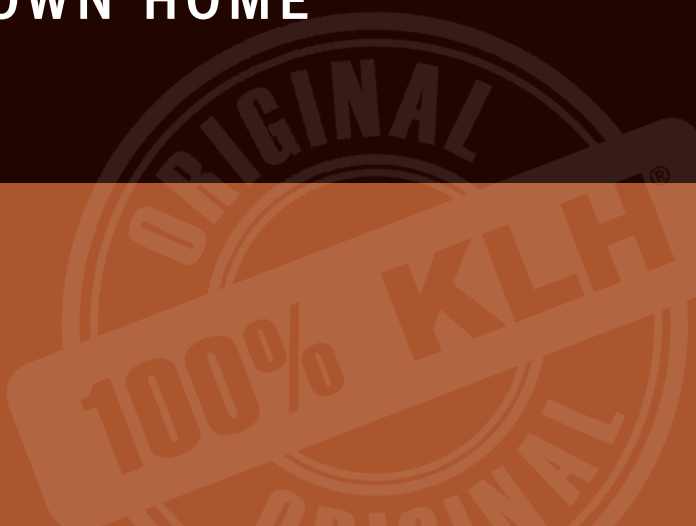
KLH®

MADE FOR BUILDING
BUILT FOR LIVING

COMPONENT CATALOGUE FOR **BUILDING YOUR OWN HOME**



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KLH®

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BUILDING YOUR OWN HOME

Wood is the ideal construction material for sustainable building. After all, every cubic metre of wood stores the carbon from approx. one ton of CO_2. A house made out of solid wood thus stores around 70 tons of CO_2. The use of KLH® solid wood panels for wall and ceiling structures also provides the advantage that in comparison to other wood building methods (e.g. the timber frame construction) the construction can mainly be implemented in homogenous layers.

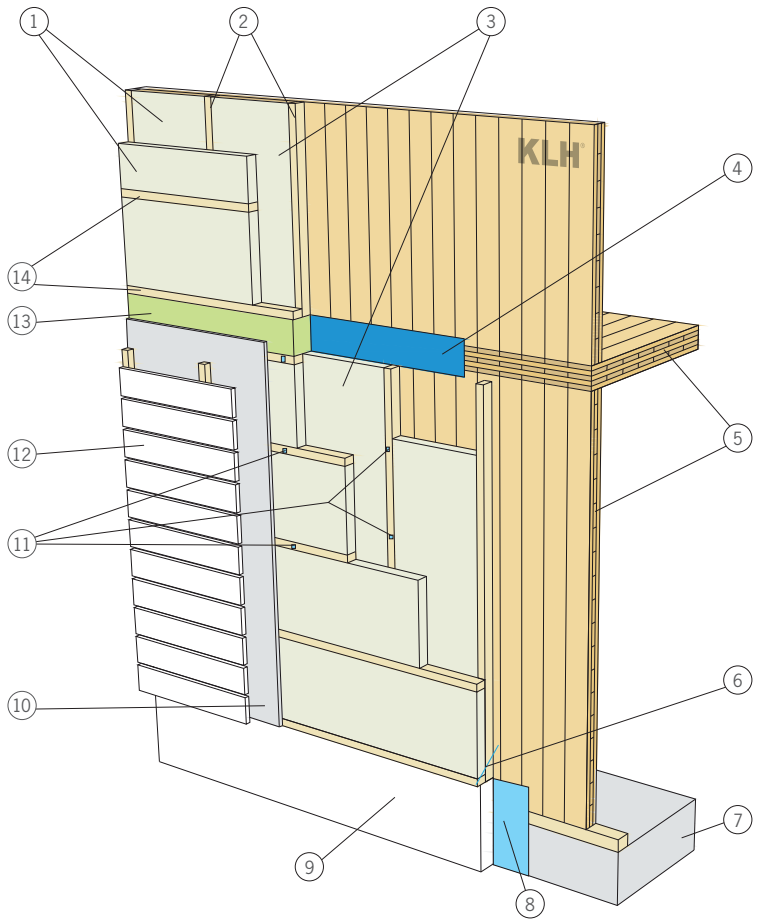
This leads to consistent temperature fields over the entire area and hence to advantages regarding the hygrothermal behaviour of the construction and a higher implementation tolerance in the design. For this reason, buildings of solid wood elements with their high density and high specific heat storage capacity, but with a low temperature penetration coefficient, low thermal conductivity and the resulting long phase shift show only a low heating energy demand. Generally, the wall and roof structures should be designed as permeable, i.e. the materials must be more open to the outside. Airtight layers and vapour retarders should be carefully implemented, requirements in building physics are decisive.

Similar to the statics, the wall and roof structures need to be calculated for each individual case. The following detailed proposals should illustrate the construction principles and are only a recommendation of the manufacturer.

KLH®
Architect Dipl. Ing. Oliver Seindl, KLH®

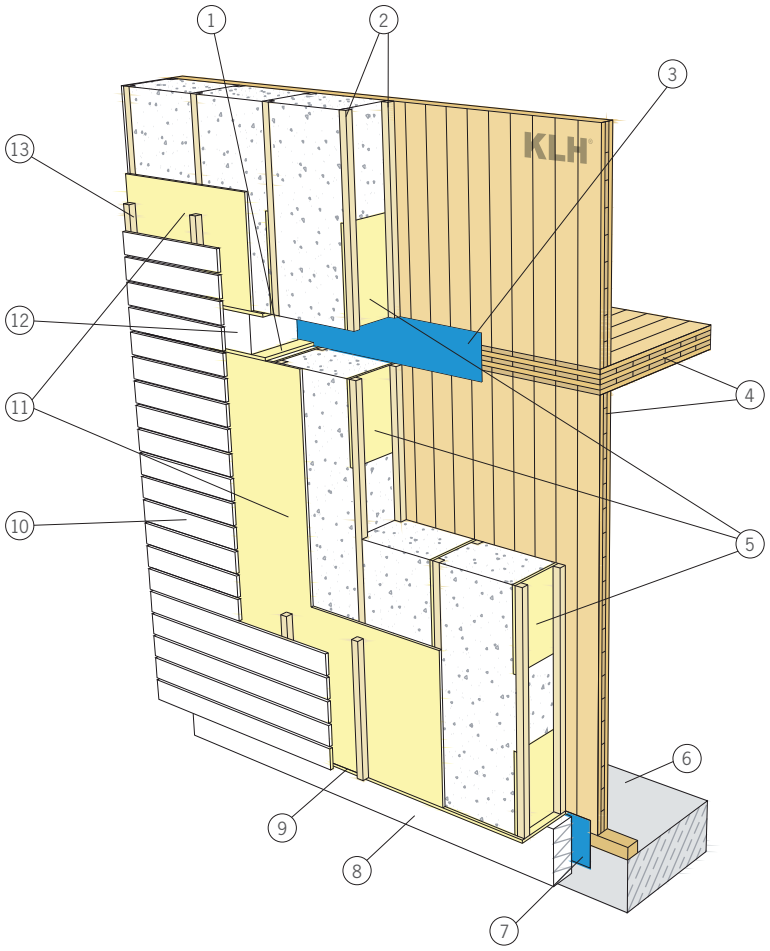
01 EXTERNAL WALL STRUCTURE

1.1 WITH WOOD CLADDING AND SOFT INSULATION



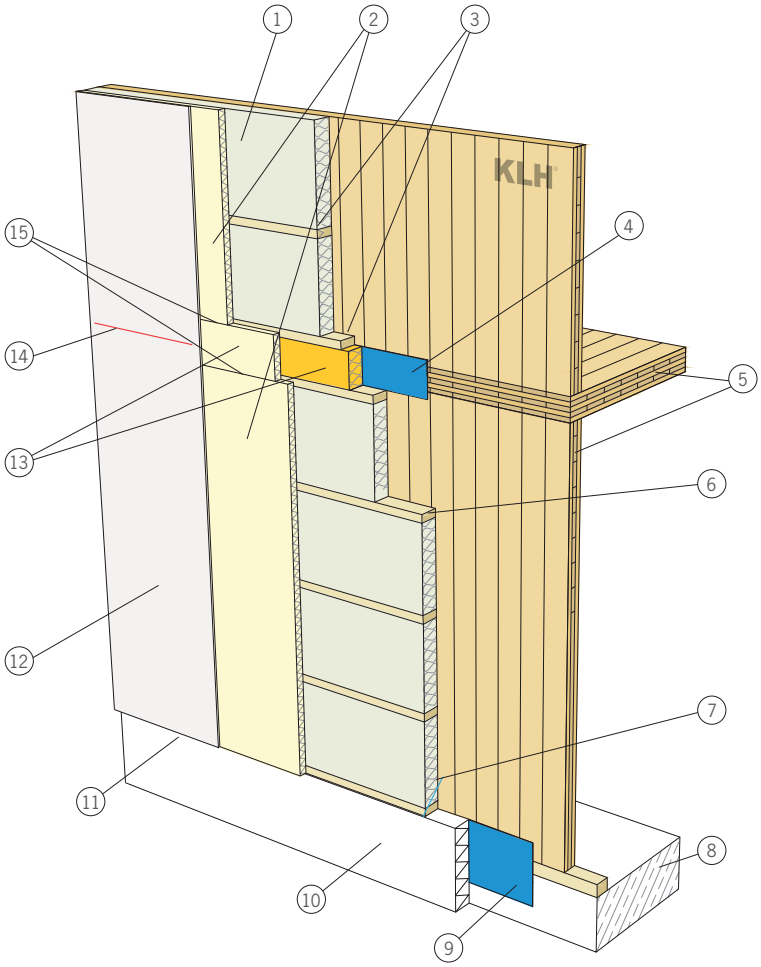
1. 2-layer insulation panel construction is recommended to avoid negative effects caused by possible joints
2. E.g. vertical interior laths if the rear ventilation laths run vertically
3. Insulation material of choice - in case of high fire protection requirements we recommend rock wool. Otherwise also hemp, cellulose, soft fibre or similar are possible. Insulation panels can be soft - the cladding supports the load of the facade (permanent vertical loads, wind loads)
4. Taping of the joints in the ceiling area - depending on the size of the joints (wind-sheltered area)
5. KLH® wall and ceiling elements depending on static requirement
6. For heavy facades insert screws at an angle - the facade should be statically proven (wind, facade weight)
7. Concrete foundation
8. Extend sealing over the horizontal joint
9. Base insulation according to the requirements - e.g. XPS insulation in the splash-water area
10. Windproof and water-repellent layer dependent on the design of the facade. The more open the facade the more important is this layer - with open joints take the UV resistance into account
11. Screw connections depending on the static requirement - watch for wind suction in the corner area
12. E.g. wood facade
13. With pre-fabrication of the facade construction we recommend the subsequent installation of the insulation in the joint area
14. Transverse laths as an intermediate structure

1.2 WITH HOLLOW BODIES FOR BLOW-FILLING WITH CELLULOSE INSULATION



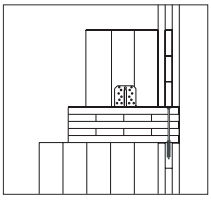
1. Upper finish of the hollow bodies, e.g. with OSB panels; by this means walls can also be pre-fabricated
2. Lath construction for the production of the hollow body - 5/5 laths are usually sufficient, depending on the used screws/nails and the thickness of the OSB plate
3. Tape the joints in the ceiling area or respectively seal the joints between the KLH® components
4. KLH® wall and ceiling elements depending on static requirement
5. Fix vertical OSB panel strips according to the static requirements and connect with the laths (vertical loads, wind suction). Do not run the vertical OSB panel strips continuously - this improves the U-value and reduces the so called thermal bridges (important for passive houses)
6. Concrete foundation
7. Thoroughly tape the joints also in the transition to the concrete, connection to the waterproof area on the concrete
8. Base insulation according to the requirements - e.g. XPS insulation in the splash-water area
9. Lower finish of the hollow body, e.g. by means of OSB panels
10. Horizontal cladding
11. External, continuous finish, e.g. OSB, soft fibre panel
12. With a pre-fabrication close the insulation strips in the joint area afterwards
13. Laths for the rear ventilation layer

1.3 WITH RENDERED FACADE ON PLASTER BASE LAYER

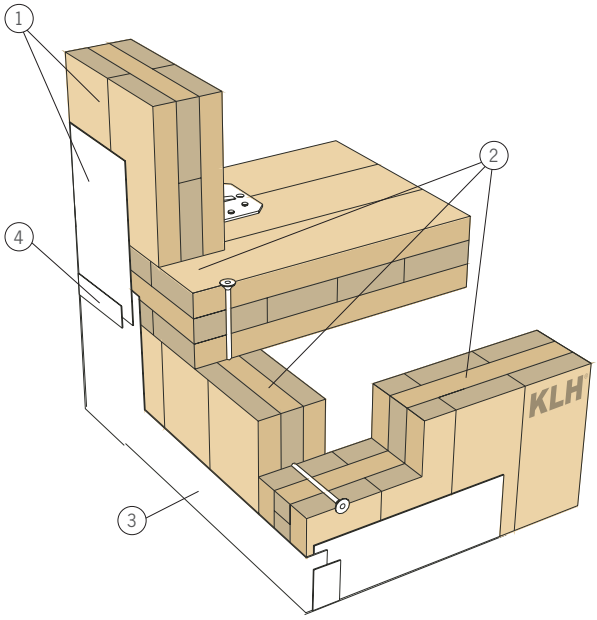


1. Soft insulation between the wood cladding
2. Adjust plaster base layer to the cladding distance
3. Wood cladding according to static requirement. Watch out for vertical loads (plaster and plaster base layers are rather heavy) and wind suction
4. Tape the joints in the ceiling area or form the joints between the KLH® components appropriately - adjust to the plaster system (vapour diffusion)
5. KLH® wall and ceiling panels depending on static requirement
6. Cladding as basis for the plaster base. If necessary include second cladding layer (passive houses)
7. Use angled screw connections due to the weight of the plaster base layers
8. Concrete foundation
9. Thoroughly tape the joints also in the transition to the concrete, connection to the waterproof area on the concrete
10. Base insulation according to the requirements - e.g. XPS insulation in the splash-water area
11. Protect the edges with appropriate sections (depending on the plaster system)
12. Adjust the external plaster to the entire wall construction (vapour diffusion)
13. With pre-fabrication add the insulation layer and the plaster base on site
14. Where appropriate provide settlement joint in the ceiling area
15. Fully line the joints between the plaster base panels to reduce possible settlements

02 AIR TIGHTNESS - SEALING THROUGH HEAT TRAP FITTING

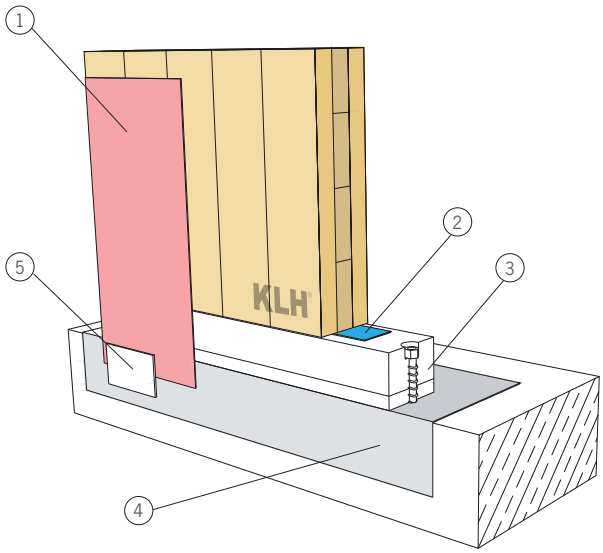


2.1 CEILING JOINT



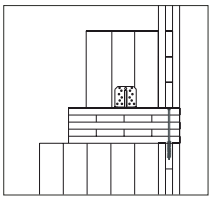
1. Airtight external walls with externally attached film (vapour tightness of the film is adjusted to the further wall structure)
2. In this design the joints can be finished without sealing tapes
3. A heat trap fitting, e.g. in a permeable material, adjusted to the further wall structure (e.g. airtight layer)
4. Joint taping

2.2 BASE CONNECTION

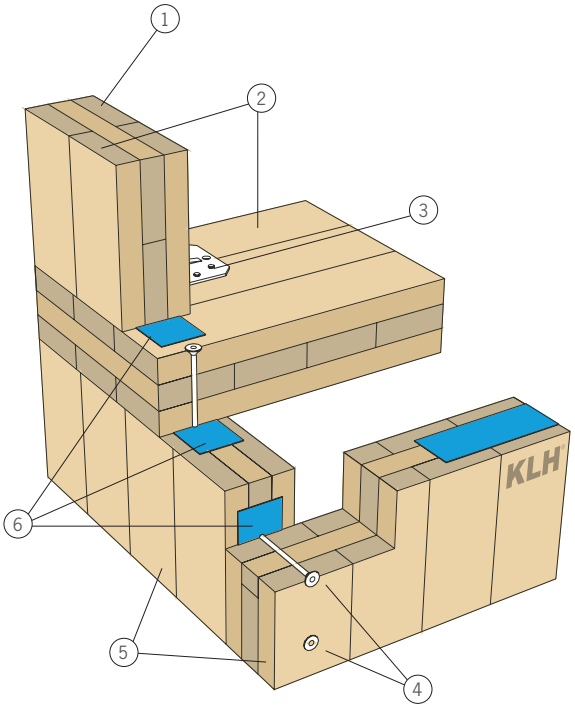


1. Facade construction with heat trap fitting - windtight, permeable film is attached to the entire area of the external panel surface
2. If a special sealing layer is attached to the outside, a sealing tape is not absolutely necessary
3. Wood sills offset in the mortar bed (tolerance compensation)
4. Sealing of the floor slab
5. Connection of the seal layers with approved products - coordinate with the materials used

03 AIRTIGHT DESIGN OF THE CONSTRUCTION – AIR TIGHTNESS

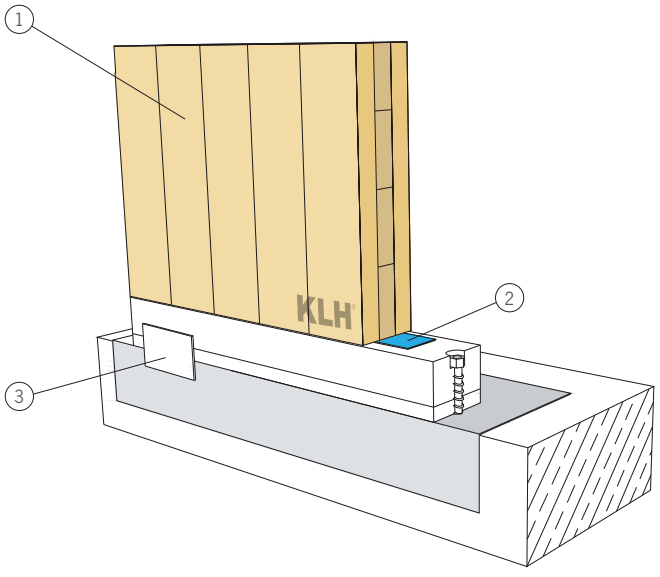


3.1 AIRTIGHT EXTERNAL WALLS WITHOUT ADDITIONAL FILMS - CEILING JOINT



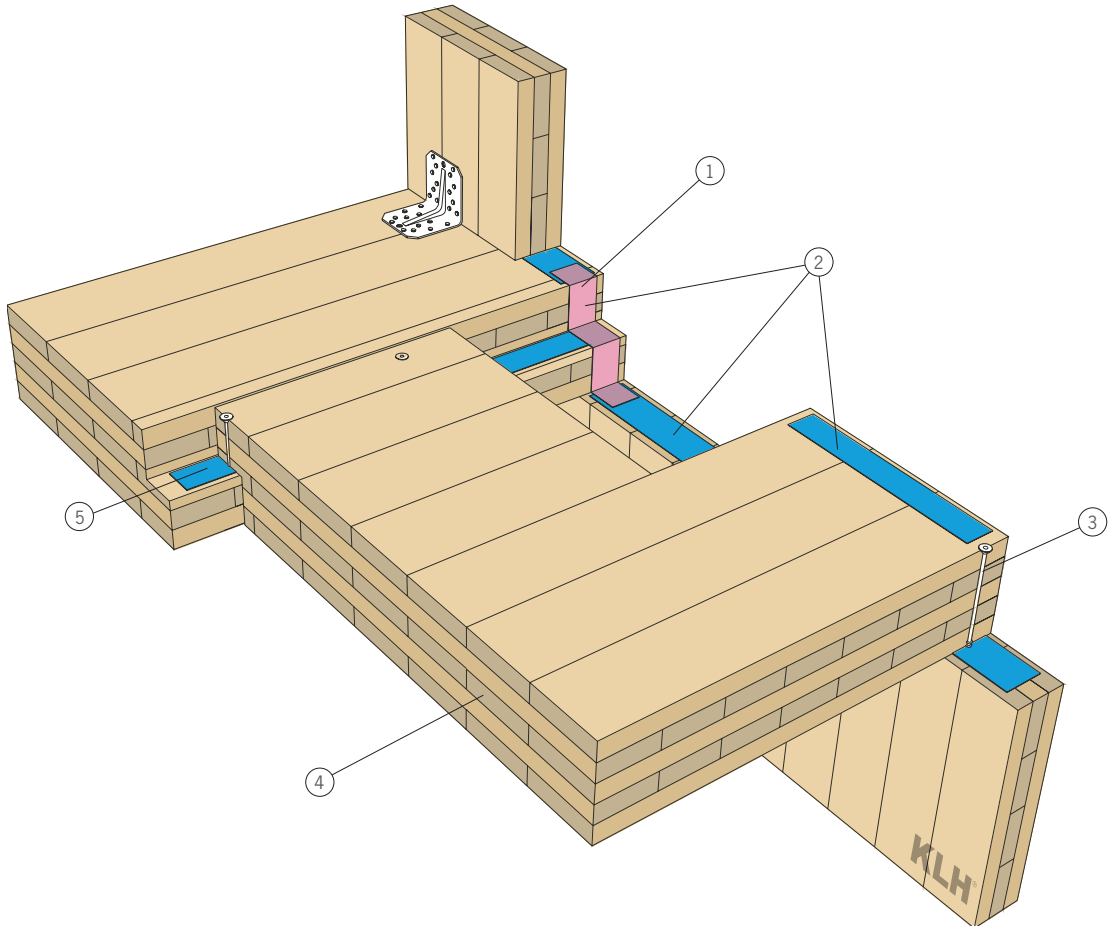
1. Walls of non visibility quality made out of 5-layer panels (KLH 5s NSI) or walls of industrial visibility quality made out of 3-layer panels (KLH 3s ISI)
2. KLH® wall and ceiling panels depending on static requirement
3. For example BMF angles for the statically effective connection between wall and ceiling
4. Corner connections of the KLH® panels by means of wood screws to achieve sufficient pressing of the joint tapes - if necessary also statically effective
5. KLH® panels according to static requirement
6. Insert joint tape at all panel joints - design for the ceiling joint see also 3.3 Sealing of the ceiling cross joints

3.2 BASE CONNECTION



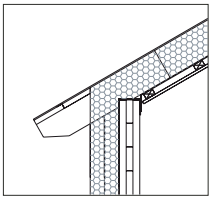
1. Facade construction without vapour retarder - the KLH® panel is considered as inner airtight layer. Provided that the glue lines are not penetrated and joints are sealed accordingly
2. Joint tape highly important as connection for the sill with the wall
3. Connection of the seal layers with approved products (adjust to the different materials)

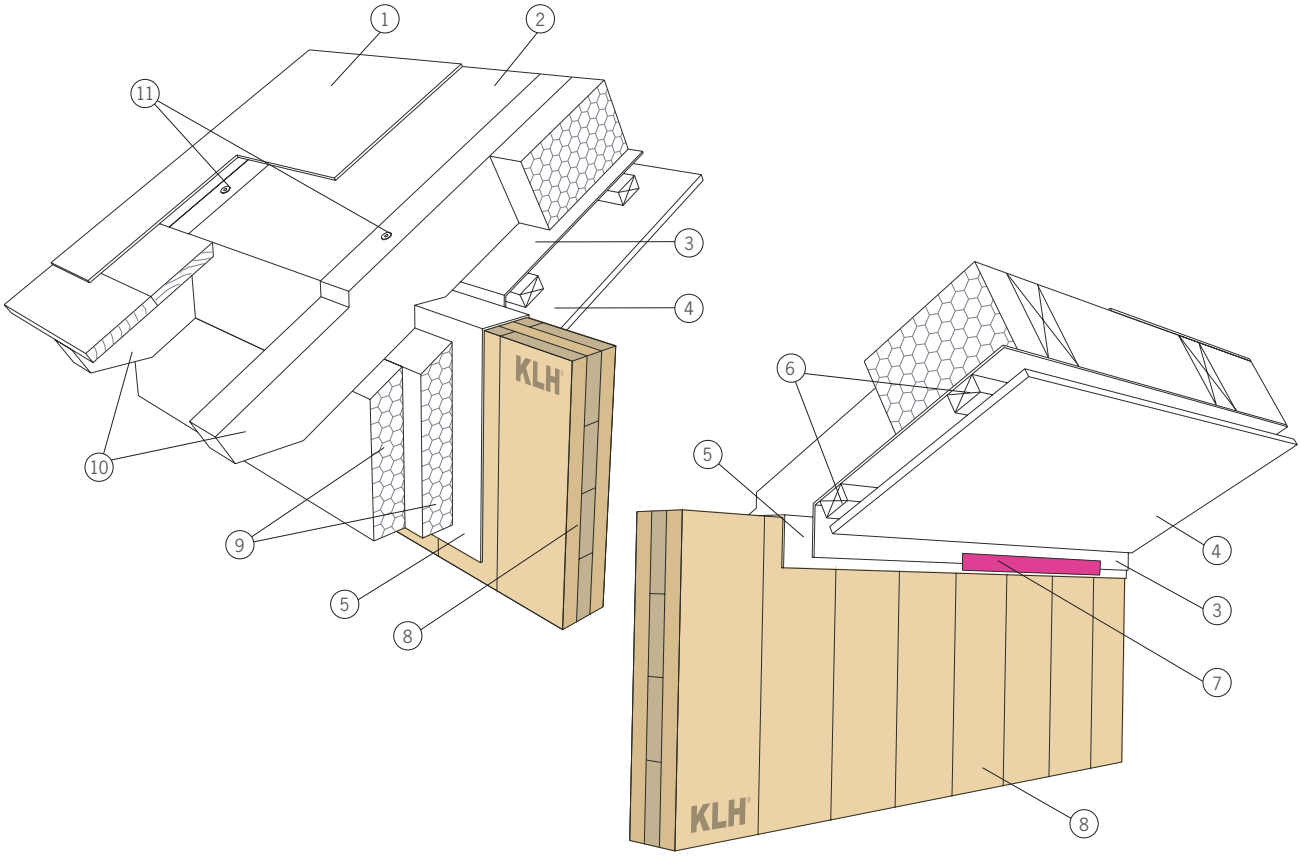
3.3 SEALING OF THE CEILING CROSS JOINTS



1. Arrange sealing strips laterally to the stepped profile
2. Airtight KLH® shell construction - use of sealing strips as long as no vapour retarder or heat trap fitting is installed
3. Screw connections according to statics
4. KLH® ceiling panels according to static requirement
5. Joint tapes if airtight joint is necessary

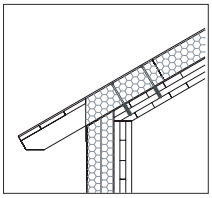
04 KNEE WALL FOR RAFTER ROOF

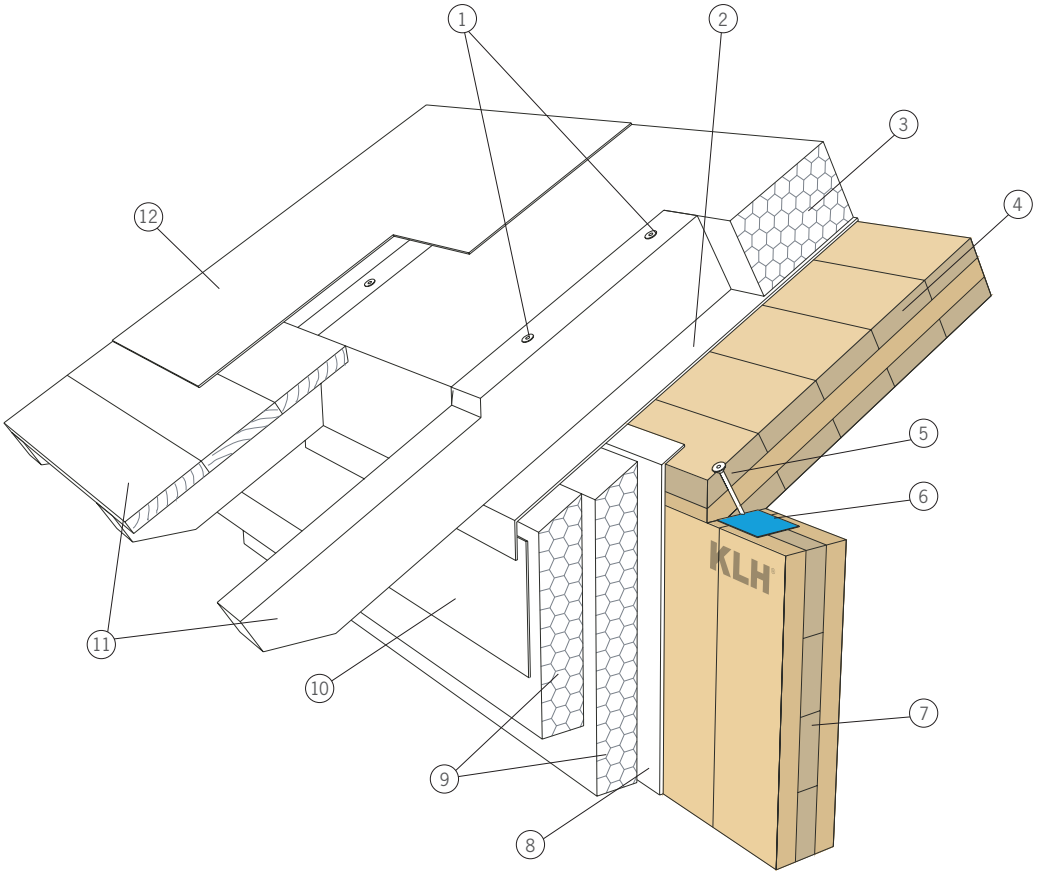




1. For example underroof membrane - further roof construction conventional
2. Thermal insulation
3. Vapour barrier
4. Soffit - e.g. plasterboard
5. Vapour retarder
6. Sub-structure
7. Taping of the vapour barrier of the roof with the vapour retarder of the wall
8. KLH® panel according to static requirement
9. 2-layer thermal insulation
10. Rafter according to static requirement
11. Anchoring of the rafters against suction, define connection of the roof panel as necessary

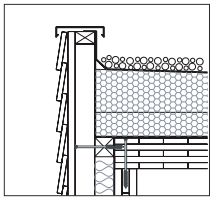
05 PROJECTING ROOF CONSTRUCTION FOR PITCHED ROOF

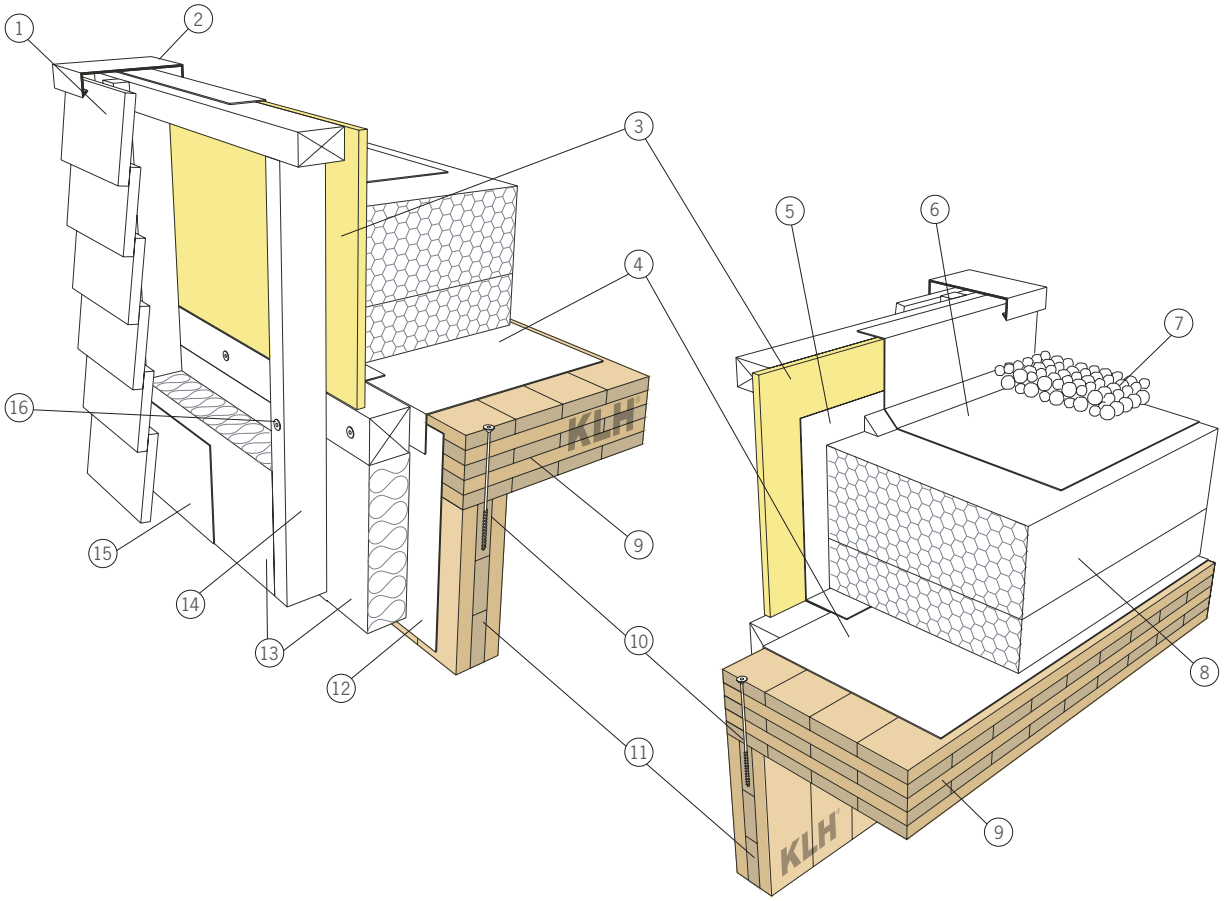




1. Connection of the rafter head according to static requirement
2. Vapour barrier
3. Thermal insulation
4. KLH® panel according to static requirement
5. Screw connection according to static requirement
6. Where appropriate insert joint tape
7. KLH® panel according to static requirement
8. Vapour retarder
9. 2-layer thermal insulation
10. Wind proofing
11. Rafter head and formwork for projecting roof construction
12. E.g. underroof membrane - further roof construction as necessary

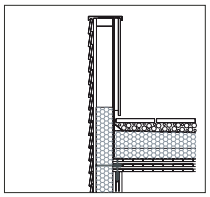
06 ATTIC DESIGN FOR FLAT ROOF

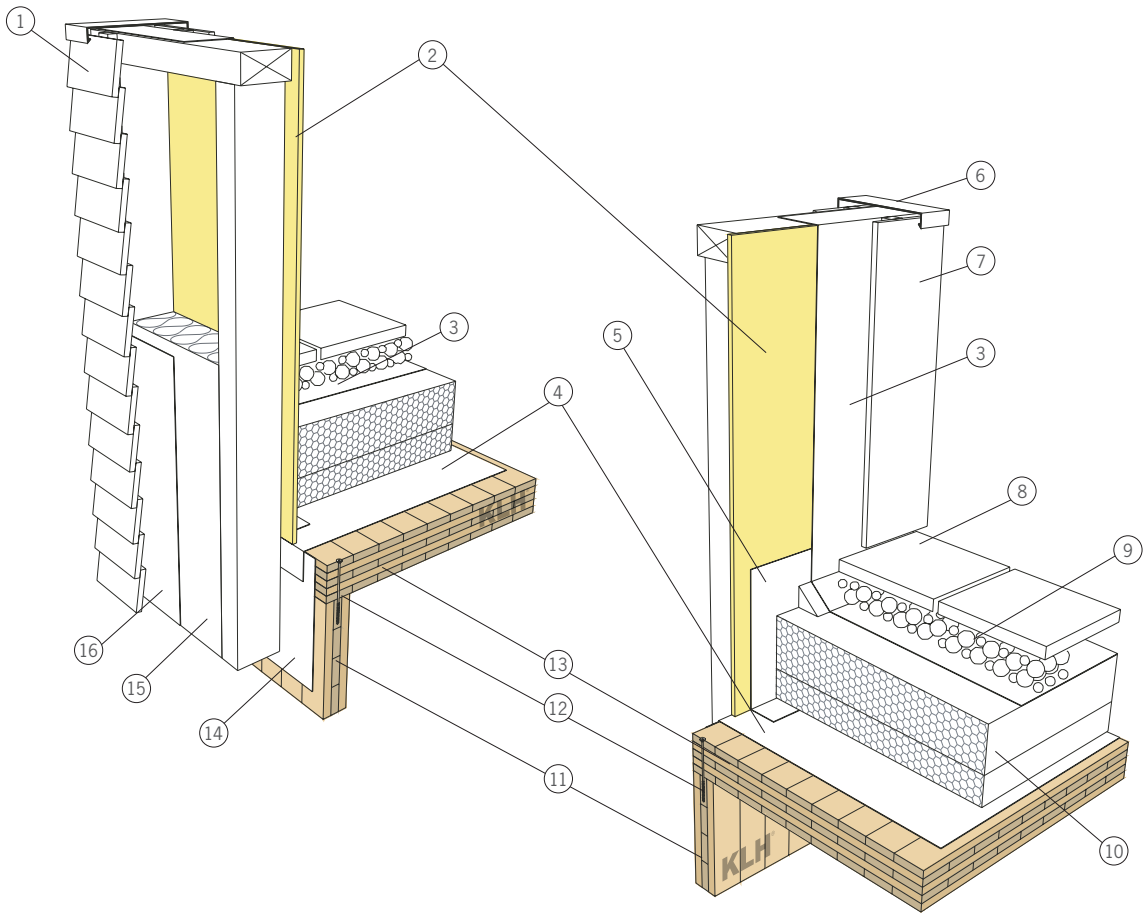




1. Rear ventilated facade
2. Sheet covering
3. For example OSB panel 15 mm as a foundation for the seal
4. Vapour barrier
5. Suspension of the vapour barrier for emergency sealing during the construction phase
6. Moisture sealing
7. Gravel filling
8. Thermal insulation on the slope
9. 5-layer KLH® panel according to static requirement
10. Screw connections according to statics
11. KLH® panel according to static requirement
12. Vapour retarder
13. 2-layer thermal insulation
14. Vertical cladding of the supporting structure for the attic
15. Wind proofing
16. Anchoring of the cladding against suction

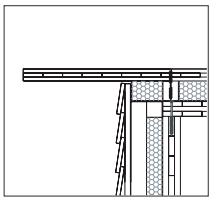
07 HANDRAIL DESIGN ON WALK-ON ROOF (CLOSED DESIGN)

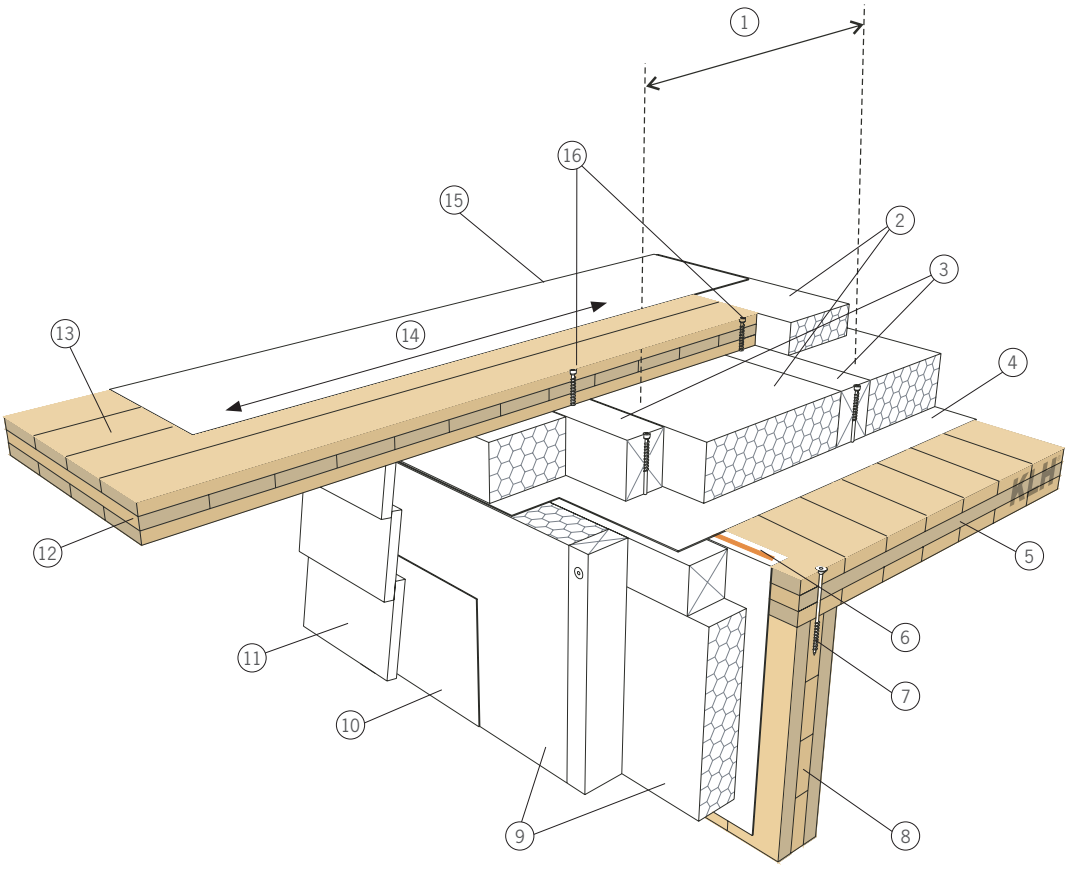




1. Back ventilated facade
2. OSB panel 15 mm as a sub-structure for the sealing layer
3. Moisture sealing
4. Vapour barrier
5. Suspension of the vapour barrier for emergency sealing during the construction phase
6. Sheet covering
7. Panelling
8. Panel cladding
9. Gravel filling
10. Thermal insulation on the slope
11. KLH® panel according to static requirement
12. Screw connections according to statics
13. 5-layer KLH® panel according to static requirement
14. Vapour retarder
15. Thermal insulation
16. Wind proofing

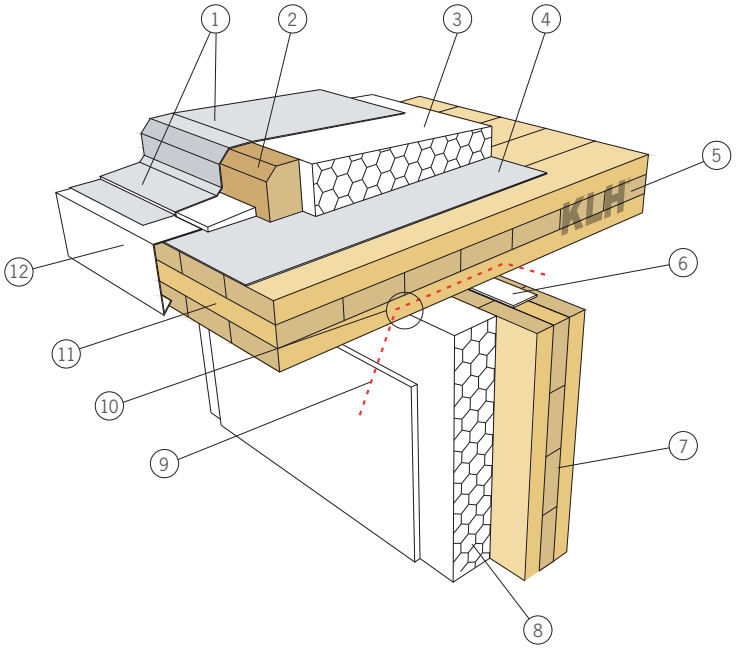
08 PROJECTING ROOF CONSTRUCTION FOR FLAT ROOF



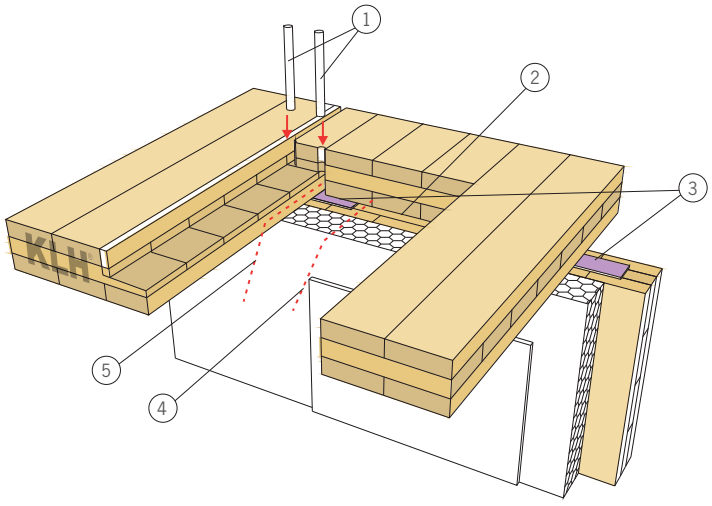


1. Anchoring length at least 50% of the cantilever length or according to static requirement - tension anchoring is of decisive importance
2. Thermal insulation
3. Intermediate construction screwed together with underlying ceiling
4. Vapour barrier with aluminium insert
5. KLH® roof element according to static requirement
6. Joint tape
7. Screw connections according to statics
8. KLH® wall element according to static requirement
9. 2-layer thermal insulation
10. Wind proofing
11. Back ventilated facade
12. Panel soffit with cladding or with KLH® solid wood panels in visibility quality; implement edge termination as necessary
13. KLH® panel according to static requirement, with corner overhangs at least 5 layers
14. KLH® solid wood panels, e.g. laid in the slope
15. Moisture sealing
16. Anchoring of the projecting roof according to statics

09 OVERHANGING ROOF PANELS - TIGHTNESS OF THE CONSTRUCTION

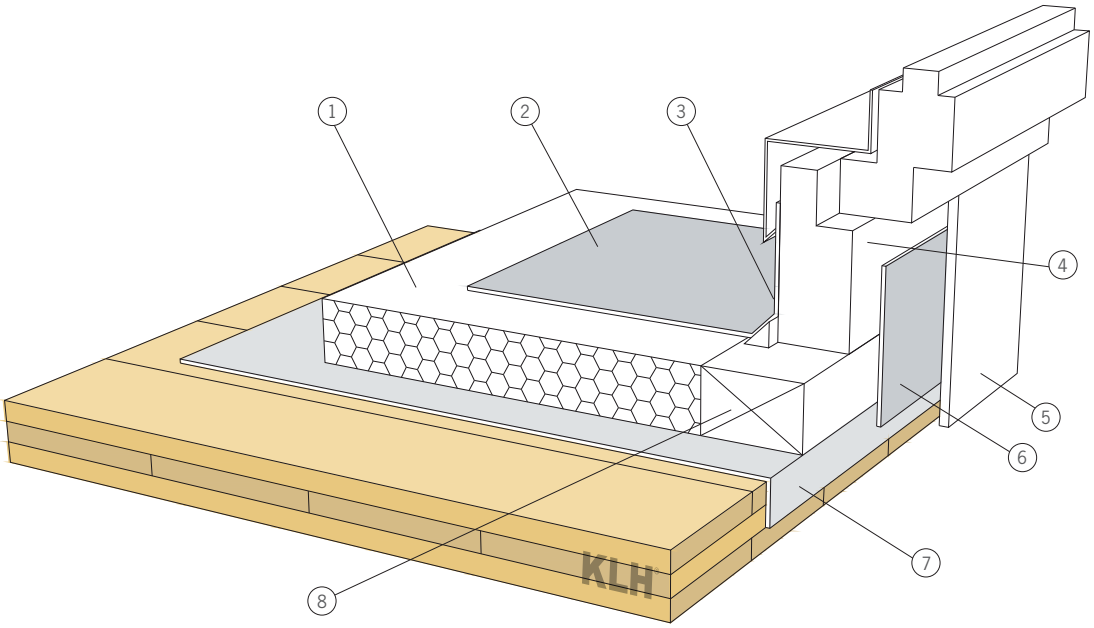


1. Roof membrane
2. Margin strip for fixing of the insulation
3. Slope wedge insulation
4. Vapour barrier
5. KLH® roof element according to static requirement
6. Wide joint sealing if no vapour retarder layer has been used at the wall
7. KLH® wall element according to static requirement
8. Example - insulation with external rendering
9. Weakness - possible airway along the joints (between boards and panels and along the stepped profile)
10. Risk of moisture damage through condensing humid interior air
11. KLH® roof element pulled outwards for use as direct projecting panel
12. Edge sheeting



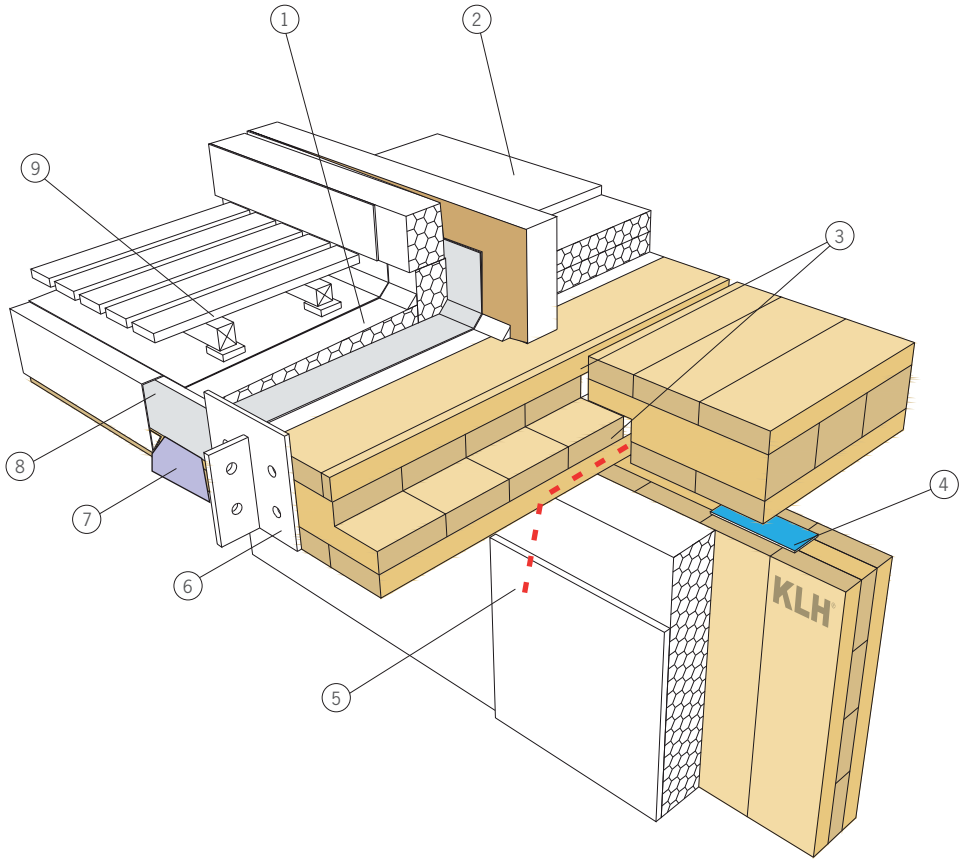
1. Closure of the joints absolutely necessary, e.g. glue wooden dowels into the joints
2. Insert joint tape - no tight joint without joint tape
3. Wide sealing strips - for example for the compensation of unevenness
4. Possible airways also in the board joint area. Can only be prevented with living area surface!
5. Possible airway along the panel joint (e.g. at the stepped profile) - cannot be fully avoided!

10 MOUNTING OF THE ROOF-TOP WINDOWS – FIRE SMOKE VENTILATION



1. Roof insulation panels
2. Roof membrane
3. Suspension of the roof membrane
4. Insulated add-on element (see also rule details of the individual manufacturers)
5. Internal cladding
6. Connection between the vapour barrier and the inside of the insulated add-on element
7. Vapour barrier of the roof area pulled inwards
8. Attachment elements - depending on skylight dome attaching element (height compensation); often serves also as cross beam (for thin panels often necessary)

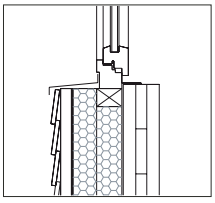
11 OVERHANGING BALCONY SLABS - TIGHTNESS OF THE CONSTRUCTION

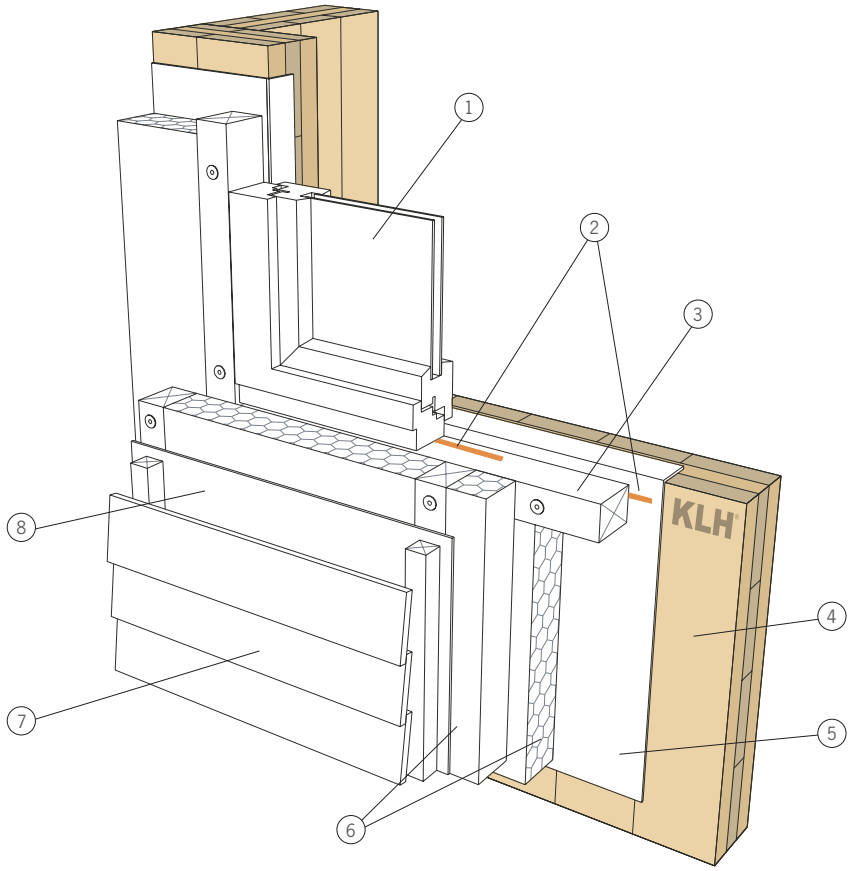


1. Slope with slope wedge insulation
2. Internal floor structure
3. Seal joints between the panels - possibly check prior to the rendering works
4. Continuous, wide sealing strip
5. Possible airway along the stepped profile joint
6. On the front side a handrail connection is only possible for thick panels (statics)
7. Seal with drip sheet
8. Edge sheeting
9. Wood covering in the terrace area

12 WINDOW ABUTMENT

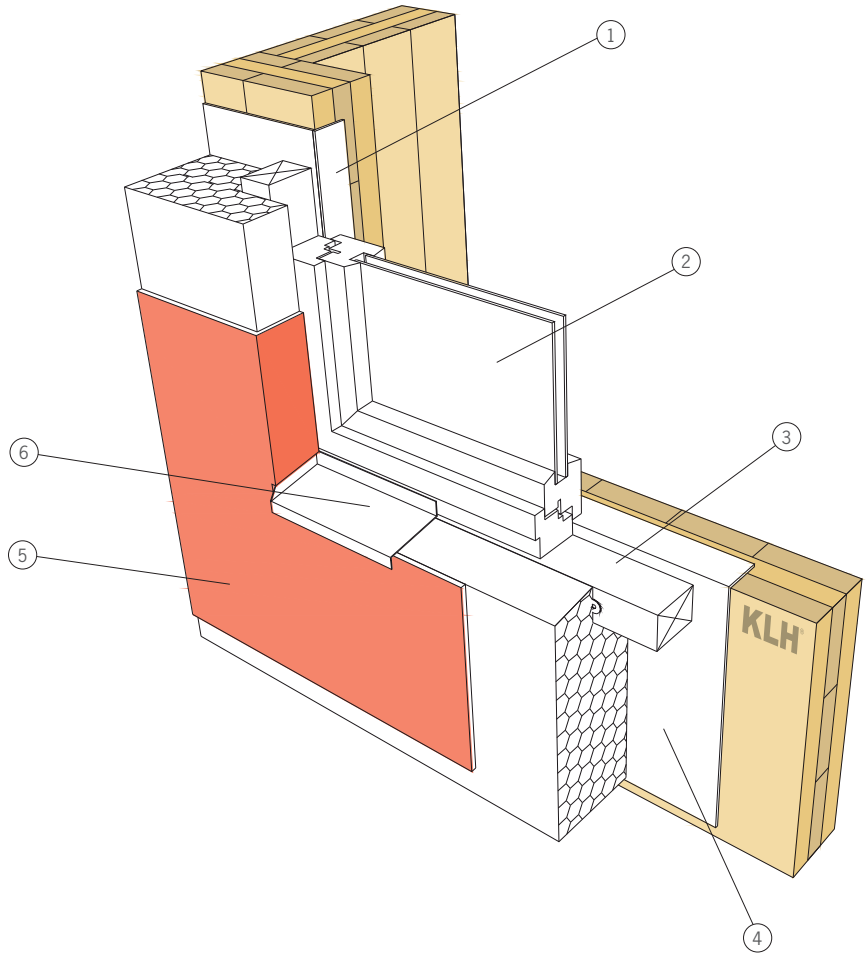
12.1 EXTERNAL WALL WITH BACK VENTILATED FACADE





1. Window or door elements
2. Joint tapes to seal the windtight layer – installation of the windows/doors according to the information of the manufacturer or according to standard
3. E.g. screw window frame to the wall
4. KLH® as a wall element
5. Possible heat trap fitting or vapour retarder layer - adjusted to the further wall structure
6. E.g. wall insulation, 2 layers, in between wooden cladding
7. Back ventilated, wooden facade
8. Wind tightness according to the type of insulation

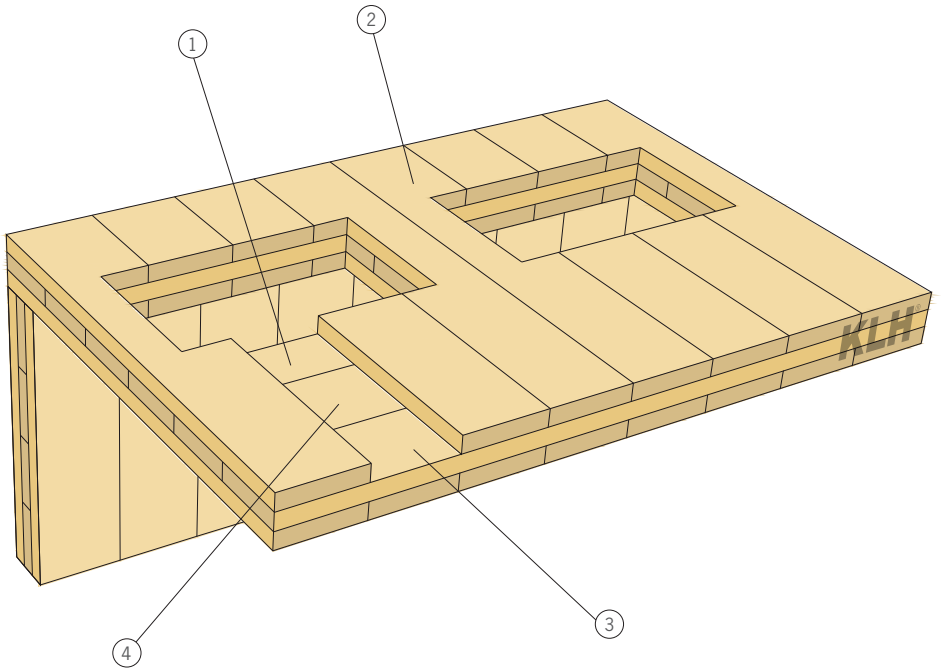
12.2 EXTERNAL WALL WITH RENDERED FACADE



1. Vapour retarder - pulled inwards to seal window
2. Window
3. Sub-frame
4. Vapour retarder, adjusted to the structure of the facade (with dense plaster a variable vapour retarder may be necessary)
5. Rendered facade
6. Window sill on the slope

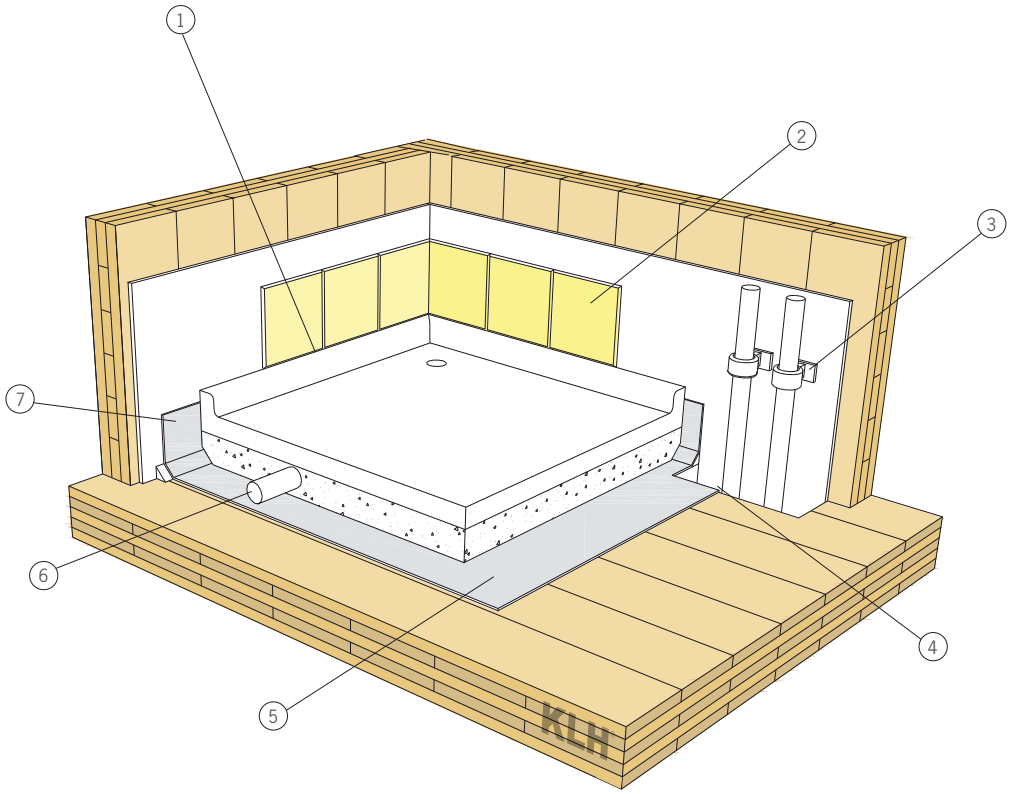
13 INSTALLATIONS - WET ROOMS

13.1 SLOTS AND OPENINGS FOR INSTALLATIONS



1. Slot on the upper side (if necessary - e.g. for drainpipes if more longitudinal slope is necessary)
2. If openings for cables are arranged transversely to the ceiling's direction of span, they should continuously be subdivided with runners - wide and continuous slots are only possible without additional measures for higher panel thicknesses
3. Slots on the upper side in the opening area only up to the first transverse layer - otherwise interruptions of the cross span strength of the element in the opening area
4. Slot - check for statics

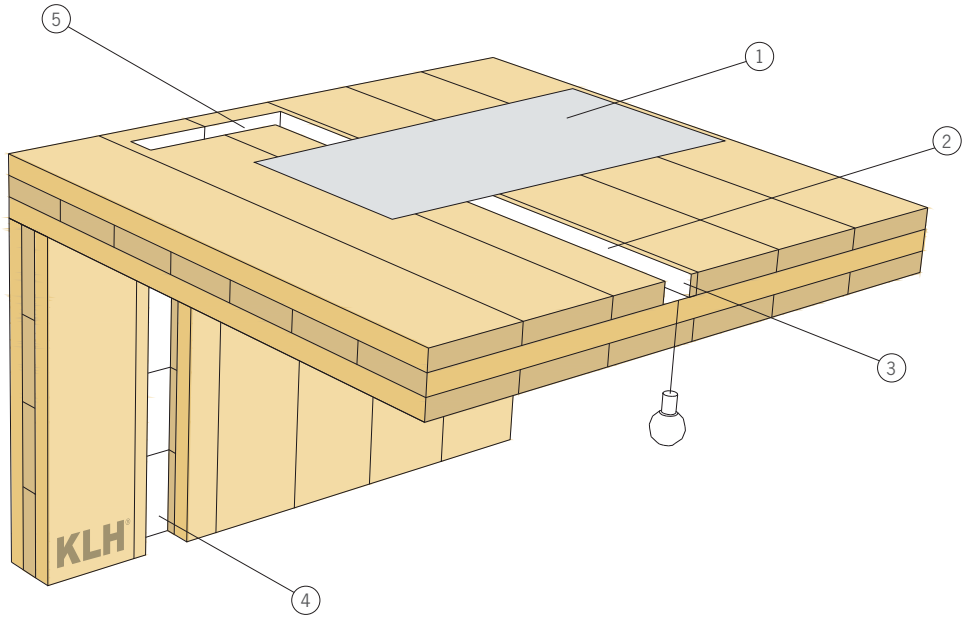
13.2 WET ROOMS



1. Caution: Joints between tiles are generally not tight! Joints, e.g. between shower tray and tiles (silicone joints), are maintenance joints and have to be checked regularly!
2. E.g. tiles on plasterboard panels (suitable for wet rooms); in splash-water areas (bath tub and shower areas) with additional sealing layer between the tiles and the plasterboard panels (also in the floor structure: horizontal sealing underneath the tiles - the seal behind or underneath the tiles is not shown in the drawing)
3. Mounting of the pipes is acoustically insulated
4. Pull the seal layers into the installation shaft – in the event of water damage this can be detected on the underlying shaft wall
5. Single seal layer - directly on the KLH® solid wood panel
6. Do not screw the pipes to the ground! Possibly tape to the ground and fix with bundled filling material!
7. Suspension of the sealing layer on all sides - even in the door area

14 ELECTRICAL INSTALLATION

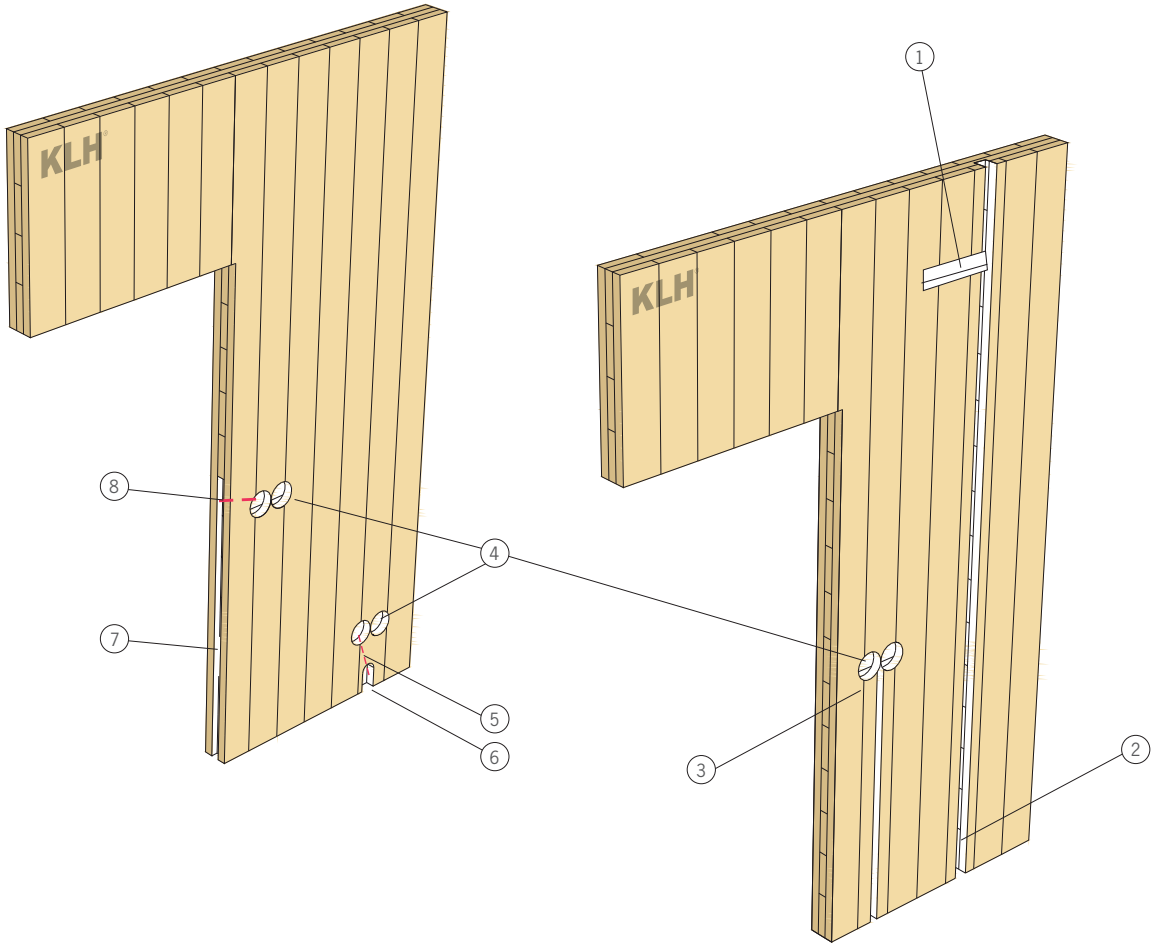
14.1 SLOTS IN ROOF PANELS WITH EXPOSED WOOD SOFFITS



1. Mounting of the vapour barrier above the slot and the cables is possible – avoid penetration
2. Slot with surface area only possible in direction of the cover panels
3. For roof elements on the visible surface, cut out a recess for the cables on the surface – generally only necessary for light flux (also suitable for external walls with visible surface on the inside)
4. Vertical slots only in top layer and only in fibre direction of the cover panels - check statics in the area of doors and windows
5. Short lateral slots generally possible in the supporting area

14.2 SLOTS AND BORES IN THE VISIBLE WOOD SURFACES

14.3 SLOTS AND BORES IN NON-VISIBLE WOOD SURFACES



1. Lateral slots - only possible in limited cases, check statics
2. Vertical slots - only in direction of the cover layer
3. Minimum distance to the edge 10 cm
4. Bores for sockets and switches - the edge distance of the socket bores depends on the load of the wall element
5. Bores on the front sides of the walls (from underneath)
6. Small niche/hole in the surface for cable routing (in the floor structure)
7. Slot in the door reveal
8. Bore from the door reveal to the switch bores

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NOTES

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