



TIMBERCRETE
AN
INTRODUCTION



BUILDING
OUR
SUSTAINABLE
FUTURE



What is Timbercrete?

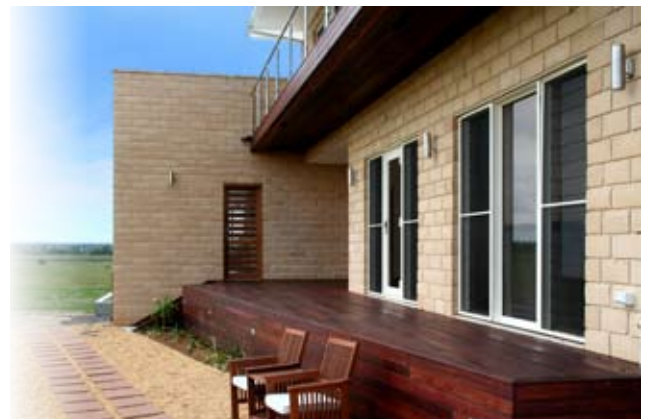
Timbercrete is an award-winning, environmentally sensitive building material that is simply better. Whether used as bricks, blocks, panels or pavers, its comprehensive performance and benefits to the environment are impressive.

This unique product can be moulded into a vast range of sizes, shapes, colours and textures. It is used in domestic, industrial and commercial buildings, as well as landscaping and a range of other applications.

Please read on to discover how Timbercrete stands out from the rest of the products on the market.

- Timbercrete is the only brick or block product on the market that actually traps carbon that would normally end up as greenhouse gases in our atmosphere.
- It has substantially lower embodied energy.
- It has a significantly higher insulation value (R) in comparison with traditional bricks, blocks and panels.
- Superior thermal mass (the ability to store thermal energy and release it slowly).
- Improved engineering qualities (see test data).
- Lighter weight (two and a half times lighter than concrete or clay).
- Unique workability, it can be nailed and screwed into just like timber, but retains all the advantages of bricks.
- Highest possible fire rating, outperforming concrete, clay, timber and steel. FRL240/240/240 (at 190mm thick)

This ground breaking innovation is an Australian invention and proudly Australian owned. It has international patents (PCT) and trademark protection granted or pending in 28 countries, and is making a difference throughout the world, one brick at a time.





What is Timbercrete Made Of?

Timbercrete is made of a unique blend of cellulose (timber waste), cement, sand, binders, and other materials.

Recycled Waste

- As the name suggests “Timber-crete” is made primarily from timber waste such as sawdust and wood chips. No tree has ever been cut down specifically to produce Timbercrete. Instead, we use the excess sawmill waste from plantation timbers that would otherwise be burnt or used in a form that would cause it to degrade, releasing greenhouse gases into our atmosphere.

Other Ingredients

- **Sand** - Blended sands that have been carefully selected to maximise its load bearing capacity (MPA) and minimise water ingress.
- **Binders** - Cement binder such as Portland cement and or other cementitious material, along with a special non-toxic “deflocculate” and other products that improve density and cement performance. These products also act as a waterproofing agent.





Environmentally Friendly

Timbercrete is amazingly environmentally friendly all the way from its raw ingredients through to its everyday use. Its main ingredient is recycled timber waste (cellulose). It has significantly lower embodied energy, and actually acts as a carbon trap. On top of all this, its fantastic insulation qualities mean Timbercrete homes are energy efficient throughout the year.

Carbon Trap

- Timbercrete's main ingredient of sawdust (sawmill waste) is generally used for producing fertiliser, as floor cover in horse stables, or is simply discarded or burnt. All of these uses have a negative impact on our environment, because as the product breaks down, it releases carbon gas into the atmosphere. This in turn contributes to global warming through the green house effect. When used for Timbercrete however, this vicious cycle is stopped. Incredibly, Timbercrete acts as a **carbon trap**, because the timber is preserved within a concrete tomb so that it never breaks down.

Lower Embodied Energy Due To:

- **No Kiln Firing** - Timbercrete uses no artificial or man-made drying processes. The bricks are simply allowed to cure using natural sunshine and wind. Conventional clay bricks require firing for strength and durability. This process consumes a very large amount of energy and the toxic by-product is a poisonous cocktail of sulphuric acids and gases along with carbon monoxide and carbon dioxide gases.
- **Energy use during manufacturing** - To manufacture 1m² of wall area, Timbercrete uses far less equipment and energy than other traditional brick and block making systems in its production process.
- **Energy to attain raw materials** - Timbercrete has embarked upon a deliberate strategy of establishing multiple production centres in diverse geographic locations, which are close to respective markets. As a result the average time to access our primary raw materials is reduced.
- **Energy to deliver finished product** - One truck (carting 18 pallets) supplies enough blocks for 149m² of wall area (our standard 200 mm thick single skin wall). The time in transit is typically between 15 minutes and 2 hours (one way).





Performance

Timbercrete's unique density and matrix achieve impressive sound qualities and up to six times the thermal insulation of conventional bricks. It has fantastic durability and a very high load-bearing capacity, yet allows you to nail or screw into it like timber. It also has less accumulative shrinkage and expansion than concrete and clay bricks. Because blocks are typically larger and lighter, construction is easier and faster.

Density and Matrix

- Timbercrete's dry density is 900 to 1000 kg/m³, with the product closest to this density being water, followed by timber. The matrix of Timbercrete is a patented blend of (mainly) low density soft woods and a smaller portion of special sands, cement, and other non-toxic products acting as binders.

Sound Qualities

- While tests still need to be conducted, acoustic experts agree that Timbercrete's unique density and matrix will achieve superior acoustic values in relation to sound absorption and sound transmission resistant qualities. In effect Timbercrete has a unique ability to absorb and diffuse sound, as well as preventing sound transference, allowing it to acoustically outperform bricks, blocks and cement walls. Anecdotal evidence clearly demonstrates this.

Load-bearing Capacity

- Timbercrete has a very high load-bearing capacity. A single standard 200 mm thick Timbercrete block supports in excess of 30 tonnes.

Accumulative Shrinkage & Expansion

- Timbercrete has less accumulative shrinkage and expansion than concrete and clay bricks. This is partly due to an extended curing time and to a unique method of fixing brick, blocks and panels into the wall.

Ease and Simplicity of Building

- Tradesmen enjoy working with Timbercrete because it is lightweight, coming in at only 900kg/m³ (approximately). This is around two and a half times lighter than traditional concrete or clay products, which makes Timbercrete much easier to handle.
- Timbercrete can be nailed and screwed without the need for pre-drilling. It is just like nailing into a piece of timber. Unlike other lightweight building products such as aerated concrete, nails and screws in Timbercrete stay fixed. This makes life incredibly simple when it comes to attaching various fixtures to the walls.



Thermal efficiency

Superior Insulation

- **R value comparison** - The insulation or total R-value of Timbercrete is R 1.02 @200mm thick. The conventional clay fired brick rates only R 0.24 @110mm thick, which makes Timbercrete over 4 times more insulative. Concrete blocks share a similar R-value to clay brick. Timbercrete insulation value is also far superior to rammed earth and mud bricks, which have a total R-value of approximately R 0.40 @300mm thick.
- Timbercrete has a range of blocks and bricks with varying thickness from 90mm thick up to 300mm thick. One range includes our “**super insulator block**” (subject to a patent pending), which can achieve an insulation rating in excess of R 3.0 (depending on thickness). Put simply, this block will thermally outperform any other brick, block or wall system available.

Improved Thermal Mass & Lower Thermal Drag

High Thermal Mass or (specific heat) is desirable & Thermal Drag or (conductivity) can be a bad thing when it comes to developing ideal thermally efficient building material.

Timbercrete has a density and matrix unlike most other products, resulting in a unique combination of thermal characteristics. We firmly believe Timbercrete offers a superior thermal dynamic, achieved by a three-fold approach.

Superior Thermal Dynamic

1. An **improved THERMAL MASS, (Specific heat)** or (thermal momentum) or (Volumetric thermal capacitance) = MJ/m³.K 1,171
2. Improved **THERMAL INSULATION** (R value) Thermal conductivity k W/m.K 0.234
3. Reduction of **excessive THERMAL DRAG** (high conductivity).

The reason why Timbercrete has a superior thermal dynamic when comparing it with traditional building materials such as clay and concrete, is mainly because of the timber content in Timbercrete.

Timber has a much higher insulation value or lower conductivity than clay or concrete. What many people don't understand, is that whilst timber is lighter (less dense) than clay or concrete, it also has a much higher thermal mass (specific heat) or the ability to store absorbed thermal energy.

As seen in the figures below products such as water have a very high specific heat whereas iron or copper have a very low specific heat.



Specific Heat of wood for selected temperatures and moisture contents

Specific heat (kJ kg⁻¹ K⁻¹)

(K)	Temperature			
	c(dry)	c(5%)	c(12%)	c(20%)
280	1.2	1.3	1.5	1.7
300	1.3	1.4	1.7	1.9
320	1.3	1.5	1.8	2.0
340	1.4	1.6	1.9	2.2
360	1.5	1.7	2.0	2.3

Material	Specific heat c_p (J/ kg x °K)
Iron	.470
Copper	.390
Water	4.186

Concrete (approximately)	.800
Mortar (approximately)	.700
Timbercrete (Independent value approximately)	1.171

The problem with products with higher density is that they also have a high conductivity; these products with their higher conductivity are thermally hungry. This means that if one was to build out of such materials, when the inside temperature drops below or rises above a comfortable level, the energy generated by an active heating or cooling source is absorbed by the walls, and a greater proportion of energy is dragged from one side of the wall through to the other (thermal drag).

In other words, the walls consume large amounts of energy that should really be spent on moderating the temperature of the building.

Therefore thermal efficiency is a question of balance. The thermal mass which causes thermal momentum is an important dynamic, but not at the cost of throwing away too much insulation value.

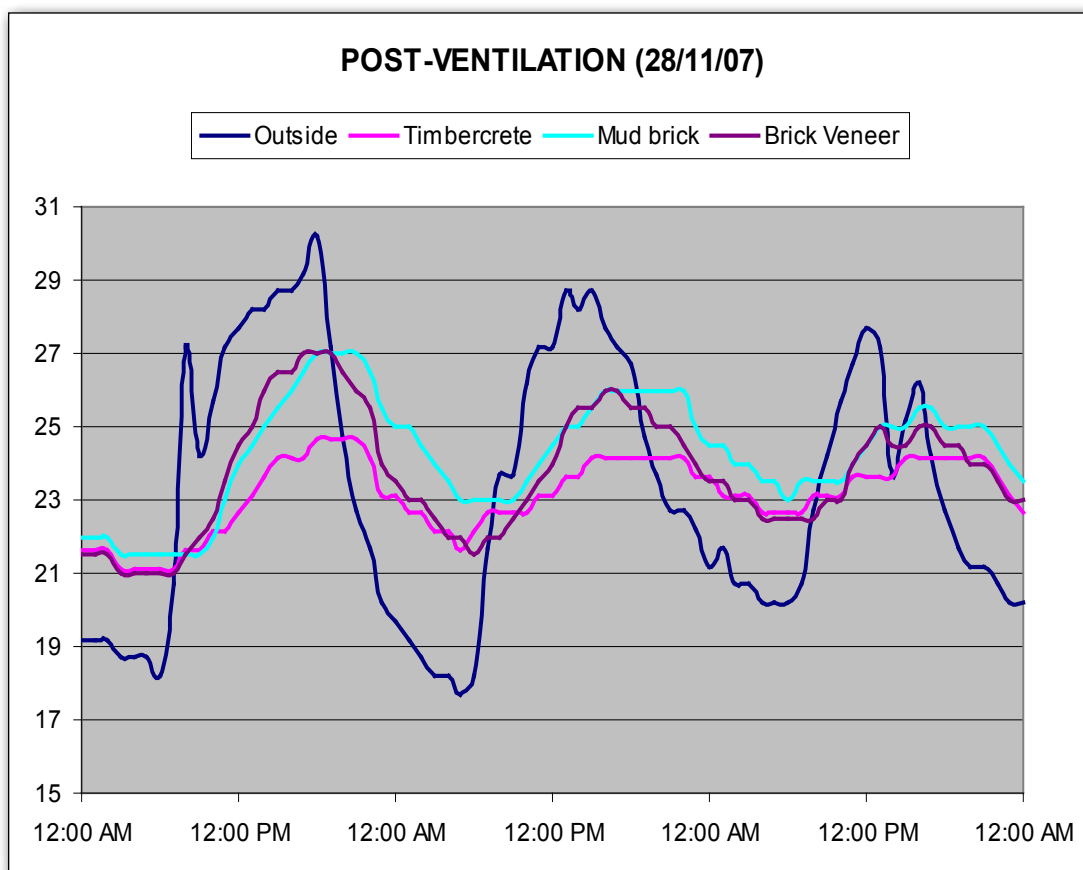
Evidence indicates that houses built with 200mm wide single skin Timbercrete external walls have consistently achieved this "balance".



Thermal Efficiency Test Results

The test graph below represents three identical buildings constructed with different types of building materials of the same thickness (250mm). Independent tests were conducted by Kevin Heathcote from the University of Technology in Sydney.

- The single skin **Timbercrete** wall has a respectable total R-value of a little over R 1 and a high specific heat of approximately C 1.171
- The **Mud Brick** wall has a total of R-value of less than R 0.4 which is fairly low but it does have a respectable specific heat of approximately C 0.7
- The **Brick Veneer** wall is a standard composite system with reflective foil insulation (R 1) plus insulation (R 1.5) plus air cavity (50mm) plus brick plus plasterboard lining. All this adds up to a total insulation value of approximately R 3. Due to the fact that the bricks were used on the outside layer of the wall, the specific heat of the wall is very low. Therefore thermal momentum was due largely to the specific heat available in the concrete slab.



When it comes to getting the thermal dynamic balance right, these tests clearly indicate that Timbercrete has achieved that. As seen by the pink line, which represents Timbercrete, the thermal swing was far less dramatic.



Durability

Timbercrete is designed to last for generations. Independent tests prove Timbercrete has the highest possible fire resistance rating for building materials in Australia. It is impervious to termites and rot, and even bullet-proof! The colour will not fade and the bricks, blocks, panels and pavers will not wear away when exposed to extreme weather conditions. It even has superior bracing values (both in and out of plane) for those in earthquake prone or cyclonic areas.

Lifespan

Timbercrete longevity is the same as any other concrete product such as, "Hollow Core Concrete Blocks". The expected life span is therefore hundreds of years. Also like other concrete products, sealing or rendering increases its longevity.

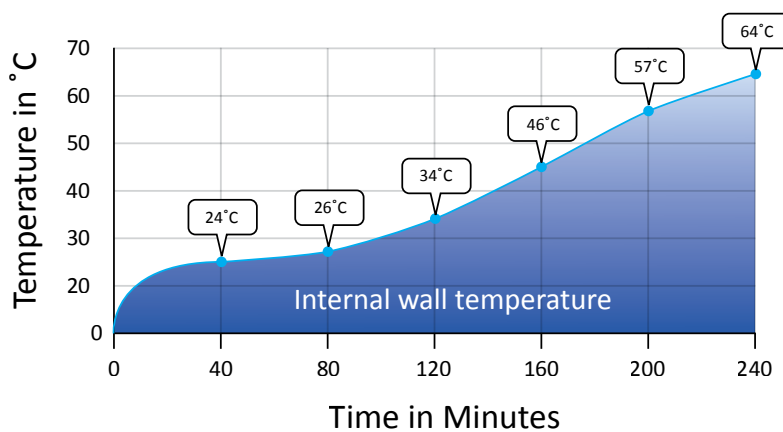
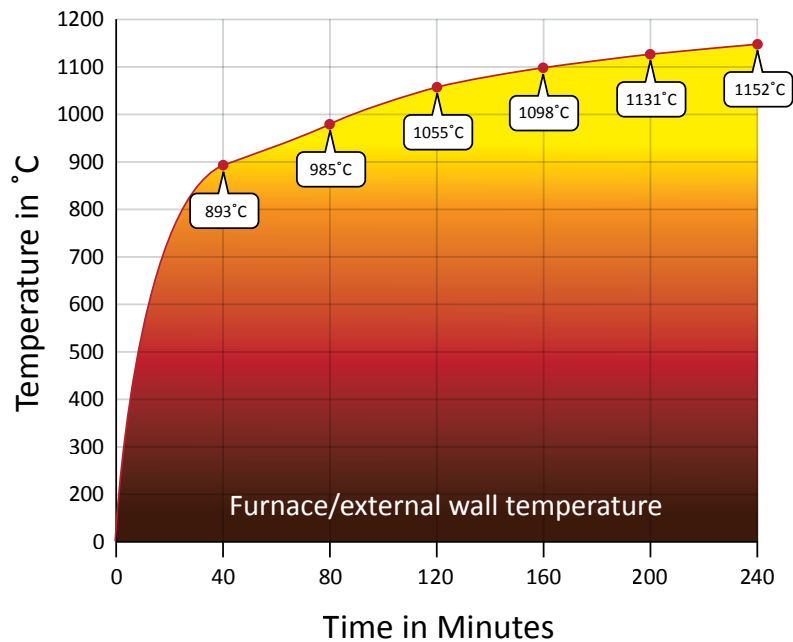
Fire Resistance Level Rating (FRL240/240/240 minutes)

Timbercrete has the highest possible fire rating, which outperforms most other building blocks & bricks according to independent accredited fire tests. With 30 tonnes of pressure applied, over a 3 metre expanse, Timbercrete's Fire Resistance Level Rating exceeds the highest possible fire rating of 240/240/240.





Timbercrete Independent Scientific Fire Temperature Analysis



Freeze – Thaw Proof

At the other end of the scale, “freeze-thaw” testing has shown that Timbercrete easily withstands the extremes of weather, regardless of whether it is hot or freezing, or rapidly changing between extremes.



Versatility

Greater Choice

Timbercrete is a leader in regard to aesthetic versatility by offering our clients the opportunity of specifying any colour, texture, size or shape. No other brick company offers such versatility. You can literally “Design Your Own Brick, Block or Panel”.

Range of Products

Construction alternatives include single skin blocks, veneer or double brick, and wall panels. Products are available in a wide range of styles, or you can just design your own. Landscaping products and pavers are also available.

Cost Effective

Cost Competitive to Construct

- Easier and faster to construct, which reduces construction costs.
- Timbercrete is typically more cost competitive per square metre of wall than traditional alternatives.
- Timbercrete has just released a new panel’s system that is significantly more cost-effective than any other building system within Australia.

Year Round Savings

- Timbercrete’s amazing thermal efficiency saves you money on heating and cooling year in and year out.
- Single skin walls are extremely low maintenance, with no need for patching or repainting fragile gyprock internal walls.

Higher Resale Value

- Because Timbercrete is cheaper to build, your resale profit is automatically increased.
- Timbercrete is a uniquely visually pleasing and hand crafted product. This look is more often associated with sandstone or limestone. In the midst of a street full of common brick veneer (cookie cutter) houses, Timbercrete homes stand out.
- The many benefits that attract you to Timbercrete, also appeal to homebuyers.



Single Skin Simplicity

Timbercrete also offers a **single skin building system** that allows the builder and homeowner to enjoy significant financial and time saving costs. This is due largely to the fact that many conventional building elements are not required. The following are a selection of some of the areas where economies are achieved.

NO Need For:

- Sisalation (reflective foil or vapour barrier)
- Insulation
- Timber frames
- Gyprock (plasterboard sheeting)
- Paint (normally re-applied after a few years)
- Timber reveals for windows (when building with our single skin)
- Skirting to protect fragile Gyprock
- Acid cleaning (standard procedure for clay fired bricks)

* New Fixing Panel

Timbercrete now offers a lightweight panel that is a drop-in replacement for brick veneer. This new panel system eliminates many of the problems and costs associated with masonry veneer. It is much faster to erect and provides a uniquely attractive alternative to busy little bricks.

Because of the lighter weight per square metre one can anticipate significant savings on footings and foundations in reactive soil types. Panels are typically 50 to 60 mm thick and come in a variety of sizes shapes and textures. This represents 50 to 60 kg m² of wall area, whereas clay bricks weigh over 200 kg m².

