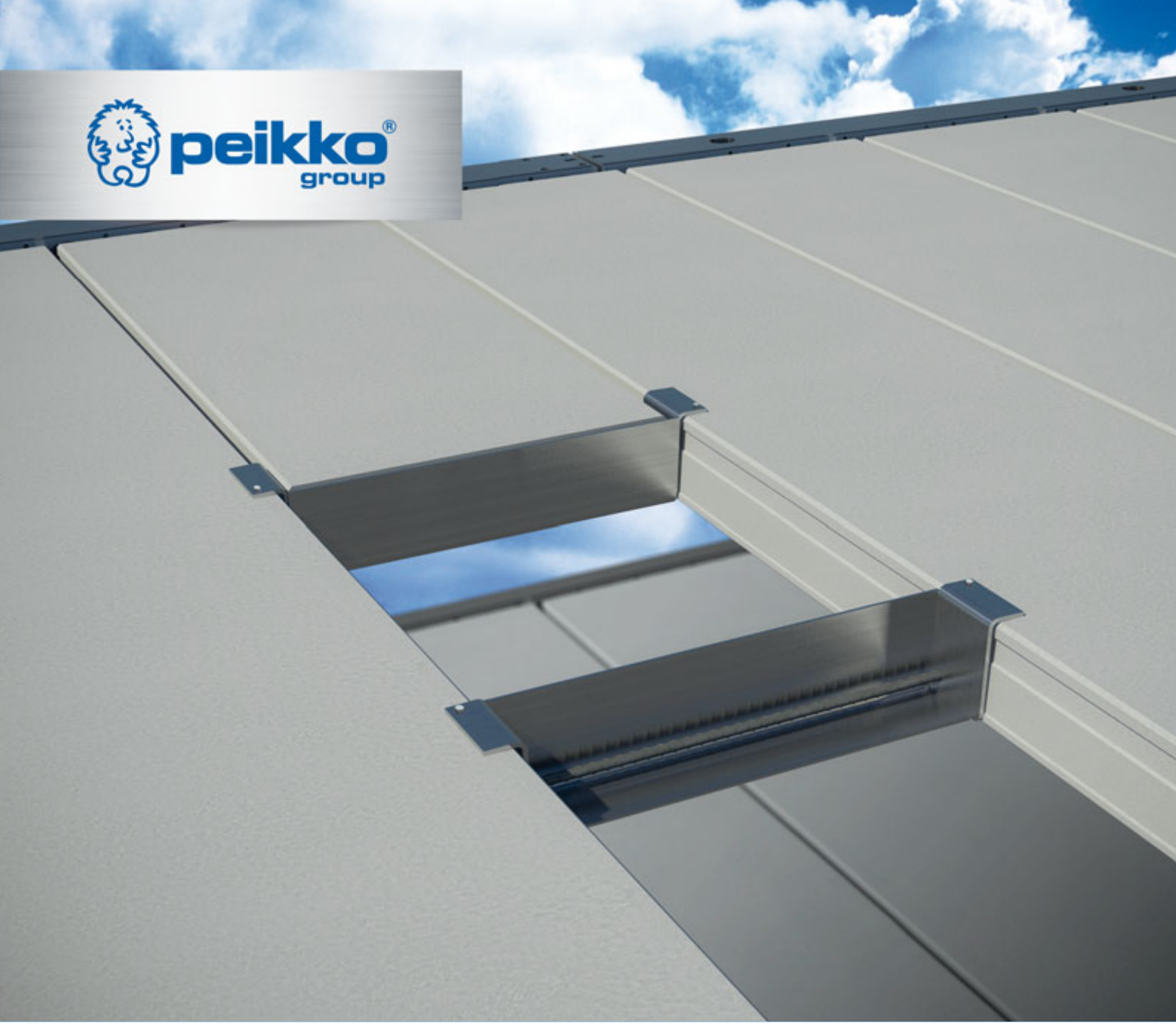


PETRA

Support for Hollow-Core Slabs for Floor Openings

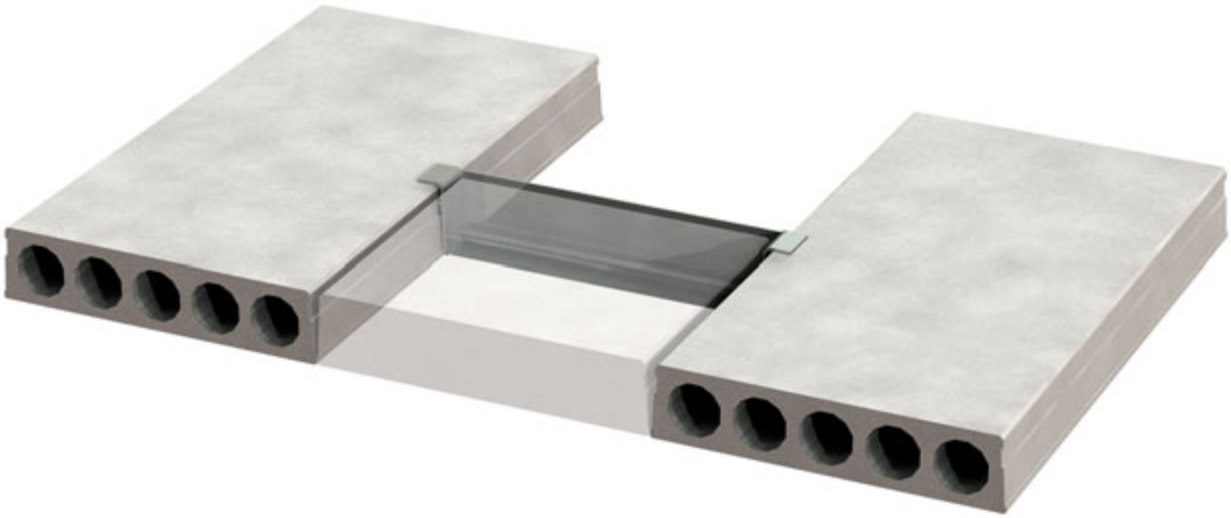
Version: **PG 12/2011**

CERTIFIED inspecta ORGANIZATION
ISO 9001
ISO 14001

Technical Manual

PETRA

Support for Hollow-Core Slabs Around Floor Openings



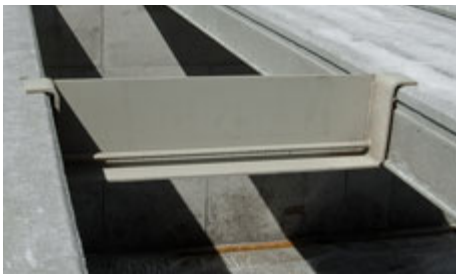
Create openings to hollow-core slab floor with PETRA

- Readily available solution
- No need for propping during installation
- Install floor slabs in one go

PETRA is used to support hollow-core slabs around floor openings. Creating larger openings in such floors traditionally requires casting reinforced concrete beam to support shorter slabs around the opening.

To be able to cast such beam, the short slab has to be propped during installation. These additional operations can be avoided by using PETRA, since it is designed to support short slabs without propping even during assembly time. In such way, short slabs can be installed fluently at the same time with other slabs of the floor.

PETRA is a unique technical solution that has all the benefits of a standardized product (pre-designed structural properties validated by Technical Approvals, guarantee of high quality of manufacturing) while being used for applications that usually requires careful static analysis and tailor-made structural solutions.



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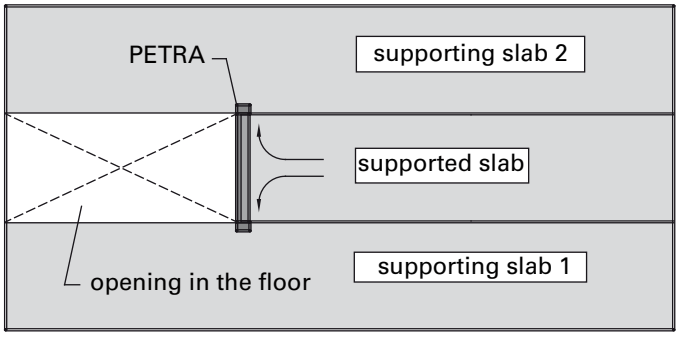
1. Product properties

PETRA consists of an L-shaped steel front plate welded together with side plates. PETRA is usually hanged on two parallel slabs and one or more slabs are supported by the front plate (Figure 1).

Figure 1 Typical layout of a hollow-core floor with PETRA (view from top)



PETRA is available in several standard models that are pre-dimensioned so that their shape and resistances do fit with the properties of most of the hollow-core slabs available on the European market. PETRA is designed to support slabs at assembly time, normal use situation and fire situation without need for temporary supports or propping.

The appropriate model of PETRA to be used in a project may be selected using the design diagrams available in this Technical Manual. The resistance curves have been determined by a design method that conforms with the principles of EN Eurocodes. In case when existing standard models may not be used (special structural or load conditions), the Technical Support team of Peikko may design special PETRA solutions.

1.1 Structural behavior

From the structural point of view, PETRA acts as a linear support of the hollow-core slab(s) at the edge of the opening. Since the structural behavior and performance of the slab hanger depends not only on the properties of PETRA but also on its interaction with the hollow-core slabs, the load bearing mechanism developed by PETRA will be referred later in this document as „trimmer beam". The trimmer beam carries the reaction of the supported slab and transfers it to the supporting elements, most often parallel supporting slabs.

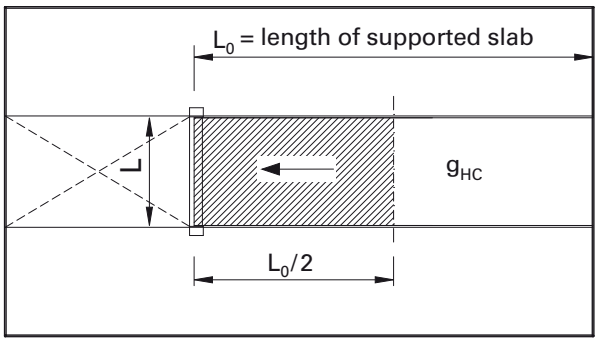
The static behavior of the trimmer beam formed by the PETRA slab hanger varies in the different stages of the life cycle of the structure.

During assembly time, PETRA is considered to be loaded only by the self-weight of the supported hollow-core slab. Since lateral joints between slabs are not grouted at this point, the supported slab is acting as a simply supported beam with PETRA as one of the supports. The load carried by PETRA is then determined according to Figure 2 as:

$$g_{HC,R} = \frac{g_{HC} \cdot L_0}{2}$$

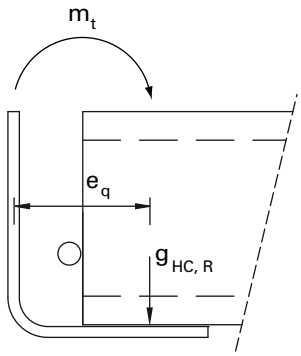
where g_{HC} is the self weight of the supported slab [kN/m²].

Figure 2 Load distribution during assembly time



The resultant of this load is situated outside of the shear center of PETRA and causes torsion of the front plate (Figure 3). Since PETRA is considered to be un-propped, it is the capacity of the front plate to withstand torsion during assembly time that is determining the maximum length of the supported slab.

Figure 3 Torsion of the front plate



Before the structure is given into normal use, the lateral joints between the hollow-core slabs have to be grouted and hardened. Thereafter, it is possible to consider transverse distribution of loads between hollow-core slabs. This type of analysis is allowed by the Annex C of the European Standard for hollow-core slabs (EN 1168) under the condition that the horizontal displacements of the hollow-core floor are restricted by:

- adjacent structural parts
- friction in supports
- friction in lateral joints
- ring reinforcement
- concrete topping with mesh reinforcement

If at least one of the above mentioned requirements is satisfied, it may be considered that PETRA will have to carry only a part of imposed load situated within a triangular area shown on Figure 4.

During fire situation, the front plate of PETRA is directly exposed to fire without any additional fire protection. For this reason, the resistance of the front plate is neglected in fire design. The structural action of the front plate is replaced by a reinforced concrete beam formed by coupling the additional fire rebar with compressed concrete of the joint grouting (Figure 5). The resistance or trimmer beams for standard types of PETRA may be obtained from design diagrams available in Annex A of this Technical Manual. The load bearing behavior of the reinforced concrete end beam is guaranteed for structures with fire resistance class R60. For structures with higher fire resistance classes, adequate fire protection has to be provided to the surface of the front plate directly exposed to fire.

Figure 4 Load distribution during normal use situation

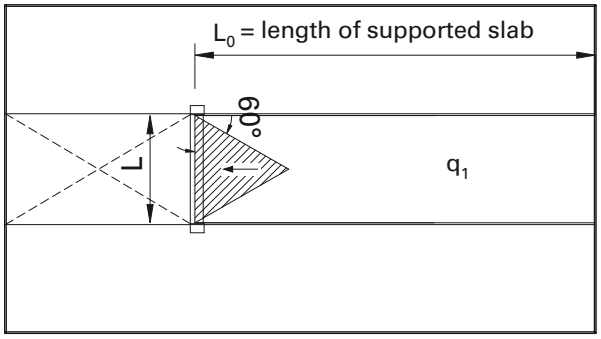
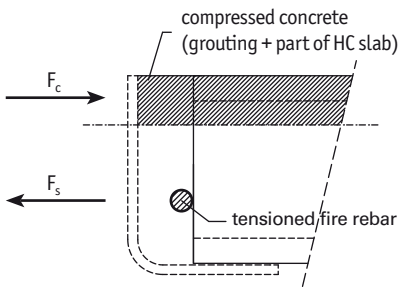


Figure 5 Reinforced concrete mechanism during fire situation



In special cases, for instance when the designer of the hollow-core floor is able to guarantee that the hollow-core floor keeps its transverse stiffness under conditions mentioned earlier in this paragraph also during fire situation, the loads from the supported slab will be transferred to supporting slabs by lateral joints. Under such conditions, PETRA models without fire rebars may also be used. At the same time, it is always recommended to use models with fire rebars in following cases:

- PETRA carries direct linear or point load;
- PETRA is supporting 2 or more hollow-core slabs.

1.2 Limitations for application

1.2.1 Loading and environmental conditions

The standard PETRAs are designed to carry static loads. In the case of dynamic and fatigue loads, individual design has to be made.

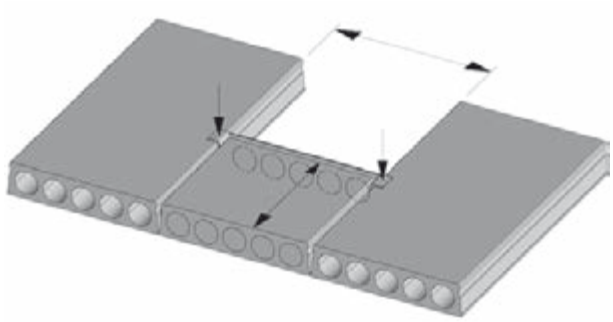
PETRA is designed to be used in indoors and dry conditions. When using PETRA in other conditions, the surface treatment must be adequate according to environmental exposure class and intended operating life.

1.2.2 Hollow-core slabs

The reactions from PETRA are transferred to supporting slabs over a relatively small area of the side plates. The resistance of the supported slab to withstand such point load should be verified by the designer of the hollow-core floor (especially with small hollow-core slabs or when there are openings in the supporting hollow-core slab).

The reaction transmitted by the side plates should be calculated using load distribution models presented in Chapter 1.1. If triangular distribution of imposed load according to Figure 4 may be considered, the design value of vertical reaction in the side plate of PETRA is:

$$V_{Ed} = \gamma_G \cdot \left(g_{HC} \cdot \frac{L_0 . L}{4} \right) + \gamma_Q . \left(0{,}433 . L^2 . q_1 \right)$$



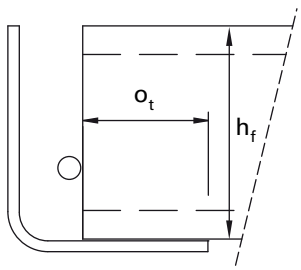
where

q_1	is the imposed load (kN/m²)
g_{HC}	is the self-weight of the supported slab (kN/m²)
L	is the length of the PETRA (mm)
L_0	is the length of the supported slab (mm)
γ_G , γ_Q	are partial safety factors for permanent and imposed load.

The shape of PETRA is optimized to be used with most of hollow-core slabs produced in European countries. The maximum bearing lengths provided by PETRA shown in Table 1 should satisfy requirements for minimum bearing length specified in the type approval of the hollow-core slab.

Table 1 Maximum bearing lengths provided by PETRA [mm]

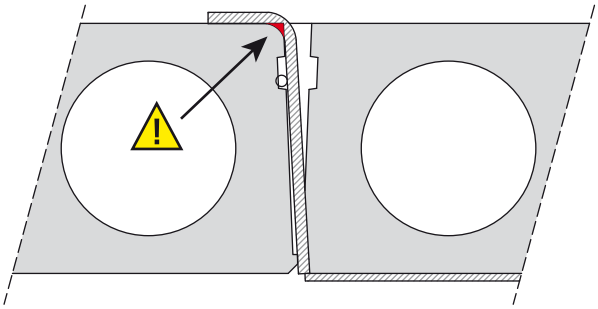
Depth of the supported slab [mm]	o_t [mm]
$h_f \leq 200$	80
$h_f > 200$	100



The width of lateral joints between hollow-core slabs has to be within limits indicated in Table 2 to avoid cases illustrated on Figure 6.

Figure 6 Limits for widths of lateral joints

a) Joint is too narrow – the side plate interferes with the upper edge of the supporting slab



b) Joint is too wide – the bearing length of the side plate is not sufficient

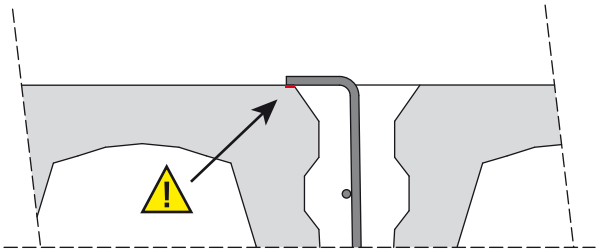
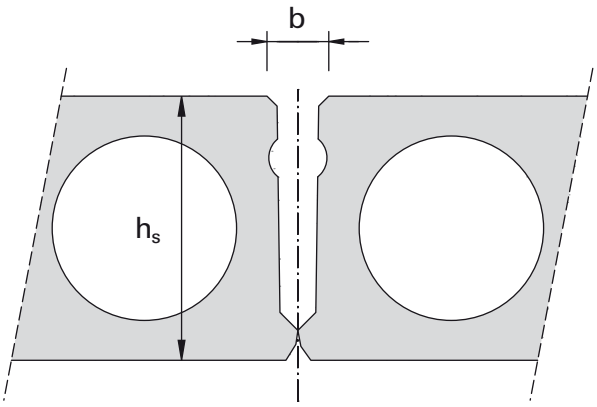


Table 2 Limits for widths of lateral joints

Depth of the supporting slab [mm]	b [mm] min	b [mm] max
$h_s \leq 200$	50	70
$200 < h_s \leq 300$	50	70
$300 < h_s \leq 500$	50	65



If the requirements concerning bearing length and width of joint of the hollow-core slab are different from those indicated in Table 1 and Table 2, Peikko technical support will design PETRA with special shape.

1.2.3 Positioning of PETRA

When determining the position of PETRA and the length of the supported slab, please consider that the minimum distance between the edge of the opening in the floor and the supported slab is 51 mm for PETRA with depth of front plate $h_F \leq 200$ mm and 57 mm for other PETRAs (Figure 7).

If short PETRA (L<1200 mm) is used without fire rebar, the arrangement between the supported slab and the edge of the opening should be as shown on Figure 8.

Figure 7 Position of supported slab (PETRA with fire reinforcement)

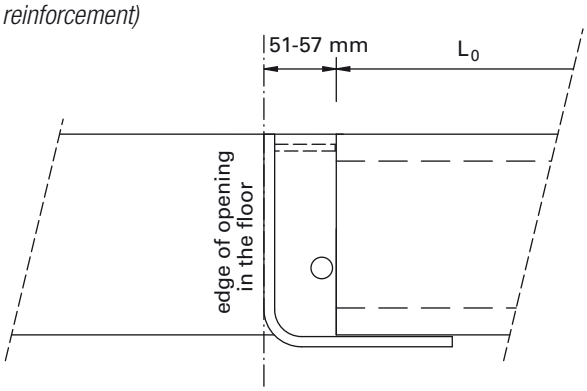
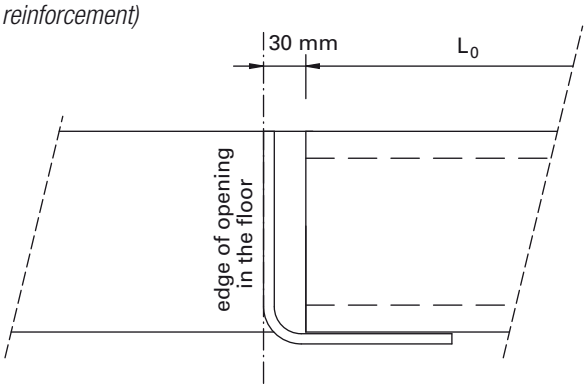


Figure 8 Position of supported slab (PETRA without fire reinforcement)



1.3 Other properties

PETRA slabs hangers are fabricated of steel plates and reinforcement bars with the following material properties:

Plates S355J2+N	EN 10025-2 (front plate)
S355MC	EN 10149-2 (side plates)
Rebars B500B	EN 10080, SFS 1268
BSt 500S	DIN 488
A500HW	EN 10080, SFS 1215

The final product is shaped and assembled by the following procedures:

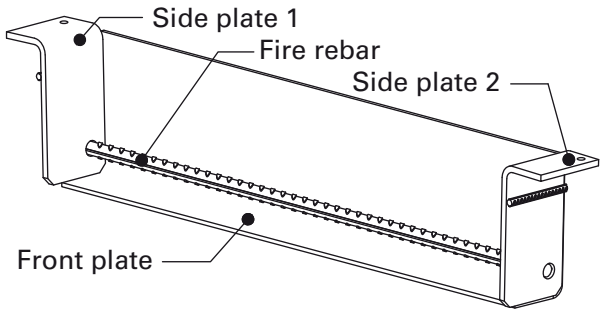
Plates	Flame or mechanical cutting and bending
Rebars	Mechanical cutting
Welding	MAG by hand or with a robot
Welding class C	(SFS-EN ISO 5817)

Peikko Group's production units are externally controlled and periodically audited on the basis of production certifications and product approvals by various organizations, including Inspecta Certification, VTT Expert Services, Nordcert, SLV, TSUS and SPSC among others.

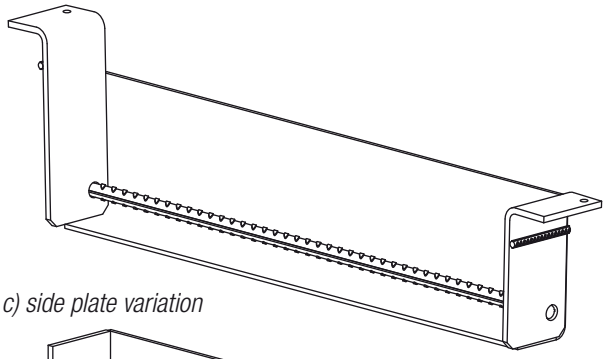
The shape and dimensions of PETRA depend on the layout of the hollow-core floor. The length of the front plate is determined by the width of the opening in the hollow-core floor. The depth of the front plate corresponds to the depth of the supported slab; the depth of side plates corresponds to the depth of the supporting slabs. If the depth of the supporting slabs is the same as the depth of the supported slab, PETRA is symmetrical. In other cases, non-symmetrical PETRA has to be used. In special cases (for example when PETRA is supported by a wall), the side plate may be straight. The standard dimensions of structural parts of PETRA are indicated in Table 3.

Figure 9 Examples of PETRA slab hangers

a) basic types of PETRA



b) side plate variation



c) side plate variation

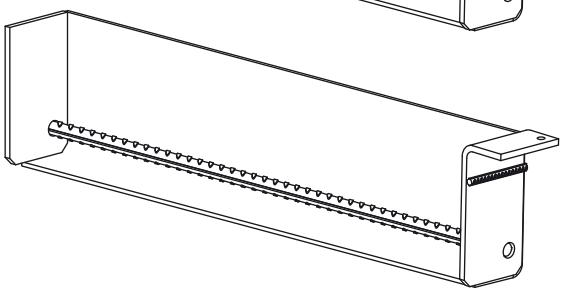
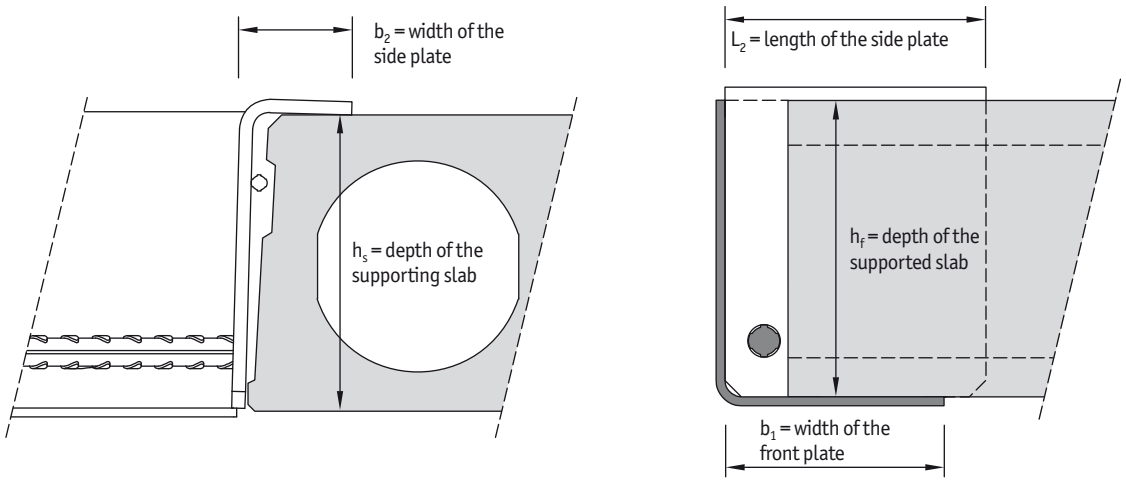


Table 3 Dimensions of standard parts of symmetric PETRA (the depth of supported and supporting slabs are equal)

Depth of slabs [mm]	Front plate	Side plate	
	Width b_1 [mm]	Length L_2 [mm]	Width b_2 [mm]
150	140	150	100
175	140	150	100
200	140	150	100
220	160	170	100
265	160	170	100
300	160	170	100
320	160	170	100
350	160	170	100
370	160	170	100
400	160	170	100
450	160	170	100
500	160	170	100
Manufacturing tolerances	±2	±2	±2



2. Resistances

The resistances of the trimmer beam developed with PETRA are verified according to a design concept based on principles of EN Eurocodes. Each PETRA is available in two models:

- PETRA : model used to support slabs with length 4-6 m
- PETRA strong : model used to support longer slabs or slabs with high imposed loads

Besides these two models, PETRA 175 and PETRA 200 are also available as model **PETRA recess**: model used in bathroom floors or other applications requiring ducting. PETRA recess is with resistances superior to those of PETRA strong. The resistances of trimmer beams with standards models of PETRA may be verified using design diagrams available in Annex A of this Technical Manual. In special cases, individual design may be provided by the Technical Support team of Peikko. The basic principles of the design concept used for the development of design diagrams for standard PETRA models are presented hereafter.

The design values of actions on PETRA are determined by global analysis following the design assumptions described in part Structural behavior of this Technical Manual. The design values of loads are determined according to standard EN 1990:2002. During assembly time, only actions resulting from the self weight of the hollow-core slab are considered:

$$E_d=\gamma_G.G$$

where E_d is the design value of actions and G are actions resulting from linear reaction g_{HC}. During normal use situation, the load combination is:

$$E_d=\gamma_G.G+\gamma_Q.Q$$

where Q is the sum of actions resulting from imposed loads. The partial safety factors γ_G=1,35, γ_Q=1,50 are recommended values from Table A1.2 of EN 1990:2002. During fire situation, the load combination acting on PETRA is:

$$E_d=G+\psi_{2,1}.Q$$

where the combination factor $\psi_{2,1}$ should be taken from A1.1 of EN 1990:2002.

The resistances of the all components of the trimmer beam formed by PETRA against relevant failure modes are verified by:

$$E_d \leq R_d$$

where E_d is the design value of actions determined by global analysis and R_d is the design value of resistance of the components determined according to

EN 1993-1-1:2005 for steel elements
EN 1992-1-1:2004 for concrete elements

The design diagrams of PETRA give the values of maximum imposed load as a function of the length and weight of the supported slab g_{HC}. If other permanent loads Δg (concrete topping ...) are acting on the hollowcore slab before the lateral joints between slabs are hardened, the total permanent load should be taken as $g_{HC}+\sum\Delta g$.

If partial factors for loads are different than those indicated on the design diagrams, the maximum imposed load on PETRA is obtained as:

$$q^{NA}=\frac{\left(1{,}35-\gamma_G^{NA}\right)g_{HC}+1{,}5.q_k}{\gamma_Q^{NA}}$$

where

q_k	is the load capacity obtained from design diagrams
γ_G^{NA};γ_Q^{NA}	are the partial factors determined according to National Annexes

Individual design will be done by Peikko technical support in the following cases:

- load distribution models in the hollowcore floor are different than those assumed for standard PETRAs
- PETRA with high lengths (L>2400 mm)
- PETRA carrying direct linear or point load

Selecting PETRA

The following models of PETRA are available as standard:

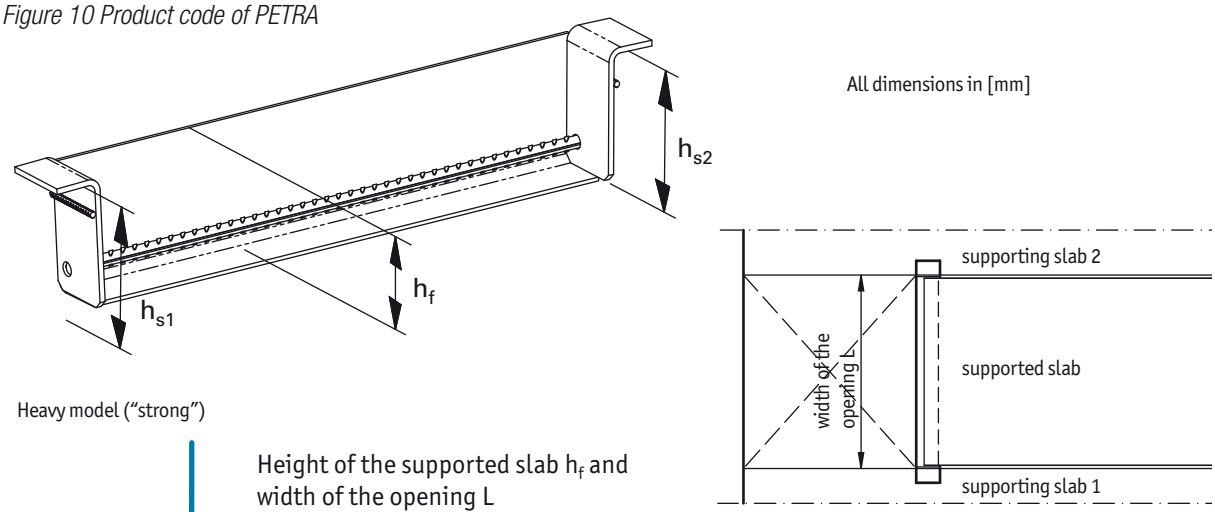
- PETRA
- PETRA strong
- PETRA recess (available only for PETRA 175 and PETRA 200)

In cases when it is not possible to use the standard models of PETRA (resistance of standard models is not sufficient or structural conditions of the hollow-core floor differ from those assumed in the design of standard PETRA models), the Technical Support team of Peikko will provide you with solution:

- PETRA special

The shape of PETRA to be used is determined according to the geometry of the opening and depth of hollow-core slabs. Thereafter, the resistance of standard resistance models may be verified using design diagrams available in Annex A of this Technical Manual. After selecting the shape and model of PETRA, a code describing the product may be composed according to rules described on Figure 10. Please use this code when ordering the product from Peikko Sales Service.

Figure 10 Product code of PETRA



Heavy model ("strong")

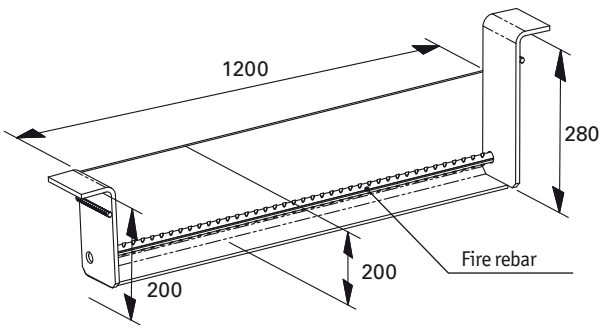
Height of the supported slab h_f and width of the opening L

h_f L h_{s1} h_{s2}

PETRA strong 200-1200 st320-200 without fire rebar

In case of non-symmetric PETRA, the height of the **supporting slabs** 1 and 2 are indicated in this order. If straight side plate is required, it is indicated with code "st" followed with the side plate's height.

If PETRA is ordered without fire rebar, this is indicated at the end of the ordering code with the English words "without fire rebar"



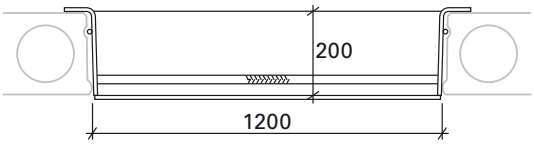
Parts of product code marked with green, blue and grey are optional and independent from one another.

On the left:
PETRA 200-1200 200-280

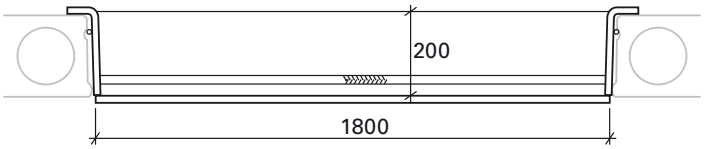
Examples of Product codes are shown on Figure 11.

Figure 11 Examples of product codes

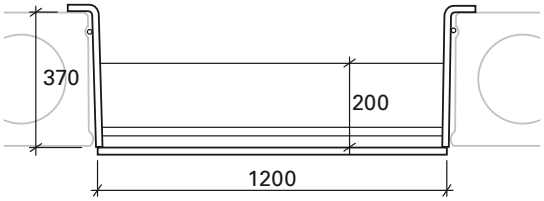
Basic types of PETRA: Side plates are L-shaped and as high as front plate. There is no need to define side plates



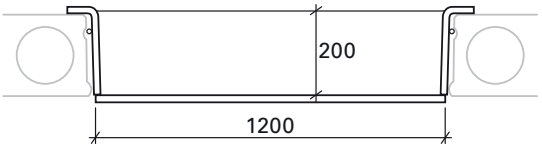
PETRA 200-1200



PETRA strong 200-1800

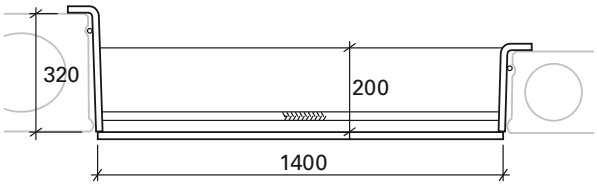


PETRA recess 200-1200 370-370

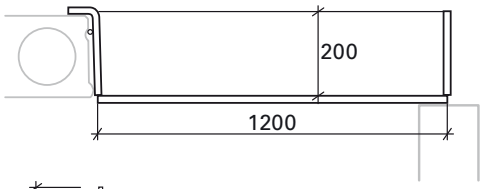


PETRA strong 200-1200 without fire rebar

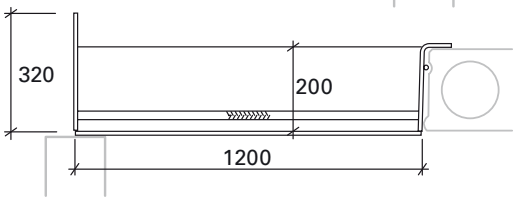
Side plate variations: Both side plates have to be defined



PETRA strong 200-1400 320-200



PETRA strong 200-1200 200-st200 without fire rebar



PETRA 200-1200 st320-200

If PETRA Special has to be designed, please provide relevant information about the project to the Peikko Sales Service using the Design form available in Annex B of this Technical Manual.
Please see Figure 12 for more information about the process of selection and ordering of PETRA.

Figure 12 Selecting and ordering process of PETRA

Standard design situation
- Standard design assumptions
- L ≤ 2400 mm
- only uniformly distributed load

Non-standard design situation
- Different to standard:
  - Load distributions
  - Partial factors
  - Self weight of slab
- L > 2400 mm
- Point load or linear load on hanger

Properties of product:
- Load bearing resistance (according to Annex A)
- Geometry (Table 2 + Table 3)

NOT OK

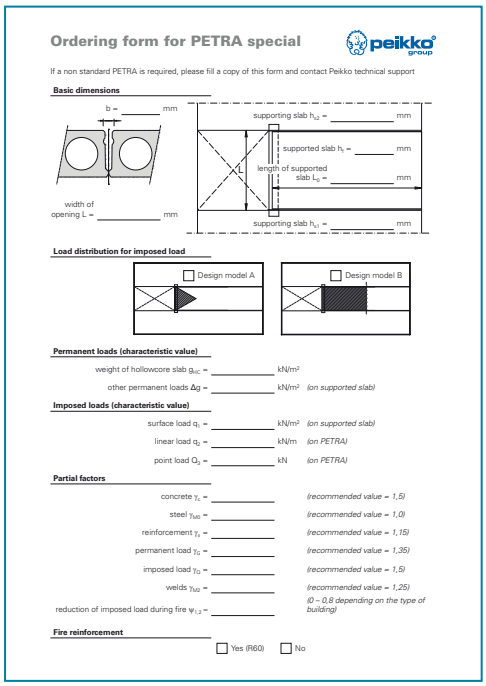
OK

Contact Peikko technical support:
- Fill the design form found in Annex B or download it from our webpage to order PETRA special and send it to Peikko's technical support. It is possible to add L-profiles to the back of the front plate. The L-profiles can be defined using the special design form.

Select PETRA: (Figure 10)
- Select model according to loads and geometry:
  - PETRA
  - PETRA strong
  - PETRA recess
- Check the needed heights and shapes of side plates: Basic type of PETRA or side plate variations
- Select model according to global behaviour of hollow core floor (chapter 1.2): With or without fire rebar

Peikko will:
- Design your PETRA special
- Give an unique name and ID-code to the product
- Instruct you to use this given name and ID-code in your design drawings
- Make a shop drawing

Make an order to Peikko with the given name and ID-code



Ordering form for PETRA special

If a non standard PETRA is required, please fill a copy of this form and contact Peikko technical support

Basic dimensions

b = _____ mm

width of opening L = _____ mm

supporting slab h_{L2} = _____ mm

supported slab h_t = _____ mm

length of supported slab L_s = _____ mm

supporting slab h_{L1} = _____ mm

Load distribution for imposed load

☐ Design model A ☐ Design model B

Permanent loads (characteristic value)

weight of hollowcore slab g_{HC} = _____ kN/m²

other permanent loads Δg = _____ kN/m² *(on supported slab)*

Imposed loads (characteristic value)

surface load q_t = _____ kN/m² *(on supported slab)*

linear load q_l = _____ kN/m *(on PETRA)*

point load Q_p = _____ kN *(on PETRA)*

Partial factors

concrete γ_c = _____ *(recommended value = 1,5)*

steel γ_{Ms0} = _____ *(recommended value = 1,0)*

reinforcement γ_s = _____ *(recommended value = 1,15)*

permanent load γ_G = _____ *(recommended value = 1,35)*

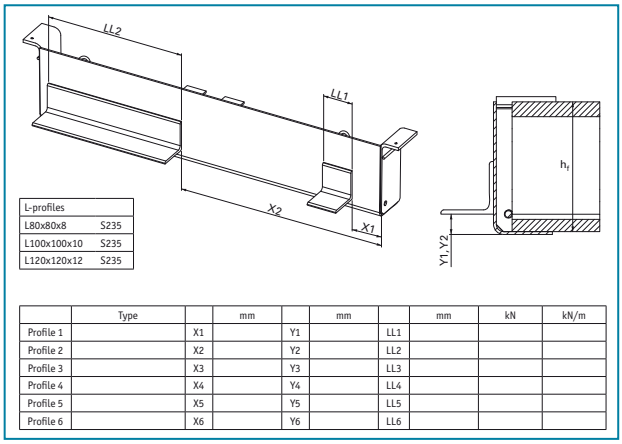
imposed load γ_Q = _____ *(recommended value = 1,5)*

welds γ_{Ms2} = _____ *(recommended value = 1,25)*

reduction of imposed load during fire $\psi_{1,2}$ = _____ *(0 – 0,8 depending on the type of building)*

Fire reinforcement

☐ Yes (R60) ☐ No



PETRA 150, PETRA strong 150

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	4,0 kN/m²
γ_{M0} = 1,0	3,0 kN/m²
γ_c = 1,4	2,0 kN/m²

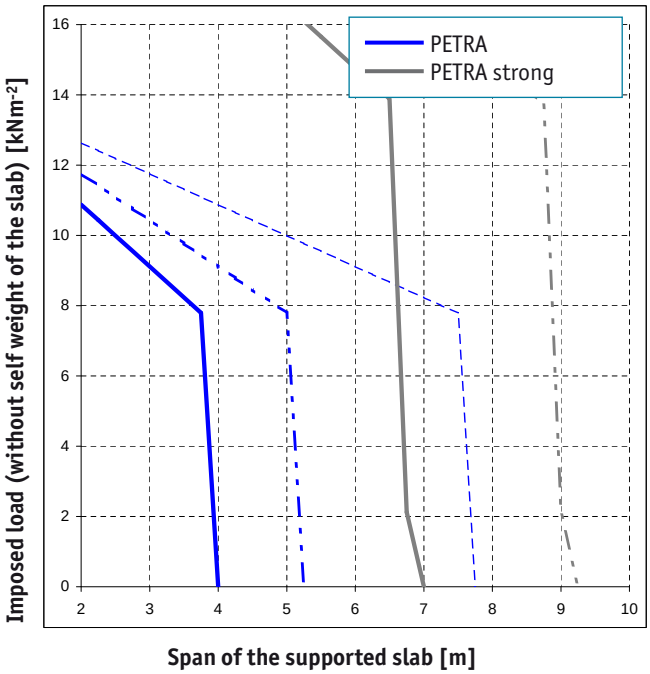
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

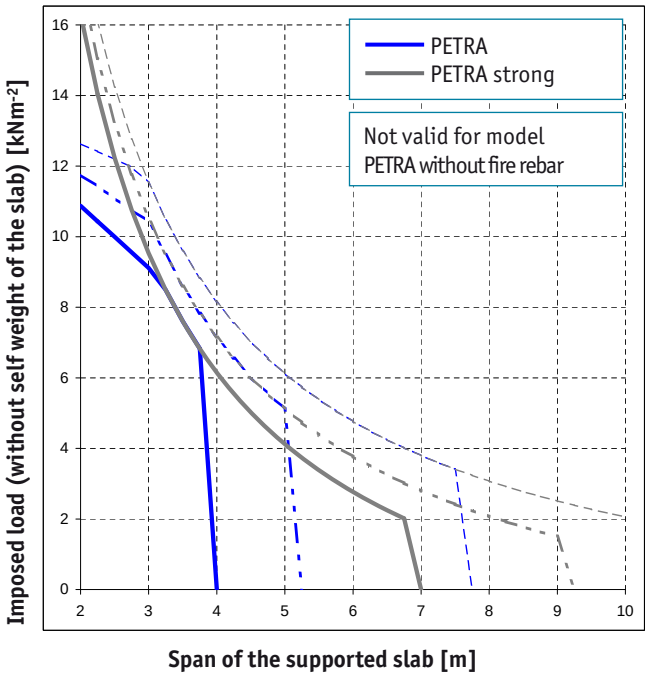
PETRA 150-1200, PETRA strong 150-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



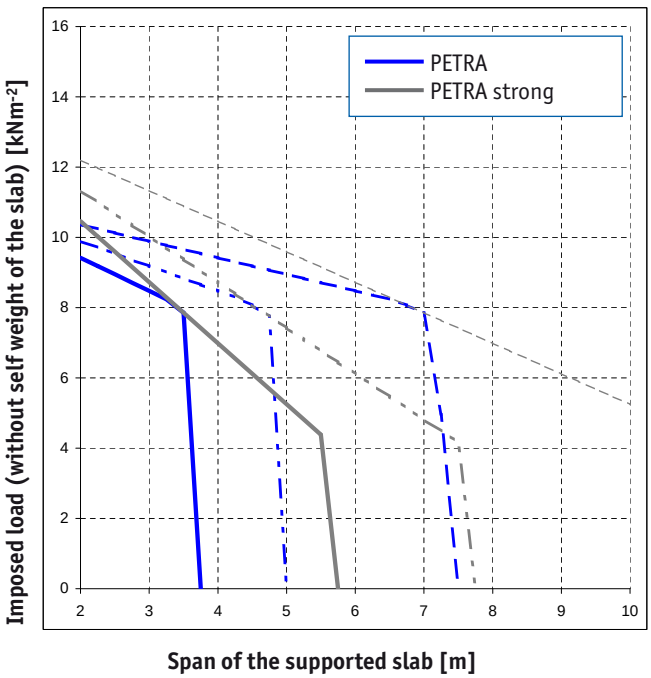
Fire situation, class R60



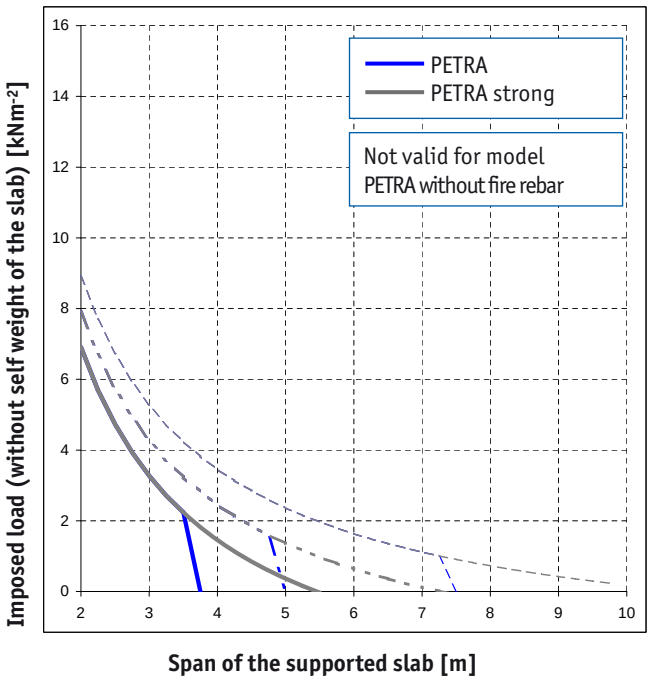
PETRA 150-2400, PETRA strong 150-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 175, PETRA strong 175

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	4,0 kN/m²
γ_{M0} = 1,0	3,0 kN/m²
γ_c = 1,4	2,0 kN/m²

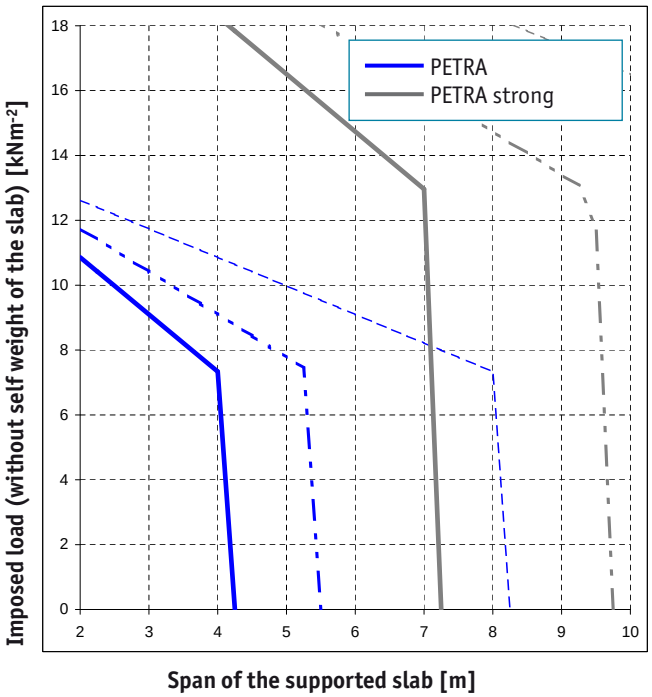
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

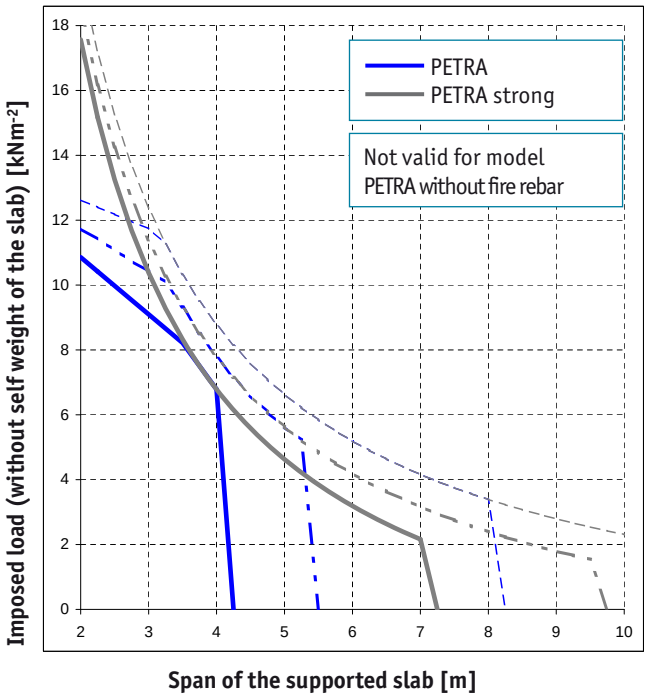
PETRA 175-1200, PETRA strong 175-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



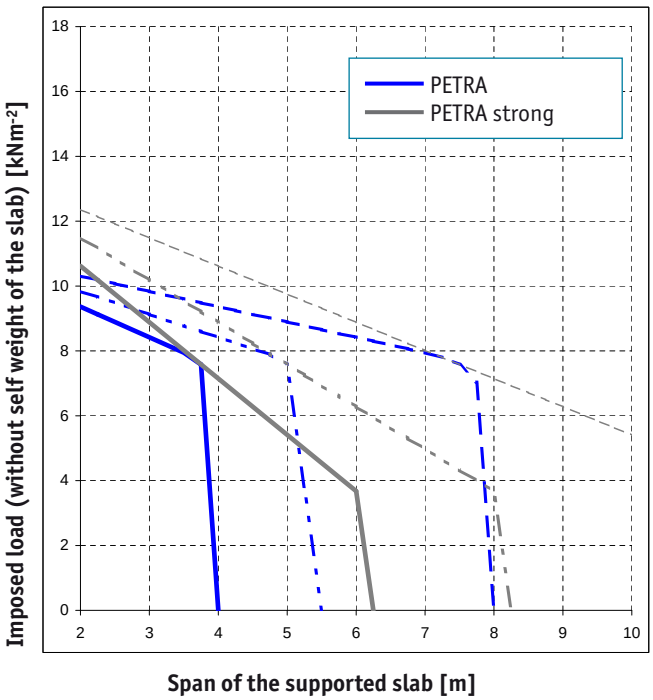
Fire situation, class R60



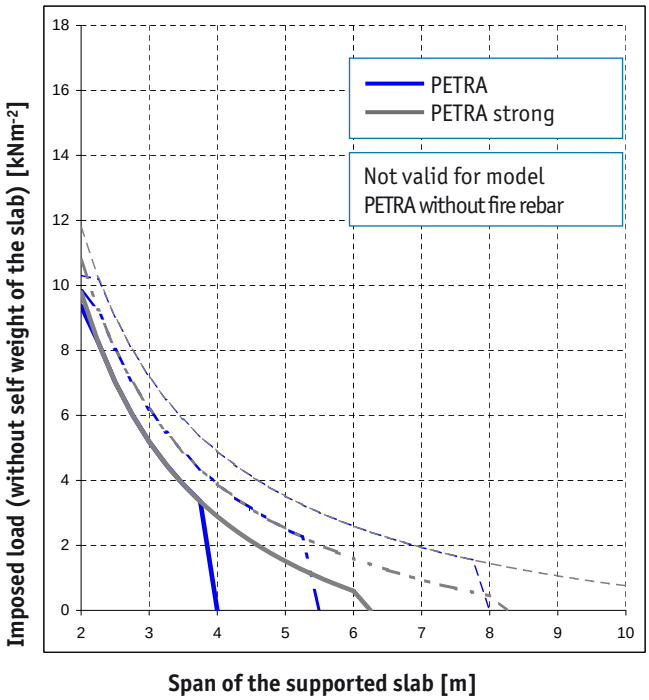
PETRA 175-2400, PETRA strong 175-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 200, PETRA strong 200

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	4,0 kN/m²
γ_{M0} = 1,0	3,0 kN/m²
γ_c = 1,4	2,0 kN/m²

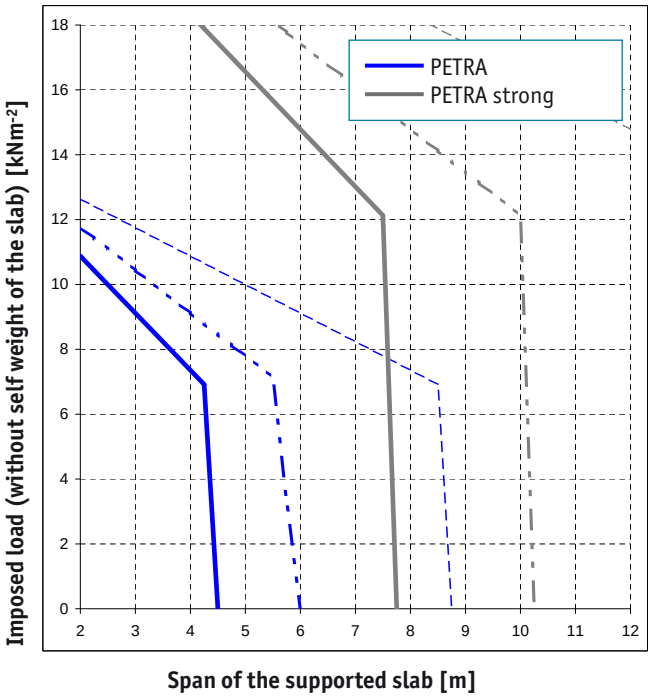
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

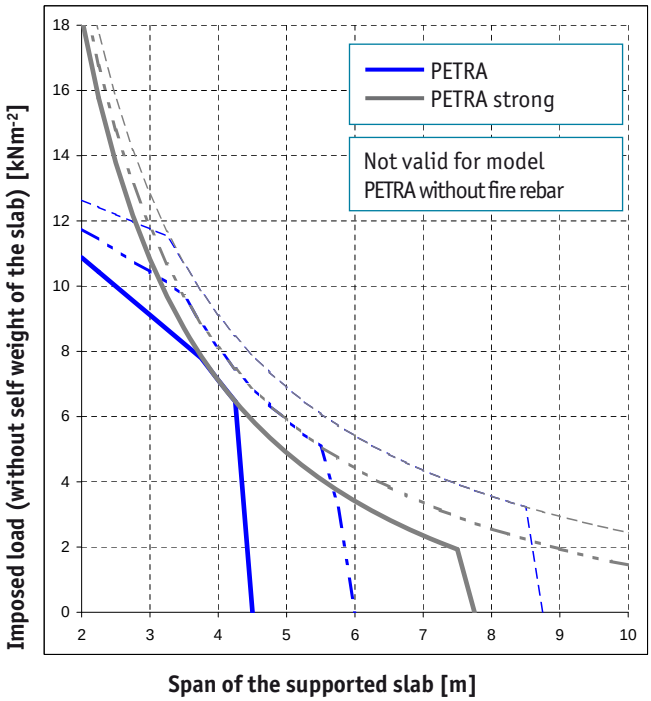
PETRA 200-1200, PETRA strong 200-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



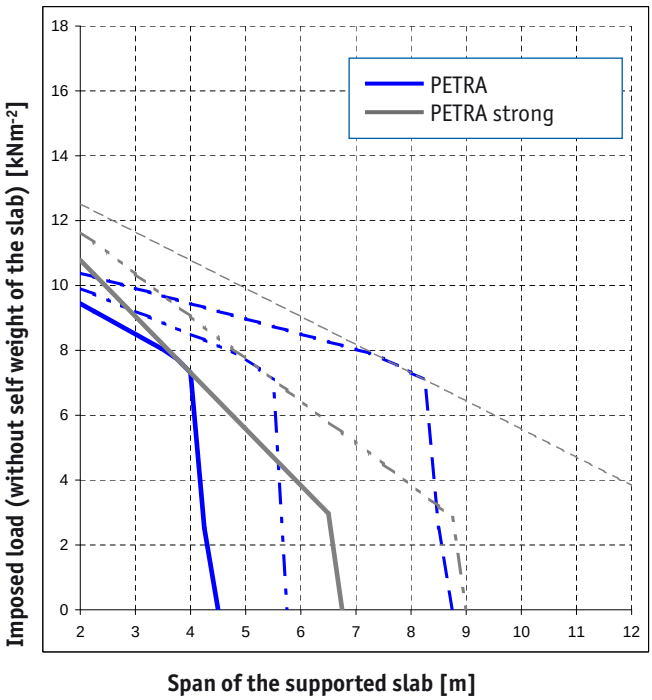
Fire situation, class R60



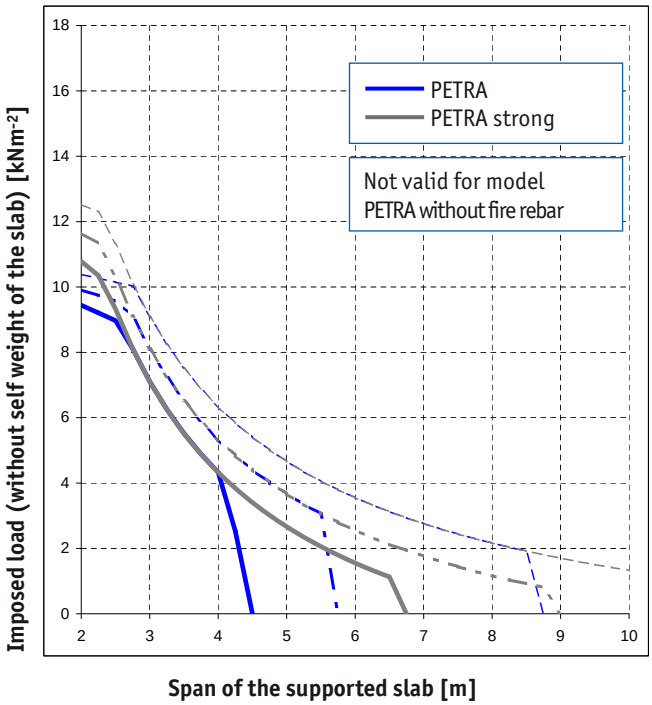
PETRA 200-2400, PETRA strong 200-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 220, PETRA strong 220

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	4,0 kN/m²
γ_{M0} = 1,0	3,0 kN/m²
γ_c = 1,4	2,0 kN/m²

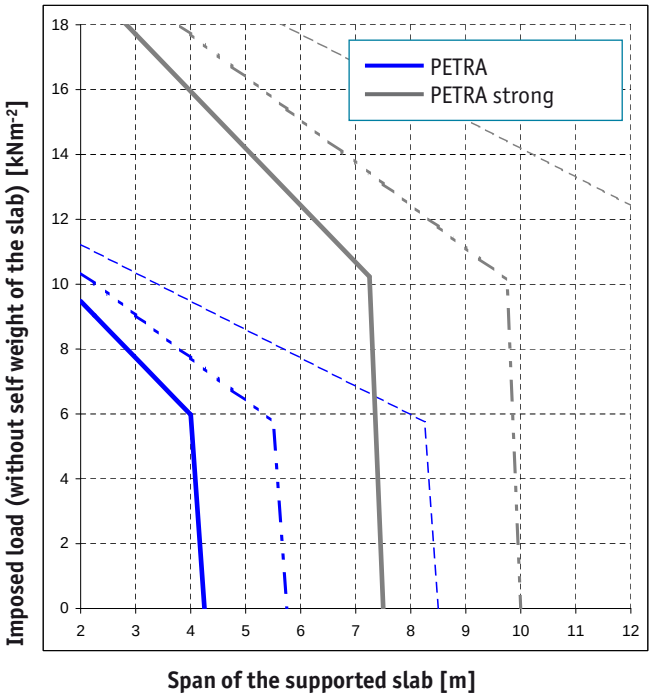
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

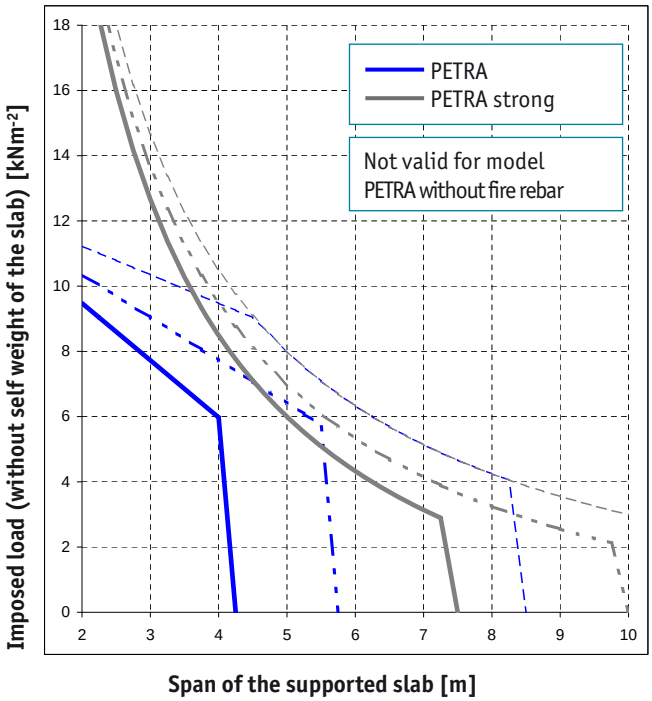
PETRA 220-1200, PETRA strong 220-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



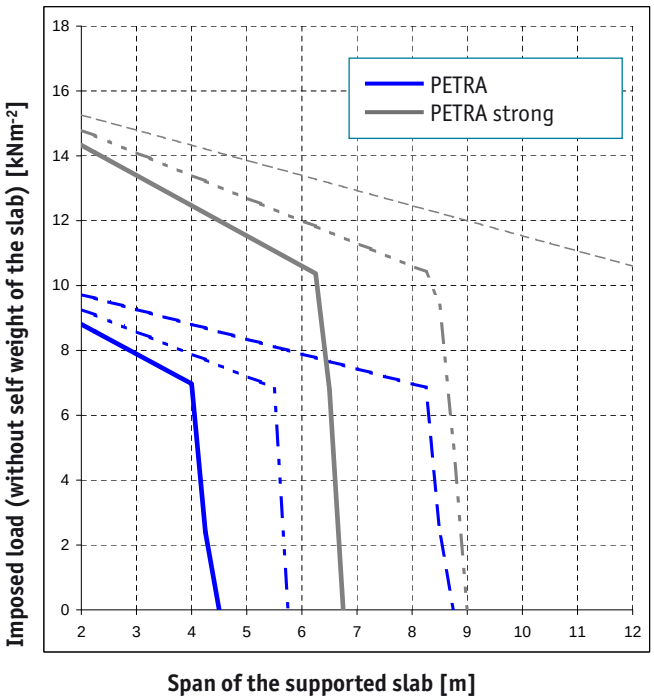
Fire situation, class R60



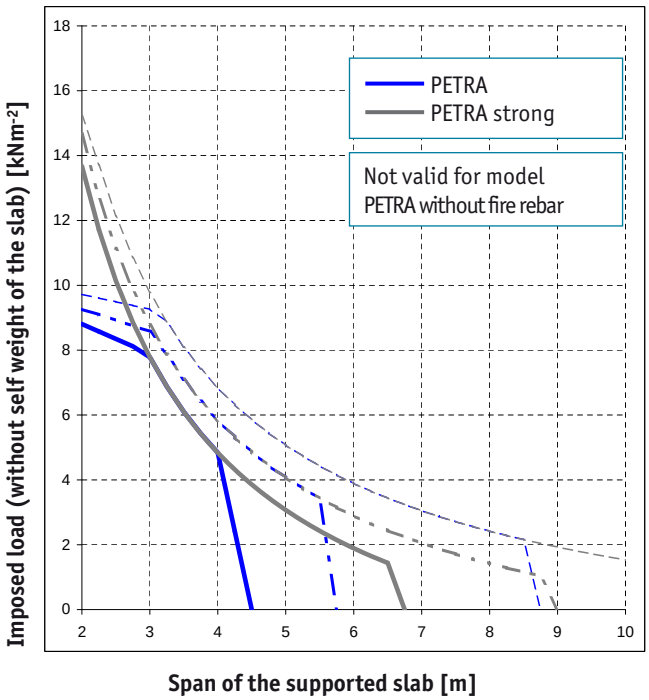
PETRA 220-2400, PETRA strong 220-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 265, PETRA strong 265

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	5,0 kN/m²
γ_{M0} = 1,0	4,0 kN/m²
γ_c = 1,4	3,0 kN/m²

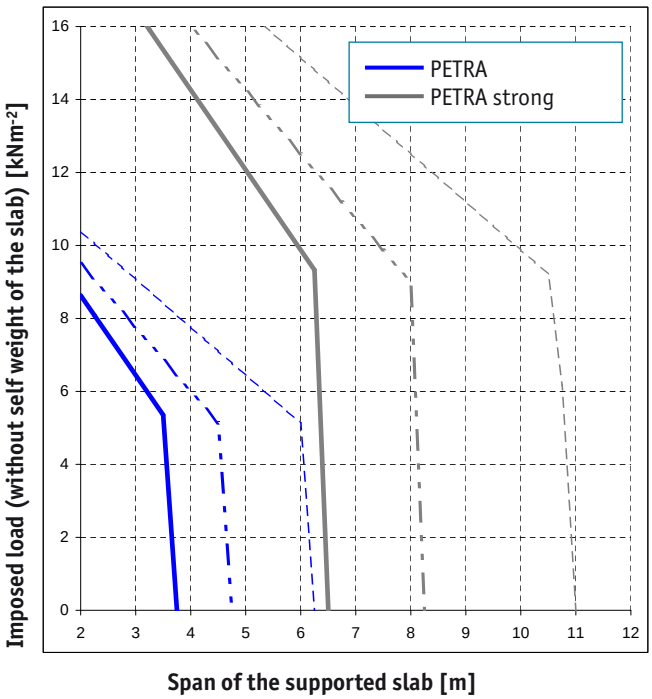
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

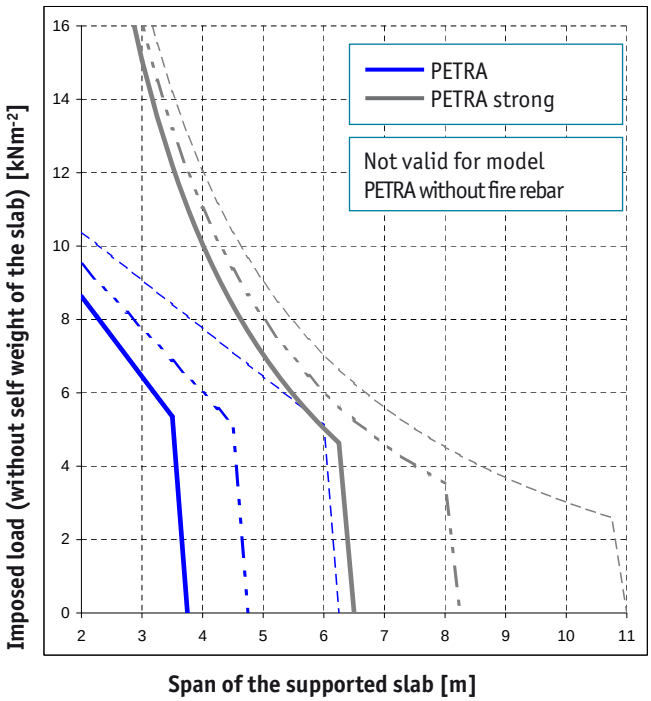
PETRA 265-1200, PETRA strong 265-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



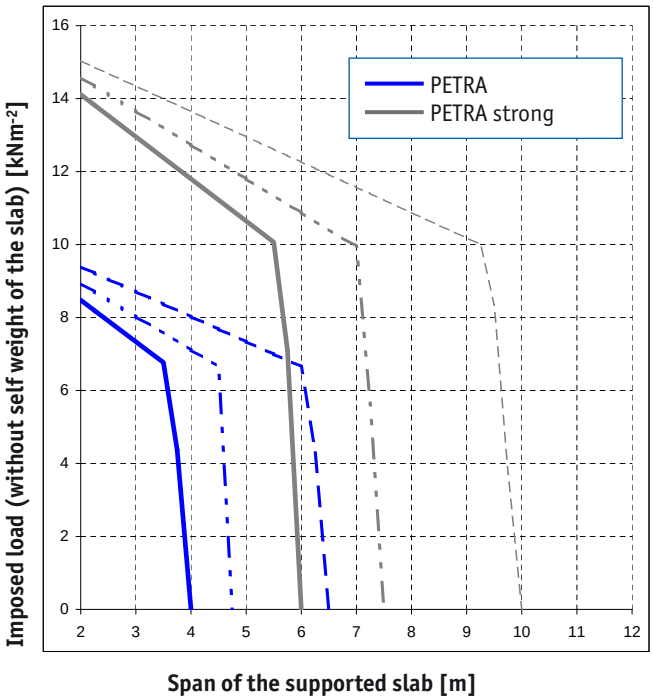
Fire situation, class R60



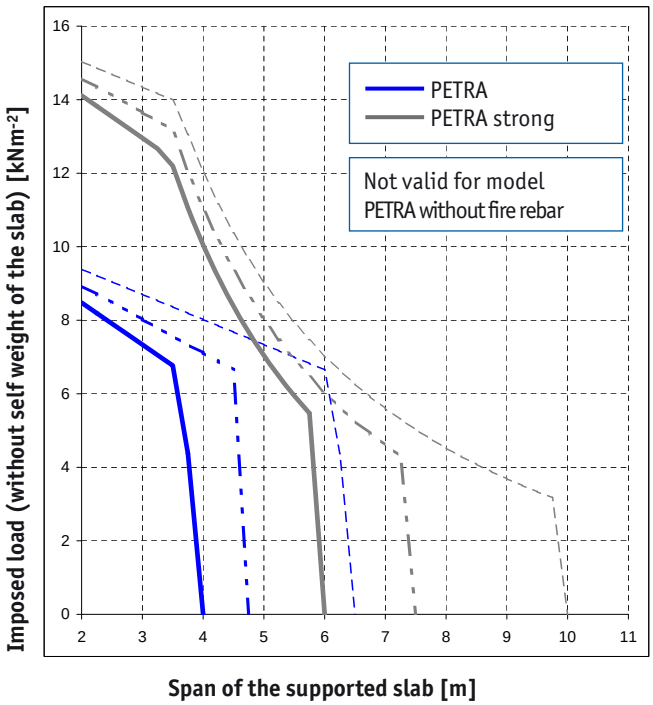
PETRA 265-2400, PETRA strong 265-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 300, PETRA strong 300

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	5,0 kN/m²
γ_{M0} = 1,0	4,0 kN/m²
γ_c = 1,4	3,0 kN/m²

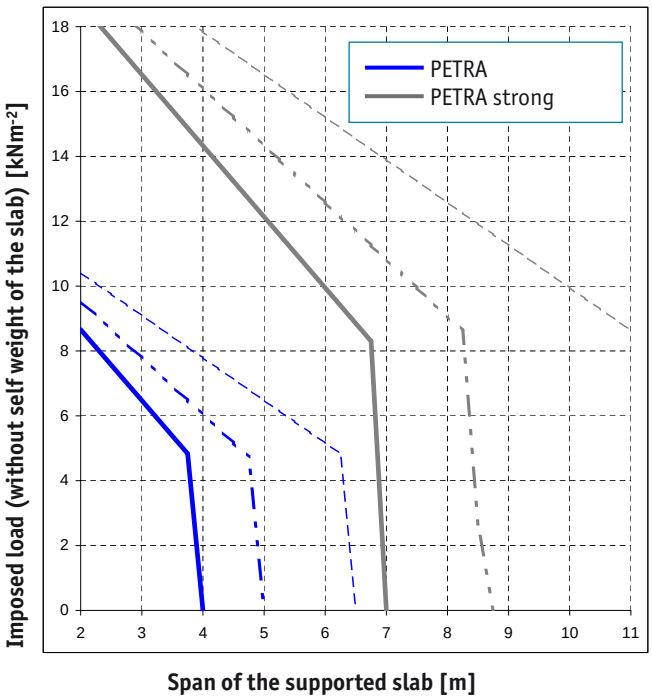
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

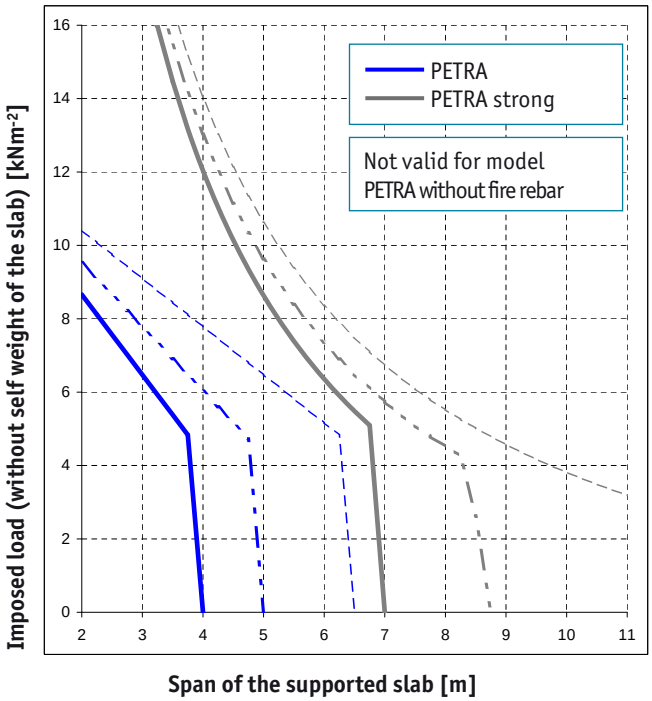
PETRA 300-1200, PETRA strong 300-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



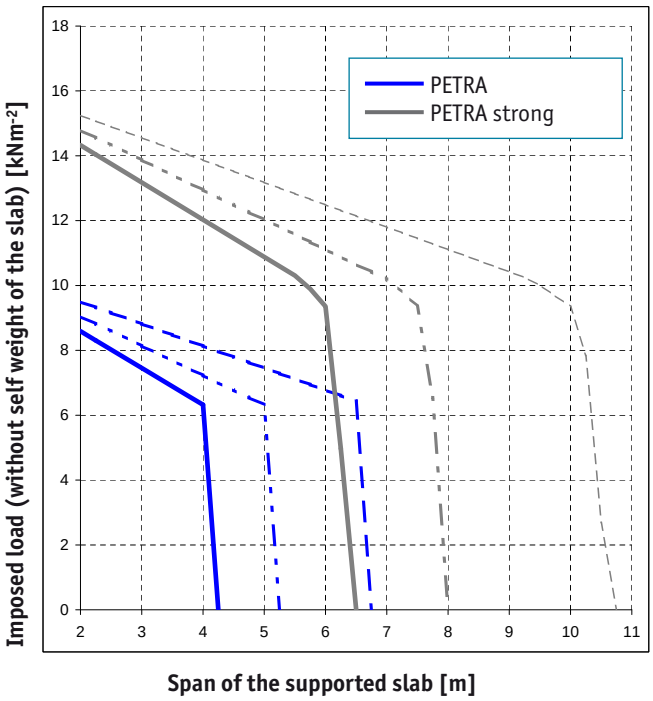
Fire situation, class R60



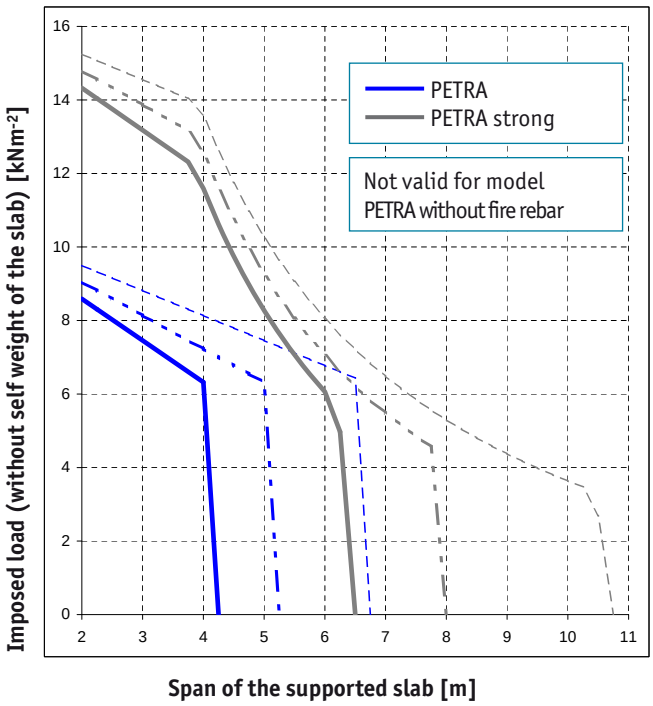
PETRA 300-2400, PETRA strong 300-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 320, PETRA strong 320

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	5,0 kN/m²
γ_{M0} = 1,0	4,0 kN/m²
γ_c = 1,4	3,0 kN/m²

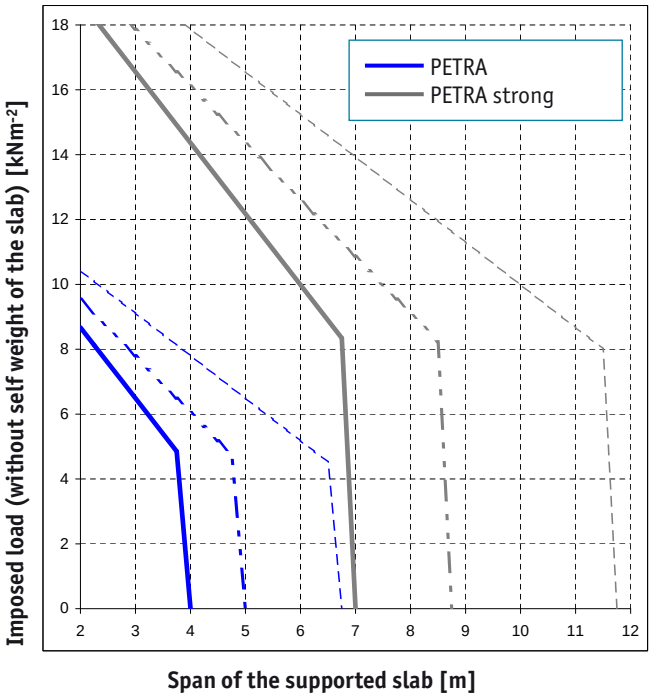
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

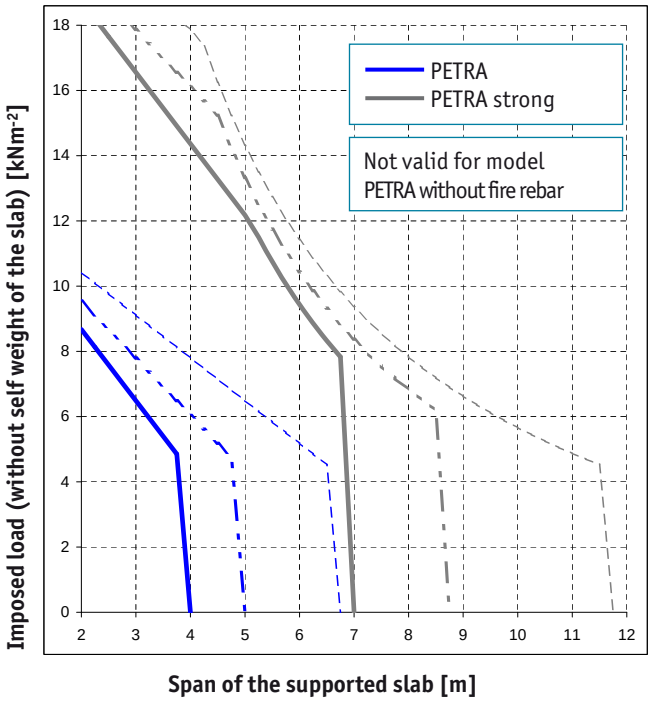
PETRA 320-1200, PETRA strong 320-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



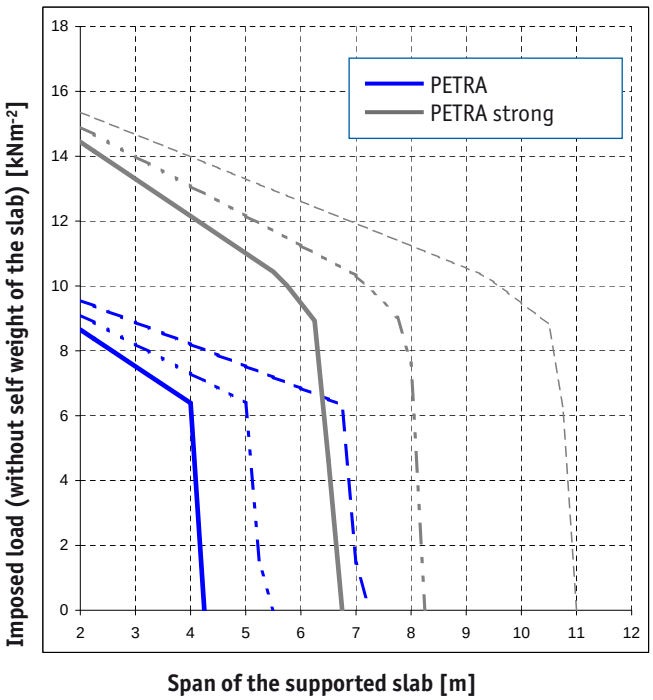
Fire situation, class R60



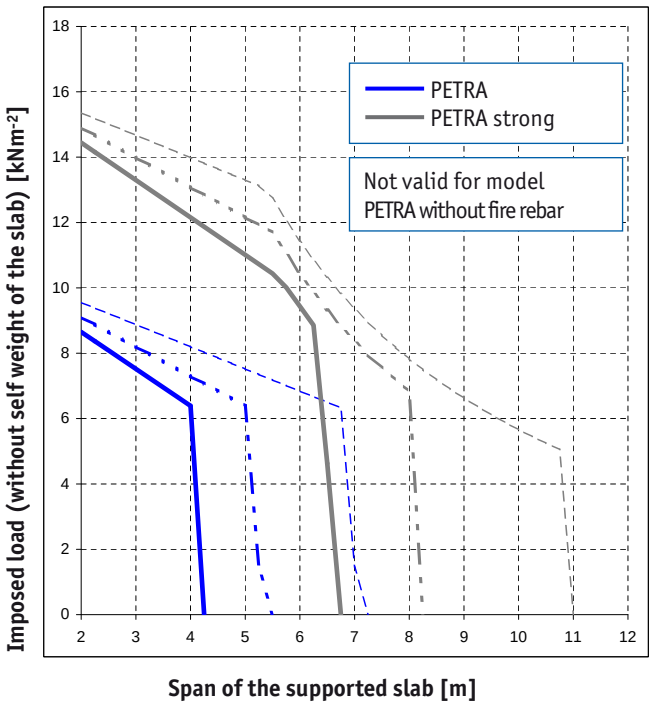
PETRA 320-2400, PETRA strong 320-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 350, PETRA strong 350

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	6,0 kN/m²
γ_{M0} = 1,0	5,0 kN/m²
γ_c = 1,4	4,0 kN/m²

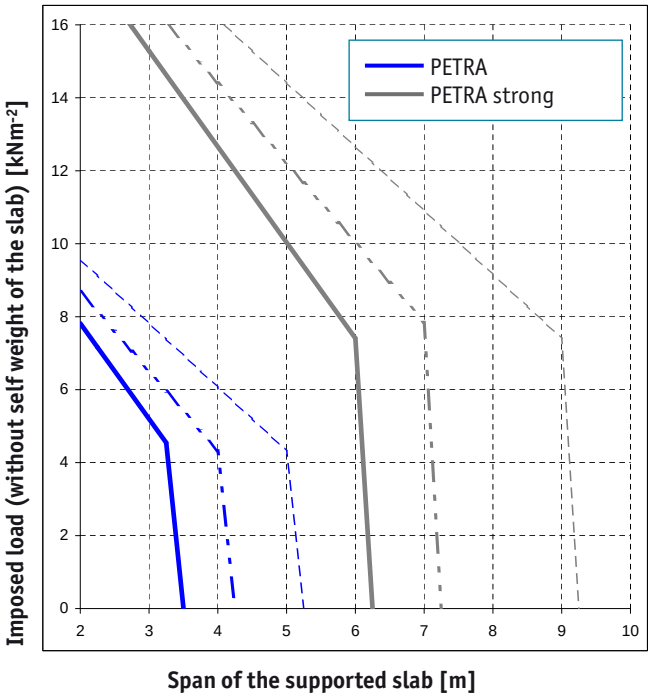
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

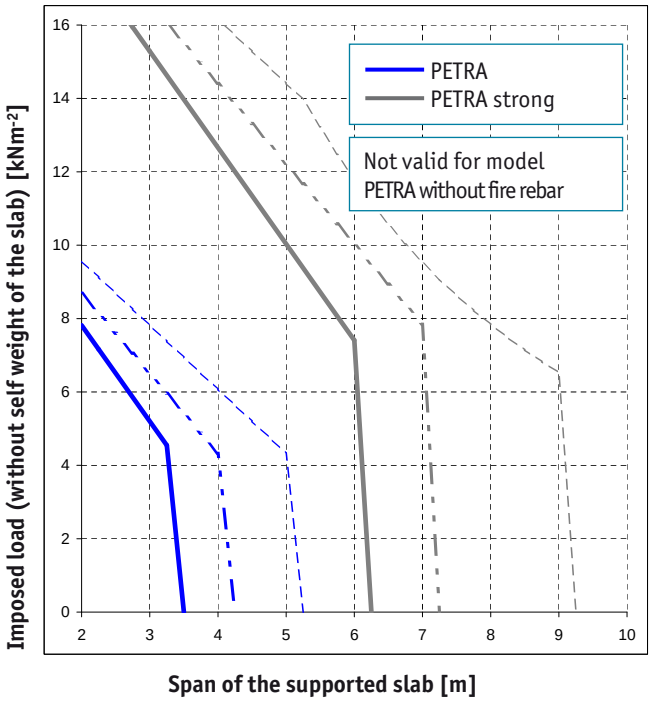
PETRA 350-1200, PETRA strong 350-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



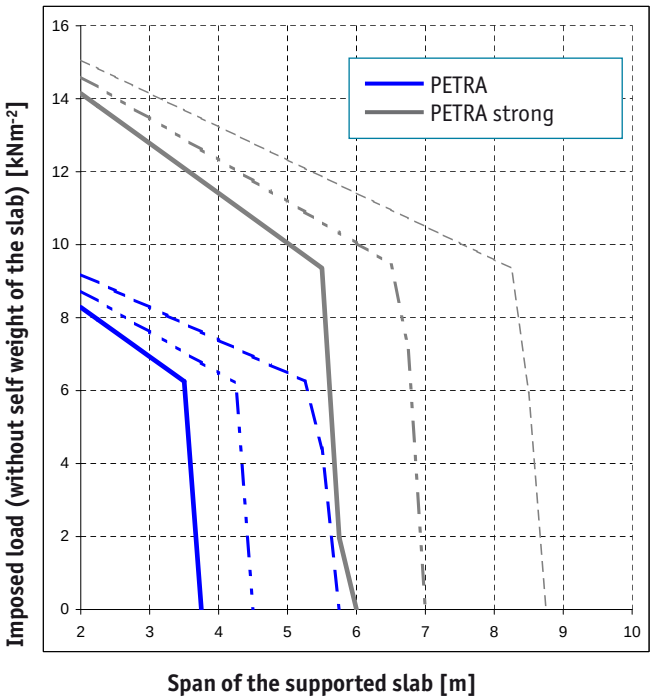
Fire situation, class R60



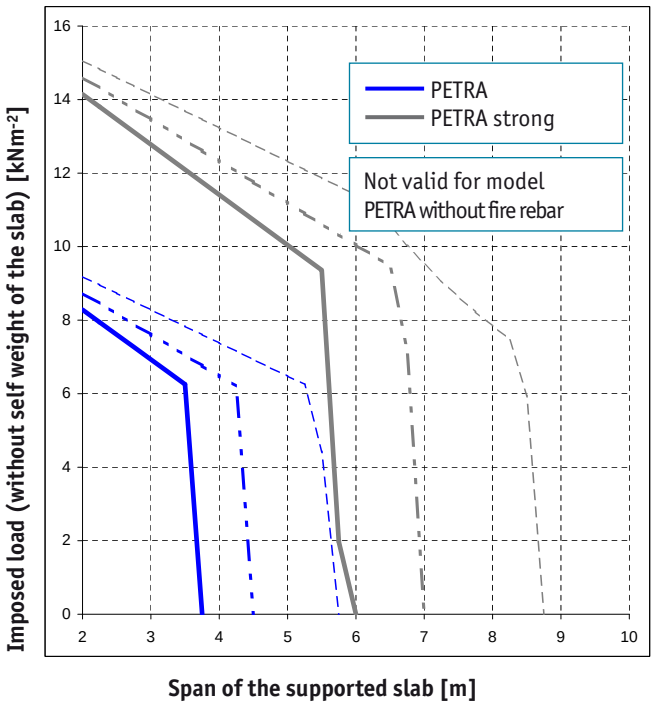
PETRA 350-2400, PETRA strong 350-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 370, PETRA strong 370

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	6,0 kN/m²
γ_{M0} = 1,0	5,0 kN/m²
γ_c = 1,4	4,0 kN/m²

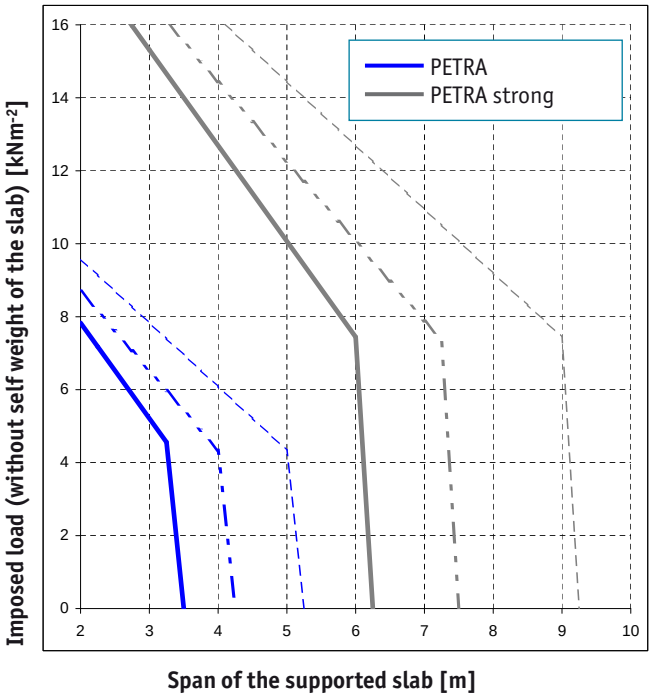
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

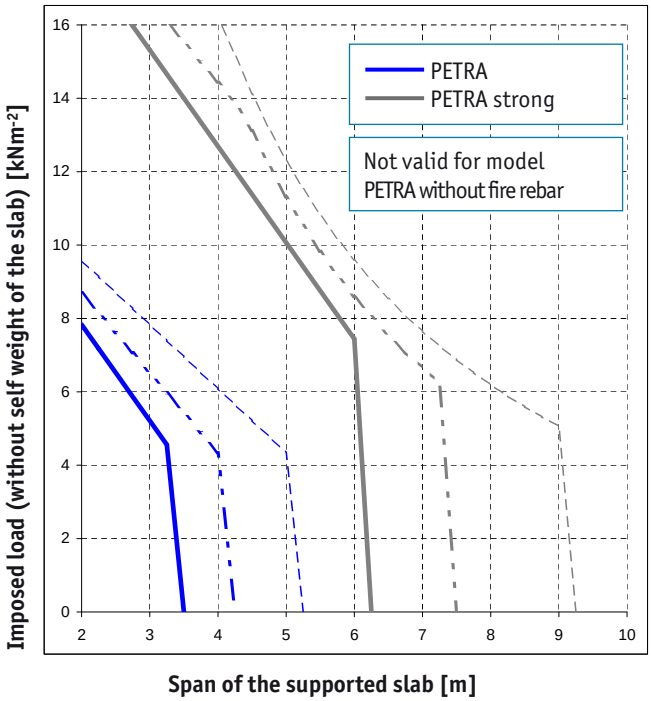
PETRA 370-1200, PETRA strong 370-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



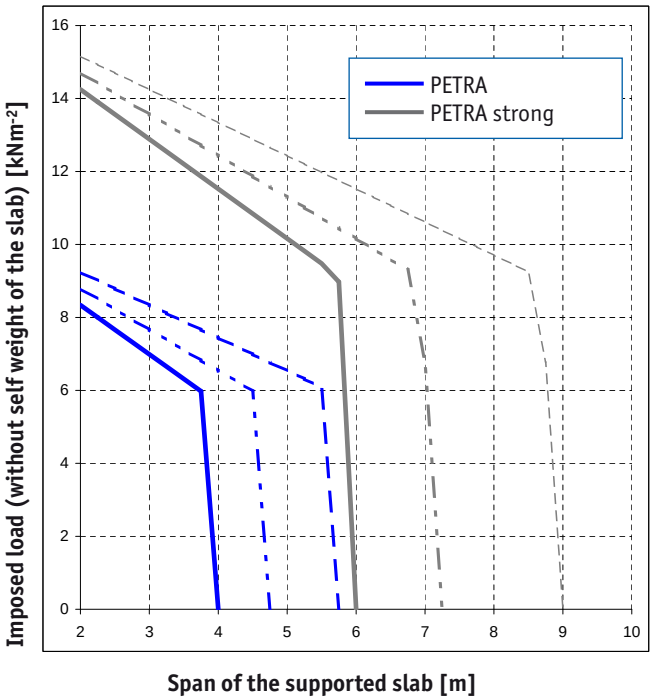
Fire situation, class R60



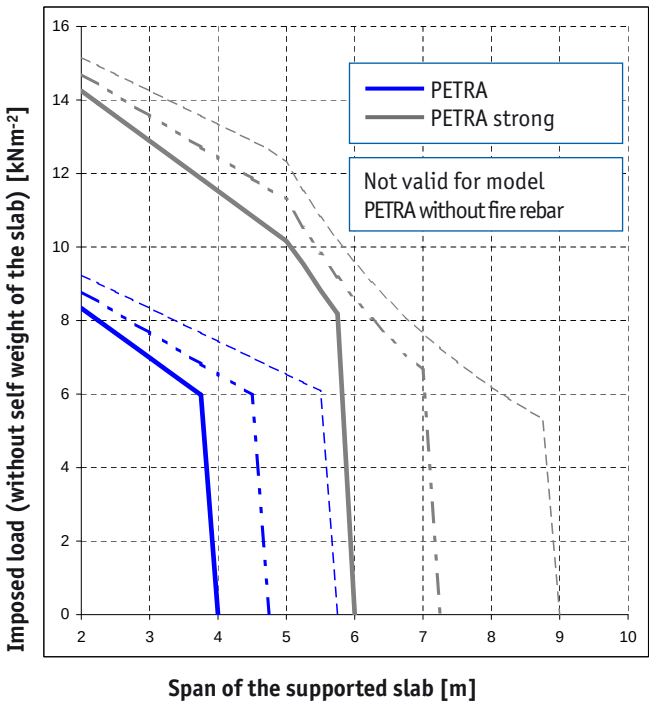
PETRA 370-2400, PETRA strong 370-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 400, PETRA strong 400

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	6,0 kN/m²
γ_{M0} = 1,0	5,0 kN/m²
γ_c = 1,4	4,0 kN/m²

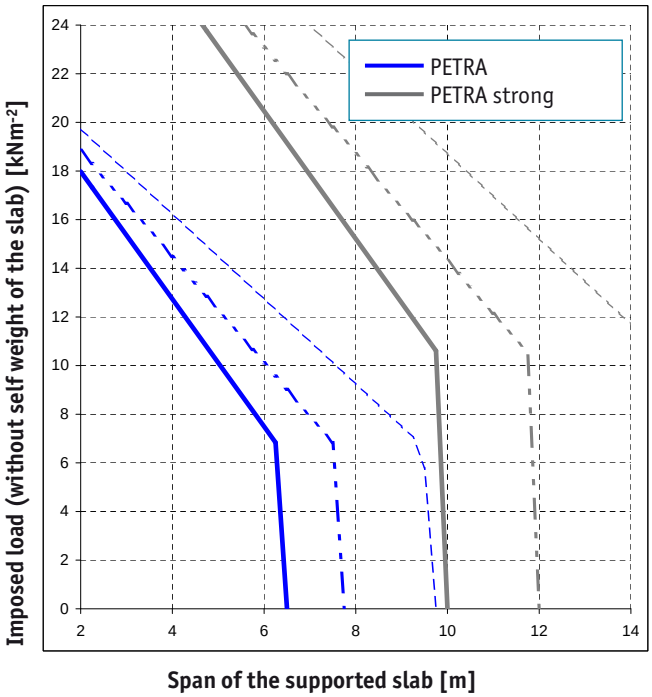
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

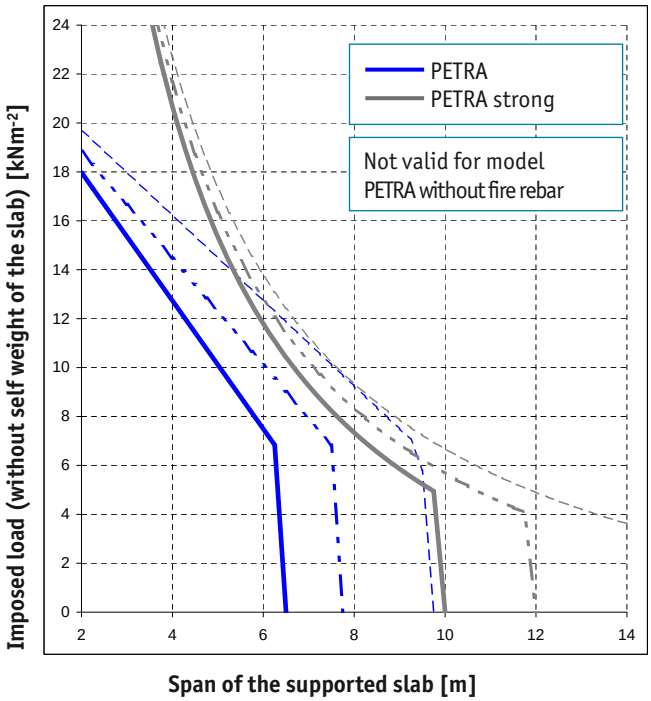
PETRA 400-1200, PETRA strong 400-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



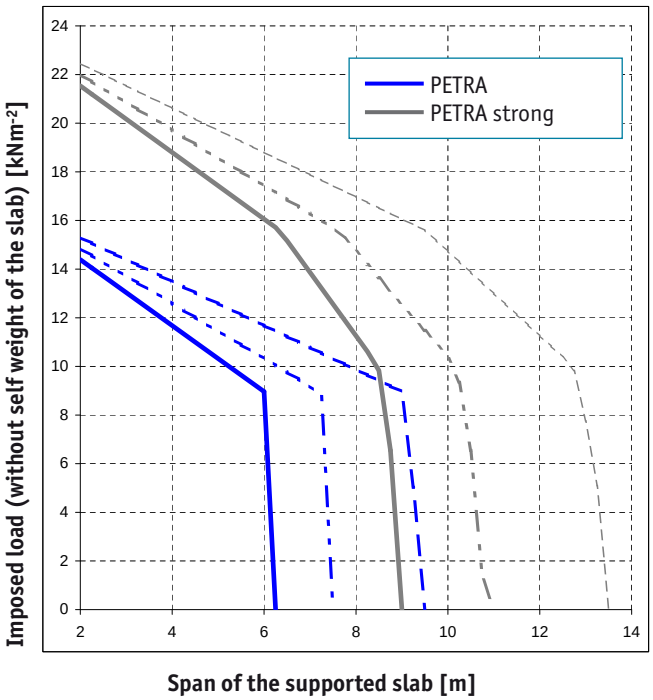
Fire situation, class R60



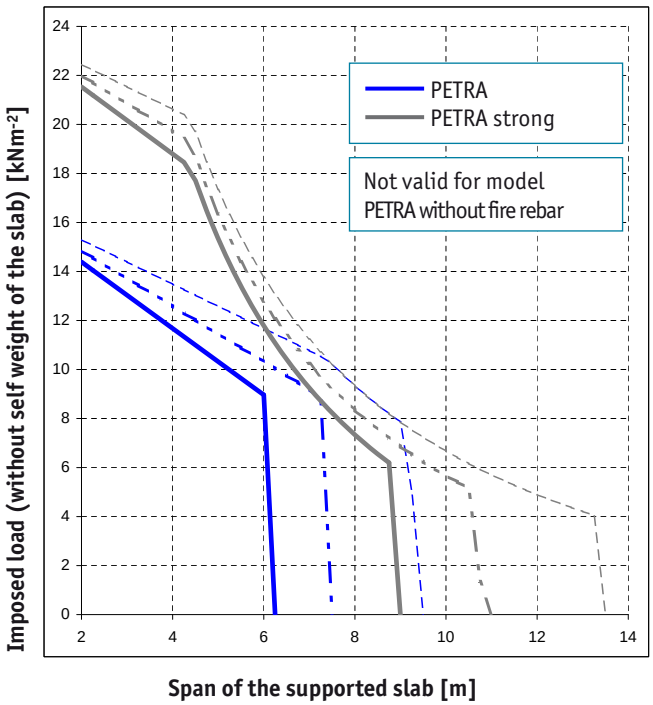
PETRA 400-2400, PETRA strong 400-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 450, PETRA strong 450

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	7,0 kN/m²
γ_{M0} = 1,0	6,0 kN/m²
γ_c = 1,4	5,0 kN/m²

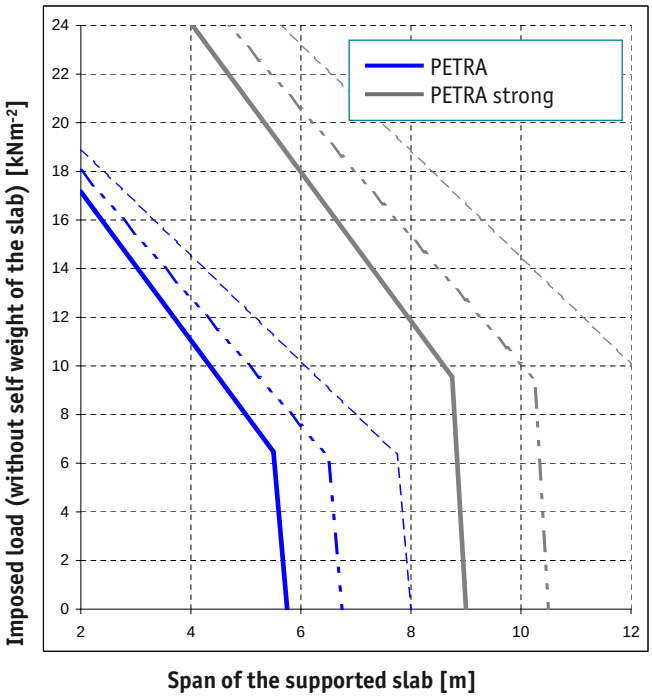
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

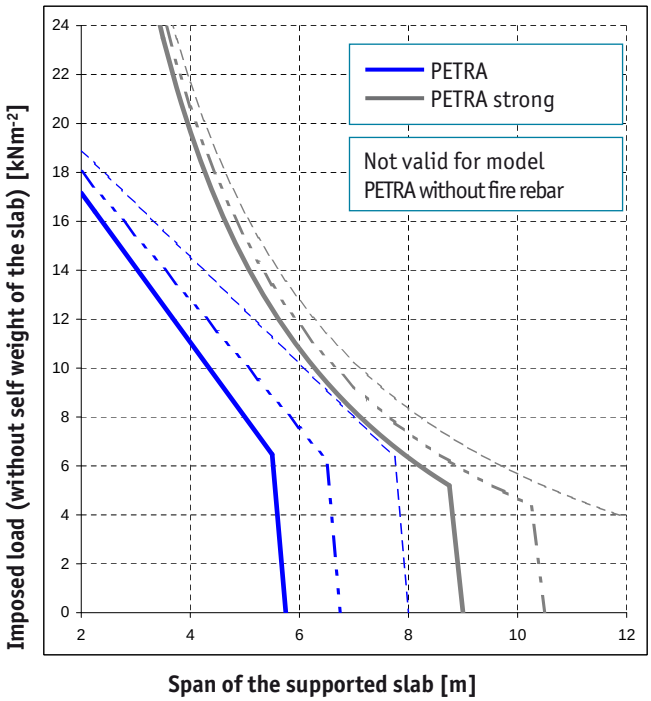
PETRA 450-1200, PETRA strong 450-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



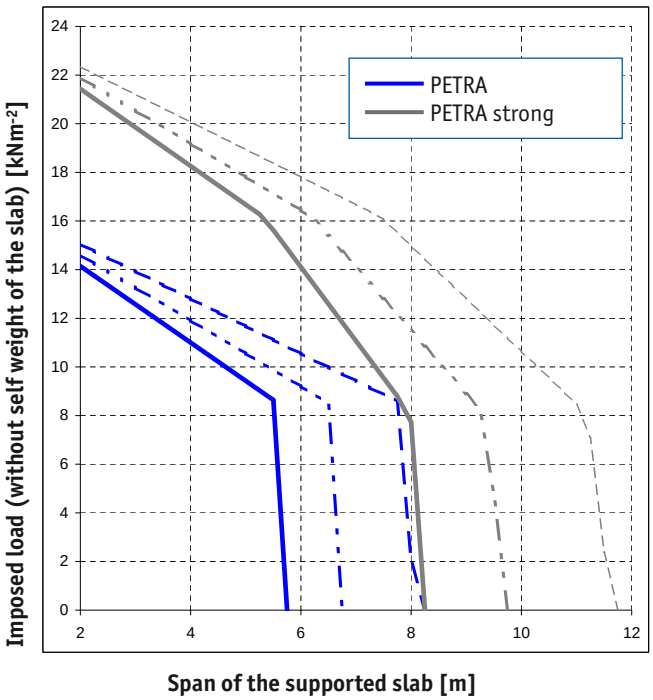
Fire situation, class R60



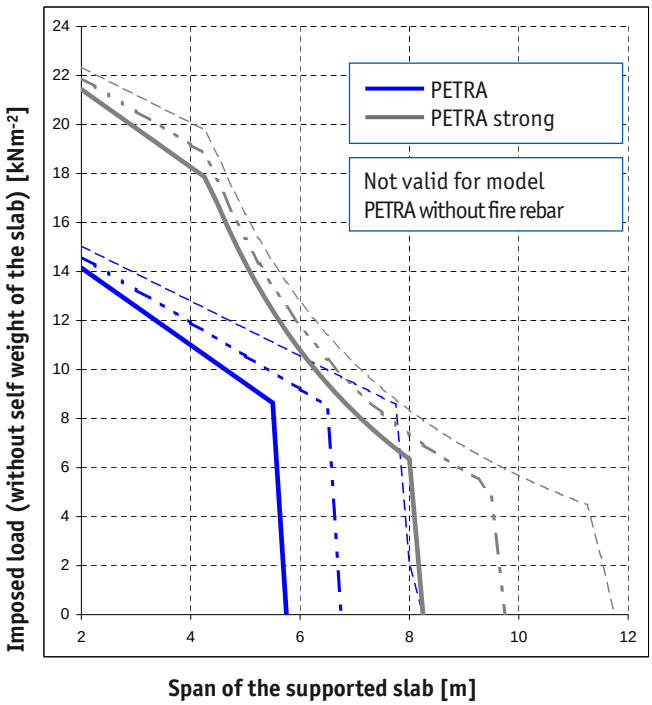
PETRA 450-2400, PETRA strong 450-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



Fire situation, class R60



PETRA 500, PETRA strong 500

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	7,0 kN/m²
γ_{M0} = 1,0	6,0 kN/m²
γ_c = 1,4	5,0 kN/m²

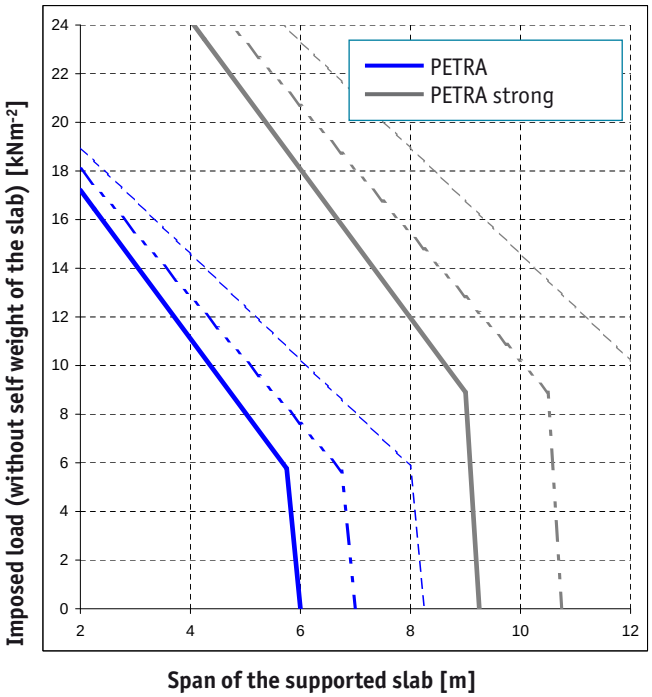
Use characteristic values of both self weights and imposed loads when using these curves.

Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.

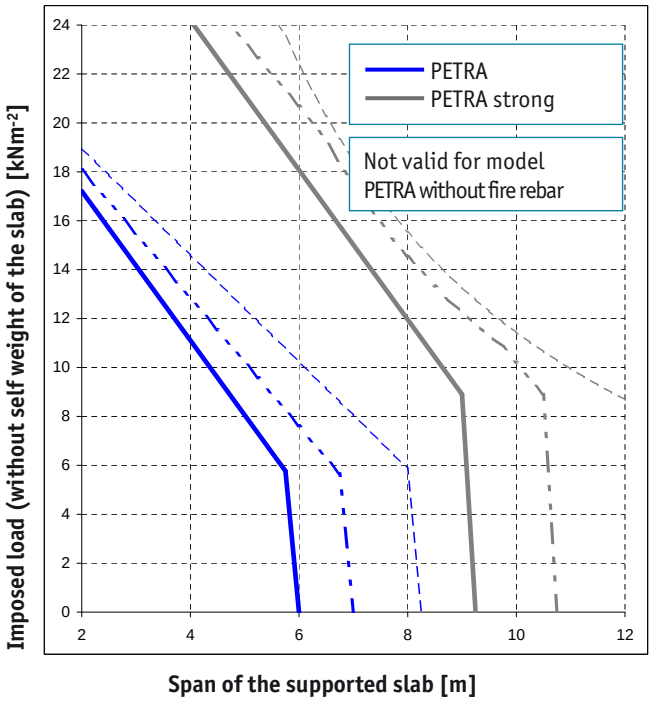
PETRA 500-1200, PETRA strong 500-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



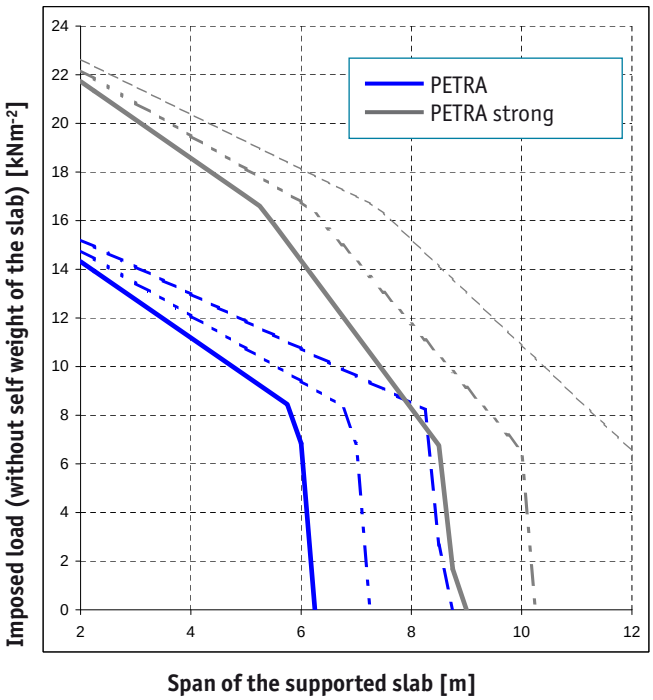
Fire situation, class R60



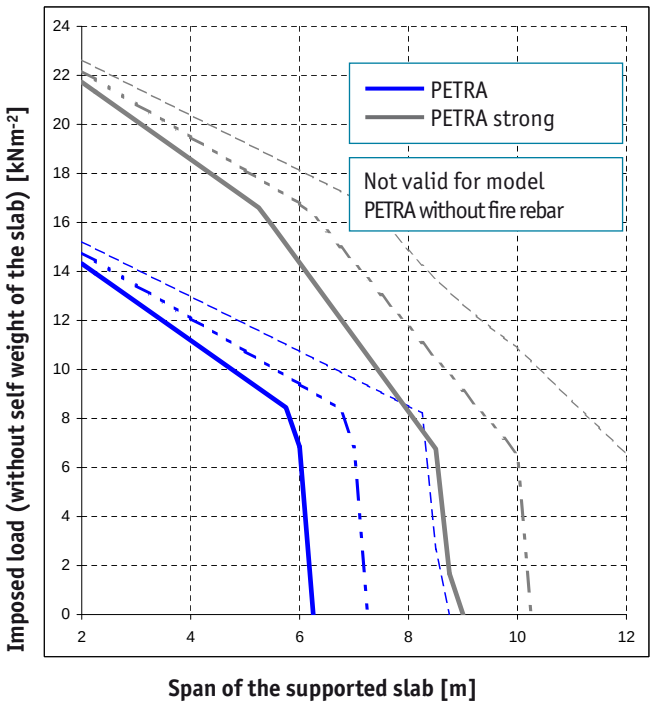
PETRA 500-2400, PETRA strong 500-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



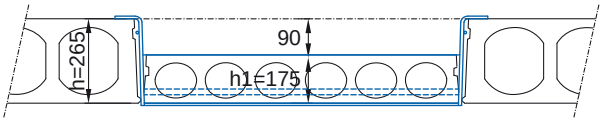
Fire situation, class R60



PETRA recess 175

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	6,0 kN/m²
γ_{M0} = 1,0	5,0 kN/m²
γ_c = 1,4	4,0 kN/m²

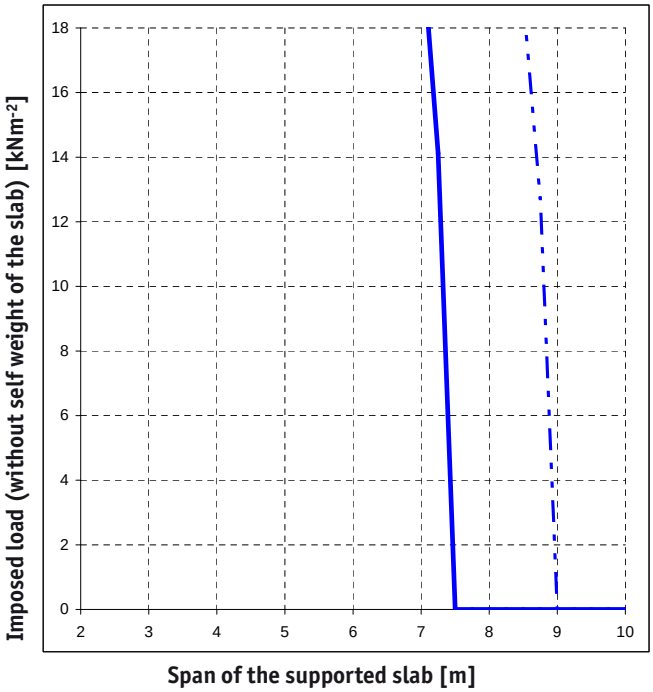
Use characteristic values of both self weights and imposed loads when using these curves. Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.



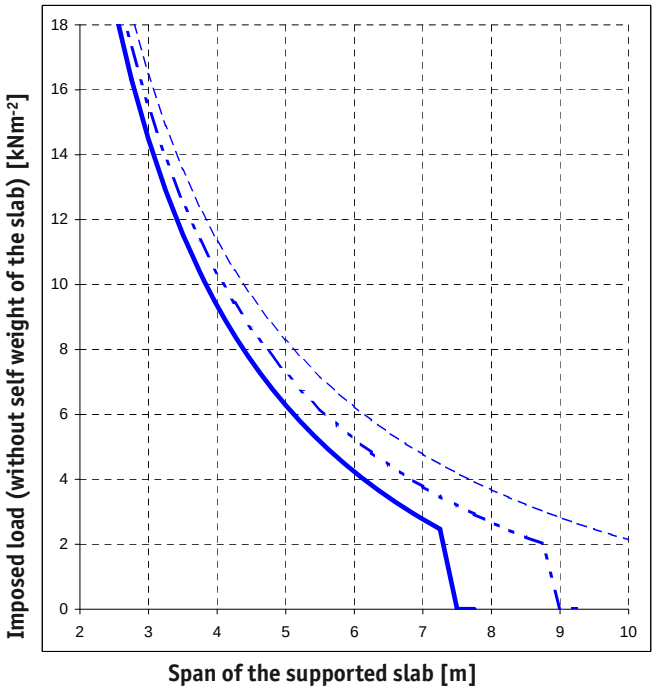
PETRA recess 175-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



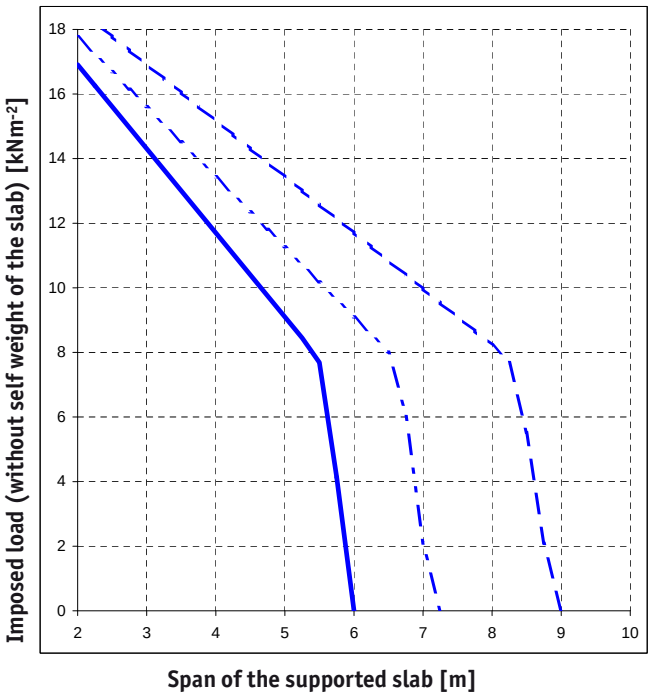
Fire situation, class R60



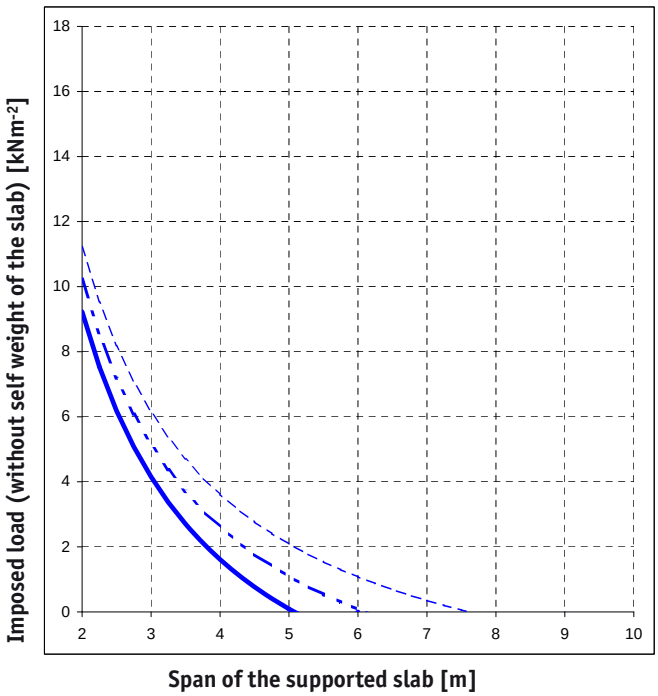
PETRA recess 175-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



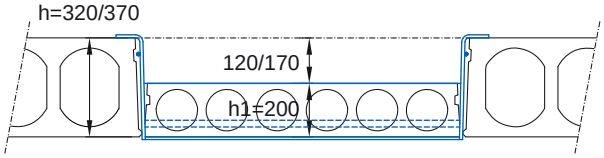
Fire situation, class R60



PETRA recess 200

γ_G = 1,35	Self weight of the slab [kN/m²]
γ_Q = 1,50	6,0 kN/m²
γ_{M0} = 1,0	5,0 kN/m²
γ_c = 1,4	4,0 kN/m²

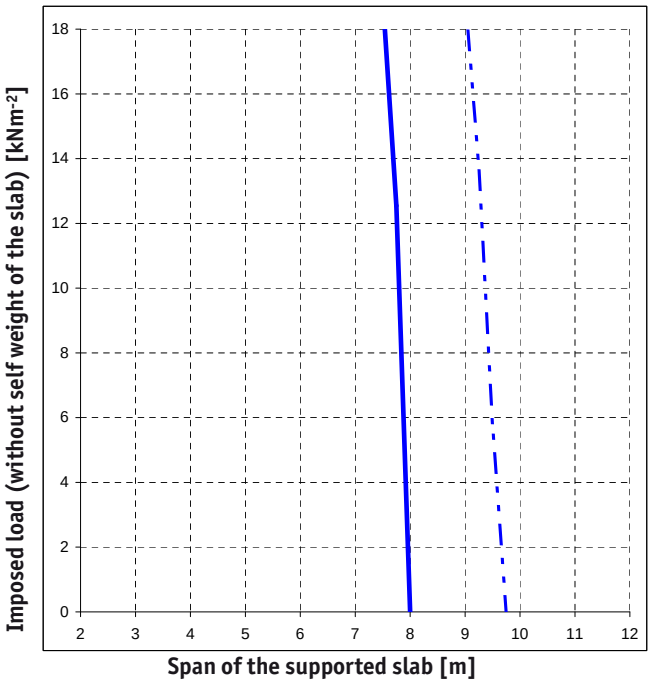
Use characteristic values of both self weights and imposed loads when using these curves. Add weight of the topping into self weight of slab if the topping will be casted before slab joints are hardened.



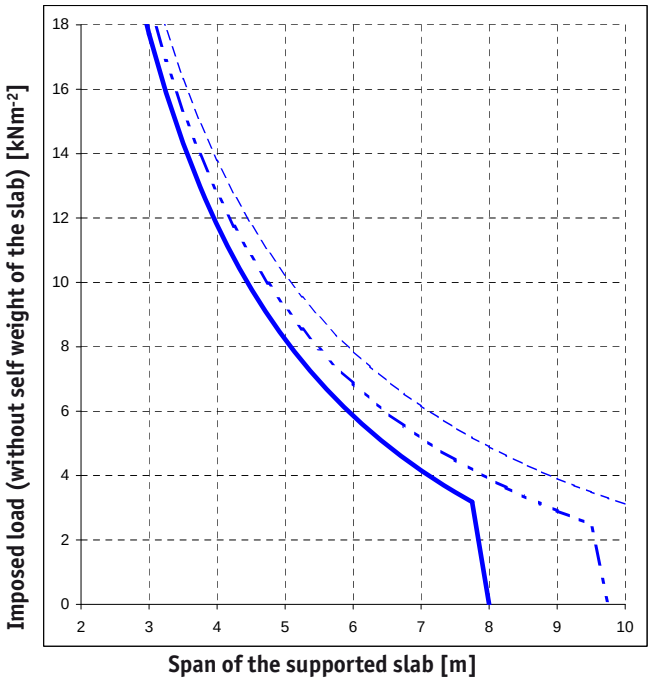
PETRA recess 200-1200

– Valid for opening widths of 0 < L ≤ 1200 mm

Normal situation



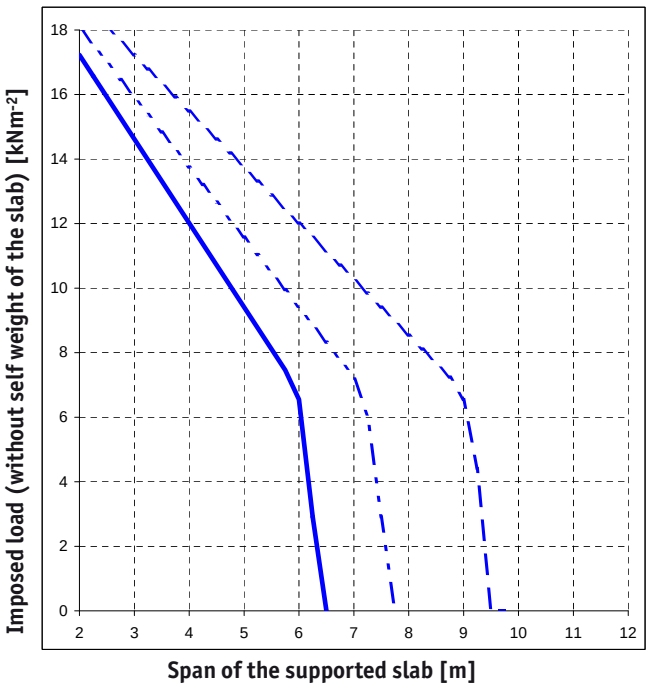
Fire situation, class R60



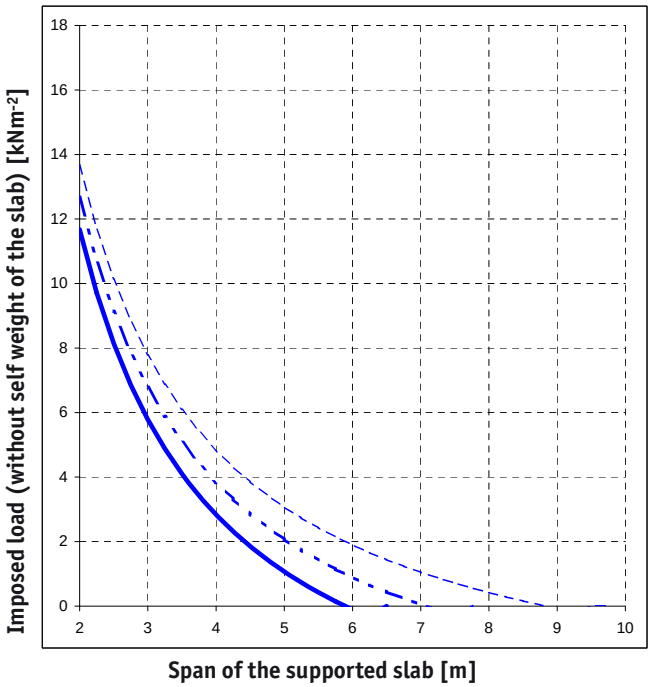
PETRA recess 200-2400

– Valid for opening widths of 1200 < L ≤ 2400 mm

Normal situation



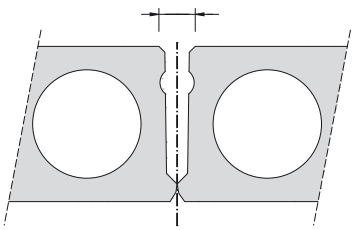
Fire situation, class R60



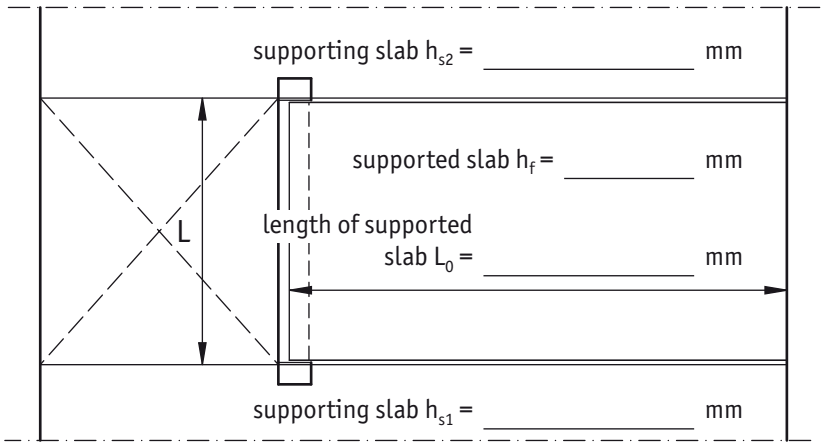
If a non standard PETRA is required, please fill a copy of this form and contact Peikko technical support

Basic dimensions

b = _____ mm

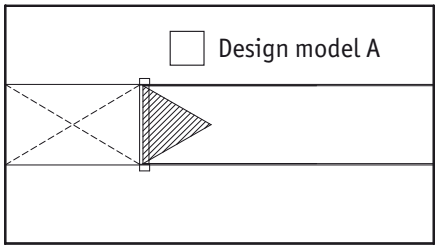


width of opening L = _____ mm

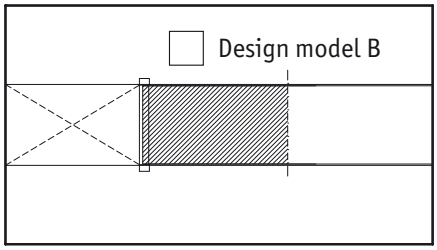


Load distribution for imposed load

☐ Design model A



☐ Design model B



Permanent loads (characteristic value)

weight of hollow-core slab g_{HC} = _____ kN/m²

other permanent loads Δg = _____ kN/m² *(on supported slab)*

Imposed loads (characteristic value)

surface load q_1 = _____ kN/m² *(on supported slab)*

linear load q_2 = _____ kN/m *(on PETRA)*

point load Q_3 = _____ kN *(on PETRA)*

Partial factors

concrete γ_c = _____ *(recommended value = 1,5)*

steel γ_{M0} = _____ *(recommended value = 1,0)*

reinforcement γ_s = _____ *(recommended value = 1,15)*

permanent load γ_G = _____ *(recommended value = 1,35)*

imposed load γ_Q = _____ *(recommended value = 1,5)*

welds γ_{M2} = _____ *(recommended value = 1,25)*

reduction of imposed load during fire $\psi_{1,2}$ = _____ *(0 – 0,8 depending on the type of building)*

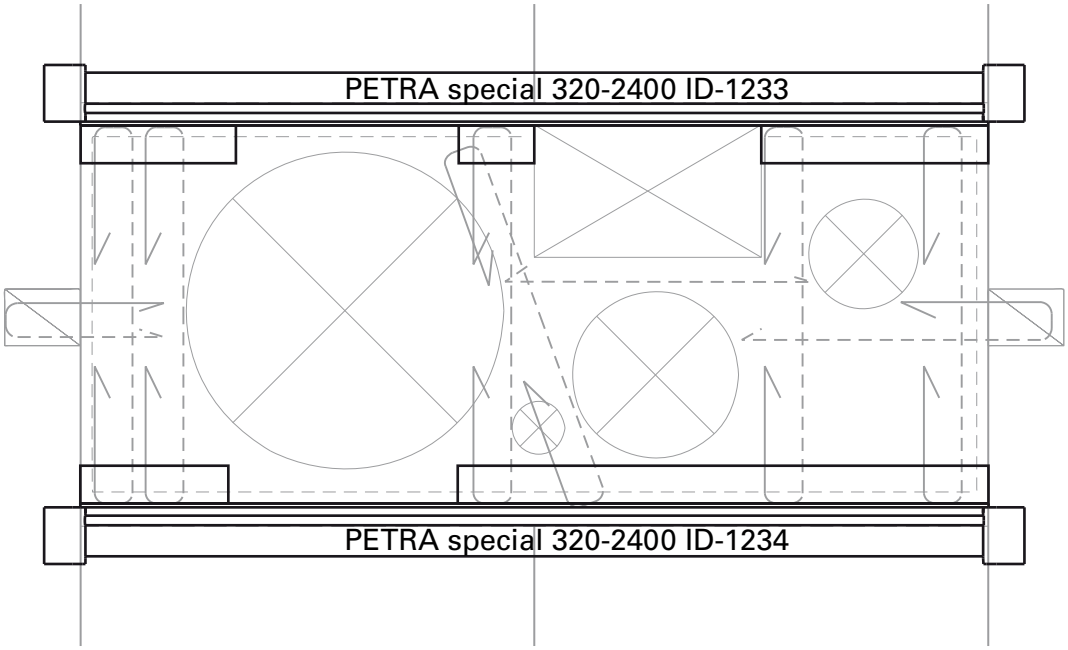
Fire reinforcement

☐ Yes (R60) ☐ No

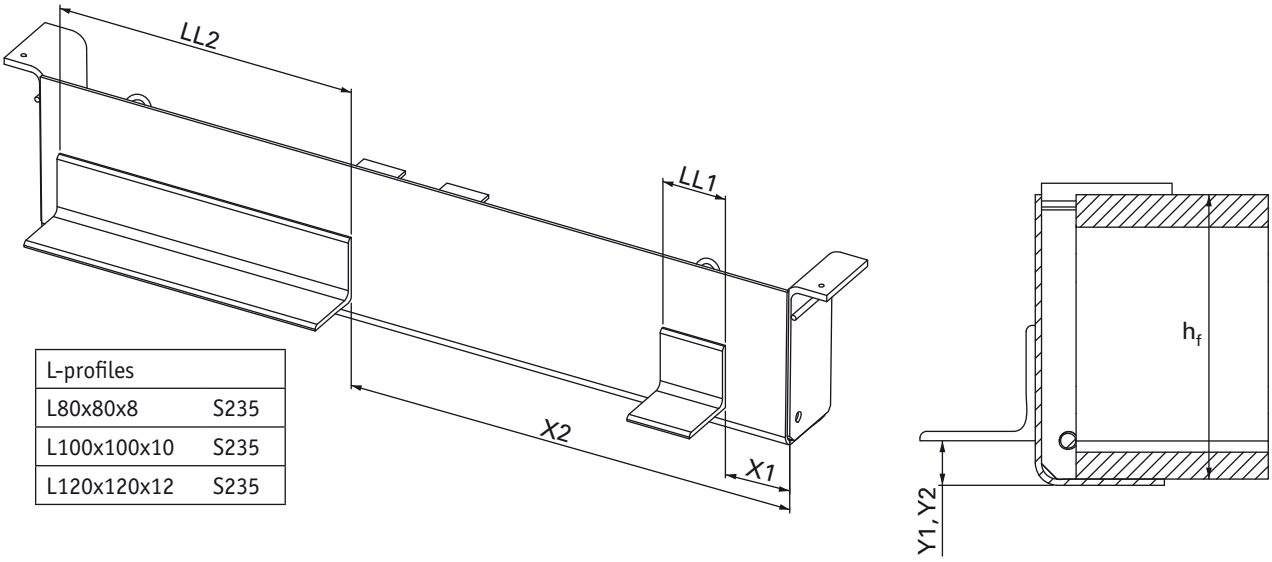
Additional L-profiles to the front plate of PETRA

Below you can find example of how to support in-situ slab with L-profiles welded into PETRA. Type of PETRA in this case will be PETRA special. Peikko technical support defines id-number for PETRA special.

In addition designer can define note for PETRA eg. PETRA-101, this note will be printed on the label of PETRA. Characters A-Z, 0-9, + and hypen (-) can be used. Max number of characters is 18.



This form can be downloaded from Peikko Group website. Fill in the form and send it to Peikko's technical support with loading information.



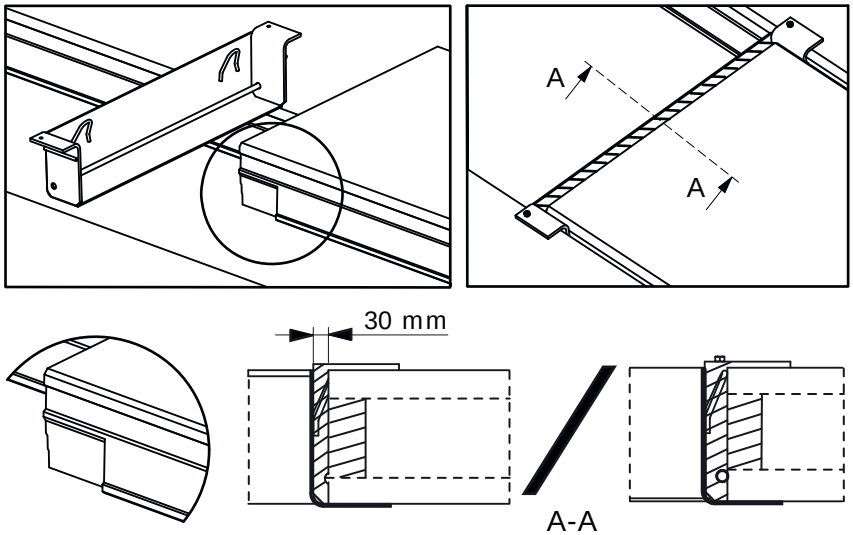
L-profiles	
L80x80x8	S235
L100x100x10	S235
L120x120x12	S235

	Type		mm		mm		mm	kN	kN/m
Profile 1		X1		Y1		LL1			
Profile 2		X2		Y2		LL2			
Profile 3		X3		Y3		LL3			
Profile 4		X4		Y4		LL4			
Profile 5		X5		Y5		LL5			
Profile 6		X6		Y6		LL6			

Identification of the product:
The standard PETRA models are described by codes. Standard PETRA models may be identified using this code in the plan drawings of the building. On site, each PETRA hanger is identified by a label that includes this code. PETRA Special hangers are described by a code with a unique id number; this id number may be used to identify PETRA Special both in the plan drawings and on site.

Colors of PETRA models:
- PETRA (light blue)
- PETRA strong (grey)
- PETRA recess (grey)
- PETRA special (green)

PETRA must be installed on an undamaged hollow-core slab to the location determined in the plan drawing. The slab has to be placed so that it is in contact with the fire rebar or with the horizontal steel strip welded to the front plate or with lifting loop.



The bottom edge of the supported slab should be removed so that the slab is bearing directly on the front plate. On the top flange of side plates of PETRA are Ø12 mm holes for fastening PETRA to supporting hollow core slabs with expander bolts

The gap between PETRA and the hollow-core slab should be fully cast when concreting the floor. The concrete should be hardened before applying loads to the floor. Lifting loops welded on the front plate are used in manufacturing and shipping process. They can be removed before PETRA is installed on site.

Figure 13. PETRA must be installed on an undamaged edge of hollow-core slab

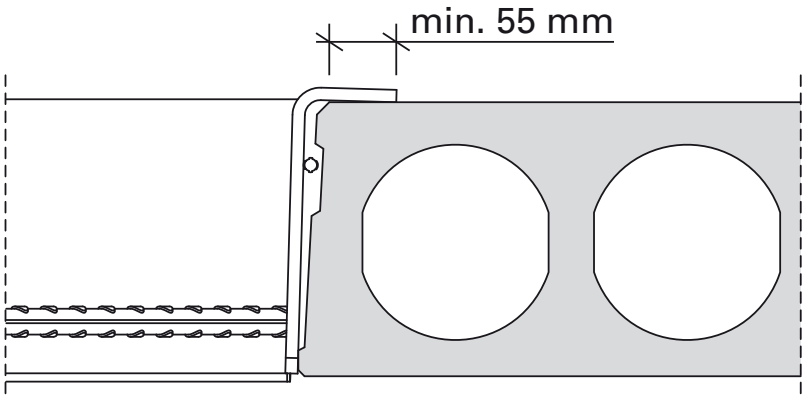


Figure 14. It is not allowed to support PETRA on the area of empty non-reinforced hollow

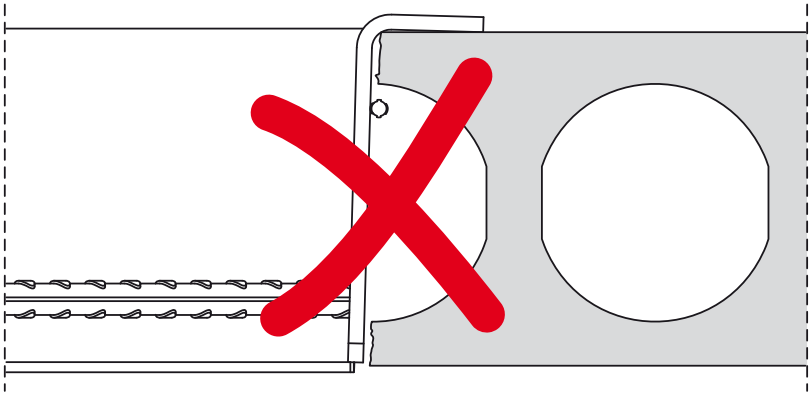
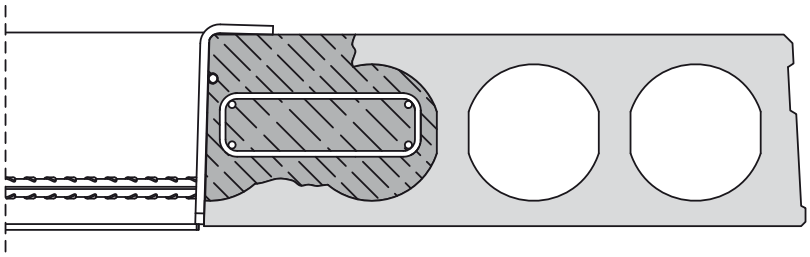


Figure 15. Two hollows must be connected, reinforced, casted and designed to support PETRA when there is a need to support PETRA on the area of hollows



PEIKKO GROUP CORPORATION

Peikko Group, founded in 1965, is a family owned company specializing in composite beams and fastening products for concrete connections. Peikko provides innovative solutions to help customers make their building process faster, easier and more reliable. Precasters, builders, constructors, developers, flooring specialists, machine manufactures, power plant designers, architects and structural designers can all enjoy and take advantage
of the Peikko solutions.

The Group has offices in 30 countries in Europe, North America, and Middle East. The modern production facilities are located in Canada, China, Finland, Germany, Lithuania, Russia, Slovakia, United Arab Emirates, and United Kingdom. Peikko Group, with headquarters in Lahti, Finland, employs more than 800 persons