



Reinforcement at the interface  
between concrete cast at different times

## Reinforcement at the interface between concrete cast at different times

General information:

Data input:

Results:

1. Selection of the product category
2. Defining of the input data
3. Defining of the substrate
4. Defining of the reinforcement
5. Conditions of the installation
6. Analysis of the results
7. Generating the printout



- move to a selected issue

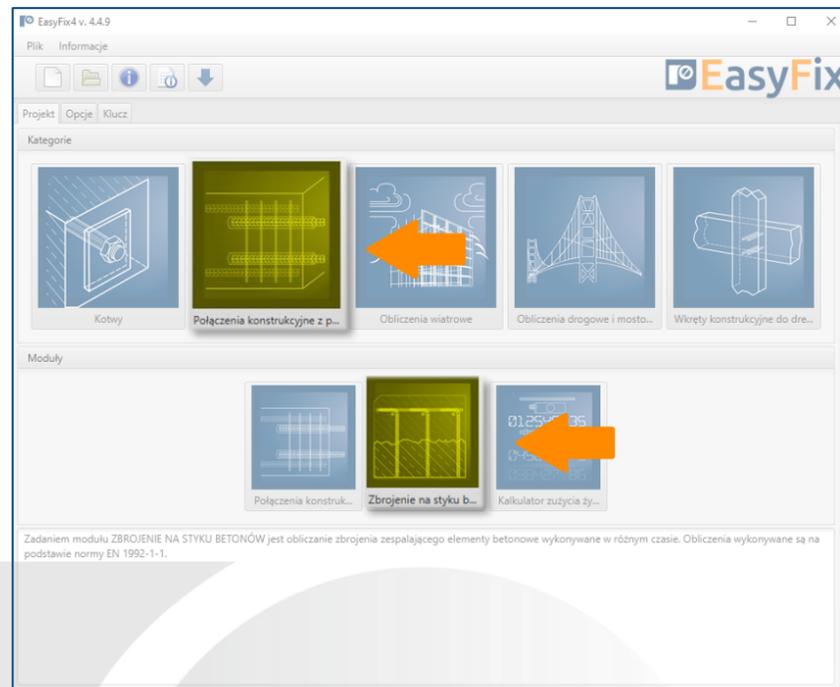


- back to the table of contents

## Reinforcement at the interface between concrete cast at different times

# 1

Selection of  
The product category



Designing methods:

EUROCODE 2 | EN 1992-1-1

PIRR | Post Installed  
Rebar Rawlplug

Meaning of icons and symbols:



Create new design



Open file



Safe | Safe as



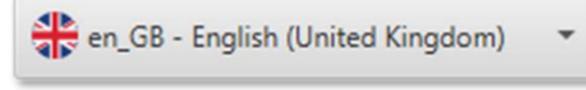
Undo | Redo changes



Generate pdf printout



Information about software



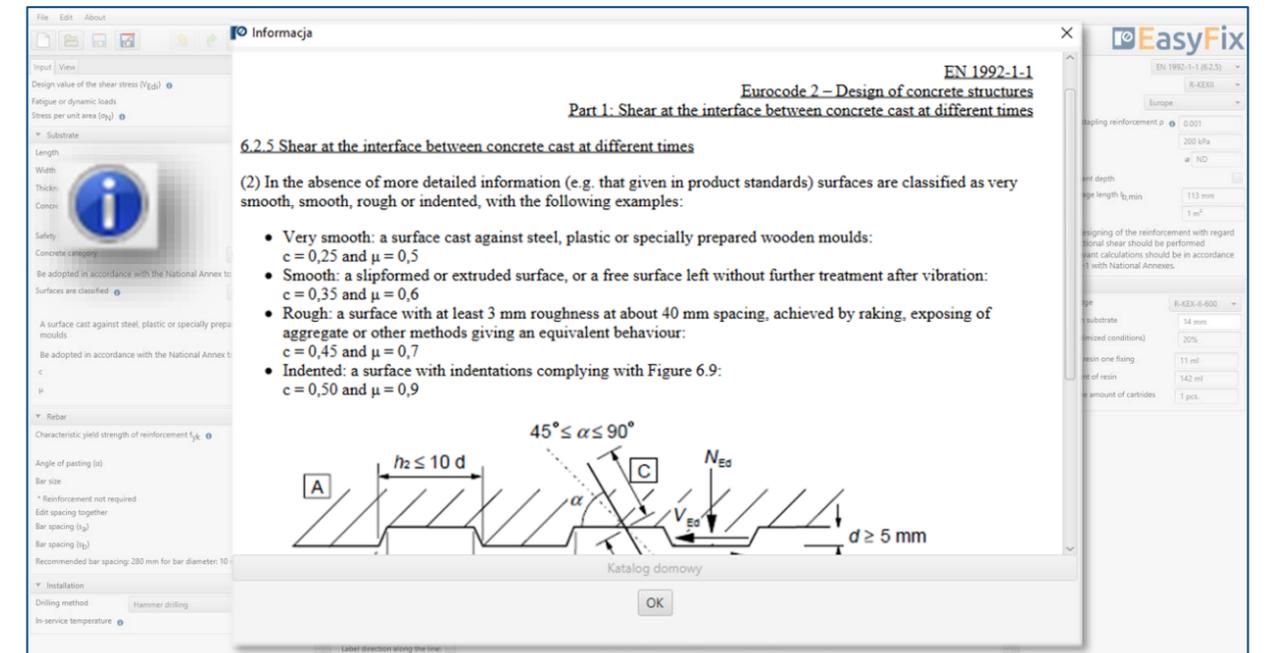
Language selection



Info icons



Instruction manual



Click to **information icon** to display an additional window containing theory related to a particular issue.



# Reinforcement at the interface between concrete cast at different times

## 2 Defining of The input data



Reinforcement at the interface between concrete cast at different Times is based on the standard EN 1992-1-1:2008 p. 6.2.5. The result of the calculations is the given anchorage depth resulting from calculations based on the standard or the PIRR engineering method using the possibilities of concrete and connection with bonded anchors.

Determination of the stress on the concrete surface.

Characteristics and conditions of the substrate.

Characteristics of reinforcing steel

Determination of installation conditions.

The screenshot shows the EasyFix software interface with the following sections:

- Input View:**
  - Design value of the shear stress ( $V_{Edi}$ ): 0 Pa
  - Fatigue or dynamic loads:
  - Stress per unit area ( $\sigma_N$ ): 0 Pa
- Substrate:**
  - Length: 1 m
  - Width: 1 m
  - Thickness (T): 250 mm
  - Concrete class: C20/25
  - Safety factor ( $\gamma_c$ ): 1.5
  - Concrete category: Uncracked
  - Surfaces are classified: Very smooth
  - Reinforcement type: A surface cast against steel, plastic or specially prepared wooden moulds
  - Be adopted in accordance with the National Annex to EN 1992 1-1
  - Surfaces are classified: Very smooth
  - By customer:
  - A surface cast against steel, plastic or specially prepared wooden moulds
  - Be adopted in accordance with the National Annex to EN 1992 1-1
  - c: 0.025
  - $\mu$ : 0.5
- Rebar:**
  - Characteristic yield strength of reinforcement  $f_{yk}$ : 400 MPa
  - Angle of pasting ( $\alpha$ ): 90°
  - Bar size:  $\varnothing 10$
  - \* Reinforcement not required:
  - Edit spacing together:
  - Bar spacing ( $s_a$ ): 280 mm
  - Bar spacing ( $s_b$ ): 280 mm
  - Recommended bar spacing: 280 mm for bar diameter: 10 mm
- Installation:**
  - Drilling method: Hammer drilling
  - In-service temperature: None

The 3D model shows a concrete slab with a grid of rebar. Dimensions of 280 mm are indicated for the spacing between bars. The software interface also includes a right-hand panel with design method (EN 1992-1-1 (6.2.5)), anchor (R-KEXII), region (Europe), and resin (R-KEX-II-600) settings.



# Reinforcement at the interface between concrete cast at different times

## 2 Defining of The input data



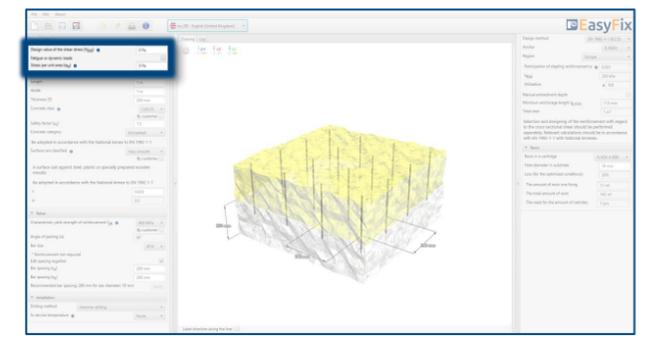
The contact stress in the contact surface of concrete that have hardened at different times should meet the requirements:  $v_{Edi} \leq v_{Rdi}$

The normal stress to the contact surface caused by the smallest external load on the joint surfaces, which always acts simultaneously with the contact shear force.

Design value of the shear stress ( $v_{Edi}$ )	0 Pa
Fatigue or dynamic loads	<input type="checkbox"/>
Stress per unit area ( $\sigma_N$ )	0 Pa



Design value of the shear stress ( $v_{Edi}$ )	0 Pa
Fatigue or dynamic loads	<input checked="" type="checkbox"/>
Stress per unit area ( $\sigma_N$ )	0 Pa





# Reinforcement at the interface between concrete cast at different times

## 3 Defining of The substrate

Determining the **dimensions of the structure**: The geometry of the structure can be specified in the side panel or on the model.

Determining of the **concrete strength class and the yield steel strength**: Entering data by selecting from the list or the option "by user".

Determination of the **roughness of the connection plane**. Entering data by selecting from the list or the option "by user".

When defining the ground conditions, the surface condition of the existing concrete is also determined. The theory describing this issue is described in the standard EN 1992-1-1 p. 6.2.5 (2).

The screenshot shows the EasyFix software interface with the following settings:

- Substrate:** Length: 1 m, Width: 1 m, Thickness (T): 250 mm.
- Concrete class:** C20/25.
- Safety factor ( $\gamma_c$ ):** 1.5.
- Concrete category:** Uncracked.
- Surfaces are classified:** Very smooth.
- Concrete roughness parameters:**  $c = 0.025$ ,  $\mu = 0.5$ .
- Rebar:** Characteristic yield strength of reinforcement  $f_{yk}$ : 400 MPa, Angle of pasting ( $\alpha$ ): 90°, Bar size:  $\varnothing 10$ , Bar spacing ( $s_a$ ): 280 mm, Bar spacing ( $s_b$ ): 280 mm.
- Installation:** Drilling method: Hammer drilling, In-service temperature: None.

The 3D model shows a concrete slab with rebar. Dimensions of 280 mm are indicated for the rebar spacing. The interface also includes a right-hand panel with design parameters such as Design method (EN 1992-1-1 (6.2.5)), Anchor (R-KEXII), Region (Europe), and Resin (R-KEX-II-600).



# Reinforcement at the interface between concrete cast at different times

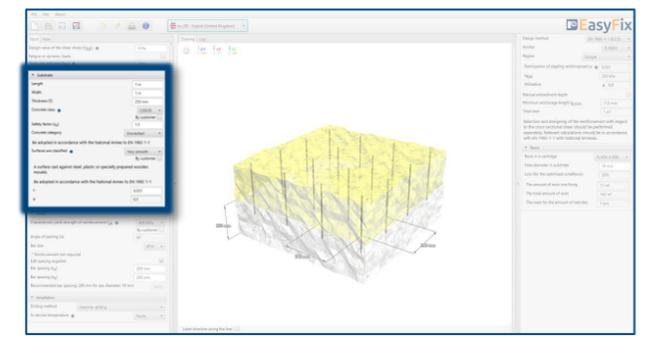
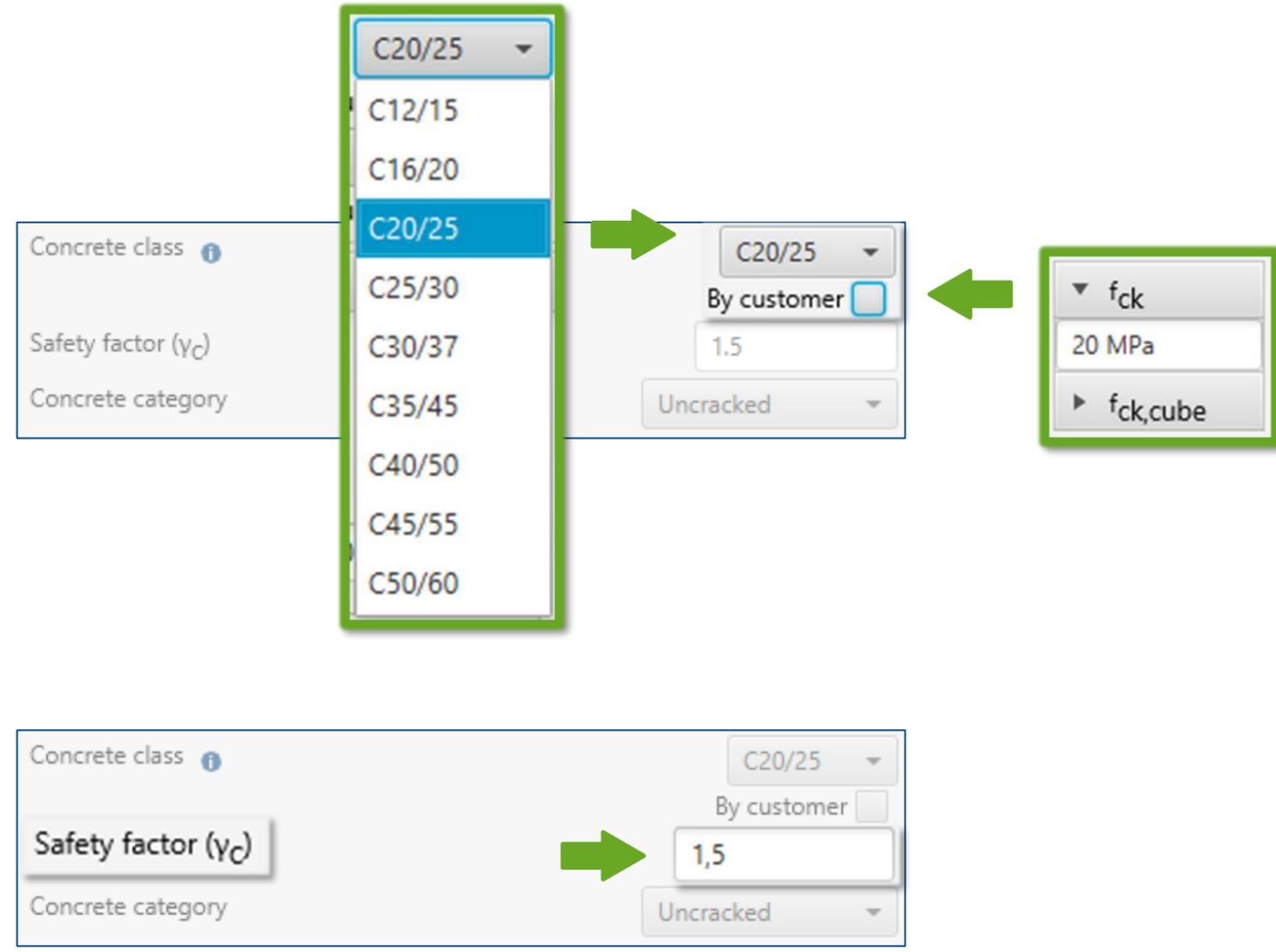
## 3 Defining of The substrate

Determining of the concrete strength class:

**Selecting from the list:**  
Concrete strength class according to standard EN 206

**Option „by user“:**  
Possibility of manual input of characteristic compressive strength of cylinder  $f_{ck}$  or  
Possibility of manual input of characteristic compressive strength of cube  $f_{ck, cube}$ .

User-entered safety factor for concrete - depending on regional requirements.





# Reinforcement at the interface between concrete cast at different times

## 3 Defining of The substrate

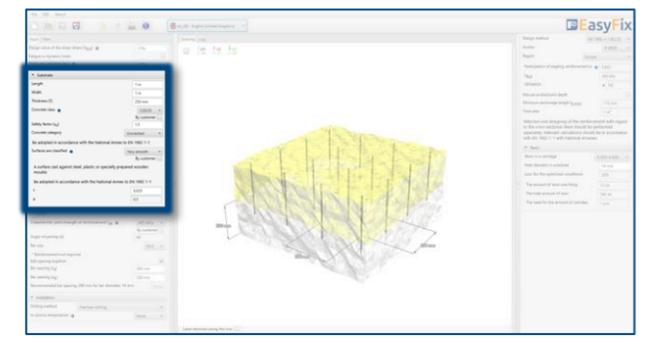
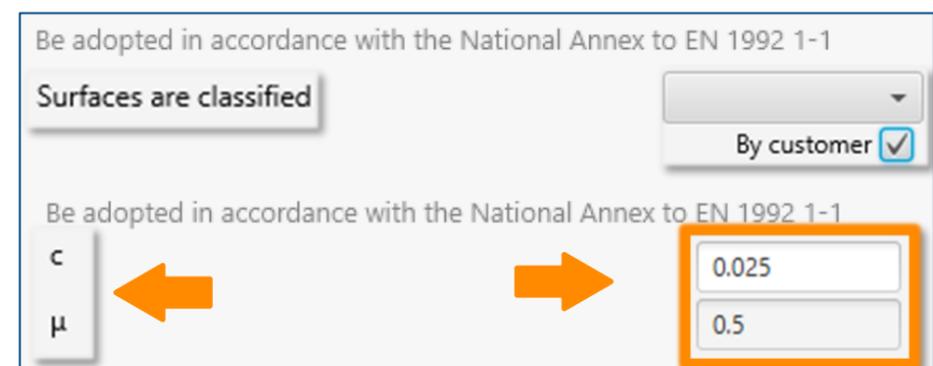
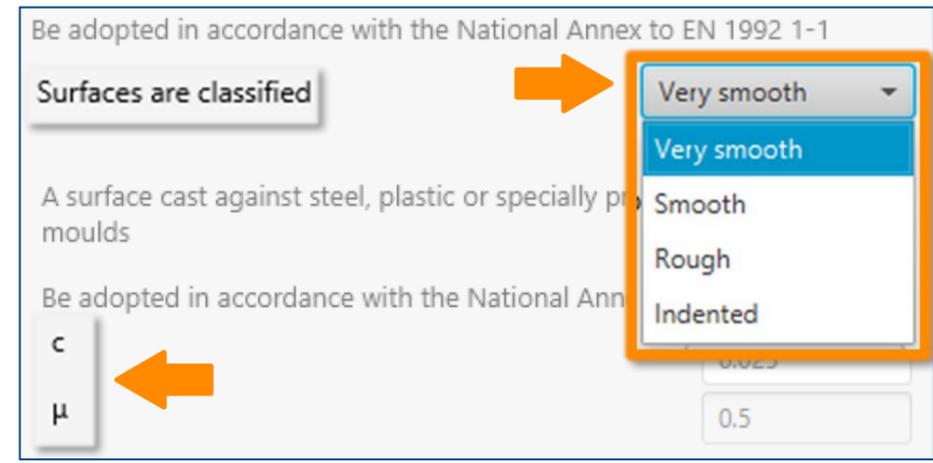


**Surface classification:**

**Selection from the list:**  
According to EN 1992-1-1

- Very smooth
- Smooth
- Rough
- Indented

**By user:**  
Possibility to manually enter the coefficients depending on the roughness of the connection plane  $c$  and  $\mu$ .





# Reinforcement at the interface between concrete cast at different times

## 4 Defining of the reinforcement



Specification of data for reinforcing steel:  
 Entering data by selecting from the list or the option "by user".

Determining of rebar spacing  
 Possibility to set the reinforcement at the same distance in both directions. The bar spacing can be specified in the side panel or on the model.

The screenshot displays the EasyFix software interface. On the left, the 'Input' panel shows various parameters for substrate and rebar. The 'Rebar' section is highlighted with a blue box and a blue arrow, showing settings for yield strength (400 MPa), angle (90°), and bar size (Ø10). Below this, the 'Bar spacing' fields are set to 280 mm for both directions, with a note: 'Recommended bar spacing: 280 mm for bar diameter: 10 mm'. The central 3D model shows a concrete slab with vertical rebar. Green arrows point to the 280 mm spacing labels on the model. The right sidebar shows design parameters like 'Design method' (EN 1992-1-1), 'Anchor' (R-KEXII), and 'Resin' (R-KEX-II-600) settings.



# Reinforcement at the interface between concrete cast at different times

## 4 Defining of the reinforcement

Determining of the yield steel strength:

Selection from the list:  
Ribbed bars in accordance with EN 1992-1-1:2008

Option „by user“:  
Possibility of manual input yield steel strength  $f_{yk}$  and its safety factor  $\gamma_s$  according to national requirements.



500 MPa  
400 MPa  
410 MPa  
460 MPa  
490 MPa  
500 MPa

Characteristic yield strength  $f_{yk}$   By customer

400 MPa

Angle of pasting ( $\alpha$ ) 90°

Bar size  $\varnothing 10$

\* Reinforcement not required



$f_{yk}$  500 MPa

Safety factor  $\gamma_s$  1.15

By customer

400 MPa

Characteristic yield strength of reinforcement  $f_{yk}$   By customer

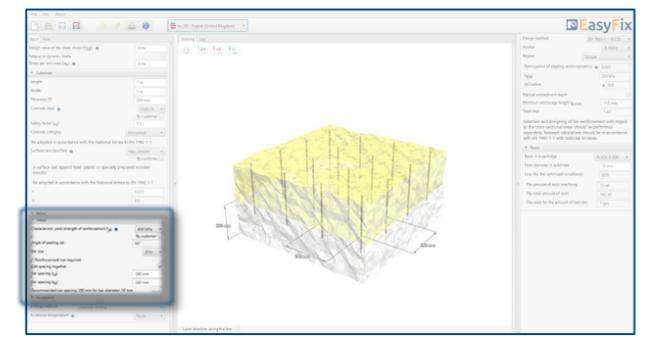
Angle of pasting ( $\alpha$ ) 90°

Bar size  $\varnothing 10$

\* Reinforcement not required



$\varnothing 10$   
 $\varnothing 8$   
 $\varnothing 10$   
 $\varnothing 12$   
 $\varnothing 13$   
 $\varnothing 14$   
 $\varnothing 16$   
 $\varnothing 18$   
 $\varnothing 20$   
 $\varnothing 22$   
 $\varnothing 25$





# Reinforcement at the interface between concrete cast at different times

**5** Conditions of The installation »

Determination and defining of the drilling method in the existing structure.  
The choice of the service temperature determines the minimum and maximum temperature of the substrate at the time of installation of the anchor.

Determination of drilling method:  
Selecting from the list:  
Hammer | Diamond

Determination of service temperature:  
Selecting from the list of results filters the proper anchor group.

The screenshot shows the EasyFix software interface with the following details:

- Design Parameters (Left Panel):**
  - Design value of the shear stress ( $V_{Ed}$ ): 0 Pa
  - Fatigue or dynamic loads:
  - Stress per unit area ( $\sigma_N$ ): 0 Pa
  - Substrate:** Length: 1 m, Width: 1 m, Thickness (T): 250 mm, Concrete class: C20/25, Safety factor ( $\gamma_c$ ): 1.5, Concrete category: Uncracked.
  - Rebar:** Characteristic yield strength of reinforcement ( $f_{yk}$ ): 400 MPa, Angle of pasting ( $\alpha$ ): 90°, Bar size:  $\varnothing 10$ , Bar spacing ( $s_a$ ): 280 mm, Bar spacing ( $s_b$ ): 280 mm.
  - Installation:** Drilling method: Hammer drilling, In-service temperature: None.
- 3D Model (Center):** A 3D perspective view of a concrete slab with a grid of reinforcement bars. Dimensions of 280 mm are indicated for the spacing between bars.
- Design Results (Right Panel):**
  - Design method: EN 1992-1-1 (6.2.5)
  - Anchor: R-KEXII
  - Region: Europe
  - Participation of stapling reinforcement  $\rho$ : 0.001
  - $V_{Rdi}$ : 200 kPa
  - Utilisation: ND
  - Manual embedment depth:
  - Minimum anchorage length  $l_{b,min}$ : 113 mm
  - Total area: 1 m<sup>2</sup>
  - Resin: R-KEX-II-600
  - Hole diameter in substrate: 14 mm
  - Loss (for the optimized conditions): 20%
  - The amount of resin one fixing: 11 ml
  - The total amount of resin: 142 ml
  - The need for the amount of cartridges: 1 pcs.





# Reinforcement at the interface between concrete cast at different times

## 5 Conditions of The installation



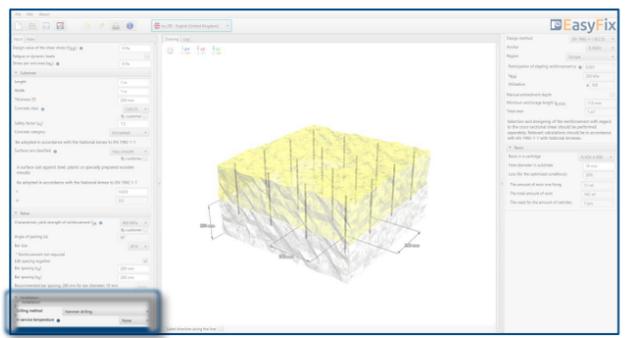
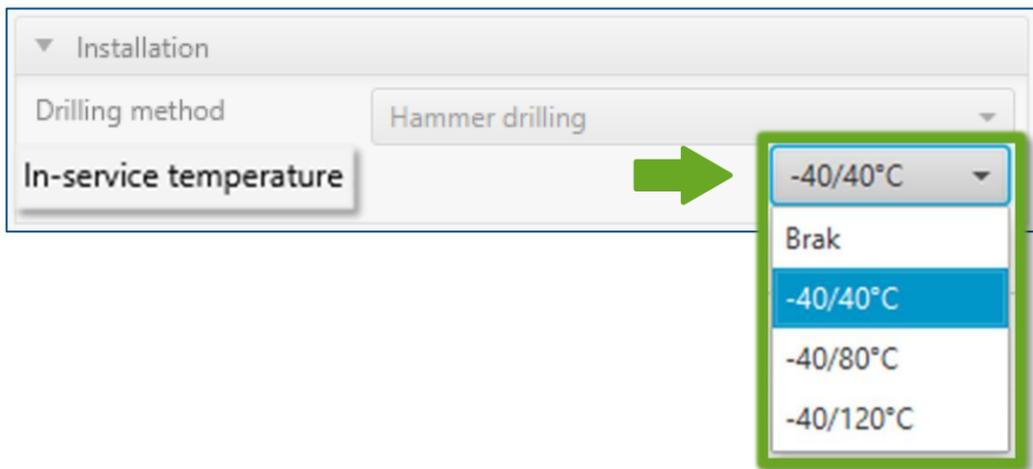
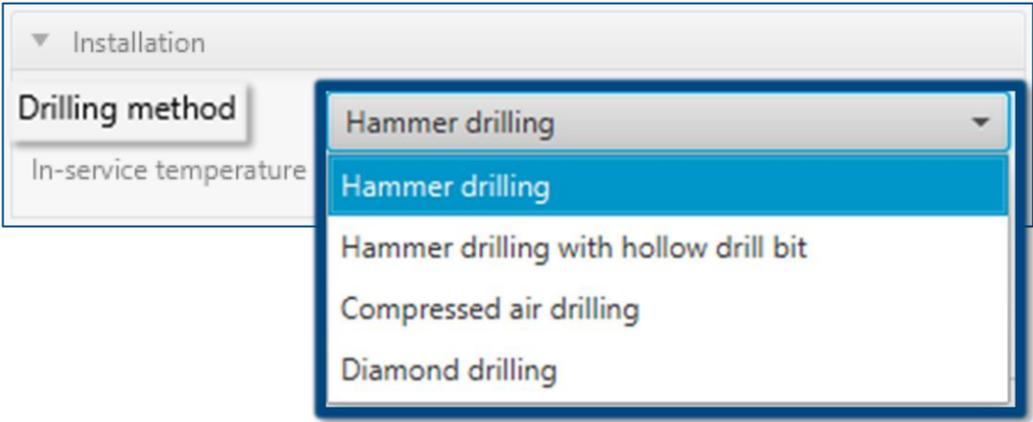
Determination of drilling method:  
Selecting from the list:

- Hammer drilling
- Hammer drilling with hollow drill bit
- Compressed air drilling
- Diamond drilling

Determination of service temperature range:  
Selecting from the list:

- 40° C ÷ + 40° C
- 40° C ÷ + 80° C
- 40° C ÷ + 120° C

Selecting from the list of results filters the proper anchor group.





# Reinforcement at the interface between concrete cast at different times

## 6 Analysis of The results

In the results panel, we can choose a design method between the calculation of the anchorage according to the standards contained in Eurocode 2 and the PIRR engineering method. In addition, it is possible to filter products and the region in which the products will be used.

- Panel of filters:
- Design method
  - Type of resin
  - Region

Results for reinforcement with **determined anchorage depth.**

Possibility to enter the declared anchorage depth.

Results for the appropriate **resin** depending on the package.

The screenshot shows the EasyFix software interface. On the left, the 'Input' panel contains various parameters for substrate, rebar, and installation. The central part of the interface displays a 3D model of a concrete slab with rebar reinforcement. On the right, the 'Results' panel shows calculated values and design options. Three arrows point from the explanatory text on the left to specific parts of the software interface: a blue arrow points to the 'Design method' dropdown, a green arrow points to the 'Resin' section, and an orange arrow points to the 'Resin in a cartridge' dropdown.

Parameter	Value
Design method	EN 1992-1-1 (6.2.5)
Anchor	R-KEXII
Region	Europe
Participation of stapling reinforcement $\rho$	0.001
$V_{Rdi}$	230 kPa
Utilisation	ND
Manual embedment depth	<input type="checkbox"/>
Minimum anchorage length $l_{b,min}$	142 mm
Total area	1 m <sup>2</sup>
Resin in a cartridge	R-KEX-II-600
Hole diameter in substrate	14 mm
Loss (for the optimized conditions)	20%
The amount of resin one fixing	14 ml
The total amount of resin	176 ml
The need for the amount of cartridges	1 pcs.



# Reinforcement at the interface between concrete cast at different times

7 Generating The printout »

In the printout panel it is possible to set regional options, i.e., language, decimal separator and system of units. The printout in pdf format contains all the data that is necessary in design and during the installation of the product.

Print option. Enables you to generate a document in a pdf format.



