

# PROTECTO

Edge protection

User guide



**HUNNEBECK** 

BY BRAND  SAFWAY

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# 1 Product features

The guard rail system PROTECTO is based on the DIN EN 13374:2004 - class A and is intended as temporary edge protection in order to keep people from falling and to prevent accidents caused by falling objects. It is not designed for bearing loads or as any other kind of support.

PROTECTO complies to the product specifications and test procedures of the DIN EN 13374:2004 - class A. The use of the PROTECTO system is permitted up to a peak velocity pressure of 0.60 kN/m<sup>2</sup>. A use outside this range is in principle permissible, but requires separate structural proof.

PROTECTO is also used as temporary protection of staircases and accesses to elevator shafts.

## 1.1 General information

This user guide contains important information regarding the assembly and use of the guard rail system PROTECTO made by HÜNNEBECK as well as safety instructions that are important for a safe application on site.

The user guide is created to support effective working processes on site using PROTECTO. Therefore, please read this user guide carefully before assembly and use of PROTECTO. Also, keep this user guide at hand and archive it for future reference.

HÜNNEBECK products are exclusively designed for commercial use by technically qualified users.

## 1.2 Safety instructions

This section contains important information regarding the intended use and safe application of formwork and falsework.

- Risk assessment

The contractor is responsible for the compilation, documentation, implementation and revision of a risk assessment for each construction site. Employees are obliged to implement the measures resulting from this in accordance with all legal requirements.

- Installation instructions

The contractor is responsible for compiling a written set of installation instructions. The user guide is not usually identical to the installation instructions but can be part of the basis for the compilation of the installation instructions.

- User guide

Formwork is technical work equipment that is intended for commercial use only. The product must be used as intended exclusively by properly trained personnel and appropriately qualified supervising personnel. The user guide is an integral component of the formwork construction. It comprises minimum guidelines, details on the standard configuration and intended use, as well as the system description.

The functional instructions (standard configuration) contained in the user guide are to be complied with as stated. Enhancements, deviations or changes represent a potential risk and therefore require separate verification (with the help of a risk assessment) or a set of installation instructions that comply with the relevant laws, standards and safety regulations. The same applies in those cases where formwork and/or falsework components are provided by the contractor.

This user guide is intended for commercial users with appropriate technical training. The contents and processes described are in accordance with the legal and occupational safety regulations of Germany and Austria. Hünnebeck assumes no liability for deviations from the contents and processes described or for use outside this area of application.

- Availability of the user guide  
The contractor has to ensure that the user guide provided by the manufacturer or formwork supplier is available on site. Before the assembly and use the site personal has to be familiar with the user guide and the user guide must be available at all times.
- Images  
The images shown in the user guide are, in part, situations of assembly and not always complete in terms of safety considerations. Nevertheless, the safety installations that may not be shown in these images must be available.
- Storage and transportation  
The special requirements of the respective formwork constructions regarding transportation procedures as well as storage must be complied with. For example, the appropriate lifting gear should be indicated.
- Material check  
Formwork and falsework material deliveries are to be checked on arrival at the construction site/place of destination as well as before each use to ensure that they are in perfect condition and function correctly. Changes to the formwork materials are not permitted.
- Spare parts and repairs  
Only original components may be used as spare parts. Repairs are to be carried out by the manufacturer or authorized repair facilities only.
- Use of other products  
Combining formwork components from different manufacturers carries certain risks. They are to be individually verified and can result in the compilation of a separate user guide required for the installation of the equipment.
- Safety warnings, Note and visual check  
The individual safety messages or notes and the visual check are to be complied with.



## DANGER

### Danger!

Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.



## WARNING

### Warning!

Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.



## CAUTION

### Caution!

Caution used with the safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

## NOTE

### Note

Note refers to practices not related to personal injury.



## VISUAL CHECK

Visual check refers to a visual check and is not related to personal injury.

- **Miscellaneous**

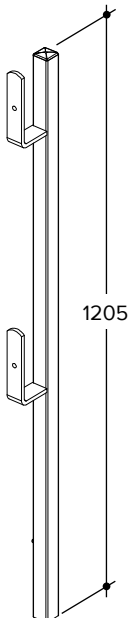
Technical improvements and modifications are subject to change without note. For the safety-related application and use of the products, all current country-specific laws, standards and other safety regulations are to be complied with without exception. They form a part of the obligations of employers and employees regarding industrial safety. This results in, among other things, the responsibility of the contractor to ensure the stability of the formwork and falsework constructions as well as the structure during all stages of construction. This also includes the basic assembly, stripping and the transport of the formwork and falsework constructions or their components. The complete construction is to be checked during and after assembly.

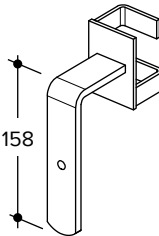


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40855 Ratingen  
Germany

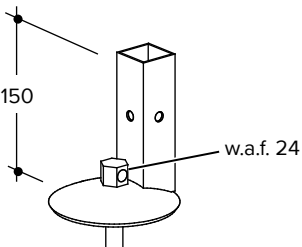
## 2 Components

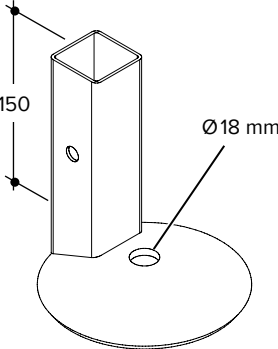
### 2.1 PROTECTO railing post

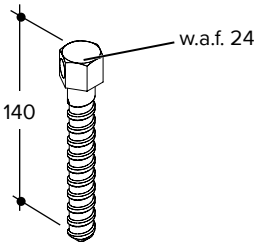
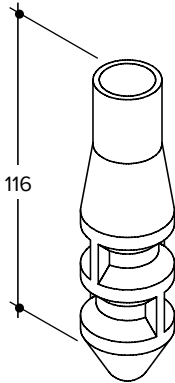
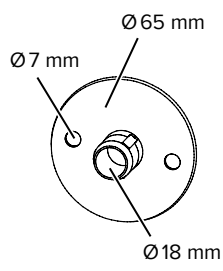
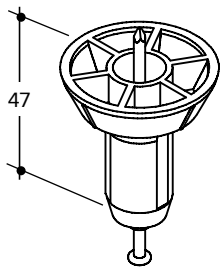
	Component	Product code	Weight [kg]
	<b>PROTECTO railing post</b> The PROTECTO railing post is the basic component of the PROTECTO system. It is used to carry plank railings or protective mesh panels. An integrated safety device secures the post automatically to the various retaining elements (see page 12).  When using railing planks, the planks must be 30 mm thick, 150 mm high and meet the requirements of strength class C24 according to EN 338 (formerly S10).	<b>601225</b>	<b>3.65</b>

	<b>PROTECTO toe board retainer</b> When using plank railings, this add-on part for the PROTECTO railing post secures the toe board. The PROTECTO toe board retainer can easily be attached to already installed PROTECTO railing posts (see page 18).	<b>601227</b>	<b>0.69</b>
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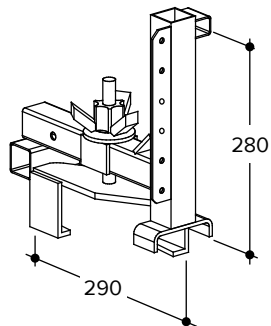
### 2.2 Fastening in concrete

	Component	Product code	Weight [kg]
	<b>PROTECTO screw base joint</b> This fixing part for the PROTECTO railing post is attached to a flat and stable concrete slab. The PROTECTO screw base joint is fixed to the concrete slab (see page 13), with an integrated screw (M16) and a dowel (with internal thread).	<b>601228</b>	<b>1.02</b>

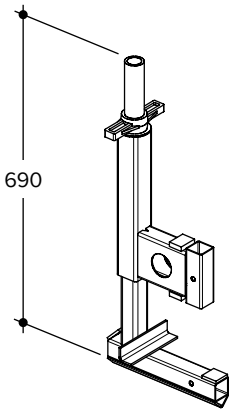
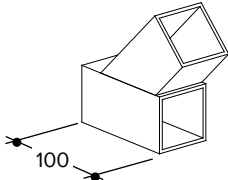
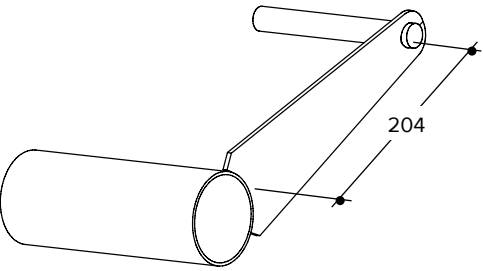
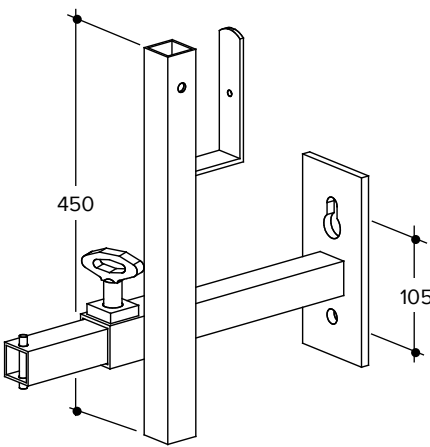
	<b>PROTECTO screw base without bolt</b> This screw base can be used in combination with the tie sleeve DW15 and the SF screw DW15 instead of the PROTECTO screw base joint in areas where drilling is not permitted. PROTECTO tie sleeve DW15 and PROTECTO SF screw DW15 must be ordered separately (see page 14). Alternatively, the screw base can also be fixed using self-tapping screw anchors.	<b>601258</b>	<b>0.90</b>
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	Component	Product code	Weight [kg]
	<b>PROTECTO SF screw DW15</b> In connection with the tie sleeve DW15, it fixes the PROTECTO screw base without bolt to the building.	<b>602583</b>	<b>0.22</b>
	<b>Tie sleeve DW15</b> The cast-in tie sleeve is an alternative fastening method to dowels. It is used in connection with the PROTECTO screw base without bolt and the PROTECTO SF screw DW15 (see page 14).	<b>602584</b>	<b>0.04</b>
	<b>Cap for the tie sleeve</b> The cap covers the tie sleeve DW15 when it is positioned and fixed in freshly poured concrete (see page 14).	<b>602026</b>	<b>0.01</b>
	<b>Fixing cone for tie sleeve</b> Fixes the tie sleeve DW15 to the formwork (see page 14).	<b>602025</b>	<b>0.02</b>

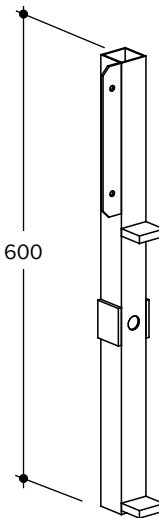
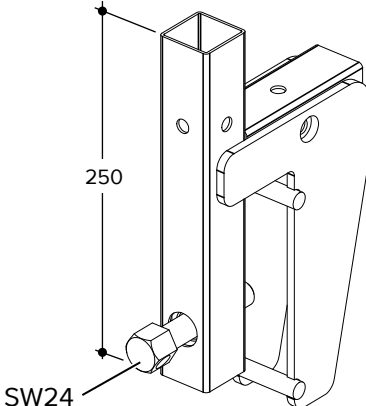
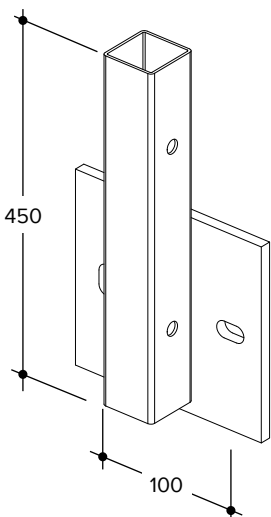
### 2.3 Fastening at timber formwork

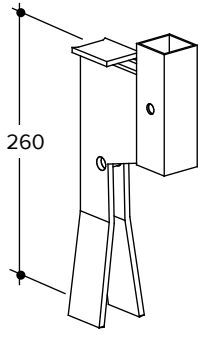
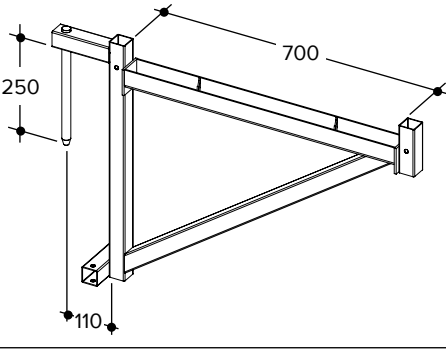
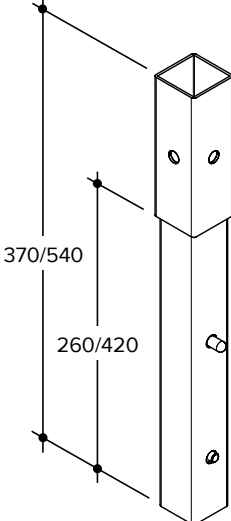
	Component	Product code	Weight [kg]
	<b>PROTECTO timber beam connector</b> The PROTECTO timber beam connector is used to mount PROTECTO railing posts to H 20 and R 24 beams. At the same time, the connector can be used as a support for slab edge forms. The beam side form can be nailed to the integrated nailing plate (see page 21).	<b>601291</b>	<b>4.20</b>

## 2.4 Other fixing parts

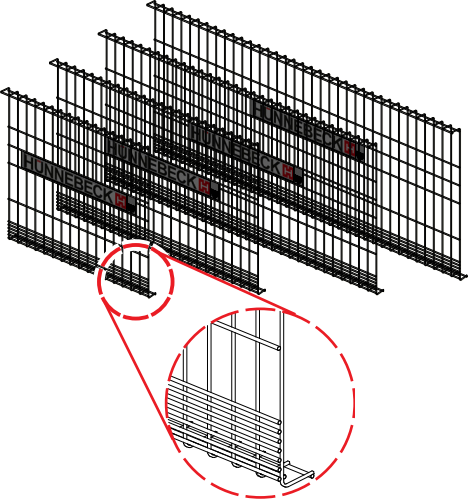
	Component	Product code	Weight [kg]
	<p><b>PROTECTO multiple clamp</b></p> <p>This clamp can be used in a wide range of applications to attach the PROTECTO railing post to any structural component, such as slab edges, parapet walls, and roof parapets.</p> <p>Adjustments can be made within a range of 2 to 47 cm by turning the movable clamping part (see page 23).</p>	<b>601226</b>	<b>6.49</b>
	<p><b>PROTECTO beam section clamp</b></p> <p>The PROTECTO beam section clamp is used to mount the PROTECTO multiple clamp to horizontal and vertical I-beams. The standard clamping part of the PROTECTO multiple clamp must be replaced by two of these PROTECTO beam section clamps (see page 25).</p>	<b>601310</b>	<b>0.79</b>
	<p><b>PROTECTO fixing device for clamp</b></p> <p>The PROTECTO fixing device for clamp in combination with the PROTECTO multiple clamp, the PROTECTO railing post and a plank railing allows the installation of a railing to stairways (see page 26).</p>	<b>601990</b>	<b>2.16</b>
	<p><b>PROTECTO post holder vari</b></p> <p>This post bracket is mounted to exterior walls. Its adjustable cantilever compensates for slab projections of up to 27 cm (see page 27).</p>	<b>602150</b>	<b>6.01</b>

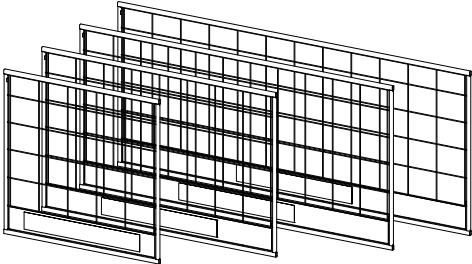


	Component	Product code	Weight [kg]
	<p><b>PROTECTO front attachment</b></p> <p>This bracket is used for the installation of protective guard rails on building walls. It is mounted to the building by using screws or tie rods. The PROTECTO front attachment is also used as a support for slab edge forms for slab formwork. The integrated nailing plate allows the attachment of the beam side formwork (see page 28).</p>	<p><b>601285</b></p>	<p><b>2.01</b></p>
	<p><b>PROTECTO sheet pile clamp</b></p> <p>This sheet pile clamp allows to mount a PROTECTO fall protection to sheet piles at constructions pits (see page 30).</p>	<p><b>603546</b></p>	<p><b>2.93</b></p>
	<p><b>PROTECTO screw-on bracket</b></p> <p>This post bracket is mounted to walls as holder for the PROTECTO post (see page 31).</p>	<p><b>601892</b></p>	<p><b>2.00</b></p>

	Component	Product code	Weight [kg]
	<p><b>PROTECTO staircase bracket</b></p> <p>This bracket is used for the installation of a plank railing along a staircase.</p> <p>The bracket is attached by using one M12 bolt and a matching dowel. This provides safety and enough space for unhindered work on the stairs and in the staircase until the permanent railing is installed (see page 33).</p>	<p><b>601229</b></p>	<p><b>2.02</b></p>
	<p><b>PROTECTO concrete pouring bracket</b></p> <p>The PROTECTO concrete pouring brackets are hung to hollow walls. With attached planks and mounted railings they allow safe pouring (see page 34).</p>	<p><b>601894</b></p>	<p><b>8.52</b></p>
	<p><b>PROTECTO post extension 26</b></p> <p><b>PROTECTO post extension 42</b></p> <p>With these parts it is possible to extend the PROTECTO railing post by 26 cm or 42 cm.</p> <p>When using post extensions, a post spacing of up to 2.40 m is allowed in combination with protection meshes.</p> <p>When using plank railing with post extension 26, the maximum post spacing is limited to 1.70 m.</p> <p>When using plank railing with post extension 42, the maximum post spacing is limited to 1.30 m.</p>	<p><b>602111</b></p> <p><b>602580</b></p>	<p><b>0.93</b></p> <p><b>1.19</b></p>

## 2.5 Protective mesh panel

	Component	Product code	Weight [kg]
	<b>PROTECTO protective mesh panel 263</b>	<b>601231</b>	<b>22.20</b>
	<b>PROTECTO protective mesh panel 240</b>	<b>604730</b>	<b>20.14</b>
	<b>PROTECTO protective mesh panel 180</b>	<b>604731</b>	<b>15.31</b>
	<b>PROTECTO protective mesh panel 130</b>	<b>604733</b>	<b>11.09</b>
	<p>The alternative to plank railings.                      The hot-dip galvanized PROTECTO protective mesh panel is a complete edge protection that can be attached easily, quickly and with flexibility to the PROTECTO railing posts (see page 15).</p>		

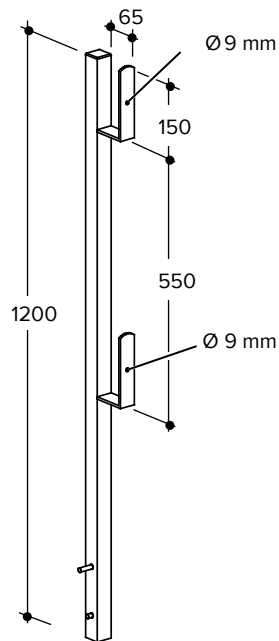
	<b>Universal protection mesh 270</b>	<b>607945</b>	<b>19.45</b>
	<b>Universal protection mesh 240</b>	<b>607940</b>	<b>17.64</b>
	<b>Universal protection mesh 180</b>	<b>607985</b>	<b>13.85</b>
	<b>Universal protection mesh 120</b>	<b>607955</b>	<b>10.07</b>
	<p>Hot-dip galvanized 1.15 m high protection mesh with lightweight frame design. The special arrangement of bars secures the protection mesh against unintentional lifting. At the same time, the large distances between the bars allow the user to reach through the mesh.                      Also available powder-coated in any RAL colour on request.</p>		

## 3 Assembly

### 3.1 PROTECTO railing post

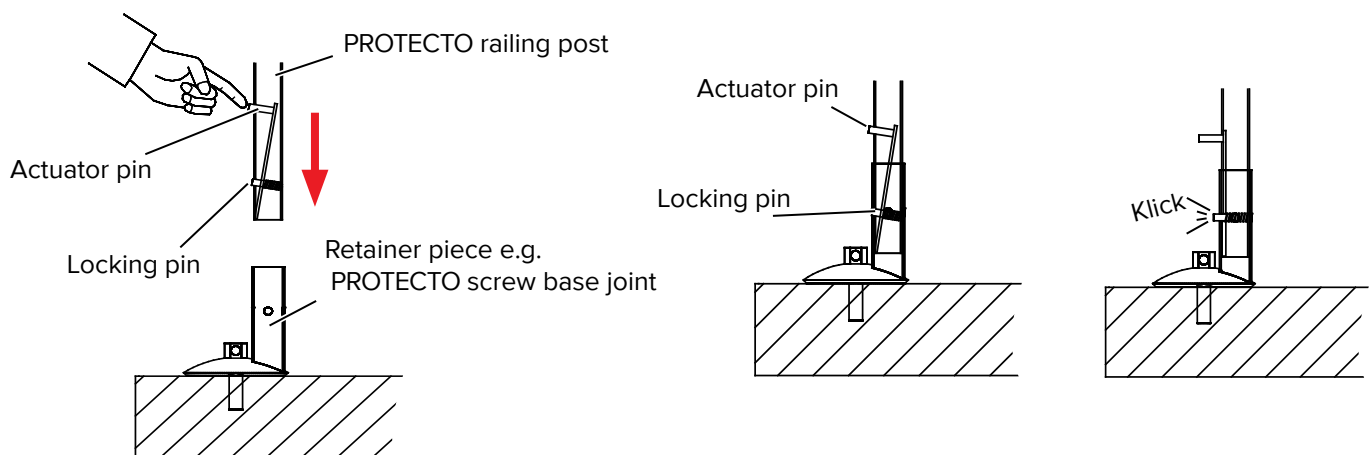
The PROTECTO railing post is the basic component of the PROTECTO system.

It is equipped with two brackets for the PROTECTO protective mesh panel or a plank railing with dimensions of 15 × 3 cm. The post is secured by correctly inserting the integrated safety lock.



#### Function of the safety device

Insert the PROTECTO railing post into the retainer and press the actuator pin of the safety lock. The locking pin retracts inside the post and the post can be inserted into the retainer. When the locking pin is inside the retainer piece release the actuator pin. Insert the PROTECTO railing post into the retainer until the spring mechanism can be heard and seen as fully locked. Test the proper seating of the PROTECTO railing post by pulling and inspect visually the correct engagement of the locking pin.



#### WARNING

#### Warning!

Never use PROTECTO railing posts with a damaged or a missing safety device.



#### VISUAL CHECK

Check the proper engagement of the locking pin!

### 3.2 PROTECTO screw base joint

A guard railing can be installed on horizontal concrete slabs by using a PROTECTO screw base joint with an integrated screw (M16) and a dowel with internal thread. When using HILTI dowels HKD M16 or Fischer ED II M16 hammer-set anchors as anchors in uncracked concrete slabs of C20/25 quality (previously B25), the anchor loads have already been proven according to the example below. Equivalent dowels/hammer-set anchors from other manufacturers may be used.

The requirements of the dowel approval must be kept.

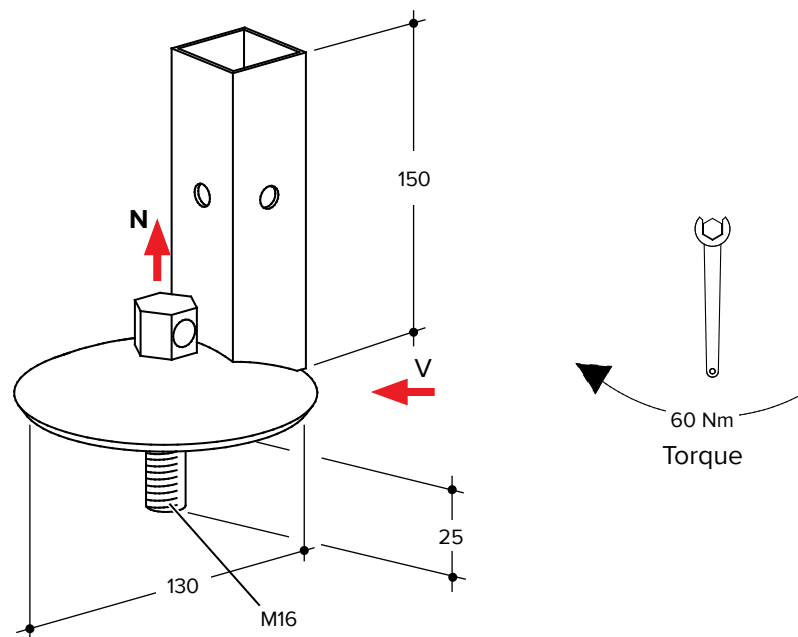
Distance to edges and floor thickness must be taken from the approval of the dowel.

**For tying systems, calculate with the following characteristic loads:**

Horizontal load:  $V_k = 1.08 \text{ kN}$

Moment:  $M_k = 0.67 \text{ kNm}$

Tension force:  $N_k = 14 \text{ kN}$



**WARNING**

**Warning!**

Check strength of concrete before mounting the guard railing!

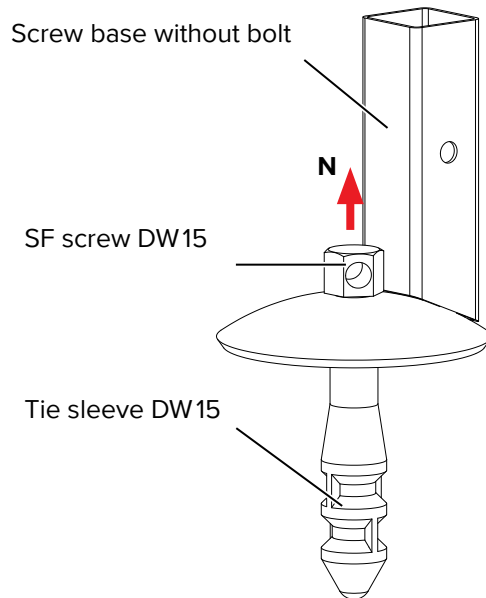
The PROTECTO screw base joint can be fastened to the slab by tightening the integrated screw using the tip of a hammer or a 24 mm wrench. Adjust the PROTECTO screw base prior to tightening the bolt!



## 3.3 PROTECTO screw base without bolt

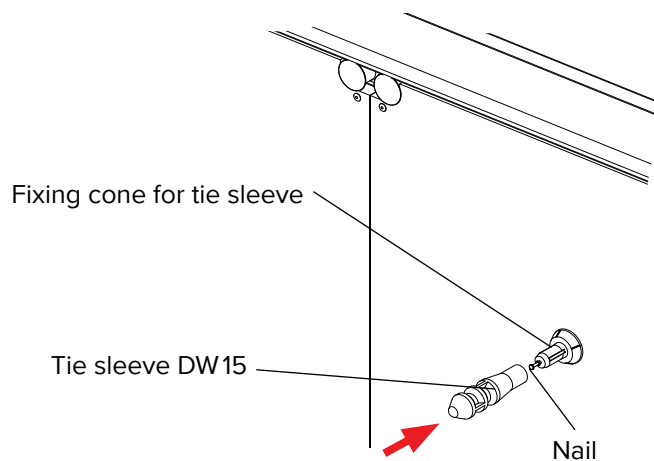
This screw base is designed as an alternative fastening element for the PROTECTO railing post. It is used in wall and slab areas where it is not permitted to use dowels. The screw base is fastened with the PROTECTO SF screw and the tie sleeve DW15 (lost part), which is set in concrete.

Tension force:  $N_k = 14 \text{ kN}$



### Encase tie sleeve DW15 in concrete

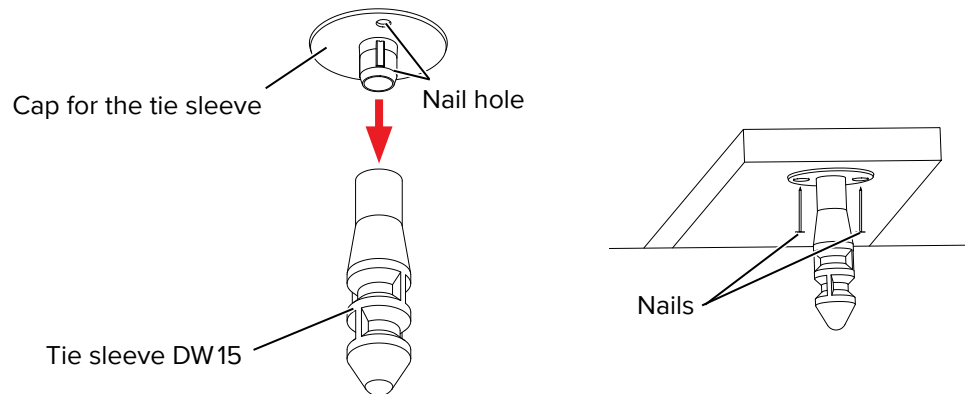
The tie sleeve is fixed to the formwork with the fixing cone for tie sleeve by nails. After pouring, the fixing cone is removed during stripping. The screw base is mounted with the SF screw.



### WARNING

#### Warning!

When using the tie sleeve a minimum distance to the concrete edge of 12.5 cm must be kept. Quality of concrete at least C16/20.



When inserting the tie sleeve into fresh concrete from above, the DW15 thread is covered with the cap for tie sleeve. Now the tie sleeve is inserted into the fresh concrete. It is also possible to attach the cap for tie sleeve with nails.

Tension force:  $N_k = 14 \text{ kN}$

### 3.4 PROTECTO railing post with protective mesh panel

#### 3.4.1 Protective mesh panel

The standard use of the PROTECTO protective mesh panels in combination with the PROTECTO railing post allows a maximum post-spacing of up to 2.40 m and forms a complete side protection.



#### WARNING

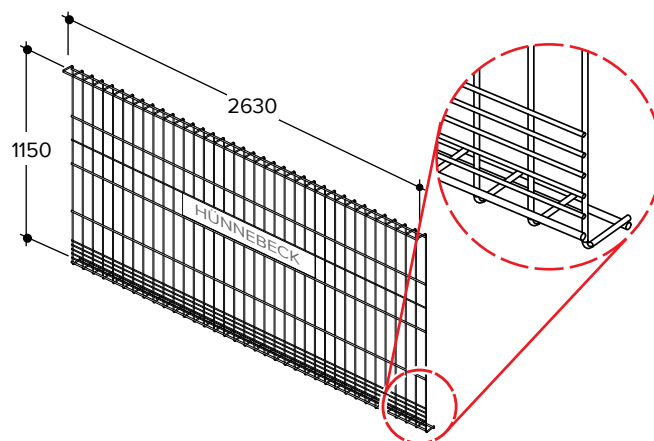
#### Warning!

Make sure that the PROTECTO protective mesh panel is standing directly on the slab.

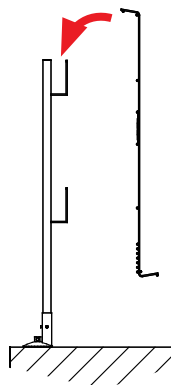
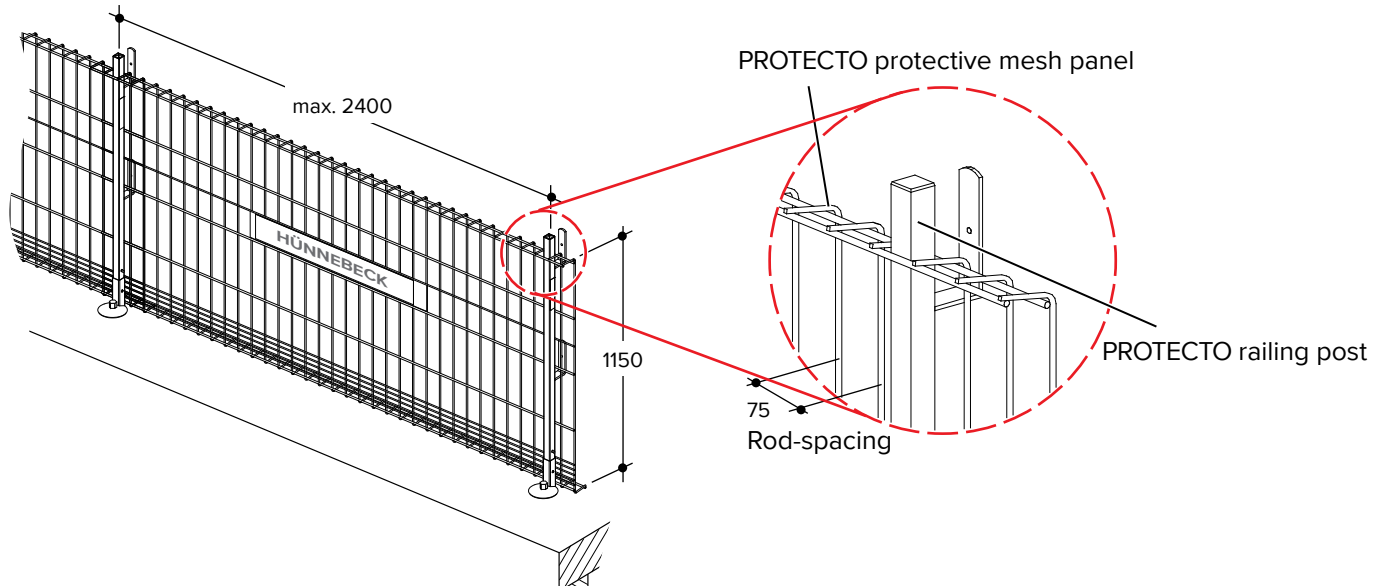
#### NOTE

#### Note

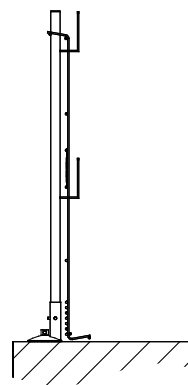
When using the PROTECTO protective mesh panel in combination with the PROTECTO post extension see page 19.



The PROTECTO protective mesh panel must be installed on at least two PROTECTO railing posts. The post spacing (max. 2.40 m) can be selected without a specific grid.



Hang PROTECTO protective mesh panel over the posts.



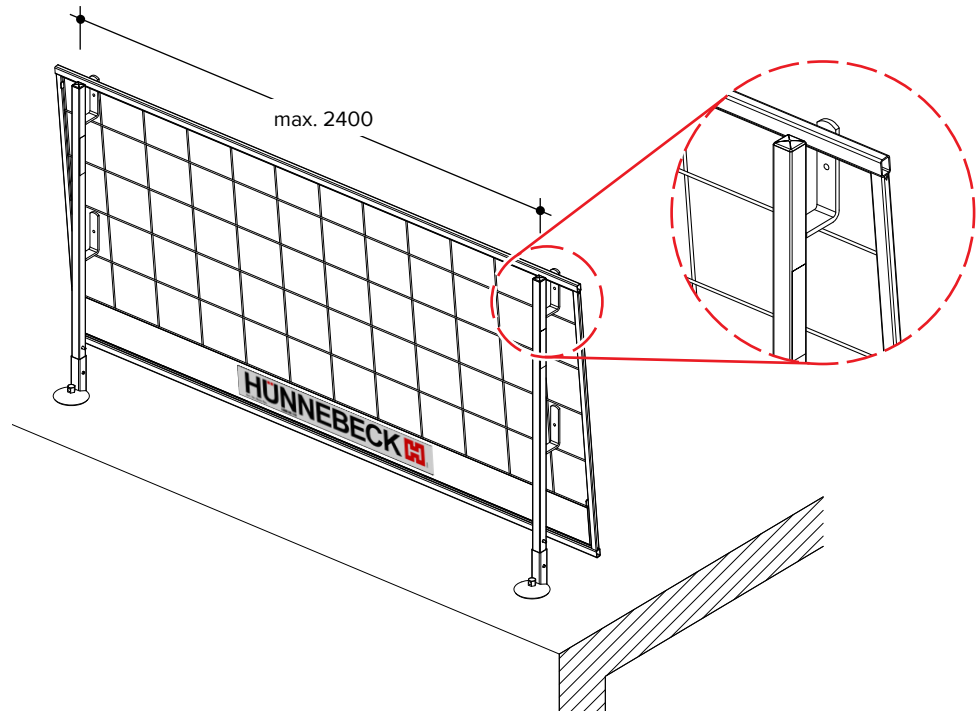
PROTECTO protective mesh panel in secured final position.



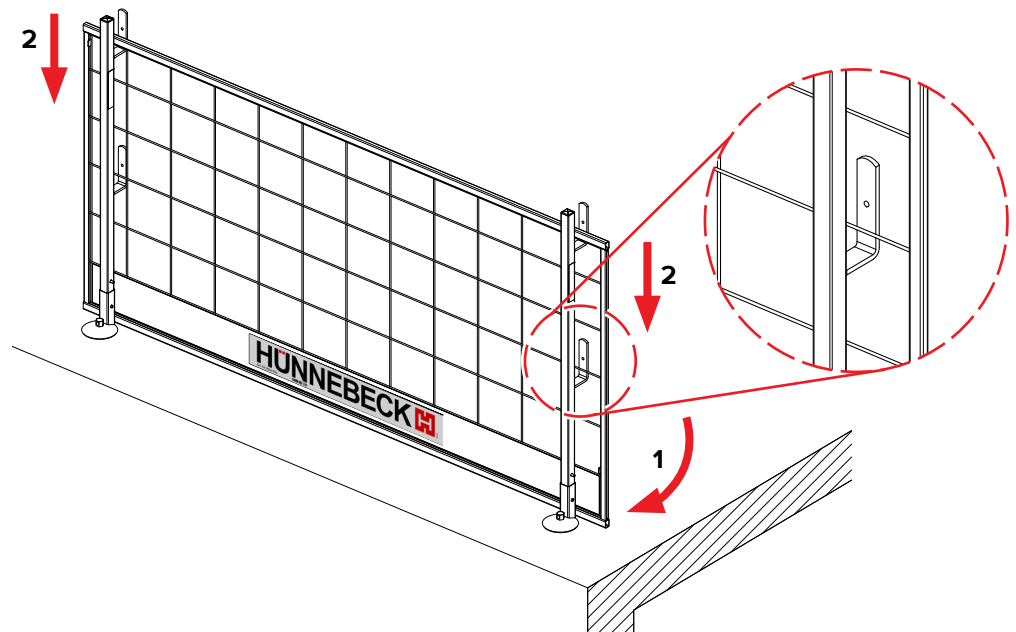
### 3.4.2 Universal protection mesh

The universal protection mesh has the same protective function as the protective mesh panel. How to attach the universal protection mesh to the PROTECTO posts differs somewhat.

**Step 1** Slightly incline the protection mesh towards the post and hook the upper frame profile for a few centimeters into the upper hook of the PROTECTO post.

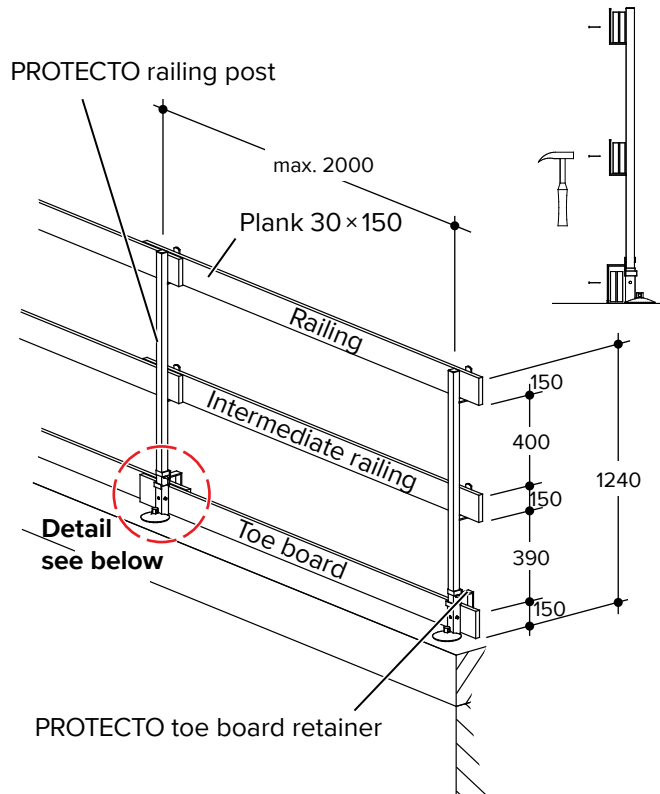


**Step 2** Place the protection mesh in a straight position and hook the 3rd lattice bar from above in the lower hook of the PROTECTO post.



## 3.5 PROTECTO railing post with plank railing

When using a three-part guard railing according to DIN EN 13374, the maximum distance between the PROTECTO railing posts is 2.00 m. The planks of the railing must have a cross-section of at least 30 × 150 mm.



### WARNING

#### Warning!

The plank railings must be secured with nails to prevent falling.



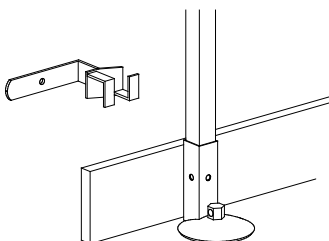
### WARNING

#### Warning!

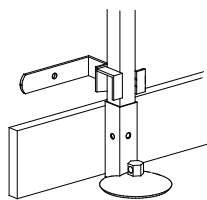
The railing planks must be 30 mm thick, 150 mm high and meet the requirements of strength class C24 according to EN 338.

Mount the PROTECTO toe board retainer with a simple rotation to the previously installed post.

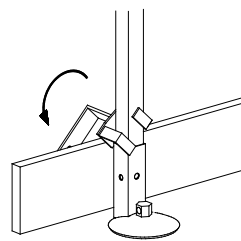
1.



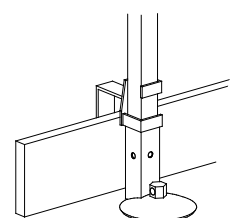
2.



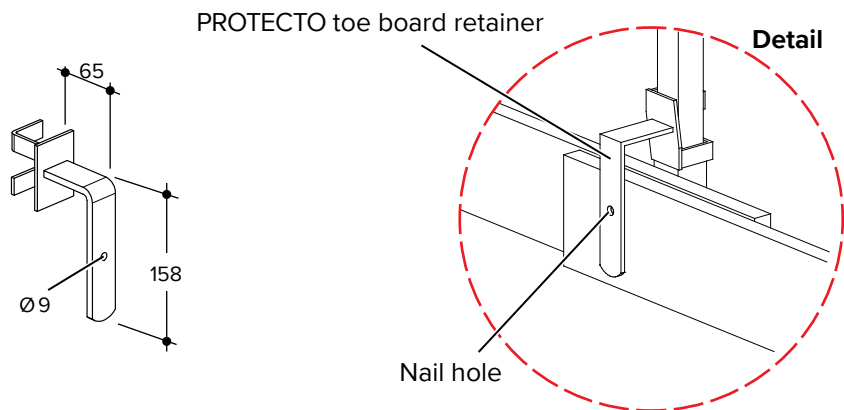
3.



4.



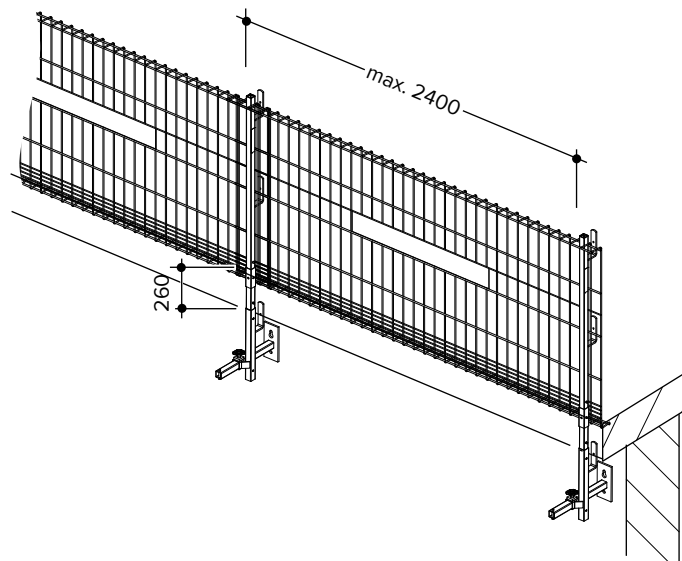
To fix the toe board of a three-part guard railing always use the PROTECTO toe board retainer.



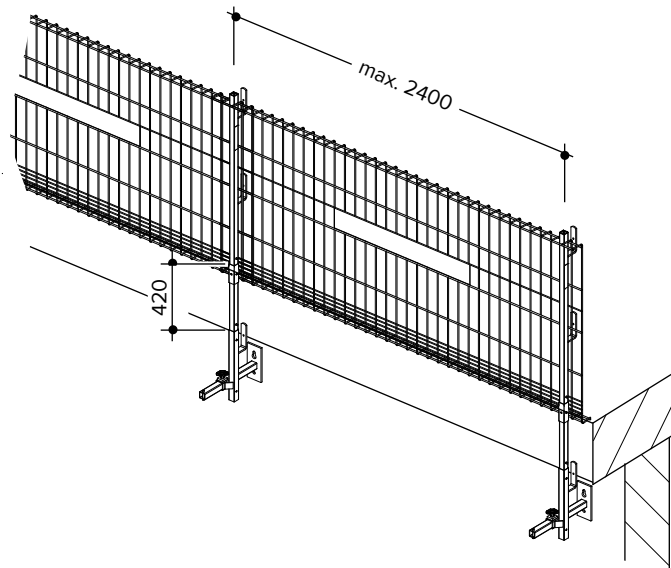
### 3.6 PROTECTO railing post with post extension

The standard use of the PROTECTO protective mesh panel in combination with the PROTECTO post allows a post spacing of up to 2.40 m. It is a complete side protection.

#### Example PROTECTO post extension 26



## Example PROTECTO post extension 42



According to DIN EN 13374, when using the PROTECTO mesh panel with:

- PROTECTO screw base joint
- PROTECTO staircase bracket
- PROTECTO multiple clamp (with or without beam section clamp)
- PROTECTO front attachment
- PROTECTO timber beam connector

and the post extension 26 or post extension 42, the maximum allowable post spacing is 2.40 m.



### WARNING

#### Warning!

When using plank railing with post extension 26, the maximum post spacing is limited to 1.70 m.  
When using plank railing with post extension 42, the maximum post spacing is limited to 1.30 m.



### WARNING

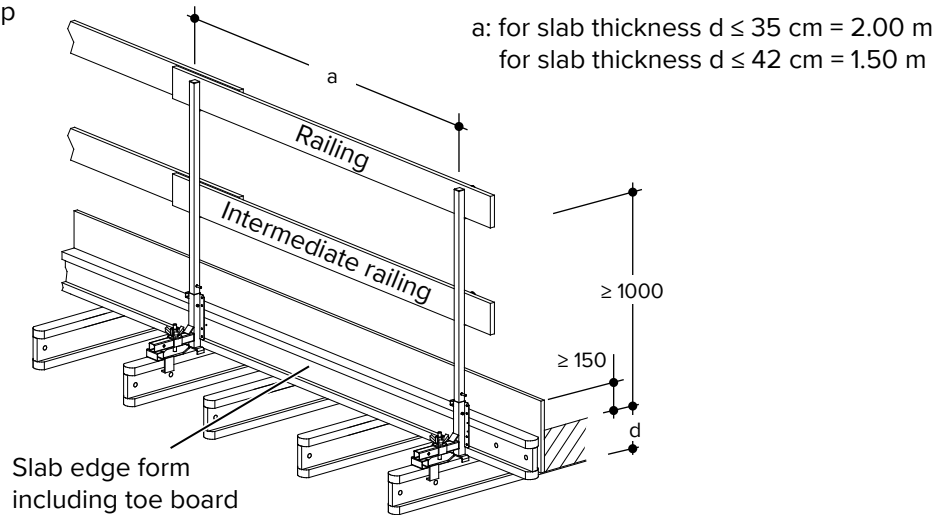
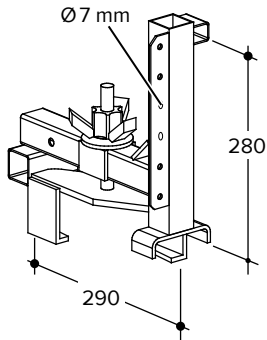
#### Warning!

The maximum deformation must be checked when using the PROTECTO post holder vari in combination with a PROTECTO post extension.

### 3.7 PROTECTO timber beam connector

The PROTECTO timber beam connector is a post bracket especially designed for the connection to conventionally available H 20 or R 24 beams. This connector allows the installation of the required guard railings at cantilevered slab formwork and can be used at the same time as a support bracket for slab edge forms.

PROTECTO timber beam clamp

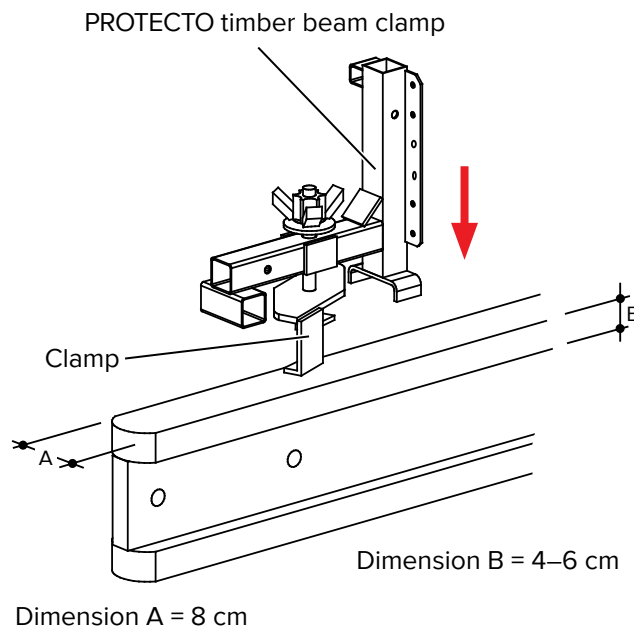


**! WARNING**

**Warning!**  
Secure the slab edge form with at least two nails or screws!  
Also secure the railing!

#### Mounting

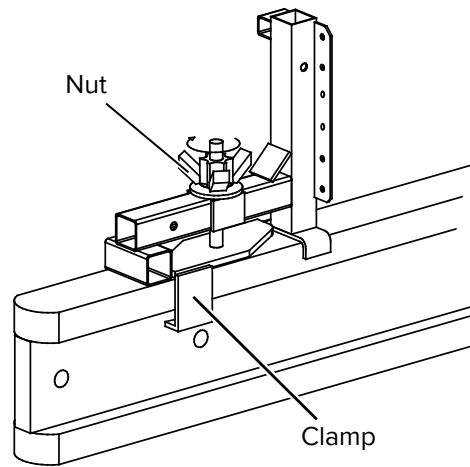
Swivel the clamp of the PROTECTO timber beam connector to a position that allows to attach the connector to the timber beam.



**! WARNING**

**Warning!**  
The PROTECTO post extension must be used when the slab thickness is 25 cm or more.

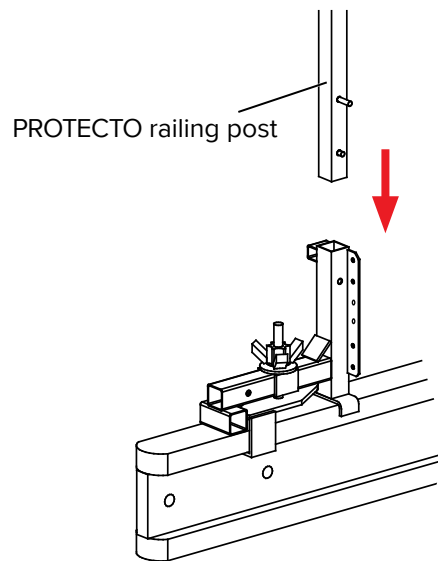
Fasten the nut by hand and tighten it with a hammer. The PROTECTO timber beam connector is now fixed to the flange of the timber beam.



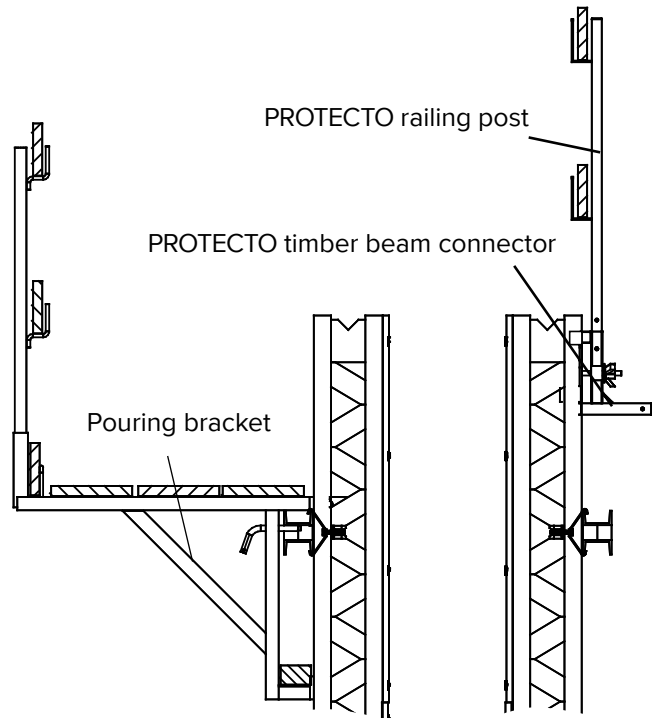
## VISUAL CHECK

Check the proper seating of the clamping part!

Insert the PROTECTO railing post for the guard railing into the PROTECTO timber beam connector until the post engages.



The PROTECTO timber beam clamp can also be used for the installation of guard railings on vertical timber beams. This holder allows an easy and quick installation of guard railings at the opposite site of the pouring platforms on timber beam formwork systems.



### 3.8 PROTECTO multiple clamp

The PROTECTO multiple clamp is a flexible post fixture that can be used horizontally as well as vertically. With a clamping range between 1 to 47 cm, the clamp can be used on many construction components such as floor edges and parapets.



**Warning!**

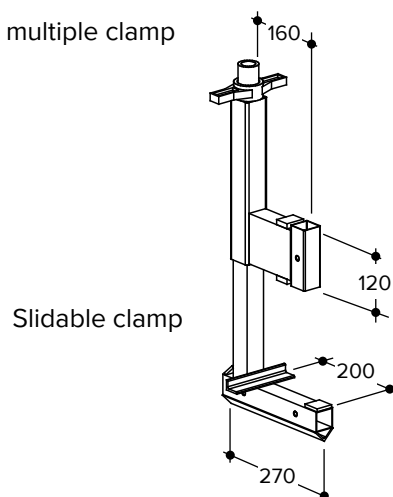
Insert the PROTECTO railing post from above only. A hanging post is not permitted!



**Warning!**

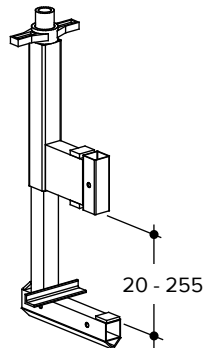
The PROTECTO multiple clamp must always be placed completely over the slab to its stop!

PROTECTO multiple clamp

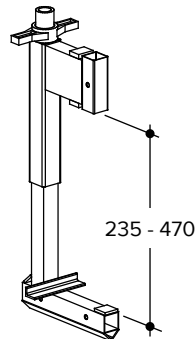


The two broad clamping ranges of the PROTECTO multiple clamp can be set by rotating the slidable clamp. Position A is suitable for a range between 2 cm and 25.5 cm; position B is suitable for a range between 23.5 cm and 47 cm.

Position A



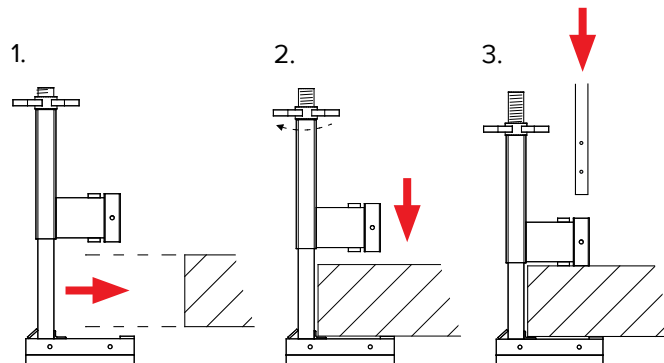
Position B



The robust thread and the smooth running wing nut allow fast fixing and release of the clamp with a hammer.

## Mounting

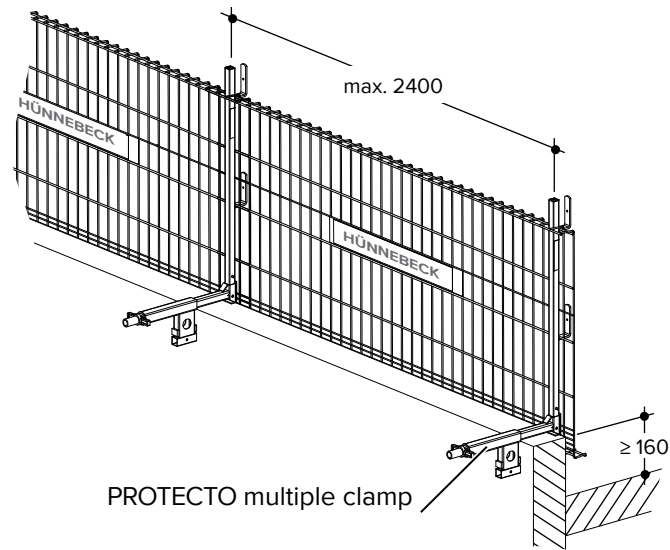
- Step 1** Place the PROTECTO multiple clamp at the required location (floor edge, parapet etc.).
- Step 2** Fix the PROTECTO multiple clamp by fastening and tightening the nut.
- Step 3** After the installation of the PROTECTO multiple clamp, insert the PROTECTO railing post.



## Use with protective mesh panel

This illustration shows the installation of the PROTECTO multiple clamp to a parapet in combination with PROTECTO railing posts and PROTECTO protective mesh panels.

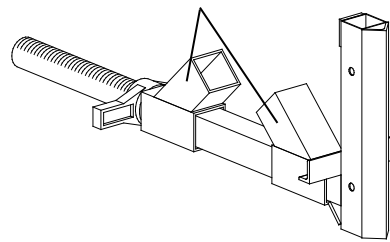




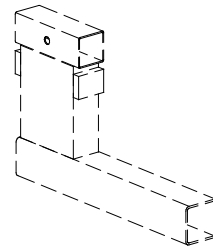
### 3.9 PROTECTO beam section clamp

The PROTECTO beam section clamp is used to install fall protection systems on steel structures (e.g. hall- and bridge constructions).

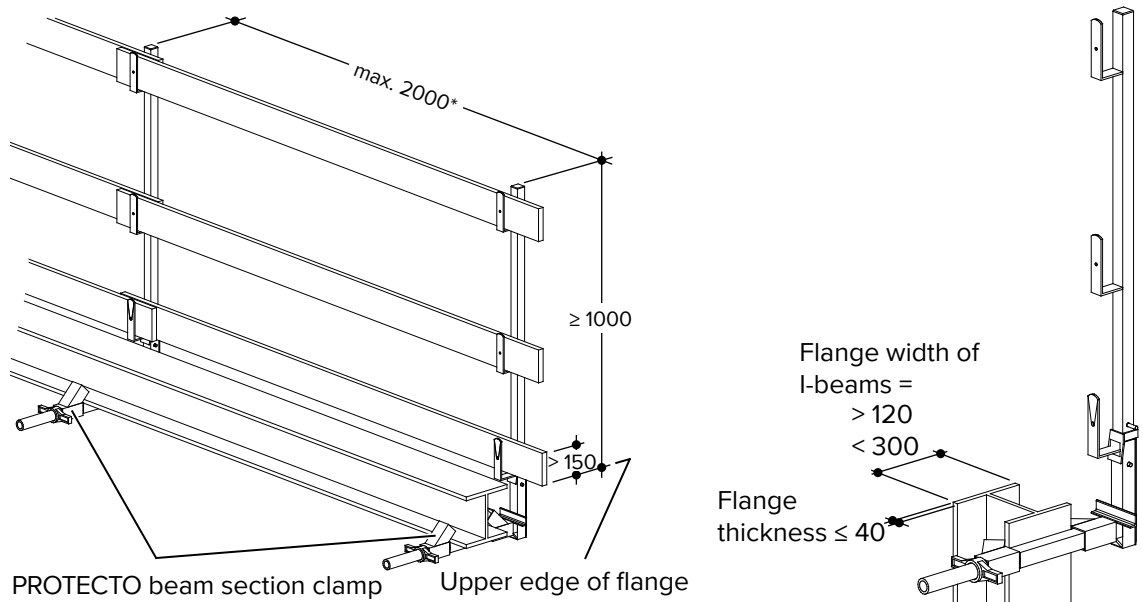
PROTECTO beam section clamp



Standard clamp



The PROTECTO beam section clamps in combination with the PROTECTO multiple clamps add up to a flexible and safe connection element for “I” beams and “W” beams. After removing the standard clamp, the two beam section clamps must be installed as shown. The illustration below shows installation at a horizontal and a vertical double T girder. The clamps grip the lower flange of the beam, allowing unobstructed access to the upper flange. Rotate the PROTECTO beam section clamps by 90° to attach the clamp to vertical steel beams.



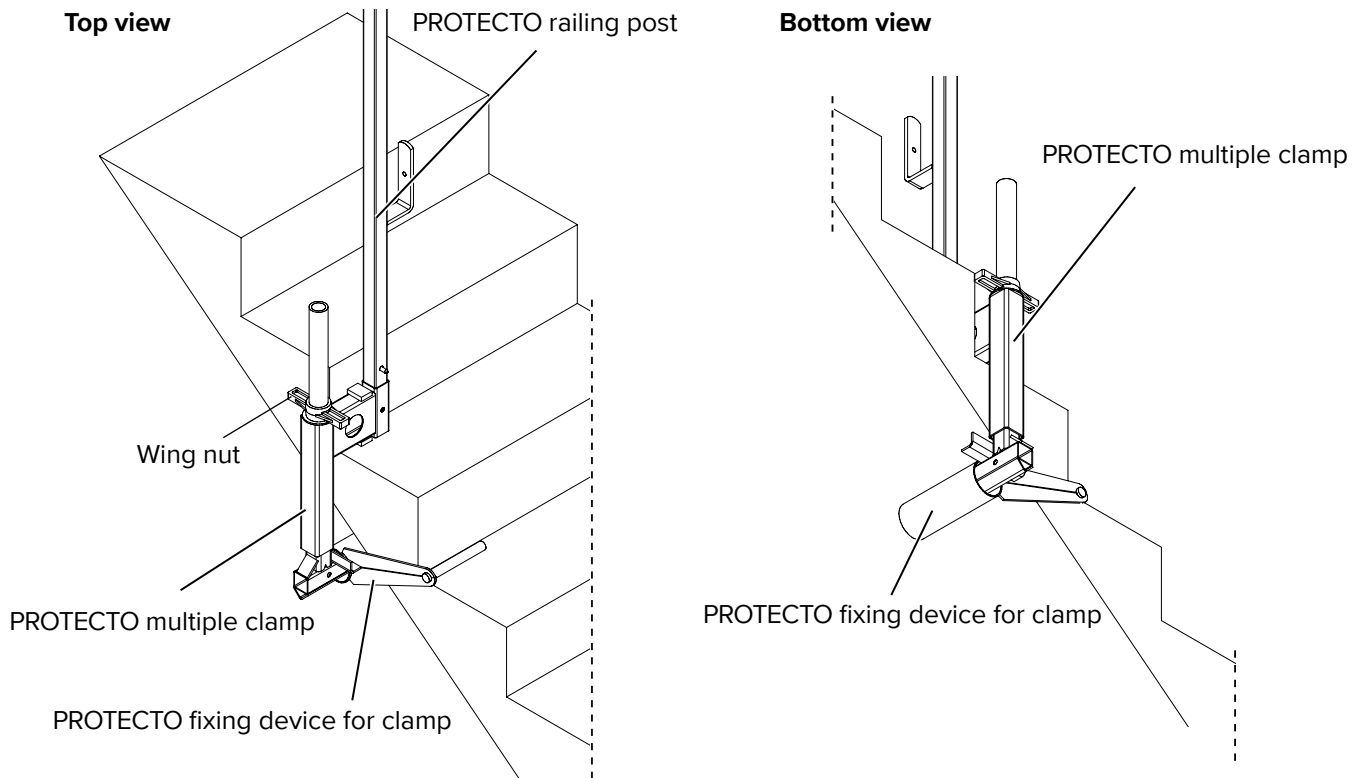
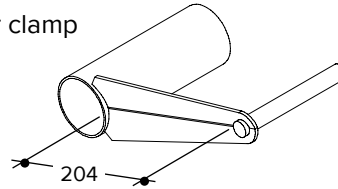
\* max. 2.40 m when using a protective mesh panel.

## 3.10 PROTECTO fixing device for clamp

The PROTECTO fixing device for clamp allows the installation of a clamped guard railing at stairways. The PROTECTO fixing device for clamp must be attached to the PROTECTO multiple clamp (position „B“ = clamping range between 23 to 47 cm, see page 24) and clamps it after fastening the wing nut, to the stairway.

Now the PROTECTO railing post can be inserted into the PROTECTO multiple clamp.

PROTECTO fixing device for clamp



### 3.11 PROTECTO post holder vari

The PROTECTO post holder vari is installed at slab projections. The PROTECTO railing post can be slid to a distance of 35 cm from the wall, allowing slab projections of up to 27 cm. The PROTECTO post holder vari is fixed with dowels to concrete walls. The characteristic tension force of the tying (equal to characteristic permitted tension force) is  **$N_k = 6 \text{ kN}$**

The holder must always be fixed through both holes (1 + 2).



**WARNING**

**Warning!**

The PROTECTO post extension must be used when the slab thickness is 20 cm or more.

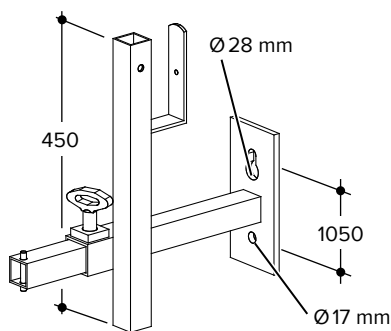


**WARNING**

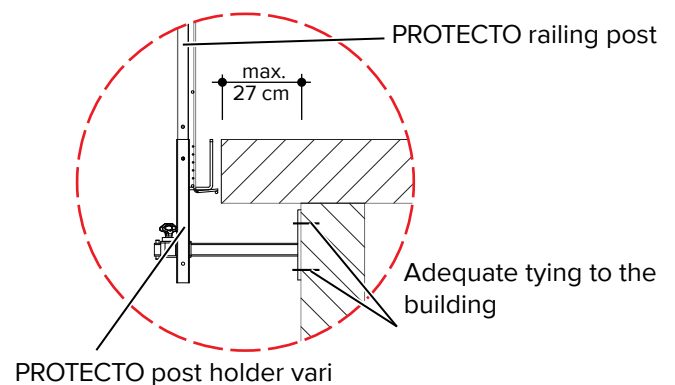
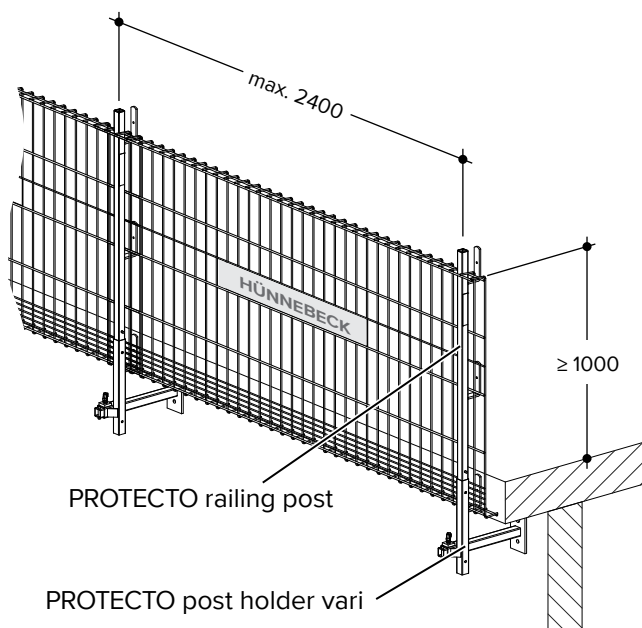
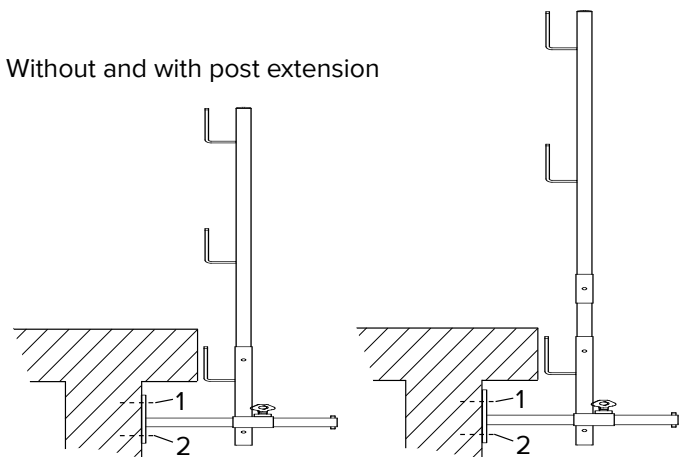
**Warning!**

The maximum deformation must be checked when using the PROTECTO post holder vari in combination with a PROTECTO post extension.

PROTECTO post holder vari



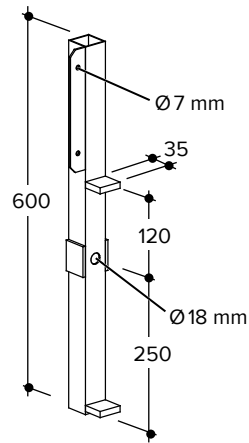
Without and with post extension



## 3.12 PROTECTO front attachment

The PROTECTO front attachment is used on building facades as a post retainer for guard railings as well as a support for slab edge forms. In order to mount the front attachment, only one bolt or an appropriate tie rod is required.

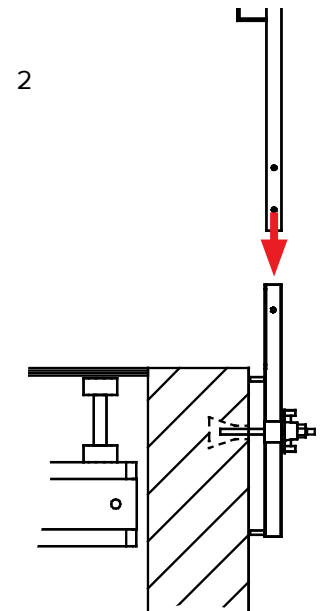
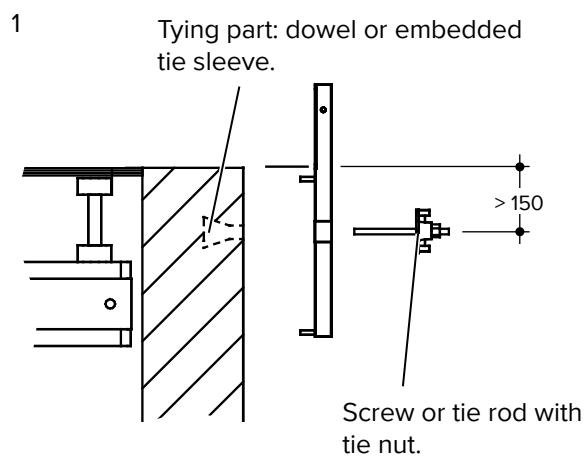
PROTECTO front attachment



The plywood for the slab edge form can be fixed through the nailing plate of the PROTECTO front attachment.

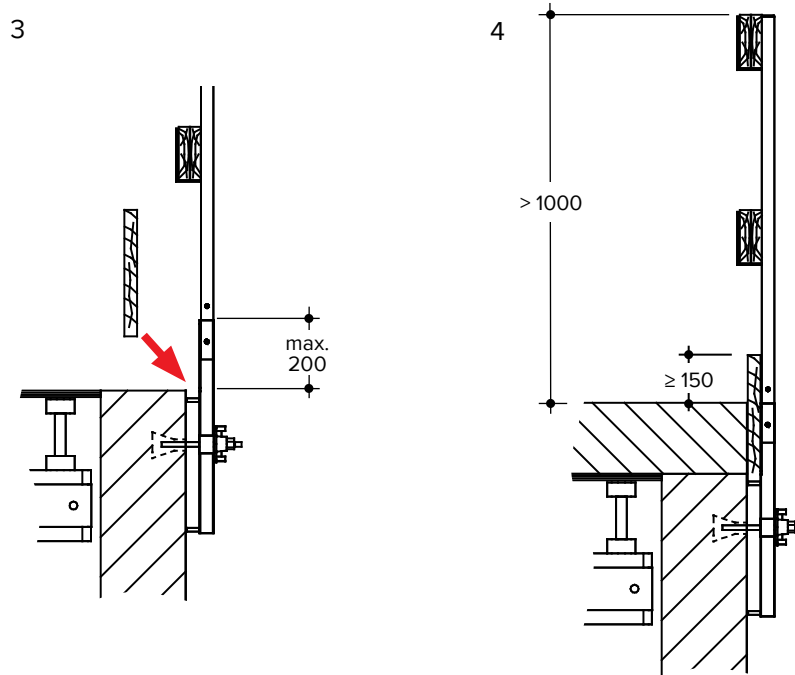
### Mounting

- Step 1** Mount the PROTECTO front attachment on the building.
- Step 2** Insert the PROTECTO railing post and make sure that the post is secured. Finish the side protection by installing a protective mesh panel or a plank railing (min. 3×15 cm).



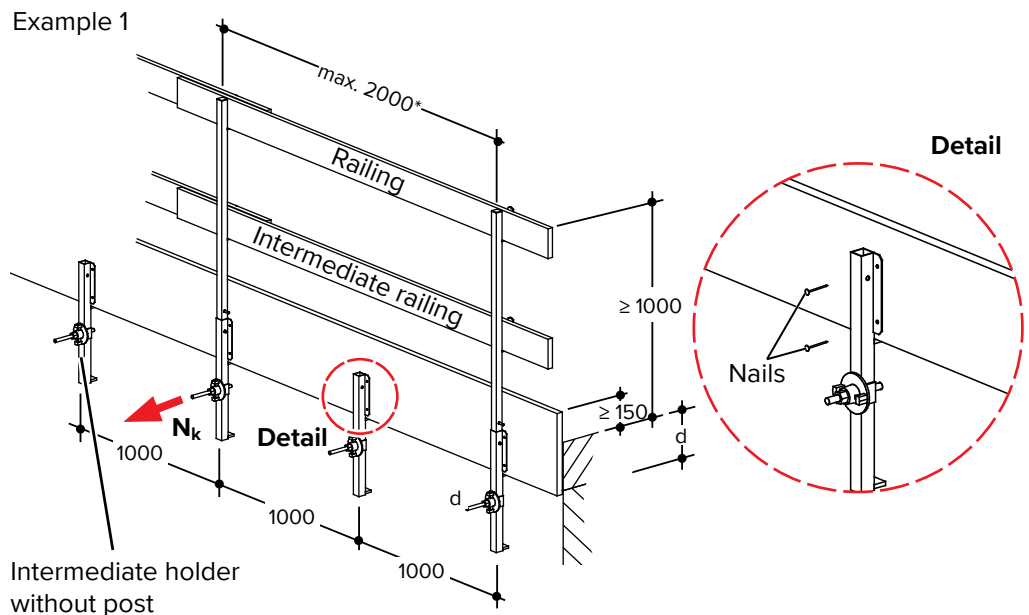
**Step 3** Install the plywood as slab edge form and secure it with nails.

**Step 4** Pour concrete.



**Use with post and slab edge form formwork**

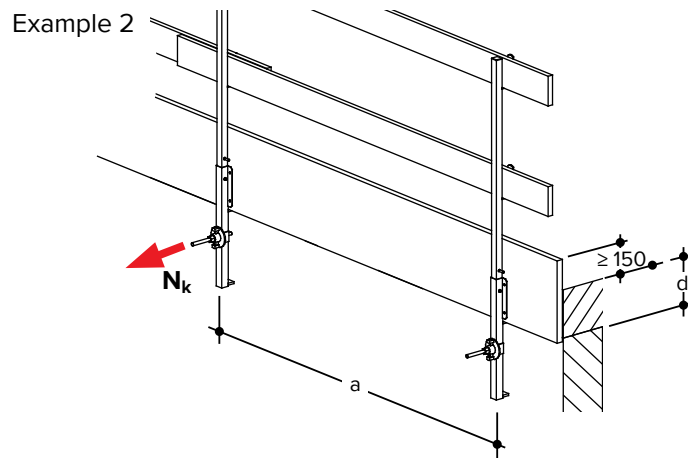
**Example 1:** For each mentioned slab thickness, the front attachments with post must be mounted in a spacing of 2.00 m with an intermediate holder without post.



\* max. 2.00 m when using the PROTECTO front attachment as a post holder with timber railing without slab edge form. max. 2.40 m when using a protective mesh panel.

<b>d [cm]</b>	15	20	25	30
<b>N<sub>k</sub> [kN]</b>	4.1	4.3	4.7	5.3

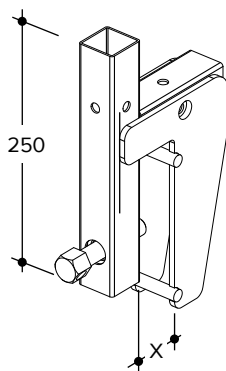
**Example 2:** The maximum distance  $a$  is depending on the thickness of the slab and the load carrying capacity of the selected tying method (see table). The characteristic loads for the dowels  $N_k$  must be taken from the corresponding table.



$d$ [cm]	15	20	25	30
$a$ [m]	1.8	1.7	1.6	1.3
$N_k$ [kN]	5.1	5.1	5.3	5.6

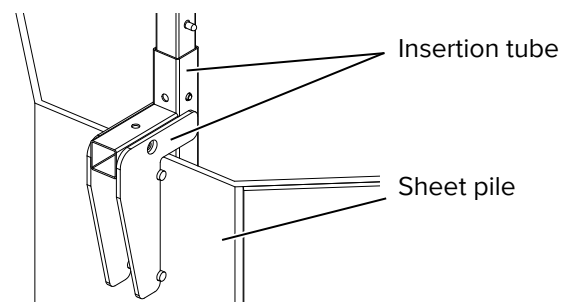
### 3.13 PROTECTO sheet pile clamp

Guard railings on sheet piles, U- and I-profiles etc. can be installed easily by using the PROTECTO sheet pile clamp. The PROTECTO sheet pile clamp can be used in a vertical or horizontal direction. Attach and secure the PROTECTO sheet pile clamp with the fixing screw to a load carrying profile and insert the PROTECTO railing post into the designated insertion tube.



PROTECTO sheet pile clamp

X = Clamping range 4 - 30 mm



The difference in height of various sheet piles can be compensated by using the railing post extension 26 or the railing post extension 42.



**WARNING**

**Warning!**

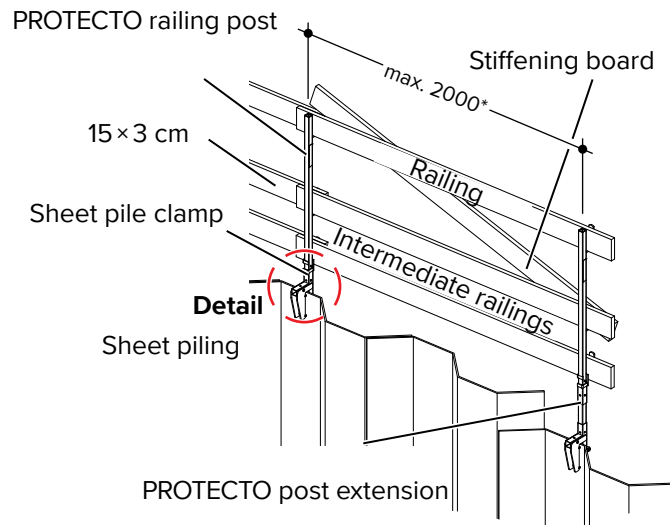
When using the PROTECTO sheet pile clamp, a diagonal stiffening board that is attached to the upper and the intermediate railing must be installed every 5<sup>th</sup> bay.



**WARNING**

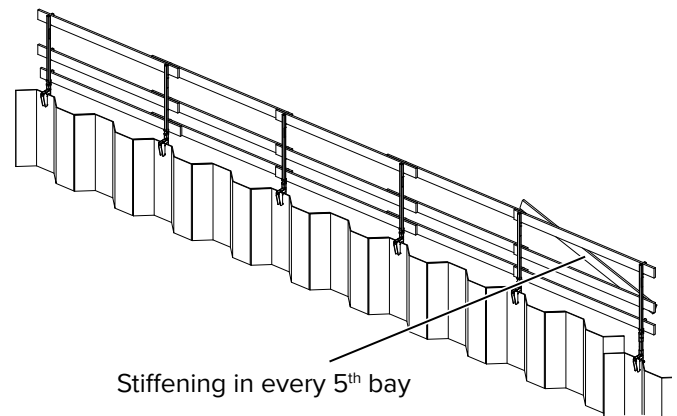
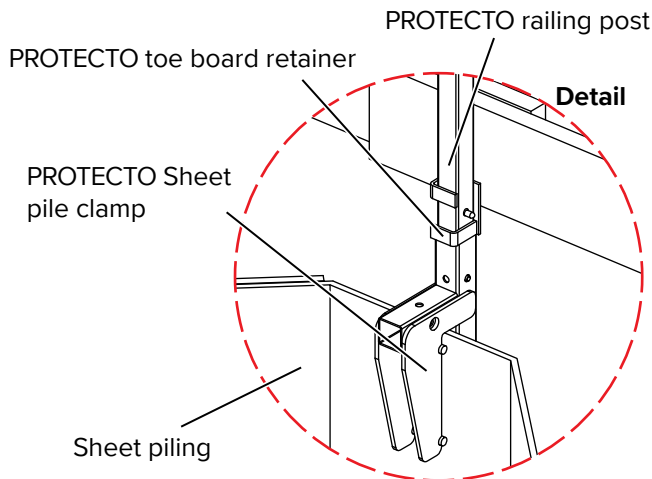
**Warning!**

All railing boards must be secured by nailing or screwing to the PROTECTO railing post.



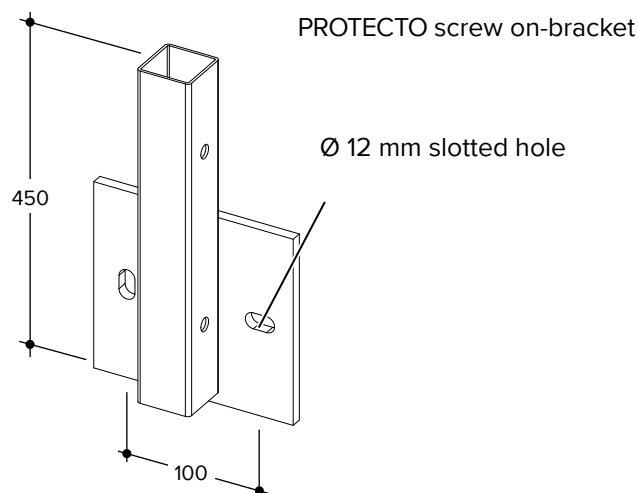
\* max. 2.00 m when using the Sheet pile clamp as a post holder with timber railing.  
 max. 2.40 m when using a protective mesh panel.

In order to attach the lower railing board, the toe board retainer is mounted to the PROTECTO railing post in such a way that the retainer faces upwards and the board can be attached safely.

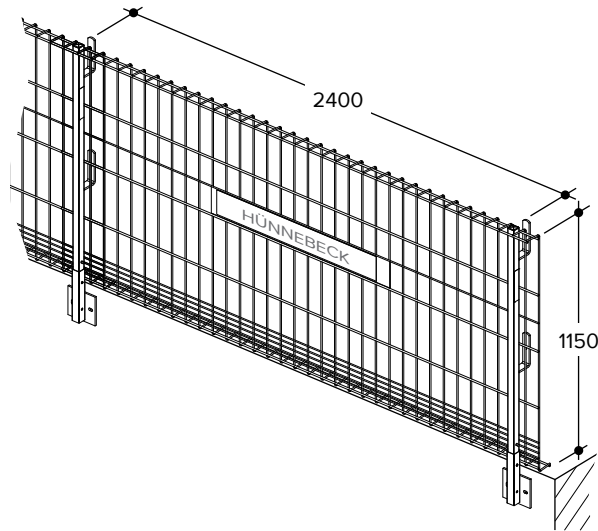


### 3.14 PROTECTO screw-on bracket

The PROTECTO screw-on bracket is used at walls that are flush with the slab.



Attach the PROTECTO screw-on brackets to the side of the concrete slab by using two dowels and screws for each bracket. When using a protective mesh panel, the maximum distance between the posts is 2.40 m. When using a timber plank railing, the maximum distance between the posts is 2.00 m.

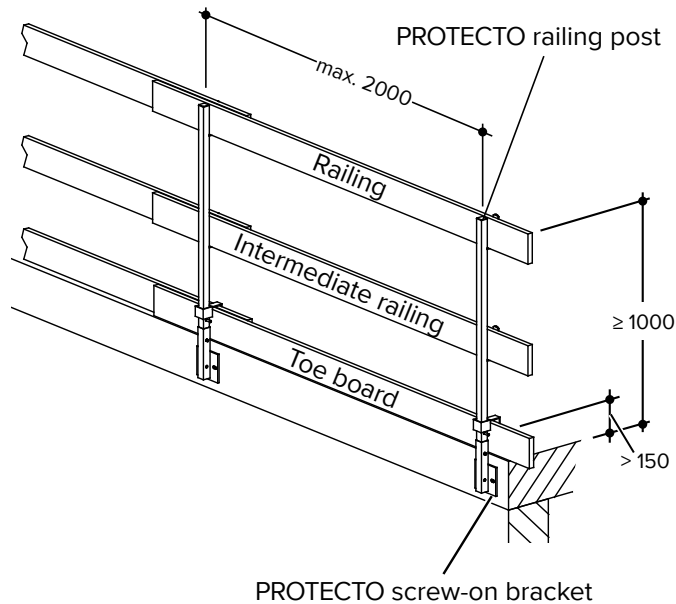


## WARNING

### Warning!

The railing planks must be 30 mm thick, 150 mm high and meet the requirements of strength class C24 according to EN 338.

The characteristic tension force of the tying per dowel is:  $N_k = 6.8 \text{ kN}$

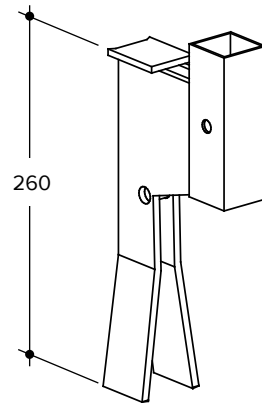




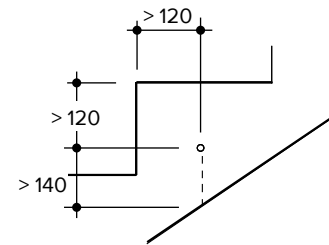
### 3.15 PROTECTO staircase bracket

The PROTECTO staircase bracket allows the installation of an edge protection in stairways. The bracket is designed to allow construction work at stairs without interference during the complete construction of the shell structure.

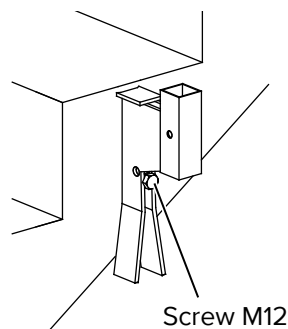
PROTECTO staircase bracket



Distance to edge

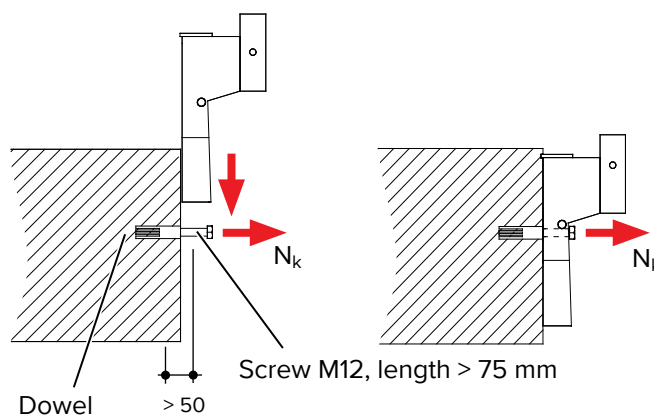


Attach the PROTECTO staircase bracket by using an extension dowel with an inside thread M12 and a screw M12 to the stair stringer.



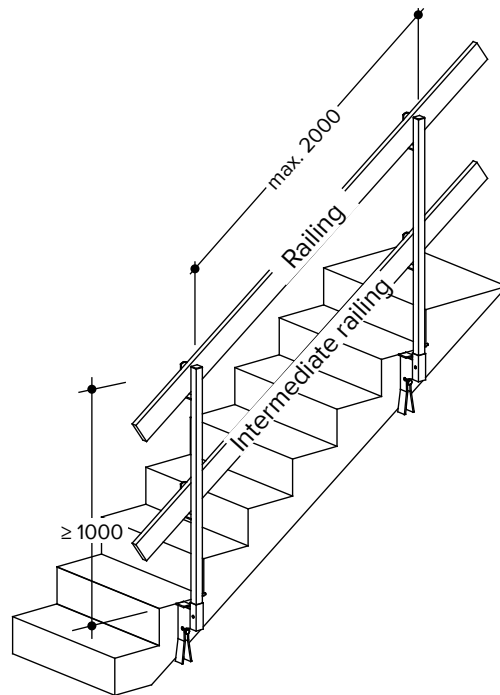
The characteristic tension load of the anchors (equal to the required tension force) following the listed edge distances is:  $N_k = 5.70 \text{ kN}$  (3.20 kN\*)

\*= inside the building without wind loads



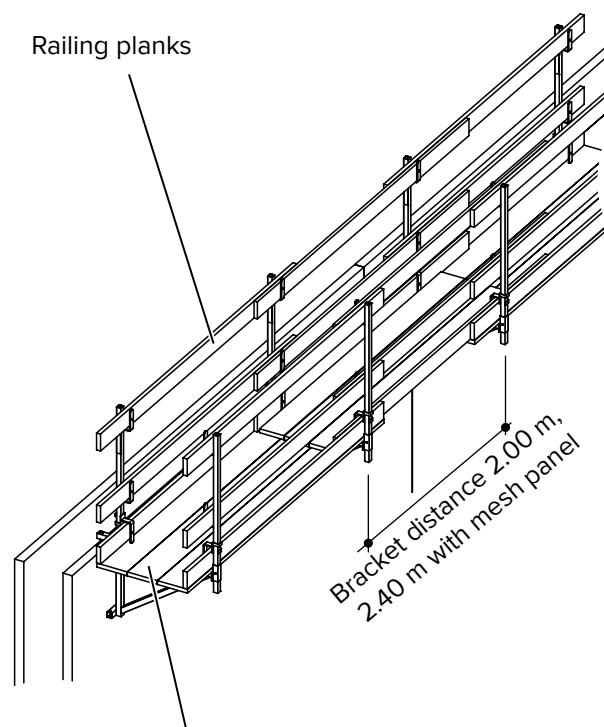
Only use dowels that are approved for these tying loads considering the existing concrete strength and edge distances. After placing a suitable dowel, the PROTECTO staircase bracket is pushed over the inserted M12 screw, adjusted and then fixed by tightening the screw.

The edge protection is completed by inserting the PROTECTO railing posts and installing and fixing of the planks.



### 3.16 PROTECTO concrete pouring bracket

The PROTECTO concrete pouring bracket is used at hollow walls. Hang the concrete pouring bracket on the upper edge of a hollow wall. The pouring bracket is equipped with a nailing strip to secure the planks with nails. The side protection with PROTECTO railing post and plank railings or protective mesh panels complete the pouring platform.



Planks min. 250 x 50 strength class C24 acc. to DIN EN 338

#### NOTE

#### Note

The access and installation is done by using a mobile scaffold or a lifting platform!

**NOTE**

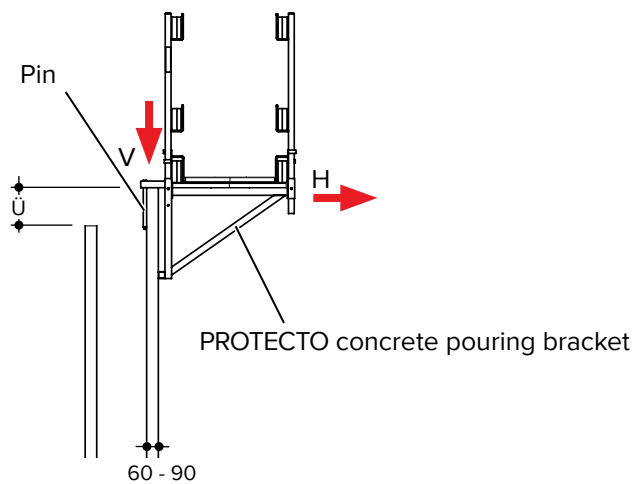
**Note**

To allow easy removing of the bracket after pouring, cover the pin of the concrete pouring bracket with a plastic installation kit (e.g. Robusta-Gaukel, prod. code 320699).

The following loads are distributed to the hollow walls when using the PROTECTO concrete pouring bracket (see table):

**Requirements of the hollow wall with a horizontal load of  $H_k = 6.0$  kN:**

- $\ddot{U} < 0.35$  m
- Concrete quality C30/37
- Reinforcing steel mesh Q257 (alternatively R257 with vertical steel strip)
- Concrete cover of reinforcing steel mesh: 40 mm (measured from the outer side!) or proof by customer!



Bracket distance [m]	Boundary forces [kN]	Load class acc. to DIN EN 12811-1	
		2 [1.5 kN/m <sup>2</sup> ]	3 [2.0 kN/m <sup>2</sup> ]
max.2.40*	$V_k$	3.6	4.5
max.2.00**	$H_k$	5.2	6.0

\* 2.40 m only with protective mesh panel or reduced wind loads

\*\* 2.00 m when using timber railings

## 4 Notes on structural analysis

Unless explicitly stated otherwise all load specifications in this document are safe working loads. This means that characteristic loads can be used for calculations.

The following safety factors are included in the safe working load (where applicable):

**Load:**

$$\gamma_f = 1.5$$

**Resistances:**

Steel:

$$\gamma_m = 1.1$$

Imperfections, load assumptions and additional rules:

According to DIN EN 1993 / DIN EN 12810 / DIN EN 12811/ DIN EN 12812 / DIN EN 1991

Aluminum:

$$\gamma_m = 1.1$$

Imperfections, load assumptions and additional rules:

According to DIN EN 1999 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

Timber:

$$\gamma_m = 1.3;$$

$$K_{mod} 0.9$$

Imperfections, load assumptions and additional rules:

According to DIN EN 1995 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

Concrete:

$$\gamma_m = 1.5$$

Imperfections, load assumptions and additional rules:

According to DIN 1044 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

Concrete steel:

$$\gamma_m = 1.15$$

Imperfections, load assumptions and additional rules:

According to DIN 1044 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

These values only include those loads that derive from the respective part itself (unless stated otherwise).

An increase in the loads due to effects in the full system (e.g. Theory II, substitute horizontal loads, scaffolding)

## 5 Chronology

Changes since edition 2018-10		
Change	Page	Date
Universal protection mesh added	div	2019-02





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