Thermal characteristics

Because wood absorbs CO2; because CLT has higher thermal performance achieving air-tight, thermal bridge free construction.

The thermal conductivity and heat capacity corresponds to the usual timber (softwood).
CLT has, like other wood products, relatively good thermal insulating characteristics. Heat conductivity or so-called lambda value, expressed in W/m°C, comparable with, for example lightweight concrete and there is substantially lower than for concrete and steel.

CLT has a comparatively high specific heat capacity (thermal inertia). Usually it is around 1300 J/kg°C and compared to concrete which has about 880J/kg°C. CLT should be used more in construction because material is energy and heat effective and CLT can make positive climate changes.

As a result of the thermal characteristics, wood gets a laminated surface feels pleasant to the touch.

As a natural renewable product performance can vary slightly, but commercial cross-laminated timber systems generally achieve:

- thermal conductivity: 0.13 W/mK
- density: 480–500 kg/m3 (spruce)

Compressive strength:

- 2.5 N/mm2 (perpen. to grain of boards)
- 21 N/mm2 (parallel to grain of boards)

Bending strength:

- 24 N/mm2 (parallel to grain of boards)

Elastic modulus:

- 370 N/mm2 (perpen. to grain of boards)
- 11,500 N/mm2 (parallel to grain of boards)

Thermal conductivity

Spruce. In terms of durability it is not worse than pine (provided that the wood is well dried).

Many European countries in terms of popularity spruce has even surpassed pine, largely due to homogeneous wood structure that facilitates the process of wood , and the ability to maintain long-term color - its ignorance over time as pine. In addition, the flexibility in terms of tree is superior to many other coniferous species , so it is often used in the manufacture of curved elements.

The thermal conductivity of ***SI units***, in W/mK (wats/meter degree Kelvin). This value is one of the most important when choosing a building materials and insulation materials. The smaller this value, the material is a better insulator.
It should be noted that the material handling sound is similar to the thermal conductivity - the material has a lower thermal conductivity, the more sound-proof material is.

Thermal conductivity of some common construction materials

Material	Density (kg/m3)	Conductivity (W/m·K)
Concrete	2400	1,93
Brickwork	1700	0,77
Reinforced concrete	2300	2,5
Gypsum	1200	0,43
Timber (softwood, plywood, chipboard)	***500***	***0,13***

CLT thermal conductivity is even lower because boards are glued together.

Thermal bridging

There are two very distinct types of thermal bridges: geometric thermal bridges and construction thermal bridges.

Geometric thermal bridges can be considered a heat loss area correction factor for junctions. The Passivhaus Standard measures heat loss area to the outside face of the thermal envelope, which tends to slightly overestimate geometric thermal bridging. Other methods of measuring heat loss, such as SAP in the UK, use the inside face of the thermal envelope and therefore slightly underestimate geometric thermal bridging. Hence the need for a correction factor in some situations.

Construction thermal bridges can usually be avoided or minimised with careful design. Any construction thermal bridges that do occur will contribute a measurable heat loss. For Passivhaus buildings, the heat loss from any construction thermal bridges must be calculated and accounted for.

In many cases, geometric thermal bridges also include an element of construction thermal bridging. For example, an external wall corner while being a geometric thermal bridge will also tend to have additional structure creating construction thermal bridging. Similar the ground floor and external wall junction often involves a degree of construction thermal bridging.

With CLT it is possible to build thermal bridge free construction.

If thermal continuity has been considered from the outset, it is possible to achieve thermal bridge free construction. If it hasn't been considered, or other factors influence the design, then each thermal bridge needs close consideration. Some can be easily minimised or eliminated through careful detailing. Others might require expensive and complex thermal break components and detailing. For example, concrete or steel structure passing through the thermal envelope will need a structural thermal break component.