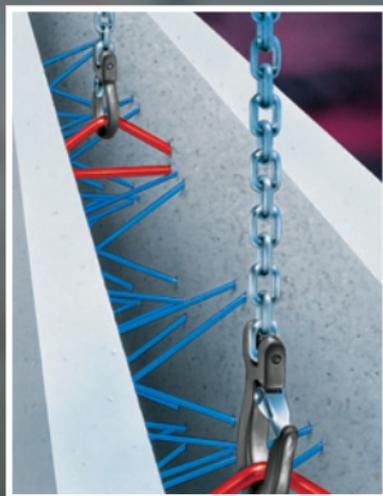


ASSEMBLY INSTRUCTIONS

for Double and Thermo Walls

Incl. Installation Instructions
for Concrete Slab



Note:

These assembly and installation instructions have been designed to assist you in your work. To the best of our knowledge, all the information provided corresponds to the standards, the authorisations and our many years of experience. No legal claims, especially liability or warranty claims, may be made based on the present instructions or on the presence of our assembly supervisor on site.

Instructions and/or support by our staff/representative are solely related to the general workmanship of the products.

Deviations in colour and surface compared to the brochure material are subject to change.

These instructions do not exempt companies and suppliers from the usual contractor obligations, especially work safety, assembly statics, and conformity to the authorisation.

In case of any deviations, contact the supplying factory for advice.

The current version is found here:
www.syspro.nu



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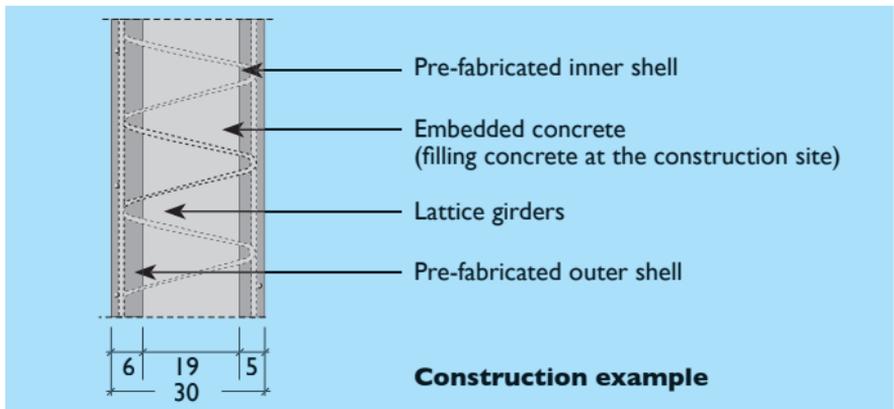
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Structural description

The **Syspro double wall** is a solid wall construction that consists of concrete components and casting concrete. In each case, 2 finished panels are connected with lattice girders. This finished part is then installed and filled with concrete at the construction site. In this case, the finished panels serve as the formwork. They already contain the statically required reinforcements. Once the concrete has been poured, the hardened overall cross-section appears monolithic. For the calculations and implementation, Eurocode 2 and the authorisation on double walls by the building authorities are valid.



The finished panels (formwork) are 5 to 7 cm thick as a rule. The core concrete must be at least 7 cm thick whereby deviations are possible in exceptional cases. For the wall construction, comply with the authorisation by the building authorities (refer to the assembly plan).

Applicable documents

The following documents are necessary for the assembly of double walls in addition to these instructions:

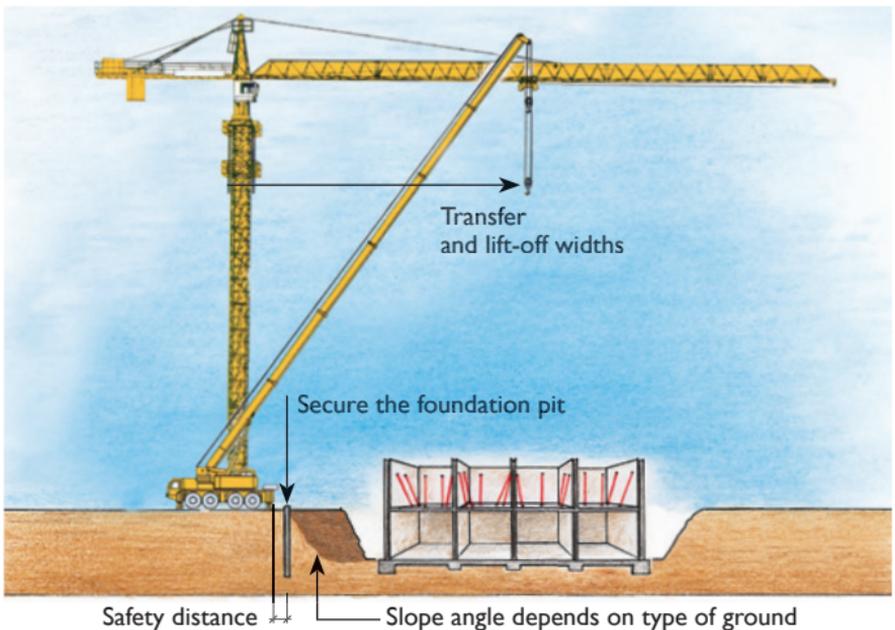
- Assembly plan by the precast factory
- Syspro Assembly Statics and Test Report by Hegger & P. (Syspro-Montagestatik und Prüfbericht Hegger & P.)
- Installation instructions transport anchor
- Concreting regulations, for example Eurocode 2
- Authorisations by the building authorities on double walls, floor slab elements, as well as thermo walls according to Z15.2-162 and Z21.8-1927
- Syspro Technical Handbook
- Rainer Hohmann: Wall elements under water pressure (Elementwände im drückenden Wasser), IRB-Verlag, 2016
- WU Guideline (German Committee on Reinforced Concrete DAfStb), 2000 Edition and Draft 11/2016
- DBV Bulletin 2013-06: Concrete formwork and stripping times
- Regulations on work safety (UVV)

For applications in neighbouring countries, take the national particularities into consideration.

Checklist for preparing assembly

Site services before the walls are delivered:

- **Installation level** (base plate: see above) besenrein, swept clean, floor plan completely spread out, height tolerance +/- 1 cm, system-compatible connecting reinforcement (if necessary, refer to p 8 ff)
- **Safety and protective scaffolding** provided and – especially for the support walls, shafts, etc. – the foundation pit secured for the crane
- **Locations determined** for the transportation vehicle and crane; minimum space coordinated for the mobile crane (min: 10 x 8 m) Ensure the operating area for the transportation vehicle
- **Bogie equipment** (p 16): horizontal, level area set up for installation, potentially as an interim storage point (box, rakes)
- **Travel route** defined: Hindrances, such as tight curves, parked vehicles, lines, pass-through limitations, ramps, etc. taken into account and removed as far as possible; necessary road closures applied for and approved
- **Feeder roads and exits** organised and smoothly regulated
- **Assembly team** briefed, power supply connected at the building site, supply and drain lines closed down, construction clearance available
- **Crane** with sufficient load-bearing capacity ordered, assembly plan and stacking list available, mounting direction announced, filling height for core concrete appropriate (possible tighter distances between the lattice girders, heights and outer corners outlined)



Important:

- Ensure sufficient operating space
- Anchors, screws and supports for the installation level: refer to the statics. Comply with the required concrete strength on the installation level
- For the wall, the anchors have already been installed. Place the screws according to the assembly plan. Observe the directions for the anchors

Tools:

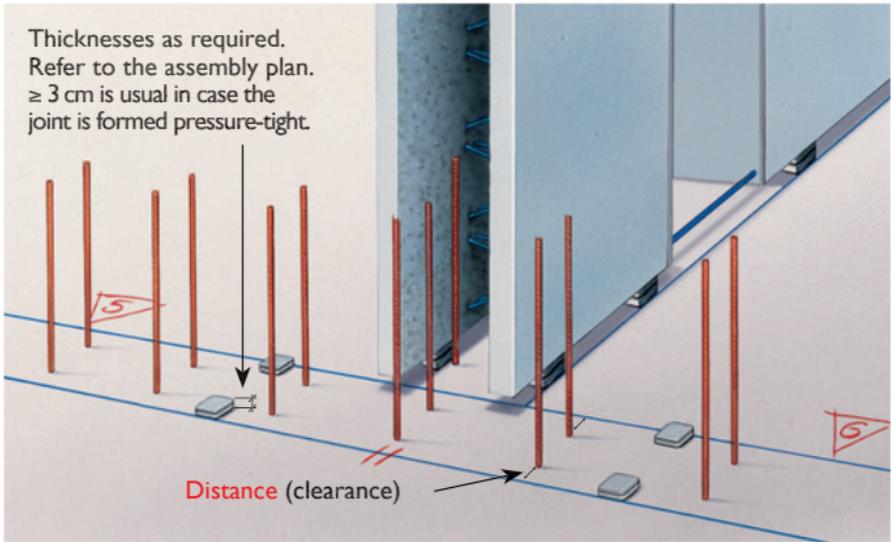


- Levelling instrument or laser, folding carpenter's ruler, chalk line, oil pastels, measuring tape, spirit level (1.5 m to 2.0 m)
- Impact drill including drills, impact screwdriver or ratchet with socket
- Angle grinder with a diamond blade for steel-reinforced concrete, bolt cutter, cable drum along with water and electricity hook-ups
- Chain hoist for 5 t crane hooks, incl. chain shorteners and sufficiently long chains (4.0 m chains to 5.0 m wall elements; wider wall elements: 5.0 m chains), if possible 2 substrings 2.0 m for 4 fastening points (refer to p 12)
- 2 crowbars, 2 pry bars, hammer, club hammer, sledgehammer
- 2 to 4 angled supports per wall element
- Wedges and spacers in various thicknesses (for example: 2 mm, 3 mm, 5 mm, 10 mm, 20 mm) for 4 or 2 bearings per wall element. Exceptions: 2 bearings, refer to p 9
- Steel brackets for building corners and T-joints
- 2 ladders; height depends on the wall height and transport vehicle; comply with accident prevention regulations, if possible a lifting ramp

Connecting reinforcements

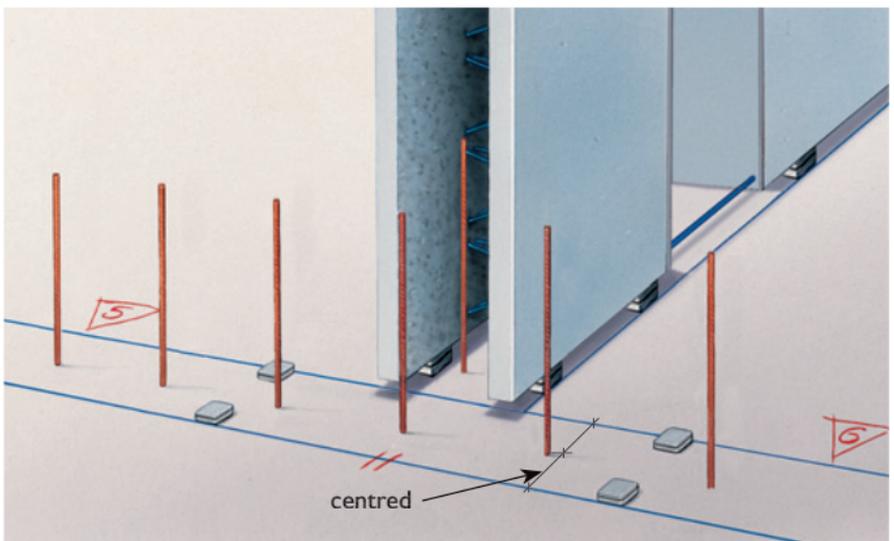
Before the concreting process of the installation level begins, ensure that the connecting reinforcements have been laid so that they are compatible with the system.

The connecting reinforcements are to be made using steel rods (or list meshes).



Distance: refer to the assembly plan.

The usual distance is defined as the shell thickness plus 2 cm.
According to the authorisation, the minimum is defined as the shell thickness plus 0.5 cm.

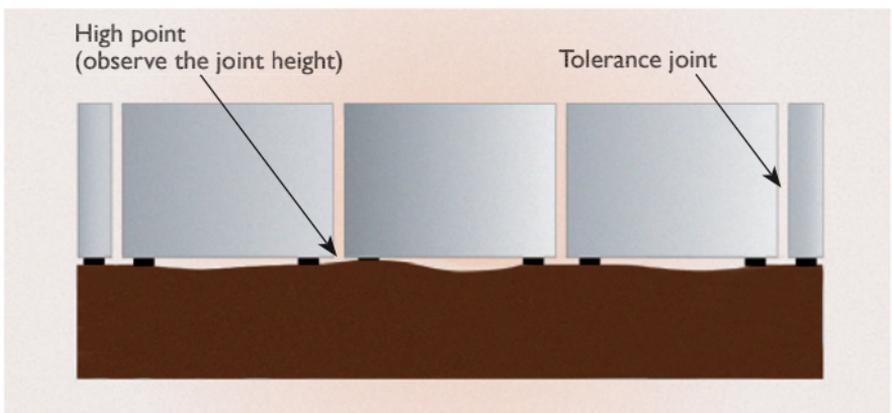
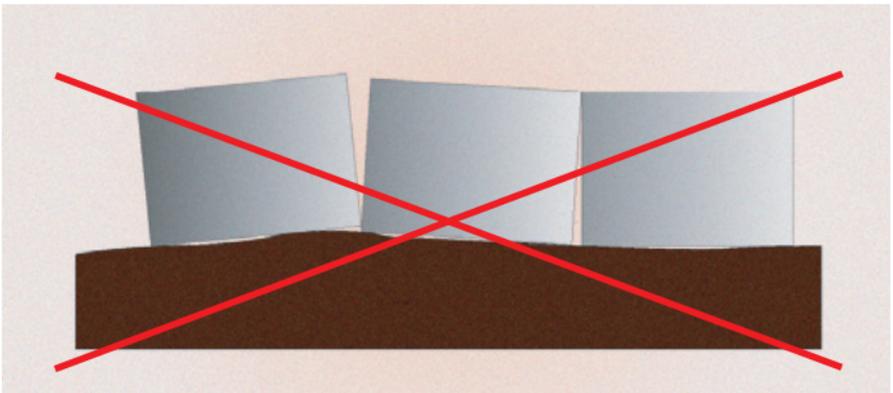


Alternative:

Single-row connecting reinforcements are located in the centre as a rule.

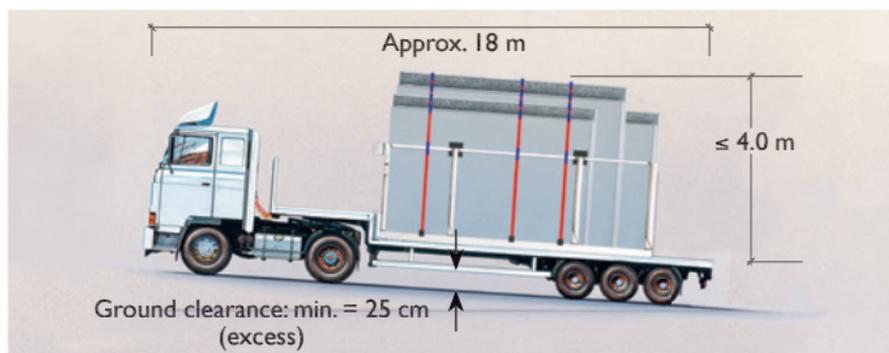
Preparing the installation area

- Before assembly, the floor plan is drawn on the installation level using chalk lines. In addition, mark the wall element lengths. Mark where the doors go. Add the position numbers from the assembly plan. Note the joint width and height (refer to the assembly plan).
- Use the spacers (made of polyamide, for example) to balance any floor unevenness (dimensions: refer to the previous page).
- As a rule, 4 spacers are needed (at both sides of the formwork, each 50 cm away from the wall ends) to level off the required height before assembly. Coordinate any exceptions with the factory (for example: only on the inside of waterproof systems and thermo walls, refer to p 29).
- Line the wall pillars separately.
- The highest relative point (on the floor plan marking) plus the joint height needs to match that of the upper edge of the spacers.
- If the total wall cross-section pushes away from pressure, then a minimum joint height of 3 cm must be kept (refer to the assembly plan).

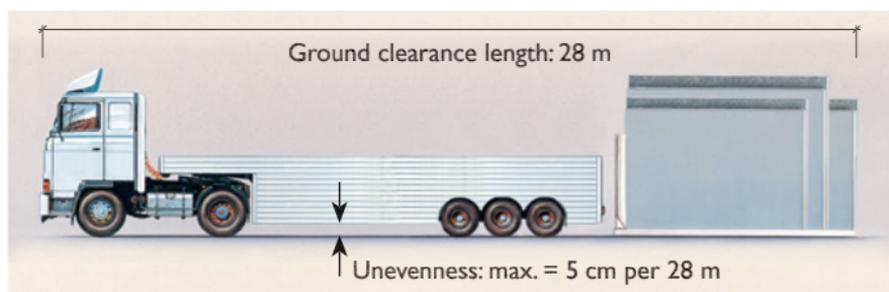


Delivery

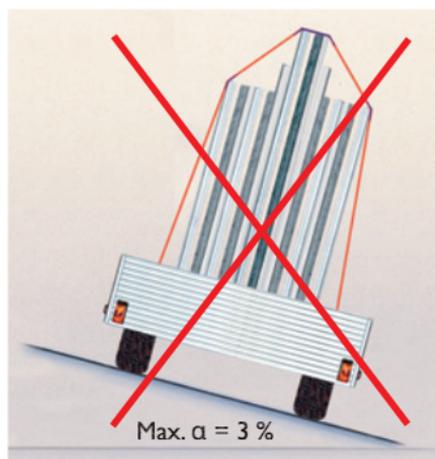
Delivery in an upright position is standard. In this case, various loading skids are used: the so-called pallets, in-loaders, A-frames, angled orientation, U-frames or boxes. Comply with the relative dimensions for the access and manoeuvring areas and coordinate with the supplying factory.



A delivery with **in-loaders** requires a ground clearance of at least $18 + 10 = 28$ m.



important:

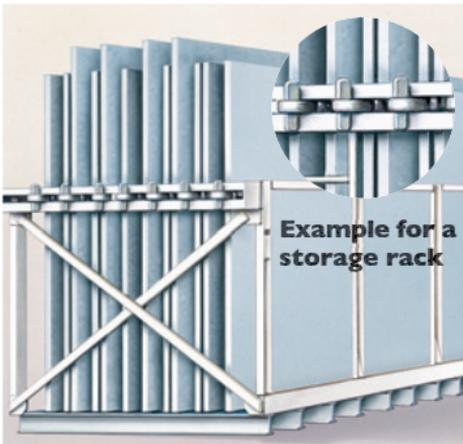


Horizontal ground space with a maximum unevenness of 20 cm per 10 m length (ground clearance).

Park the transport vehicle on a flat, even area (no inclines).

Maximum angle $\alpha = 3\%$ in the lateral direction (risk of tipping over).

Notes on unloading



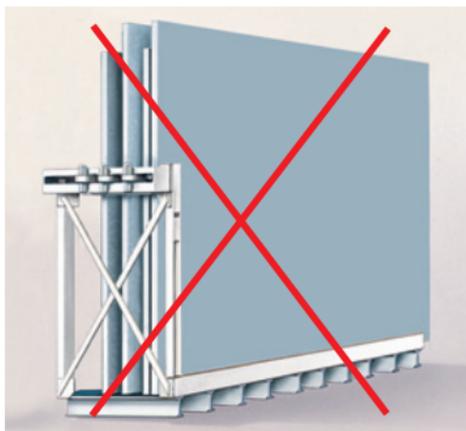
Use a ladder when you work at heights (for example: undoing the wedges)!

Secure the total load (i.e. the wall elements to be unloaded and the remaining load) against tipping before opening the safety bolts (refer to the example in the left-hand illustration) or undoing the security straps.

Hook up the wall element to be unloaded before the safety bolts and security straps are removed.

Strictly comply with the order of these work process steps! Unload from the outside to the middle independently of the assembly sequence.

Be aware of and, if needed, secure additional wall elements that as a rule stand behind each other in the driving direction. Always unload the last element first. Secure single elements.



Secure and strap any wall elements for interim storage in the in-loader (for several days).

Place walls in the middle: if need be, reload them.

Otherwise, an additional anti-tipping mechanism on the frame is necessary; for example, widening a pallet accordingly with square timber or braces.

Crane operation and chains

- Provide for careful crane operation in compliance with Hoisting Class 1.3.
- Comply with Accident Prevention Regulation VBG 9a for hoist operation and loading gear. Only use approved loading gear.
- Only use undamaged and tested chains or lifting tackle. Comply with the depositing criteria.
- Assemble the hoisting cables and round-link steel chains according to DIN 5691. Straps with inserted cable eye stiffeners must be used at the connection points between the chain and the rope.
- Comply with Safety Regulation ZH 1/17 issued by the Technical Committee for Construction of the trade association.

Fastening and shifting

Ensure the chain length is sufficient: min. 4.0 m for elements ≤ 5.0 m wide.

Fastening angle: max. = 30°

Caution:

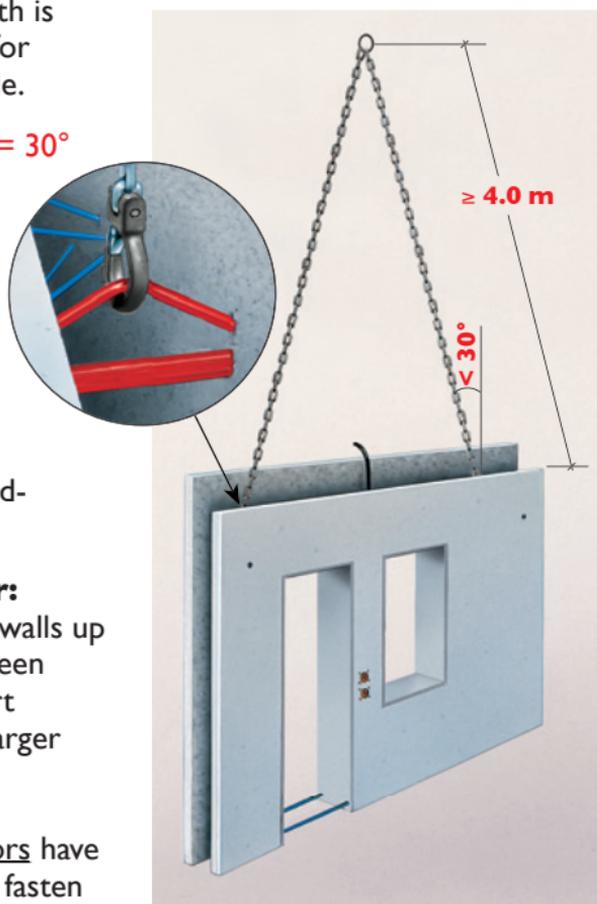
In case the fastening angle is 45°, then the load on the chain and that of the anchor will increase by approx. 30 %.

> 45°: There is no load-bearing capacity!

Transport anchor:

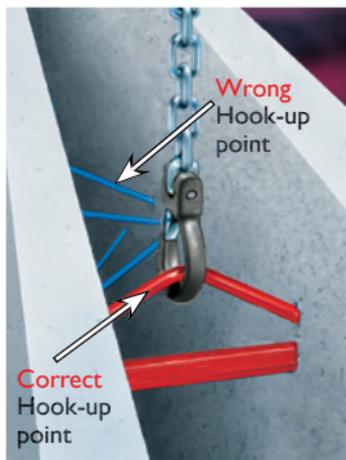
As a rule, 2 anchors (walls up to 5.0 tonnes) have been integrated. 4 transport anchors are used in larger wall weights.

In case four (4) anchors have been integrated, then fasten all 4 anchors (refer to the next page).



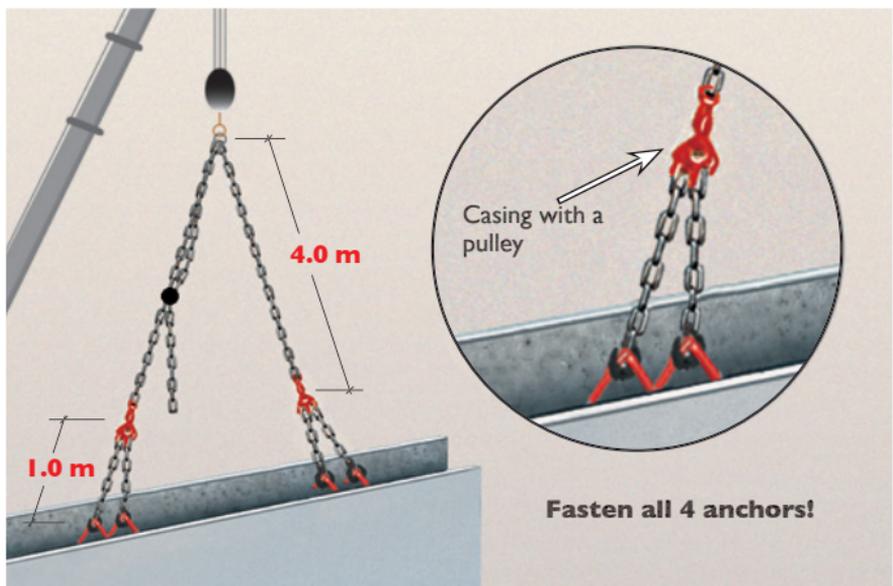
A transport anchor consists of a bracket with cross bolts and is located approx. 25 cm below the top edge of the wall. Cross bolts are made of either round steel, steel pipe or even wood.

Follow the transport anchor directions in the manufacturer's CE instruction manual.



Secure the crane hook-up in the bracket triangle.

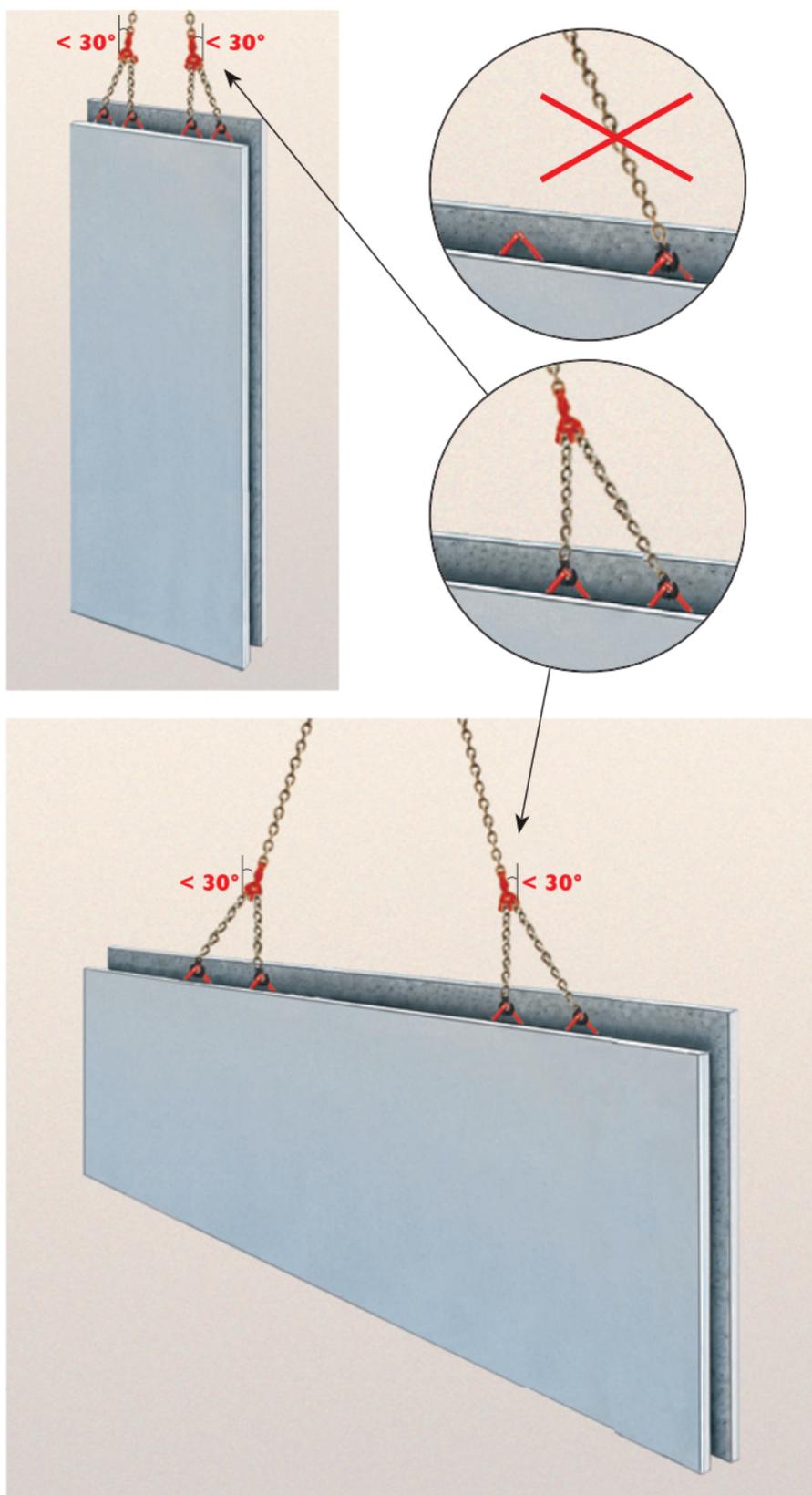
In case there are 4 anchors, work with suspension gear or tie bars. As an alternative, use a 3-chain-system as illustrated below. Such a system consists of a long upper chain with a clevis shackle, two substrings or a cable fastener, and a hitch knot between the chain hoist.



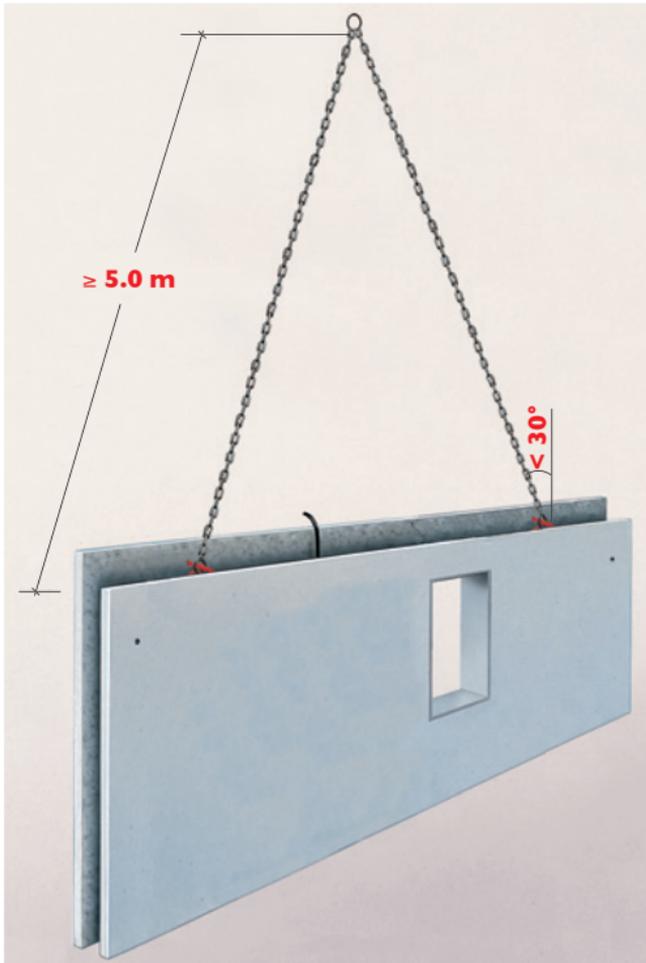
Work steps:

- Slightly stretch the suspensions
- Secure the remaining wall elements against tipping; Follow the unloading instructions (refer to p 11)
- Lift slowly and avoid any hasty movements – no sudden jerking!
- Make sure the wall element stays in a horizontal position and use a chain hoist if necessary

Attach all 4 anchors to the wall elements.



With the supplying factory, coordinate the use of only **2 special lifting links** (heavy walls) with high load-bearing capacities of above 5 tonnes each.



Horizontal deliveries are an exception and must be coordinated with the supplying factory (refer especially to pp 24 and 32).



Special C-hooks are suitable for depositing deliveries directly at the lorry. Coordinate with the supplying factory.

Caution!

Horizontal transport (above-ground method) or the horizontal transfer of double walls is **prohibited** (absent form closure).

May only be used to deposit deliveries on the lorry by the supplying factory following application consulting.

High walls

High walls are usually delivered in an upright side position to avoid cracks and transport damage. For this reason, the walls are placed in their final position with the aid of turning devices.

Obtain such turning devices (for example: bogie equipment) through the supplying factory.

Alternative:

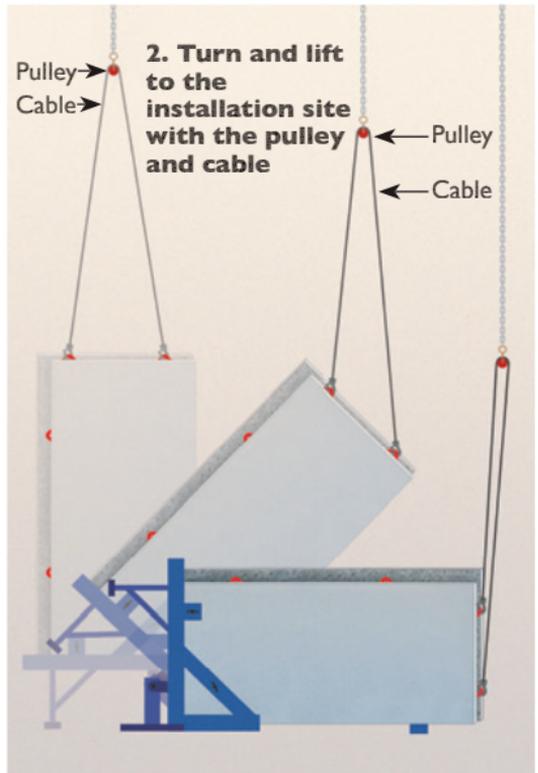
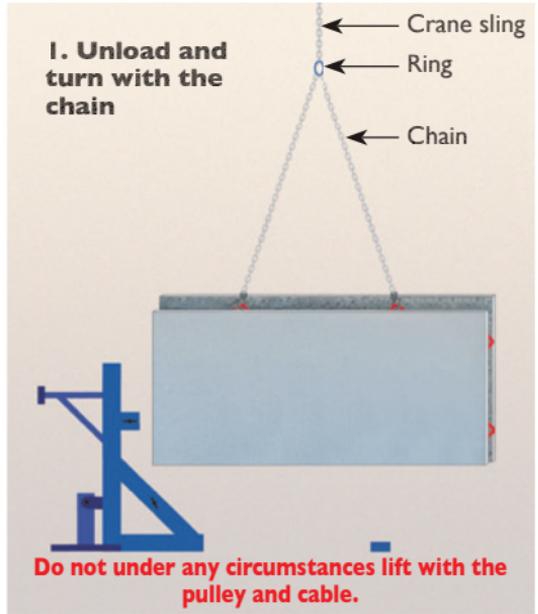
Use a crane with an additional hoist (turn in the air) to place the wall in their final positions as with the bogie equipment.

Follow the relative operating directions.

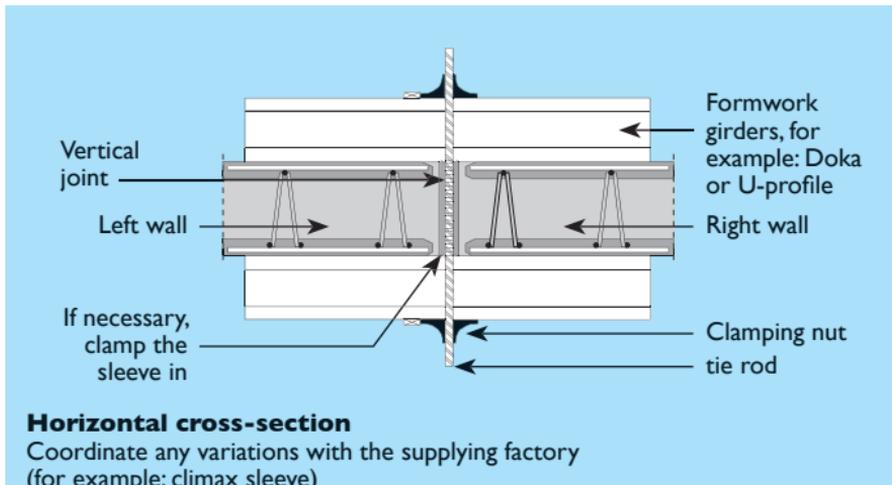
Instruction is required!

The **bogie equipment** is illustrated here as an example.

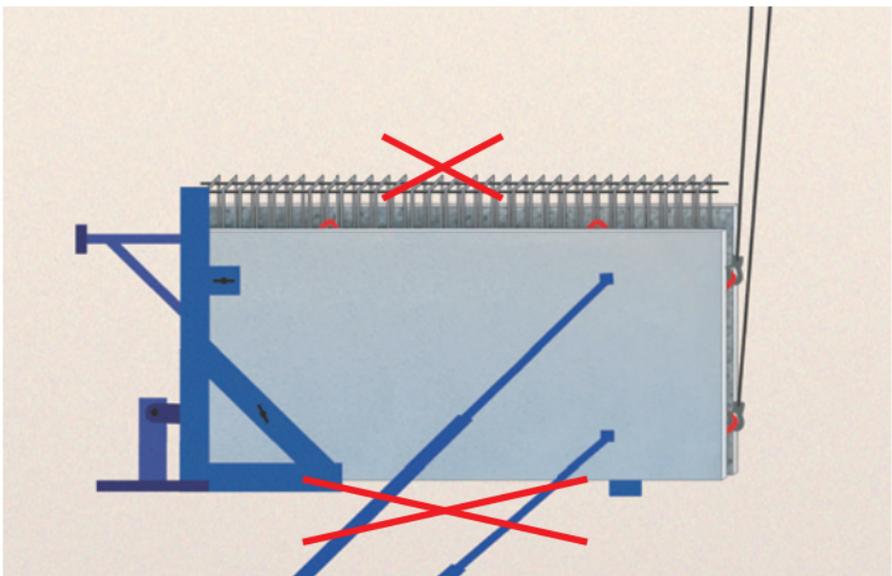
It is important to exchange the lifting chain once it has been used in the frames. A pulley with a cable then replaces the chain.



Anchor high walls throughout or secure them with clamps for better joint alignment.



Details of thrust reinforcement



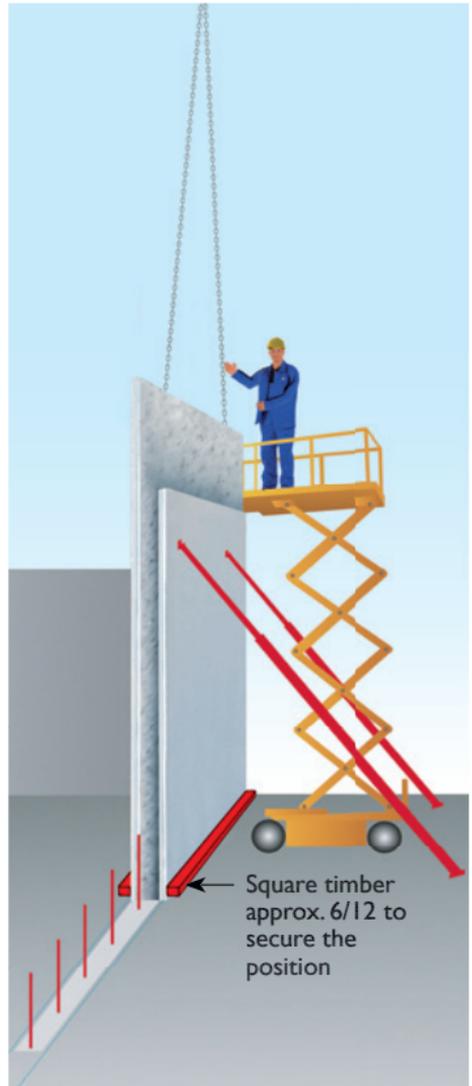
According to accident prevention regulations, special guards to prevent falls are necessary in exceptional cases. This is when assembly supports and thrust reinforcements were already mounted before the walls were fastened.

In case there are gaps in the joint area, shove the reinforcements in from the side. Do not shove them from above before the neighbouring element comes next (as in the preparation for high walls).

Observe the information on p 18 ff. (installation) and pp 24-25 (thrust reinforcement).

Installation

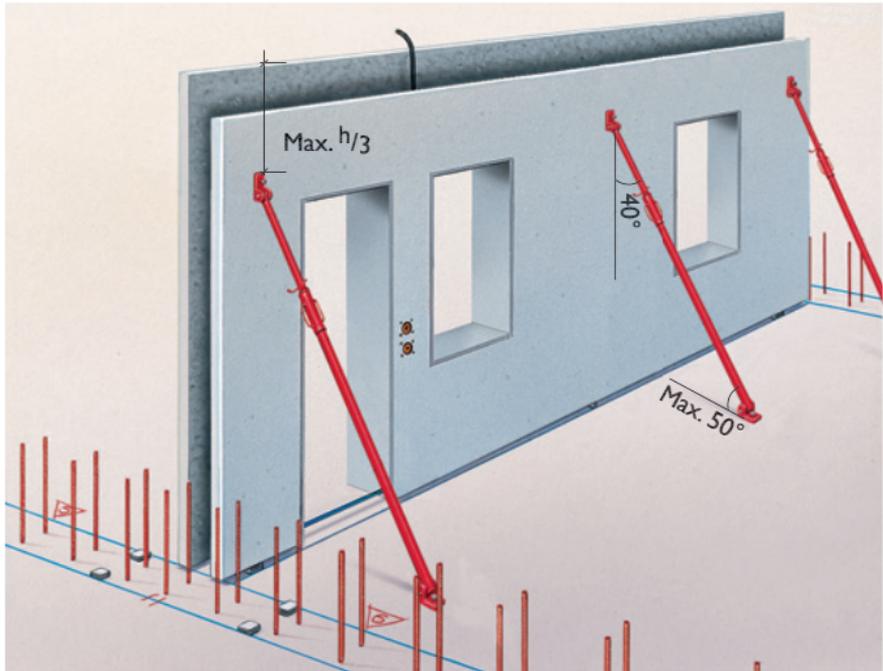
- Before transferring the walls, ensure that the connecting reinforcements do not collide with the lattice girders.
- Check the vertical alignment and the vanishing line of the integrated thrust reinforcement (refer to pp 24-25).
- Slowly lower the wall element. Next, deposit it in its place on the base points (floor plan markings). Then align the elements.
- If necessary, fix the wall position with wedges and/or by using dowels.
- When transferring a new element to its position, make sure that previously transferred walls are neither moved nor damaged.
- Secure each element with at least two angled supports, depending on the wall height and length.



Mount the supports to the element using screws and U-shaped discs. Fasten the supports to the base plate with the approved dowels. Dowels have already been integrated into the wall element at the factory. Refer to the **assembly plan** for further information.

- The assembly plan contains numerous notes, such as the position of the integrated fastening points (dowels) for the angled supports at the wall, the position numbers (triangles) of the wall elements and the assembly sequence.
- Calculate the supports and dowels (base point). Install according to manufacturer specifications!
Comply with the recommended (early) concrete stability on the installation area and support surface. Observe approved torque values!

- Do not exceed a **50° angle of inclination**. It is better to work with a 45° angle. At a 60° angle, the forces in the dowels and the supports would already increase by more than 30 %.
- Always fasten the assembly supports using all of the integrated dowels.



- Fasten the angled supports. Then, secure them. Next, make sure they are in the correct position. Do not remove the crane hook and hook up the next wall element until these 3 steps have been completed correctly.

important:

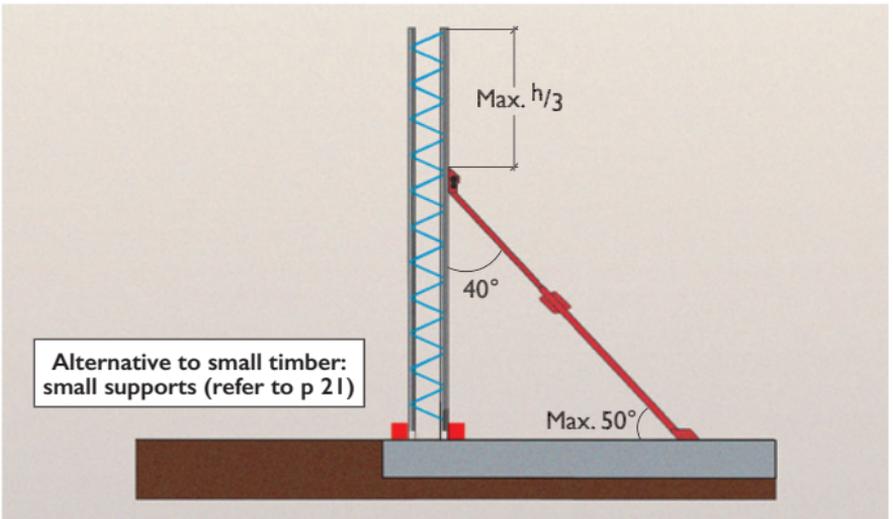
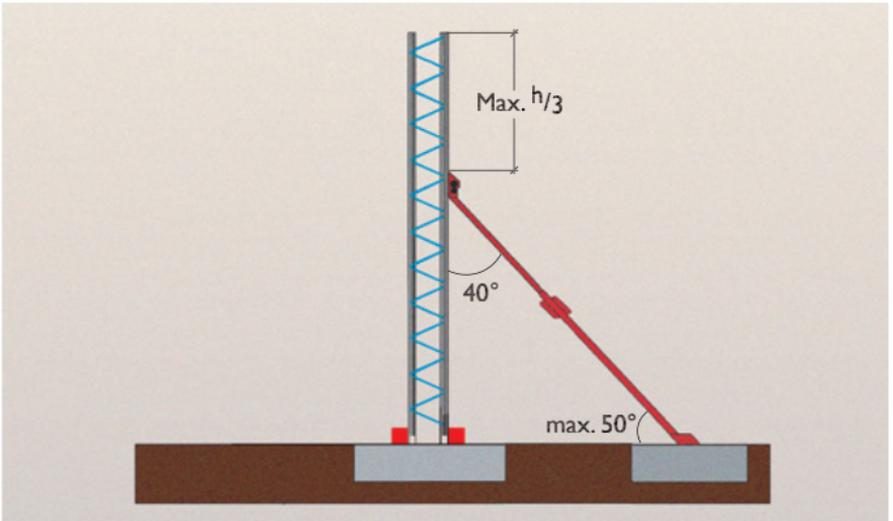
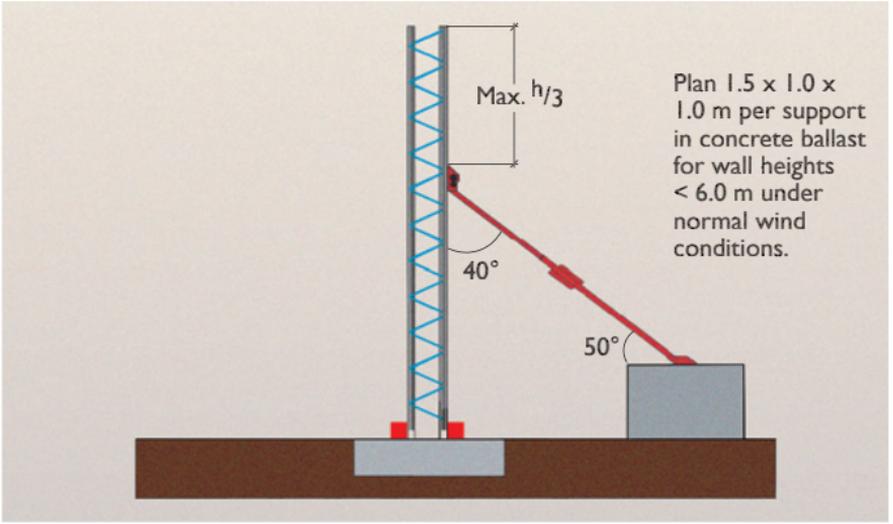
- Use the spindles to align the wall element vertically; Turn the spindles evenly and tension-free
- Next, apply the corner and joint reinforcements, and the corner brackets for concrete pressure (refer to the sections later)
- When there is a storm warning, take additional precautionary measures
- Stripping times are (removal of the angled supports) according to the standard and the statics

Note:

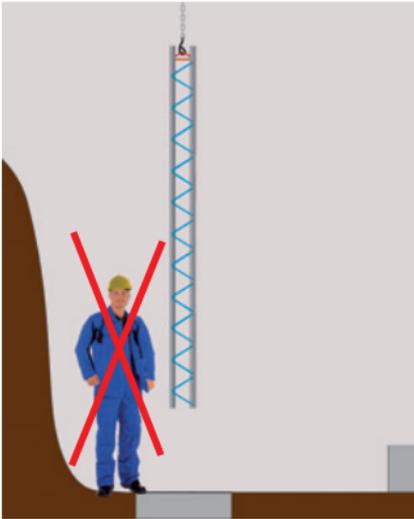
The assembly company is responsible for anchoring the assembly supports and the type of fastening for the walls. This includes the supports and dowels as well as the temporary foundations and the installation level itself. For examples, refer to the next page.

The assembly statics must be observed.

Options for mounting the supports at the base
(Pay careful attention to the note on statics on p 19):

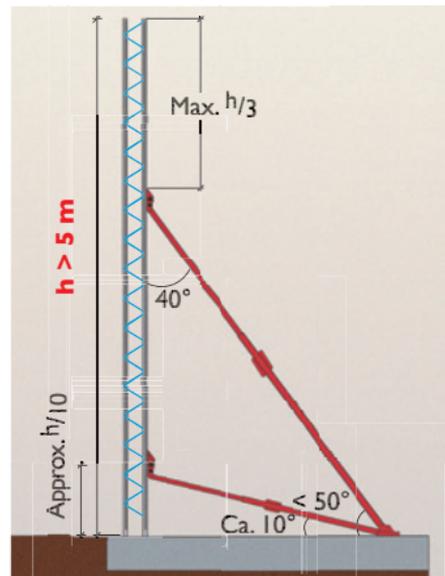
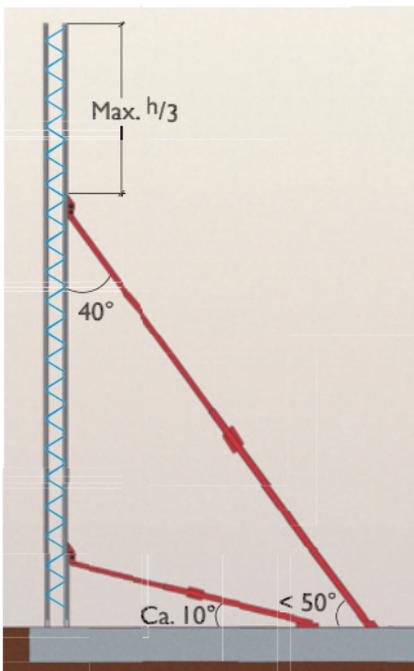


Safety notes



No one is allowed between the wall and the embankment when the crane is in operation and a wall element is being deposited.

Comply with the accident prevention regulations on securing the foundation pit.



When the wall elements are higher than 5 m (refer to the assembly statics), use the small support in addition to the large one.

Caution!

The construction company is responsible for the safe operation of the construction site. In this regard, pay special attention especially to the pertinent accident prevention regulations and the trade association rules.

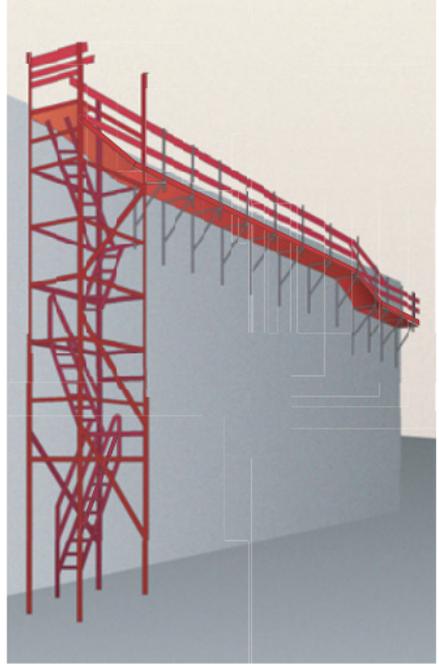
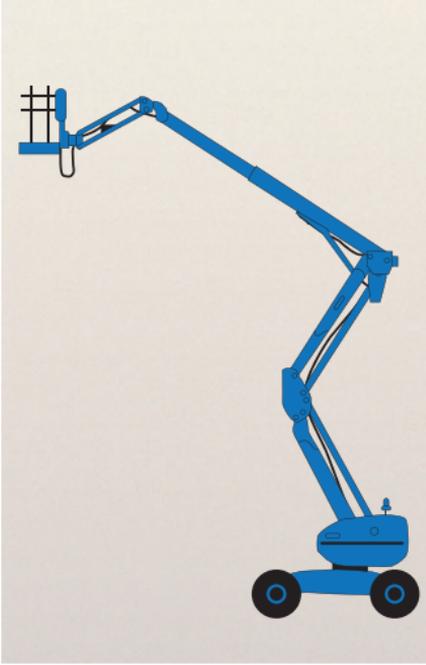
Personal protection equipment, such as a helmet, goggles, equipment, shoes, is critical for safe operations.

Signs with safety warnings, such as "Enter at your own risk!" and the following symbols are recommended:



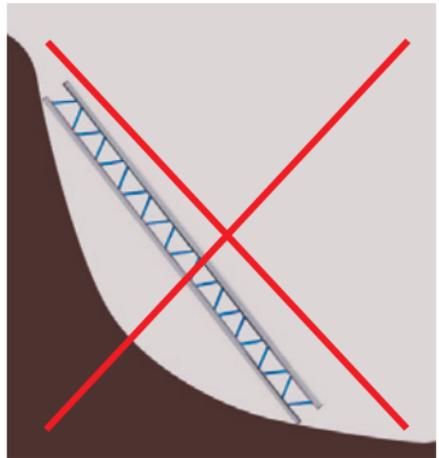
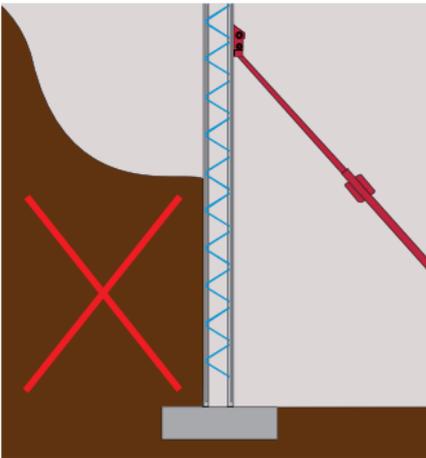
Safety notes

Single activities (for example: concreting the core) require work at the top of the wall. In this case, use the usual safety equipment and precautions such as slip guards, guardrails and personal protective equipment. Two examples of usual safety precautions are displayed in the following:



Do not backfill work areas during assembly. It is not allowed.

Do not store wall elements for the interim at the embankments or in the work area.



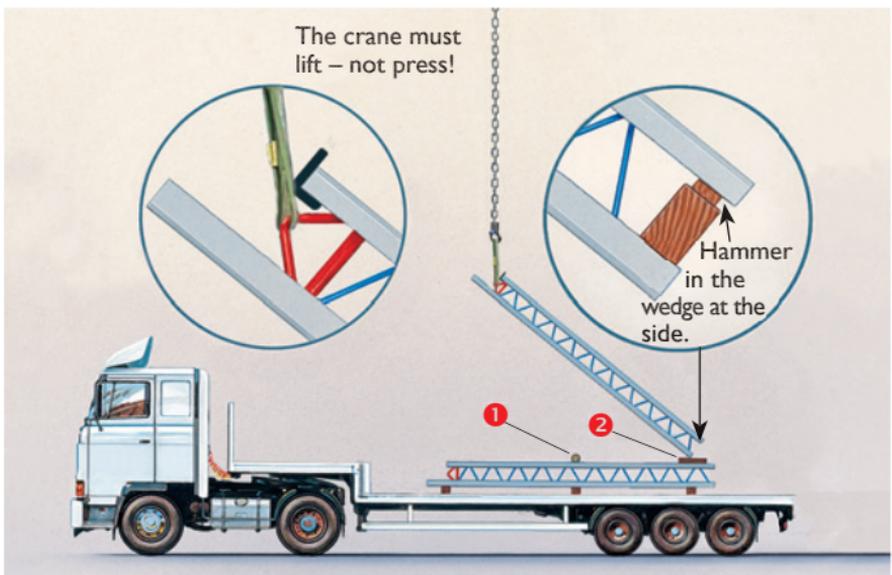
Flat delivery (exception)

When wall elements are high or very high (more than approx. 5 m), then unloading a flat delivery can lead to cracks forming (visual flaws). This is why a more vertical delivery is necessary (bogie equipment or similar: refer to p 16).

Follow the assembly statics.

To unload, complete the following steps:

- The lorry must be parked on a flat and even surface in any case (no inclines)!
- Insert and secure a steel bracket 60/6 or wooden board (approx. 60 cm long) in the transport anchor area to protect the upper shell from damage (crane hook).
Alternatively, use strap or cable fasteners: refer to the detail in the left big bubble in the illustration below.
- Hook up the top wall element at the transport anchor. Lift and lay a section of steel pipe ① underneath.
- Next, unload the wall element by shifting towards the suspension points. Then tilt the wall element. Lay a guard board ② underneath.
- Now, carefully raise the secured element on to the guard board and lift it up.

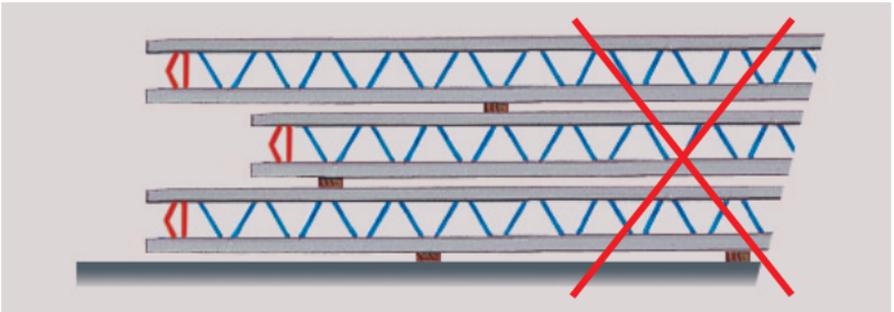
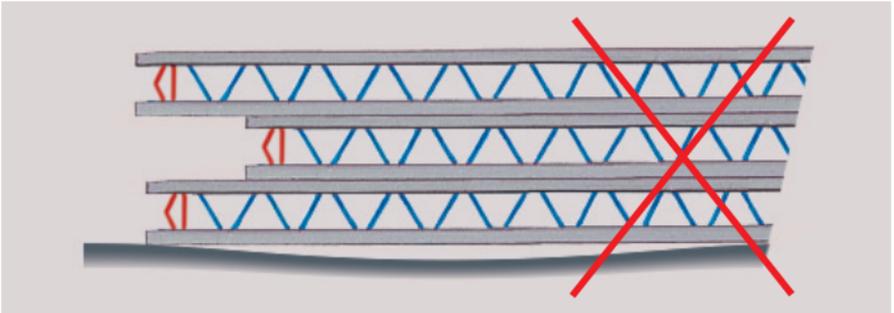
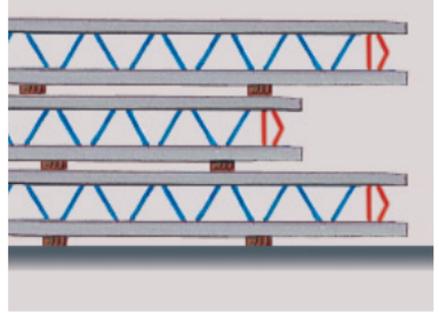
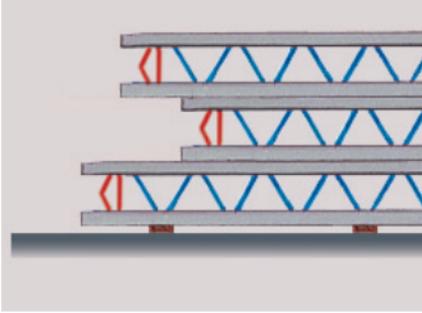


Caution!

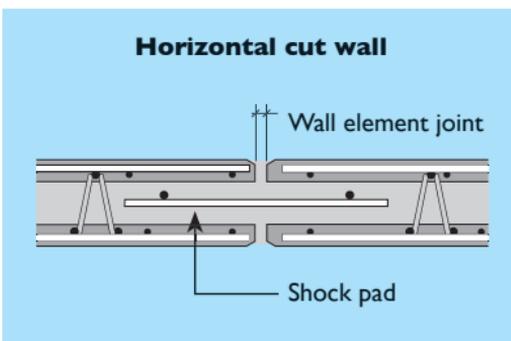
This is especially important when the lattice girders are shorter at the foot of the wall element (for example: the joint sheet metal in base plates). In this case, hammer in wedges in the hollow areas throughout the whole length. Refer to the right big bubble in the illustration below.

Interim storage

In exceptional cases, store wall elements up to 5.0 m long (> 24 cm thick) horizontally for the interim as illustrated. Coordinate any other wall measurements with the supplying factory.

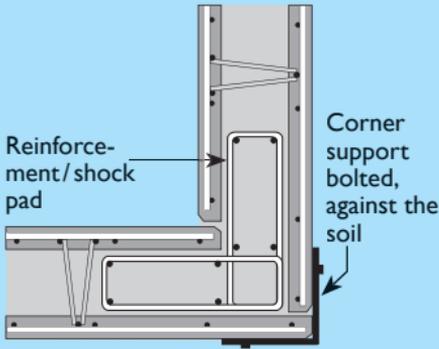


Thrust reinforcement and securing corners



Install the necessary thrust reinforcement and secure the corners according to the statics. As a rule, one strip of shock pad is sufficient.

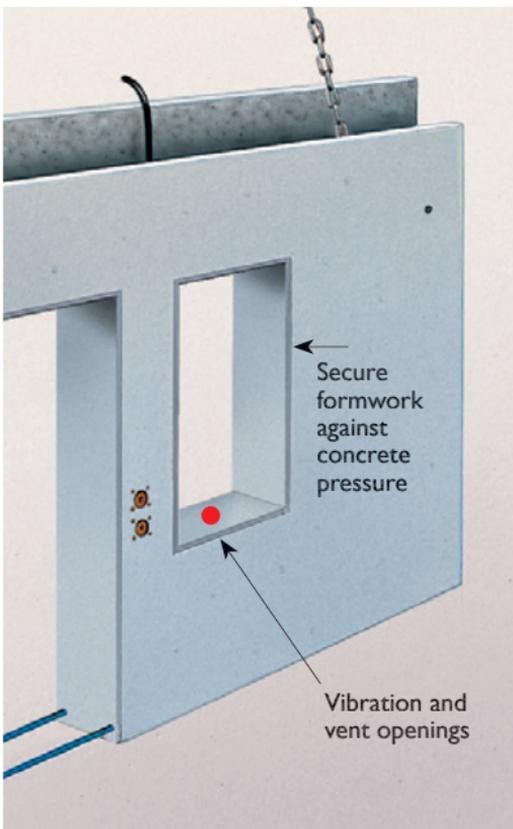
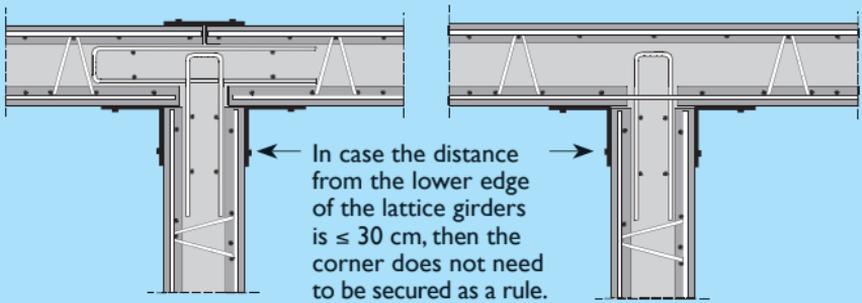
Horizontal cross-section of the corner



Secure the concrete pressure at the corner and the T-joints, for example the steel brackets, bracing against the soil or bolting a base plate.

Coordinate dowels for the WU cellar with the supplying factory.

Horizontalschnitte T-Stoß



Secure the formwork against concrete pressure in the direction of the wall at the wall ends or at the openings.

Plan for small openings for vibration units in the formwork (refer to graph on p 28) when there are especially large openings, for example windows wider than 1.0 m.

important:

When the reinforcements have been integrated (for example: the shock pad, tie beam, floor mounting brackets), examine the E-pipes and other built-in components (for example: the casing tubes).

Before concreting

Once the wall elements have been mounted, continue directly with laying the Syspro floor panels. This enables a rational workflow by concreting walls and floor panels in one work step. It is important to observe the maximum filling heights!

Fill all horizontal and vertical joints as follows:

- Remove the formwork starting at an approx. 2 cm width. Do not fill with foam in any case.
- Finish vertical joints up to approx. 2 cm wide with installation foam or joint cord. Installation foam may not extend into the in-situ concrete.
- Joints less than 1 cm wide can be left open at F3. Waterproof formwork at F5.

Support long and/or protruding formwork. Do not support formwork against elements that have not been filled or hardened.

Concreting

The concreting process must be performed according to the pertinent regulations (for example: EC2). This especially includes moistening the wall interior sides, the measures in interrupting the concreting process, drop heights, the insertion depth of the vibration unit, as well as the primary and follow-up treatment of the core concrete.

In addition, ensure that:

- For concrete core thicknesses < 15 cm: maximum grain size = 16 mm; at the base of the wall, a follow-up mixture with 8 mm is recommended.
- Do not shift or inadvertently bump against installed elements, for example with a concrete bucket.
- Fill evenly without using a material cone. Make sure that the elements are perpendicular.
- Immediately examine elements once they have been concreted. If necessary, align them again. Examine the e-pipes again.

Filling heights and the ascending rate

Measure the filling or concreting height permitted h_E in connection with the concrete ascending rate v on site according to DIN 18 218. According to the authorisation, the maximum fresh concrete pressure amounts to $\sigma_{Hk, max} = 30 \text{ kPa}$ (without any special measures and with a usual lattice girder distance of 60 cm). The usual filling height of 80 cm or concrete ascending rate of 80 cm/h requires normal environmental conditions (ambient temperature $T_{amb} = 20^\circ\text{C}$, consistency F3, no

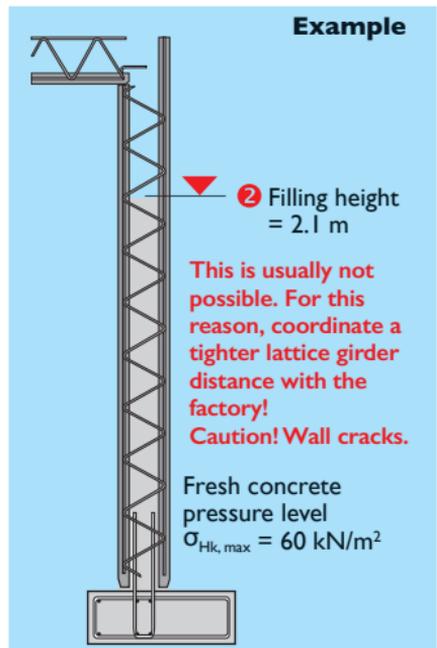
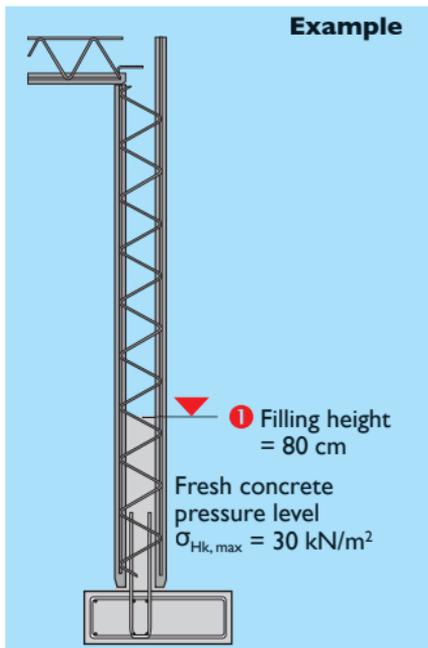
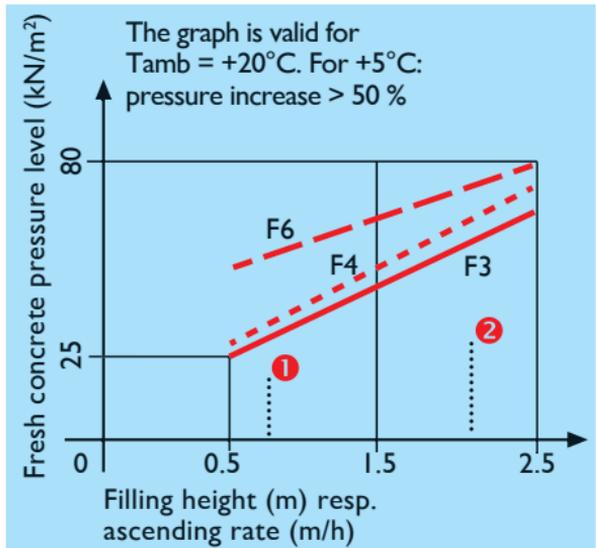
retardants). The results of ambient temperatures $< 20^{\circ}\text{C}$ are deviations, consistencies softer than F3 and the addition of retardants, etc.

Caution: Wall cracks are a risk when filling concrete quickly. This is because the concrete pressure that rises is not absorbed by the wall as a rule.

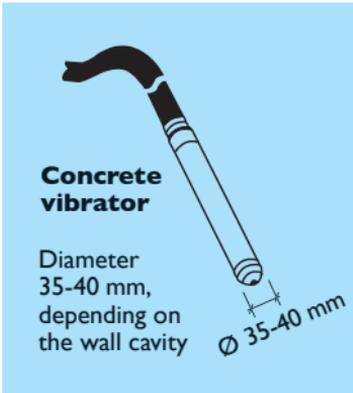
Soft concrete consistencies allow only low filling heights and require special measures since increased concrete pressure results. A release by the supplying factory is necessary when the concrete is self-compacting or F4 to F6.

Important:

When the filling height is increased, then the pressure from fresh concrete increases in direct relation. The wall element, as a rule, is **not** designed for this (danger of **wall cracks** with fresh concrete spilling)!



Coordinate with the factory to reduce the distance in the lattice girder. Do not install additional layers of concrete until the preceding layer has set t_{ϵ} (period of time for mixing until setting is complete according to DIN).



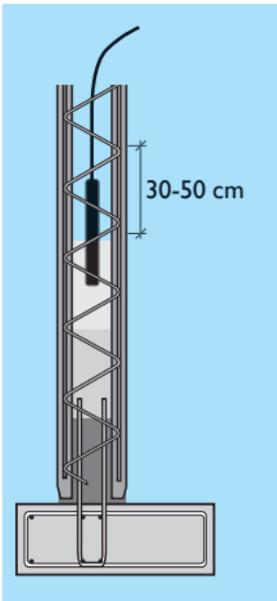
Compacting

Do not compact point-by-point. Use the vibration unit correctly to shake and adjust the unit width to the gap in the wall.

For improved ventilation, insert the internal vibrator quickly into the concrete and then pull it up again slowly.

First layer: Insert the vibration unit up to the base of the wall.
Maximum insertion depth = 15 cm in an already compacted layer.

When the concrete is easy to compact, then carefully poke it, for example with a rod.



Attention:

Increase in concrete pressure due to the vibrator.

Use drain pipes or tubes when the drop heights are more than 1.5 m. Avoid inserting the vibrator into the concrete layer.

Vibration distance \leq approx. $10 \times \varnothing_{\text{concrete vibrator}}$

Sealing the joints and the hardening process

Complete follow-up work on the joints between the wall elements and the floor slab elements following mounting as a site service. In case agreed, remove any impurities in the joint areas.

If the joints are to be finished on site, then we recommend using low-shrinkage jointing compounds that can absorb temperature and load-dependent deformations (for example: Köster Adhesive

Mortar or Alsecco filling compound). Follow the manufacturer's instructions.

When installing a non-insulated façade, then use the approach for an elastic joint as a site service. For example:

- Apply the sealing strip to the wall sides during mounting or insert it in the butt joints following the mounting process
- To use sealing compound, for example PU-based, refer to the page on thermo wall (p 32 ff.)

Caution!

It is important to avoid the bond between the wall element panels and the in-situ concrete from being affected. Protect the walls from vibrations and other stresses until the concrete has **hardened** sufficiently.

ANNEX

Waterproof systems

The purpose of double walls in WU construction, for example in waterproof systems, is to ensure that the seal is not damaged during mounting.

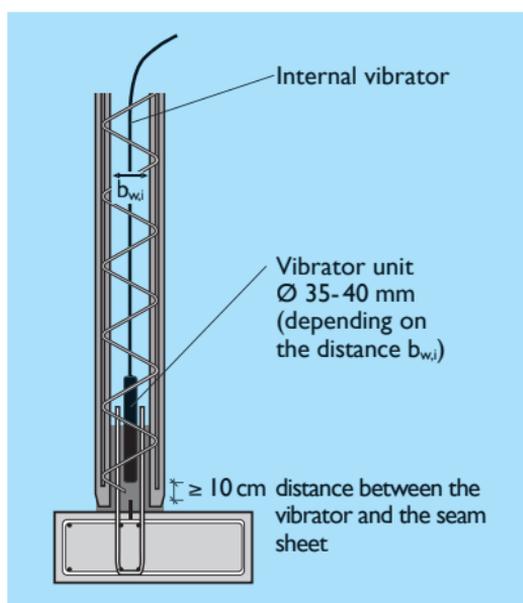
Coordinate with the structural engineer on any jobs that can damage the seal, such as drilling, milling, flame treatment, flex applications, joint heights < 3 cm, an outer shell with spacers, and the use of built-in components.

Comply with the special regulations, since the wall fulfils a sealing function. These regulations contain critical details on the seam sheets and the predetermined tear lines, among others. Comply with the test reports on seam sheets, etc.

Filling the core with concrete requires increased care, for example moistening the inner sides and the follow-up mixture.

The object is to needle the single, approx. 30-to-50-cm high fill layers to another (refer to the illustration below). First, insert the internal vibration unit approx. 15 cm into the already compacted concrete layer.

Insert the vibration unit up to the base of the wall.



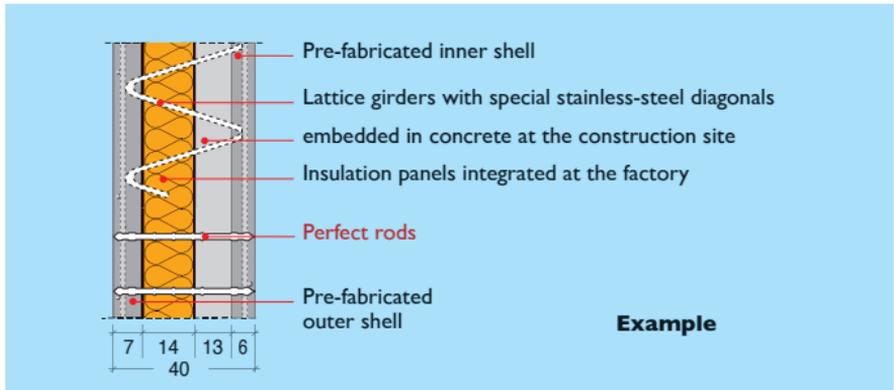
When compacting the concrete, ensure that the internal vibrator does not come into direct contact with the concreted joint seal.

According to DIN 18 197, keep a minimum distance of 10 cm between the internal vibrator and the joint seal when joint tape is used (elastomers or thermoplastics).

Vibration distance \leq approx. $10 \times \varnothing_{\text{concrete vibrator}}$

Thermo walls

The thermo wall is a pre-fabricated wall construction with core insulation integrated at the factory. It consists of the regular double wall system with concrete components as an inner and outer shell, and the filling concrete. The finished panels are connected to each other at the factory through special lattice girders with stainless-steel diagonals or round glass-fibre cable rods. The core insulation is already integrated at the factory.



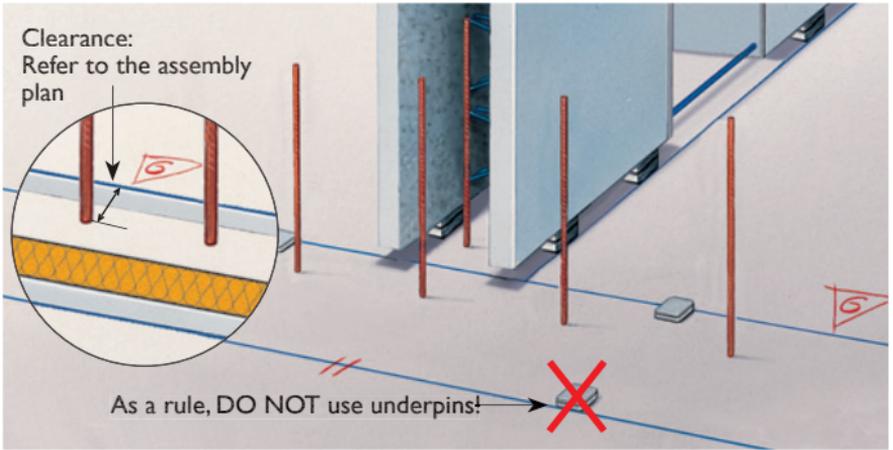
The previously described preliminary work and the installation for double walls also apply in this case.

Prevent any remaining **moisture** from entering the wall construction during the building stage by covering the top of the wall, for example.

Cantilevered thermo walls, for example in halls, require a double row of connecting reinforcements. This requires special attention when they are mounted in the base plate (refer to p 8).

Before the wall is installed, examine the positions of the connecting reinforcements again (no kinks or bent rods) and correct them if necessary.

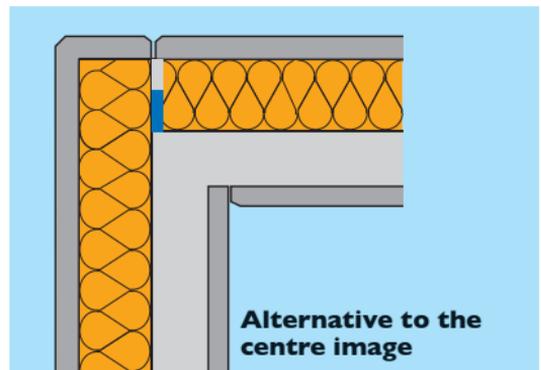
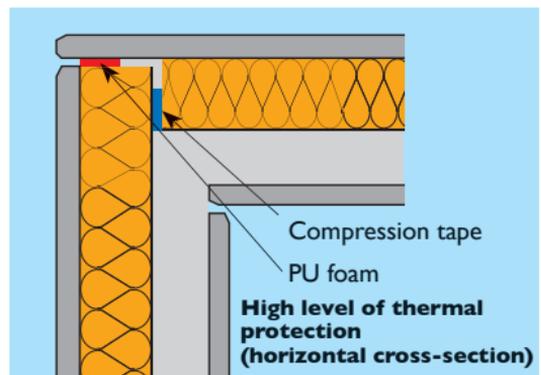
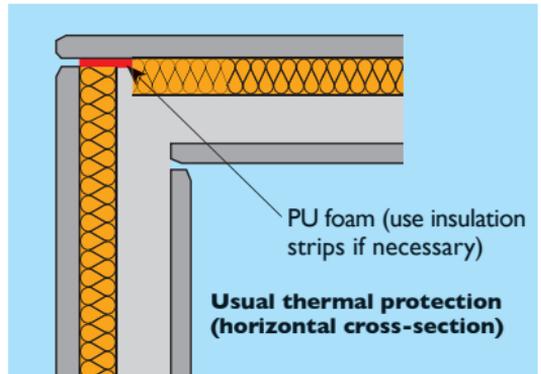
As a standard, keep a 3 cm gap on the inside of the walls (horizontal concrete pressure joint in cantilever construction). Before filling in the concrete, use square timber as formwork to prevent fresh concrete from spilling out (refer to p 18).



Peculiarities will arise when the floor plan is applied. As a rule, the single-row connecting reinforcements are located approx. 3 cm away from the inner shell.

Finish the vertical and any horizontal joints in the insulation panels with PU foam before you begin with the concreting process. In this case, products labelled with the general building authority test certificate (ABP) are recommended: for example, Fischer, BTI, Ablon, Würth.

To meet high thermal protection demands, for example in the passive house standard, finish these joints with pre-compressed sealing strips.

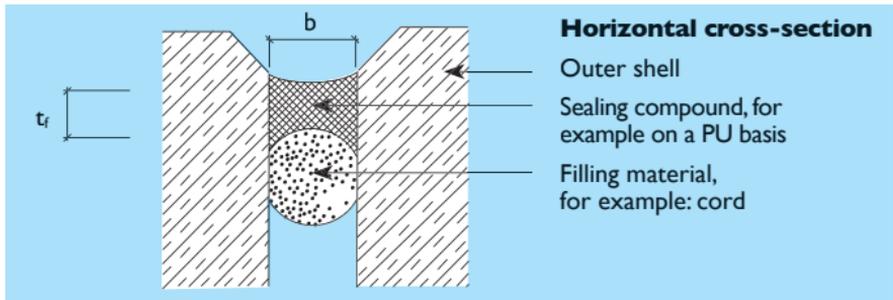


Re-work grate, protruding formwork, etc. at the bevelled edges on site before the sealing materials are inserted.

In case the factory omitted the insulation around the transport anchor, then supplement it on-site with the fitting pieces in the delivery.

Consider the following additional work during assembly:

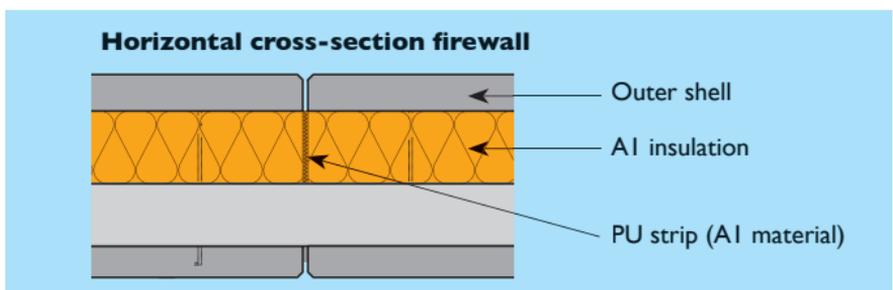
- Ensure that the wall is not hanging perpendicularly from the crane but at an angle
- There will be assembly tolerances due to the joint alignment (front and interior views)
- Use spacers only on the inside
- Secure a wall that tips to the outside
- Supplement finishing the joints and insulation
- Protect against moisture at the top of the wall
- Withdraw the lifting link according to the statics



Finish the joints between the outer shells so that they are flexible according to DIN 18 540, as illustrated above. “Water-repellent” round profiles, such as closed-cell PE round cord can be carefully integrated into the joint using tools with rounded-off edges. Once the filling material has been inserted, paint the concrete flanks with a primer. Integrate the sealing compound in the joint so that the finish is even with the inner edge of the chamfer strip.

Use well foam as required in the lower floor that comes in contact with the ground.

To comply with fire protection requirements, use B2 joint material and implement any additional planned measures (refer to the following illustration):



Floor slab elements

General

The System quality floor slab consists of floor slab elements made of reinforced steel according to Eurocode 2 and the relevant approvals from the building authorities. It consists of 4-to-7-cm-thick pre-fabricated panels that are supplemented with in-situ concrete. The finished panels are smooth underneath and contain the statically required reinforcements. In addition, the lattice girders ensure the necessary stiffness of the finished panels during installation.

Crane

During the planning phase, ensure that the crane's load capacity is sufficient for the maximum occurring load. The finished panels are usually unloaded from the lorry using the construction site crane and laid in one work step. The standard-thickness panels weigh approx. 125 kg/m².

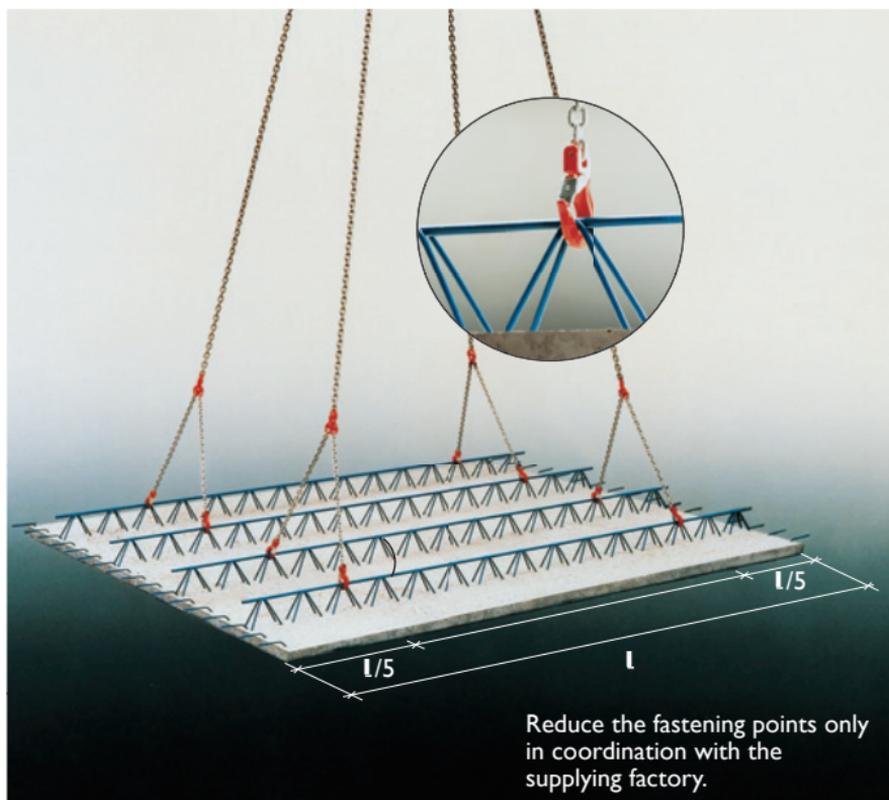
The installation plan

An installation plan is generated for every floor. It contains all the important information, especially the position of the finished panels with position numbers in the floor plan, the arrangement of the assembly supports, and the reinforcements of the butt joints.



Unloading

Attach the crane hooks to the diagonals – not the upper belt. Balancing suspension gear must be used whenever the finished panels are lifted. In this case, use suspension gear made of steel rope and/or chains. Or, use a solid frame made of steel rope and chains so that the net weight load is evenly distributed on the lattice girders.



Interim storage

In case the shipment is stored at the construction site, then the storage surface must be even and able to bear the load.

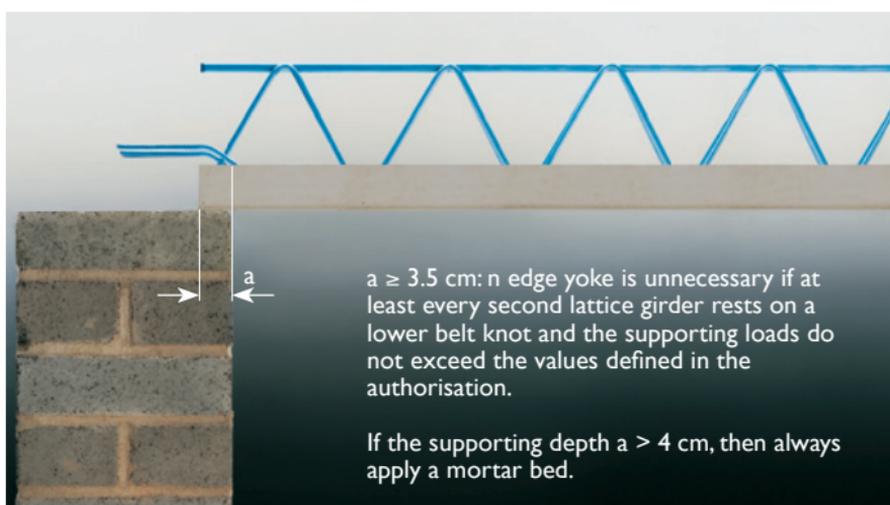
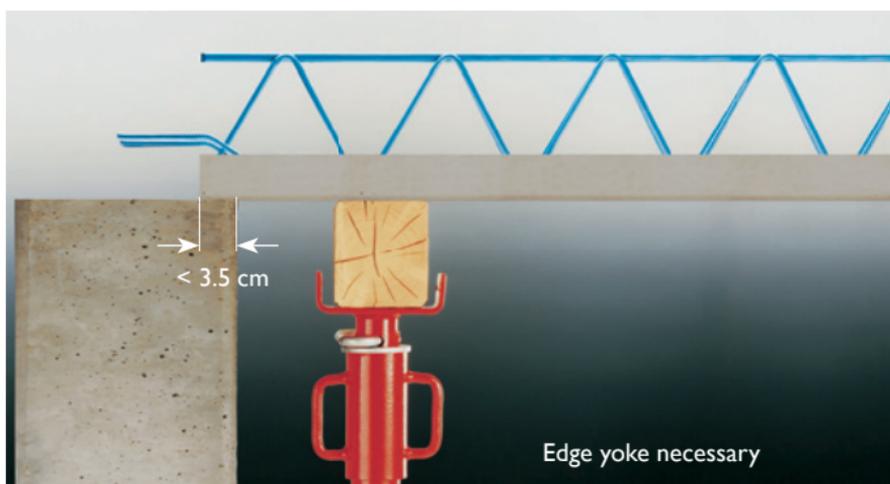
To protect the panel undersides, use two pieces of square timber as a cushion that are as long as the panel width. Ensure that the distance from the panel ends is approx. $1/5$ th of the panel length. Stack up to 10 panels directly on to the lattice girders.

Put 3 (better are 4) pieces of square timber underneath when the panels are longer than 4.5 m. The details on p 24 are valid in the same relationship.

Assembly support

Set up the assembly support before the panels are installed. For details on the distances between the yokes, refer to the installation plan or the information provided by the equipment supplier. In this case, the yokes must always be positioned cross-wise (even in balconies).

The conditions for edge yokes are shown in the following illustrations:



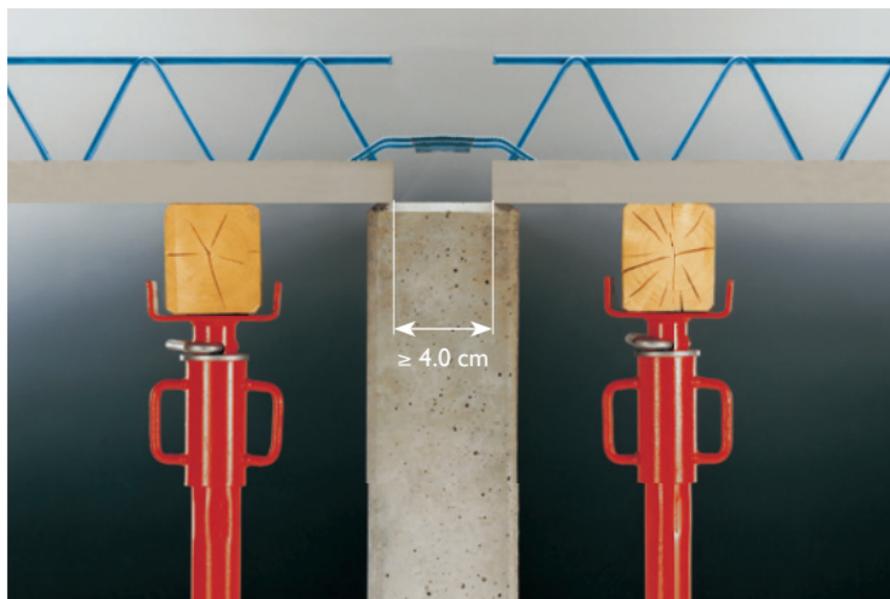
Notes:

The supporting depth of the finished panels is defined in the installation plan.

Clean the support areas (walls and yokes) well before the panels are installed.

Distance between the supports: refer to the manufacturer's specifications.

When there are intermediate supports (for example: interior walls), then comply with the minimum distances between the finished panels to be supported.



Height adjustment (wall is too low)

1. The wall ends approx. 1 cm to 2 cm below the bottom of the panel in case a mortar bed is applied before installation. The finished panel then presses on the yoke into the fresh mortar bed when it is deposited. The finished panels must be deposited horizontally. Otherwise, by pressing the mortar to one side, there is no even support.
2. The wall ends approx. 2 cm to 4 cm below the bottom of the panel. Once the finished panels have been installed, the gap must be closed. During the concreting process, fill the wall carefully with concrete using the vibrator unit.

Do not use installation foam!

Examining the view from below

The finished panels must be deposited horizontally on the supports: in this connection, refer to p 37. The joints between the finished panels must not display any differences in height over the complete length of the joint. Before starting with the concreting process, ensure that the panels are aligned correctly throughout their complete width to avoid any misalignments.

Cut-outs, openings and drilled holes

Cut-outs and openings in the finished panels are usually produced in the factory. The factory can also plan the formwork or the edge of the slab (in double walls as an outer shell).

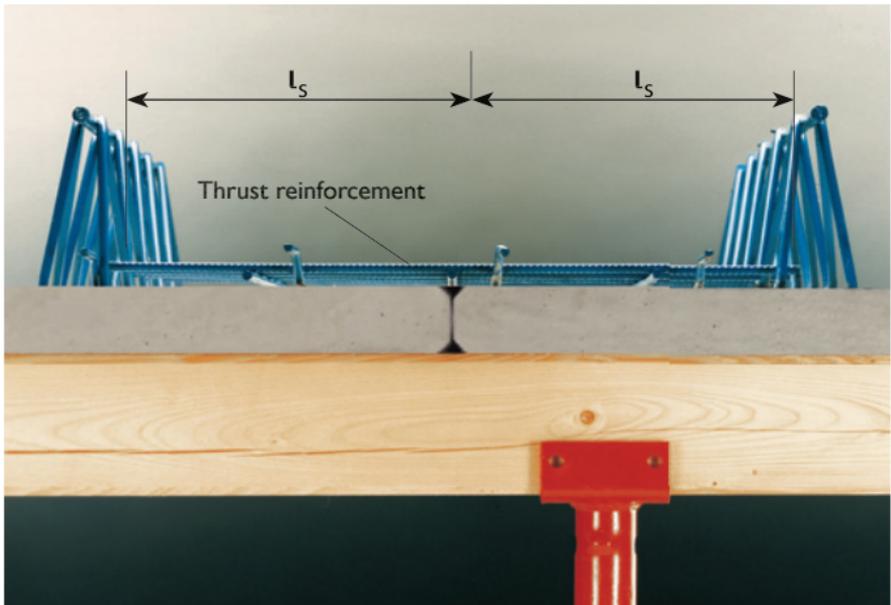
Caution!

Coordinate any additional drilled holes with the structural engineer.

Work from below in case you need to drill any holes, for example, openings for the electrical installation. Chipping on the bottom of the panel will result if you drill from above.

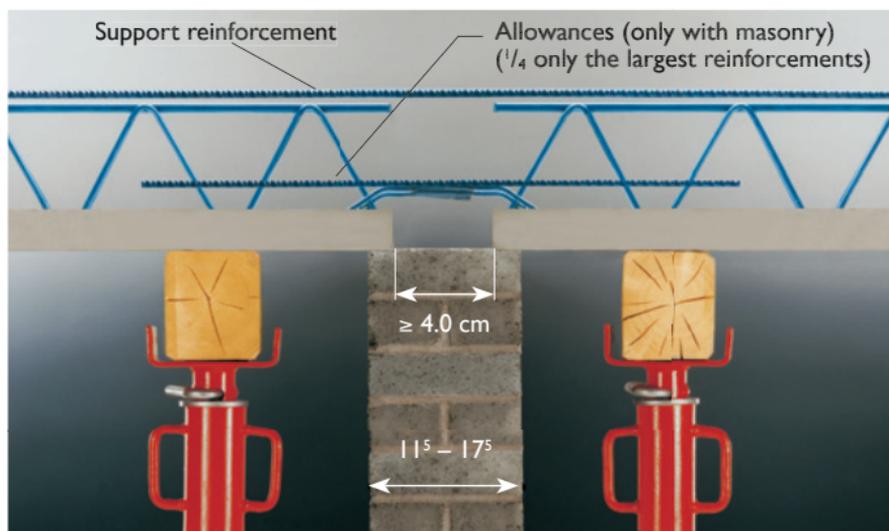
The reinforcements above the joints

Either strips made of concrete steel mats or individual rods are used as thrust reinforcements above the joints between the finished panels. The dimensions for the reinforcements are found in the installation plan. Ensure that the thrust reinforcement is longer than the measurement defined for the panel joint in the installation plan.



The additional reinforcement on the finished panels

The alignment is defined in the installation plan. The additional reinforcement is planned in for replacements, panels tensed crosswise, among others. Refer to the **separate reinforcement plan** for the upper reinforcements of the slab. It is necessary as a support reinforcement when there is continuous slabs and cantilevered panels, for example.



Pressure joints

Remove the pressure joints between the panels required statically according to the installation plan.

Preparing to pour in-situ concrete

Before applying the in-situ concrete, ensure that the

- Finished panels were installed correctly (direction of stress, cut-outs).
- Finished panels are supported and positioned correctly on the supports (refer to p 38).
- Reinforcements above the joints, the additional reinforcements, the upper reinforcements and the installation pipelines have been installed. It could be that the structural engineer will need to approve the reinforcements before the concreting process can begin. This is also valid for stud rails, balcony connections and ventilation lines.

The installation lines

In case installation lines are required in the floor panels, then these must be laid before the in-situ concreting process begins. Observe the structural statics. Request the design since the transverse can weaken through the ventilation lines. Do not damage lattice girders due to the installation of ventilation lines. Ensure that the lines are covered by concrete.

Caution!

Wet the surfaces of the finished panels sufficiently before applying the in-situ concrete.

Remove any dirt from the surface of the finished panels. Only a clean surface can form the necessary bond between the finished panel and the in-situ concrete.

The concreting process

Ensure the concrete has the prescribed quality and consistency so that it can be applied and compacted in one work step.

To avoid overload and potential damage, the in-situ concrete must be applied evenly to avoid any accumulations from arising or being distributed (additional load $\leq 1,5 \text{ kN/m}^2$ or $\leq 1,5 \text{ kN}$ per lattice girder possible).

Do not shift or kick down the reinforcements during the concreting process.

Important:

During the concreting process, ensure from below that the panel joints remain at the same height and that they are under stress. Adjust again if necessary.

The follow-up treatment

The lower ceiling panels must be level. In case the finished panels are not installed tightly, then cement sludge can run through the joints. This is why the joints and wall connections are cleaned following the concreting process.

Complete follow-up surface treatment according to EN 13 747.

Removing the assembly supports

Do not remove the assembly supports until the concrete has sufficiently hardened. In this case, comply with the regulations in the Eurocode 2 and the DBV Bulletin on stripping times.

The current version is located here:
www.syspro.nu



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