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MOISTURE MANAGEMENT GUIDE

IMPRINT

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01 INTRODUCTION

Water is the number one cause of damage to buildings. Good moisture management not only significantly extends the service life of a building, it is also an important factor for building insurance coverage.

Note:
Bear in mind, wood reacts quickly to moisture, damage depends on reaction (time).

There needs to be some sort of concept for moisture management during the construction phase. This should contain on-site handling, time scheduling and taking protection measures.

For critical areas concerning the building design, there is technical literature containing details and basic design principles (see building physics, flat roof, plinth, wet rooms, etc.).

TOP PRIORITIES

- No standing water
  (plinth area, ceilings, roofs, balconies and terraces)
- No excessive moisture in installed materials
- Recognisable drainage in the event of water ingress
- Maintainable/checkable wearing parts (drains, joints, connections, etc.)
- Correct building physics design of components (diffusion and convection)

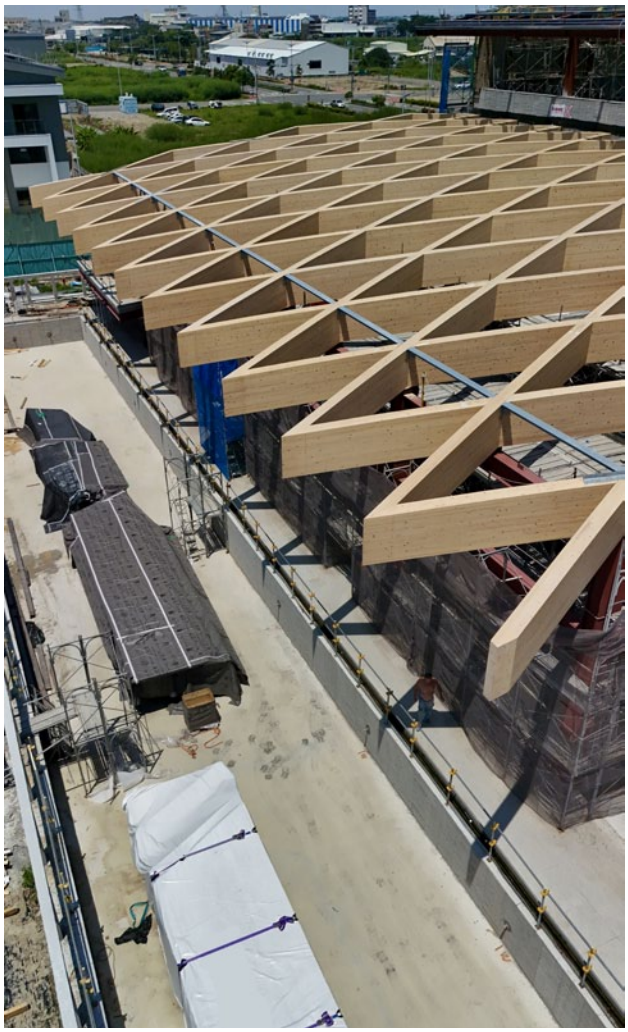


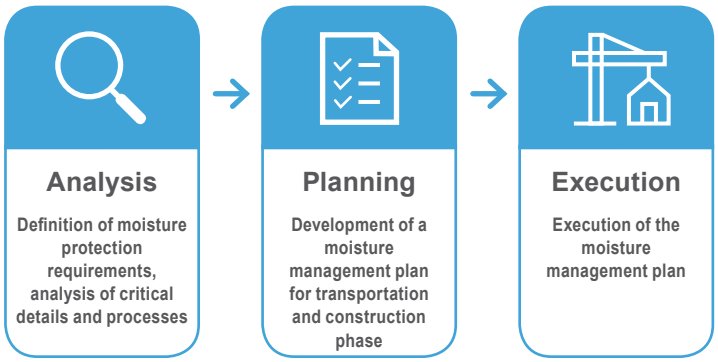
Figure 1. KLH packages waiting for installation

Figure 2. Floor panel lifting

02 MOISTURE MANAGEMENT

Moisture management should be part of the construction site concept, the schedule for building sections and change between trades.

It is crucial to assess which requirements have the most impact on your construction site and plan accordingly.



This should include, but is not limited to:

- Transportation
  Give information to prepare panel handling, storage and a timetable
- Storage
  Suitable storage areas and tarpaulins are needed
- Protection during construction
  How and which components need protection (e.g. visible surface)
- Temporary drainage system
- Critical details
  Especially horizontal panels and end grain parts
- Timing for wood moisture measurement
  (e.g. after weather events and before next trade begins)
- Management in case of water ingress
  (preventing long-term damage and possible repairs for visual quality)

Also bear in mind that:

It must be clear who will keep track of the water management and check if the execution is according to plan.

The additional costs need to be considered in the construction site costs.

Construction site processes do not always follow the schedule; weather conditions can change quickly and vary depending on the region and time of the year.

It is always better to be prepared and act quickly. Swift reaction is the most important thing to prevent costly repairs.

03 TRANSPORT AND STORAGE

To ensure trouble-free transportation, the first step should be to check the KLH transportation conditions and/or contact technical support.

TRANSPORTATION

By truck

Conditions for transportation by truck

Container delivery

Conditions of transport for container deliveries

This determines the loading type according to element sizes and destination.

Wrapping and protection measures can depend on the means of transportation and the surface quality.

For onward processing after unloading, the type of loading dictates how much effort is required to get the panels installed, to storage or further transportation.

It also influences:

- Lead time
- Possible element size
- Loading sequence
- Lifting possibilities
- Wrapping and packaging options

Figure 3. Open package during loading

Figure 4. Closed package ready for transport

Figure 5. Truck ready for unloading

Ordered wrapping is not the same as the initial wrapping that covers the whole package.

As noted, this depends on the loading conditions and is not always the same. Ordered wrapping needs to be specified upfront and can also be an issue when it comes to border restrictions that require cargo inspection.

Figure 6. Ordered wrapping for smaller packages

Note:
Container transport is carried out in one of three container loading types mentioned below. Wrapping and packaging conditions after container transport are not consistent due to the different loading situations. Cargo inspections and possible treatment sometimes require opening the packages, leaving them in an unfit state for outdoor storage (example BMSB treatment, brown marmorated stink bug).

Figure 7. Package storage on site

There are 3 container loading types available

Figure 8. Horizontal with loading sledge-standard

Figure 9. Vertical single element loading for open top containers

Figures 10a. - 10b. Horizontal with loading sledge-light (stripes mounted on panel)

STORAGE

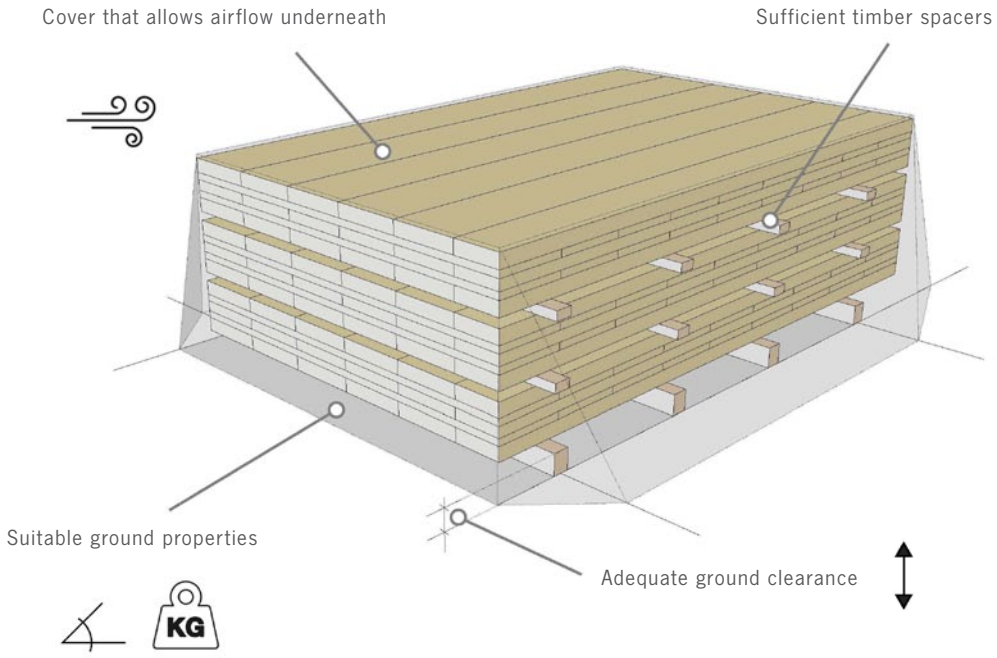
If elements are stored at the construction site:

- Ensure that the ground is dry and has adequate load-bearing capacity.
- Use timber spacers, align them vertically.
- Secure against toppling.
- Remove packaging to prevent condensation.
- Provide adequate ground clearance and tarpaulins to protect elements from rain, water spray, and rising damp.
- Use additional timber spacers to prevent creeping deformations when in extended storage.

Common problems after incorrect storage include yellowing and water stains on visible surfaces.

Figure 11. Stack of panels in the loading hall

Figure 12. Discolouration due to direct sunlight (UV)



04 PROTECTION DURING THE CONSTRUCTION PHASE

Preventive measures can help to simplify the construction process and offer basic protection against the effects of moisture and soiling on the construction site. However, caution is still required, especially during storage and in the presence of standing water.

KLH offers protective coatings and temporary protective films that can prevent negative weather influences for a certain period of time.

Note:
Only building waterproofing can permanently keep out standing water.

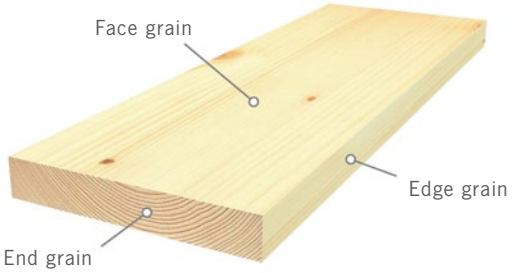
Coatings and temporary protective films have a limited protection period. Please refer to the product data sheets for more detailed information. However, the protective films can be used as a permanent airtight layer (without UV exposure).

Various precautions can be taken to provide protection at the construction site.

Note:
End grain absorbs water the quickest, in contrast to face or edge grain sides which can drain water away relatively quickly when inclined. Horizontal surfaces must always be protected if they are directly exposed to rain (water), as there is always a risk of standing water without a slope.

Figure 13. KLH Protect at construction site

Figure 14. KLH Protect at KLH production facilities



TEMPORARY ROOF SCAFFOLDING OR HALL

In exceptional cases, the entire building, construction section or floor is covered with a temporary roof, or a temporary hall is erected to produce prefabricated parts and modules.

Figure 15. Temporary roof scaffolding, Berlin

COVERING THE INDIVIDUAL PARTS

In most cases, the individual parts are covered as required. Visible surfaces must be adequately protected.

Preventive measures can already protect a large part of the surfaces.

Transitions, openings and joints still need to be sealed, and a functioning drainage system established.

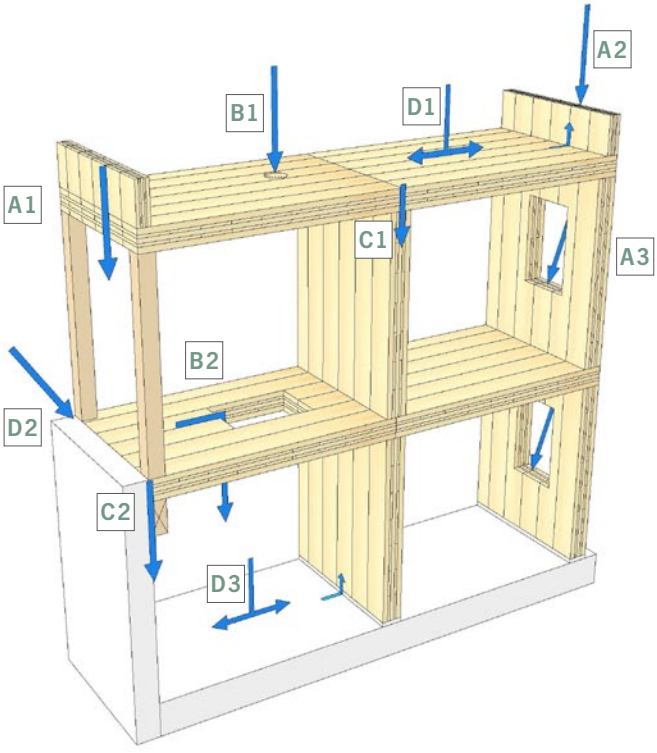
Figure 16. Protected construction site, Slovenia

A End grain
at the top or side, is quite vulnerable

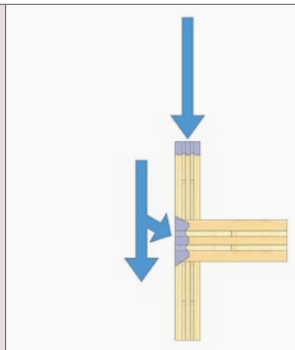
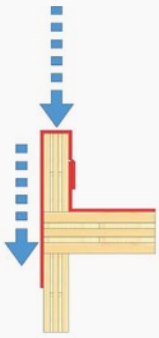
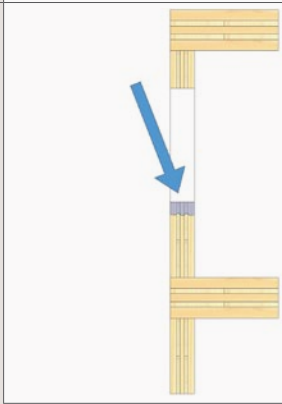
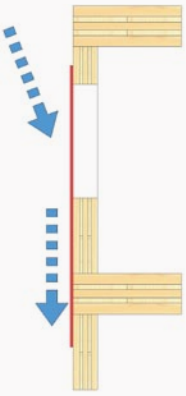
B Openings
conduct water further and open additional end grain parts

C Joints
between horizontal elements or component connections allow water ingress

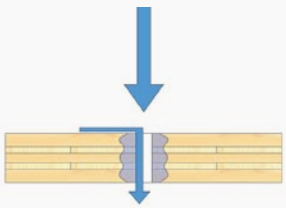
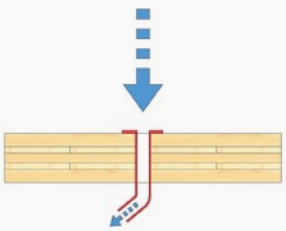
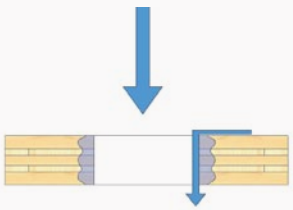
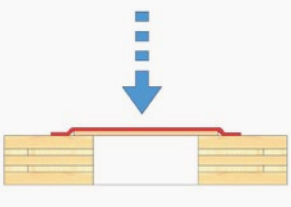
D Horizontal elements
conduct water to the end grain of walls and columns



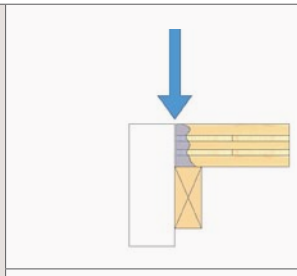
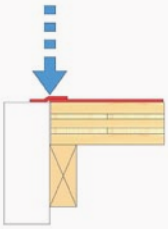
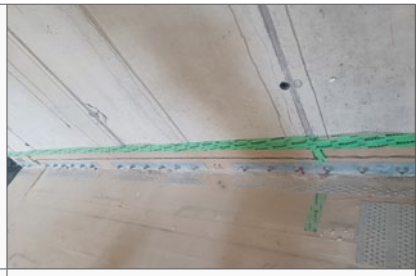
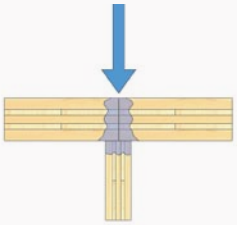
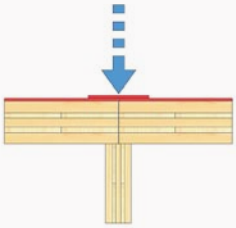
End grain

A1 + A2			
	Exposed end grain	Protected	Figure 17. Covered attica
A3			
	Exposed end grain	Protected	Figure 18. Covered window with KLH Protect

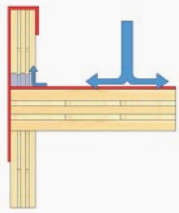
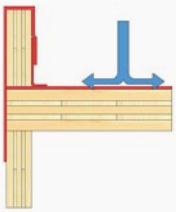
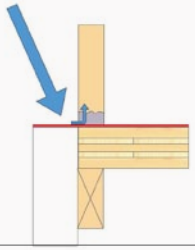
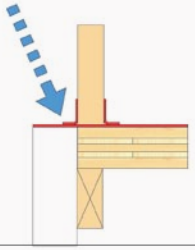
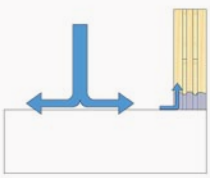
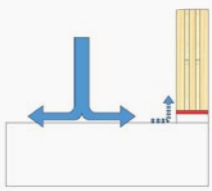
Openings

B1			
	Small opening	Possible drainage	Figure 19. Shaft openings used for temporary drainage
B2			
	Big opening	Walkable cover	Figure 20. Walkable cover with sealed edge

Joints

C1			
	Exposed joint	Protected	Figure 21. Joint to adjacent concrete sealed with tape
C2			
	Exposed joint	Protected	Figure 22. Joint between KLH Protect, sealed with tape

Horizontal elements

D1			
	Exposed end grain	Protected	Figure 23. Fully closed roof area with first protection layer
D2			
	Exposed column end grain	Protected	Figure 24. Column base covered with tape
D3			
	Exposed wall end grain	Raised wall protected	Figure 25. Raised wall base with tape sealing

DRAINAGE SYSTEMS

On horizontal surfaces, puddle formation is quite likely after a rain event. Without proper drainage, this can lead to high moisture ingress.

- Temporary drainage systems are needed to remove water immediately.
- Controlled drainage can prevent water ingress to vulnerable parts.

Figure 26. Shaft openings used for temporary drainage

Figure 27. Temporary drainage

OPENINGS

Most openings need to be covered for safety anyway. Keep in mind that a safety cover is not necessarily fit to prevent moisture ingress to vulnerable parts.

- Exposure of additional end grain that needs to be covered.
- Should be considered when planning the drainage route.

Figure 28. Secured and covered openings during construction

REMOVE STANDING WATER

Standing water can penetrate most temporary protection layers after a while. Without functioning drainage, this needs to be removed by hand immediately.

- Components without a slope must be freed from water accumulation.

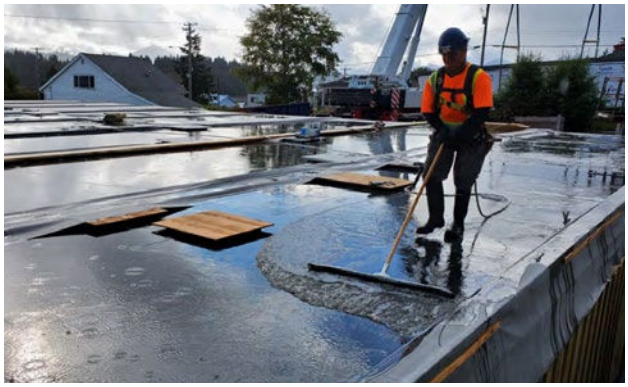


Figure 29. Removal of standing water from horizontal elements

END GRAIN PROTECTION

As noted before, an end grain absorbs water quite rapidly and can lead to visible stains. Especially on concrete elements, dirty water can be an issue.

- For walls, elevation, coating or covering are possible.
- For horizontal elements, covering is the best option.

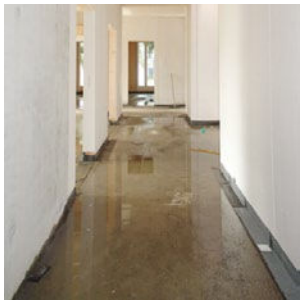


Figure 30. Elevated walls on concrete foundation

Figure 31. Exposed wall end grain on concrete foundation

05 WATERPROOFING AND MONITORING

WATERPROOFING

When waterproofing, it is important to test:

The underlying (wood) moisture

- Permanent waterproofing will not support any drying after installation, and the trapped moisture can lead to long-term problems in the supporting structure.

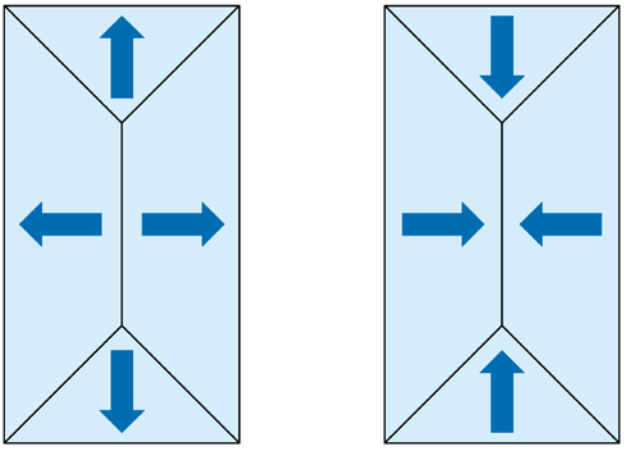
For leakage

- A lot of damage is related to faulty connections or damage that occurred during construction. A leakage test can help to detect that before closing the construction.

NO STANDING WATER

Maintain a minimal slope:

- A minimum of 2% is recommended.
- The deflection should be considered when planning the slope and drainage direction.
- The drainage system must follow the slope to work properly.

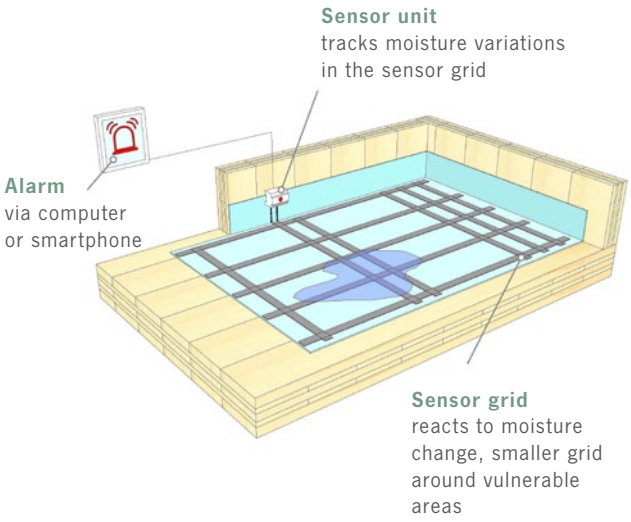


Possible drainage with ridge formation, e.g. due to sloped insulation

DRAINAGE

Recognisable drainage, also in the event of water ingress below the primary waterproofing.

- Maintainable/checkable parts (drains, joints, connections, etc.)
- Emergency drainage, decoupled from the regular drainage system
- Secondary layer that leads to a visible outlet (e.g. façade, shaft, weep hole)



MONITORING

There are passive and active monitoring options.

- Used primarily for flat roofs and wet rooms
- Passive monitoring, e.g. via weep holes, is low in cost and easy to maintain
- Active monitoring via sensors is becoming more necessary (faster response, remote monitoring)
- Possible utilisation during the construction phase, early detection (e.g. weekends or holidays)

06 RISKS OF MOISTURE INGRESS

Besides the long-term structural damage that high wood moisture can cause, there is a risk of stains and discolouration on the surface even after a single, brief occurrence of water ingress.

Surfaces with visual coatings are especially sensitive to water stains.

There are no perfect solutions for removing stains and discolouration!

High moisture ingress can lead to:

- Deformation (particularly relevant for millings)
- Increased moisture during installation
- Fungal infestation
- Long-term damage to the structure
- Corrosion and embrittlement of screws

Time is crucial here; the list of effects is shown from fastest to slowest.

To prevent any of the above listed long-term issues, the wood moisture needs to be below 18%.

If additional drying is possible after the construction is finished, < 20% is acceptable. Slight deformations in the edge area may remain even after re-drying.

Figure 32. Unprotected window end grain

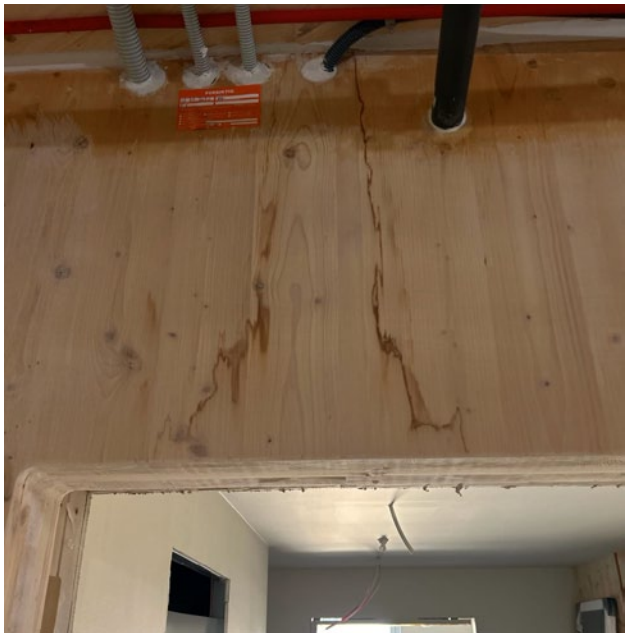


Figure 33. Water stains on a coated surface

Figure 34. Wood moisture measurement

07 MEASURES IN THE EVENT OF MOISTURE INGRESS

FAST REACTION!

As mentioned before, time is crucial and fast removal of water should prevent all damage that affects the structural integrity.

- Remove water quickly
- Drying to below 18% wood moisture
- Cleaning, sanding
- Replacement if necessary

Note:
Be aware of subsequent introduction of moisture through screed, fill or TCC installation.

Cleaning can be difficult as the stains can vary depending on the water and level of contamination. It is advised to try the chosen cleaning method on a non-crucial part to evaluate the outcome.

Possible cleaning methods:

- Washing with water, soap or soda
- Washing with wood care products or stain removers
- Sanding

Figure 35. Measuring after water damage

Figure 36. Drying equipment

Figure 37. Sanded wall element after water ingress

08 ADDITIONAL LITERATURE AND RESOURCES

KLH® Brochures

https://www.klh.at/en/booklets/
https://www.klh.at/en/approvals-certificates/

Publications on Timber Construction
https://informationsdienst-holz.de/publikationen

Cross-Laminated Timber (CLT) Information Sheet
https://informationsdienst-holz.de/publikationen/brettsperrholz-merkblatt

Moisture Management – Weather Protection During the Construction Phase
https://informationsdienst-holz.de/publikationen/feuchtemanagement-witterungsschutz-in-der-bauphase

Flat Roofs in Timber Construction
https://informationsdienst-holz.de/publikationen/2-informationsdienst-holz-holzbau-handbuch/reihe-3-bauphysik/flachdaecher-in-holzbauweise

Guideline for plinth connections in timber construction
Drying After Water Damage in Timber Construction
Guidelines for the renovation of flood-damaged wooden buildings
https://www.holzforschung.at/en/knowledge-transfer/shop-downloads/

Moisture risk management strategies for Mass Timber Buildings
https://www.rdh.com/resource/moisture-risk-management-strategies-for-mass-timber-buildings-v3/

09 IMAGE REFERENCES

Figure 1. Packages, WoodTek Co., Ltd., 2025, Taiwan

Figure 2. Floor panel lifting, KLH, 2025, Netherlands

Figure 3. Open package during loading, KLH, 2025

Figure 4. Closed package ready for transport, KLH, 2025

Figure 5. Truck ready for unloading, KLH, 2025, Netherlands

Figure 6. Ordered wrapping for smaller packages, KLH

Figure 7. Package storage on site, WoodTek Co., Ltd., 2025, Taiwan

Figures 8. to 10. Container loading types, KLH

Figure 11. Stack of panels in the loading hall, KLH

Figure 12. Discolouration due to direct sunlight (UV), KLH

Figure 13. KLH Protect at construction site, KLH, 2025, Netherlands

Figure 14. KLH Protect at KLH production facilities

Figure 15. Temporary roof scaffolding, Informationsdienst Holz, 2024, Feuchtemanagement in der Bauphase, Berlin

Figure 16. Protected construction site, KLH, 2025, Slovenia

Figure 17. Example A1+A2, Attica, RDH Building Science, 2022, Moisture Risk Management Strategies for Mass Timber Buildings

Figure 18. Example A3, Opening, Element ehf., 2025, Iceland

Figure 19. Example B1, Drainage, RDH Building Science, 2022, Moisture Risk Management Strategies for Mass Timber Buildings

Figure 20. Example B2, Cover, RDH Building Science, 2022, Moisture Risk Management Strategies for Mass Timber Buildings

Figure 21. Example C1, Connection to concrete, KLH, 2020, Austria

Figure 22. Example C2, Joint between two elements, KLH, 2025, Netherlands

Figure 23. Example D1, Raised waterproofing, KLH, 2025, Germany

Figure 24. Example D2, Column protection, KLH, 2025, Slovenia

Figure 25. Example D3, Raised wall, KLH, 2015, Austria

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