

# TECHNICAL MANUAL



## WILORA® Connecting Rail

Wire loop rail for wall connections

Version PEIKKO GROUP 02/2024



# WILORA® Connecting Rail

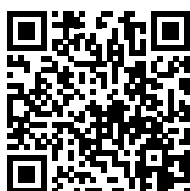
## Wire loop rail for wall connections

WILORA® Connecting Rail is a wire loop connection system for forming joints between precast wall-to-wall or wall-to-column connections. The design allows for the transfer of tensile load, transverse shear load, vertical shear load, and combinations of these loads.

WILORA® Connecting Rails are manufactured of profiled steel rail with five wire loops inside that are protected by a deck. The rails are installed on the formwork at the full length of the joint, creating the casting channel with no extra work needed. Fixation to formwork is simple with basic tools, and less measuring needed with fixed wire loop positions.

After casting, the formwork is removed, the protective is taken off and the wire loops are bent open. The patented wire remains in opened position, making rebar installation easy.

A pair of WILORA® Connecting Rails together with the installed vertical rebar and the grouting material create a joint that is resistant to shear and tensile forces. The use of thixotropic grout makes WILORA® Connecting Rail system suitable for a wide range of applications.



# CONTENTS

<b>About WILORA® .....</b>	<b>4</b>
<b>1. Product properties .....</b>	<b>4</b>
1.1 Structural behaviour .....	5
1.1.1 Temporary conditions .....	5
1.1.2 Final conditions.....	6
1.2 Limitations for application .....	6
1.2.1 Loading and environmental conditions.....	6
1.2.2 Thickness of the precast panel .....	6
1.2.3 Positioning the WILORA® Connecting Rail.....	7
1.3 Other properties .....	7
<b>2. Resistances .....</b>	<b>8</b>
2.1 Tensile resistance .....	8
2.2 Vertical shear resistance .....	9
2.3 Transverse shear resistance .....	10
2.4 Fire resistance .....	10
<b>Annex A – Additional reinforcement .....</b>	<b>16</b>
<b>Installation of WILORA® Connecting Rails .....</b>	<b>20</b>
Installing the product – Precast factory .....	20
Installing the product – Construction site.....	22

## About WILORA®

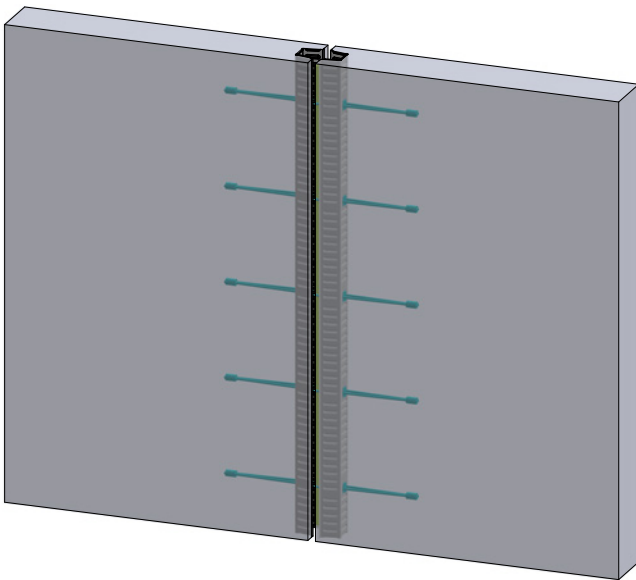
### 1. Product properties

WILORA® Connecting Rails are used for connecting structural or non structural precast concrete wall elements to create wall-to-wall or wall-to-column connections. WILORA® Connecting Rail consists of a recess rail, five wire loops, and a protective tape.

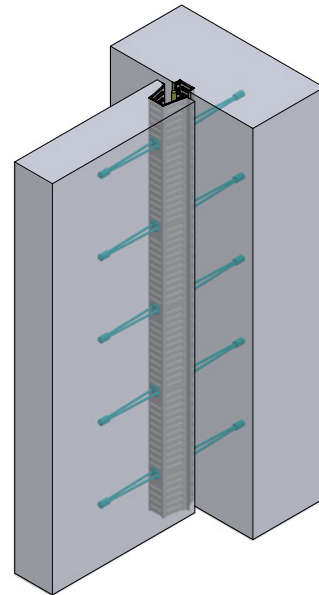
WILORA® Connecting Rails are attached to the formwork at the wall's full height and create a continuous joint before the element is cast. After installation of the precast element on site, the wire loops, the vertical reinforcement (placed into the wire loops), and the grouting mortar create a joint which resists shear forces and tensile forces.

WILORA® Connecting Rails are available in two models for different applications:

- WILORA® 50 is designed for standard wall-to-wall connection where there is sufficient space to insert a 50 mm deep rail (*Figure 1*).
- WILORA® 20 is designed for applications where a 20 mm deep rail should be installed to a concrete cover. WILORA® 20 is used in combination with WILORA® 50 in joints such as T-wall joint or wall-to-column joint (*Figure 2*).



*Figure 1.* WILORA® 50 in a straight wall-to-wall connection.



*Figure 2.* WILORA® 20 + WILORA® 50 in a T-wall joint connection.

## 1.1 Structural behaviour

WILORA® Connecting Rail is designed to transfer vertical shear forces ( $V_{Ed,\parallel}$ ), transverse shear forces ( $V_{Ed,\perp}$ ), tensile forces ( $Z_{Ed}$ ), and their combinations in wall-to-wall or wall-to-column connections. They are used to create the rough surface of the wall joint for transferring shear forces (either vertical or transverse). The rough surface, determined by EN 1992 1.1 section 6.2.5, is a surface of at least 3 mm of roughness. Grouted rough surface of the joint, along with the crossing wire loops (see Figure 3 and Figure 4), form a strut and tie model in the connection. Grouting serves as a “concrete strut” transferring compression and wire loops work as “ties” transferring tension in the joint.



Please note that WILORA® Connecting Rail is not designed for connecting floor slabs or beam to column connection.

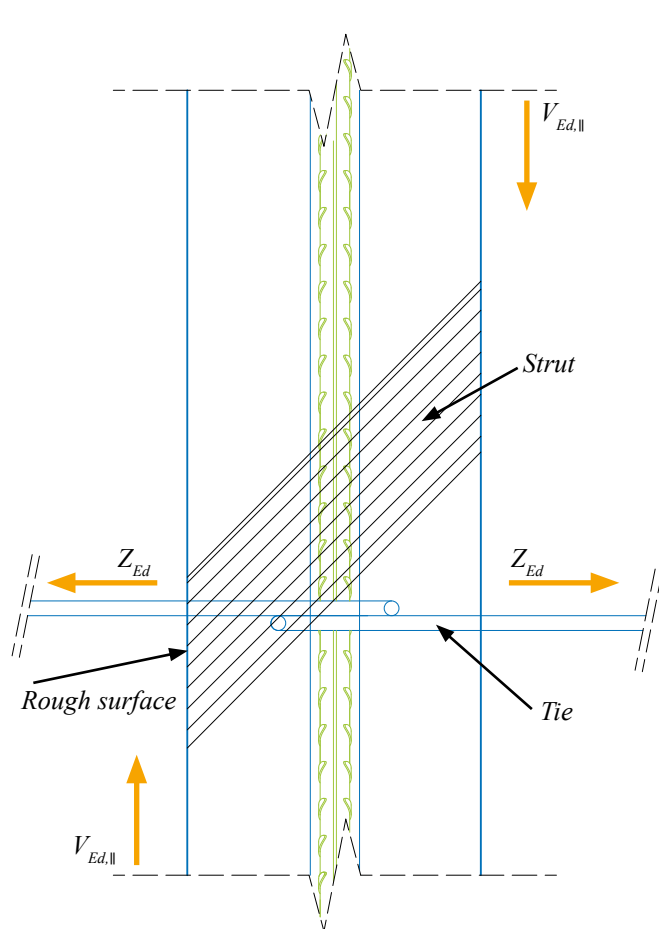


Figure 3. Strut and tie model for vertical shear load transfer.



In the case of transverse loads, the joint connected by the WILORA® Connecting Rail works as a hinge joint. It is not possible to transfer any bending moments using the connection.

### 1.1.1 Temporary conditions

WILORA® Connecting Rails are not designed to transfer any loads during the erection stage with an ungrouted joint. The vertical stability of the concrete precast element during the erection stage must be secured by other measures, such as a temporary bracing system. The opened joint must be grouted with thixotropic BETEC Thixo (alternative BETEC 193). Prior to loading any structures, the system must have the required strength determined by the design of the joint.

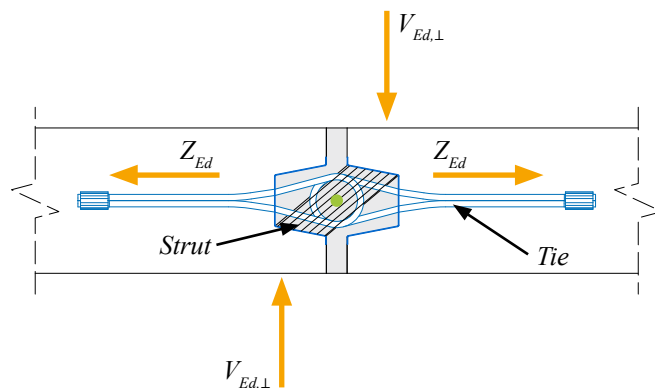


Figure 4. Strut and tie model for transverse shear load transfer.

## 1.1.2 Final conditions

In the final stage, after the grouting has reached the required strength (usually 60 N/mm<sup>2</sup> after 7 days), the connection can be loaded by other structures and transfers loads using the strut and tie model explained in Section 1.1.

## 1.2 Limitations for application

Standard models of WILORA® Connecting Rails are designed for use under the conditions mentioned in this section. If these conditions cannot be satisfied, please contact Peikko Technical support.

### 1.2.1 Loading and environmental conditions

WILORA® Connecting Rails are designed to transfer predominantly static loads. Resistances of the connecting rails are given in the approval of the DIBt. Constrain forces for the precast element joint resulting from temperature deformation or other weather conditions (except wind load) must be excluded from design of the WILORA® connection. Those must be covered by other manners. In the case of dynamic or seismic loads, please contact Peikko Technical Support.

The connecting rails are designed for use in both indoor and outdoor conditions. The rail and the wire loops are electrogalvanized. To ensure resistance against corrosion, the concrete cover of WILORA® Connecting Rail, including the wire loop and the recess rail, must fulfil the minimum requirements determined by EN 1992-1-1; section 4.4.1.

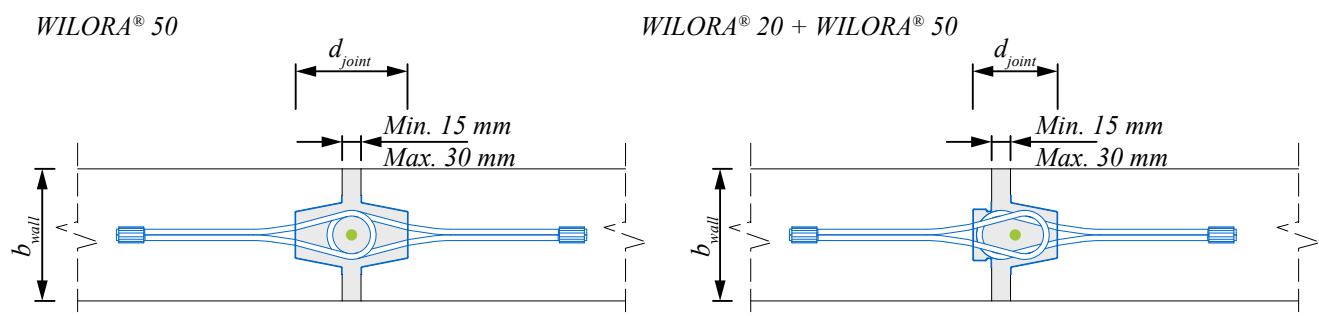


WILORA® Connecting Rails may not be used for lifting wall elements. Lifting systems such as JENKA, KK or RR from Peikko product portfolio can be used for this purpose.

### 1.2.2 Thickness of the precast panel

The minimum values for thickness of wall panels are given in Table 1.

Table 1. Minimum value for thickness of wall panels and ideal joint width.



WILORA® Connecting Rail	$b_{wall}$ [mm]	$d_{joint}$ [mm]	Joint width [mm]	Wall type
WILORA® 20+50	140	90	Min. 15 Max. 30 mm	Load bearing
WILORA® 50	140	120		Load bearing



### WARNING:

The rebar installation is only possible with a joint width of 15 mm to 30 mm.

### 1.2.3 Positioning the WILORA® Connecting Rail

WILORA® Connecting Rails are designed to be used in reinforced concrete walls or columns with the minimum concrete grade of C25/30. The structural properties of WILORA® Connecting Rails are guaranteed only with BETEC Thixo grout (alternative BETEC 193).

### 1.3 Other properties

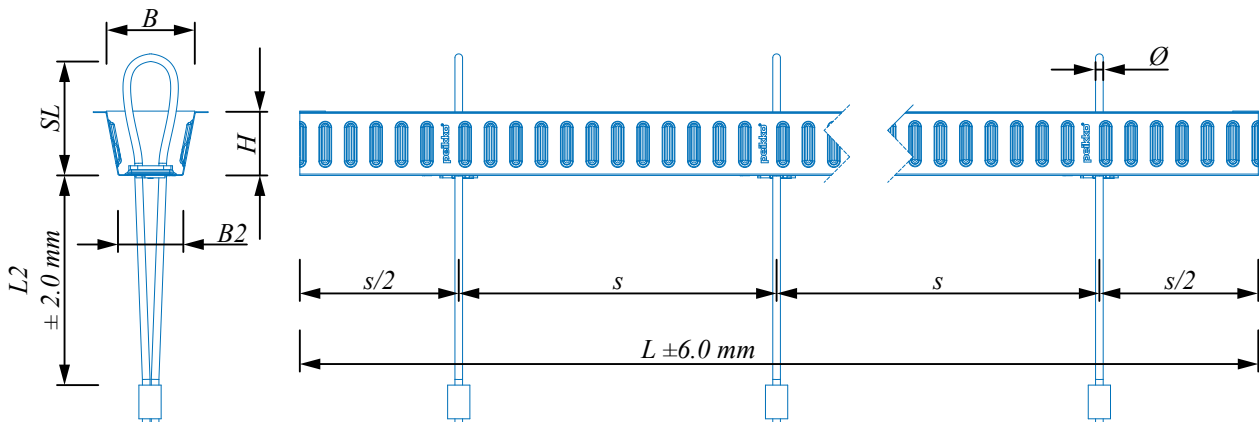
WILORA® Connecting Rails are fabricated from components with the following material properties:

Rail	Galvanized metal sheet	JIS G3302
Ferrule	Alloyed steel	EN 13411-3 GB/T 8162-2018
Protective cover	Duct Tape / Plastic Cover	
Wire loop	$R_r \geq 1770$ MPa	EN 12385-2

Peikko Group's production units are controlled externally and audited periodically based on production certifications and product approvals provided by various independent organizations.

The dimensions of standard WILORA® Connecting Rails are summarized in *Table 2*.

Table 2. Dimensions of WILORA® Connecting Rail.



WILORA®	$L$ [mm]	$L2$ [mm]	$s$ [mm]	$B$ [mm]	$B2$ [mm]	$H$ [mm]	$SL$ [mm]	Number of loops	Wire $\emptyset$ [mm]	Weight [kg]
WILORA® 20	1250	160	250	60	50	20	75	5	6	1.3
WILORA® 50	1250	160	250	70	50	50	75	5	6	1.7



WILORA® Connecting Rail can be cut to the required length when a shorter rail is needed. A minimum of 2 pairs of wire loops per short joint are always needed.

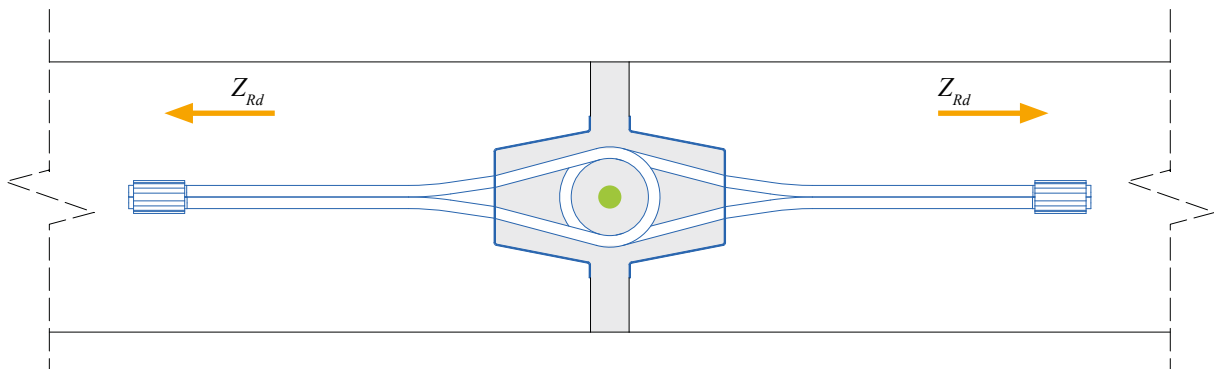
## 2. Resistances

Joint resistances with the WILORA® Connecting Rail are defined according to the compressive strength of the concrete grout in the joint. Resistances are determined by the approval and refers to the following standards:

- EN 1990-1: 2016
- EN 1992-1-1: 2011/A1:2015
- EN 206: 2021
- EOTA EAD 332589-00-0601:09-2020
- EOTA TR 074:08-2021.

### 2.1 Tensile resistance

Table 3. Tensile resistance of WILORA® Connecting Rail



Grouting/Wall	Tensile resistance $Z_{Rd}$ [kN/pair of loops]			
	C25/30	C30/37	C35/45	C40/50
WILORA® 20 WILORA® 50	7.9			



Please note that the tensile resistances of WILORA® Connecting Rail presented in Table 3 are per one-loop pair.

$$\sum Z_{Rd} = \eta_{loop} \cdot Z_{Rd} \text{ [kN / m]} \quad (1)$$

Where

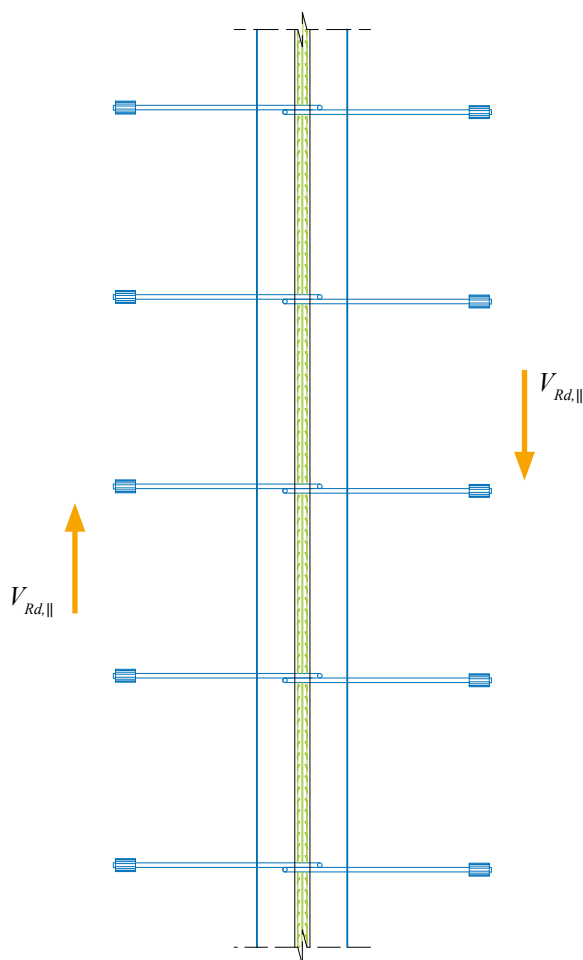
$\eta_{loop}$  = Number of loops per 1 m length of joint [pcs]

The WILORA® Connecting Rail has 4 wire loops per running meter length.



## 2.2 Vertical shear resistance

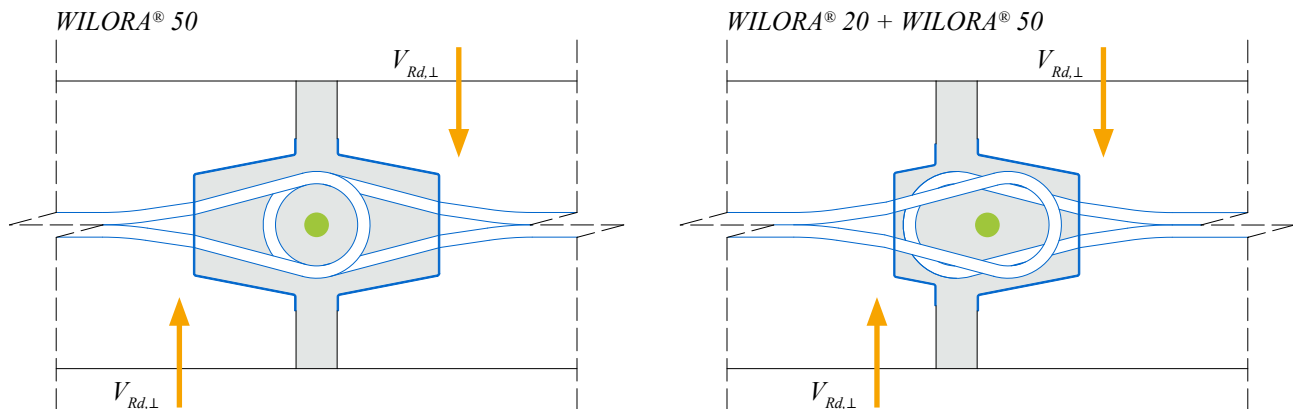
Table 4. Vertical shear resistance of WILORA® Connecting Rail.



WILORA® Configuration	Grouting type	Vertical shear resistance $V_{Rd,  }$ [kN/m] Concrete of wall element			
		C25/30	C30/37	C35/45	C40/50
WILORA® 20+50 WILORA® 50+50	BETEC Thixo BETEC 193	75	80	80	

## 2.3 Transverse shear resistance

Table 5. Transverse shear resistance of the WILORA® Connecting Rail.



Wall thickness [mm]	Transverse shear resistance $V_{Rd,\perp}$ [kN/m] Concrete of wall element				
	C25/30	C30/37	C35/45	C40/50	C45/55
140	8.5	9.1	11.1	11.9	12.6
150	9.7	11.2	12.7	13.7	14.5
160	11.0	12.7	14.4	15.5	16.5
170	12.4	14.2	16.2	17.4	18.6
180	13.8	15.9	18.1	19.4	20.7
190	15.3	17.5	20.0	21.4	22.8
200	16.8	19.3	21.9	23.5	25.1
210	18.3	21.0	24.0	25.7	27.4
220	19.9	22.8	26.0	27.9	29.7
230	21.5	24.7	28.2	30.2	32.2
240	23.1	26.6	30.3	32.5	34.6
250	24.8	28.6	32.5	34.9	37.2
260	26.5	30.5	34.8	37.3	39.8
270	28.3	32.6	37.1	39.8	42.1
280	30.1	34.6	39.4	42.1	42.1
290	31.9	36.7	41.8	42.1	42.1
300	33.8	38.8	42.1	42.1	42.1

## 2.4 Fire resistance

The utilization of WILORA® Connecting Rails in load bearing walls is possible and regulated into the DIBt approval. The concrete elements must fulfil the requirements according to EN 1992-1-2 in combination with EN 1992-1-2/NA/A1:2015-09.



WILORA® Connecting Rails for fire walls which are required to resist impact loading is permitted (criterion M according to EN 1992-1-2, section 2.1.2 (6)).

The resistance of WILORA® Connection Rails in fire resistant walls must be reduced with a reduction factor  $\alpha_{fi}$ . The relevant reduction values  $\alpha_{fi}$  are given in Diagram 1.

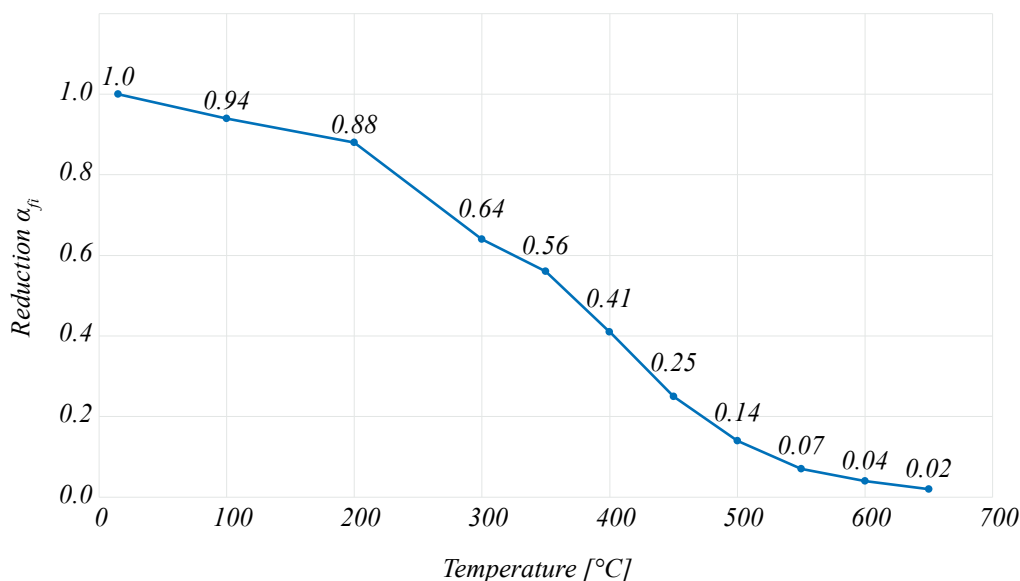


Diagram 1. Reduction factor  $\alpha_{fi}$  in relation to the wire rope temperature.

Table 6. Resistances during fire

	Tension [kN/loop] $Z_{Rd,fi}$	Shear force vertical [kN/m] $V_{Rd,fi,  }$
Betec Thixo	$Z_{Rd,fi} = 0.8 \alpha_{fi} \times Z_{Rd}^{1)}$	$V_{Rd,fi,  } = 0.8 \times \alpha_{fi} \times V_{Rd,  }^{2)}$
Betec 193		

<sup>1)</sup>  $Z_{Rd}$  according DIBt approval

<sup>2)</sup>  $V_{Rd,||}$  according DIBt approval

### Verification of resistance during fire

For the verification of load bearing connections exposed to fire the resistances according to table 6 can be used. The design resistances must be reduced following the wire rope temperature (e.g EN 1992-1-2:2010-12, Figure A2) with the reduction factor  $\alpha_{fi}$ .

System verification of tension loads:  $n \times Z_{Rd,fi} \geq z_{Ed,fi,VII} + z_{Ed,fi,N}$   
with  $z_{Ed,fi,VII} = 0.5 \times v_{Ed,fi,I}$

Verification of shear loads vertical:  $v_{Rd,fi,||} \geq v_{Ed,fi,||}$

### Attention

For wall elements which are defined as "fire resistant" the relevant section of the DIBt approval must be considered.

## Selecting the WILORA® Connecting Loop

The following aspects must be considered when selecting the appropriate type of WILORA® Connecting Rail to be used in a wall connection:

- Wall thickness
- Concrete compressive strength used in the wall
- Grouting material type
- Load bearing capacity.

### Verification

Verification of the joint when no tensile loads are acting according to equation (2).

$$V_{Ed \parallel} \leq V_{Rd \parallel} \text{ or } V_{Ed, \perp} \leq V_{Rd, \perp} \quad (2)$$

With combined shear loads according to equation (3)

$$\frac{V_{Ed \parallel}}{V_{Rd \parallel}} + \frac{V_{Ed, \perp}}{V_{Rd, \perp}} \leq 1.0 \quad (3)$$

Verification of the joint when only tensile forces are acting according to equation (4).

$$Z_{Ed} \leq \sum Z_{Rd} \quad (4)$$

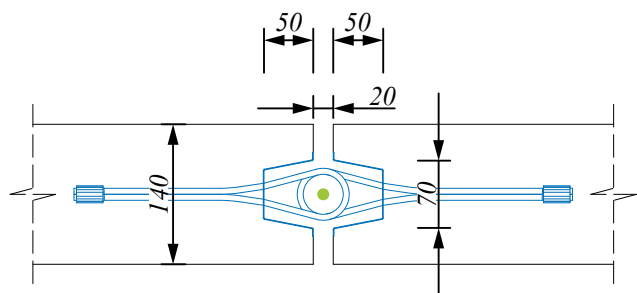
Additional verification of the joint when tensile loads in combination with shear loads are acting according to equation (5)

$$\begin{aligned} Z_{Ed} + Z_{Ed \parallel} + Z_{Ed, \perp} &\leq \sum Z_{Rd} \\ Z_{Ed \parallel} &= 0.5 \cdot V_{Ed \parallel} \\ Z_{Ed, \perp} &= 0.5 \cdot V_{Ed, \perp} \end{aligned} \quad (5)$$

Where:

$Z_{Ed}$	=	Tensile load of joint [kN/m]
$Z_{Ed \parallel}$	=	partial tensile load resulting from $V_{Ed \parallel}$ in the joint [kN/m]
$Z_{Ed, \perp}$	=	partial tensile load resulting from $V_{Ed, \perp}$ in the joint [kN/m]
$V_{Ed \parallel}$	=	Vertical shear load of joint [kN/m]
$V_{Ed, \perp}$	=	Transverse shear load of joint [kN/m]
$Z_{Rd}$	=	Tensile resistance of joint [kN/m]
$V_{Rd \parallel}$	=	Vertical shear resistance of joint [kN/m]
$V_{Rd, \perp}$	=	Transverse shear resistance of joint [kN/m]

### Design example 1:



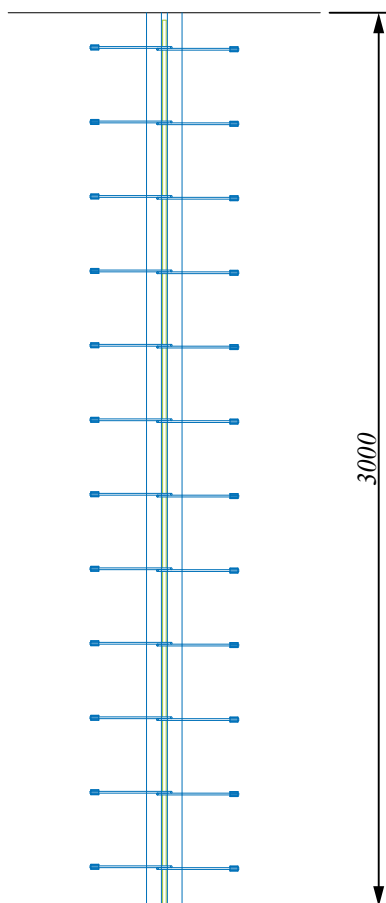
Concrete grade of the wall: C25/30  
 Grouting: BETEC Thixo  
 Wall thickness: 140 mm  
 Vertical shear load:  $V_{Ed,||} = 43.9$  kN/m

**Design:**  
 WILORA® 50

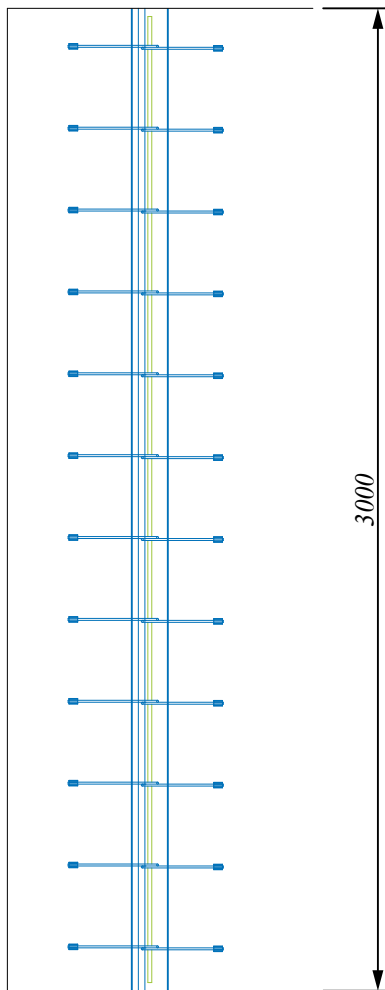
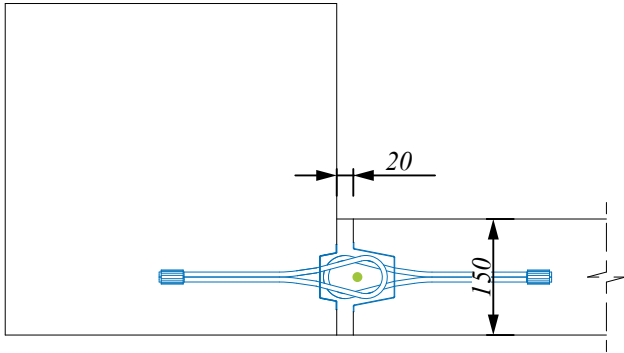
**Vertical shear resistance of WILORA® Connecting Rail:**  
 $V_{Rd,||} = 75.0$  kN/m

**Verification:**

$$\frac{V_{Ed,||}}{\sum V_{Rd}} = \frac{43.9}{75.0} = 0.58 < 1.0$$



## Design example 2:



Concrete grade of the wall: C25/30  
 Grouting: BETEC Thixo  
 Wall thickness: 150 mm  
 Vertical shear load:  $V_{Ed,\parallel} = 20.9 \text{ kN/m}$   
 Transverse shear load:  $V_{Ed,\perp} = 5.25 \text{ kN/m}$

**Design:**  
 WILORA®50 + WILORA®20

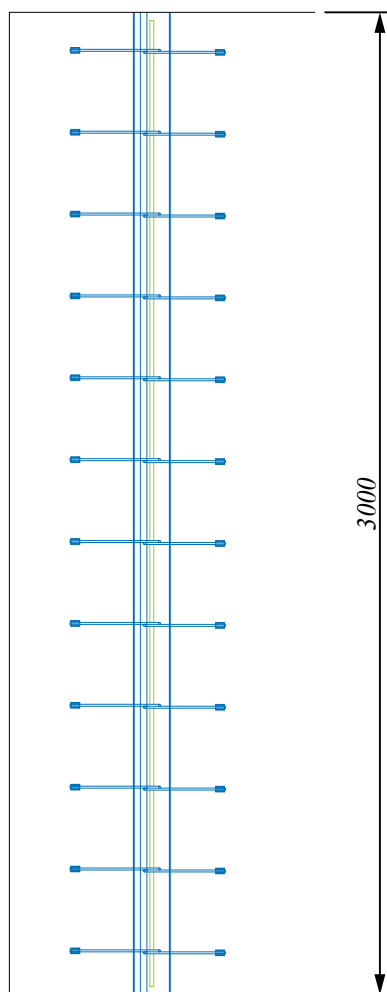
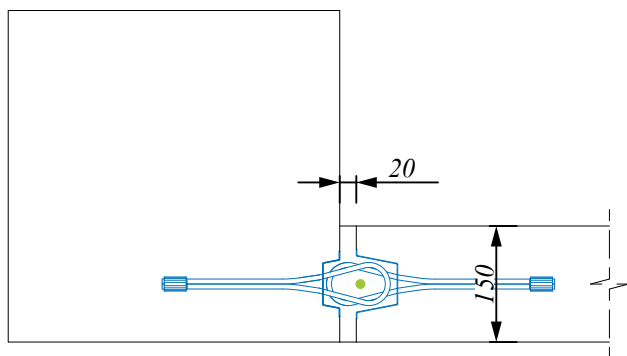
**Vertical shear resistance of WILORA® Connecting Rail:**  
 $V_{Rd,\parallel} = 75.0 \text{ kN/m}$

**Transverse shear resistance of WILORA® Connecting Rail:**  
 $V_{Rd,\perp} = 9.7 \text{ kN/m}$

**Verification:**

$$\frac{V_{Ed,\parallel}}{\sum V_{Rd,\parallel}} + \frac{V_{Ed,\perp}}{\sum V_{Rd,\perp}} = \frac{20.9}{75.0} + \frac{5.25}{9.70} = 0.82 < 1.0$$

### Design example 3:



Concrete grade of the wall: C25/30  
 Grouting: BETEC Thixo  
 Wall thickness: 150 mm  
 Vertical shear load:  $V_{Ed,\parallel} = 14.9 \text{ kN/m}$   
 Transverse shear load:  $V_{Ed,\perp} = 2.25 \text{ kN/m}$   
 Tensile load:  $Z_{Ed} = 12.4 \text{ kN/m}$

**Design:**  
 WILORA®50 + WILORA®20

**Vertical shear resistance of WILORA® Connecting Rail:**  
 $V_{Rd,\parallel} = 75.0 \text{ kN/m}$

**Transverse shear resistance of WILORA® Connecting Rail:**  
 $V_{Rd,\perp} = 9.7 \text{ kN/m}$

**Tensile resistance of WILORA® Connecting Rail:**  
 $Z_{Rd} = 4 \cdot 7.9 \text{ kN/pcs} = 31.6 \text{ kN/m}$

**Verification:**

$$\frac{V_{Ed,\parallel}}{V_{Rd,\parallel}} + \frac{V_{Ed,\perp}}{V_{Rd,\perp}} = \frac{14.9}{75.0} + \frac{2.25}{9.7} = 0.43 < 1.0$$

$$Z_{Ed} + Z_{Ed,\parallel} + Z_{Ed,\perp} \leq \sum Z_{Rd}$$

$$Z_{Ed,\parallel} = 0.5 \cdot V_{Ed,\parallel} = 0.5 \cdot 14.9 = 7.45 \text{ kN/m}$$

$$Z_{Ed,\perp} = 0.5 \cdot V_{Ed,\perp} = 0.5 \cdot 2.25 = 1.13 \text{ kN/m}$$

$$12.4 + 7.45 + 1.13 = 20.98 \text{ kN/m} \leq 31.6 \text{ kN/m}$$

## Annex A – Additional reinforcement

Additional reinforcement in the form of U stirrups should be used **if the tensile load is applied** to the connection. Existing reinforcement in the wall element can be assumed as an additional reinforcement, if it fulfils the minimum requirements specified in this section. U stirrups are placed as close as possible to the wire loop tails and anchored properly to the concrete element.

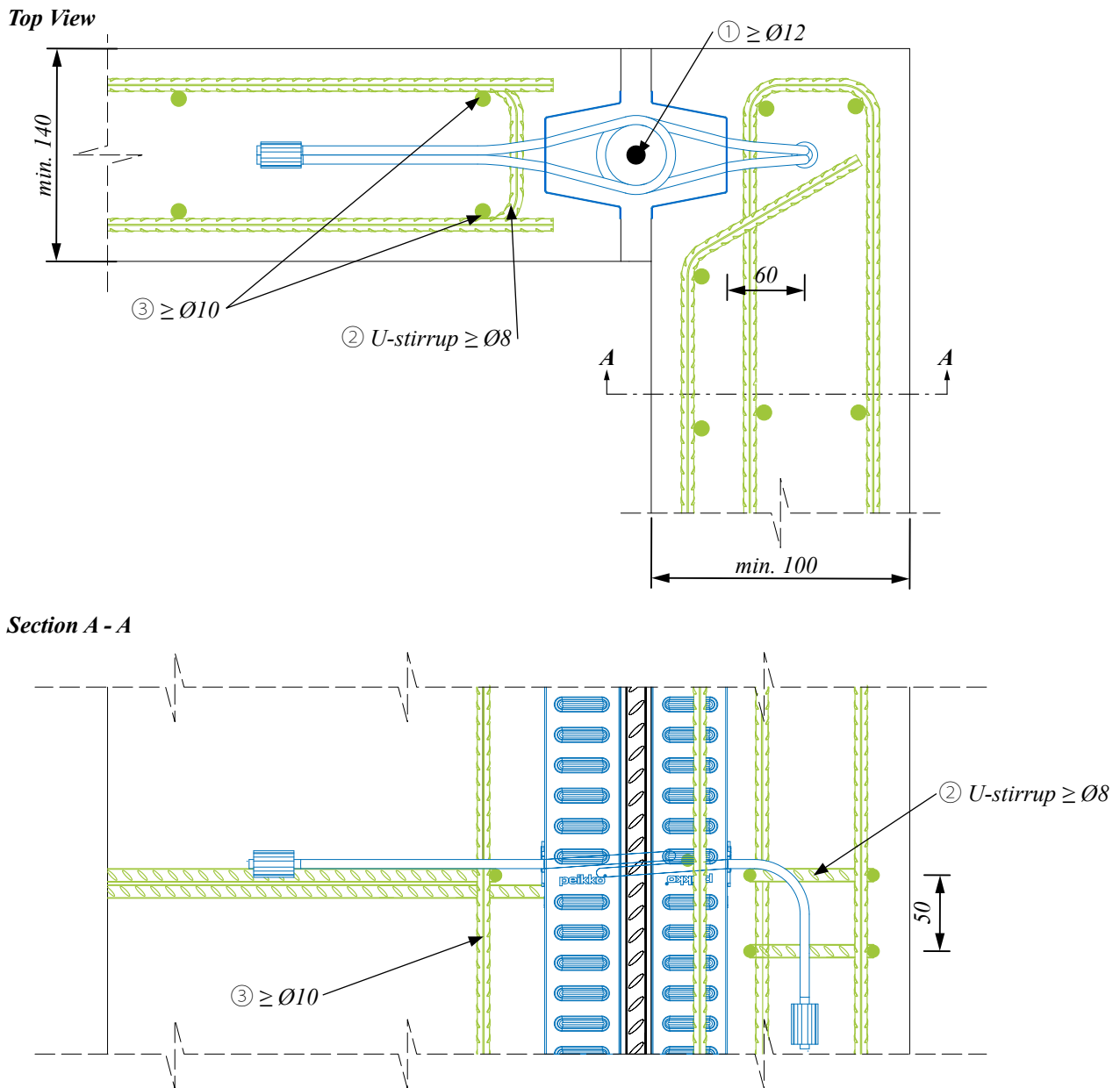
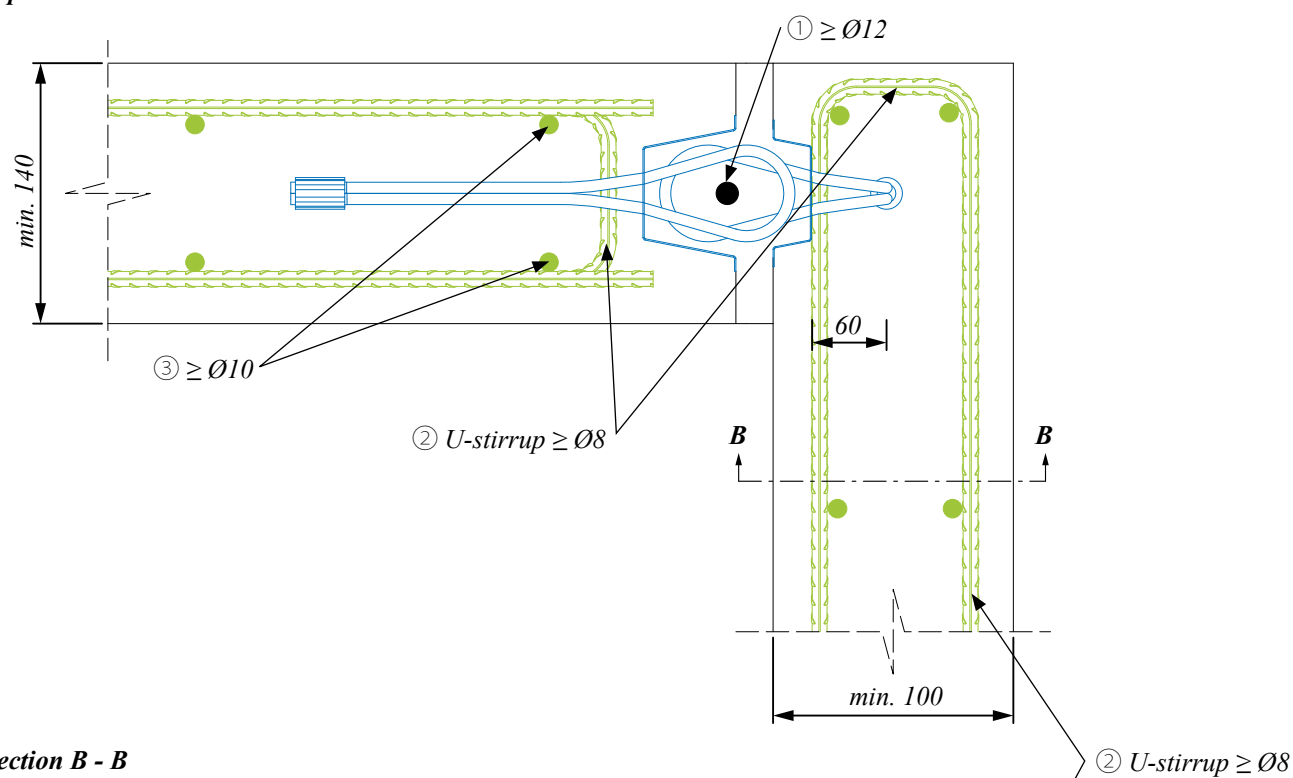


Figure 5. Reinforcement at wall end with WILORA® 50 Connecting Rails.



## Top View



## Section B - B

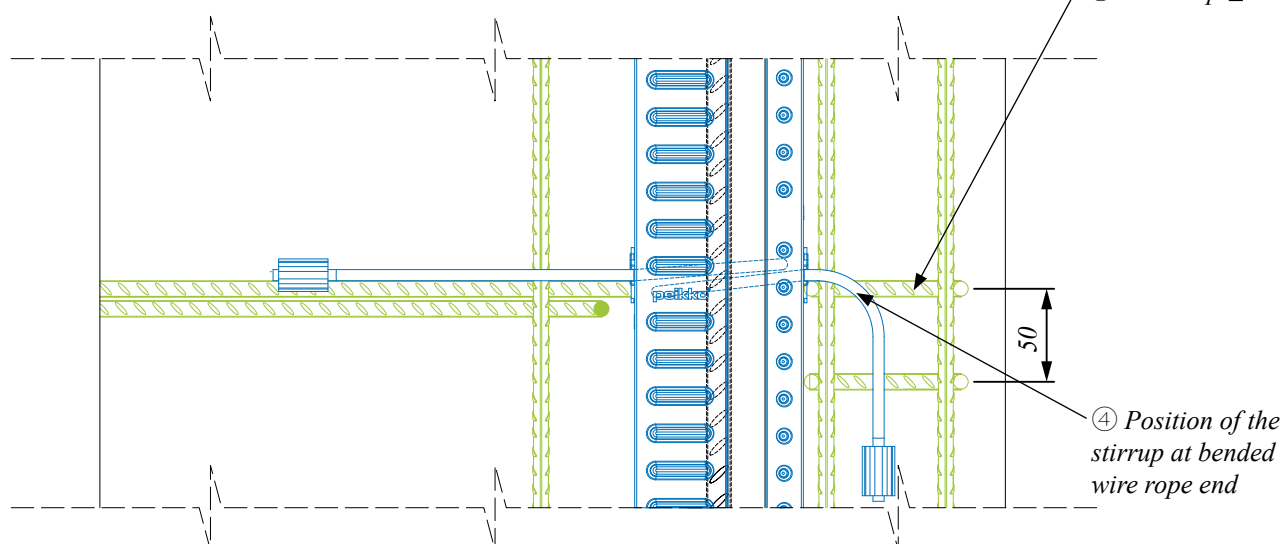


Figure 6. Reinforcement at wall end with WILORA® 20 + WILORA® 50 Connecting Rails.

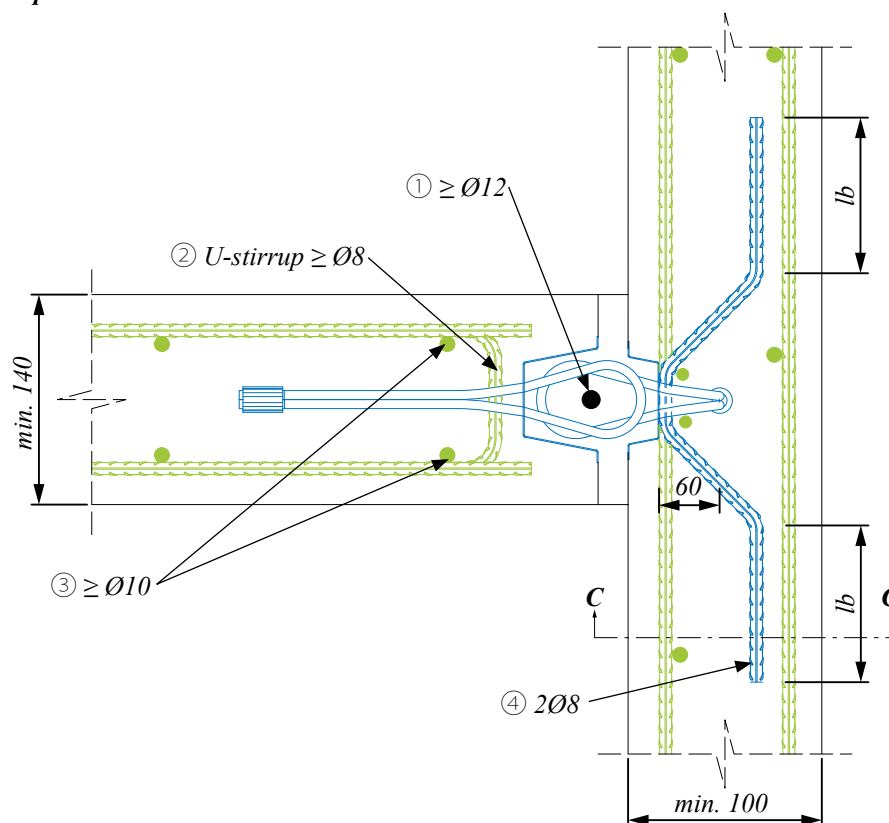
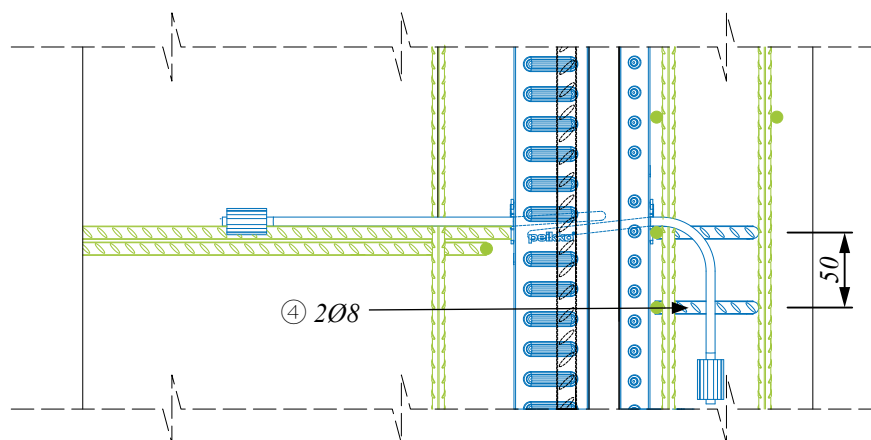
*Top View**Section C - C*

Figure 7. Reinforcement at T-wall joint with WILORA® 20 + WILORA® 50 Connecting Rails.

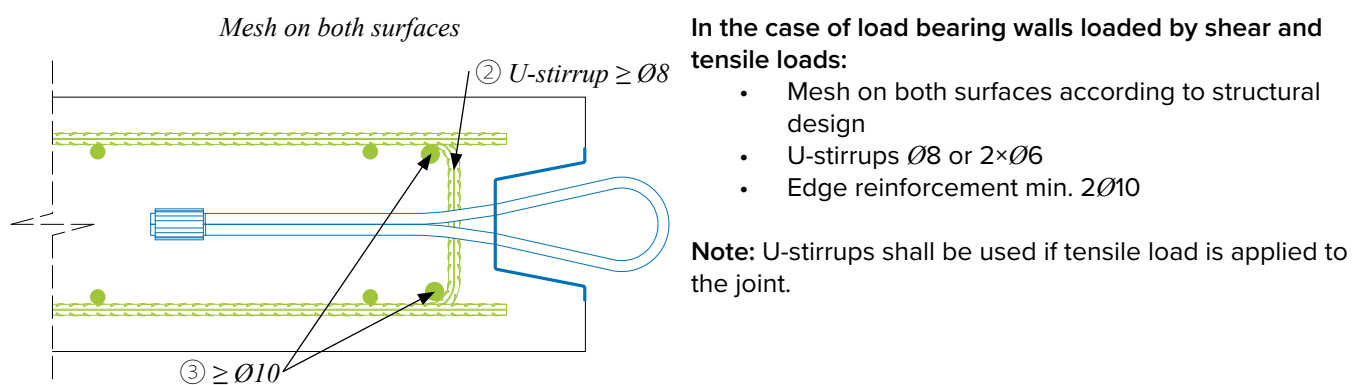


Figure 8. Additional reinforcement for WILORA®20; WILORA®50.

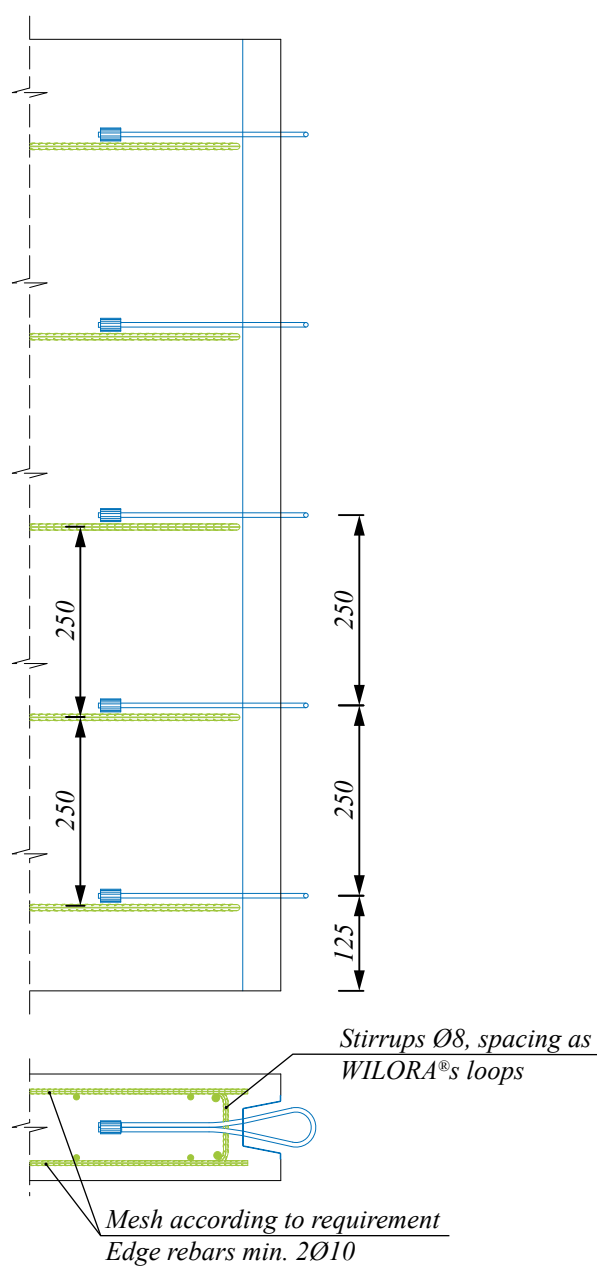


Figure 9. Options for additional reinforcement for WILORA®20; WILORA®50.

## Installation of WILORA® Connecting Rails

### Installing the product – Precast factory

Before installing the product to the formwork, check the WILORA® Connecting Rail for straightness according to *Table 6* and make sure that the protecting tape closes the recess properly. Press the possible loose areas firmly to the rail edge or in the case of damaged protective tape replace it completely.

WILORA® Connecting Rails are placed into the reinforcement of the wall and fixed through the recess rail to the formwork according to the installation scheme. The wall edge is reinforced by additional reinforcement according to Annex A. Installation tolerances of WILORA® Connecting Rail must fulfil the requirements specified in *Table 6*.

Due to the shape of the WILORA® rail, there is no need for extra formwork for the joint channel. Connecting the recess rails to the formwork depends on the material used. In the case of wood or plywood, WILORA® Connecting Rails can be fixed using nails through the holes in the recess rails. In the case of steel formworks, screws or glue should be used for attaching the recess rail to the formwork.

Start assembling the WILORA® Connecting Rail from the top side of the precast element. Connecting rail can be cut to smaller pieces (250 mm module) if the length of the joint does not allow to use full length of the WILORA®. The cut piece of connecting rail must be retaped to eliminate leaking of the concrete inside. Alternatively, a piece of polystyrene or wood can be used as a short recess for missing joints. Dimensions of the correct shape are presented in *Figure 10*.

After casting the wall and when the concrete has achieved the required strength, the concrete formwork and the protective cover and tapes are removed, loops can be bent out and straightened by using a hammer claw. Due to the structure of the wire, the loops will remain in an open horizontal position.

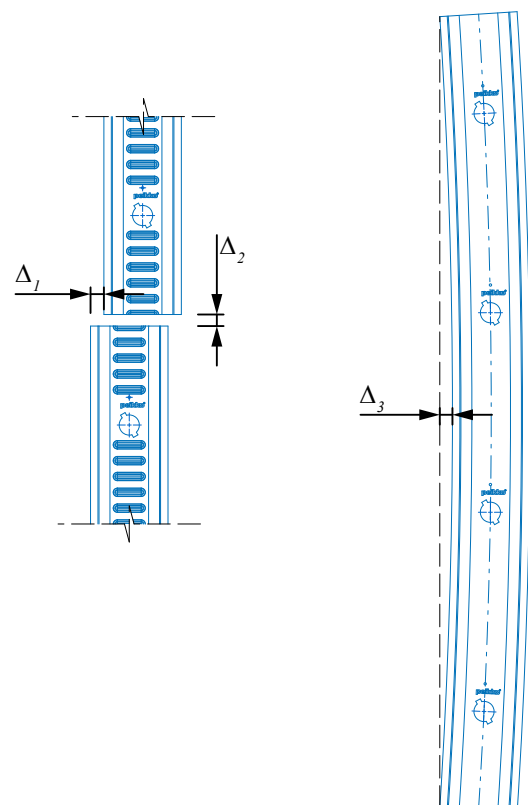


It is wise to remove the protective cover and tapes at the precast factory before transportation to the construction site. This will eliminate any possible waste at the site.

*Table 7. Installation tolerances for WILORA® Connecting Rail at the precast factory.*

Tolerances in the precast plant		
$\Delta_1$	$\Delta_2$	$\Delta_3$
$\pm 3$ mm	$\pm 3$ mm	$\pm 8$ mm/m

Tolerances are based on edge straightness in EN 13670



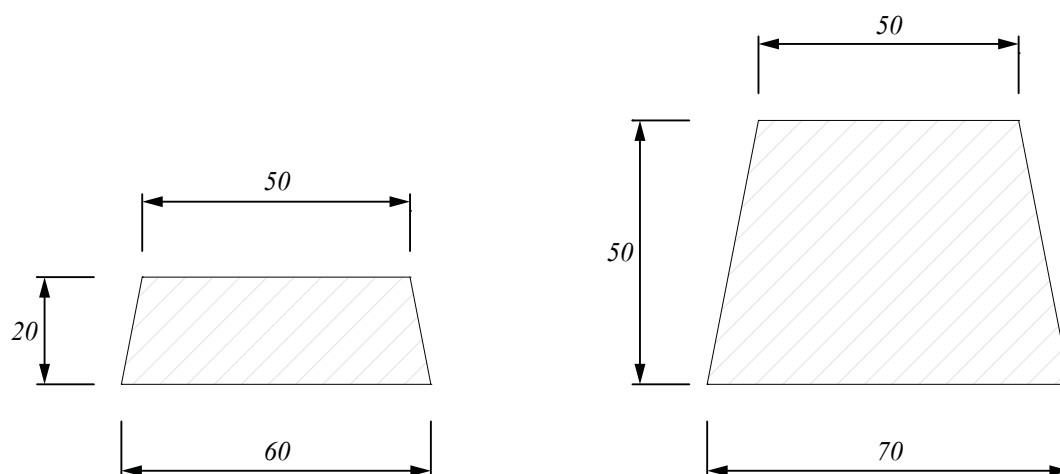


Figure 10. Cross-section requirement for wooden/polystyrene recess.

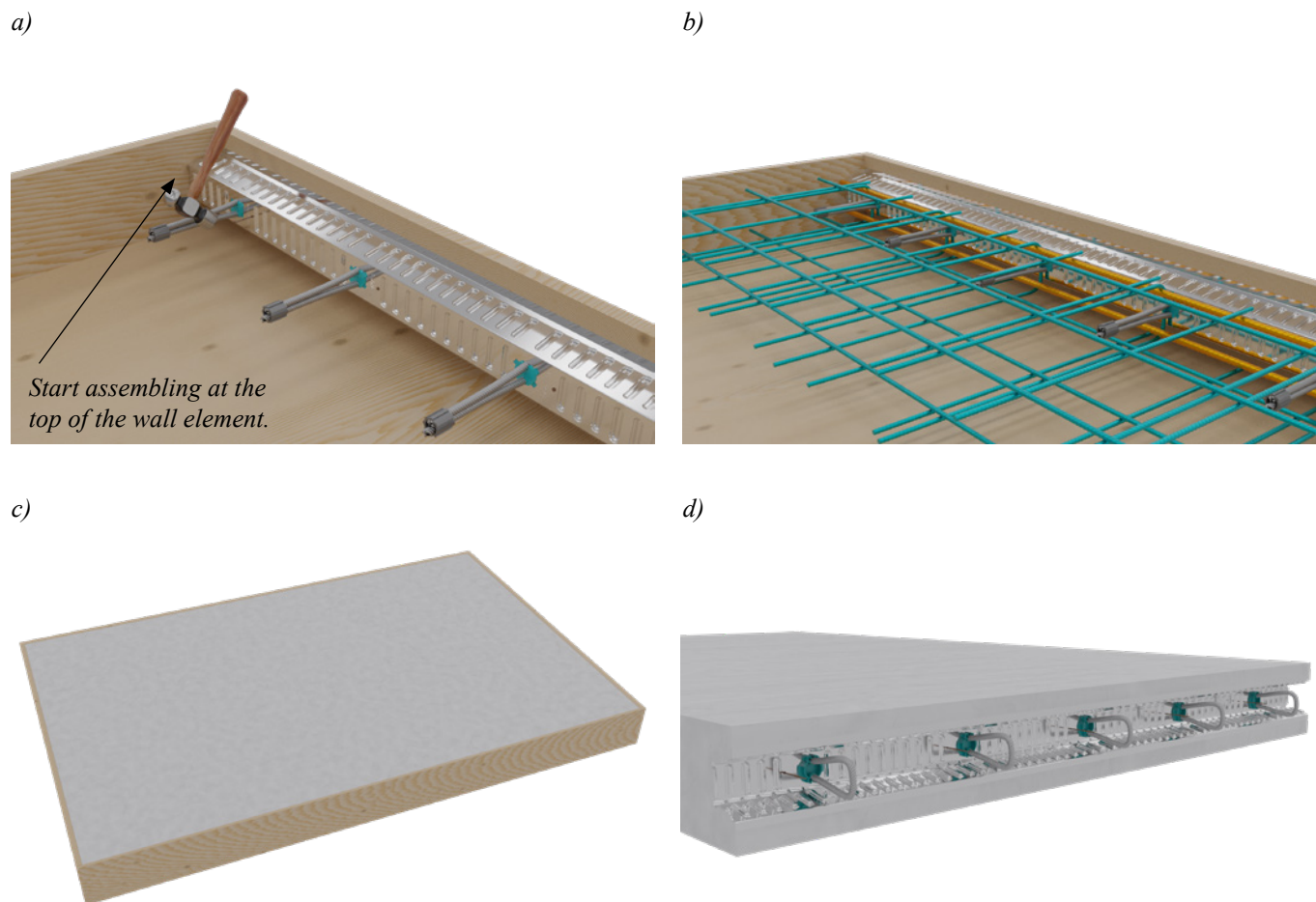


Figure 11. Installation of the WILORA® Connecting Rail to a wooden formwork; a) nailing of the rail starting with rail in position at the top of the wall element; b) installation of the wall reinforcement; c) casting of the wall; d) removing the formwork and protective cover or tape. Bending the wire loops open either in the precast plant or at the construction site.

## Installing the product – Construction site

The wall panels are installed according to the plans and supported by a temporary bracing system (Figure 12). Wire loops in the joint are adjusted to be perpendicular to the surface of the joint (Figure 13) and to fulfil the installation tolerances specified in Figure 14. Vertical reinforcement (Table 8) is placed through all wire loops (Figure 15 and Figure 16). The length of the reinforcement is equal to the height of the joint.

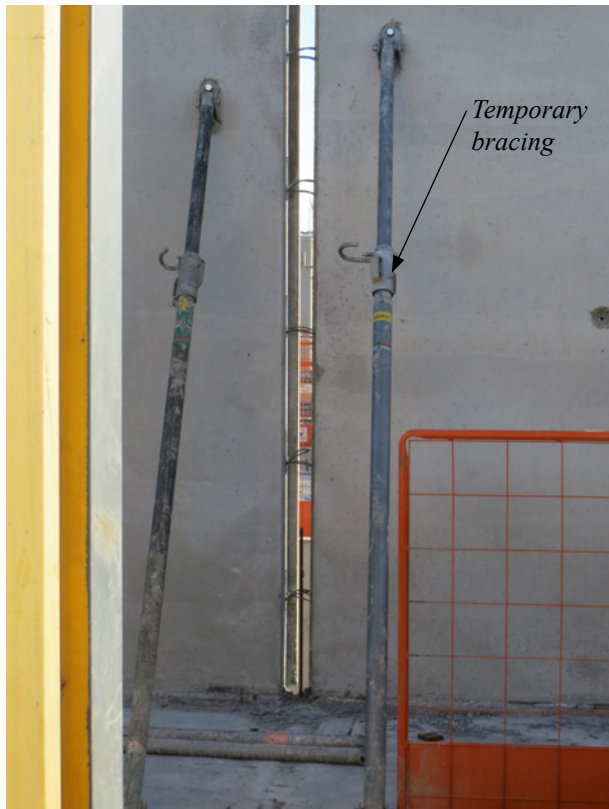


Figure 12. Precast wall installed at the final position and secured by temporary bracings.

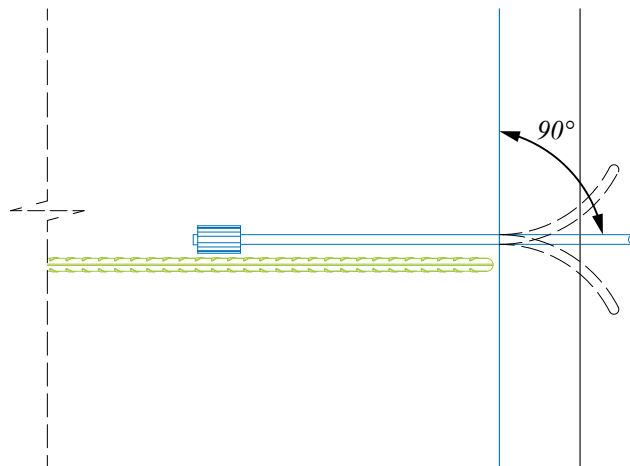


Figure 13. Wire loop with the correct installation angle to the wall joint.



Wire maintains its full strength in normal use, where there is a maximum of three open close bindings.

Figure 14. Vertical installation tolerance for wire loops.

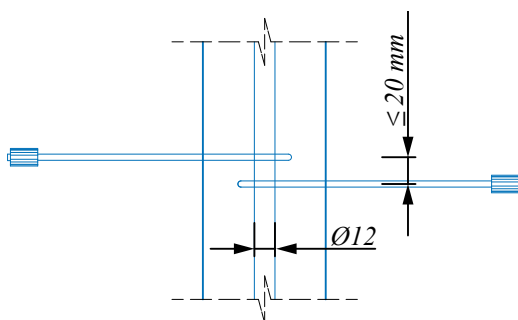


Table 8. Diameter of a vertical reinforcement for WILORA® Connecting Rail.

	WILORA®20 + WILORA®50	WILORA®50
Vertical reinforcement B500B	$\varnothing 12$	$\varnothing 12$



Spacing between loops is bigger than 20 mm



Wrong position of the loop, outside of the vertical reinforcement (example from PVL® Connecting Loop)

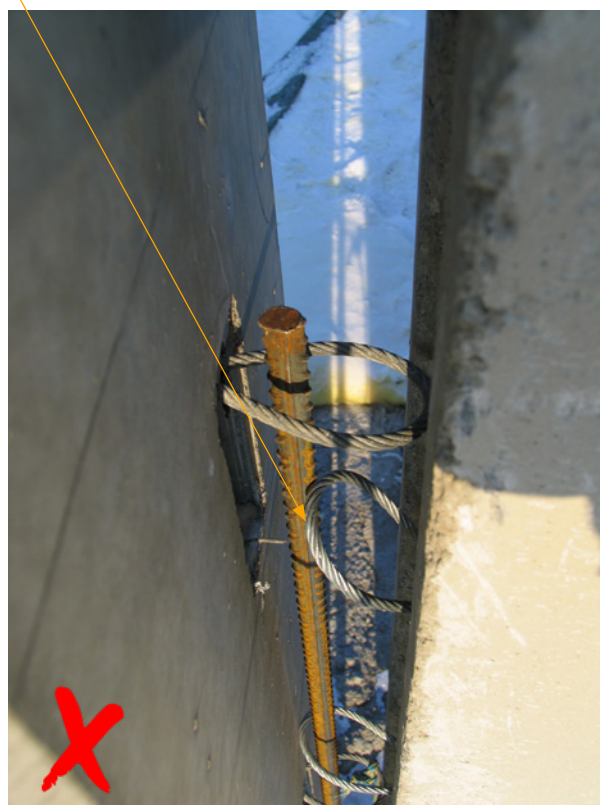


Figure 15. Incorrect installation of wire loops.

Position of the wire loops before grouting

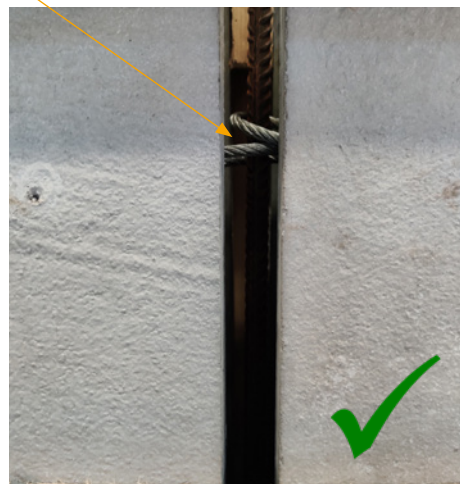


Figure 16. Correct installation of the wire loops.

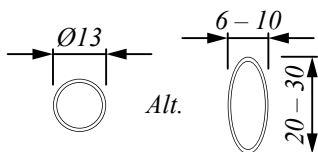
## INSTALLING

Based on the dimension of the joint, the formwork can be created from one side. After that the concrete grout is poured into the joint (*Figure 17*). Required properties for grouting material are presented in *Table 8*. Environmental conditions, such as temperature and humidity, must be considered when casting the grouting material to the joints.

*Table 9. Minimum requirements for grouting materials (EN 1504-3 and EN 12190).*

Parameter	BETEC Thixo / BETEC 193
Compressive strength 7 days	$\approx 60 \text{ N/mm}^2$
Grain size	0 – 0.5 [mm]
Consistency	Thixotropic
Expansion	$\geq 0.1\%$

In relation to the joint size a flexible hose can be used at narrow joints ( $\frac{1}{2}$  inch). A precise and exact grouting even on difficult sections such as the overlapping of the loops is then possible.



### Filling nozzle

Section according to figure in the joint, preferably hose ( $\varnothing 13 \text{ mm}$  or  $\frac{1}{2} \text{ inch}$ ) or joint fuse ( $6 - 10 \times 20 - 30 \text{ mm}$ )

For joint grouting with thixotropic grout a so called “grouting license” is recommended. It can be obtained from the grout manufacturer by attending a training session.



*Figure 17. Casting the joint.*



*Figure 18. Finished wall joint.*

The instructions for use which are given into the approval must be considered during joint grouting. A so called “grouting licence” is required when BETEC Thixo or BETEC 193 is applied and can be made at the grout producer.







## Revisions

### **Version PEIKKO GROUP 02/2024. Revision 003**

- Updated design concept.
- Updated resistances according to DIBt approval.
- Updated reinforcement information for T-wall joints.
- Updated fire resistance.

### **Version PEIKKO GROUP 03/2023. Revision 002**

- Updated layout.
- Updated joint width.
- Added grouting criteria and filling nozzle information.

### **Version: PEIKKO GROUP 11/2020. Revision: 001**

- First publication.

# Resources

## DESIGN TOOLS

Use our powerful software every day to make your work faster, easier and more reliable. Peikko design tools include design software, 3D components for modeling programs, installation instructions, technical manuals and product approvals of Peikko's products.

[peikko.com/design-tools](https://peikko.com/design-tools)

## TECHNICAL SUPPORT

Our technical support teams around the world are available to assist you with all of your questions regarding design, installation etc.

[peikko.com/technical-support](https://peikko.com/technical-support)

## APPROVALS

Approvals, certificates and documents related to CE-marking (DoP, DoC) can be found on our websites under each products' product page.

[peikko.com/products](https://peikko.com/products)

## EPDS AND MANAGEMENT SYSTEM CERTIFICATES

Environmental Product Declarations and management system certificates can be found at the quality section of our websites.

[peikko.com/qehs](https://peikko.com/qehs)

COMPANY WITH  
MANAGEMENT SYSTEM  
CERTIFIED BY DNV  
[ISO 9001](#) • [ISO 14001](#)  
[ISO 45001](#)