

Assembly instructions for LIGNATUR box element (LKE)

Assembly preparation

- Prepare a level and clean storage space for the unloading of the elements.
- The packages are packed with PE stretch foil to protect against dirt.
- Load on the truck and package numbers correspond to the assembly order.



- To protect the visible surface, the bottom element in the package is inverted. Use edge protectors when unloading the packages and protect tongues and grooves against damage caused by straps.

- Unload by crane over the roof or with forklift from the side of the truck
- Elements must not be rotated on the truck or platform.
- Caution: the visible side of elements filled with chippings in the factory faces downwards
- Study the installation diagram in advance. It defines the order of assembly, tongue side, connection details, cut-outs, framing, preparations for installations, fasteners, interfaces.
- Ordered additional material and assembly suspensions are in package no. 1.



- Measure the ceiling, position of first element and mark the grid dimension.

- According to occupational health and safety regulations, protection against falling must be provided.
- Use tarpaulins to store the packages on the building site. The foil is not a weather protection.



- The Lignatur packaging films are polyethylene (PE). The packaging is to be disposed of as waste type film at the recycling yard. With professional recycling, film waste can be reprocessed and used for new production.

Unloading the LIGNATUR packages

- Edge protectors must be used when unloading so that the straps do not damage tongues and grooves.
- For this purpose, the "LIGNATUR Edge Protector" consisting of 2 protective boards and 4 steel brackets can be ordered from Lignatur AG at extra cost or alternatively you can manufacture edge protectors yourself.



steel bracket



protective board

Procedure for unload packages with a crane



- Push the protective board and crane strap between the packages.



- "fish" the straps from above with a hook and pull them out.



- Set the steel brackets in place and pull the straps tight.

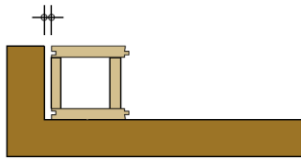


- Fasten the straps to the crane suspension gear and lift the package.

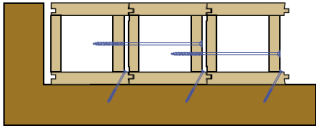


- For transport reasons, factory-fitted lifting straps may be required. Please note: Only use lifting straps once; unloading is the responsibility of the crane operator.

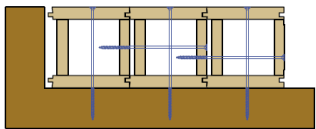
Assembly and fastening LKE



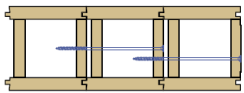
- Allow a little space to the exterior wall for possible swelling.
- For large areas, plan expansion joints on walls.



- Position the first element precisely and screw it constructively to the bearings on the tongue side. Recommended screws: Countersunk head wood screw \varnothing 6 mm, $l = 90$ mm for constructive bolting.
- Then install the next element without a joint.



- Static fastening according to the specifications of the structural engineer. Recommended screws: countersunk head wood screw \varnothing 8 mm, $l = \text{element height (h)} + \text{structurally necessary thread length in the bearing}$



- For regular swelling and shrinkage, screw elements with a horizontal spacing of 1.5 to 2.0 m. Recommended screw: Countersunk head wood screw \varnothing 8 mm, $l = 280$ mm (shaft length ~ 190 mm).

Fire protection

- The groove and comb design of the LIGNATUR box elements meets the fire protection requirements EI 30 or 60.
- Interfaces to the bearing and installations must be implemented in accordance with the installation diagram or the structural engineer's specifications.

Aesthetics

- Shell construction is the finished construction – the timber builder is aware of the topic, can deal with it and works carefully and cleanly in his own interests.

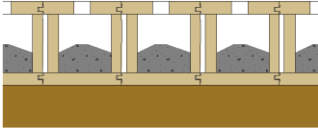


- Glaze containers are supplied for small repairs to glazed surfaces.

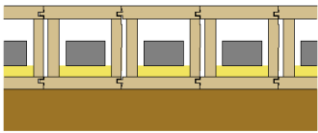
- Draw the attention of subsequent workers on the building site to the visible ceiling and instruct them not to soil it during their work.

Acoustic insulation: LKE filling

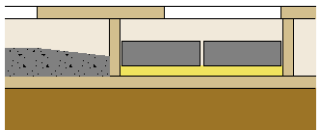
- After mounting the elements, distribute the sacks with chippings over them, cut open, empty and sweep the chippings with the broom into the slots prepared according to the order (43 mm x 500 mm). Depending on the filling quantity, tamp with a wooden block in the cavities if necessary. With regard to acoustic insulation, it does not matter whether the filling is evenly distributed in the cavity.



- LKE filling with chippings
Limestone chippings filling material: FERMACELL honeycomb filling 1500 kg/m³, grain size 1 to 4 mm, one 22.5 kg sack. The filling quantity specified on the installation diagram is decisive.



- LKE silence12 are already filled with damper stones depending on the dead weight of the element and in consultation with Work Preparation. After installation, they must also be filled with limestone chippings (filling quantity according to the installation diagram).



- LKE silence12, which, depending on the dead weight of the element, can only be installed by hand without built-in damper stones, must subsequently be filled from above with damper stones and limestone chippings according to the installation diagram.

- In each case, check where pallets with chippings may be set down from a structural point of view.
- Constructive couplings greatly worsen the acoustic insulation of the building – do not use spray foam. Implement acoustic insulation decouplings according to the building physicist's specifications.



- A custom-fit moulding can be supplied to close the slots.



- The moulding is secured with a clip in the slope to prevent it from slipping.

Breakthroughs

Installation ducts, breakthroughs with diameter ≤ 200 mm



- Installation ducts can be implemented differently depending on the required size. Installation slats are suitable for smaller ducts and hollowed-out cavities for larger ducts.



- Simple breakthroughs up to a diameter of 200 mm are structurally unproblematic in the area of the cavity near the bearing.

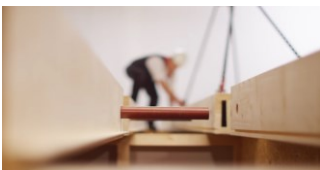
Breakthrough with diameter \leq 600 mm, ROR framing



- Breakthroughs, shown here with a diameter of 600 mm, require an appropriate reinforcement and framing, which is prepared in the factory.



- 1. Position the element with prepared breakthrough. Steel pipes, ideally inserted on the longer side so that the shorter end protrudes.

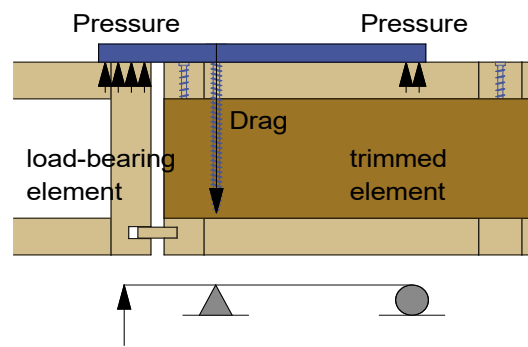


- Place the connecting element on the steel pipe and slide it up to the joint.

Framing with trimmer and steel plates



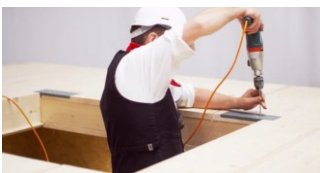
Large framing with trimmer and steel plates



Static system steel plate



- Trimming, structural reinforcement, trimmer and steel plates are already prepared in the factory.
- Insert the trimmer in the trimmed element and already mount the possible steel plate.
- Structurally connect the trimmer to the element.



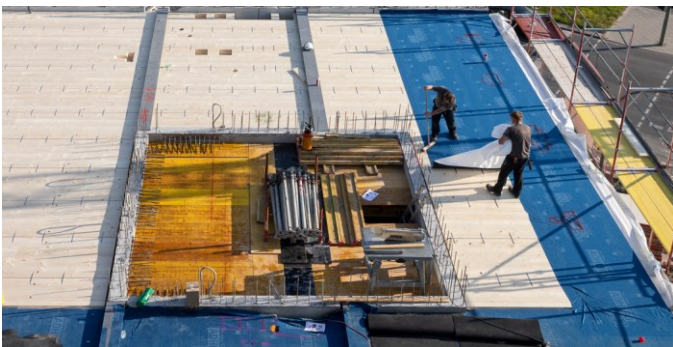
- Place the trimmed element between the two load-bearing elements.
- Push the elements into position
- Mount the missing steel plate and attach further structural connections.

Weather protection

Potection during the construction period



- On flat roofs, the use of the suitable vapour barrier takes over the emergency sealing. The installation must be carried out according to the manufacturer's instructions and taking into account swelling shrinkage in the joint transition.



- Self-adhesive weather protection membranes such as SIGA Wetguard, Isocell Timber Protect or Proclima Solitex Adhero are suitable as for reliable moisture protection and trickle protection. The installation of the temporary covering membrane must be carried out according to the manufacturer's instructions. The on-site application of the weather protection membrane offers the advantage that danger spots such as joints, openings, fasteners, ... can be identified and sealed directly on site. We do not offer factory pre-assembly of the weather protection membrane. Experienced carpenters report us that on-site assembly without factory pre-assembly is more efficient, more cost-effective and less prone to errors.

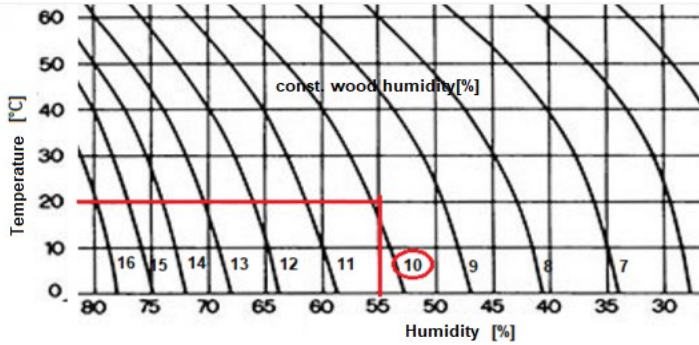


- Temporary cover fixed according to processing guidelines, incl. emergency drains, joints overlapped and glued. The weather protection is connected in a rainproof manner all around, across all trades and at penetrations with system products, the fasteners are sealed.



- The temporary cover is to be laid immediately after the wooden construction has been erected, at the end of each working day. The emergency drains must be designed in such a way that the rainwater can flow out of the area without backing up. The positioning of the emergency drains must be agreed with the site management.

Wood moisture Lignatur



- LIGNATUR elements must be installed dry immediately upon delivery or protected from moisture during storage on the construction site. The elements are manufactured with a moisture content of 10+/-2 %. This corresponds to a moisture content that occurs in a room climate of 20 °C and 55 % relative humidity. Source: Keylwerth - Diagram.

Protection from building moisture



- An unacceptable increase in humidity of LIGNATUR elements as a result of high building humidity (direct effect of humidity or indirect effect of high relative humidity) must be prevented during all construction phases. The indoor climate has to be checked continuously and rooms with high building moisture have to be ventilated or dehumidified until the higher building moisture has decreased. A climate with a temperature between 10 °C and 25 °C and a relative humidity between 65 % and 40 % is ideal.

Beware of drying out too quickly:



- Continuous monitoring of the air humidity is necessary to guarantee slow, damage-free re-drying. When using drying and heating tools, care must be taken to avoid too rapid re-drying. Different wood moisture contents on the upper and lower side of the element can be the result of too fast re-drying. This can lead to unsightly stress cracks in the visible surface.