

CROSS LAMINATED TIMBER

FIRE AND INSULATION EVALUATION



SUSTAINABLE BUILDING RESOURCES

LINKING TOMORROWS NEEDS WITH
TRADITIONAL CRAFTSMANSHIP

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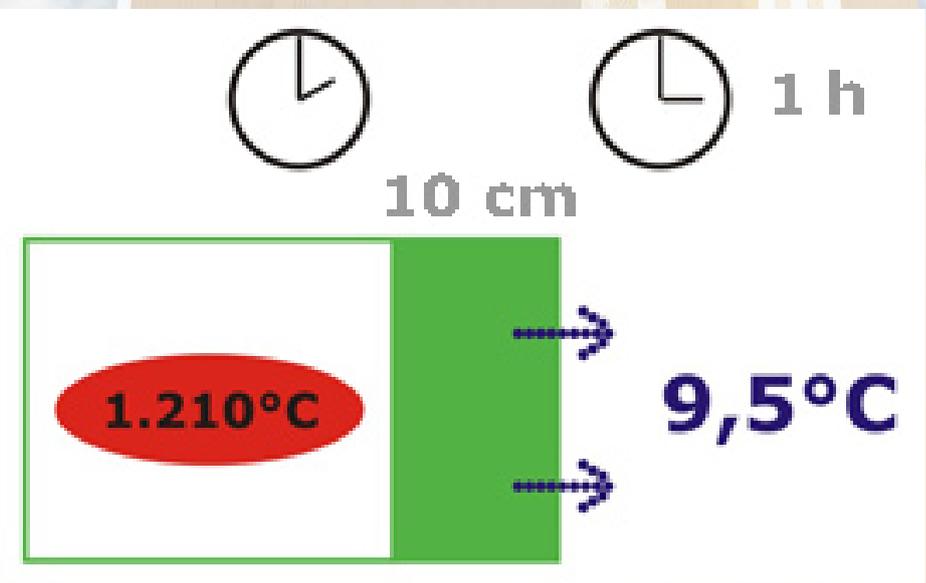
Fire prevention with CLT elements

Cross laminated timber burns at a rate of 0.67 mm per minute and therefore the duration of the fire can be exactly calculated. The element connections are impervious to gas and smoke and the fire cannot spread. The CLT module functions in the case of fire like a capsule. A rapid spread of the fire is prevented due to the solid and secure construction. The fire remains in the room.

Most fire victims do not die from burns, but from smoke and gas poisoning. This is an advantage of solid elements from single-ply boards. The fire must compete against solid wood without grooves on every part of the element.

The whole construction is impervious to gas and smoke.

CLT burns but burns safely!



If one side of a CLT element burns with approx. 1.210 °C, only 9.5° C penetrates through to the other side of the 10 cm thick BS after 60 minutes. Therefore, just imagine that you use CLT as a roof element and outside the temperature is a summery 35 °C. How much of this summer heat would you feel in your living area?

What is actually the task of heat insulation, both in winter and summer?

We are dealing with **CLT thermo** properties.

Why is the handle of the frying pan made of wood?

CLT thermo » U-Value

In the **fire protection** paragraph, we informed you already that from 1,210°C on one BS side only 9.5°C penetrated through to the other side. What happens here to the energy from the fire? The energy is almost completely stored by the CLT element. This is why the frying pan handle is made of wood!

"... and what u-value does the CLT thermo wall have?" This is a frequently asked question.

What actually is the u-value?

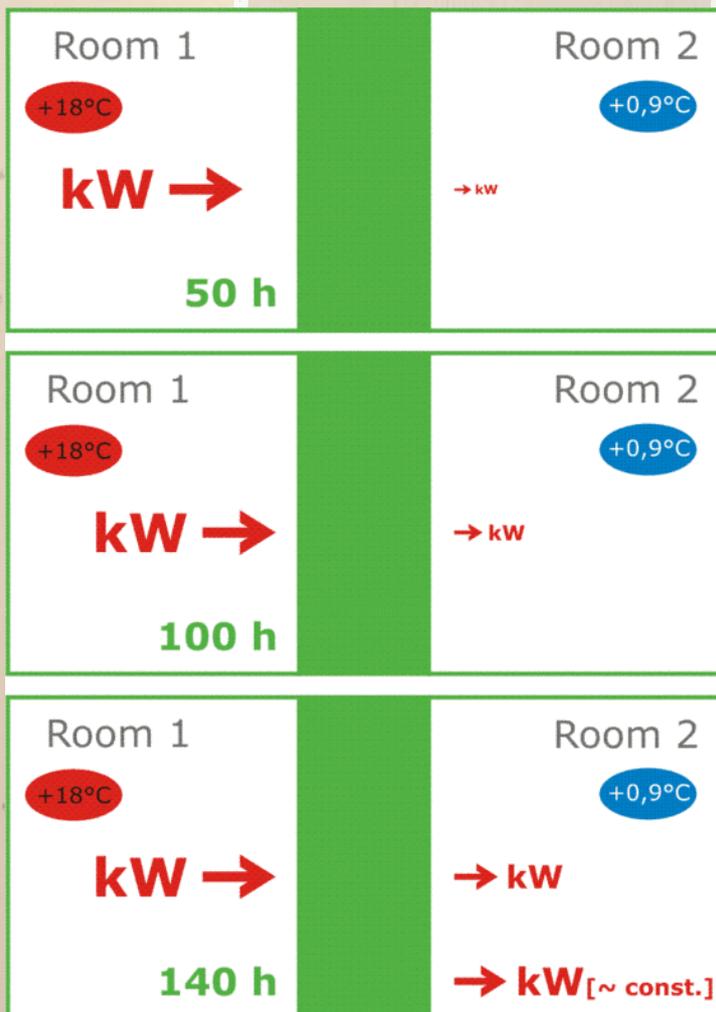
In the norm, it means heat transfer coefficient. The u-value is calculated.

CLT thermo is a solid building material that insulates heat well and at the same time excellently stores it.

This and lots more is not considered by the usual calculation of the u-value.

... Store heat and save energy

Measuring the u-value



The u-value can be measured according to EN ISO 8990 in a regulated heater box.

This is 2 boxes that are separated by a wall made of light insulating material.

A 1 m² large CLT thermo element is built into this wall. Now room 1 is constantly heated up to approx. 20°C and room 2 constantly cooled down to approx. 0°C. What happens? As is commonly known, heat flows from warm to cold. Thus, it flows through the wall from room 1 to room 2. The u-value is then calculated from this heat flow, but only then when the heat flow, you could also call it heat loss, is constant.

How fast does the CLT thermo wall now lose heat to the outside? One waits about 140 hours, about 6 days, until almost a constant heat flow through the 211 mm CLT thermo wall takes place. The u-value can only be calculated now.

If the u-value is calculated in this way, the important effect of the heat storage is completely ignored. The experiment shows that a larger part of the heating energy used for room 1 has been stored by the CLT thermo wall on the warm side, and transported very slowly to the outside.

And what else is not taken into account with all these experiments? CLT thermo buildings are mostly not in the laboratory, but outdoors, in summer and winter, in the rain or sun.

We are conscious that the u-value of CLT thermo is very important for customers and interested parties. Building approval depends on this. Nevertheless, this question would be more important:

„ ... and how much energy does a BS thermo house actually need“?

Nobody asks about the calculated consumption of a car. It is tested according to regulation and we all test this for ourselves almost every time we refuel.

We are not saying that the u-value is an incorrect characteristic. We do not doubt the u-value as such. However, we realize that the u-value, the way it is normally calculated, does not give the correct information about the energy behavior of CLT elements.

Buildings made of BS thermo consume considerably less energy than conventional calculations show.

The people, who live in CLT buildings, know that this is true.

... the natural radiant heat

Have you ever gone skiing on a glacier? Yes? Then you know this already! At lunchtime, you sit in the sun in a t-shirt and drink wheat beer and this at a temperature of -8°C. How is this possible? We are sure there is a scientist who will explain this to you in detail. However, can the whole thing be calculated? Only with great difficulty. And how is it with CLT elements?

With the conventional regulators for calculating the heat load, stationary conditions of the building shell under laboratory conditions are assumed. Thus, the passive use of the solar energy in the wall and roof area, absorption of the solar rays, their storage and thereby the solar energy gain are unaccounted for. Calculating models exist already that take all of this into account. The so-called effective u-value of the building shell can be calculated in this way. A different effective u-value is given depending on whether the wall is facing north, south, east, or west. On the north side, it can even happen that the outside of the CLT wall heats up due to the absorption of the solar rays, so that no heat can be lost outwards again. The heat from inside "accumulates" in the outer layer of the wall.

BS thermo building shells do not "know", that they cannot be calculated according to conventional rules and therefore cannot be properly evaluated.

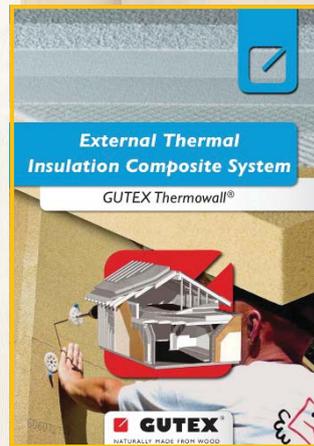
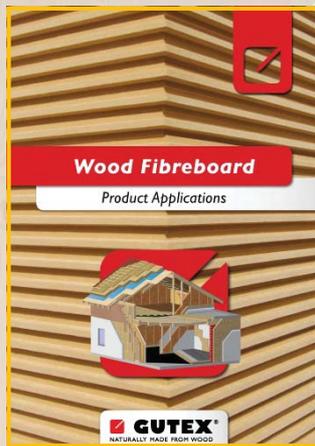
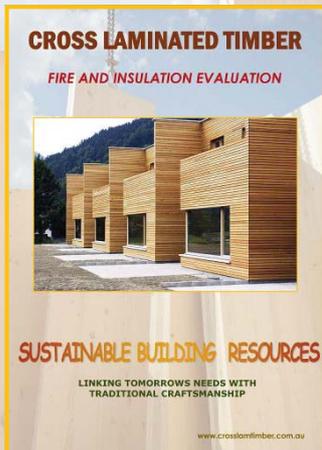
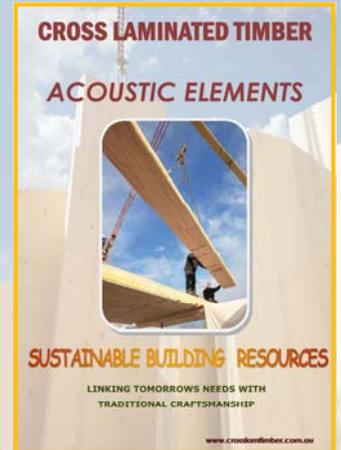
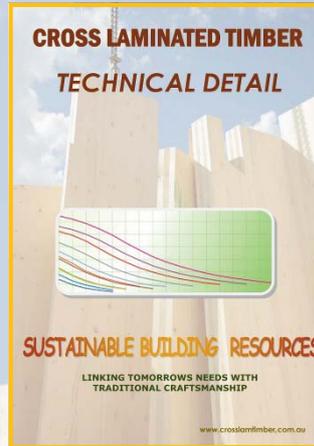
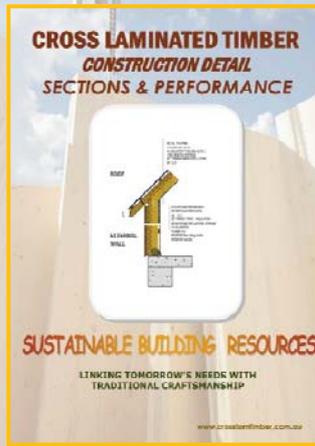
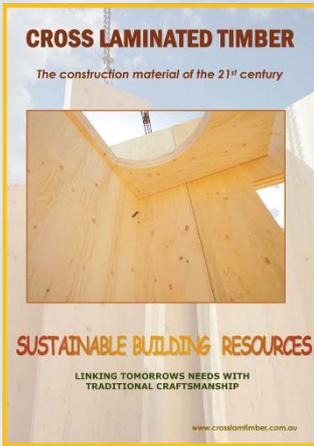
This is like the bumblebee. It has a wing area of 0.7 cm² and weighs 1.2 grams. According to the laws of aerodynamics, it is impossible to fly with this ratio. However, the bumblebee does not know this and just simply flies!

BS thermo is absolutely sustainable and saves resources. If you combine the passive use of solar from BS CLT elements with active use of solar by the use of a solar panels, the CLT construction can be kept warm in winter and cool in summer with only a small amount of additional energy.

With regards to all experiments, results and knowledge, we are working on drawing up an energy concept for CLT elements. This integral concept should make it possible to estimate the expected energy consumption in the plan phase already.

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Available brochures:



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