

Installing DELTABEAM® Slim Floor Structure

These DELTABEAM® installation instructions are intended to complement the project's erection plan. Peikko's technical support can help with the erection plan if required. If there are differences between the erection plan and this document, the differences should be approved by the structural engineer.

NOTE: IF THE INSTALLATION TOLERANCES OF DELTABEAM® ARE EXCEEDED, PEIKKO MUST BE CONTACTED. DELTABEAM® OR CONNECTIONS BETWEEN DELTABEAM®S CANNOT BE MODIFIED WITHOUT PERMISSION FROM PEIKKO.

Deliveries

DELTABEAM®s are delivered to the site according to the agreed project schedule. Delivery of each shipment should be confirmed with Peikko three weeks prior to shipping. DELTABEAM®s of different lengths are not loaded in the order of installation at the factory because it is not economical or practical. The beams are marked with identification codes in accordance with the drawings.

Storage on-site

The DELTABEAM®'s visible bottom plate is painted with anticorrosive primer. For long-term storage, the beams must be covered. Piling strips are used under the beams to protect the surface treatment. Piling strips should be free from grease or other substances that may damage the surface treatment. When storing beams in piles, the bearing capacity and the level of the surface should be verified.

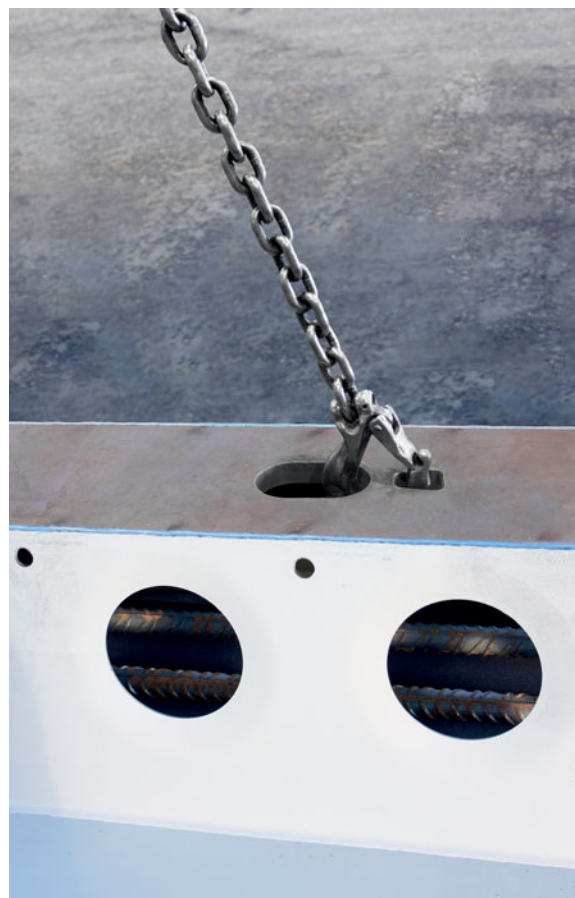
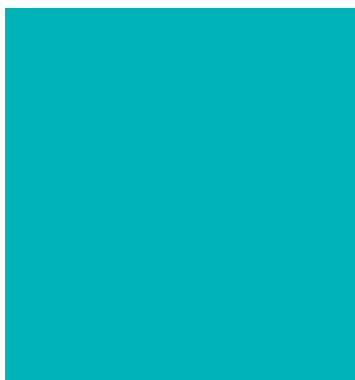


Any damage to the surface treatment should be repaired as soon as possible. The surface treatment should be completed with the top layers as soon as possible.

Lifting and moving

DELTABEAM®s can be lifted and moved using ordinary lifting equipment, such as cranes or forklifts. DELTABEAM® characteristic such as weight, beam number and project number can be found on the identification sticker as shown below. DELTABEAM®s must be lifted using the lifting holes on the top plate symmetrically to the axis of the center of mass. The maximum allowed lifting angle of the chains must be notified.

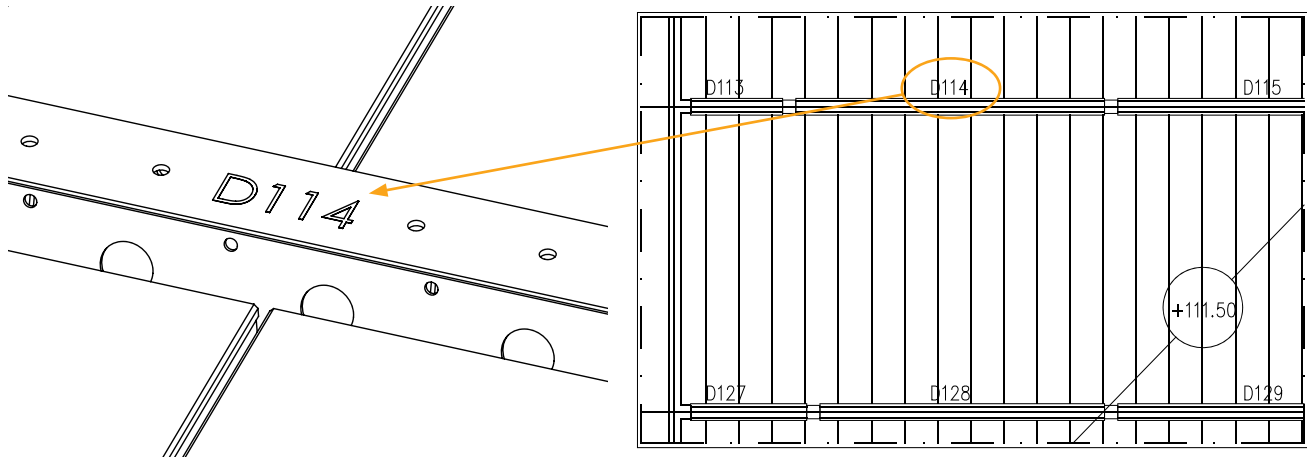
In special cases, when there are no lifting holes, DELTABEAM®s can be lifted with chains attached to the web holes. In some cases, a third chain is needed in order to lift DELTABEAM® and maintain its balance. For example, DELTABEAM®s with wide formwork sheets should be lifted using the lifting holes and a third chain should be assembled to the sheet.



NOTE: ALWAYS USE APPROVED LIFTING CHAINS AND LOCK THE CHAIN HOOKS.
NO LIFTING STRAPS / CHAINS AROUND DELTABEAM®: THIS IS A SAFETY RISK.

Assembling DELTABEAM®s

The project's erection plan must be followed at all times. Every DELTABEAM® has an identification code on the top plate. The beams are installed in such a way that the identification code on the top plate of DELTABEAM® can be read in the same direction as marked in the element lay-out drawing.

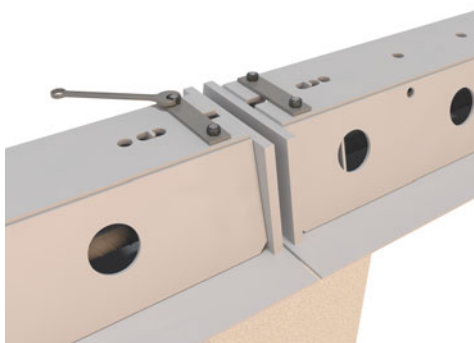


Connecting DELTABEAM®s

DELTABEAM®s are connected according to the project's erection plan, the installation plans, and the connection details. The connection details are specified in the construction plan for each project. Shim plates and steel packs should be placed according to the erection plan. The DELTABEAM® delivery only includes installation material for the connections between DELTABEAM®s (Hinged and Side connections).

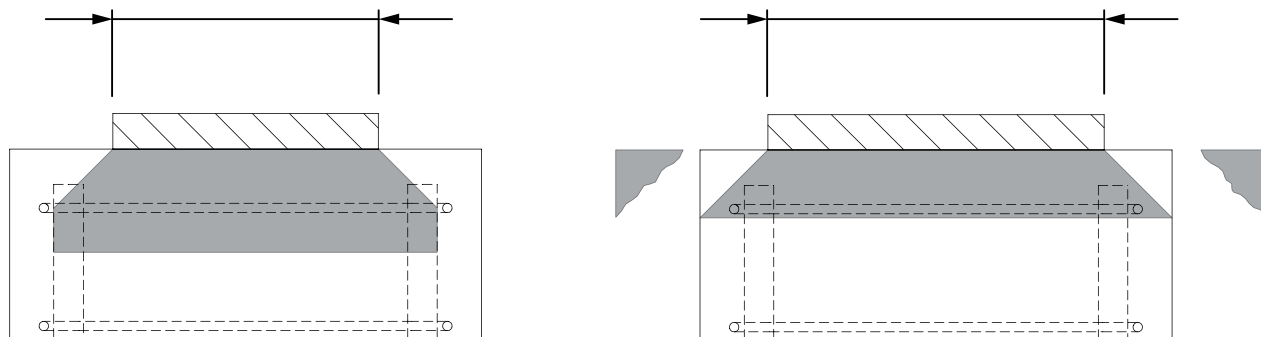
The DELTABEAM®'s weight is not effective enough to stabilize the frame during installation of the slabs. Therefore, DELTABEAM®s should be connected prior to assembling the shoring posts and floor units. This prevents the beams from moving. If on-site welding is required, the process and the qualification of the welders should be in accordance with the erection plan.

Shim plates in Hinged and Side connections are used by default to allow installation tolerance. Installation tolerance is $+ \frac{3}{16}$ " / $- \frac{3}{8}$ " (+5 mm / -10 mm) and the maximum thickness of the shim plates is $\frac{5}{8}$ " (15 mm). DELTABEAM® lengths have been designed with the shim plate so that a $\frac{3}{16}$ " (5 mm) shim plate is set to every connection after DELTABEAM® is installed but before the bolts are tightened. Possible variations to the designed total length of the beam line are taken into account by adding or removing the number of shim plates from other connections within the allowed tolerances.



When assembling continuous DELTABEAM®, the location of each DELTABEAM® and total length of the beam line should be confirmed prior to tightening the bolts in the hinged connections and other connections. The ends of the continuous beam lines must be prevented from uplifting during installation.

Steel packs are placed on the reinforced concrete structure so that the effect of the contact stress remains inside the perimeter of the stirrup reinforcement. The risk of spalling can be reduced by applying chamfers to the edges of the concrete structure. The usage of neoprene is not recommended between DELTABEAM® and the support.



NOTE: DELTABEAM® MUST NOT BE CUT WITHOUT PERMISSION AND INSTRUCTIONS FROM PEIKKO, OPEN OUT BOLT HOLES, etc.

Shoring DELTABEAM®s

Shoring should be carried out according to the project's erection plan prior to assembling the floor units. DELTABEAM®s must be connected according to the erection plan and the connection details before shoring. The locations of the shoring posts and the loads to the posts must be in accordance with the structural engineer's instructions.

The stability of the shoring posts must be confirmed when they are assembled. The foundation for the posts must also be secure and solid. The posts should be assembled as close to the beam support as possible. The shoring posts must be placed at the loaded side of the beam, below the web. The shoring can only be removed when the joint grout and the infill concrete of DELTABEAM® has reached a minimal strength of 3000 psi (20 MPa) unless specified otherwise by Peikko's engineers.

With hollow core slabs, DELTABEAM® shoring is used only to prevent the rotation of the beam at the supports. The function of DELTABEAM® shoring posts are not to prevent deflection. DELTABEAM® should never be shored at mid-span. The hollow core slabs should not be shored without permission from the manufacturer.

When DELTABEAM® is bearing on the end of a wall running parallel with the beam the shoring plan prepared by structural engineer should be followed.



Location of shoring post with PCs® Corbel connection



Location of shoring posts with DELTABEAM® bearing on a wall

The DELTABEAM®'s wide formwork must always be shored. The shoring posts must be placed at maximum 4ft (1.2m) c/c.



Special attention should be paid to asymmetrically supported beams, long beam spans, or tall shoring posts. Peikko can offer special solutions to shoring problems, although this must be taken into account in the DELTABEAM®'s' design.

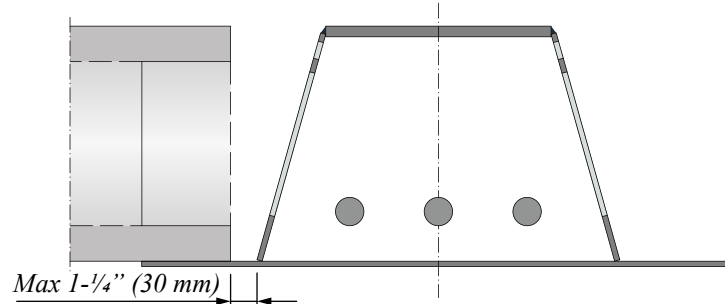
NOTE: DELTABEAM® SHORING IS USED WITH ALL TYPE OF FLOORS ONLY TO PREVENT THE BEAM FROM ROTATING AT ITS SUPPORTS.

Assembling floor units

The DELTABEAM®'s' connections and the shoring posts must be securely installed, tightened, or welded before assembling the floor units. To minimize the rotation of the beam, the floor units should be assembled alternately on different sides of the beam. After the slabs are installed, the necessary formwork, edge forming, and slab reinforcement will be carried out.



Floor units should be assembled directly on the beam ledge. Usage of neoprene is not recommended. Floor units should be assembled so that there is a gap of a maximum of 1-1/4" (30 mm) between the DELTABEAM®'s web and the end of the floor unit. If this gap is exceeded, contact Peikko or the structural engineer. Finally, all holes on the bottom side of DELTABEAM® (locations of consoles, Side connections and Gerber connections) should be blocked. The joint and ring reinforcement are also assembled.



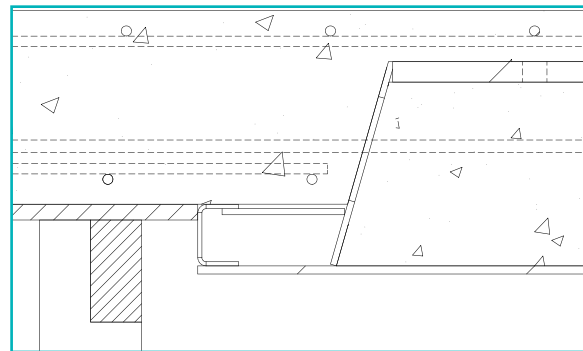
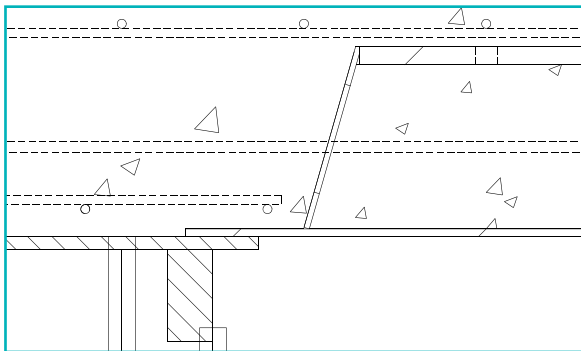
The composite steel sheet should be assembled according to the erection plan. The composite steel deck should be supported at the same elevation as the beam following the precamber shape. No room for settlement should be allowed. The precambering is fabricated to DELTABEAM® to ensure that DELTABEAM® is level after the floor is installed.

NOTE: MATERIAL MUST NOT BE STORED ON THE FLOOR BEFORE THE INFILL CONCRETE HAS REACH REQUIRED STRENGTH.

THE FLOOR ABOVE MUST NOT BE BUILT UNTIL THE INFILL CONCRETE HAS REACH REQUIRED STRENGTH.

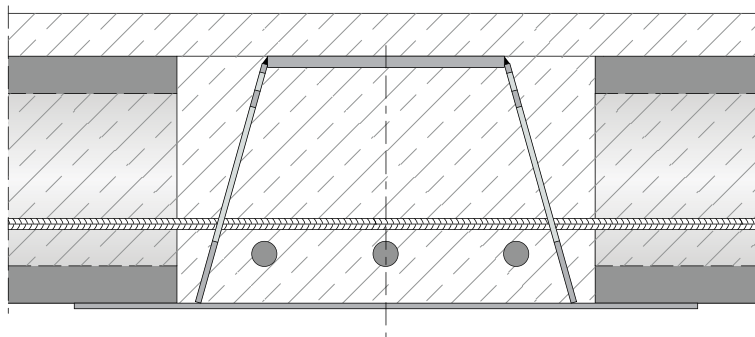
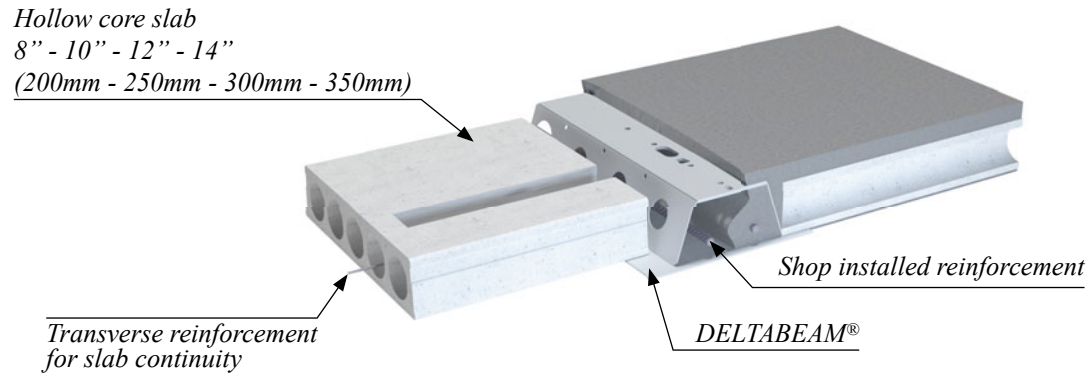
Cast in place concrete slab

Cast in place concrete slabs are built to the nominal level. To achieve a flush bottom surface with a cast in place slab, it is recommended that the formwork be built under the bottom plate. When the beam has a downstand on the beam ledge, the formwork is built against the web of the downstand.



Reinforcement

Reinforcement is installed in accordance with the erection plan. The DELTABEAM®'s minimum transverse reinforcement is 2×#5 rebar @ 48" c/c (15 M @ 1220 mm c/c). The transverse reinforcement must be assembled even if rebars are being bent over DELTABEAM®. The transverse reinforcement should always pass through the DELTABEAM®'s web holes or through the additional web holes (with deep DELTABEAM®s).



Casting the concrete

DELTABEAM®s are cast with concrete simultaneously with the slab or the joints of the hollow core slabs. DELTABEAM® must be filled with concrete in one run. DELTABEAM® must be cast completely in order for it to secure the properties of a composite beam. DELTABEAM® is designed for a temporary live construction load of 10 psf (0.5 kN/m²).

Structural concrete is always used when casting the concrete. The maximum aggregate size shall not exceed ½" (13mm) with a recommended maximum size of ⅝" (8mm). It is recommended that the concrete have at least a 9" slump to allow for proper placement. The minimum concrete strength shall be 4500 psi (30MPa). The lower parts of hinged and Side connections must be properly filled with concrete. Topping concrete is cast according to the erection method statement.

Casting the concrete:

1. Confirm that DELTABEAM® is clean for casting.
2. Confirm that the formwork and the reinforcement are in accordance with the design.
3. Initial infill may be done through the casting holes in the top plate. DELTABEAM® is filled with concrete up to the bottom edge of the web holes.
4. After the initial infill, the final concreting is done only from one side of DELTABEAM®.
5. Ensure that DELTABEAM® is completely filled with concrete by checking the air holes on the opposite side of DELTABEAM®. The beam is full when concrete runs through the air holes. Concrete spillage over the beam must be avoided as this will make it harder to observe whether the beam is full.
6. Compact the concrete with a vibrator while concreting. The entire infill process may be done through the casting holes in the top plate, but it will be slower and require more work with the vibrator to run the concrete. Mind the formwork plate and the vertical web when using a vibrator.



Additional fire protection

The vertical web of the EDB-type DELTABEAM® must be protected against fire on-site if the vertical web is not protected against fire by permanent structures such as walls. A wall would act as permanent structural fire protection. If DELTABEAM® is being connected to a fire-protected steel structure, the extent of fire protection must be done according to the erection plan.

On-site check list

1. Storage on-site

- Use piling strips to protect the surface treatment
- Cover DELTABEAM®s in long-term storage on-site

2. Lifting and moving

- DELTABEAM®s are lifted by the lifting holes located in the top plate. Always lock the chains.
- Note the maximum allowed lifting angle of the chains

NO LIFTING STRAPS / CHAINS AROUND DELTABEAM®: SAFETY RISK

3. Assembling DELTABEAM®s

- First check the instructions and the requirements in the erection plan
- DELTABEAM®s are installed in such a way that the identification codes of the beams read in the same direction as marked in the element lay-out drawing
- The beams must be connected to shoring posts prior to beginning the assembly of the floor units (hollow core slabs)
- When assembling DELTABEAM®s on reinforced concrete columns, use either one wide steel pack or two smaller packs: one small pack in the middle is not sufficient
- Prior to tightening the bolts on the hinged connections, check the location of each DELTABEAM® and the total length of the beam line

4. Shoring

- Each beam should have four shoring posts, two at both ends.
- With hollow core slabs: Place shoring posts as close as possible to the DELTABEAM® supports.
- Posts must be placed under both web of the beam.
- With other floor types the erection plan must be followed
- Remove shoring posts only after the concrete has reached required strength

5. Assembling floor units

- Assemble the floor units directly on the beam ledge
- Max. 1-¼" (30 mm) gap between the DELTABEAM®s web and the end of the hollow core slab
- To minimize the rotation of the beam, assemble floor units alternately on each side of the beam

6. Reinforcement

- The minimum transverse reinforcement through DELTABEAM®s is rebar #5 @ 48" c/c (15 M @ 1220 mm c/c), from slab to slab in joints or voids
- In edge beams use L-shaped rebars

7. Casting the concrete

- Fill in one run, fill only from one side, observe from the other side. The beam is full when concrete starts to run through the small air holes in the upper part of the web. Mind the formwork plates when using a vibrator.
- Ensure that concrete fills the gap between hinged and Side connections

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