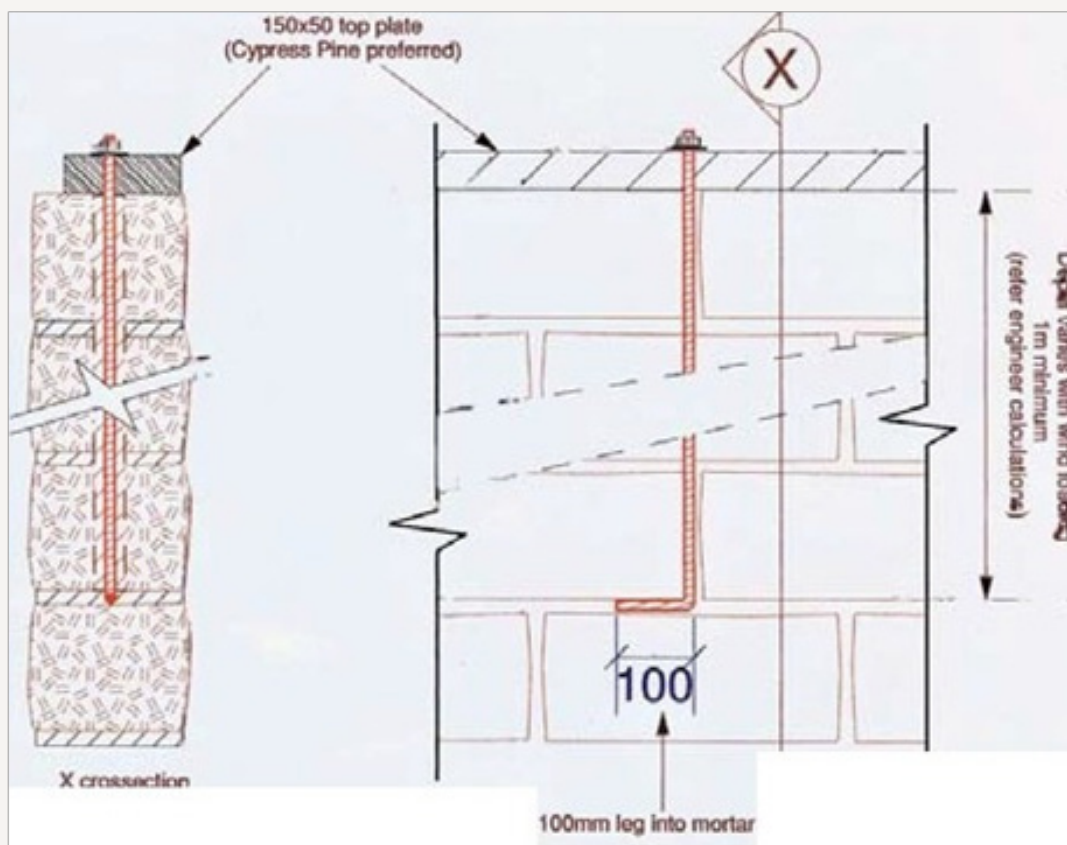
Adapting a Standard Rebate to 200 mm wide block



Standard Veneer Footing Detail

TOP PLATE DETAILS - SINGLE LEAF

TOP PLATE and TIE DOWN RODS



General Specifications

Suggested Rod Width:

Rods; 12mm threaded "Booker Rod or Hooker Rod" Rod spacing: 1800mm maximum width

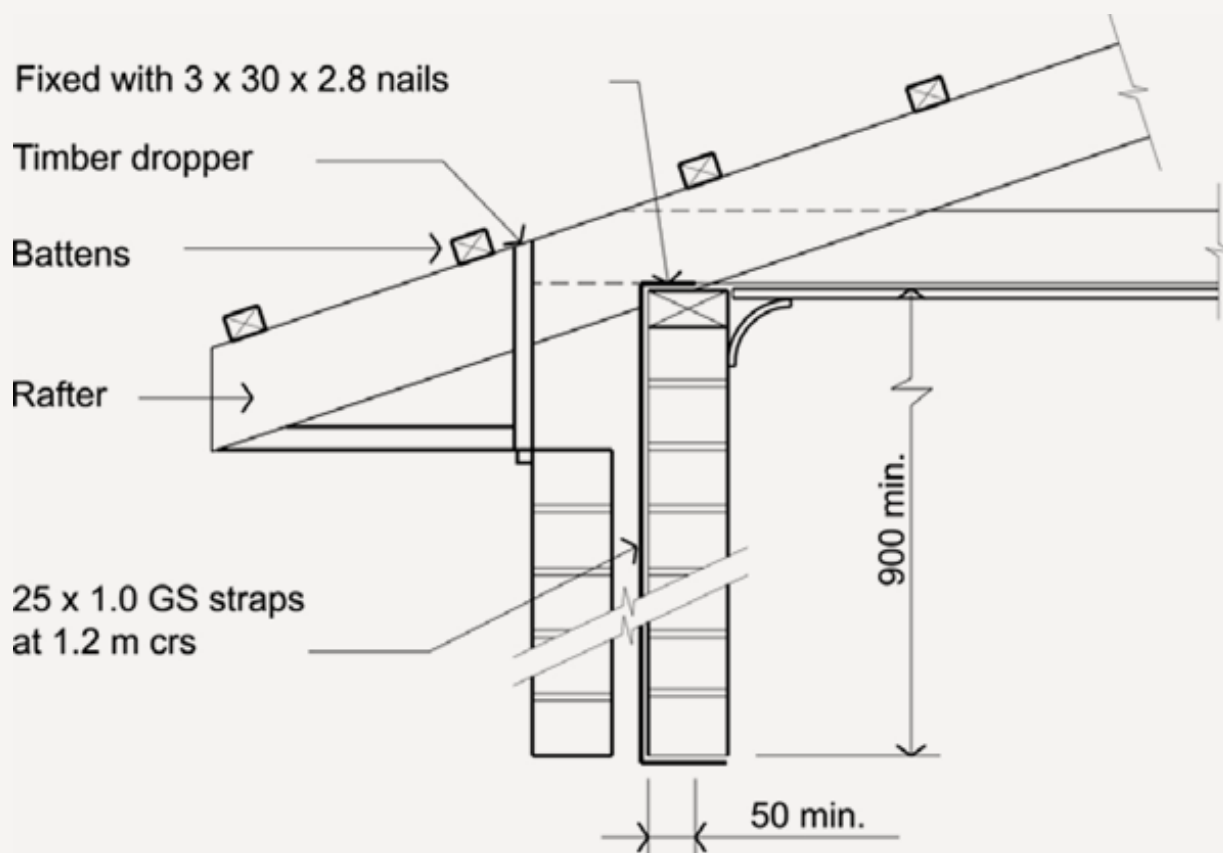
Suggested Rod Depth:

- <40 WR 1080mm depth (6 courses)
- 40 WR to 50 WR 1980mm (11 courses) - direct into slab preferred

CONSULT with your local engineer to specify rod depth & spacing's to suit project.

Openings

Rods are placed hard against 1/2 blocks (200mm) from window or door jamb (both sides of opening).



Tie Down Details for Double Brick Homes

(Diagram above supplied by ABCB, from BCA Volume 2: section 3.3.3.3)

In addition to the relevant BCA guidelines, Timbercrete recommends that when placing the tie down strap in the mortar course, it is screwed to the Timbercrete brick using a 50mm stainless steel decking screw (square head). This recommendation is made because it provides a superior anchor point for the strapping. It is not possible to affix tie down straps to normal clay or concrete brickwork in this fashion.

Note - For all structural details as to the length or the strap refer to your Structural Engineer or the BCA.

FINISHING TOUCHES

Timbercrete is constantly researching ways to improve product installation with a view to ensure our customers achieve the best possible outcome. This includes the use of flexible and non flexible gap fillers;

FLEXIBLE

Flexible off-the-shelf caulking compounds such as “Mortar Flex” can be used with Timbercrete as per standard practices for brick and masonry walls. To fill micro cracks caused by high shrinkage in the mortar, simply rub on flexible gap filler by hand or tool and wipe off with a clean wet sponge, as though you were grouting tiles.

Uses for flexible mastic gap fillers or sealants:

- To fill gaps around doors and windows
- In control joints or expansion joints.
- To fill any cracks in mortar joints or walls.

Semi FLEXIBLE Pointing Grout

As a gap filler we suggest “Selley's Point Works Gen II ”. This product can be colour matched to brick, block or mortar with a water-based paint stain. It is a permanent water proof semi to non flexible filler that has a sandy texture and sets hard like mortar.

To fill any large gaps, damages or holes in bricks, blocks or mortar where flexibility is not required.



SITE SELF 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 (see appendix 1) which is aimed at detecting any deficiencies in installation at the early stages of construction. 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.

**A Quality Product + a Quality Installtion + Outstanding Customer Service
= A Quality Home**

Thank You for Choosing Timbercrete.

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

ON-SITE SELF AUDIT CHECKLIST

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

	YES	NO
1. The builder has a copy of the Building with Timbercrete manual.	☐	☐
2. The bricklayer has a copy of the Building with Timbercrete manual.	☐	☐
3. All pallets have been unwrapped and spaced at 1m apart to maximise drying.	☐	☐
4. Blocks are installed after the "use after date" (as per the pallet label).	☐	☐
5. All the directions on the pallet label are followed.	☐	☐
6. The bricklayer has completed a mortar test on the sand (mortar test board sighted).	☐	☐
7. Cracks have not appeared and shrinkage is not evident in the mortar on the mortar test board.	☐	☐
8. The sand mix and particle size are as per the teaching in the info in the BWTC manual.	☐	☐
9. There is no unapproved mortar additive being used.	☐	☐
10. The bricklayer is batching the mortar into buckets first.	☐	☐
11. The sand and cement and lime volumes and portions are correct.	☐	☐
12. A full bed of mortar is applied to all Timbercrete brick and block surfaces.	☐	☐
13. All service block cavities are filled with mortar or concrete grout.	☐	☐
14. A damp course barrier is used between the slab and the first course of blocks as per BWTC.	☐	☐
15. Bracing strap is being installed to single skin blocks as per BWTC.	☐	☐
16. Type and size of the bracing strap is as per the BWTC manual.	☐	☐
17. Control joints are installed above all articulation joints in the slab.	☐	☐
18. Control joints are being installed at the appropriate intervals of 4m to 6 m.	☐	☐
19. Control joints are placed on either side of lintel above window & door openings	☐	☐
20. A 10 mm 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-site audit was conducted, and all agree with the results.

Bricklayer _____
 | NAME | | SIGNATURE | | DATE |

Builder _____
 | NAME | | SIGNATURE | | DATE |

Owner _____
 | NAME | | SIGNATURE | | DATE |

Building Site Address _____

Extra Comments

.....

