





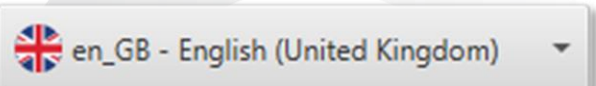





Reinforcement at the interface between concrete cast at different times

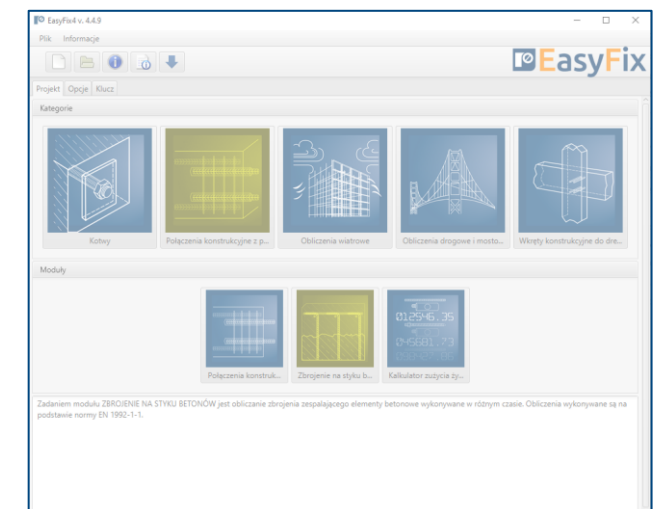
← Shortcut:

Meaning of icons and symbols:

-  Create new design
-  Open file
-  Save | Save as
-  Undo | Redo changes
-  Generate pdf printout
-  Information about software
-  en_GB - English (United Kingdom)
-  Info icons

Designing data:

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





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



The screenshot shows the EasyFix software interface. At the top, there are menu options 'File' and 'About', and a toolbar with icons for file operations. Below the toolbar are tabs for 'Project', 'Options', and 'Key'. The main area is divided into 'Categories' and 'Modules'.

Categories:

- Anchors
- Post-installed rebar (highlighted with an orange arrow)
- Wind calculations (highlighted with an orange arrow)
- Road & bridge calculations
- Wood construction screws

Modules:

- Post-installed rebar
- Reinforcement at th... (highlighted with an orange arrow)
- Resin calculator (displaying values: 012546.35, 012546.73, 058427.86)

At the bottom, a text box states: "The module's task is to calculate the reinforcement at the interface between concrete cast at different times."





Reinforcement at the interface between concrete cast at different times

2 Defining of The input data

Determination of the stress on the concrete surface.

Characteristics and conditions of the substrate.

Characteristics of reinforcing steel

Determination of installation conditions.

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.

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

- Design value of the shear stress (V_{Edi}):** 0 Pa
- Fatigue or dynamic loads:** (checkbox)
- Stress per unit area (σ_N):** 0 Pa
- Substrate:**
 - Length: 1 m
 - Width: 1 m
 - Thickness (T): 250 mm
 - Concrete class: C20/25
 - Safety factor (γ_c): 1.5
 - Concrete category: Uncracked
 - Surfaces are classified: Very smooth
 - Reinforcement: 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: (checkbox)
 - 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
 - μ : 0.5
- Rebar:**
 - Characteristic yield strength of reinforcement f_{yk} : 400 MPa
 - Angle of pasting (α): 90°
 - Bar size: Ø10
 - * Reinforcement not required: (checkbox)
 - Edit spacing together: (checkbox)
 - 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

Right Panel (Design Method):

- Design method: EN 1992-1-1 (6.2.5)
- Anchor: R-KEXII
- Region: Europe
- Participation of stapling reinforcement ρ : 0.001
- V_{Rdi} : 200 kPa
- Utilisation: ND
- Manual embedment depth: (checkbox)
- Minimum anchorage length $l_{b,min}$: 113 mm
- Total area: 1 m²
- Selection and designing of the reinforcement with regard to the cross-sectional shear should be performed separately. Relevant calculations should be in accordance with EN 1992-1-1 with National Annexes.

Bottom Panel (Resin):

- 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: 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

2 Defining of The input data



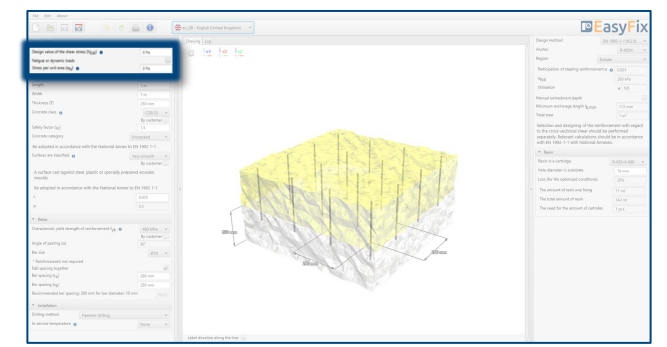
The contact stress in the contact surface of concrete that have hardened at different times should meet the requirements: $v_{Edi} \leq v_{Rdi}$

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 (σ_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 (σ_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. On the left, the 'Substrate' section is highlighted with a blue box, containing fields for Length (1 m), Width (1 m), and Thickness (T) (250 mm). Below this, the 'Concrete class' is set to C20/25, and the 'Safety factor (γ_c)' is 1.5. The 'Concrete category' is 'Uncracked'. The 'Surfaces are classified' section is highlighted with a green box, showing 'Very smooth' selected. Below that, the 'c' value is 0.025 and the 'μ' value is 0.5. The 'Rebar' section is highlighted with an orange box, showing 'Characteristic yield strength of reinforcement f_{yk}' set to 400 MPa, 'Bar size' as Ø10, and 'Bar spacing (s₃)' and 'Bar spacing (s₂)' both set to 280 mm. On the right, the 'Design method' is EN 1992-1-1 (6.2.5), and the 'Resin' section shows 'Rin in a cartridge' as R-KEX-II-600, 'Hole diameter in substrate' as 14 mm, and 'Loss (for the optimized conditions)' as 20%. The 3D model in the center shows a concrete slab with rebar, with dimensions of 280 mm indicated. Arrows from the text on the left point to these specific settings in the software.



Reinforcement at the interface between concrete cast at different times

3 Defining of The substrate

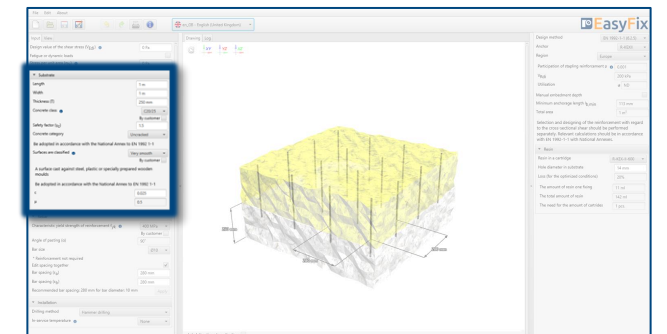
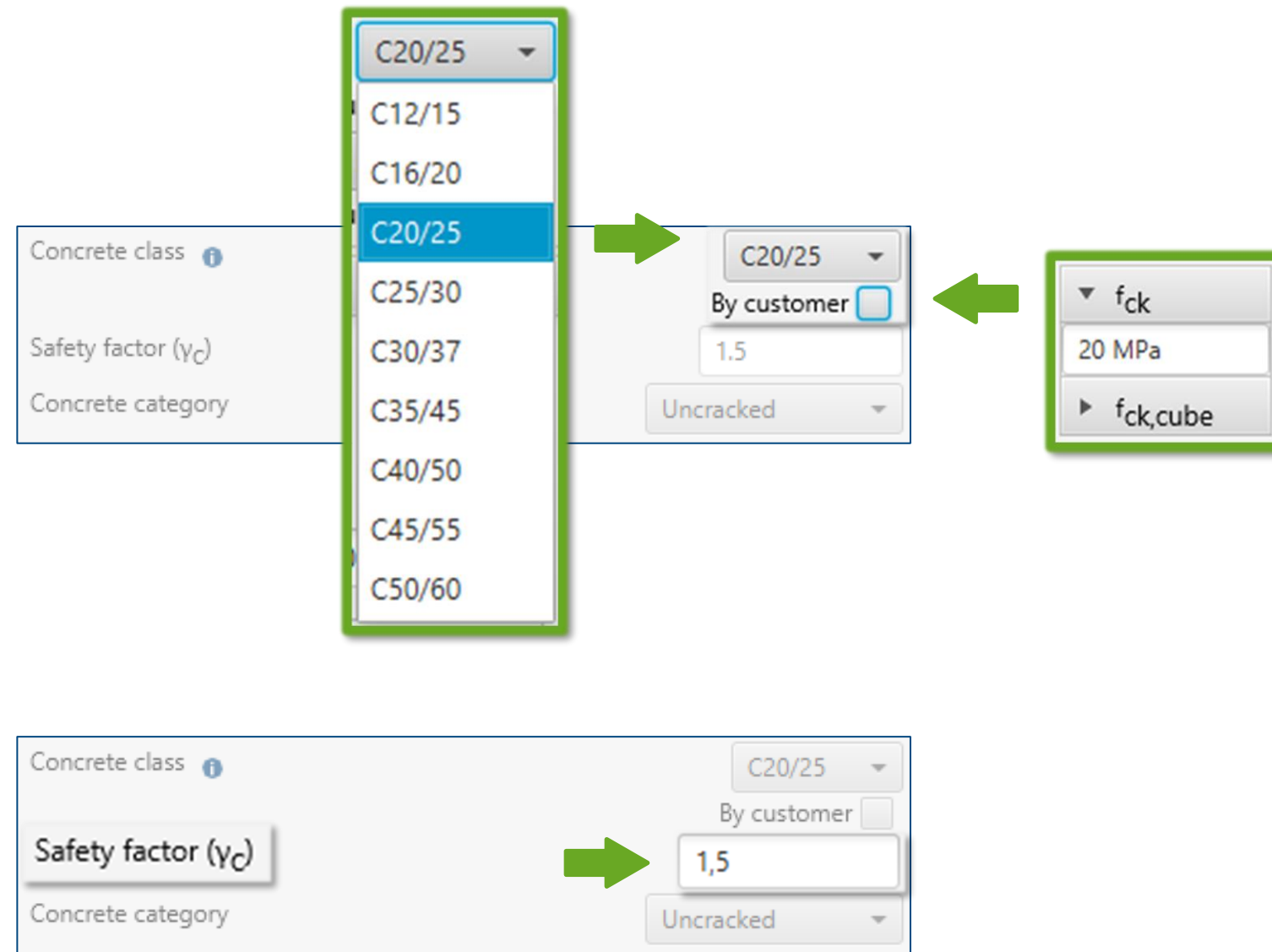


Determining of the concrete strength class:

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

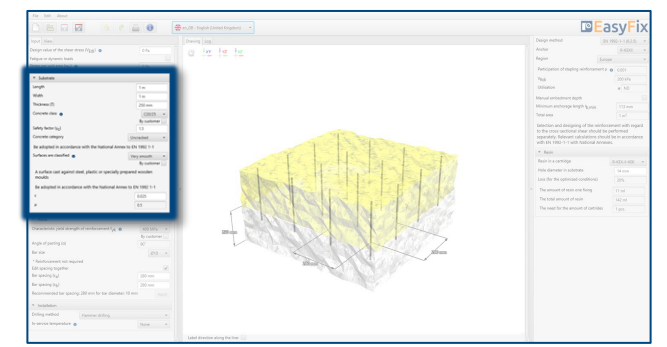
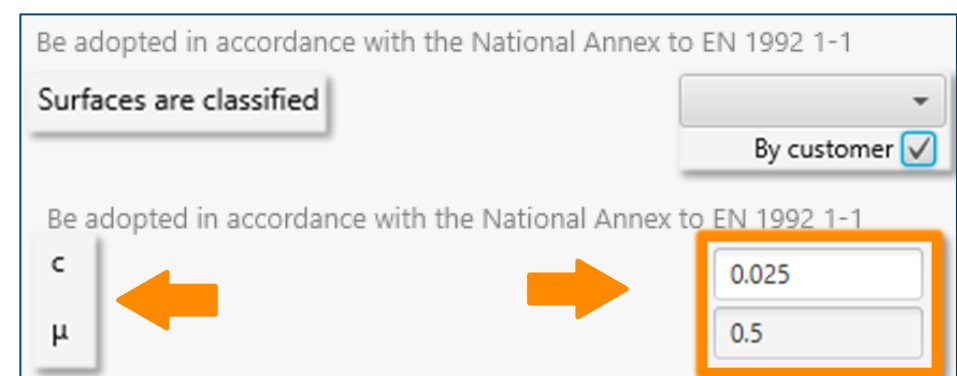
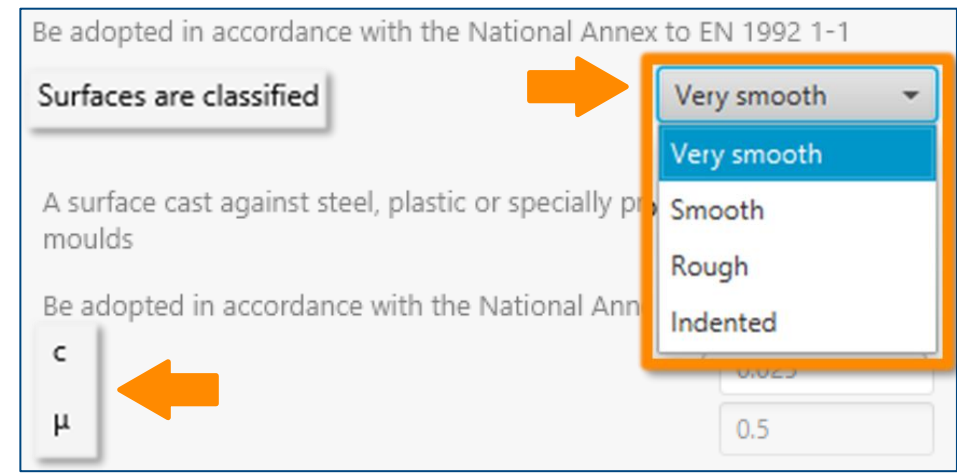


Surface classification:

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 μ .





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, a parameter panel is visible with sections for 'Substrate' and 'Rebar'. The 'Rebar' section is highlighted with a blue box and contains the following settings:

- Characteristic yield strength of reinforcement f_{yk} : 400 MPa
- Angle of pasting (α): 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

On the right, a 'Resin' section is also visible with settings like 'Resin in a cartridge: R-KEX-II-600', 'Hole diameter in substrate: 14 mm', and 'Loss (for the optimized conditions): 20%'. The central 3D model shows a concrete slab with vertical rebar bars. Green arrows point to the '280 mm' spacing labels on the model, and a blue arrow points from the 'Rebar' settings panel to the model.



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 γ_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 (α) 90°

Bar size $\varnothing 10$

* Reinforcement not required



f_{yk} 500 MPa

Safety factor γ_s 1.15

By customer

400 MPa

Characteristic yield strength of reinforcement f_{yk} By customer

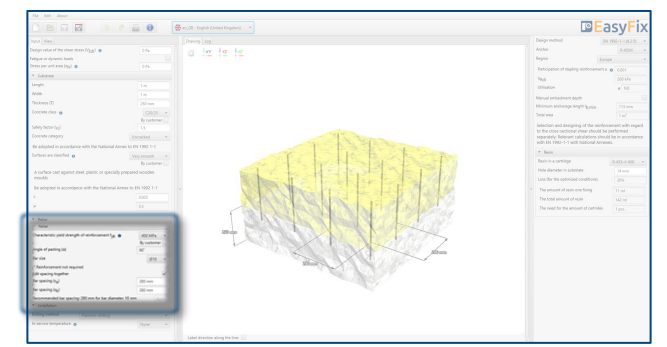
Angle of pasting (α) 90°

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. On the left, there are input fields for design parameters:

- Design value of the shear stress (V_{Ed}): 0 Pa
- Fatigue or dynamic loads:
- Stress per unit area (σ_N): 0 Pa
- Substrate: Length 1 m, Width 1 m, Thickness (T) 250 mm, Concrete class C20/25, Safety factor (γ_c) 1.5, Concrete category Uncracked.
- Rebar: Characteristic yield strength of reinforcement (f_{yk}) 400 MPa, Angle of pasting (α) 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.

On the right, there are design results and resin requirements:

- Design method: EN 1992-1-1 (6.2.5)
- Anchor: R-KEXII
- Region: Europe
- Participation of stapling reinforcement ρ : 0.001
- V_{Rdi} : 200 kPa
- Utilisation: ND
- Manual embedment depth:
- Minimum anchorage length $l_{b,min}$: 113 mm
- Total area: 1 m²
- Resin: 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 11 ml, The total amount of resin 142 ml, The need for the amount of cartridges 1 pcs.

The central 3D model shows a concrete slab with a grid of reinforcement bars. Dimensions of 280 mm are indicated for the spacing between bars.





Reinforcement at the interface between concrete cast at different times

5 Conditions of The installation



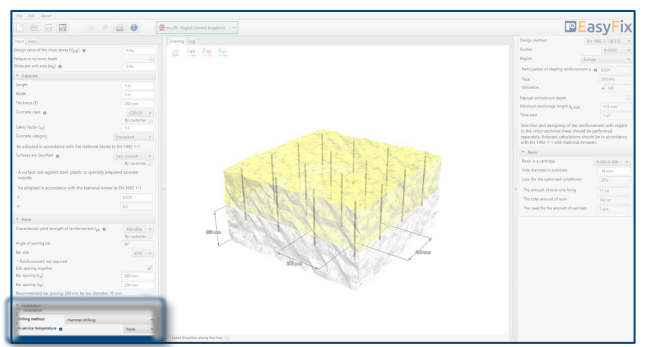
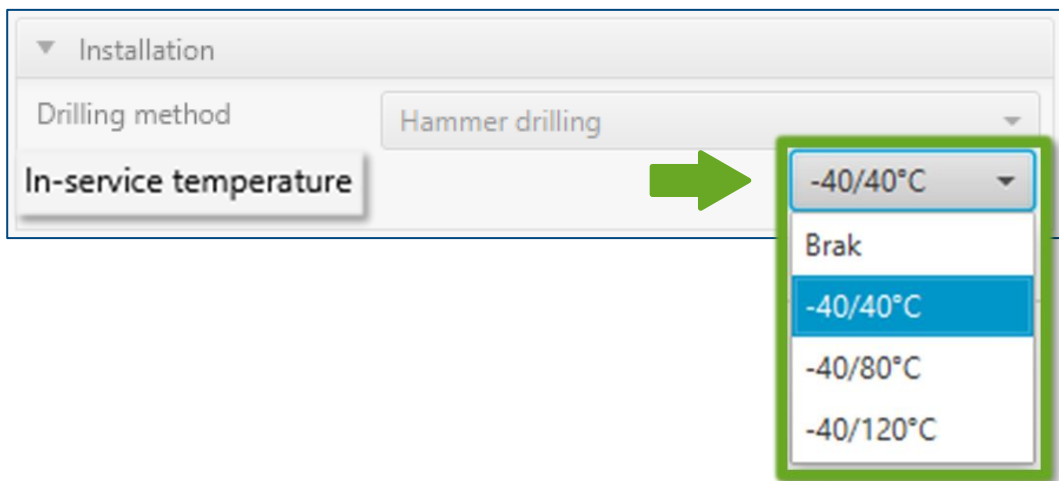
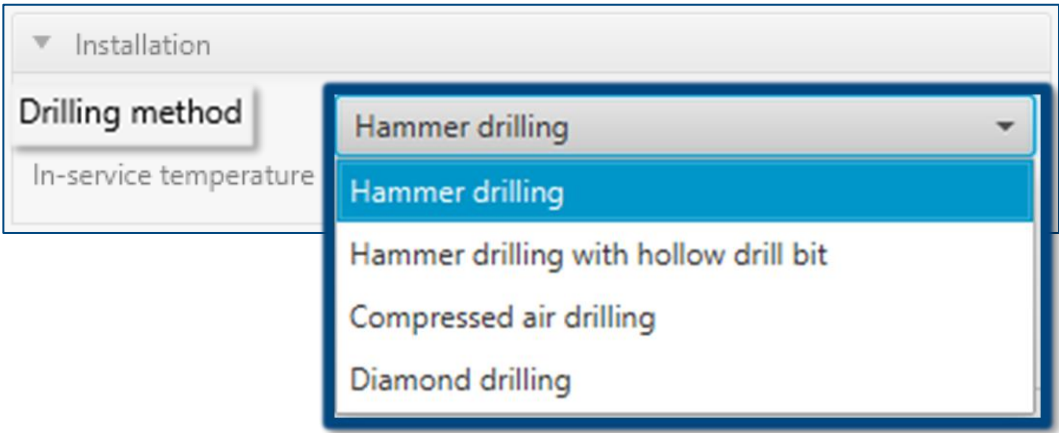
Determination of drilling method:
Selecting from the list:

- 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 parameters.

Design Method	Value
Design method	EN 1992-1-1 (6.2.5)
Anchor	R-KEXII
Region	Europe
Participation of stapling reinforcement ρ	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 ²

Resin	Value
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.



