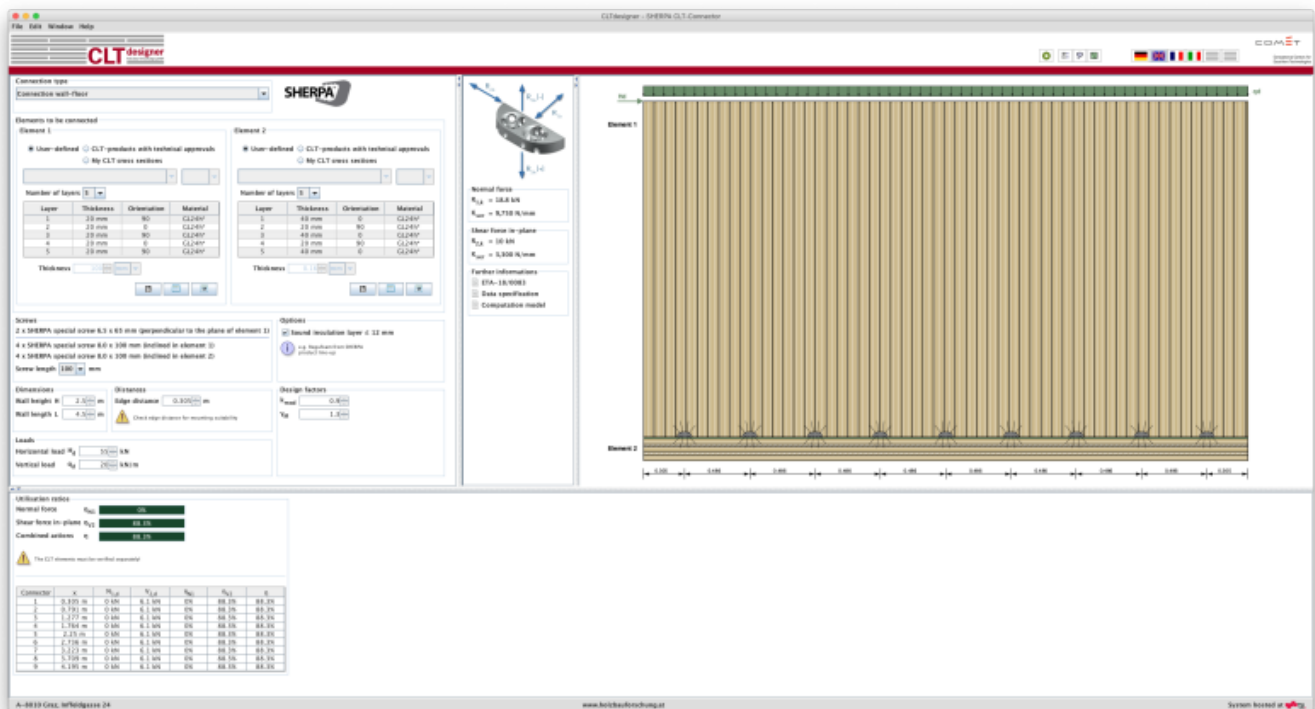


# Module "SHERPA CLT-Connector"



## Input data

The input is divided into:

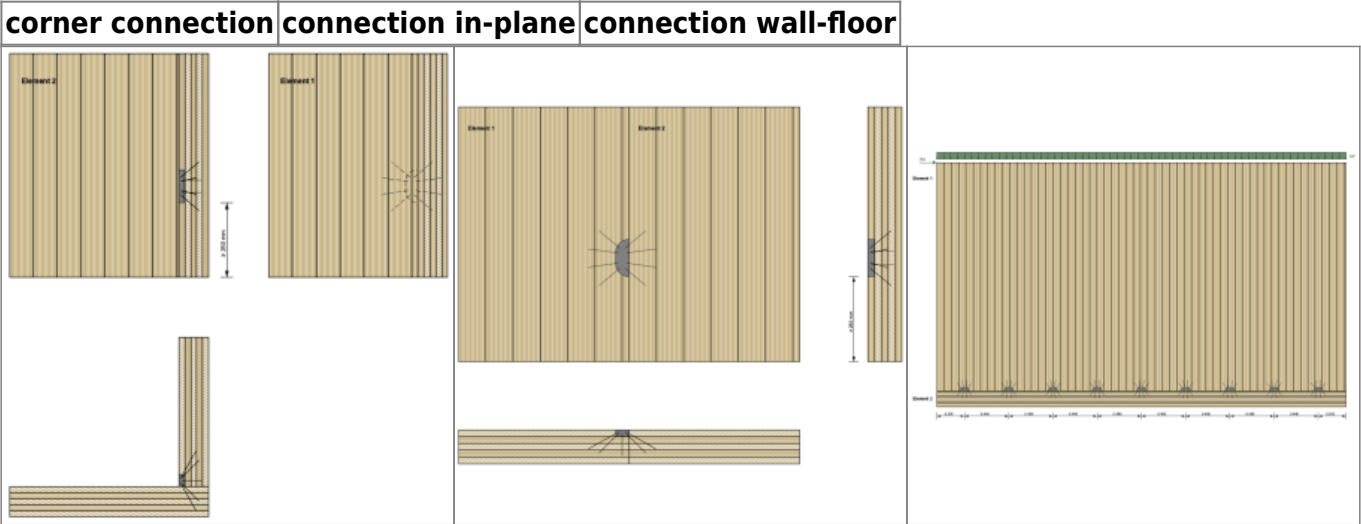
- selection of the connection type
- definition of CLT elements to be connected
- selection of screw length
- options
- depending on the connection type further system specifications
- input of loads and design factors

## Connection type



Currently the following connection types are available:

- corner connection (verification of a single connector)
- connection in-plane (verification of a single connector)
- connection wall-floor



Elements to be connected

The elements to be connected are defined by the respective layup. The input is the same as for the [Module "CLT-Plate 1D - Continuous beam"](#).

Elements to be connected

Element 1

☒ User-defined   ☐ CLT-products with technical approvals   ☐ My CLT cross sections

Number of layers 5

| Layer | Thickness | Orientation | Material |
|-------|-----------|-------------|----------|
| 1     | 20 mm     | 90          | GL24h*   |
| 2     | 20 mm     | 0           | GL24h*   |
| 3     | 20 mm     | 90          | GL24h*   |
| 4     | 20 mm     | 0           | GL24h*   |
| 5     | 20 mm     | 90          | GL24h*   |

Thickness 100 mm

Element 2

☒ User-defined   ☐ CLT-products with technical approvals   ☐ My CLT cross sections

Number of layers 5

| Layer | Thickness | Orientation | Material |
|-------|-----------|-------------|----------|
| 1     | 40 mm     | 0           | GL24h*   |
| 2     | 20 mm     | 90          | GL24h*   |
| 3     | 40 mm     | 0           | GL24h*   |
| 4     | 20 mm     | 90          | GL24h*   |
| 5     | 40 mm     | 0           | GL24h*   |

Thickness 0.16 mm

If milling is necessary due to the thickness of the elements, a warning message is displayed and, if possible, an alternative screw length is mentioned.

Check the possibility of an alternative screw length!

The SHERPA CLT-Connector must be milled deeper (10 mm) or mounted on both sides!

The mounting suitability must be checked!

Screws

The SHERPA CLT-Connector is fixed on element 1 (base element) at the factory by using 6 SHERPA special screws. A further 4 SHERPA special screws are used to connect element 2 (element to be connected). The length of the inclined screws can be 100 mm, 120 mm or 140 mm, depending on

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requirements.

**Screws**

2 x SHERPA special screw 6.5 x 65 mm (perpendicular to the plane of element 1)

4 x SHERPA special screw 8.0 x 100 mm (inclined in element 1)

4 x SHERPA special screw 8.0 x 100 mm (inclined in element 2)

Screw length  mm

## Options

Intermediate layers such as compriband or sound insulation layers can be placed between the elements. Since the installation of a sound insulation layer influences the load capacity "shear force out of plane", this must be indicated via the option "sound insulation layer  $\leq 12$  mm".

**Options**

☒ Sound insulation layer  $\leq 12$  mm

 e.g. Regufoam from SHERPA product line-up

## Further system specifications

In case of connection type "Connection wall-floor", wall height and length as well as an edge distance must be specified. When selecting the edge distance, always pay attention to the mounting suitability.

**Dimensions**

Wall height H  m

Wall length L  m

**Distances**

Edge distance  m

 Check edge distance for mounting suitability

## Load data and design factors

Depending on the selected connection type, either loads (connection type "connection wall-floor") or internal forces (connection type "corner connection" and "connection in-plane") must be specified.

### Connection type "connection wall-floor"

For the connection type "connection wall-floor", a horizontal and a vertical load (design value) can be specified. The required number of connectors as well as the respective forces on the individual connectors are calculated by means of a [linear elastic spring model](#), taking into account the geometry and the edge distances as well as the minimum and maximum distances between them.

| Loads                 |                                      |
|-----------------------|--------------------------------------|
| Horizontal load $H_d$ | <input type="text" value="55"/> kN   |
| Vertical load $q_d$   | <input type="text" value="20"/> kN/m |

## Connection type "corner connection" and "Connection in-plane"

For the connection types "corner connection" and "connection in-plane", the action is specified by internal forces (forces acting on each individual connector). The connector can be exposed to a normal force as well as to shear forces in and out of plane. The internal forces to be specified are design values. Make sure that the sign is entered correctly.

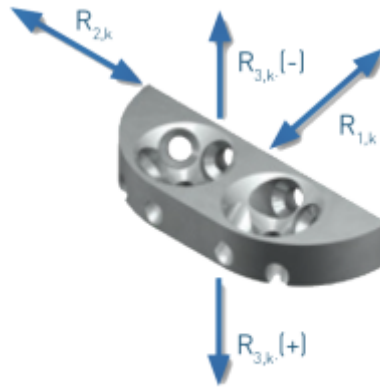
| Internal forces                    |                                     |
|------------------------------------|-------------------------------------|
| Normal force $N_{1,d}$             | <input type="text" value="5.3"/> kN |
| Shear force in-plane $V_{2,d}$     | <input type="text" value="6.2"/> kN |
| Shear force out of plane $V_{3,d}$ | <input type="text" value="3.7"/> kN |

Furthermore, the modification coefficient  $k_{mod}$  and the partial safety factor  $\gamma_M$  must be specified.

| Design factors |                                  |
|----------------|----------------------------------|
| $k_{mod}$      | <input type="text" value="0.9"/> |
| $\gamma_M$     | <input type="text" value="1.3"/> |

## Results and Output

Information about the CLT-Connector is displayed between the input data (left) and the graphic (right). This includes, on the one hand, the load capacities and stiffnesses depending on the direction of loading and, on the other hand, the basis of the calculation (ETA, data specification and computation model).

**Normal force**

$$R_{1,k} = 18.8 \text{ kN}$$

$$K_{\text{ser}} = 9,750 \text{ N/mm}$$

**Shear force in-plane**

$$R_{2,k} = 10 \text{ kN}$$

$$K_{\text{ser}} = 3,300 \text{ N/mm}$$

**Further informations** **ETA-18/0083** **Data specification** **Computation model**

As a result, the utilisation ratios of the respective stress as well as the combined stress are indicated. The output differs slightly depending on the selected connection type.

**Connection type "connection wall-floor"**

For this connection type, the maximum utilization ratios as well as the utilization ratio of each individual connector are specified.

Utilisation ratios

|                      |             |       |
|----------------------|-------------|-------|
| Normal force         | $\eta_{N1}$ | 0%    |
| Shear force in-plane | $\eta_{V2}$ | 88.3% |
| Combined actions     | $\eta$      | 88.3% |



The CLT elements must be verified separately!

| Connector | x       | $N_{1,d}$ | $V_{2,d}$ | $\eta_{N1}$ | $\eta_{V2}$ | $\eta$ |
|-----------|---------|-----------|-----------|-------------|-------------|--------|
| 1         | 0.305 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 2         | 0.791 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 3         | 1.277 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 4         | 1.764 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 5         | 2.25 m  | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 6         | 2.736 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 7         | 3.223 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 8         | 3.709 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |
| 9         | 4.195 m | 0 kN      | 6.1 kN    | 0%          | 88.3%       | 88.3%  |

## Connection type "corner connection" and "connection in-plane"

| Utilisation ratios       |             |       |
|--------------------------|-------------|-------|
| Normal force             | $\eta_{N1}$ | 48.4% |
| Shear force in-plane     | $\eta_{V2}$ | 78%   |
| Shear force out of plane | $\eta_{V3}$ | 23.6% |
| Combined actions         | $\eta$      | 89.9% |



Check milling for mounting suitability!  
Check effects of eccentricity!



The CLT elements must be verified separately!

In addition to the utilization ratios, any warnings, e.g. regarding suitability for mounting and eccentricity of the connection, are also displayed here.

### And to pay special attention:

The CLT elements must be verified separately!

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