

B\_Layer structure

The information below provides an example of Stora Enso's construction proposals

## **A Shell construction**

- Plinth/Wall anchorage
- Wall joint
- Lintel
- Ceiling
- "Ground floor wall – ceiling – top floor wall" connecting nodes
- Roof
- Cantilever/coat

## **B Layer structure**

- External walls
- Internal walls
- Floor structure
- Slab (underside)
- Roof
- Party wall
- Building partition wall

## **C Details**

- Plinth/Wall anchorage
- Window connection
- Door joint
- Cantilever
- Pitched roof
- Flat roof
- Electric installation
- Sanitary installation
- Fireplace
- Stairs

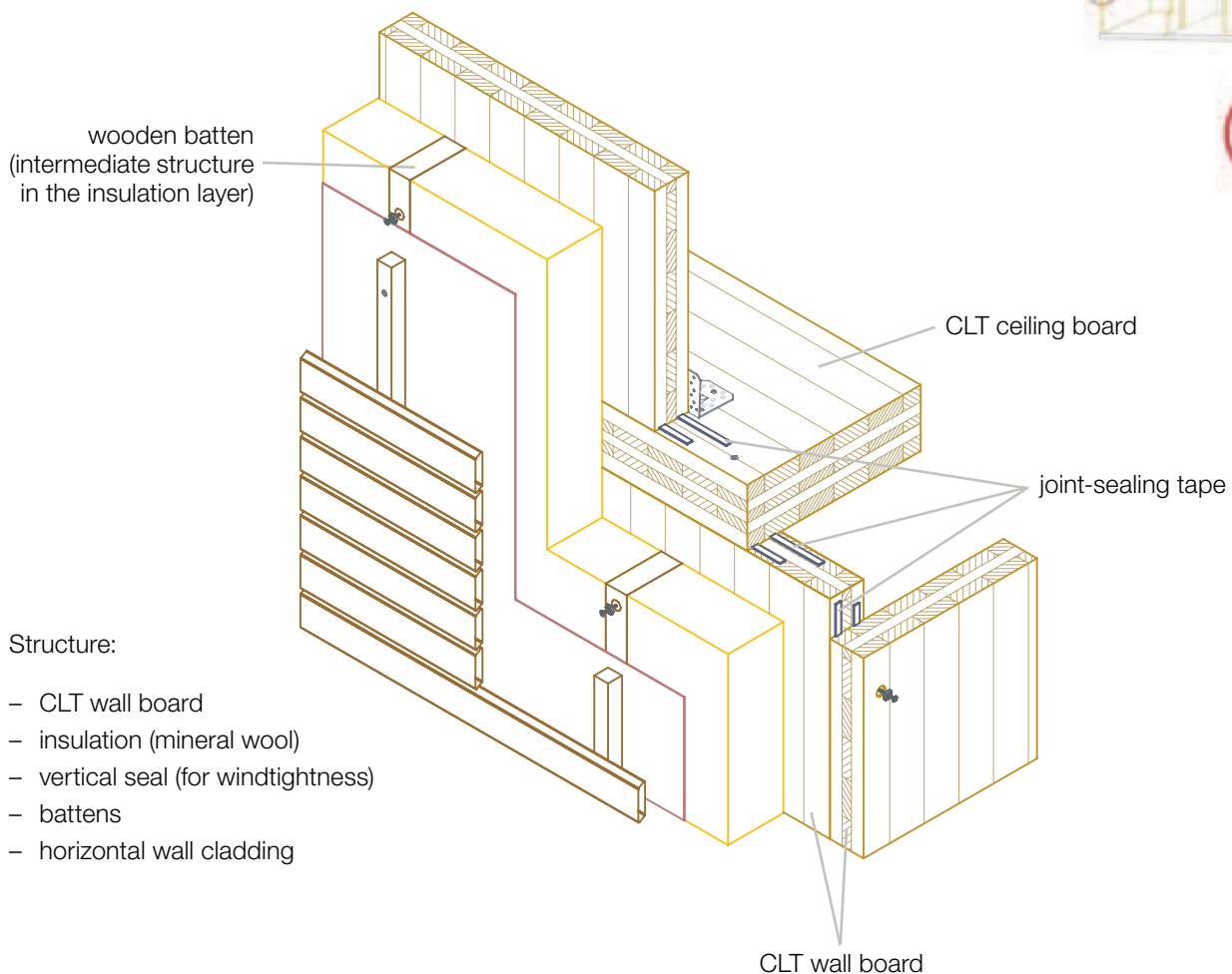
## **D Other applications**

- Industrial and commercial buildings
- Multi-storey residential buildings
- Building extensions
- Structural engineering

**Constructions or structures must be tested separately and calculated on a case by case basis with regard to the structural analysis, building physics and feasibility. The actual professional implementation is the responsibility of the crews authorised to perform the work.**

## 1 External wall

### 1.1 Insulation with mineral wool



#### Execution

- Heavy façades (material weight and wind load) must be structurally analysed and the battens sized accordingly.
- Ensure adequate air circulation (battens).
- The windtight and watertight layer must be appropriately designed to take account of the execution of the façade.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

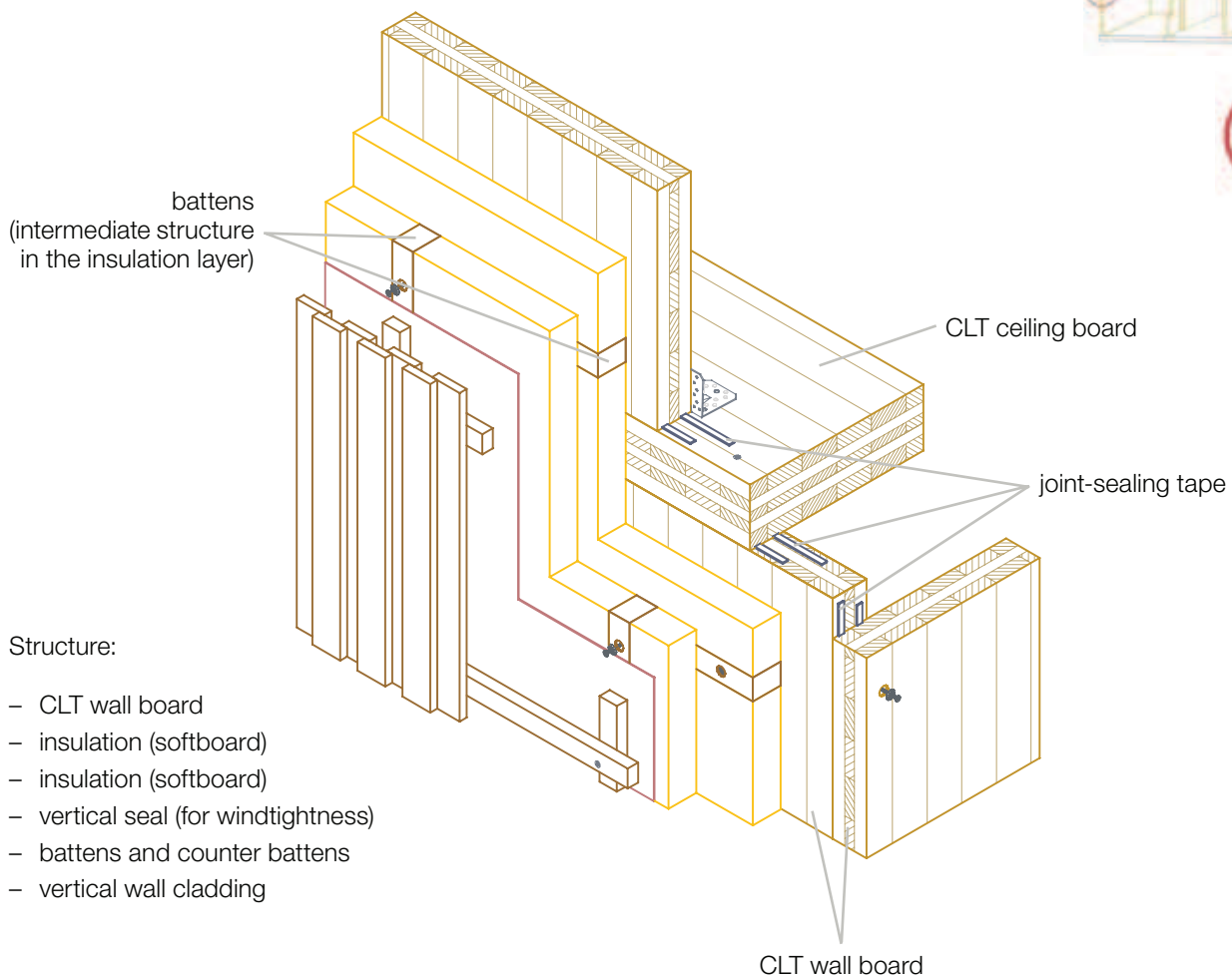
LAYER STRUCTURES

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Illustration



## 1.2 Insulation with softboard

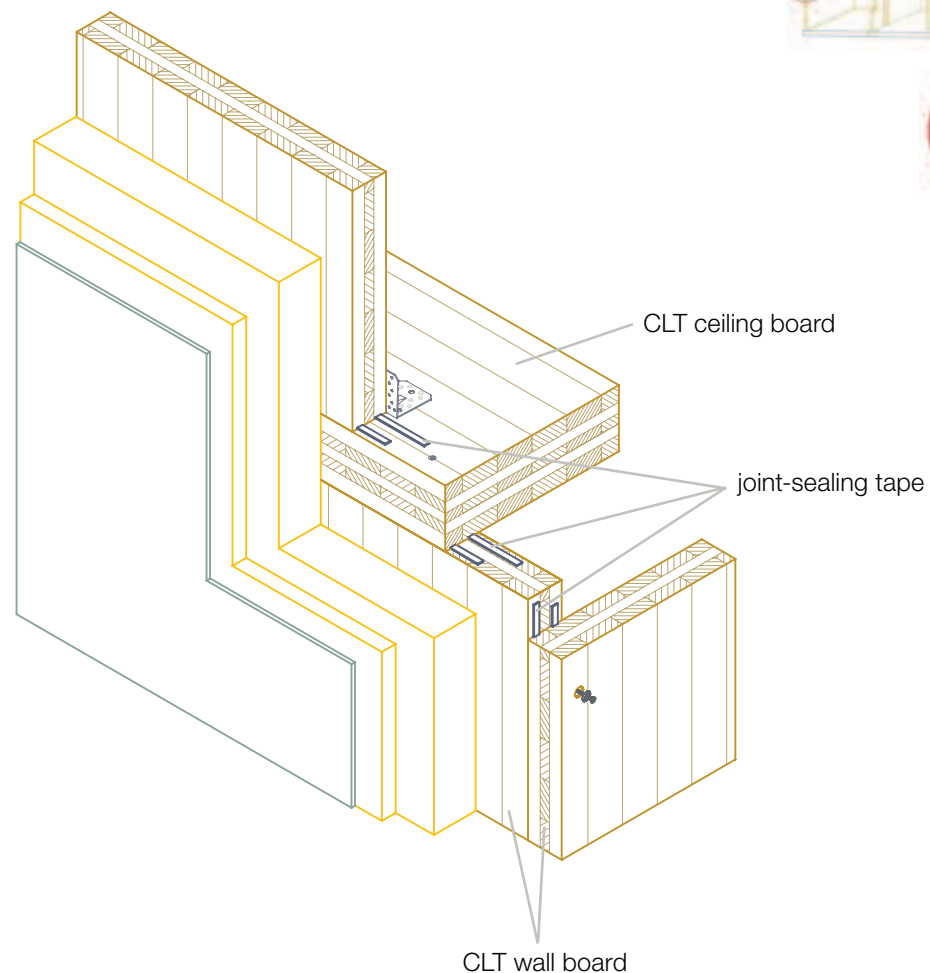


Structure:

- CLT wall board
- insulation (softboard)
- insulation (softboard)
- vertical seal (for windtightness)
- battens and counter battens
- vertical wall cladding

### Execution

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Heavy façades (material weight and wind load) must be structurally analysed and the battens sized accordingly.</li> <li>• Ensure adequate air circulation (battens).</li> <li>• The windtight and watertight layer must be appropriately designed to take account of the execution of the façade.</li> </ul> | <ul style="list-style-type: none"> <li>• The choice and rating of the connectors and all structural components depend on the structural requirements.</li> <li>• Layer structures must be matched to the required structural-physical properties of the design.</li> </ul> |
|---|--|



Structure:

- CLT wall board
- insulation (softboard)
- insulation (softboard)
- plaster (incl. base)

## Execution

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Splash-water areas must be constructed in accordance with the requirements (XPS insulation).</li> <li>• The structural-physical properties of the plaster coat must be matched to the wall structure.</li> <li>• Suitable profile sections must be used to protect plaster edges.</li> </ul> | <ul style="list-style-type: none"> <li>• The choice and rating of the connectors and all structural components depend on the structural requirements.</li> <li>• Layer structures must be matched to the required structural-physical properties of the design.</li> </ul> |
|---|--|

# Construction

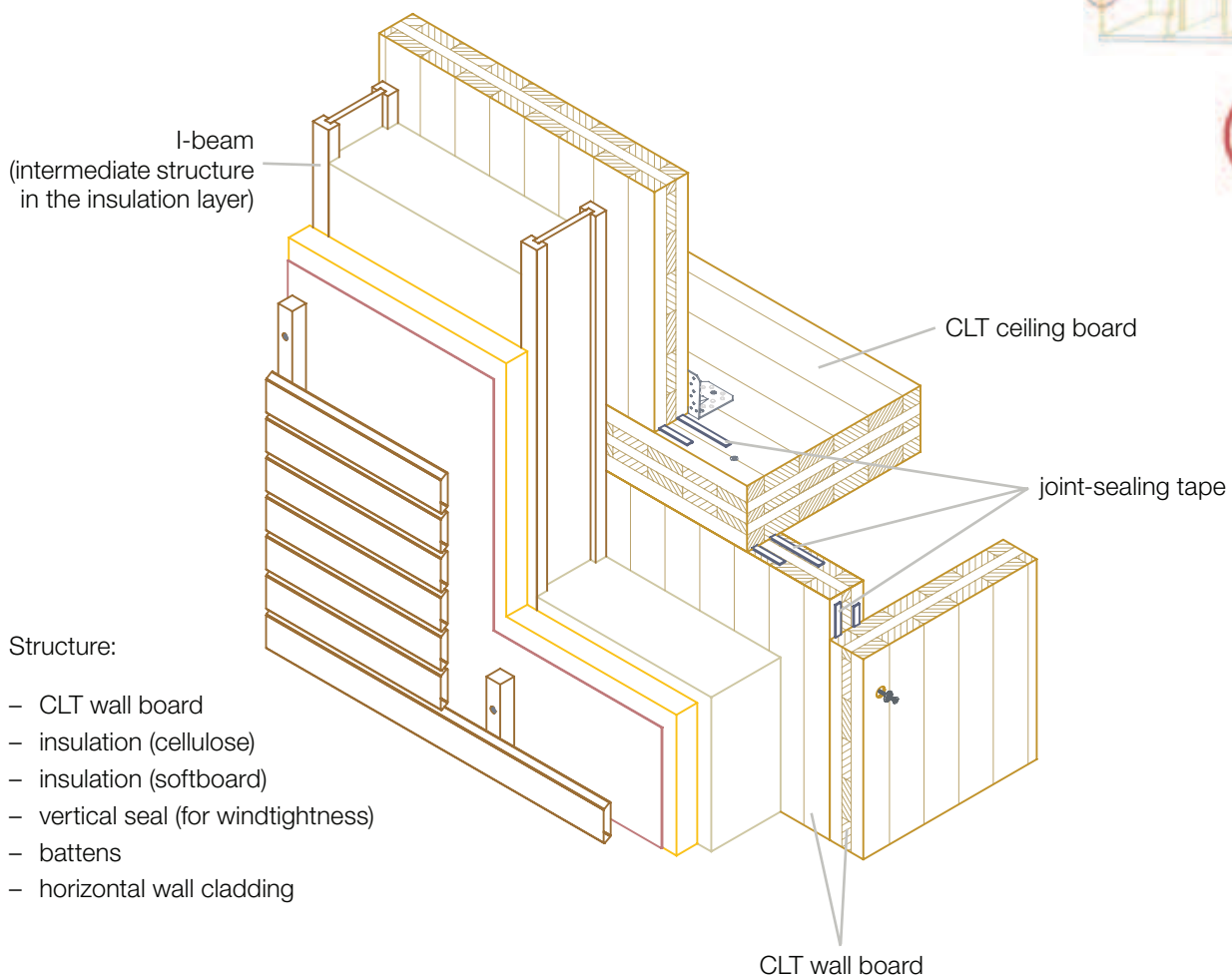
LAYER STRUCTURES

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Illustration



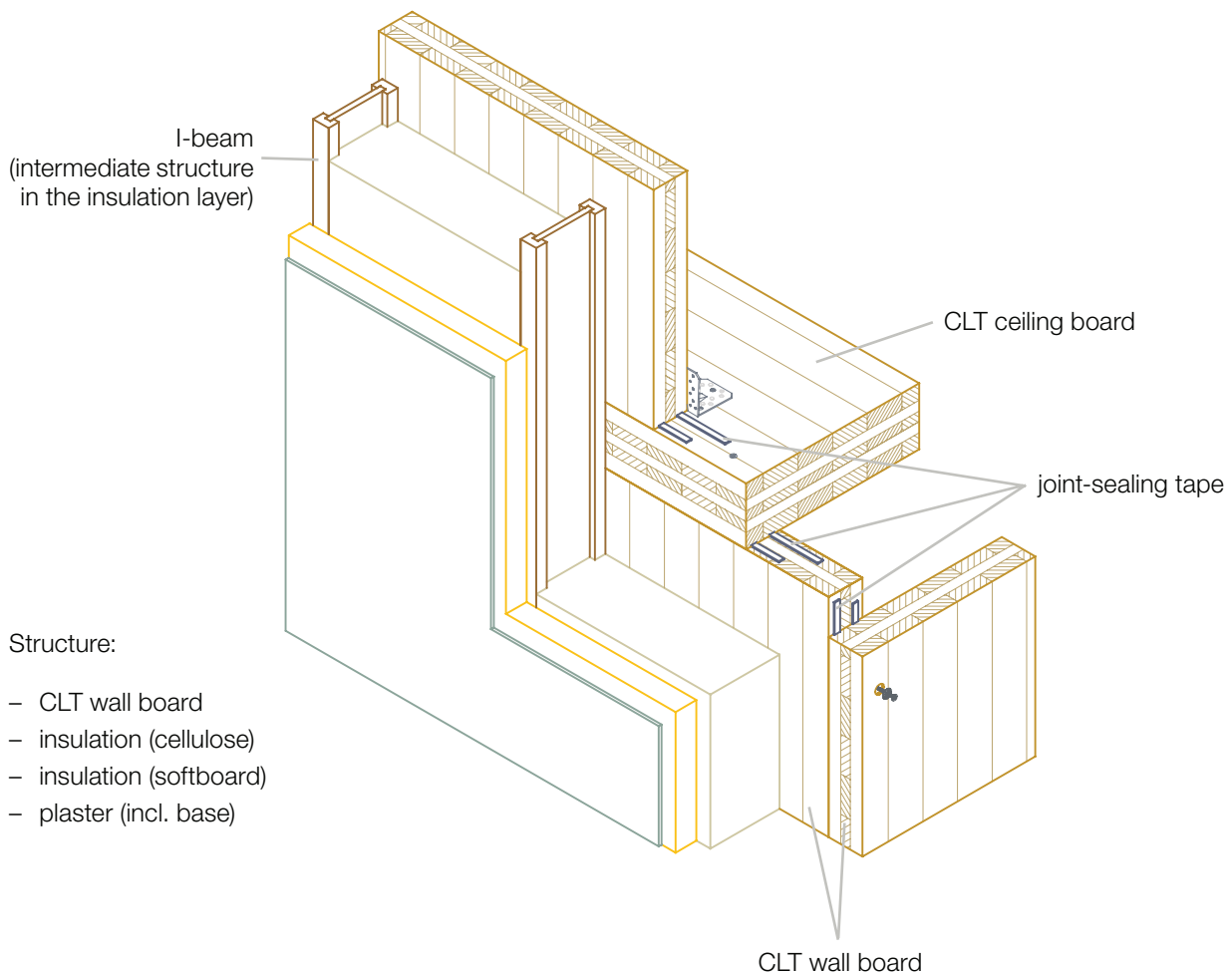
## 1.3 Insulation with cellulose



### Execution

- Heavy façades (material weight and wind load) must be structurally analysed and the battens sized accordingly.
- Ensure adequate air circulation (battens).
- The windtight and watertight layer must be appropriately designed to take account of the execution of the façade.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.





## Execution

- Splash-water areas must be constructed in accordance with the requirements (XPS insulation).
- The structural-physical properties of the plaster coat must be matched to the wall structure.
- Suitable profile sections must be used to protect plaster edges.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

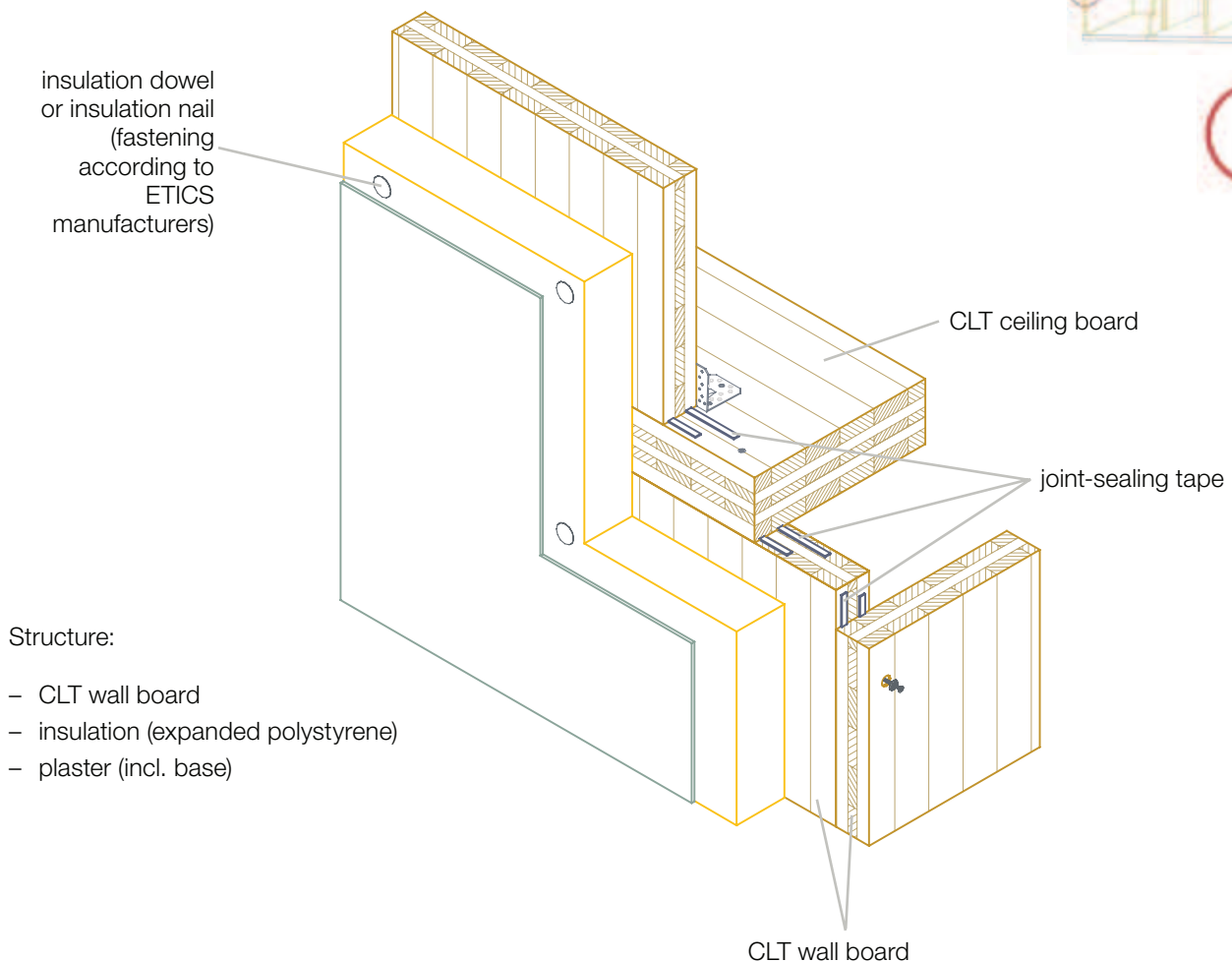
LAYER STRUCTURES

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Illustration



## 1.4 EPS insulation



Structure:

- CLT wall board
- insulation (expanded polystyrene)
- plaster (incl. base)

### Execution

- Splash-water areas must be constructed in accordance with the requirements (XPS insulation).
- Apart from its price advantage, EPS insulation and its suitability in combination with wooden constructions must be viewed critically in terms of the environment, sound insulation, impermeability etc.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

LAYER STRUCTURES

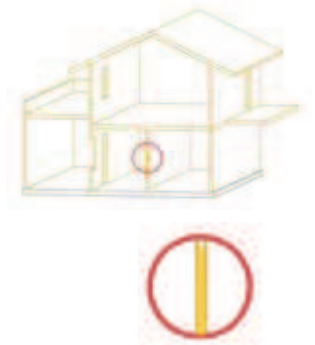
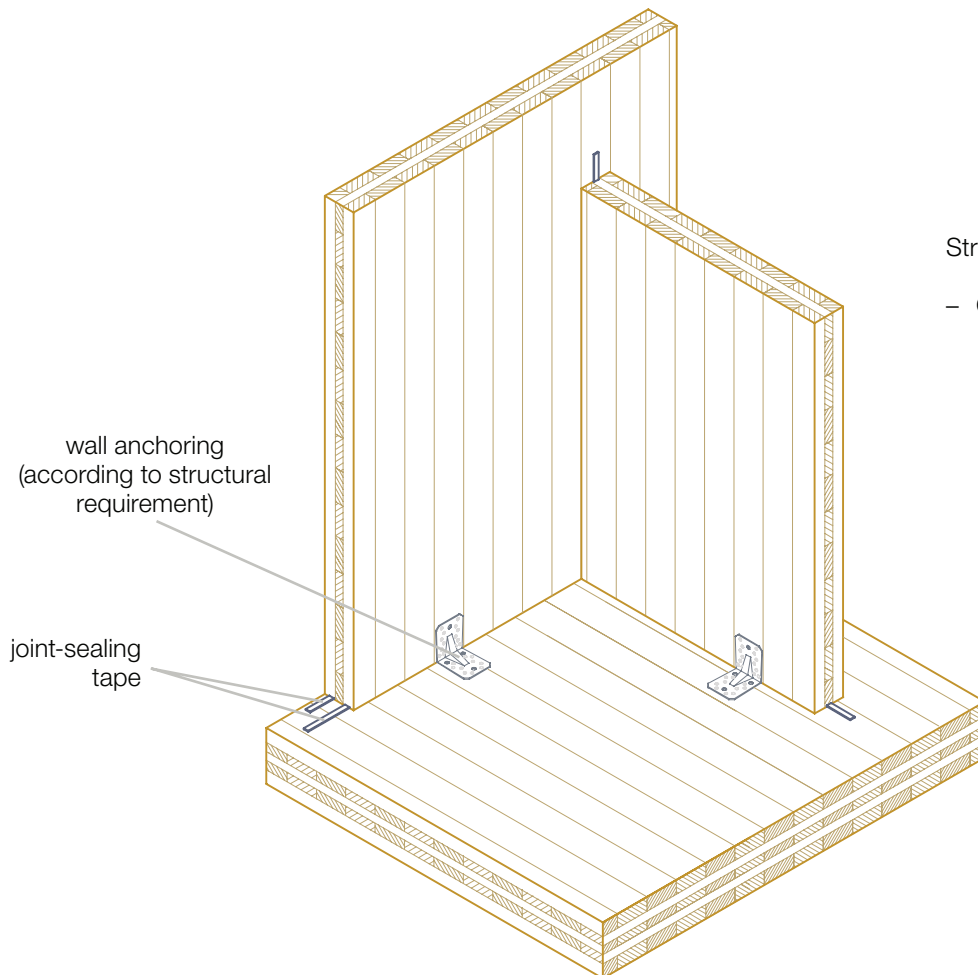
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Illustration



## 2 Internal wall

### 2.1 CLT in visible quality



Structure:

- CLT wall board

#### Execution

- If the individual rooms in the building are required to be airtight, the joints of the CLT boards must be sealed with joint-sealing tape.
- With visible CLT boards a distinction is made between single-side and double-side exposure.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

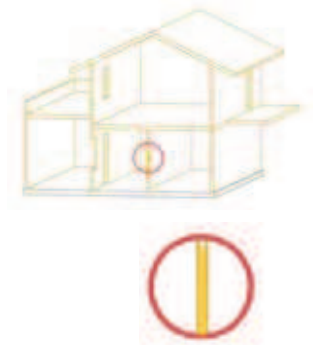
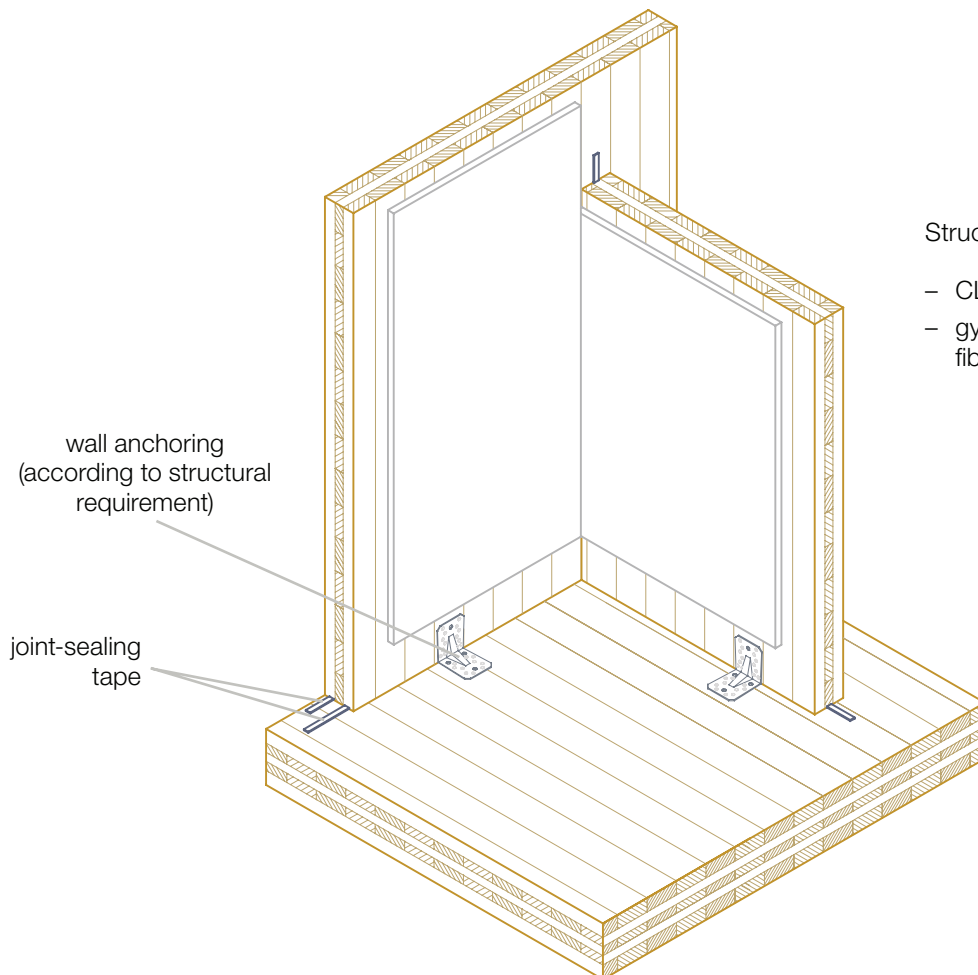
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Illustration



## 2.2 Direct facing



Structure:

- CLT wall board
- gypsum cardboard / gypsum fibreboard

### Execution

- If the individual rooms in the building are required to be airtight, the joints of the CLT boards must be sealed with joint-sealing tape.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

LAYER STRUCTURES

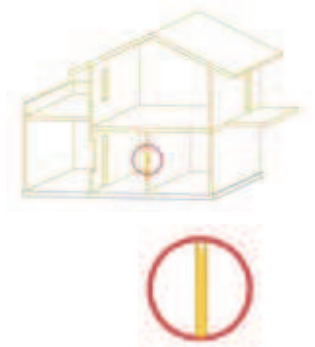
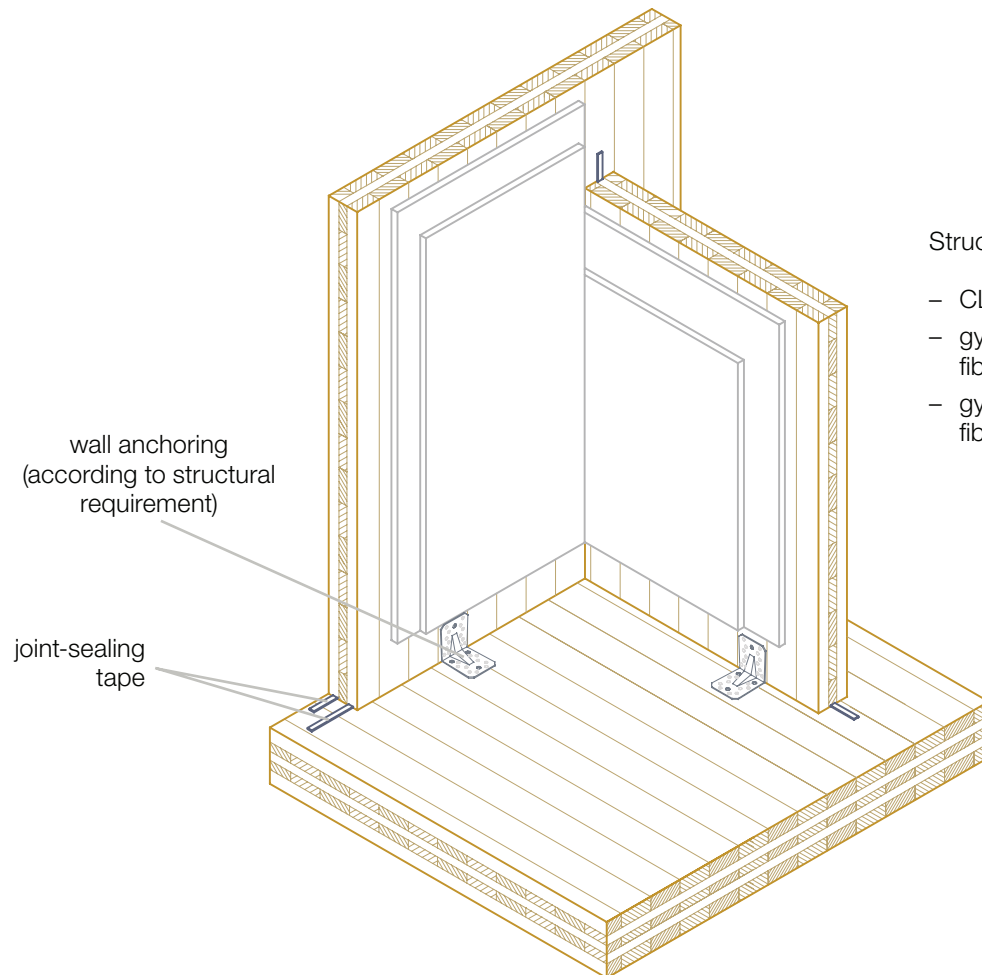
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Illustration





## 2.3 Double facing



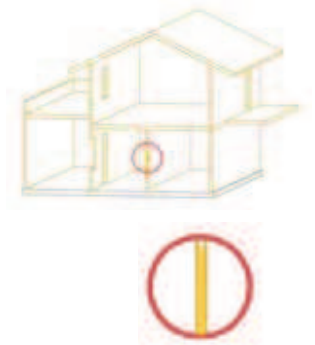
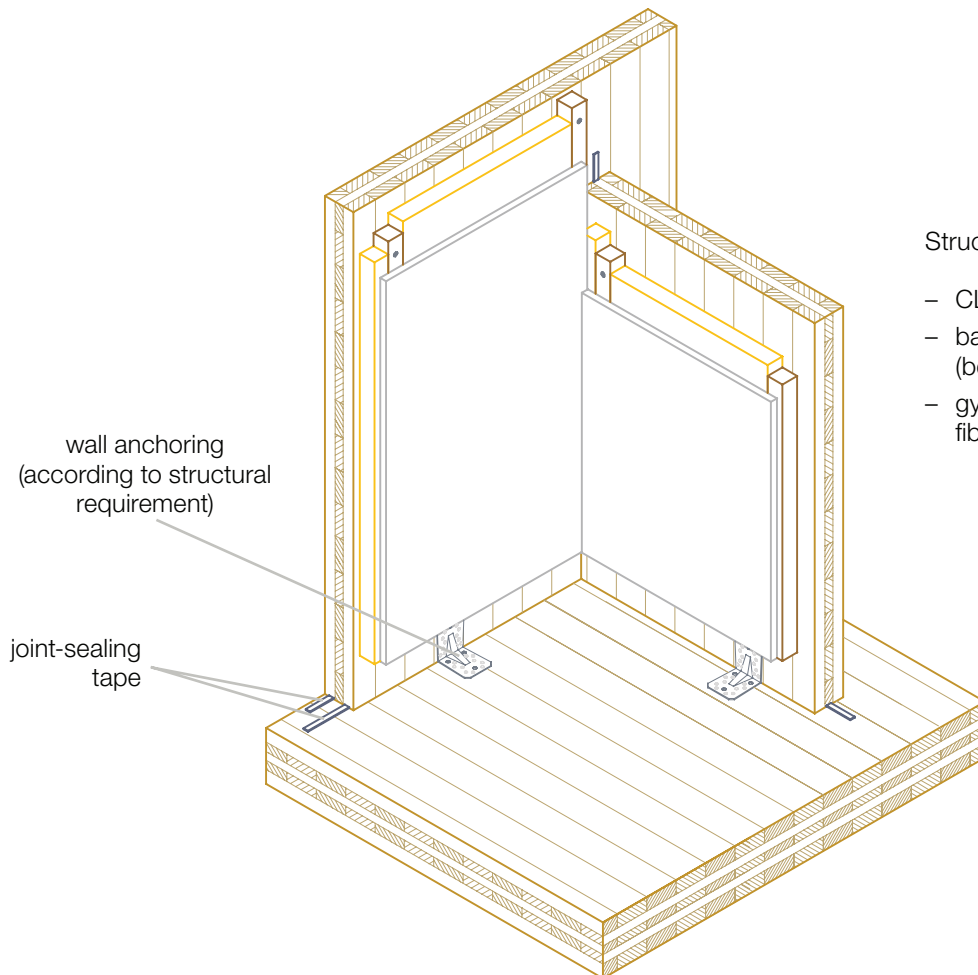
Structure:

- CLT wall board
- gypsum cardboard / gypsum fibreboard
- gypsum cardboard / gypsum fibreboard

### Execution

- If the individual rooms in the building are required to be airtight, the joints of the CLT boards must be sealed with joint-sealing tape.
- In the case of specific fire protection requirements, CLT boards are faced with a double layer of gypsum cardboard or gypsum fibreboard.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 2.4 Insulation panel (battens)



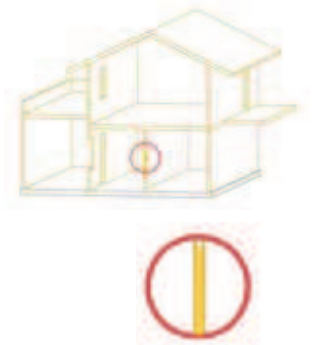
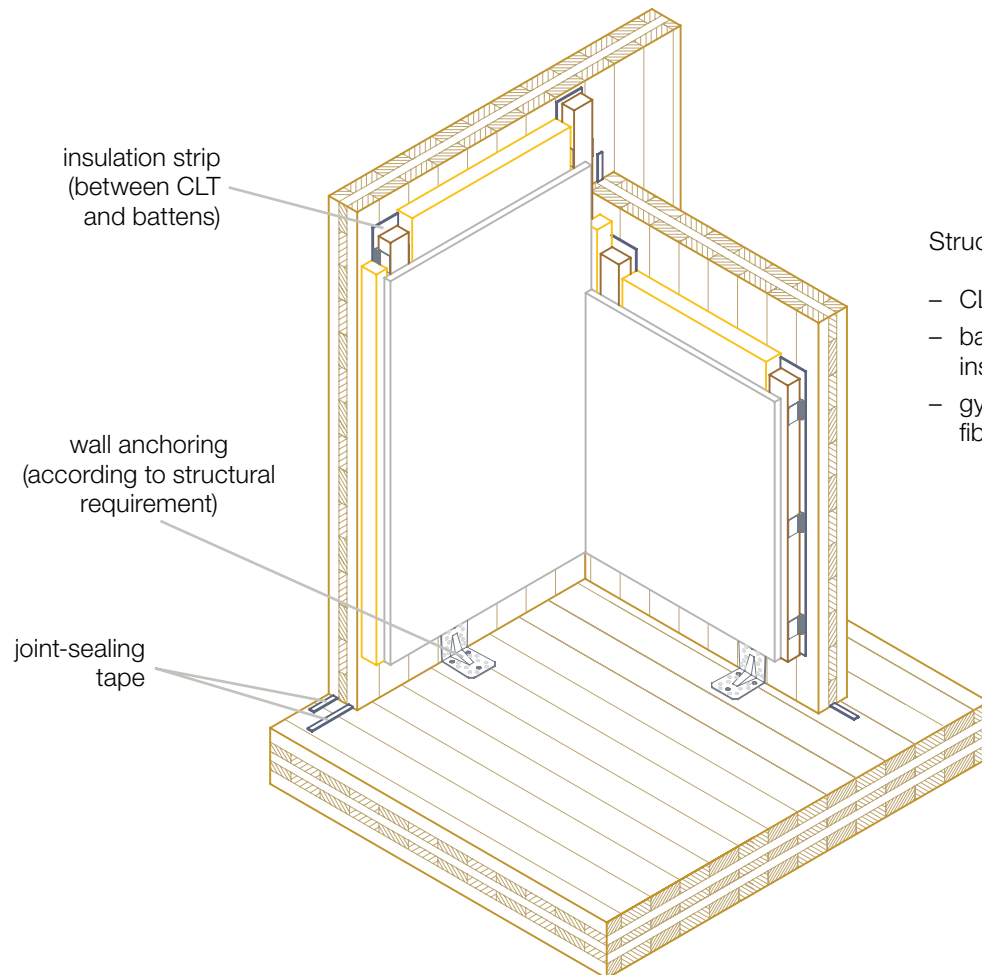
### Structure:

- CLT wall board
- battens, insulation (between battens)
- gypsum cardboard / gypsum fibreboard

### Execution

- If the individual rooms in the building are required to be airtight, the joints of the CLT boards must be sealed with joint-sealing tape.
- The service cavity secures a certain improvement in sound insulation but has disadvantages with regard to moisture control and heat storage.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 2.5 Insulation panel (spring clips)



### Structure:

- CLT wall board
- battens (on spring clips),  
insulation (between battens)
- gypsum cardboard / gypsum  
fibreboard

### Execution

- If the individual rooms in the building are required to be airtight, the joints of the CLT boards must be sealed with joint-sealing tape.
- The service cavity secures a certain improvement in sound insulation but has disadvantages with regard to moisture control and heat storage.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

LAYER STRUCTURES

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Illustration

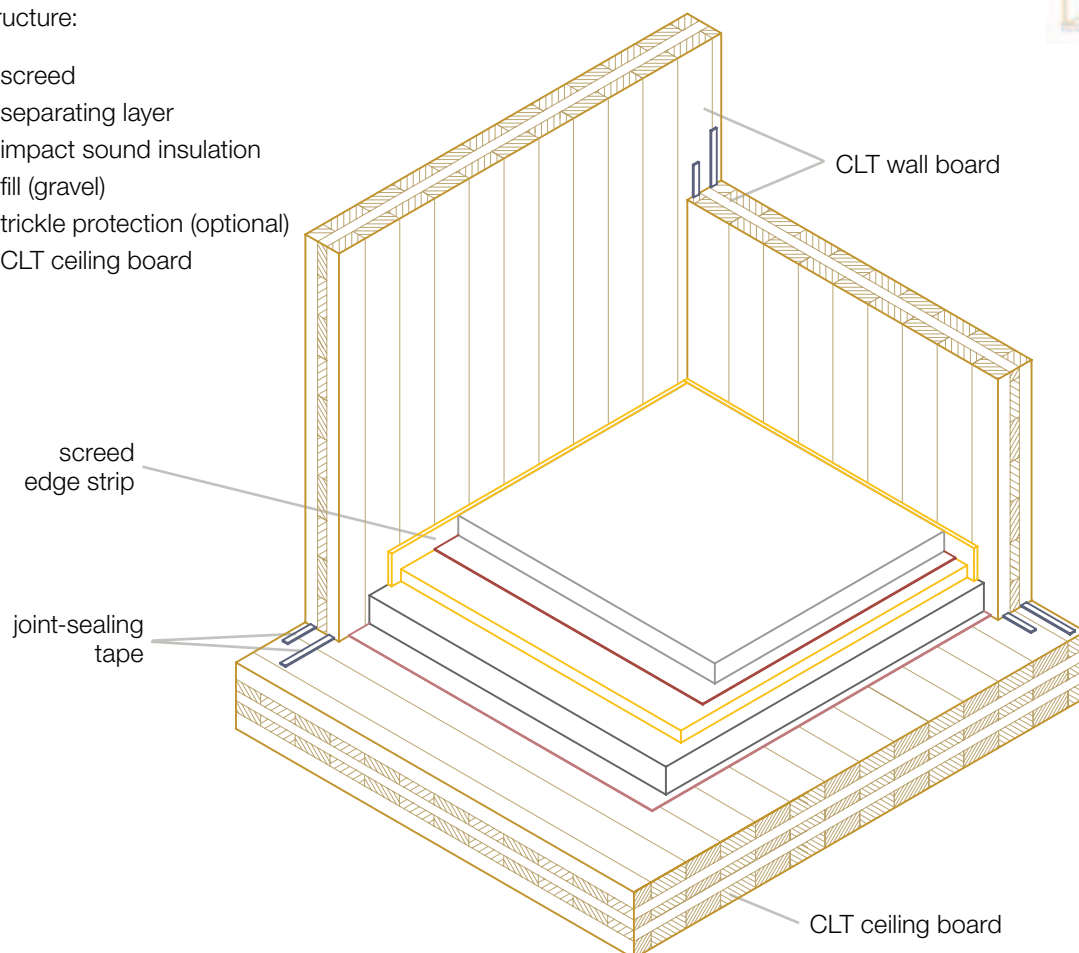


## 3 Floor structure

### 3.1 Wet screed

Structure:

- screed
- separating layer
- impact sound insulation
- fill (gravel)
- trickle protection (optional)
- CLT ceiling board

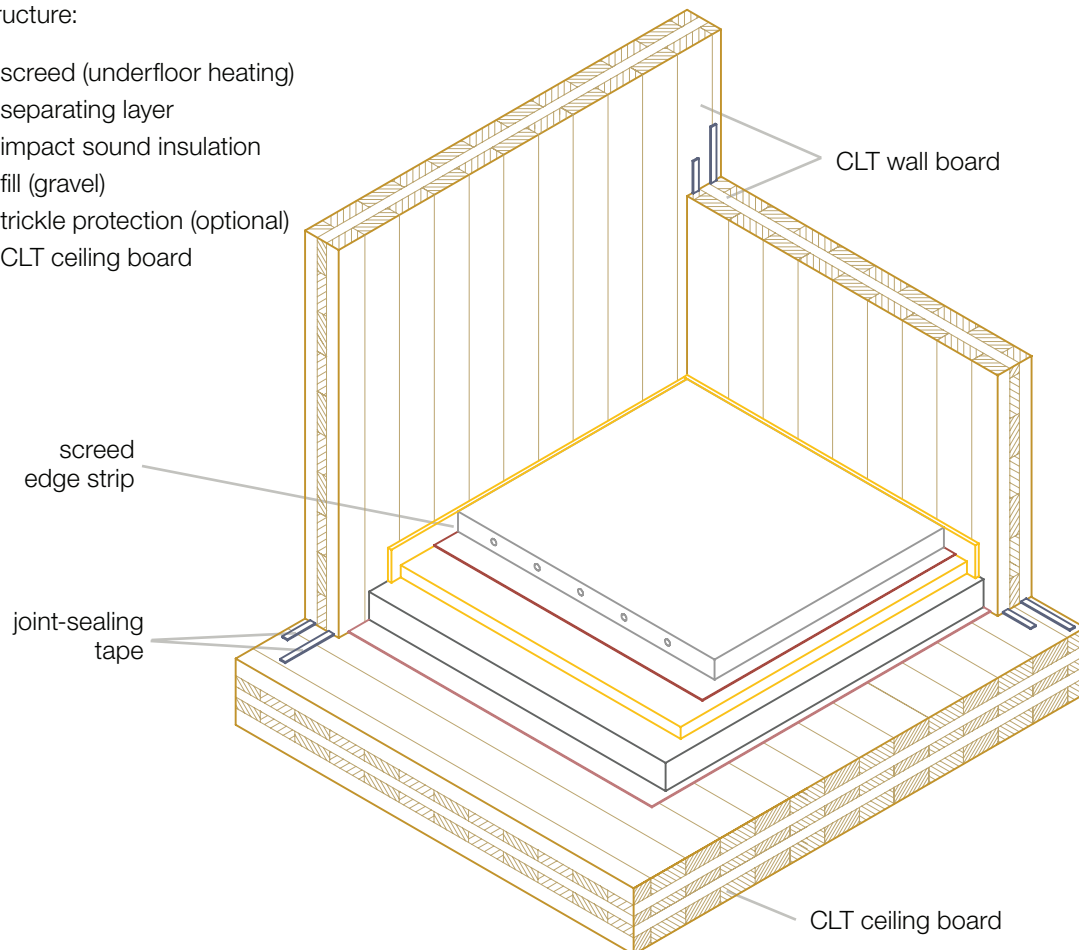


#### Execution

- The entire floor structure must always be designed according to the mass-spring-mass principle (sound insulation capacity).
- Do not forget the screed edge strips (to prevent indirect sound transmission).
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

Structure:

- screed (underfloor heating)
- separating layer
- impact sound insulation
- fill (gravel)
- trickle protection (optional)
- CLT ceiling board



## Execution

- The entire floor structure must always be designed according to the mass-spring-mass principle (sound insulation capacity).
- Do not forget the screed edge strips (to prevent indirect sound transmission).
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

LAYER STRUCTURES

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Illustration

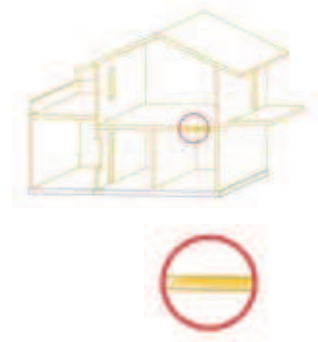
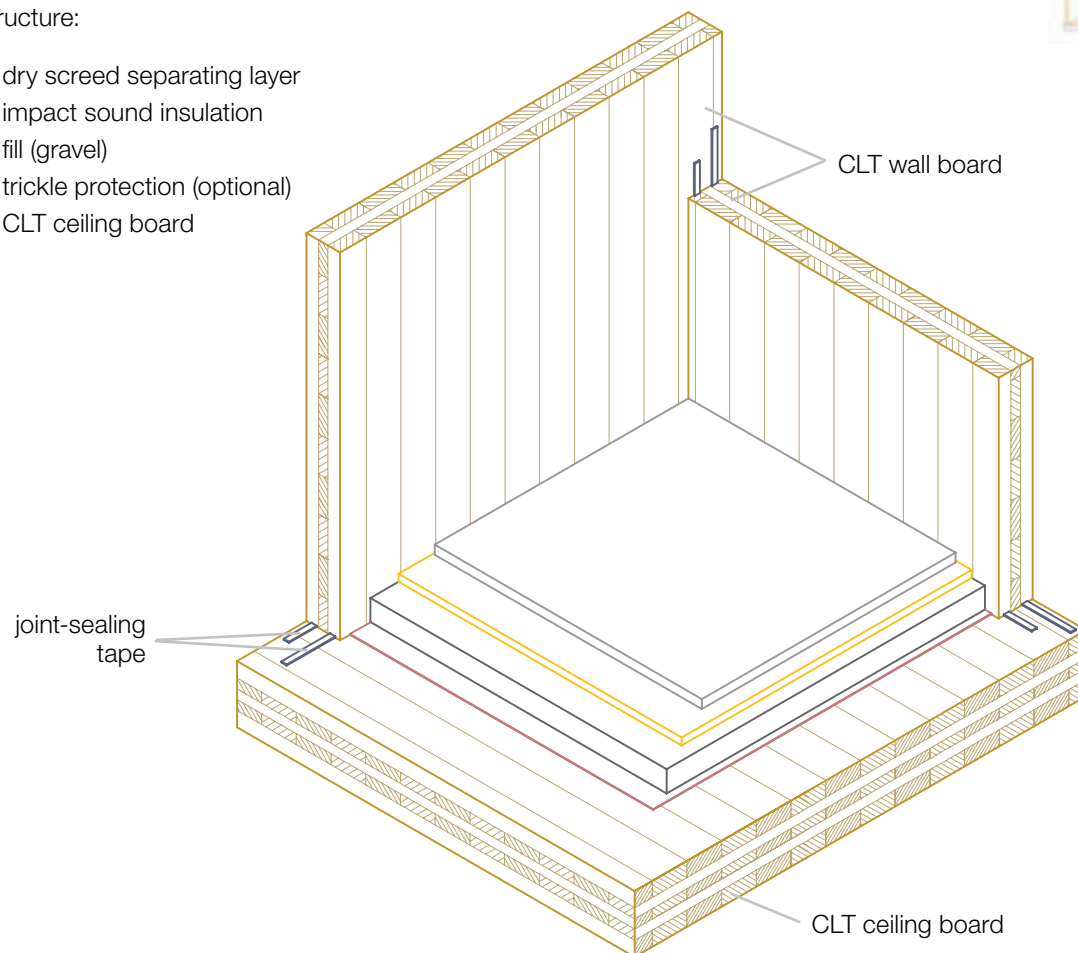




## 3.2 Dry screed

Structure:

- dry screed separating layer
- impact sound insulation
- fill (gravel)
- trickle protection (optional)
- CLT ceiling board



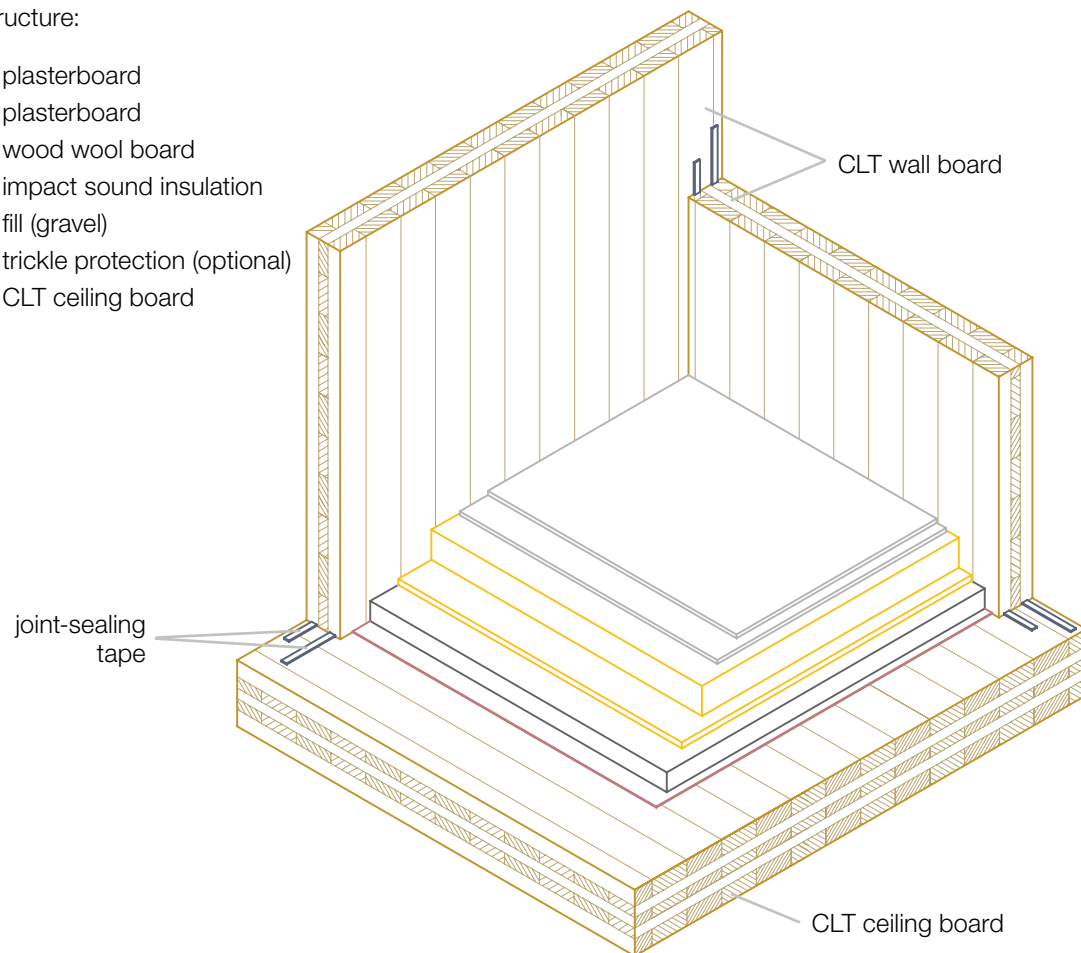
### Execution

- The entire floor structure must always be designed according to the mass-spring-mass principle (sound insulation capacity).
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.



Structure:

- plasterboard
- plasterboard
- wood wool board
- impact sound insulation
- fill (gravel)
- trickle protection (optional)
- CLT ceiling board

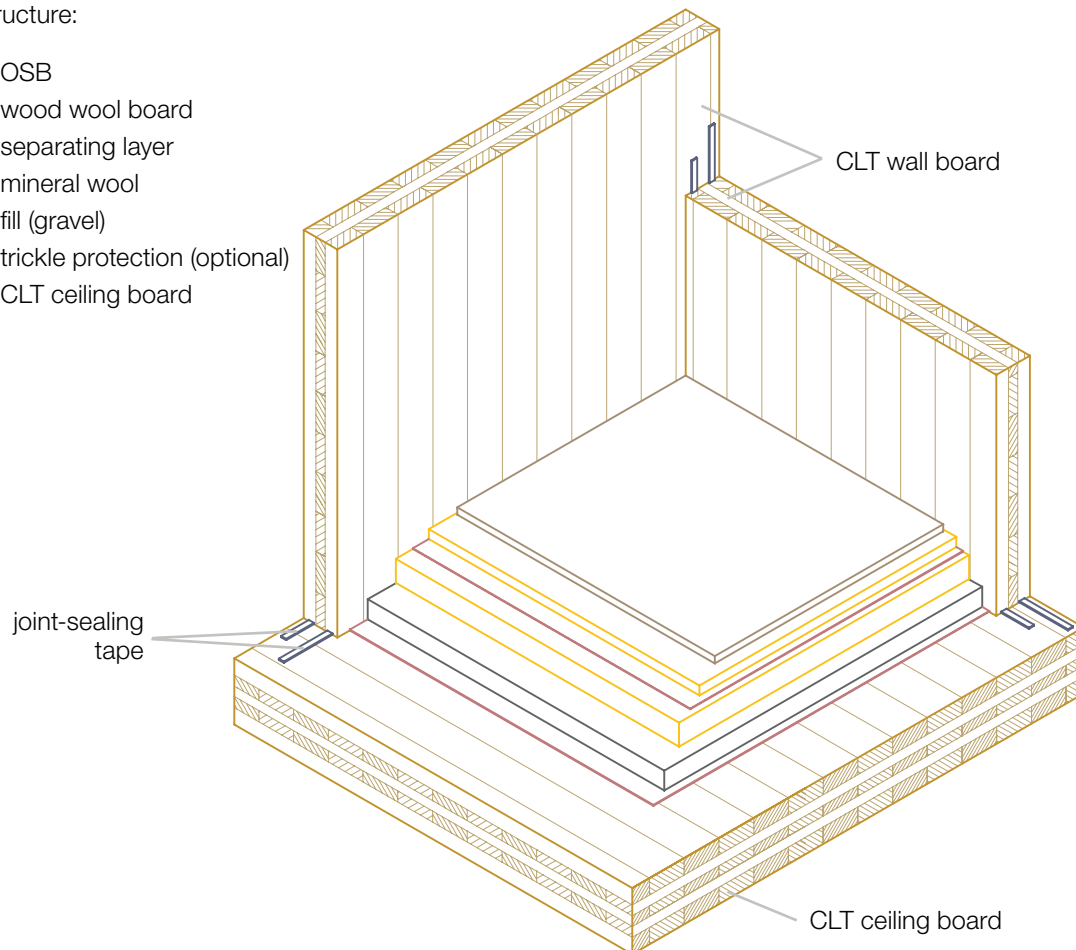


## Execution

- The entire floor structure must always be designed according to the mass-spring-mass principle (sound insulation capacity).
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

Structure:

- OSB
- wood wool board
- separating layer
- mineral wool
- fill (gravel)
- trickle protection (optional)
- CLT ceiling board

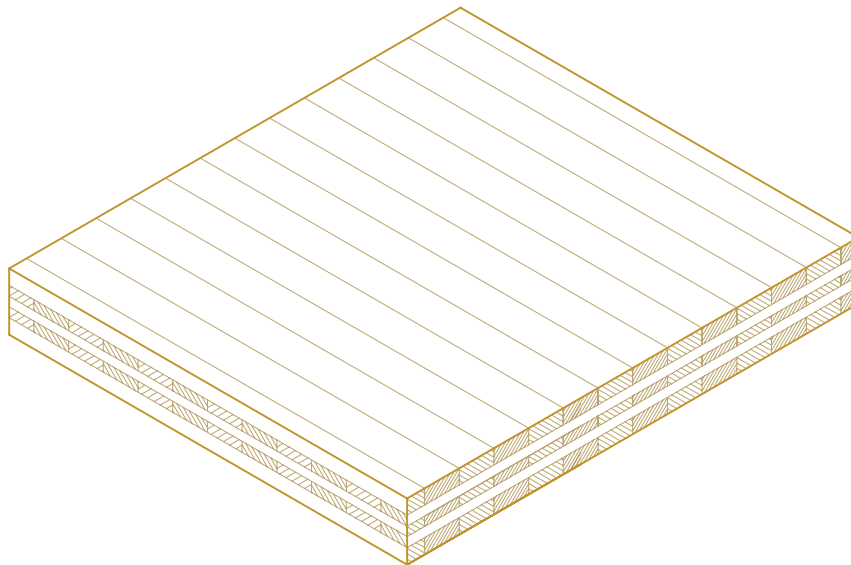
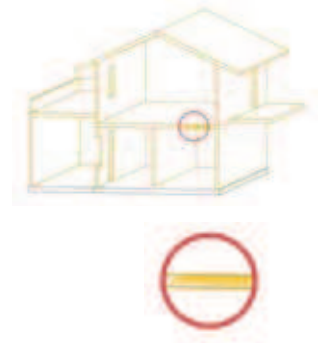


## Execution

- The entire floor structure must always be designed according to the mass-spring-mass principle (sound insulation capacity).
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 4 Ceiling (soffit)

### 4.1 CLT in visible quality



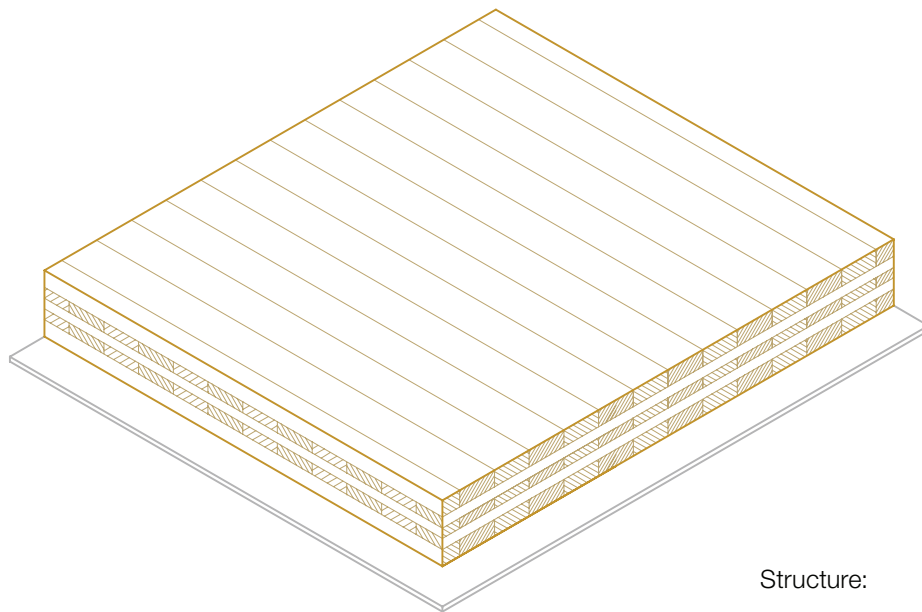
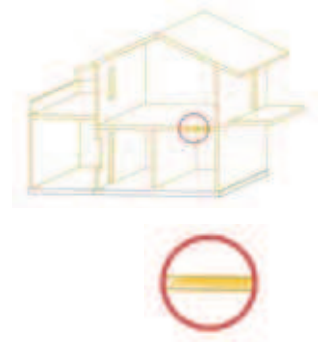
Structure:

- CLT ceiling board

#### Execution

- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 4.2 Direct facing



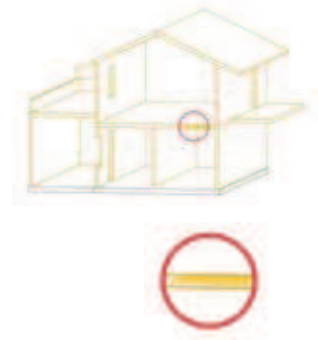
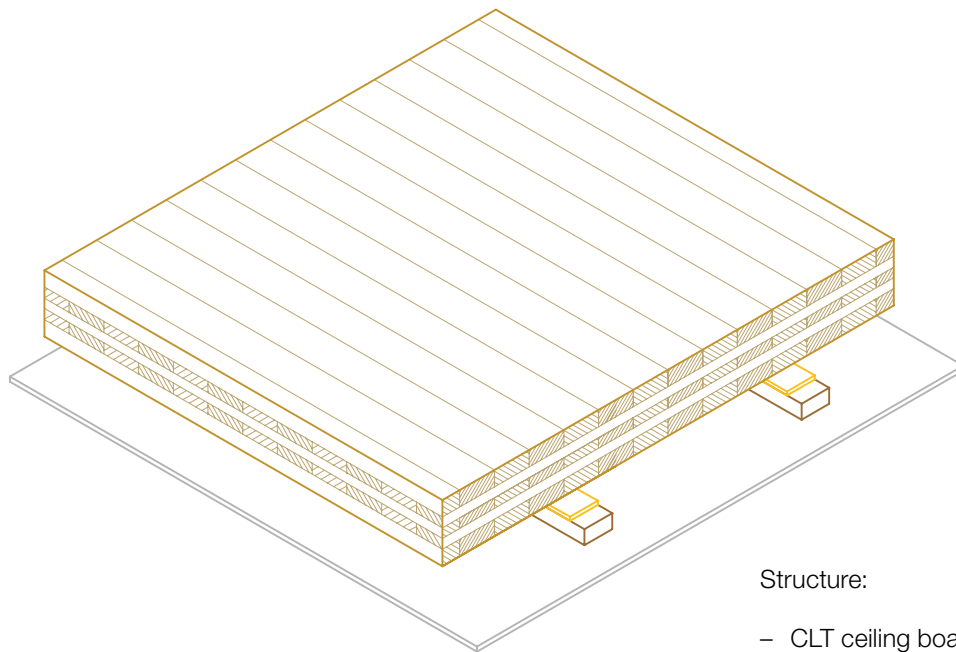
Structure:

- CLT ceiling board
- gypsum cardboard / gypsum fibreboard

### Execution

- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 4.3 Insulation panel (battens)



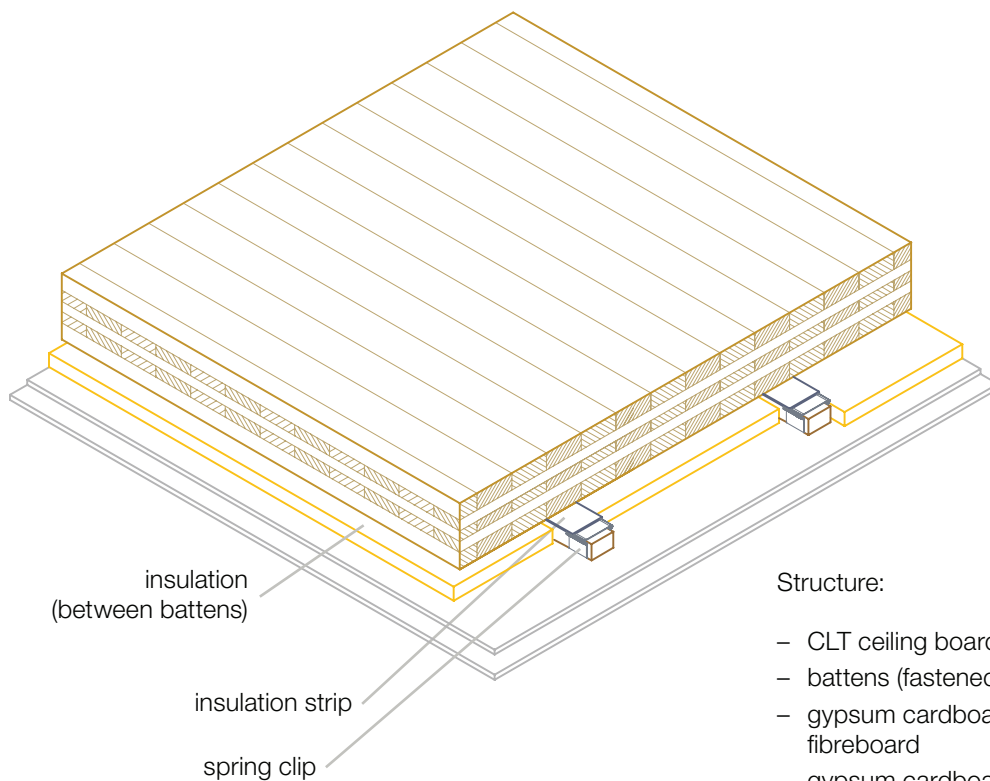
Structure:

- CLT ceiling board
- battens (on insulation strips)
- gypsum cardboard / gypsum fibreboard

### Execution

- A suspended ceiling secures a certain improvement in sound insulation but has disadvantages with regard to the CLT board's moisture control and heat storage capability.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 4.4 Insulation panel (spring clips)



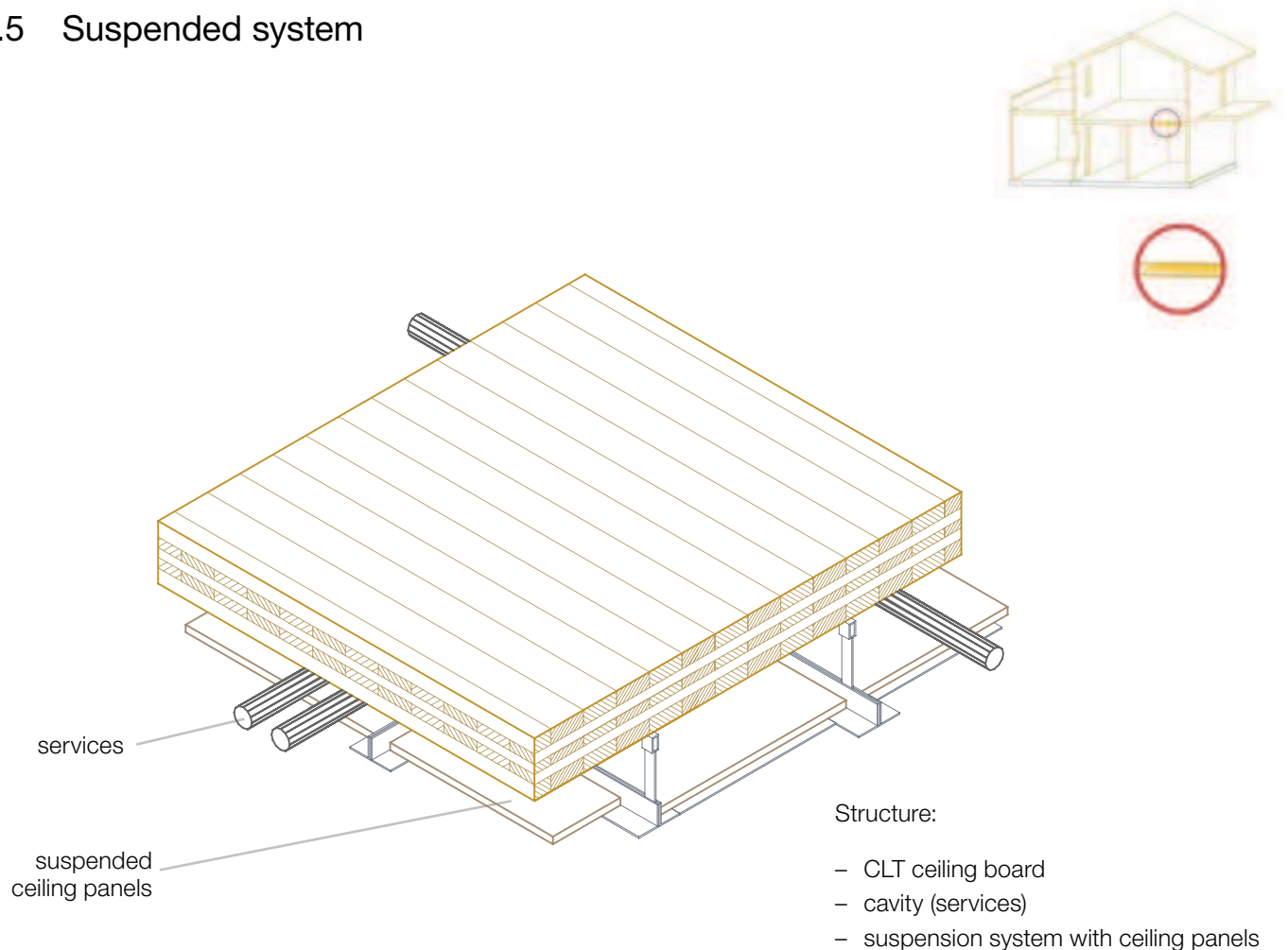
### Structure:

- CLT ceiling board
- battens (fastened with spring clips)
- gypsum cardboard / gypsum fibreboard
- gypsum cardboard / gypsum fibreboard

### Execution

- A suspended ceiling secures a certain improvement in sound insulation but has disadvantages with regard to the CLT board's moisture control and heat storage capability.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 4.5 Suspended system



### Execution

- A suspended ceiling secures a certain improvement in sound insulation but has disadvantages with regard to the CLT board's moisture control and heat storage capability.
- Concealed routing of services is possible.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

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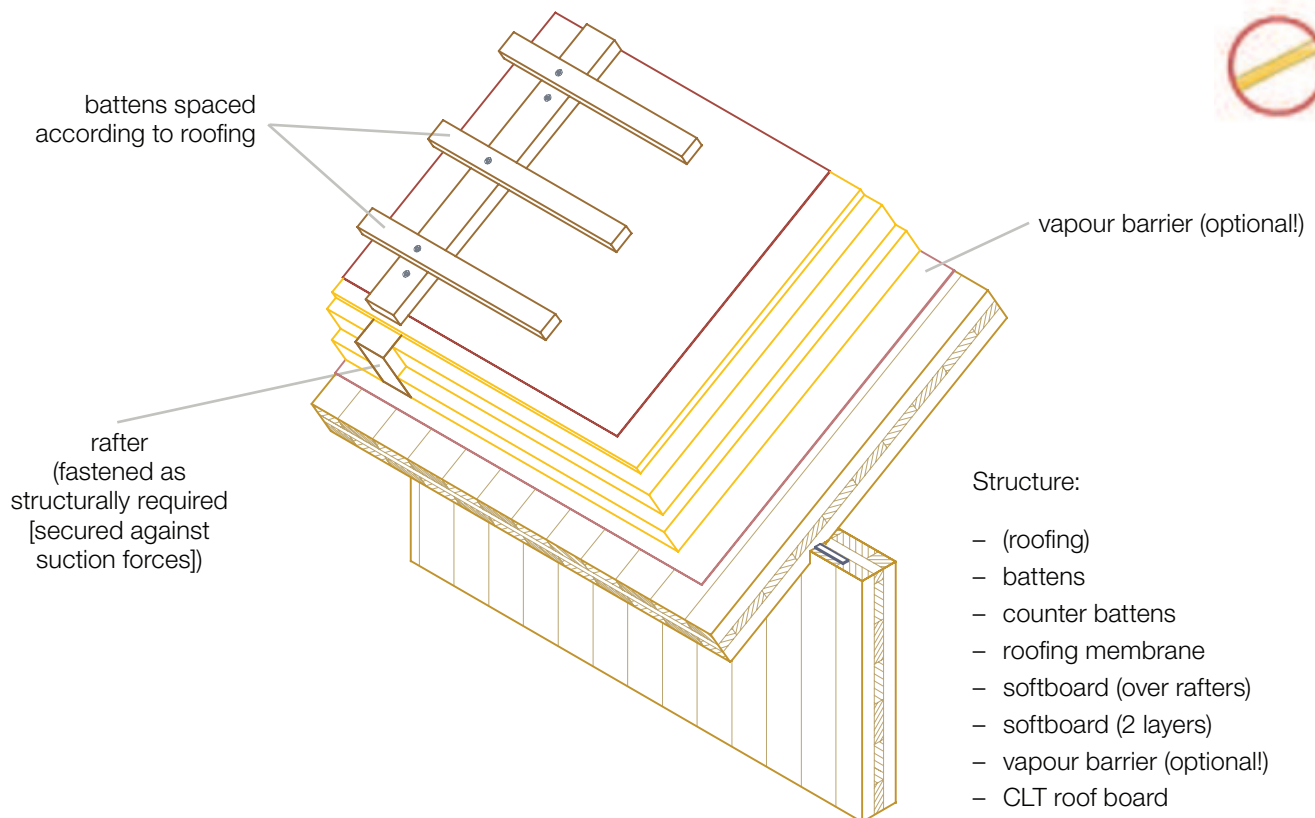
Illustration





## 5 Roof

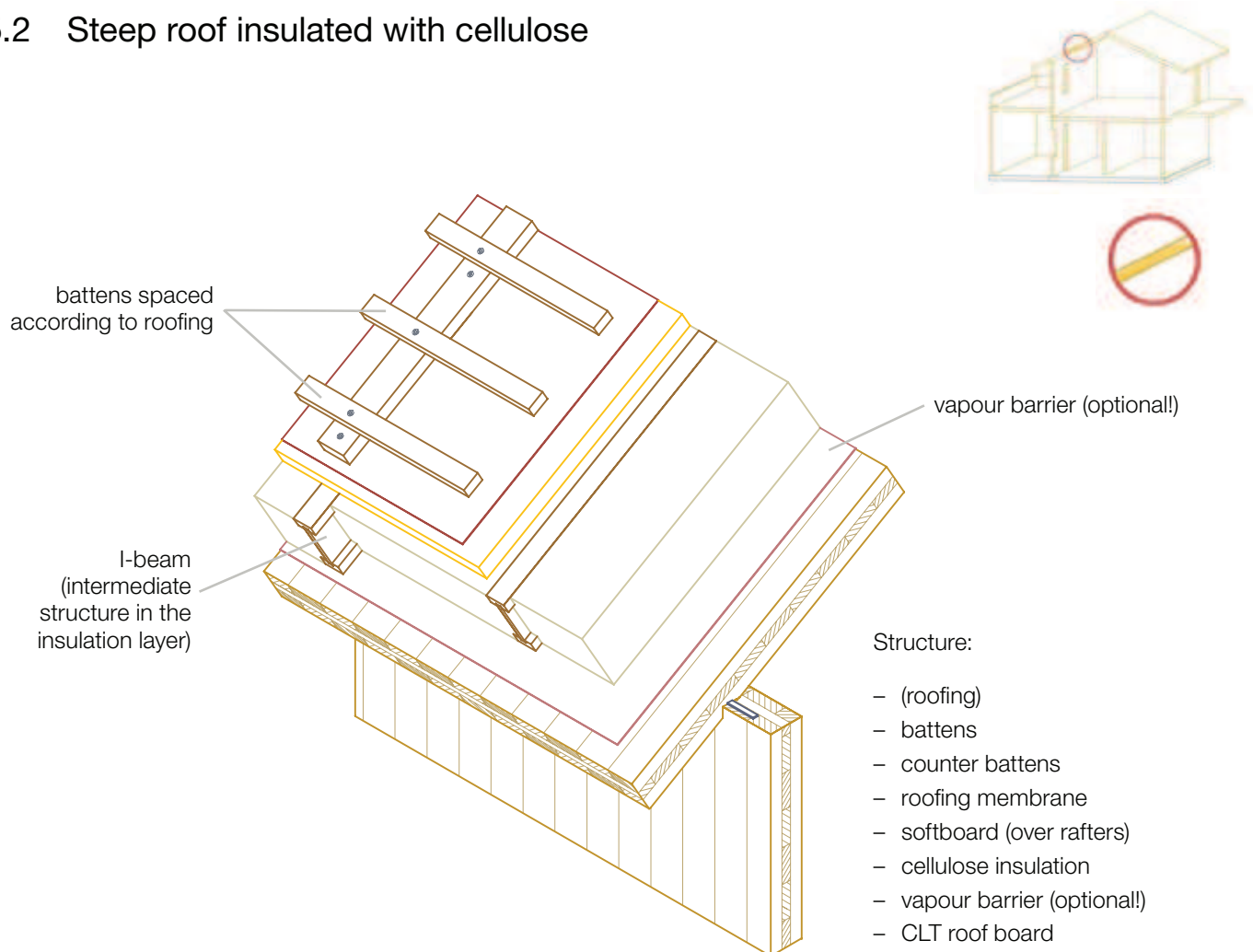
### 5.1 Steep roof insulated with softboard



#### Execution

- If the roof structure is suitably designed and the layers are configured in the right order (with their permeability increasing from inside to outside), a vapour barrier may be omitted.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

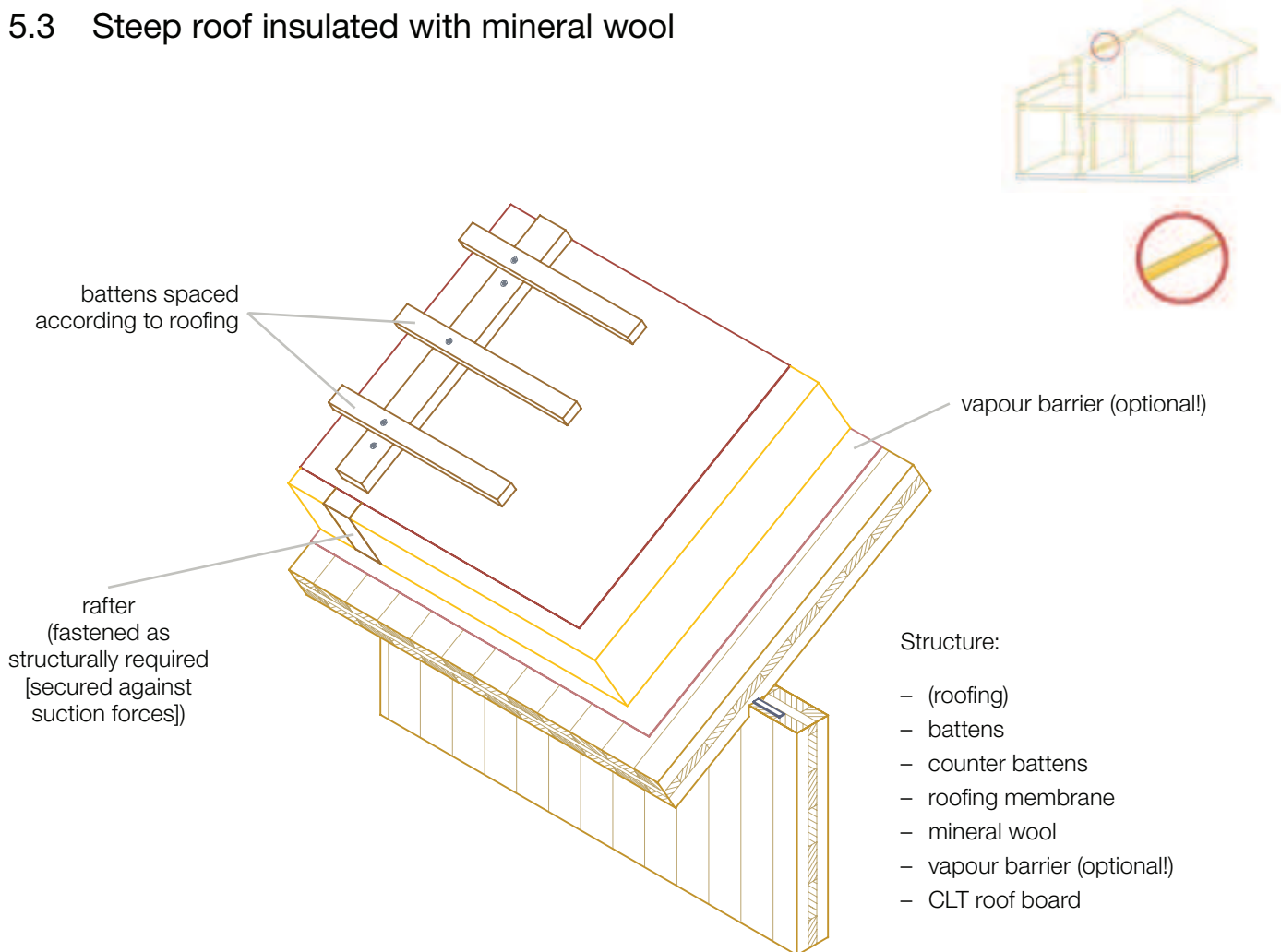
## 5.2 Steep roof insulated with cellulose



### Execution

- If the roof structure is suitably designed and the layers are configured in the right order (with their permeability increasing from inside to outside), a vapour barrier may be omitted.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

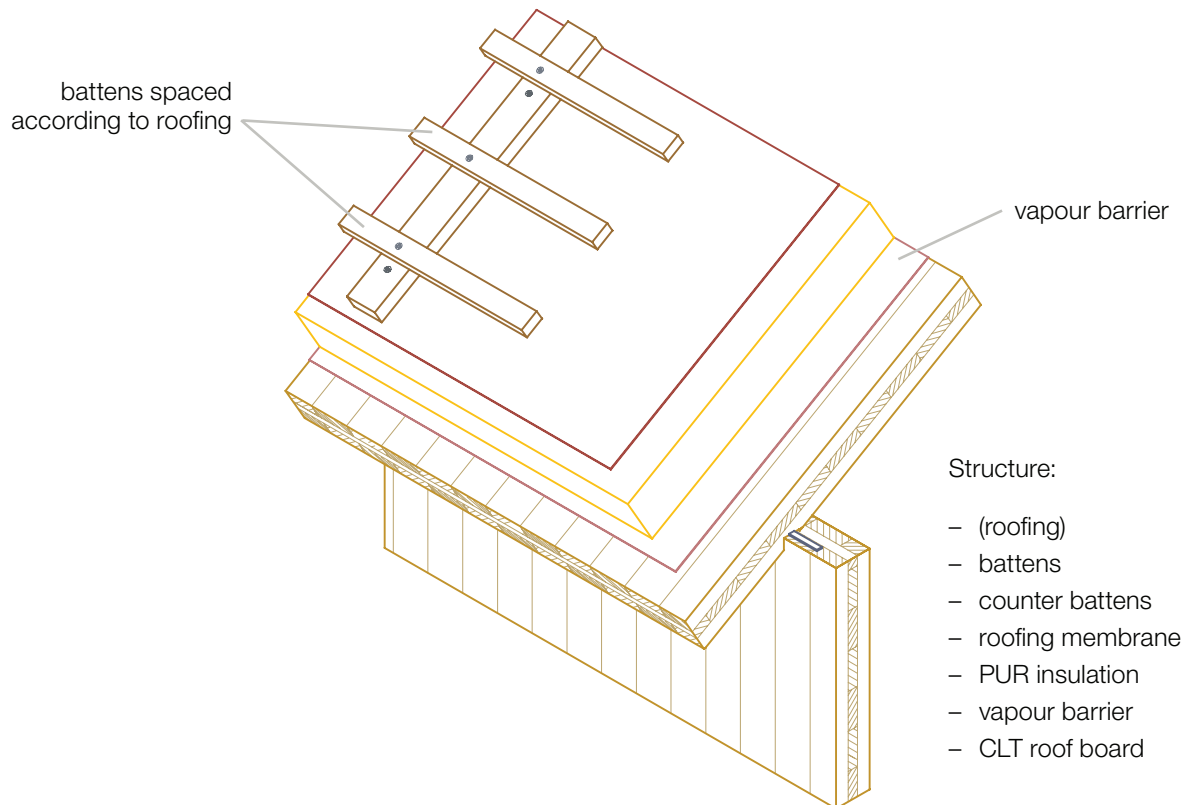
## 5.3 Steep roof insulated with mineral wool



### Execution

- If the roof structure is suitably designed and the layers are configured in the right order (with their permeability increasing from inside to outside), a vapour barrier may be omitted.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 5.4 Steep roof insulated with PUR



### Execution

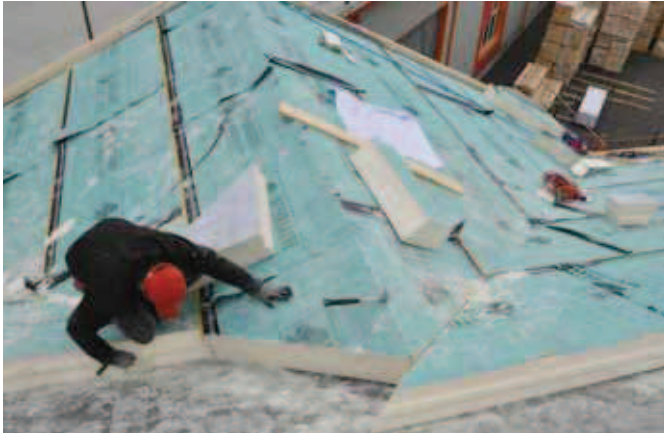
- Because of the PUR insulation's physical properties (non-permeable) a vapour barrier must be fitted.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

LAYER STRUCTURES

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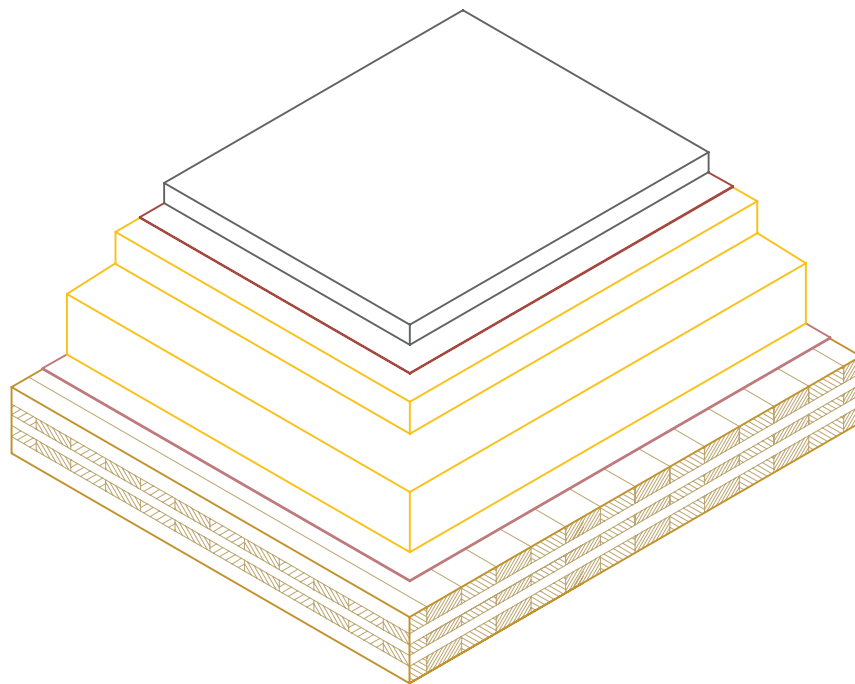
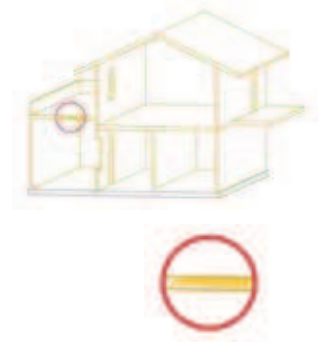
Illustration



## 5.5 Flat roof

Structure:

- fill (gravel)
- roofing membrane
- tapered insulation (EPS)
- mineral wool
- bitumen sheet
- CLT roof board

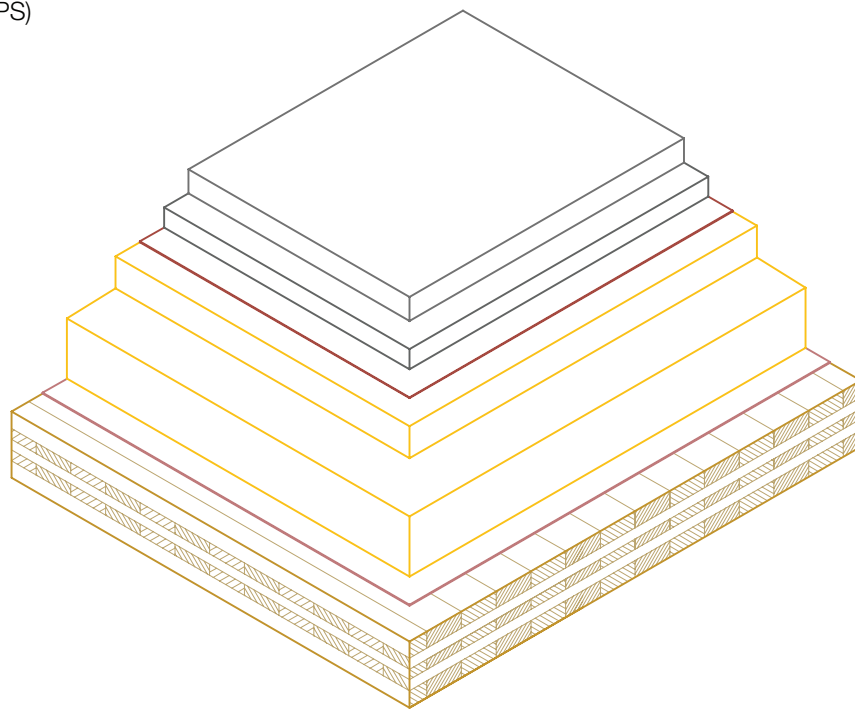


### Execution

- The gravel fill serves to keep the roof cladding in place and also to protect it against direct sunlight which would reduce the material's durability.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

Structure:

- grass pavers
- fill (gravel)
- roofing membrane
- tapered insulation (EPS)
- mineral wool
- bitumen sheet
- CLT roof board



## Execution

- The gravel fill serves to keep the roof cladding in place and also to protect it against direct sunlight which would reduce the material's durability.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

# Construction

LAYER STRUCTURES

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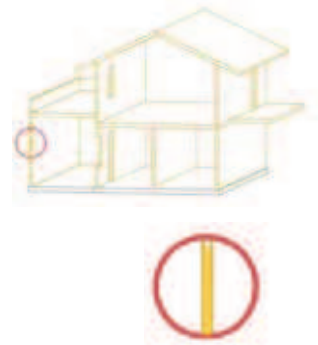
Illustration





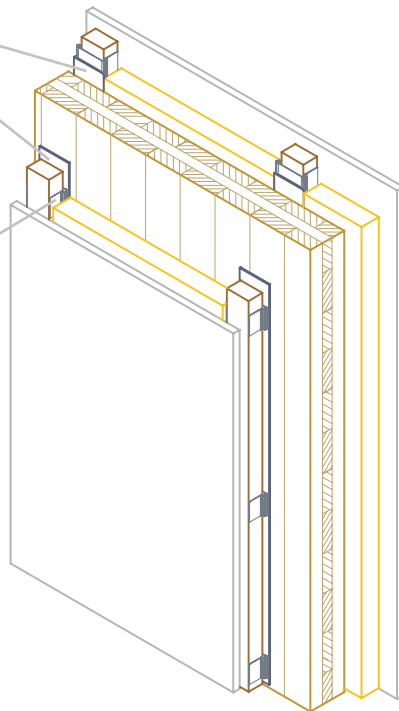
## 6 Partition wall within a home

### 6.1 Systems with single CLT structure



insulation strip  
(between CLT and battens or  
spring clips)

spring clip  
(sound insulation)

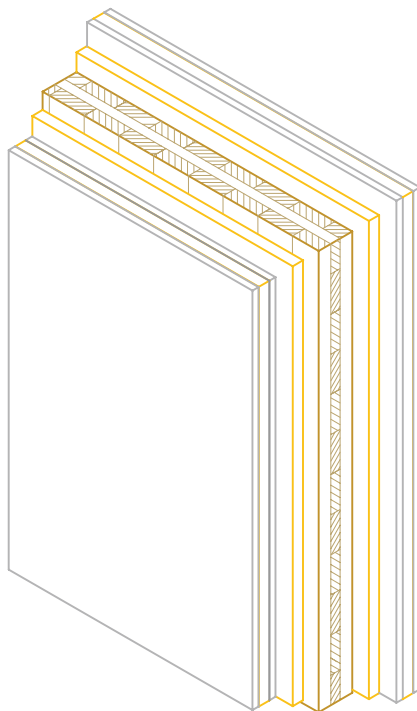


Structure:

- gypsum cardboard / gypsum fibreboard
- battens (fastened with spring clips), insulation (between battens)
- CLT wall board
- battens (fastened with spring clips), insulation (between battens)
- gypsum cardboard / gypsum fibreboard

#### Execution

- Layer structures must be matched to the required structural-physical properties of the design.
- The choice and rating of the connectors and all structural components depend on the structural requirements.



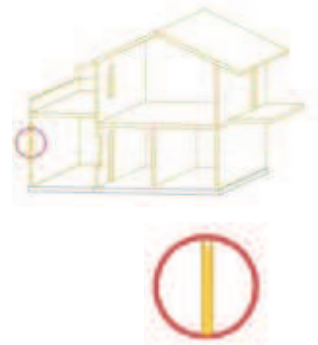
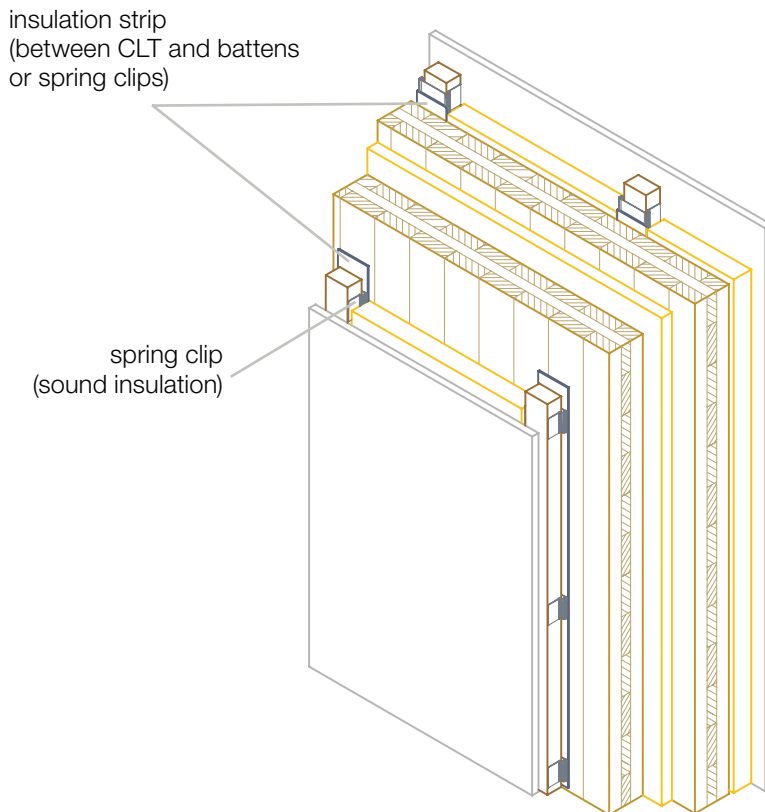
## Structure:

- composite element (wood wool board with double-sided gypsum cardboard facing)
- impact sound insulation
- CLT wall board
- impact sound insulation
- composite element (wood wool board with double-sided gypsum cardboard facing)

## Execution

- Layer structures must be matched to the required structural-physical properties of the design.
- The choice and rating of the connectors and all structural components depend on the structural requirements.

## 6.2 Systems with double CLT structure

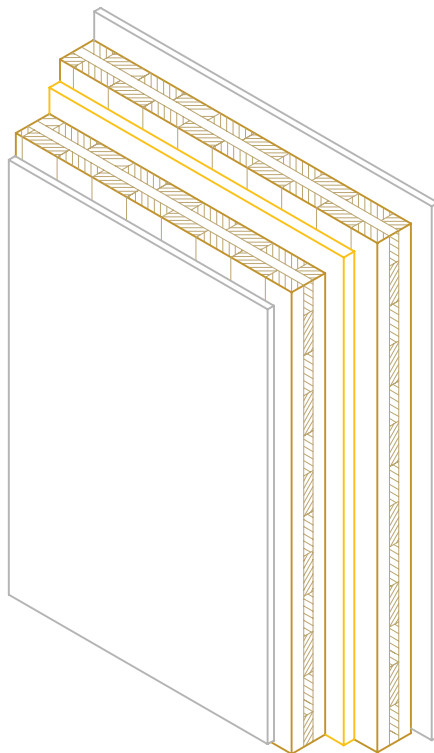


### Structure:

- gypsum cardboard / gypsum fibreboard
- battens (fastened with spring clips), insulation (between battens)
- CLT wall board
- impact sound insulation
- CLT wall board
- battens (fastened with spring clips), insulation (between battens)
- gypsum cardboard / gypsum fibreboard

### Execution

- Layer structures must be matched to the required structural-physical properties of the design.
- The choice and rating of the connectors and all structural components depend on the structural requirements.



Structure:

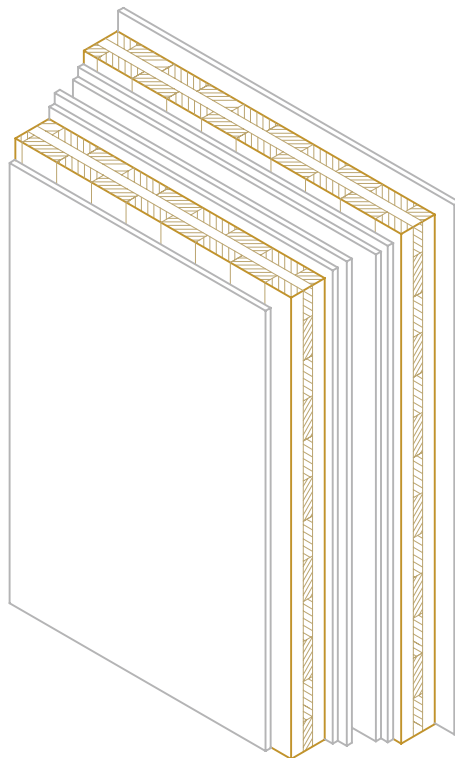
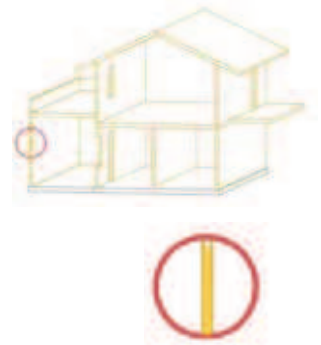
- fire-protection plasterboard
- CLT wall board
- impact sound insulation
- CLT wall board
- fire-protection plasterboard

## Execution

- Layer structures must be matched to the required structural-physical properties of the design.
- The choice and rating of the connectors and all structural components depend on the structural requirements.

## 7 Building partition wall

### 7.1 System without intermediate insulation



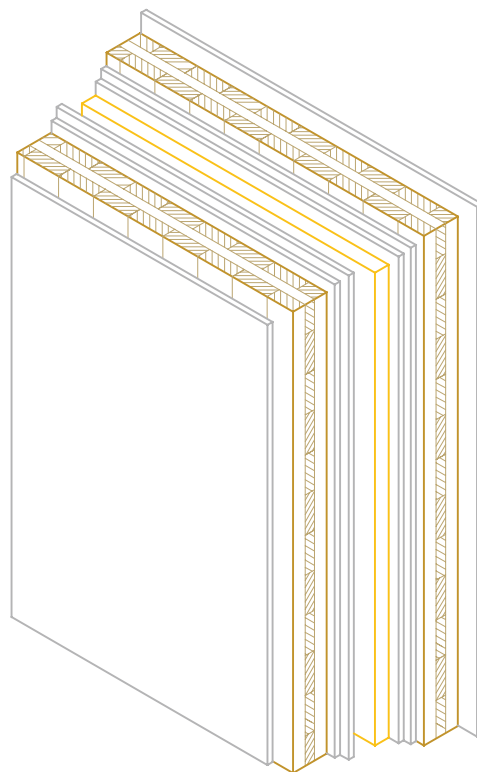
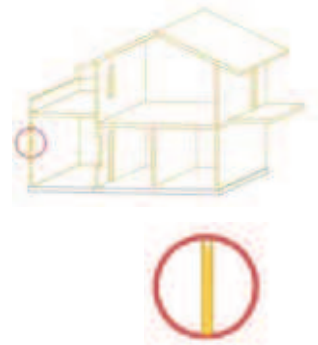
#### Structure:

- fire-protection plasterboard
- CLT wall board
- gypsum fibreboard (2 layers)
- cavity
- gypsum fibreboard (2 layers)
- CLT wall board
- fire-protection plasterboard

#### Execution

- Materials or tools which, through carelessness, are dropped into cavities can form a sound bridge.
- The choice and rating of the connectors and all structural components depend on the structural requirements.
- Layer structures must be matched to the required structural-physical properties of the design.

## 7.2 System with intermediate insulation



### Structure:

- fire-protection plasterboard
- CLT wall board
- gypsum fibreboard (2 layers)
- mineral wool
- cavity
- gypsum fibreboard (2 layers)
- CLT wall board
- fire-protection plasterboard

### Execution

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Materials or tools which , through carelessness, are dropped into cavities can form a sound bridge.</li> </ul> | <ul style="list-style-type: none"> <li>• The choice and rating of the connectors and all structural components depend on the structural requirements.</li> <li>• Layer structures must be matched to the required structural-physical properties of the design.</li> </ul> |
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