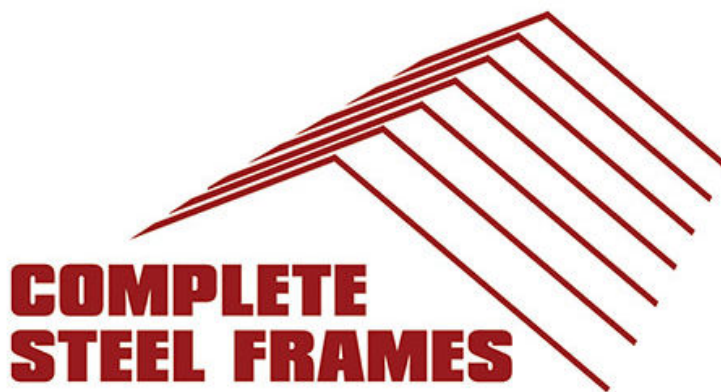


A home buyer's guide to  
**STEEL HOUSE FRAMES**  
(The pros, cons & myths of steel)



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# THE PROS OF STEEL FRAMES

## PRO: TERMITE PROOF

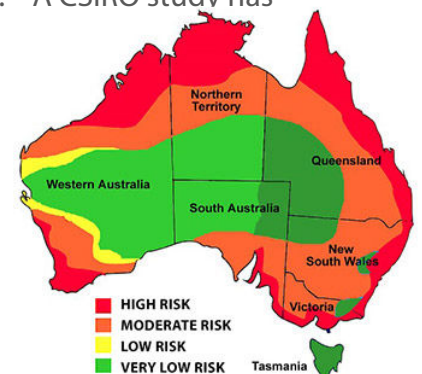
Termites are a big problem in Australia, particularly in the warmer climates of QLD and NT. Termites damage more homes in Australia than storms, floods and fires combined! With over 1 billion dollars of termite damage caused annually, home owners are 100 times more likely to lose their home to termites, than in a fire [1]. Unfortunately, most home insurance policies do not cover termite damage.



Timber framing needs regular inspections and protection. No matter how often you inspect for termites, some infestations are impossible to detect until major structural damage has already been caused. On the other hand, steel is impervious to termites and is classified as a termite resistant material under the *Building Code of Australia* (BCA). The BCA states that if you build with a steel frame, you do not have to install physical or chemical termite barriers, because termites cannot eat or damage the steel frames in any way.

A study conducted by the *University of Western Sydney* found that within Australia, 12% of timber frame houses (approximately 1 in every 9 houses) suffered termite damage, while there were no incidents of termite damage on steel frame houses [2]. A CSIRO study has

**1 IN 9 AUSTRALIAN HOUSES SUFFER TERMITE DAMAGE**





## THE PROS OF STEEL FRAMES (CONTINUED...)

### PRO: COST SAVINGS

During past decades, steel frames have cost much more than timber frames. However today the price is comparable, and a steel frame from *Complete Steel Frames* is usually cheaper than a comparable timber frame.

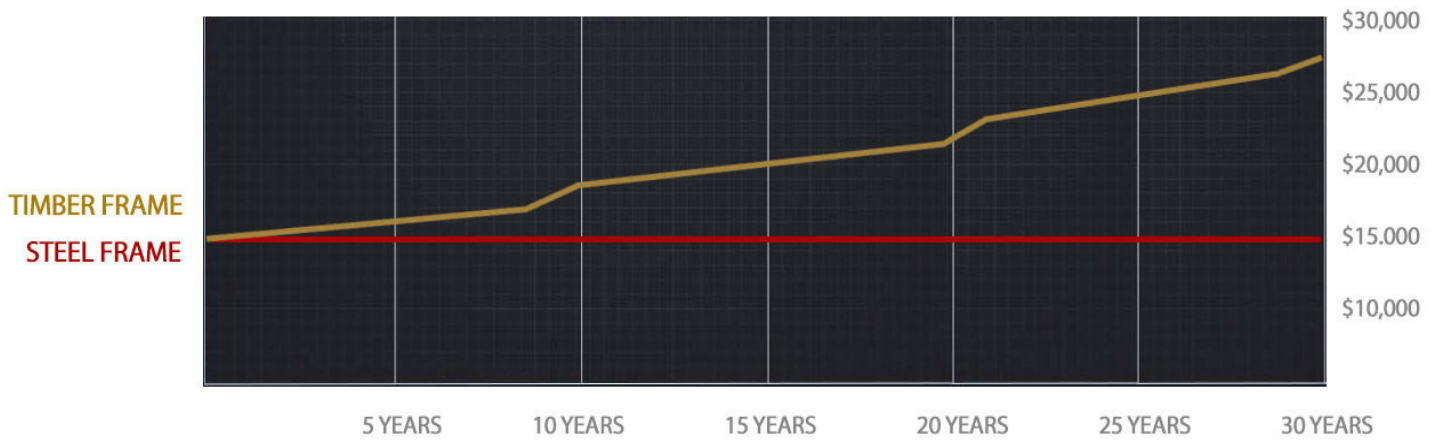
Given that there is little or no difference in the cost of the initial investment, consider the following ongoing costs associated with timber frames that you may be able to avoid by using a steel frame in your house:

- Termite inspection and treatments (annual cost).
- Rectification of serious termite infestation (budget for this once every 20 years).
- Structural maintenance due to timber frames shrinking, warping, bowing or sagging over time (budget for this once every 10 years).
- As houses with timber frames are more likely to be damaged by termites, storms, fire and flooding, home insurance premiums are normally higher for houses with timber frames (annual cost).

Over 30 years here's how the cost may differ on a frame that initially cost \$15,000:



### COST TO THE HOME OWNER OVER 30 YEARS





## THE PROS OF STEEL FRAMES (CONTINUED...)

### PRO: FIRE SAFETY

A timber house frame can easily be destroyed in a fire, however only in extreme situations will a steel frame be damaged in a fire. The CSIRO's Building Research Division state that using steel wall frames and steel ceiling trusses make a house highly resistant to fire [4]. In the event of a fire, your family is much safer in a steel frame house than a timber house. There are 3 reasons why this is so:

1. **How the fire starts**

Fires are often started by electrical faults within wall cavities or ceilings. In a timber framed house, an electrical fault can ignite a timber stud or truss and then spread rapidly to the rest of the house. This same electrical fault would be unable to ignite a steel frame or truss, therefore denying the fire this opportunity to start.

2. **How the fire is fuelled**

Steel does not burn. Unlike a timber frame, a steel frame does not become fuel for the fire to burn.

3. **How most fatalities are caused**

75% of fire related fatalities are not from the fire itself, but rather from smoke and asphyxiating gasses that are breathed in by those in the house [5]. A steel frame will not contribute to such gasses. While burning timber will release smoke and toxic gasses into the air, steel does not release smoke and toxic gasses as it heats.





## THE PROS OF STEEL FRAMES (CONTINUED...)

### PRO: BUILT TO LAST!

Steel frames are straight and true, which means walls, ceilings and roofs do not have ripples or bumps. Because steel has consistent material strength and complies with strict quality controls and tolerances, every steel stud is a good stud.

Unlike timber framing, steel does not warp or expand. Steel framed roofs do not sag over time. Because steel does not shrink, warp or twist, steel framed homes avoid settling problems, such as popping nails, sticking doors and window jambs. All of this means that 50 years in the future, your house frame will be as structurally sound and straight as the day it was built. That's why *Bluescope Steel* provide a 50 year structural warranty [6]. Steel framing is the only framing material for which any kind of structural durability warranty is offered! Doesn't that say it all!

A common problem in timber houses is frame movement which results in the cracking of plasterboard. Being a water-based cellulose product, timber shrinks and expands according to environmental conditions. It does so at a rate that conflicts with plasterboard, causing the lining surface and cornices to crack [8]. However steel has minimal expansion, making it very unlikely to cause cracking of cornices and ceilings.





## THE PROS OF STEEL FRAMES (CONTINUED...)

### **PRO: CYCLONE & FLOOD RESISTANT**

If you live in area where storms, floods or cyclones are common, then steel is the obvious choice for you. Steel frames are better equipped to deal with water damage and floods since steel does not rot, does not warp, is highly resistant to fungus and needs no drying time before house repairs can commence.

Steel frames are able to withstand level 9 earthquakes [7] and wind speeds of more than 280 km per hour. The images below come from an American journal published in 2010 [14] that discussed how a cyclone had affected 4 neighbours in the same street, some of whom used steel frames and some of whom used timber frames.







## THE PROS OF STEEL FRAMES (CONTINUED...)

### Cyclone Damage Test

These houses are neighbors in the same street, built to the same building code. Notice the vast difference in damage caused by the cyclone.



**TIMBER HOUSE**



**TIMBER HOUSE**



**STEEL HOUSE**



**STEEL HOUSE**





## THE PROS OF STEEL FRAMES (CONTINUED...)

### OTHER PROS INCLUDE...

#### Environmentally friendly

The steel used in house frames is 100% recyclable. Timber however does not get recycled and new trees take a long time to grow! This is also one reason why steel frames have become more economical over the years.



#### The healthy alternative

Steel frames require no additional chemical treatments, and no spraying of termite chemicals. Therefore steel is recognised internationally as a better option for people suffering from asthma or allergic reactions to chemicals.



#### Innovative design options

The strength and light weight of steel make more innovative design and layout ideas possible. Design aspects such as large open plan layouts that don't require loadbearing walls, very high ceilings, curved walls and circular/curved windows, are all possible with steel framed houses.



Steel framing is also ideal for homes that will be built on unusual blocks of land, including sloping sites.





# THE CONS OF STEEL FRAMES

## CON: LIMITED TRADESMEN

Working with steel frames requires a different approach and different tools than working with timber. At the present time, builders and tradies who have experience erecting steel frames are rarer to come by than those with timber frame experience. As such, builders may be hesitant to offer steel frames, or resort to reciting some of the myths below to deter home owners from requesting steel frames.



As the market demand for steel frames increases over the coming years, more builders will see the benefit of investing in training their team and buying the necessary tools to work with steel. As they do, builders will find that there are many benefits to working with steel frames compared to timber. These benefits include shorter installation times on site, ease of manoeuvring steel frames due to their lightweight nature, less tools required and a better quality outcome resulting in less claims under warranty. Watch just how quickly a steel frame house is assembled within one day at [www.CompleteSteelFrames.com.au/awesome-videos/](http://www.CompleteSteelFrames.com.au/awesome-videos/)

For your convenience, here are some builders who enjoy working with steel framing:

JAZ CONSTRUCTIONS AND RENOVATIONS

*Barry Hargreaves 0420 718 788*

STEEL FRAMING PROFESSIONALS

*Ian Dunn 0418 883 474*



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# THE MYTHS OF STEEL FRAMES

## MYTH: STEEL COSTS MORE THAN TIMBER

In years gone by, steel frames have indeed cost more than timber frames. However in today's market the price is comparable. In fact, a steel frame from *Complete Steel Frames* is usually cheaper than an equivalent treated timber frame. Not to mention the ongoing savings you'll experience, as demonstrated on page 4 of this document.



## MYTH: STEEL FRAMES MAKE CREAKING NOISES

This is a popular myth! The truth is that steel frames are not any noisier than timber frames. Studies conducted by the CSIRO found that "most occupants of homes with steel frames either reported no sound emitted from the frame or said that, if it did, it was no problem". In fact, some volunteered additional information by saying that their steel frame was less noise than previous timber framed houses they had lived in [9].



If a homeowner claims their steel frame makes noises, what they are likely hearing is the colourbond or tin roof as it expands or contracts during the day. It is normal for a roof to make expansion noises, as it receives the direct heat from the sun. However noises made by the roof will be the same regardless of what the frame of the house is made from.



## MYTH: STEEL FRAME HOUSES ARE LESS ENERGY EFFICIENT

This myth results from what is referred to as “thermal bridging”, also called a “cold bridge” or “heat bridge”. This is where the heat or cold within the house leaks outside through a conductive path that is connected to the outer cladding or roofing. The end result is that more energy is required to keep the house cold (in a hot climate) or warm (in a cold climate) through heaters or air conditioning. Thermal bridging occurs naturally in every house through windows, skylights, vents, doors and even the concrete slab itself. Any material that can conduct temperature and is exposed to the external of the house can be a thermal bridge, leaking the inside temperature. Because steel is a material that conducts temperature, a steel frame could also become a thermal bridge. This would be a real concern, except that the Building Code of Australia [10] requires that a “thermal break” be installed by the builder whenever a steel frame directly connects with the external cladding. The purpose of the thermal break is to ensure that the thermal performance of the metal frame is comparable to that of a similarly clad timber framed



wall. *Thermatape* is one type of “thermal break” material which builders can easily adhere to the steel frames prior to the installation of cladding [11].





### **MYTH: STEEL EXPANSION CAUSES CRACKS**

False. The truth is, steel framing expands and contracts at rates similar to those of other building materials, such as cornices and plasterboard.

Which means it is highly unlikely there will be cornice cracking problems due to frame movement. Expansion induced cracking is more likely to occur with a timber frame because it is a water-based cellulose product, and therefore it expands and contracts according to environmental conditions. Timber moves at a rate that directly conflicts with plasterboard, causing the lining surface to crack, the peaking of ceiling joints and cracked cornices [8]. However steel has minimal expansion, making it very unlikely to cause cracking of cornices and ceiling joints.



### **MYTH: STEEL INTERFERES WITH MOBILE/TV SIGNALS**

False. Electro-magnetic waves and satellite signals can diffract around steel just as easily as timber. Signals and waves pass through the spaces between the studs, allowing the use of all household appliances without any interference.

This is just common sense when you think about it. After all, high-rise buildings are packed full of steel. And yet it's still possible to make a mobile phone call or receive a TV signal from within.



### **MYTH: STEEL INCREASES THE LIKELIHOOD OF ELECTROCUTION**





## THE MYTHS OF STEEL FRAMES (CONTINUED...)

We smile when we hear this one, as though the Australian building authorities would turn a blind eye to consumers getting electrocuted by their houses. The truth is that steel frames are safe because they are earthed in accordance with Australian Standards [12]. All new homes are required to be fitted with safety switches, also known as RCD (Residual Current Devices) or ELCB (Earth Leakage Circuit Breaker). These switches are designed to prevent death by accidental electrocution, by reducing the possibility of the occupants touching anything live.

A broken or pierced wire in a timber frame can remain live, resulting in the risk of setting the timber frame on fire. Therefore when it comes to safety, steel frame houses are actually safer than timber frame houses.

### **MYTH: STEEL MAKES WALL MOUNTING DIFFICULT**

False. If you're mounting a photo frame on the wall, the weight of the frame can be held up by the plasterboard. Therefore it doesn't make a difference what frame sits behind the plasterboard. If you are mounting a shelf and need it to be secured to the frame of the house, you can screw it into the steel frame, rather than using nails as you would in a timber framed house. The approach required is different, but they both require basic tools and a comparable level of skill.

### **MYTH: STEEL FRAMES CORRODE AND RUST**







## THE MYTHS OF STEEL FRAMES (CONTINUED...)

False. Steel frames have inbuilt corrosion protection. Protective coatings of aluminium alloy or zinc (commonly known as “galvanized iron”) defend the steel against corrosion. These coatings are tough and are of uniform thickness over all the steel, applied to both sides of the steel by the hot-dip process. The coating must meet the requirements of the relevant Australian Standard (AS 1397), and is therefore monitored strictly under precise manufacturing conditions by the major steel suppliers (such as *BlueScope Steel* who provides a 50 year structural warranty).

While a timber frame is made up of pieces of varying quality and strength, a steel frame is made from steel of a consistently high quality and strength. In fact, steel framing is the only framing material for which any kind of structural durability warranty is offered.



In external applications (such as roofing) steel is exposed to the elements and has excellent durability, so in less exposed applications (such as inside a wall cavity or ceiling) steel weathers far more slowly.

Where there are cut edges, a naturally occurring phenomenon known as “sacrificial protection” (or galvanic action) protects the exposed steel edge against corrosion.

The only time that corrosion (over long periods of time) may be an issue is when the frame has been incorrectly installed by the builder, and as a result the frame is in direct contact with a material that is incompatible with steel [13].

### **MYTH: STEEL IS NEW AND UNPROVEN**



False. In Australia, steel frames have been used in housing since the 1940s. It is a thoroughly engineered product. In fact the steel framing industry in Australia leads the world with its technology. The Australian steel framing industry has a well-earned reputation for being highly innovative. Today's framing represents the results of decades of research, testing and product improvement. Don't forget that steel frames are the chosen material for commercial buildings because of their superior attributes.

## **MYTH: STEEL FRAMES ARE THIN & FLIMSY**

It's true that steel frames are made from thin sheets of steel, however they are structurally stronger than timber. The properties of steel are known and consistent, and conform to Australian standards. Steel framing components are designed around those properties with an extra allowance included for additional safety. Steel frames use high tensile steel components with appropriate jointing methods, and are engineered to pass strict performance tests.

While a timber frame is made up of timbers of varying quality and strength, a steel frame is made from steel of a consistently high quality and strength. Steel framing is the only framing material for which any kind of structural durability warranty is offered. Watch how strong a steel frame house is at

[www.CompleteSteelFrames.com.au/awesome-videos/](http://www.CompleteSteelFrames.com.au/awesome-videos/)





# APPENDIX

[1] Today Tonight. Watch the segment at [www.CompleteSteelFrames.com.au/awesome-videos/](http://www.CompleteSteelFrames.com.au/awesome-videos/)

[2] Termite damage study conducted by the University of Western Sydney and NASH - [http://www.nash.asn.au/nash/files/2007Study%20of%20the%20attack%20rates%20by%20Termites%20Report%20-NASH\\_1296089966.pdf](http://www.nash.asn.au/nash/files/2007Study%20of%20the%20attack%20rates%20by%20Termites%20Report%20-NASH_1296089966.pdf)

[3] The CSIRO calls for the immediate declaration of all municipalities (metropolitan Melbourne & regional Victoria) as regions where homes, buildings and structures are subject to termite infestation 13 January 2005

[4] The CSIRO's Building Materials and Equipment, Vol 16. No 6. pp 35-37. Also watch the video of the CSIRO's fire tests at [www.CompleteSteelFrames.com.au/videos/](http://www.CompleteSteelFrames.com.au/videos/)

[5] National Fire Protection Association - [www.nfpa.org](http://www.nfpa.org)

[6] [www.bluescopesteel.com.au](http://www.bluescopesteel.com.au) – Please note that BlueScope is only one of many steel suppliers used by Complete Steel Frames to manufacture frames. If you want BlueScope steel used on your frames, please be sure to request this.

[7] Watch the video of a steel frame under an earthquake test at [www.CompleteSteelFrames.com.au/awesome-videos/](http://www.CompleteSteelFrames.com.au/awesome-videos/)

[8] Coefficient of Thermal Lineal Expansion, Shortley and Williams, 1965

[9] CSIRO (G A King, Dr. M Ridge and G S Walker - in Building Materials and Equipment, Vol 17 No.1

[10] Building Code of Australia (2007) Section 3.12.1.4

[11] Fletcher Insulation introduce Thermatape - a solution to thermal bridging [www.infolink.com.au](http://www.infolink.com.au)

[12] NCC Clause 3.4.22, Australian Standard AS 3000:2007 Wiring Rules

[13] Incompatible materials for steel framing, page 4 of BlueScope Steel technical bulletin <http://www.bluescopesteel.com.au/files/dmfile/tb34aug2013.pdf>

[14] American journal article. See the full version at [www.CompleteSteelFrames.com.au/wp-content/uploads/2015/05/Florida\\_Tornado.pdf](http://www.CompleteSteelFrames.com.au/wp-content/uploads/2015/05/Florida_Tornado.pdf)



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