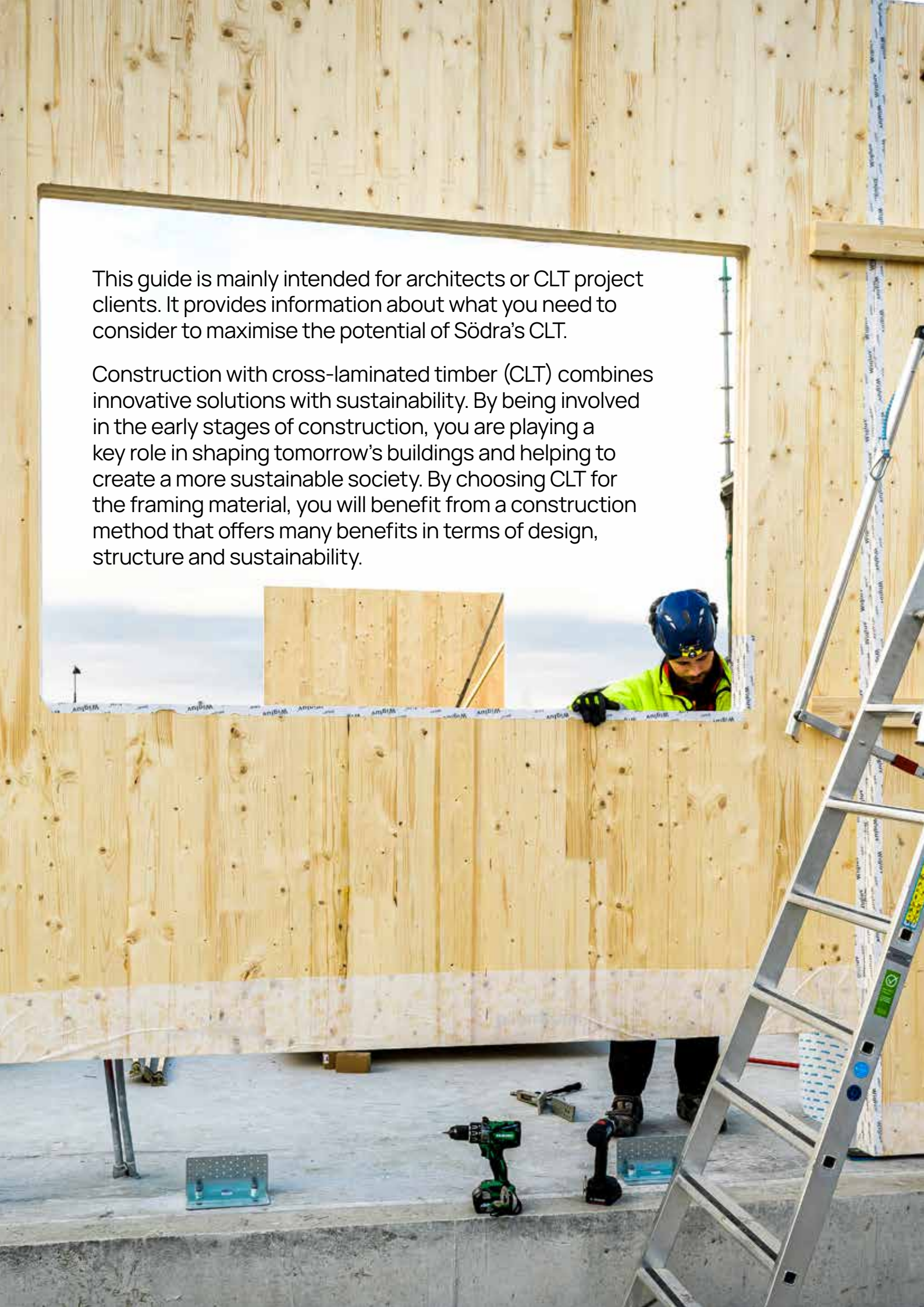
Architectural guide for CLT buildings

Opportunities and limitations to consider to maximise the potential of Södra's CLT

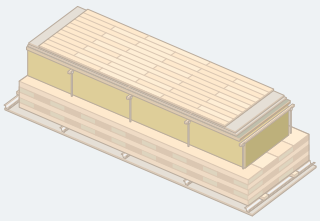
This guide is mainly intended for architects or CLT project clients. It provides information about what you need to consider to maximise the potential of Södra's CLT.

Construction with cross-laminated timber (CLT) combines innovative solutions with sustainability. By being involved in the early stages of construction, you are playing a key role in shaping tomorrow's buildings and helping to create a more sustainable society. By choosing CLT for the framing material, you will benefit from a construction method that offers many benefits in terms of design, structure and sustainability.



Joists

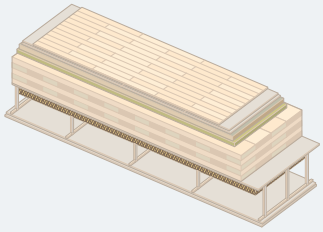
CLT is ideal for floor construction. Choosing the right thickness and dimensions is important to ensure adequate strength and stability. An understanding of the load requirements and regulations is necessary for the design of safe and functional CLT joists.



15 parquet on foam underlay
2 x 13 plasterboard
22 chipboard panel
200 raised anti-vibration floor system
200 CLT L5s
22 batten
25 acoustic profile 15 plasterboard TYPE F
Total thickness 525 mm

Benefits

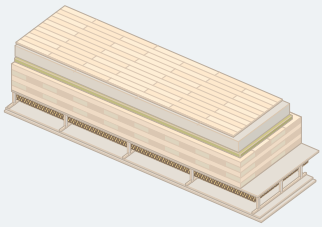
+ Good installation space under raised floor
+ Only ‘dry’ materials
+ Low dead weight
+ Installations in the same fire compartment
+ Enables easy construction with bathroom modules



15 parquet on foam underlay
2 x 13 plasterboard
38 chipboard panel
30 acoustic panel 200 CLT L5s
15 TYPE F plasterboard
150-200 suspended ceiling
45 insulation
15 plasterboard TYPE F
13 plasterboard
Total thickness 552 mm

Benefits

+ Good acoustic insulation
+ Ample space for installations in suspended ceiling
+ Usually no local ducts necessary for ventilation



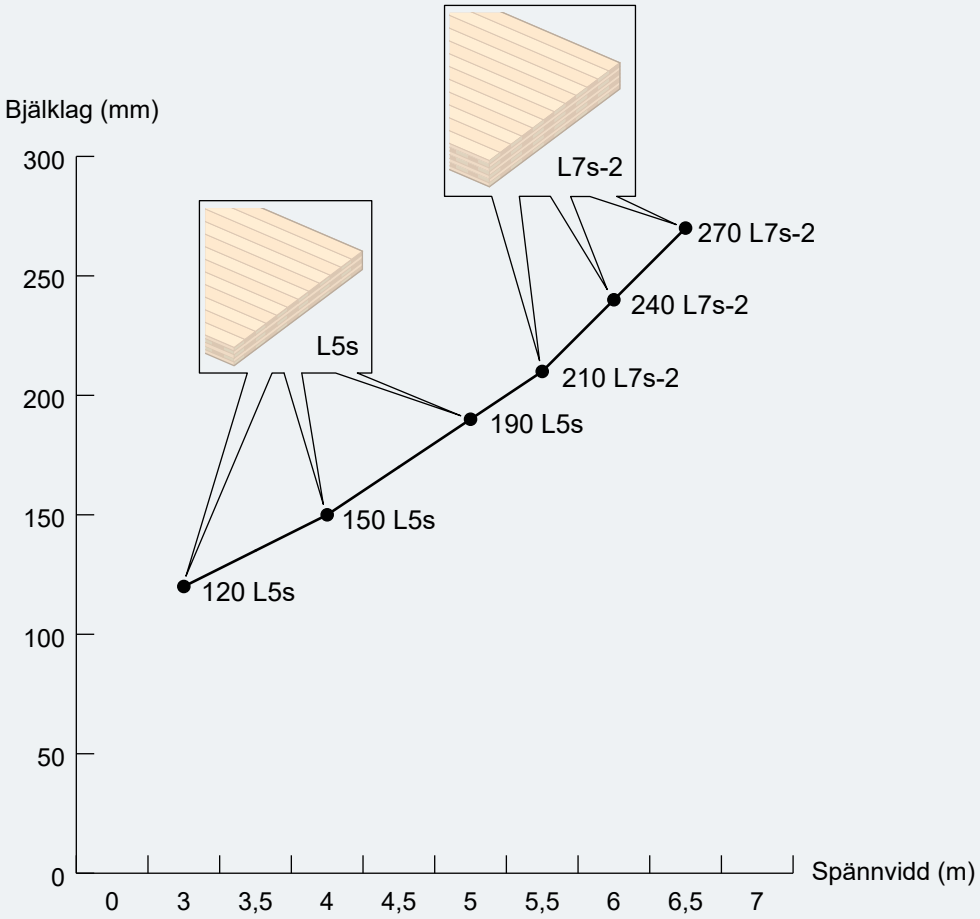
15 parquet on foam underlay 80 concrete screed
30 acoustic panel 200 CLT L5s
15 plasterboard TYPE F
100 suspended ceiling, 45 insulation
15 plasterboard TYPE F
13 plasterboard
Total thickness 468 mm

Benefits

+ Thinner joists
+ Good acoustic insulation
+ Ample space for installations in suspended ceiling
+ Few materials/steps
+ High dead weight (good for tall narrow structures)
+ Often perceived as very rigid

Span

The span is mainly significant for joists, and should not exceed 6.8 m. A wider span is not recommended.

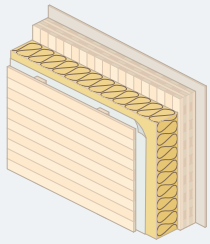


For details, see the document ’Flooring class 1 CLT’ at sodra.com/buildingsystems.

Wall types

CLT can be used for various types of wall constructions, including solid wood walls, sandwich walls and hybrid walls. An understanding of the various options and their properties can help to optimise wall design and meet specific requirements, such as sound insulation, fire protection and energy efficiency.

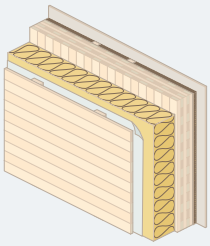
Exterior walls



22 panel
28 x 70 nailing batten Windbreak
195 insulation Wall underlay (optional)
140 CLT C5s
15 plasterboard TYPE F
Total thickness 400 mm

Benefits

+ Few thermal bridges
+ Can be built without plastic film/ underlay
+ The CLT can be exposed

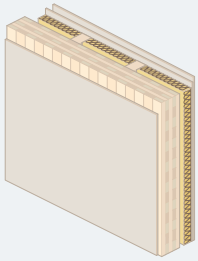


22 panel
28 x 70 nailing batten Windbreak
195 insulation Wall underlay (optional)
140 CLT C5s
45 insulation
15 plasterboard TYPE F
Total thickness 445 mm

Benefits

+ Few thermal bridges
+ Can be built without plastic film/ underlay
+ Installation layer
+ Simpler acoustic solutions

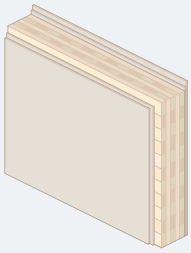
Interior walls



Partition wall
15 plasterboard
150 CLT C5s
40 air gap
70 insulation
13 plasterboard
15 plasterboard TYPE F
Total thickness 303 mm

Benefits

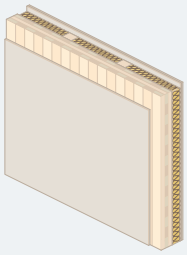
+ Optimised frame
+ Good acoustics
+ Suitable spaces for building services would be abutting an extension wall



Load-bearing interior wall
15 plasterboard TYPE F
13 plasterboard
200 CLT L5s
13 plasterboard
15 plasterboard TYPE F
Total thickness 256 mm

Benefits

+ Few materials/steps
+ The CLT can be exposed



Load-bearing interior wall
15 plasterboard TYPE F
90 CLT C3s
45 x 70 beam s450
70 insulation
2 x 13 plasterboard
Total thickness 201 mm

Benefits

+ Easy to run cables for installations

Floor plans

CLT offers flexibility when designing floor plans. The ability to create large open spaces and adapt them to specific needs is a benefit that should be considered in the design. Remember to design the building so that the CLT walls can be used as a stabilising element. For room division, we recommend using the same room layout on each floor to reduce the cumulative load.

Material optimisation of Södra's CLT

CLT can be optimised to minimise material waste and maximise the use of wood resources. By using computer-aided design and prefab elements, the use of materials and/or classic stud framing in non-load-bearing walls can be optimised to reduce costs and minimise the environmental impact. Remember to use the right materials in the right place. For example, it may be worth considering the design for buildings with many openings in an exterior wall.

Dismantling

CLT enables the dismantling and re-use of building materials, which contributes to a circular and sustainable construction process. Consideration for the possibility of dismantling in the design stage can facilitate future renovations or remodelling. Computer-aided design will save a digital twin of the building.

Fire

CLT has good fire resistance due to the wood's natural ability to remain intact during a fire. Fire risk depends on the design. Different solutions account for whether or not the wood should be visible and thereby the overall fire load.

If exposed wood is requested, the thickness can be increased, fire retardant can be applied or a sprinkler system can be installed.

Moisture

Moisture control is an important consideration when building with CLT. Proper moisture management, including the application of vapour barriers and an adequate drainage system, is essential for preventing moisture damage and mould growth in the structure.

CLT is not sensitive to short-term rain exposure but avoid standing water accumulation. Make sure that any water that has entered can quickly flow out, and let damp wood dry before it is built in. A good way to keep an eye on moisture in the panels is to perform regular moisture control.

Think about the order of assembly and assemble in sections so that each subsequent section becomes weatherproof.

Sound

Acoustic and sound requirements are met using insulation and plasterboards/panels to the extent required by the desired sound class. CLT is a relatively light framing material, which makes it sensitive to low-frequency noise. There are various ways to soundproof a frame and one common method is to use some form of elastomer between walls and joists to prevent noise from spreading between apartments and floors in the frame. Furthermore, some form of sound insulation is needed on partition walls and joists, such as suspended and anti-vibration ceilings with insulation under the joist, or a stud wall next to the CLT wall.

Read more

At sodra.com/buildingsystems, you'll find additional documents that allow you to explore the various areas in greater depth.

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