Installation handbook for the precast plant

3. Installation handbook

The installation of WILJA® Lifting Inserts in the precast plant or on site must be performed in a precise manner to ensure full load capacity of the WILJA® Lifting Inserts. The following information is important for a safe and adequate installation.

3.1 Personnel and safety requirements

Peikko products must be used by trained, qualified, experienced, and properly supervised personnel, adhering to the safety standards in this manual.

WARNING:
If untrained personnel use lifting systems, there is a risk of incorrect use, which may lead to items falling and may cause severe injury or death.

The user must evaluate the product application to determine the safe working load and control all field conditions to prevent applied loads from exceeding the product's safe working load. If it is not possible to define the loads acting on the insert through calculation (e.g. highly structured elements), inserts must then be installed in such a way that every insert is able to carry the unit's entire weight.

During the installation procedure, the operator is subject to different exposures (e.g. noise, dirt, dust, vibration, thermic influence, oil, and grease). The use of personal safety equipment is recommended.

3.2 Installing and positioning of the WILJA® Lifting System

The WILJA® Lifting System components are installed in a precast plant. During concreting proper compacting of the concrete is necessary to avoid air bubbles which affect the load impact.

Ensure that the surroundings and environmental conditions are dry and clean for installation. Any kind of environmental pollution must be avoided or minimized at any time.

The following must be considered prior to installing any type of lifting system:

- All personnel fulfill the requirements of the documentation and are familiar with it
- The limitations of applications and restrictions are known
- The design assumptions are defined and known.

During installation of any type of lifting system, the installation tolerances specified by the manufacturer must be complied with. The installation tolerances for vertical and horizontal positions are given in *Figure 21* and *Table 13*. The insert can incline a maximum of 2.5° in either direction and angle tolerance must remain within 5° of tolerance towards the insert axis.

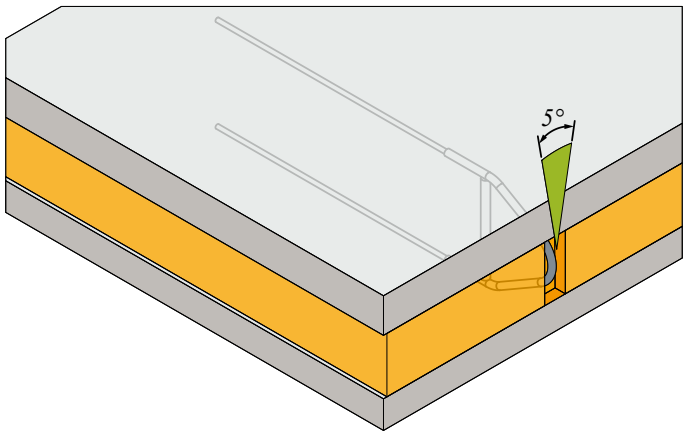
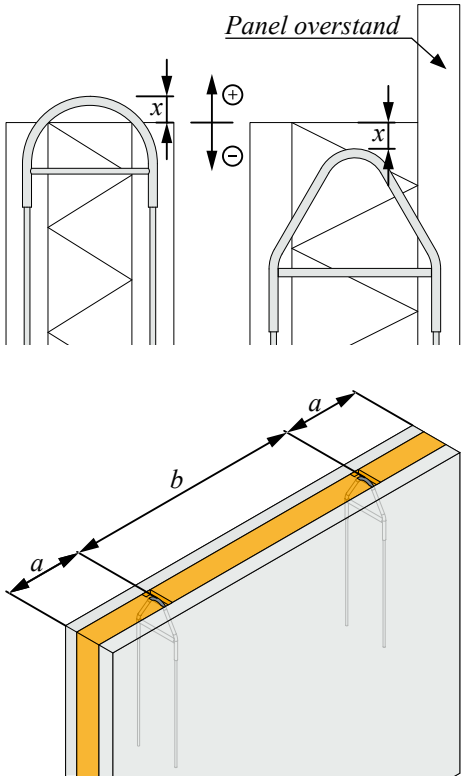


Figure 21. Angle tolerances for installation.

Table 13. Installation tolerances for WILJA® Lifting Insert.

Type	*x* [mm]	
WILJA® 2	+25	-50
WILJA® 3	+25	-50
WILJA® 4	+25	-50
WILJA® 5	+25	-50
WILJA® 6	+25	-50
Type	***a*** **[mm]**	***b*** **[mm]**
WILJA® 2	±25	±50
WILJA® 3	±25	±50
WILJA® 4	±25	±50
WILJA® 5	±25	±50
WILJA® 6	±25	±50



The items are installed by wire fixing the WILJA® Lifting Inserts to the element reinforcement which helps to comply with the tolerance requirement according to *Figure 21* and *Table 13*. The correct position after the concrete hardens ensures product usability and application according to design.

If an element has an insulation thickness that differs from standard WILJA® Lifting Inserts range (e.g. 19 cm, 21 cm, 23 cm), the next available size shall be used. The installation is performed in such a way that the minimum installation depth c_{min} (*Table 5* and *Figure 4*) has to be increased to 50 mm (*Figure 22*). This is also valid for insulation thicknesses where the correct WILJA® Lifting Inserts size is not in stock. A WILJA® Lifting Inserts for the next even size (insulation thickness +20 mm) can be used if the installation depth c_{min} is increased in both panels.

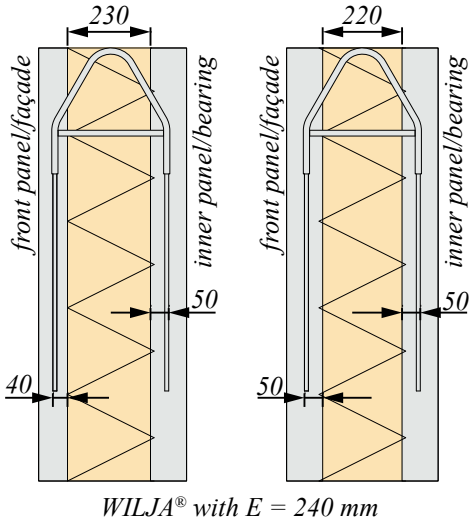


Figure 22. Uneven insulation thickness.

Lifting systems can be placed in almost any position in the concrete element. The user can choose whether the central, left, right, upper or lower position supports the application. Before installation and use, the position of the insert must be considered. It must always be higher than the center of gravity to prevent the element from tipping over as shown in *Figure 23*.

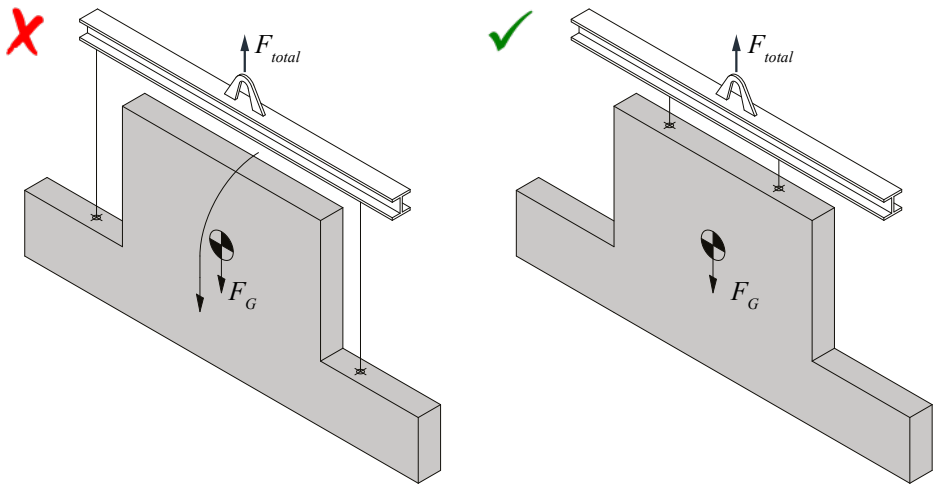


Figure 23. Lifting points lower than the center of gravity.

PLEASE NOTE:
Elements that tip over can cause severe injury to the user's limbs. Always ensure that the center of gravity is known, and the inserts are correctly positioned before attaching elements to hoisting equipment.

3.2.1 Welding and modification considerations

Peikko cannot control field conditions or field workmanship; it therefore cannot provide a guarantee for any Peikko product that has been modified in any way after it has left the manufacturing facility. This includes welding, bending (except information in chapter 1.1.10), heating it up, cutting and filing.

WARNING:
Never weld any of Peikko's products.

3.2.2 Corrosion, chemical effects, weather condition and concrete hardening

Corrosion may occur on exposed metal products when architectural precast elements are etched or acid washed. The amount of corrosion will depend on the acidity of the wash and/or the type of chemicals used. Similar effects may occur by using products in a chemical and industrial environment and in coastal zones that have a salty environment.

For lifting systems that are permanently exposed to weather, chemical conditions, and seawater atmospheres the usability of products might be affected by corrosion. Ensure that corrosion of lifting systems is prevented during storage, transport, and installation. In extreme conditions we recommend using inserts made of highly resistant stainless steel.

All Peikko lifting systems are delivered in useable condition. No further surface treatment (e.g. galvanizing, painting) is needed. Such treatments may result in unexpected embrittlement of the product.

WARNING:
Never galvanize or coat Peikko's products in any way.

All lifting system parts are subject to ultraviolet radiation. Prior to use, ensure that the products are not affected by material aging caused by ultraviolet radiation. Material aging effects occur on products that are kept in stock for extended periods or that have suffered the effects of bad weather.

All Peikko WILJA® Lifting Insert are from stainless steel. During the winter period, we recommend covering the WILJA® Lifting Insert and recess to avoid snow and ice from hampering use.

After final usage of Peikko lifting products further use is explicitly prohibited.

The concrete hardening process depends very much on environmental and temperature conditions. During the lifting application the concrete must be of the correct strength.

PLEASE NOTE:
A series of concrete cubes can help to determine the development of the concrete's strength before the lifting application starts.

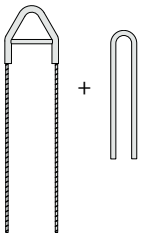
Checklist Precast Plant

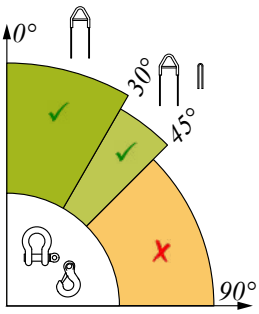
	NO then...	YES
Has the personnel the necessary qualification for the installation?	Check “Personnel and safety requirements” on page 28.	
Has the lifting insert been installed correctly? Are the geometrical requirements like edge distance and distance between inserts fulfilled?	Check *Figure 21*, *Figure 22*, *Table 5*.	
Have the tolerances been kept (minimum panel thickness, spacings, concrete cover)?	Check *Table 13* and *Figure 22*.	
WILJA® will be used in combination with PD Diagonal Ties.	Check on page 16.	
If rebars of the WILJA® Lifting Inserts have been bended, does bending follow the requirements?	Check on page 15.	
Cutting or welding the insert or heating it up is not allowed!	Check on page 30.	
Every layer of a sandwich element must be reinforced at least with 1.88 cm^2/m (B500) or 1.31 cm^2/m (B600) crosswise.	Check *Table 6*.	
Additional reinforcement is necessary for WILJA® 5 and 6 (see *Table 6*) in general and for all lifting procedures with diagonal pull 31° to 45°.	Check content of pages 12 to 13.	
Has the WILJA® Lifting Inserts and the reinforcement been fixed properly, so that it will not move during concreting process?	Check page 28.	
Has the concrete been properly compacted in the region of the insert placement?	Check page 28.	
Are the limitations of applications and restrictions known and have the design assumptions been defined and transferred?	Check “Handbook for the planning process” and internal documentation.	

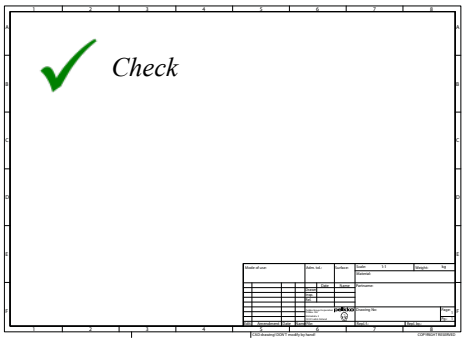
WILJA® Lifting System

WILJA®

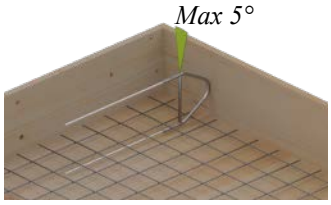
1. SELECTION







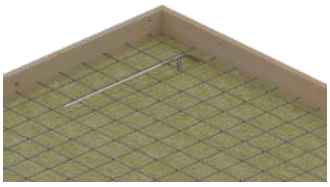
2. INSTALLATION



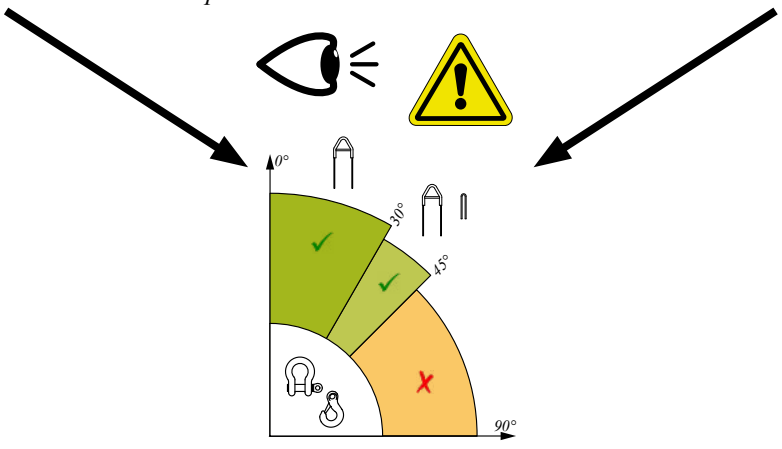
Reinforcement

Concrete
1st panel

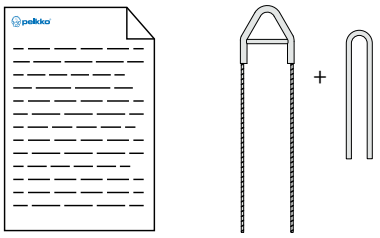
Insulation

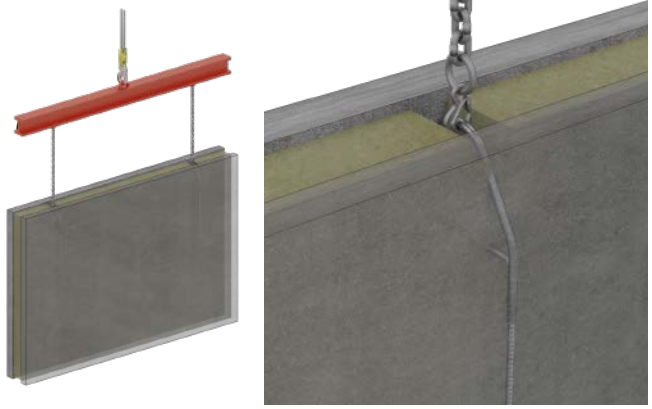


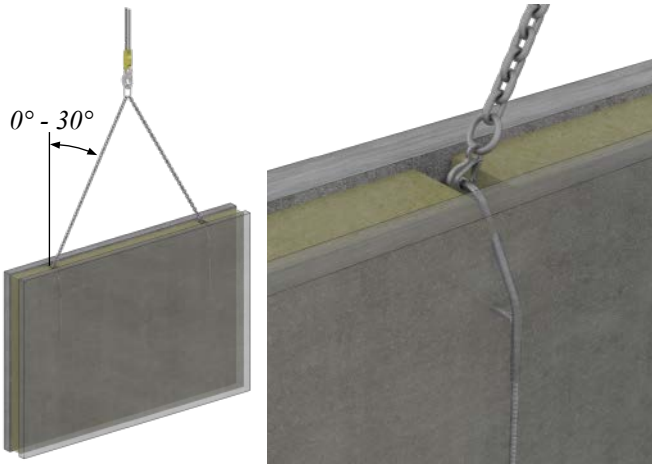
Reinforcement
2nd panel

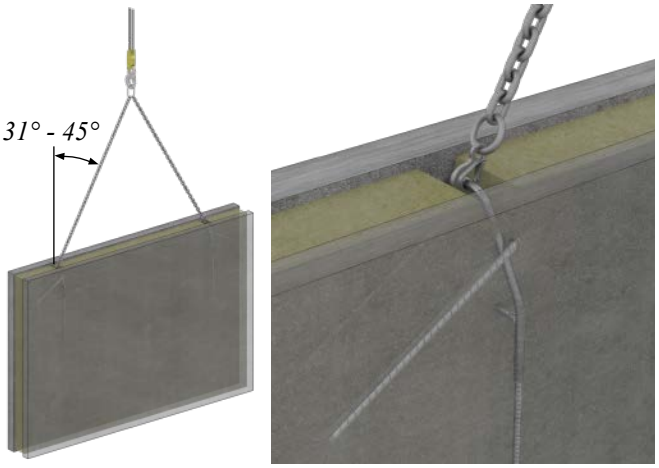


Concrete
2nd panel

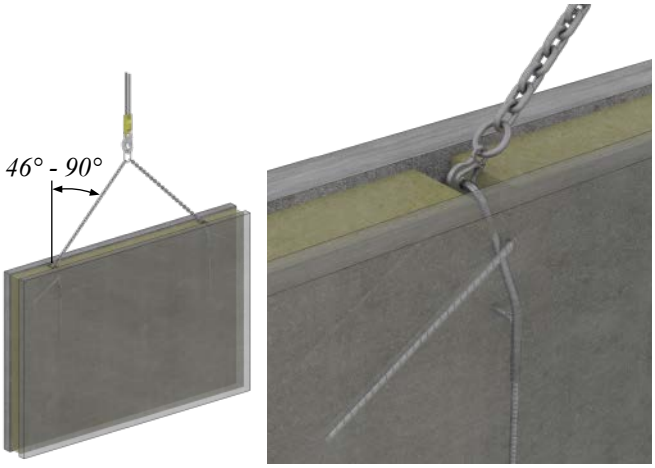


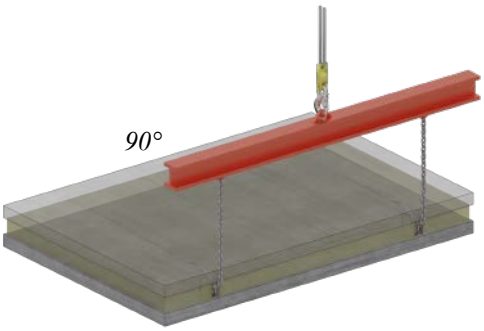


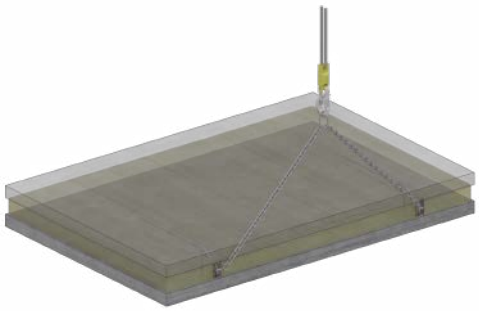




Only with additional reinforcement







Note. *Tilt-up only with Tilt-up table.*

User's handbook for the lifting application

4. User's handbook

The attaching of lifting keys to WILJA® Lifting Insert, after the concrete is strong enough to carry the impacted loads, must be performed properly, so that accidents or failures of any kind are avoided. The following information is important for a safe load attachment of lifting keys to WILJA® Lifting Insert.

4.1 Loading, lifetime and environmental conditions

WILJA® Lifting Insert are designed for use in precast elements for transportation and with a temporary attachment to standardized lifting keys.

Multiple lifts can be completed before the final installation. The lifting system must not be installed or used in crane counterweights.

The lifetime of lifting systems begins with stocking and extends to the final installation of the precast element on the construction site. This might be hours, days, or sometimes weeks or months. During this time, it is essential to protect any recess against dirt, pollution, and water. This can be achieved by using a cover or by storing elements in dry conditions under a roof or other shelter.

All precast concrete elements in which WILJA® Lifting Insert can be used must be made from normal concrete according to EN 206. The minimum compressive cube strength must be $f_{ck,cube}$ = 15 MPa in normal cases. Exceptions for lower concrete strength require individual confirmation.

$$f_{ck,cube} = 15\ MPa$$

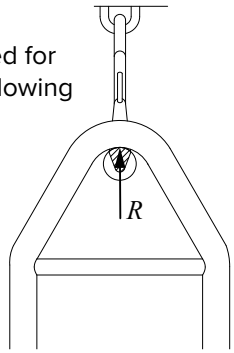
All Peikko lifting systems must be installed and used in clean, dry surroundings and environmental conditions. Environmental pollution needs to be minimized at all times. Normal humidity does not affect the durability. Dampness resulting from the concreting procedure is permissible and does not affect the usability.

To avoid cold bridge between façade - and load bearing panels it is possible to cut the visible area of WILJA® Lifting Insert after the sandwich element is installed and fixed to it's final position on the construction site. The insert slot can be filled with insulation e.g. with rockwool.

4.2 System compatibility

Peikko WILJA® Lifting Insert can be used with standardized lifting keys. These should be designed for at least the same load directions as WILJA®. The WILJA® Lifting Insert are compatible with the following lifting keys:

- Crane hooks, wire hooks and chain hooks of grade 8 or higher 
- Shackles (bolt diameter $>2R$ = 30mm) 



Lifting keys are subject to exchanging and forwarding actions during multiple lifting processes. Clarify compatibility prior to using any lifting keys in combination with WILJA® Lifting Insert.

WARNING:
Incompatible lifting keys may cause accidents and severe injuries.

4.3 Storage situation

Lifting components must be stored and protected in dry conditions, preferably under a roof. *Figure 24* shows a suitable storage location.

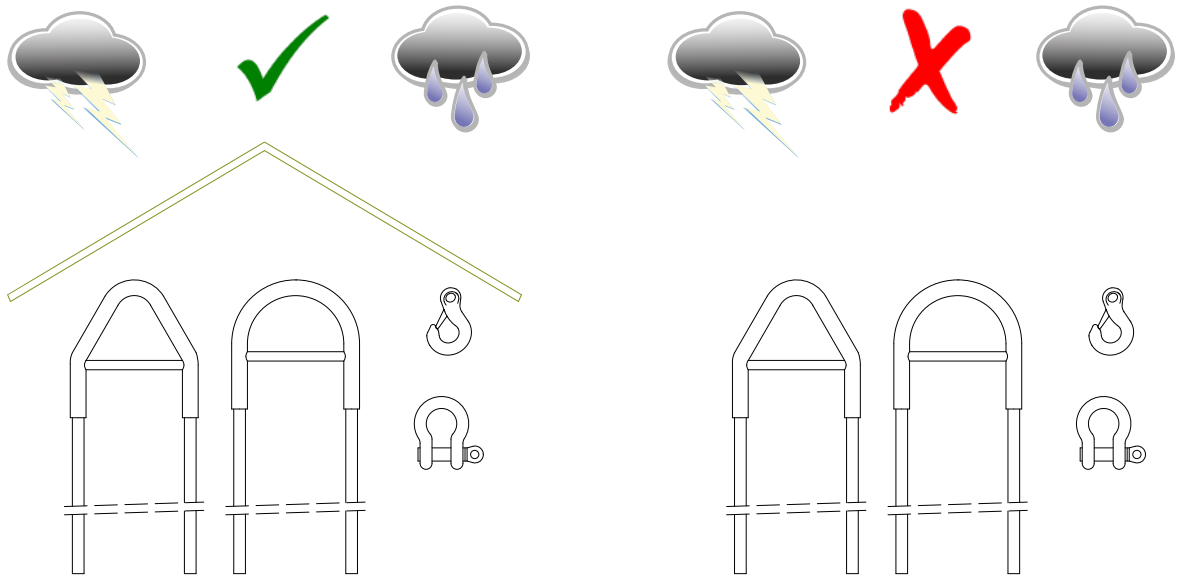


Figure 24. Storage location.

WARNING:
Lifting keys are subject to corrosion when they are unprotected and exposed to outdoor weather conditions such as large temperature variations, snow, ice, humidity, acidic atmospheres, or salt and sea water impact. These conditions may cause damage and shorten the standing time, which increases costs.

Lifting keys must be used by experienced and trained personnel. This reduces the risk of severe damage and injury. Always execute every lifting process according to the instructions.

The following are mandatory instructions for safe working. They must be complied with exactly whenever lifting systems are in use.

WARNING:

- Operate manually. Do not use any tools such as bars or claws.
- Visually inspect all lifting keys before use.
- Check and clean all Lifting Keys and inserts before use.
- Inspect all lifting keys regularly for safety purposes.
- Lifting keys to be stored under appropriate environmental conditions.
- Bear in mind local regulations for safe lifting and hoisting at any time and consider the design assumptions described in this manual.
- Don't break concrete around the WILJA® Lifting Insert and never rework mechanically (see *Figure 25*).

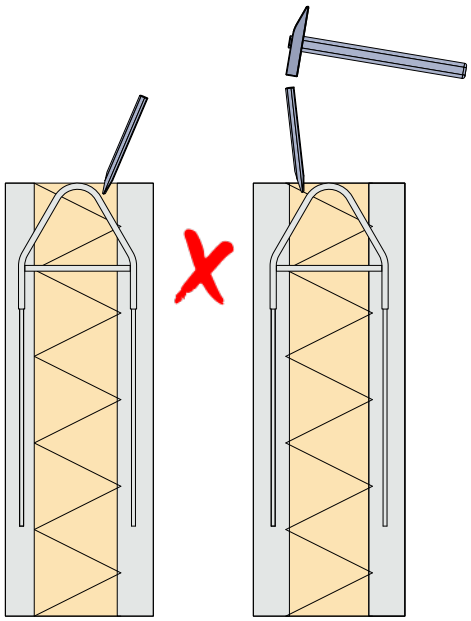


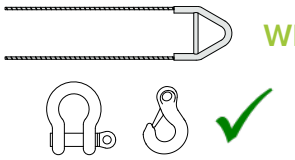
Figure 25. Rework at WILJA® Lifting Insert.

The correct lifting and handling guidelines must always be available when hoisting. This information must be supplied by the employer to all personnel concerned.

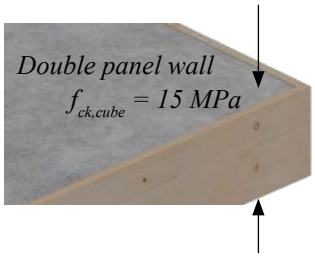
Checklist Lifting application

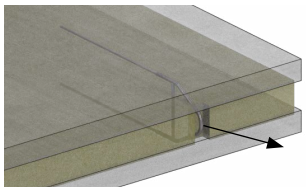
	NO check...	YES
Do the personnel have the necessary qualification for the lifting process?	Check page 28 and page 36.	
Visual check of installed inserts and concrete element. Inserts undamaged and at the right place? Do the shop drawings match the element?	Check page 23, "Handbook for the planning process", and internal documentation.	
Visual check of lifting equipment. Are chains, shackles etc. marked clearly with their working load limit, manufacturers name or symbol and a CE sign? No damage or significant wear out visible?	Check pages 35 and 36 and local regulations for lifting keys and safety regulations.	
Is the working load limit of lifting insert and lifting hardware enough for the designed loads?	Check page 17 and following.	
Lifting slings can be attached directly to the WILJA® Lifting Inserts. Minimum diameter d of the hook or shackle is 30 mm.	Check page 35.	
Load directions according to design of the wall element? Remember: Angular pull between 31° and 45° requires additional reinforcement.	Check content of pages 12 to 14.	
The minimum compressive cube strength of the concrete at first loading must be 15 N/mm^2.	 $f_{ck,cube} = 15\ MPa$	
WILJA® Lifting Insert are designed to withstand a temperature range of -20°C to +80°C.	Check existing temperature.	
Is there a need for temporary bracing to prevent the element from falling down after lifting procedure?	Check "Handbook for the planning process" and internal documentation.	
Have the necessary preparations been completed prior to the operation? Enough space, minimum number of people in the high-risk zone.	Check "Handbook for the planning process" and internal documentation.	

WILJA® Lifting System

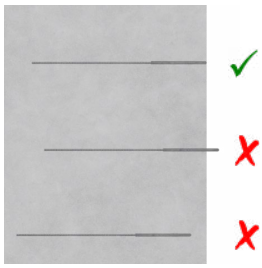


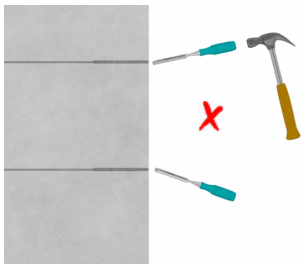
3. CASTING



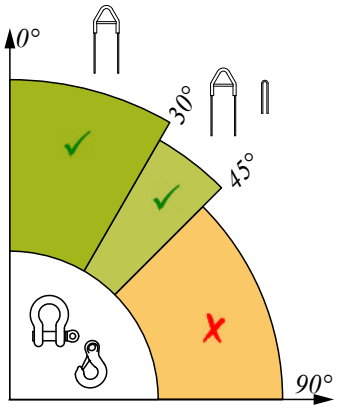


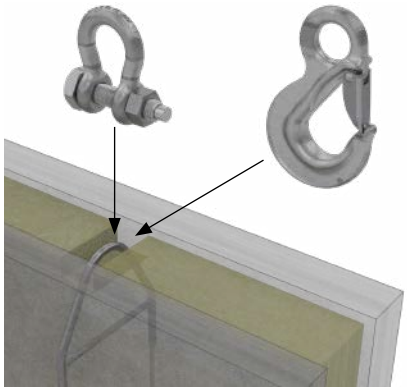
Remove local insulation at insert region





4. LIFTING





5. OPTIONAL CUTTING

After final use fill the insert region with insulation

6. LIFTING ANGLE INFLUENCE