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European Technical Assessment Body
for construction products



European Technical Assessment

ETA-17/0466
of 27 March 2026

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Slab connection ISOPRO®

Product family
to which the construction product belongs

Load bearing thermal insulating elements which form a
thermal break between balconies and internal floors

Manufacturer

PohlCon GmbH
Nobelstraße 51
12057 Berlin
DEUTSCHLAND

Manufacturing plant

PohlCon GmbH
Am Güterbahnhof 20
79771 Klettgau
DEUTSCHLAND

This European Technical Assessment
contains

42 pages including 3 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Article 95(4) of
Regulation (EU) 2024/3110, on the basis of

EAD 050001-01-0301

This version replaces

ETA-17/0466 issued on 6 March 2025

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Specific Part

1 Technical description of the product

The Slab connection ISOPRO® is used as load-bearing thermal insulation element to connect reinforced concrete slabs under static or quasi-static load.

The product description is given in Annex A.

The characteristic material values, dimensions and tolerances of the Slab connection ISOPRO® not indicated in Annexes A01 to A20 shall correspond to the respective values laid down in the technical documentation^[1] of this European Technical Assessment.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the Slab connection ISOPRO® is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the Slab connection ISOPRO® of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Load bearing capacity	See Annex C01 – C03

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire of materials	See Annex A20
Resistance to fire	See Annex C10

3.3 Protection against noise (BWR 5)

Essential characteristic	Performance
Impact sound insulation	No performance assessed

3.4 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal resistance	No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No. 050001-01-0301, the applicable European legal act is: [1997/0597/EC].

The systems to be applied is: 1+

^[1] The technical documentation of this European technical assessment is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

The following technical specifications are referred to:

EN 206:2013+A2:2021	Concrete - Specification, performance, production and conformity
EN 1992-1-1:2004 + AC:2010 + A1:2014	Eurocode 2 - Design of concrete structures - Part 1-1: General rules and rules for buildings, bridges and civil engineering structures
EN 1992-1-2:2004 + AC:2008 + A1:2019	Eurocode 2: Design of concrete structures – Part 1-2: General rules – Structural fire design
EN 1993-1-1:2005+ AC:2009 +A1:2014	Eurocode 3: Design of steel structures – Part 1-1: General design rules and rules for buildings
EN 1993-1-4:2006/A2:2020	Eurocode 3: Design of steel structures – Part 1-4: General rules – Supplementary rules for stainless
EN 10025-2:2019	Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels
EN 13163:2012+A2:2016	Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products – Specification
EN 13245-1:2010	Plastics – Unplasticized poly (vinyl chloride) (PVC-U) profiles for building applications – Part 1: Designation of PVC-U profiles
EN 13245-2:2008 + AC:2009	Plastics – Unplasticized poly (vinyl chloride) (PVC-U) profiles for building applications – Part 2: PVC-U profiles and PVC-UE profiles for internal and external wall and ceiling finishes
EN 13501-1:2018	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
EN 13501-2:2023	Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services

Issued in Berlin on 27 March 2026 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Kisan

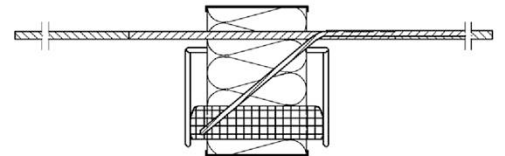
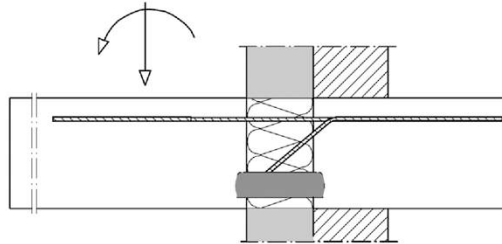
A Product description

A.1 Type Overview

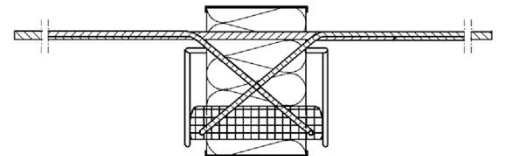
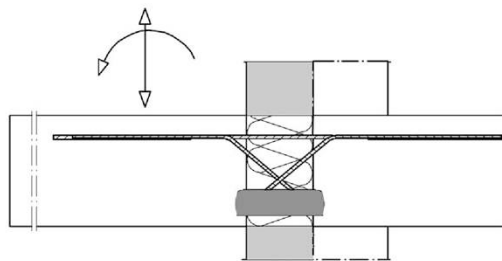
A.1.1 ISOPRO[®] with high performance concrete compression bearings (HPCB) and high performance concrete compression shear bearings (HPCSB)

A.1.1.1 Types for transmission of moments and shear forces

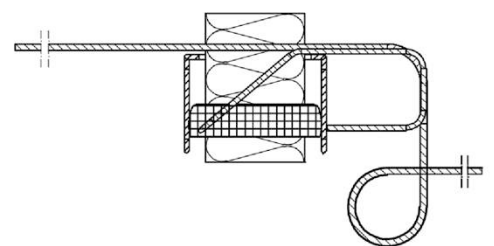
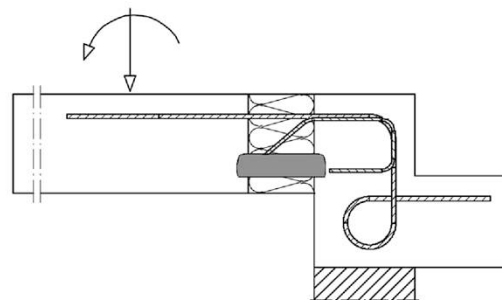
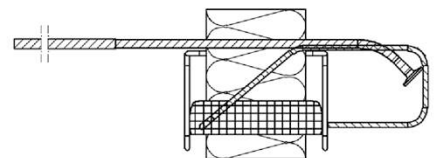
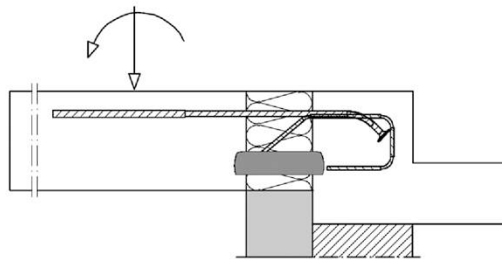
Type IP M Q



Type IP M QQ



Type IP MO

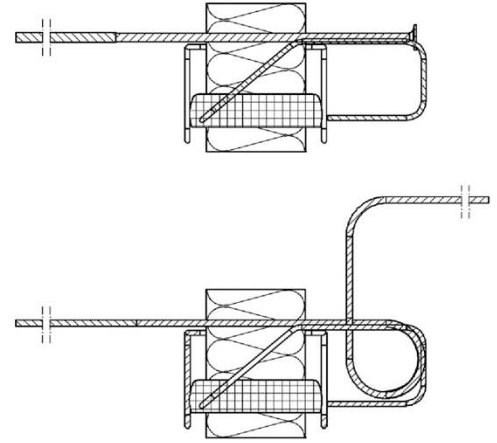
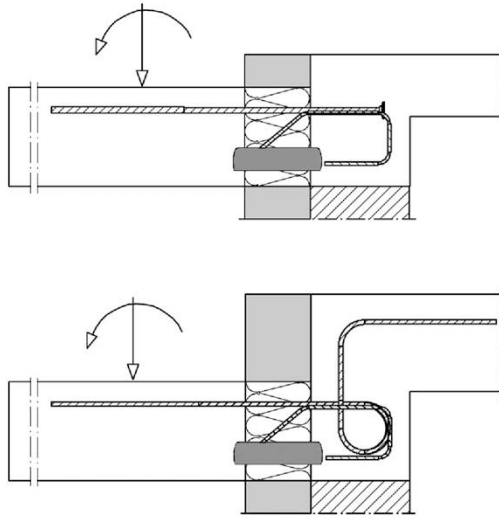


Slab connection ISOPRO[®]

Product description: Type Overview

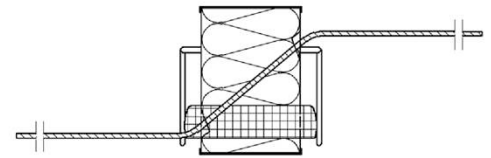
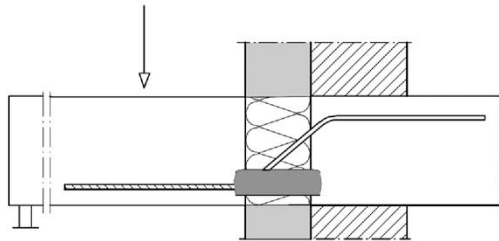
**Annex
A 01**

Type IP MU

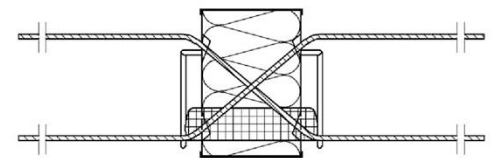
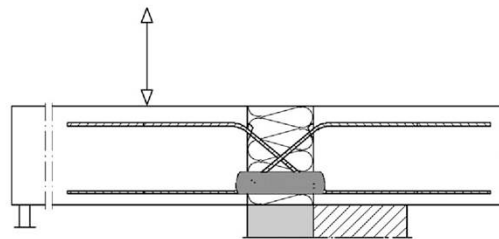


A.1.1.2 Types for transmission of shear forces

Type IP Q
Type IP QS

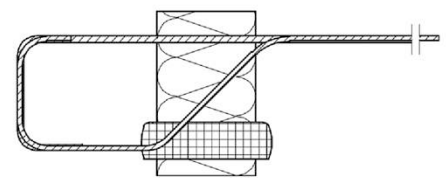
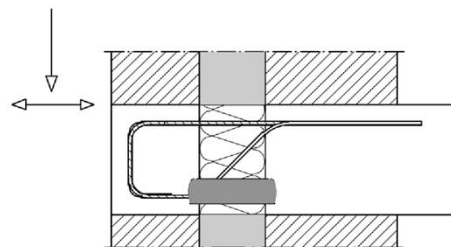


Type IP QQ
Type IP QQS



A.1.1.3 Types for transmission of shear and normal forces

Type IP O



Slab connection ISOPRO®

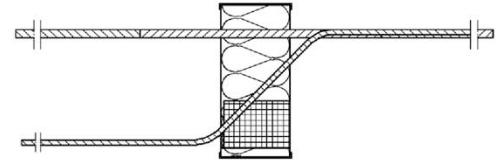
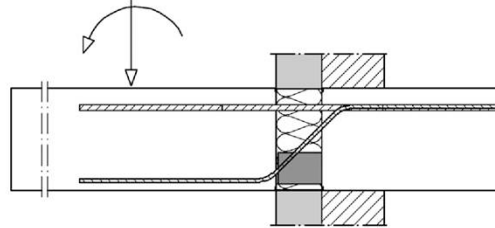
Product description: Type Overview

Annex
A 02

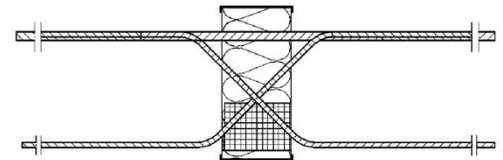
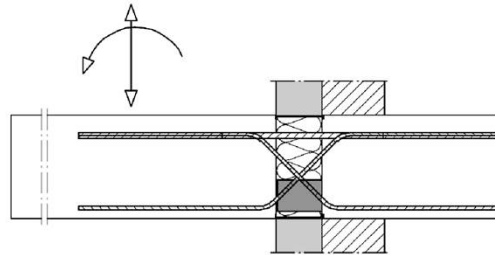
A.1.2 ISOPRO® with concrete compression bearings (CCB)

A.1.2.1 Types for transmission of moments and shear forces

Type IP M Q

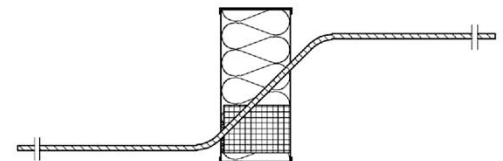
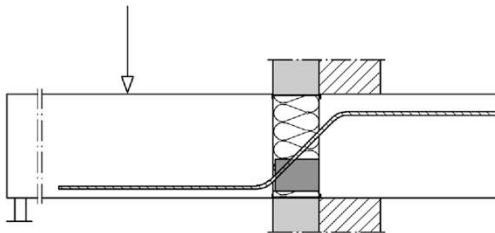


Type IP M QQ

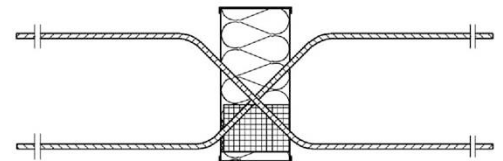
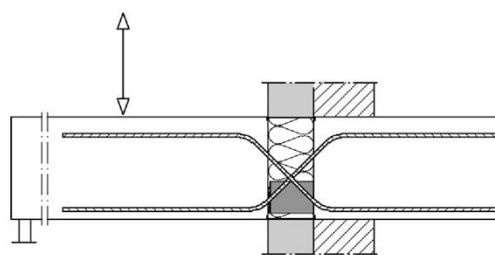


A.1.2.2 Types for transmission of shear forces

Type IP Q
Type IP QS

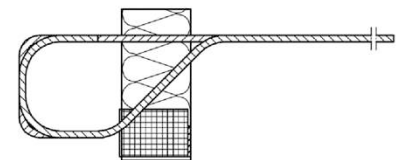
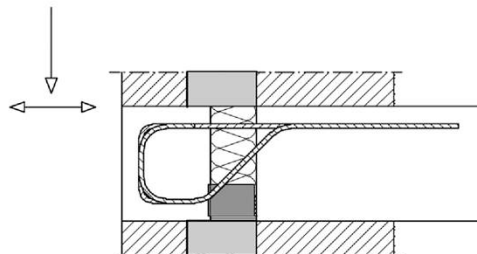


Type IP QQ
Type IP QQS



A.1.2.3 Types for transmission of shear and normal forces

Type IP O



Slab connection ISOPRO®

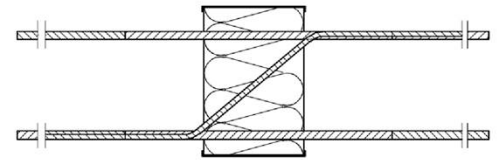
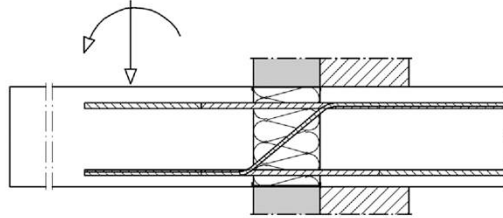
Product description: Type Overview

Annex
A 03

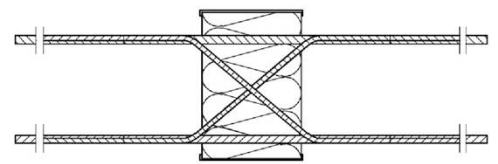
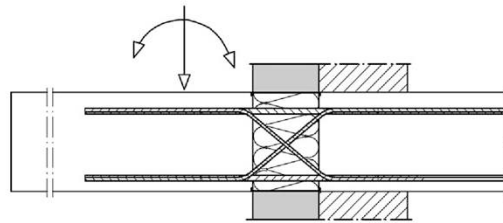
A.1.3 ISOPRO® with steel compression bearings (SCB)

A.1.3.1 Types for transmission of moments and shear forces

Type IP M Q
exemplary with
SCB variant 1

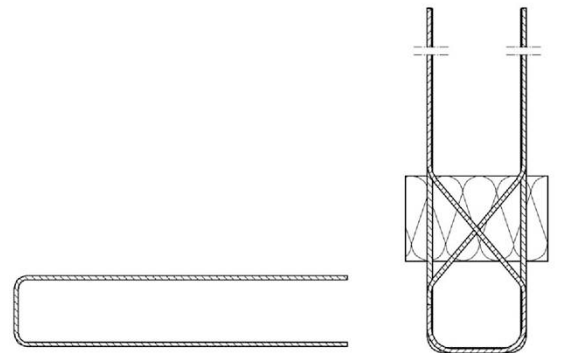
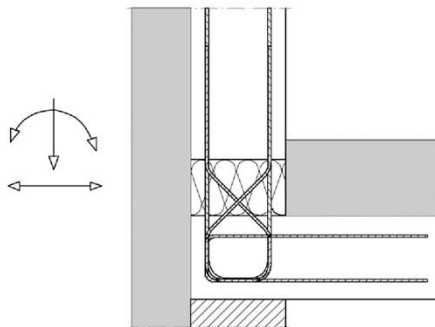


Type IP M QQ
Type IP D

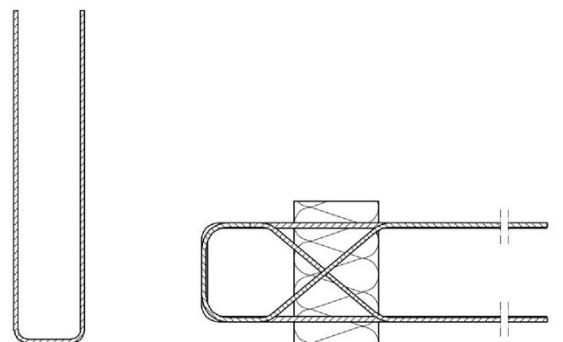
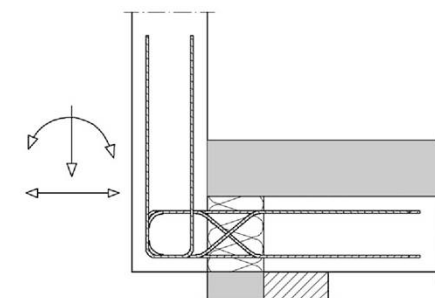


A.1.3.2 Types for transmission of moments, shear and normal forces

Type IP A



Type IP F



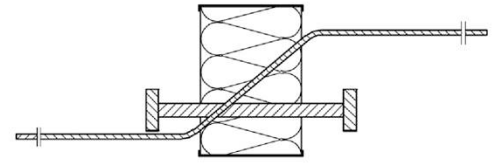
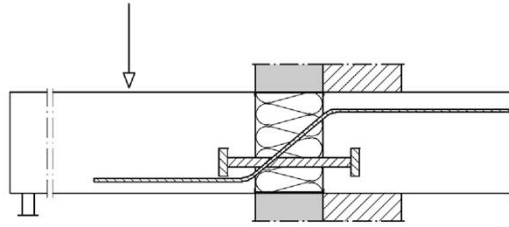
Slab connection ISOPRO®

Product description: Type Overview

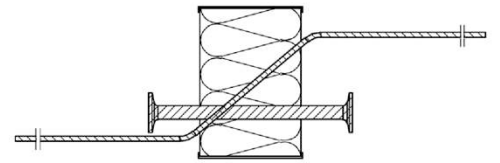
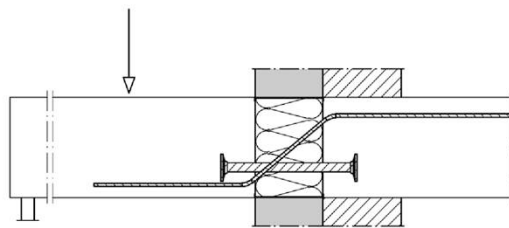
Annex
A 04

A.1.3.3 Types for transmission of shear forces

Type IP Q,
Type IP QS
exemplary with
SCB variant 4



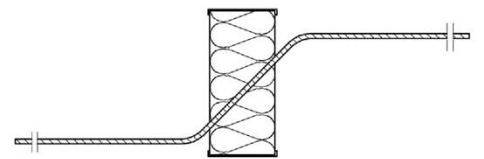
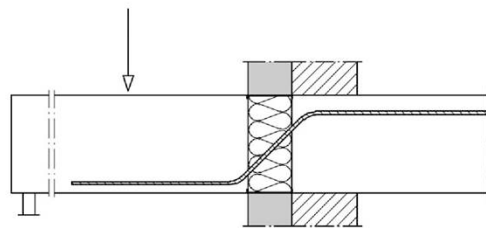
Type IP QQ,
Type IP QQS
exemplary with
SCB variant 5



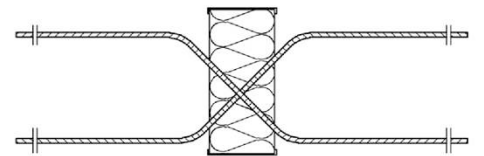
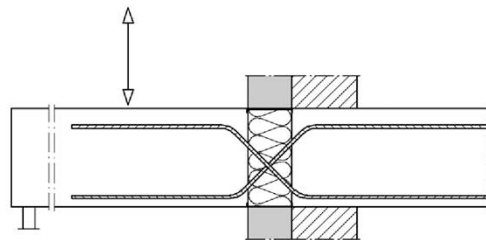
A.1.4 ISOPRO® without compression bearings

A.1.4.1 Types for transmission of shear forces for applications without constrains

Type IP QZ
Type IP QSZ



Type IP QQZ
Type IP QQSZ



Slab connection ISOPRO®

Product description: Type overview

Annex
A 05

A.2 Dimensions and positions of the bars and compression bearings in the area of the insulation joint

Tension bars (TB) – variant 1 to 4, type IP A and IP F acc. to section A.3.5:

Diameter:	$\varnothing \leq 20 \text{ mm}$ graduated nominal diameter acc. to table C.1
Quantity per meter:	$n \geq 4$
Axial distance:	$c_{1,CD} \leq 300 \text{ mm}$, average $\leq 250 \text{ mm}$ $c_{1,CD} \geq 50 \text{ mm}$
Axial edge distance:	$c_1 \leq c_{1,CD,max} / 2$ for CCB and SCB $c_1 \geq 50 \text{ mm}$ $c_1 \geq 56 \text{ mm}$ for HPCB

Tension bars (TB) – variant for type IP MU, IP MO acc. to section A.3.5:

Diameter:	$\varnothing \leq 12 \text{ mm}$ graduated nominal diameter acc. to table C.1
Quantity per meter:	type IP MO: $4 \leq n \leq 10$; type IP MU: $4 \leq n \leq 12$
Axial distance:	$c_{1,CD} \leq 300 \text{ mm}$, average $\leq 250 \text{ mm}$
Axial edge distance:	$c_1 \geq 56 \text{ mm}$ for HPCB

Shear force bars (SB) acc. to annex A.3.6:

Diameter:	$\varnothing \leq 14 \text{ mm}$
Inclination in the insulation joint:	$30^\circ \leq \varphi \leq 60^\circ$ $35^\circ \leq \varphi \leq 60^\circ$ for HPCB
Axial distance:	$c_{1,CD} \leq 300 \text{ mm}$, average $\leq 250 \text{ mm}$ $c_{1,CD} \geq \min(10 \cdot \varnothing; 100 \text{ mm})$ for HPCB $c_{1,CD} \geq 100 \text{ mm}$ for SCB
Axial edge distance:	$c_1 \leq c_{1,CD,max} / 2$ for CCB and SCB $c_1 \geq 50 \text{ mm}$ for CCB $c_1 \geq 100 \text{ mm}$ for HPCB $c_1 \geq 100 \text{ mm}$ for SCB
In the concrete free area:	Bars shall not have any bend
Mandrel diameter:	acc. to section A.3.6 and subject to the rules of EN 1992-1-1
Starting point of bend:	$\geq 2 \cdot \varnothing$ of free concrete surface, measured in bar direction

Slab connection ISOPRO®

Product description: Dimensions and positions of the bars and compression bearings in the area of the insulation joint

Annex
A 06

Shear force bars in high performance concrete compression shear bearings (HPCSB) acc. to section A.3.7:

Diameter:	$\varnothing = 6 \text{ mm}$
Inclination in the insulation joint:	$35^\circ \leq \varphi \leq 45^\circ$
Quantity per meter:	$n \geq 8$
Axial distance:	$c_{1,CD} \geq 36 \text{ mm}$
Axial edge distance:	$c_1 \geq 82 \text{ mm}$
In the concrete free area:	Bars shall not have any bend
Mandrel diameter:	acc. to section A.3.7 and subject to the rules of EN 1992-1-1
Starting point of bend:	$\geq 2 \cdot \varnothing$ of free concrete surface, measured in bar direction

High performance compression bearings (HPCB) acc. to section A.3.8.1 and high performance compression shear bearings (HPCSB) acc. to section A.3.7:

Quantity per meter:	$n \geq 4$, HPCSB may be counted
Axial distance:	$c_{1,CD} \leq 330 \text{ mm}$ $c_{1,CD} \geq 50 \text{ mm}$ for M-types $c_{1,CD} \geq 100 \text{ mm}$ for Q-types without transfer of moments
Axial edge distance:	$c_1 \geq 50 \text{ mm}$

Concrete compression bearings (CCB) acc. to section A.3.8.2:

Quantity per meter:	$n \geq 4$
Clear distance:	$\leq 250 \text{ mm}$
Axial edge distance:	$c_1 \leq c_{1,CD,max} / 2$ $c \geq 50 \text{ mm}$

Steel compression bearings (SCB variant 1 to 4) acc. to section A.3.8.3:

Diameter:	$\varnothing \leq 20 \text{ mm}$
Quantity per meter:	$n \geq 4$
Axial distance:	$\leq 300 \text{ mm}$, average $\leq 250 \text{ mm}$

Steel compression bearings (SCB variant 5) acc. to section A.3.8.3:

Diameter:	$\varnothing_D \leq 16 \text{ mm}$
Head diameter:	$\varnothing_H \geq 3 \cdot \varnothing_D$
Quantity per meter:	$n \geq 4$
Axial distance:	$\leq 300 \text{ mm}$, average $\leq 250 \text{ mm}$

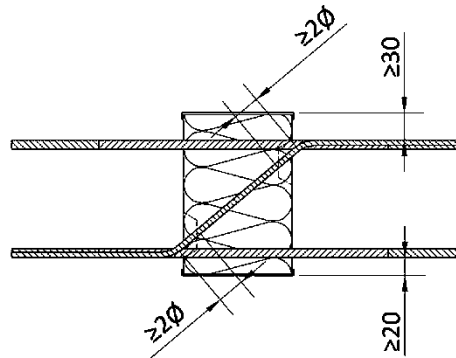
Slab connection ISOPRO®

Product description: Dimensions and positions of the bars and compression bearings in the area of the insulation joint

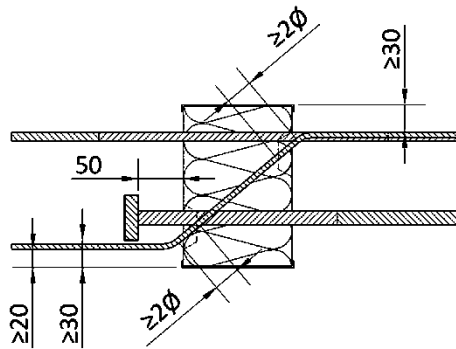
Annex
A 07

A.2.1 Position of bars

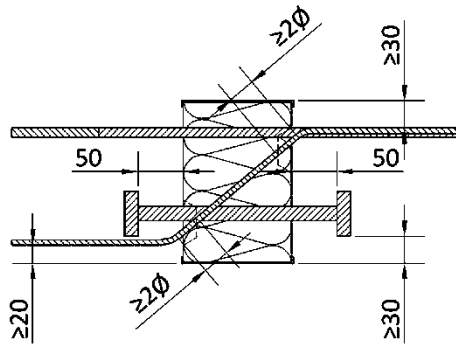
For SCB variant 1-2
acc. to section A.3.8.3,
exemplary type IP M Q



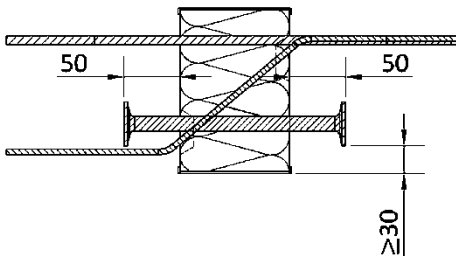
For SCB variant 3
acc. to section A.3.8.3,
exemplary type IP M Q



For SCB variant 4
acc. to section A.3.8.3,
exemplary type IP M Q



For SCB variant 5
acc. to section A.3.8.3,
exemplary type IP M Q

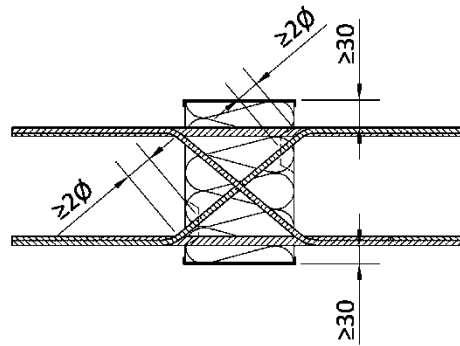


Slab connection ISOPRO®

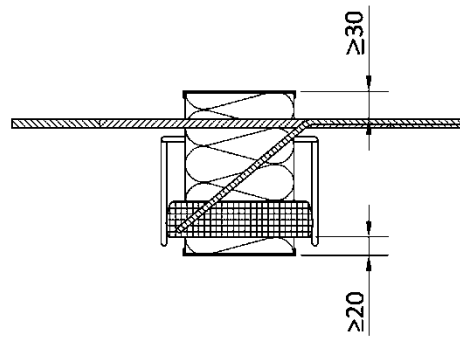
Product description: Dimensions and positions of the bars and compression bearings in the area of the insulation joint

Annex
A 08

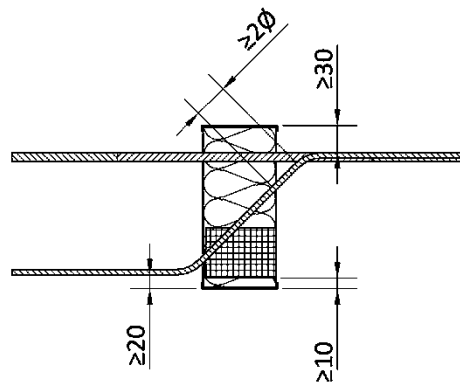
For SCB variant 1-2
acc. to section A.3.8.3,
exemplary type IP M Q



For HPCB and HPCSB
acc. to section A.3.8.1 and
A.3.7,
exemplary type IP M Q



For CCB
acc. to section A.3.8.2,
exemplary type IP M Q



Slab connection ISOPRO®

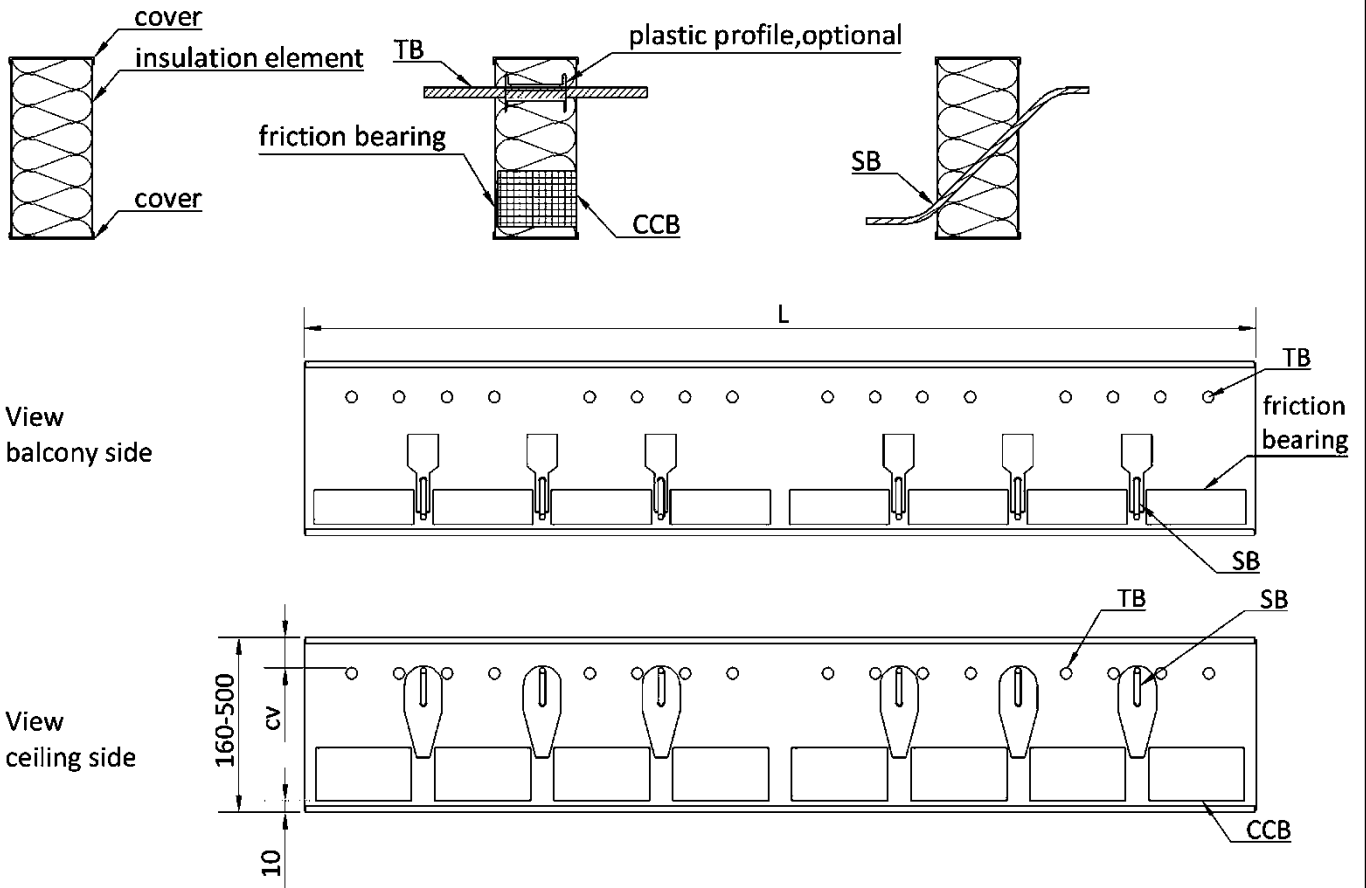
Product description: Dimensions and positions of the bars and compression bearings in the area of the insulation joint

Annex
A 09

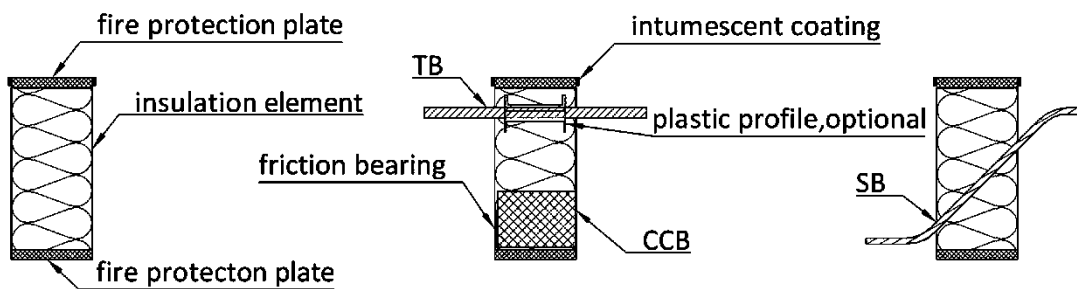
A.3 Design of the elements ISOPRO®

A.3.1 ISOPRO® with concrete compression bearings (CCB)

A.3.1.1 Without fire protection



A.3.1.2 With fire protection

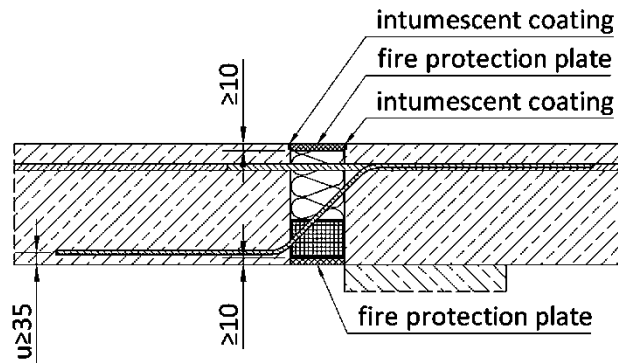


Slab connection ISOPRO®

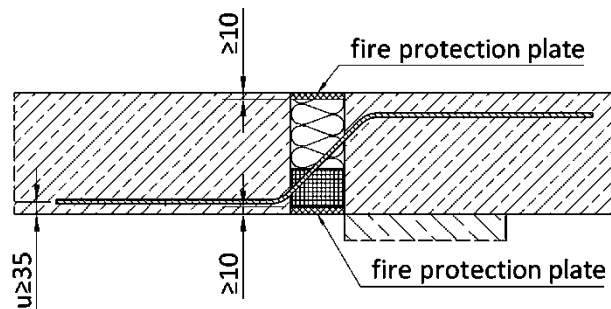
Product description: Design of the elements ISOPRO®

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Type IP M Q

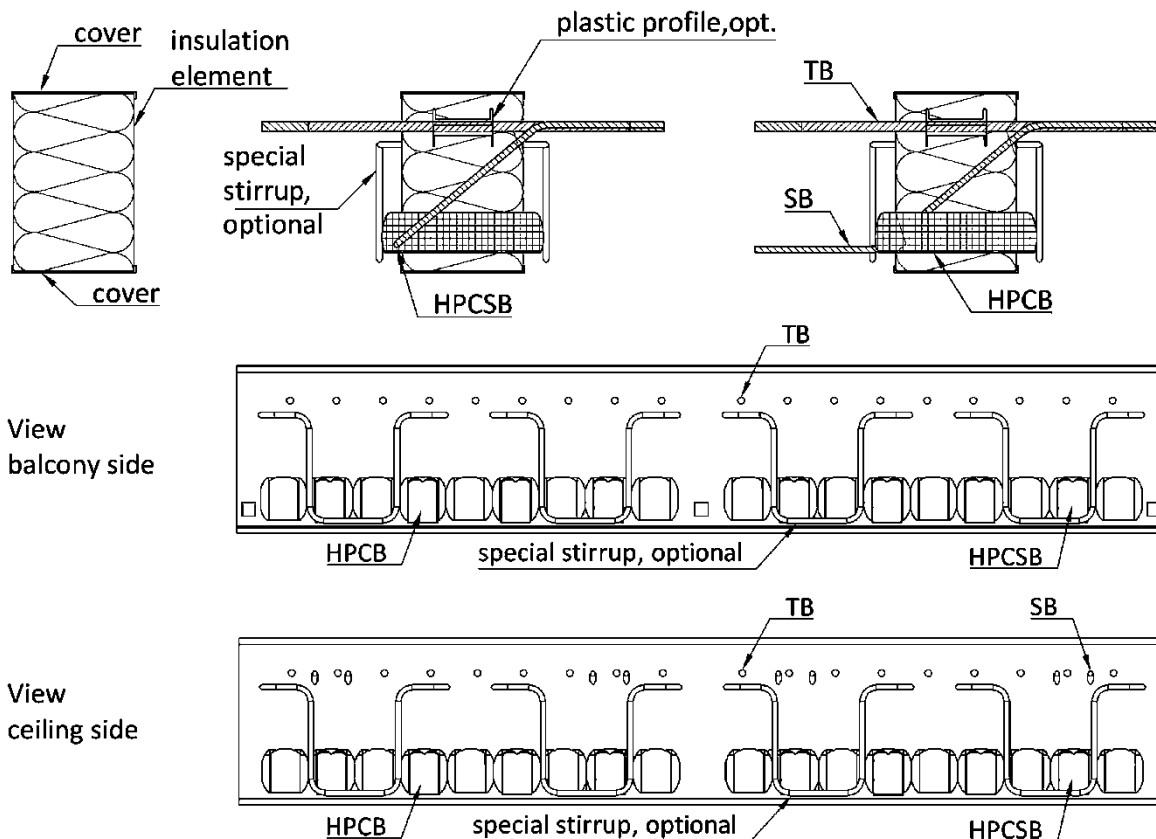


Type IP Q



A.3.2 ISOPRO® with high performance concrete compression bearings (HPCB and HPCSB)

A.3.2.1 Without fire protection

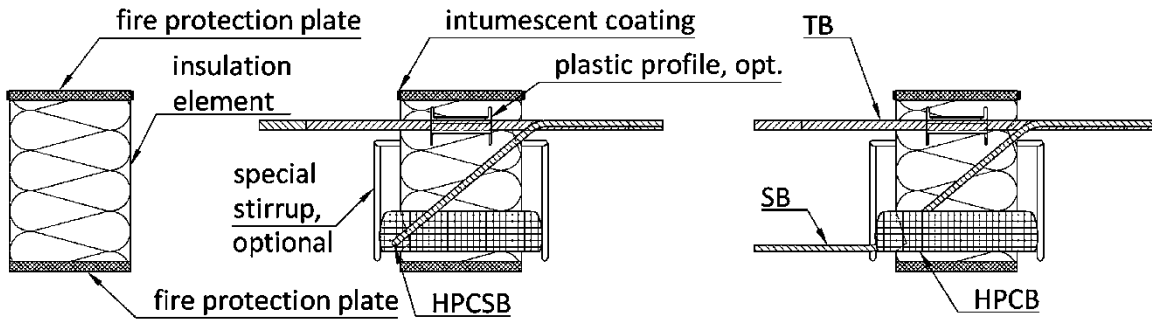


Slab connection ISOPRO®

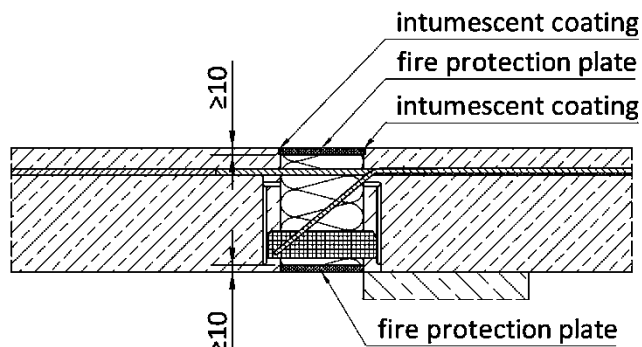
Product description: Design of the elements ISOPRO®

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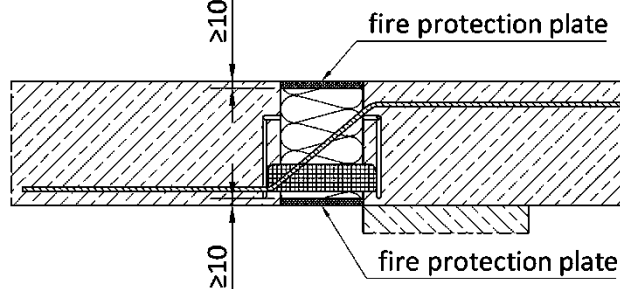
A.3.2.2 With fire protection



Type IP M Q

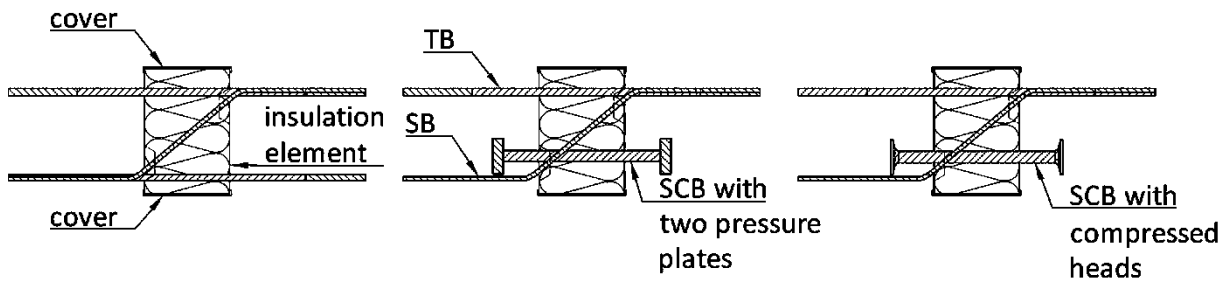


Type IP Q



A.3.3 ISOPRO® with steel compression bearings (SCB)

A.3.3.1 Without fire protection

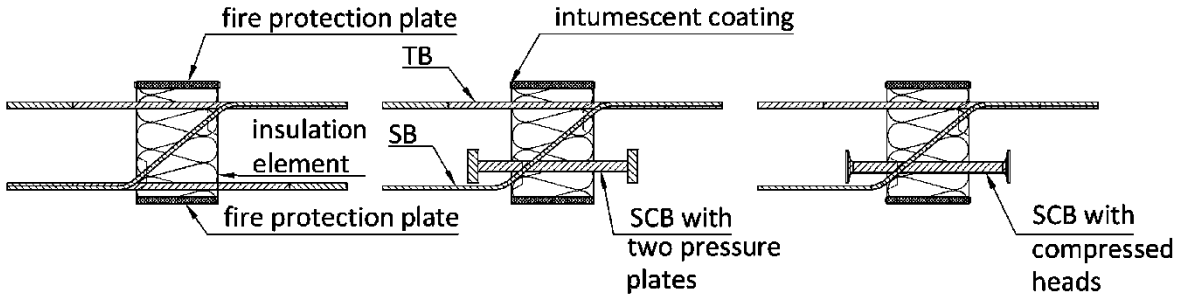


Slab connection ISOPRO®

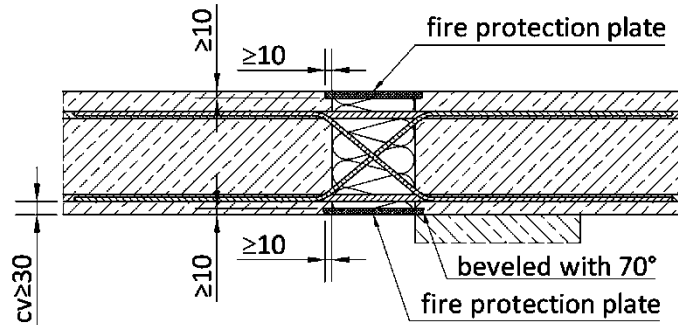
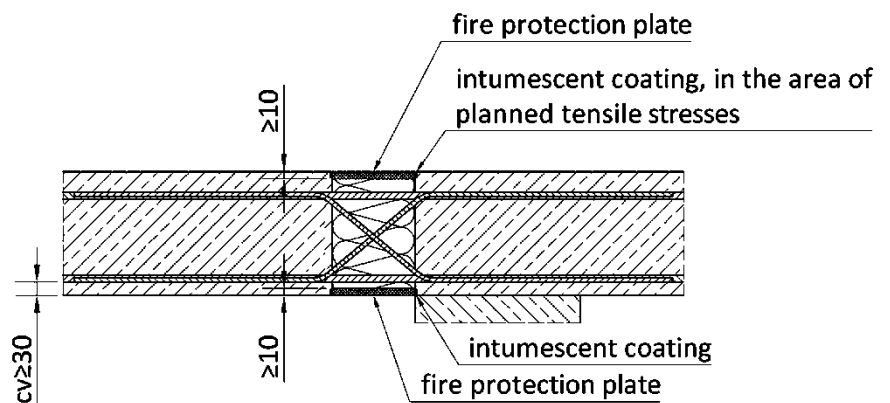
Product description: Design of the elements ISOPRO®

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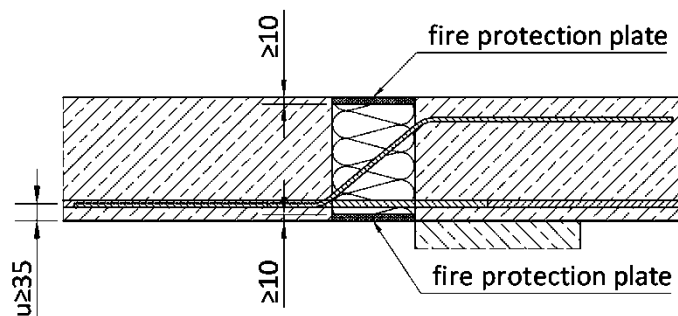
A.3.3.2 With fire protection



Type IP M QQ
Type IP D



Type IP Q



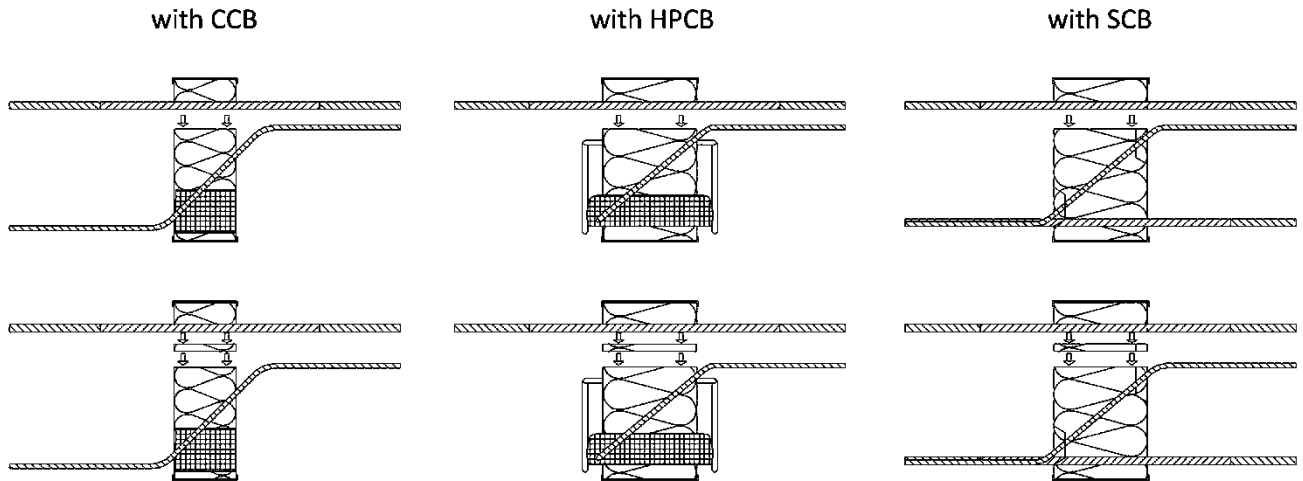
Slab connection ISOPRO®

Product description: Design of the elements ISOPRO®

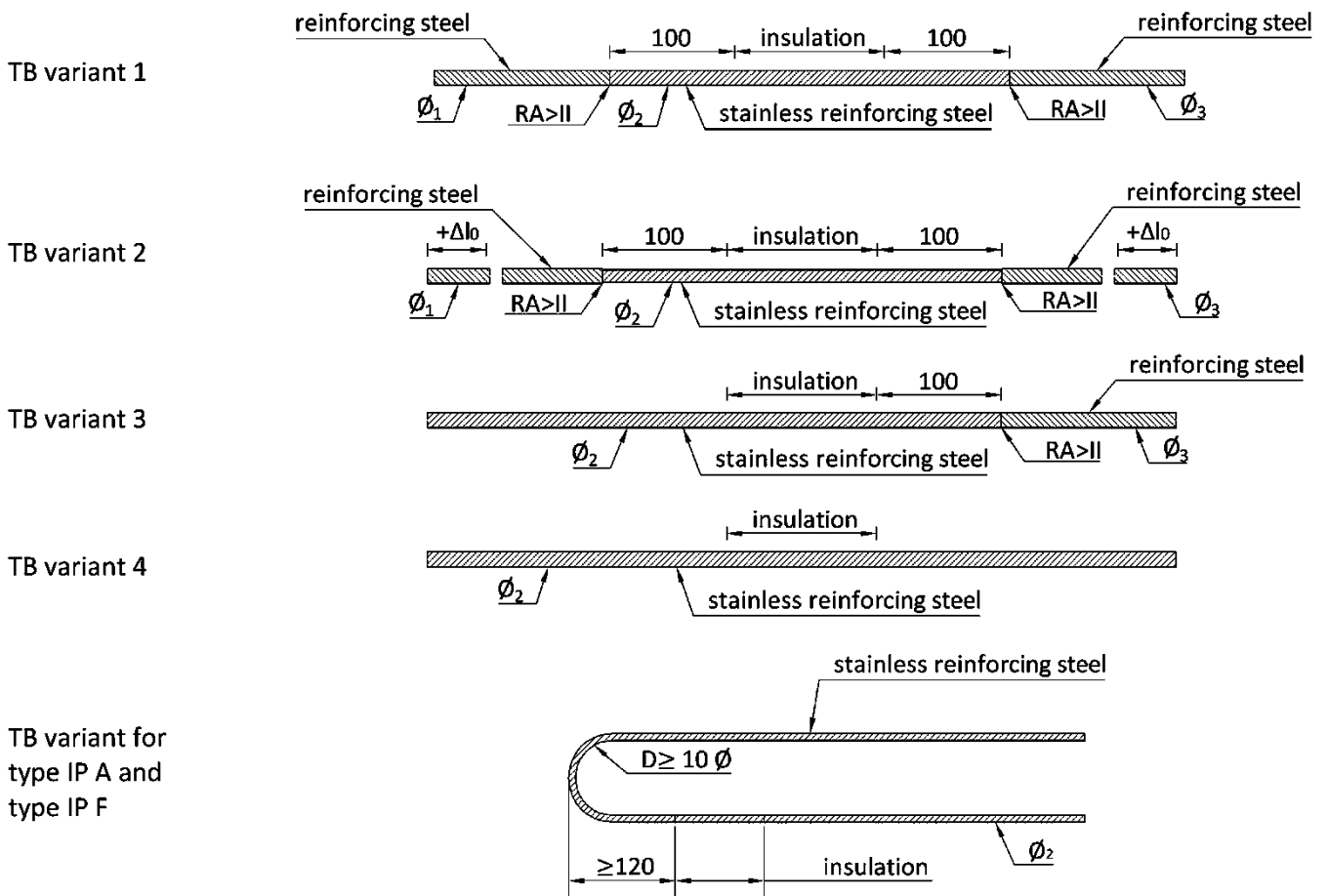
**Annex
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A.3.4 ISOPRO® in two- or multi-part design

exemplary for type IP M Q



A.3.5 Tension bars (TB)

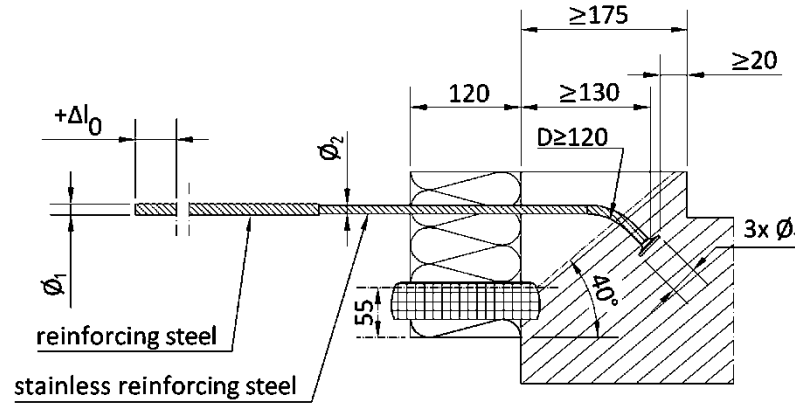


Slab connection ISOPRO®

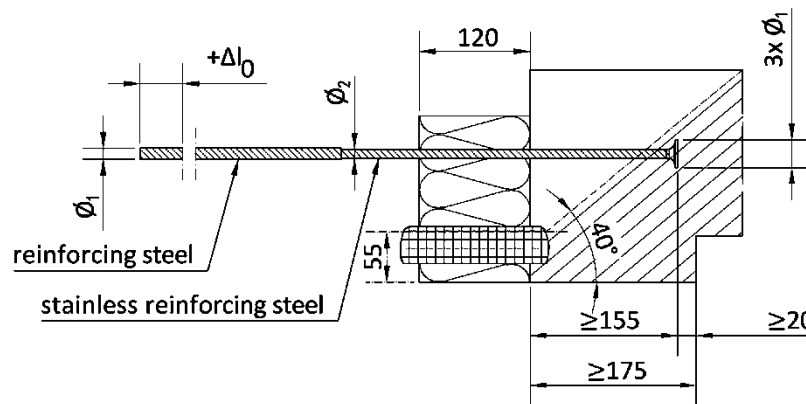
Product description: Design of the elements ISOPRO®

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TB variant for
type IP MO

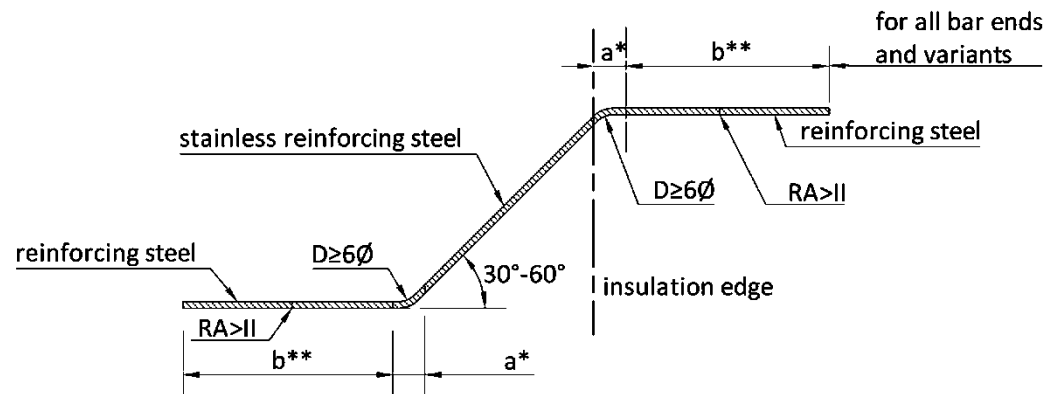


TB variant for
type IP MU

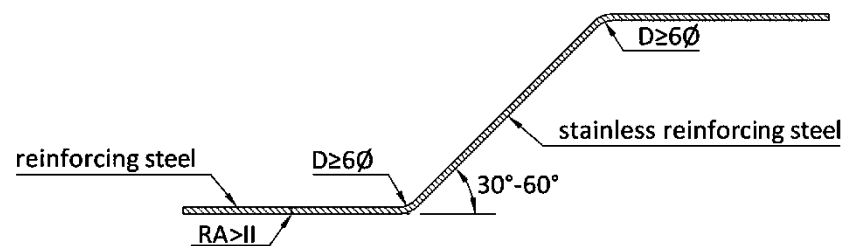


A.3.6 Shear force bars (SB)

SB variant 1



SB variant 2

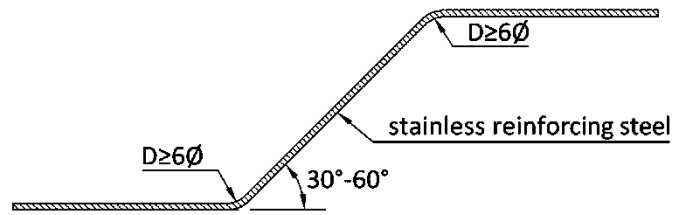


Slab connection ISOPRO®

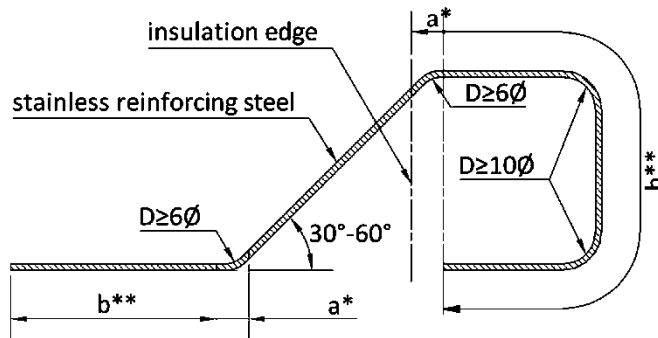
Product description: Design of the elements ISOPRO®

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SB variant 3



SB variant 1-3
for Ø6 and Ø8
ceiling side bended

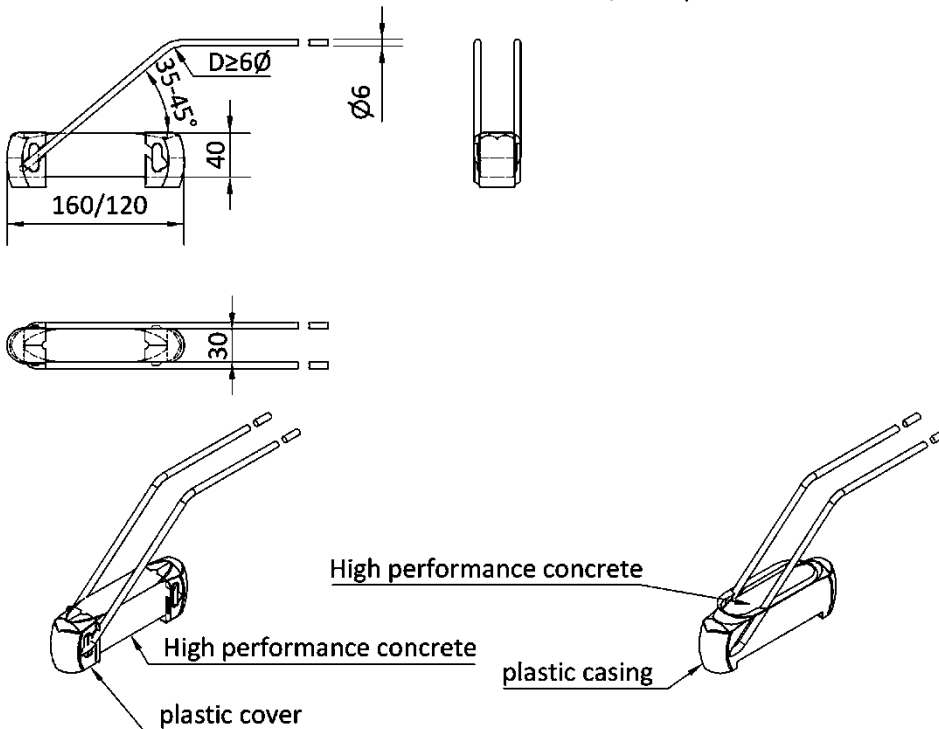


*) $a \geq 0$ for bars to be anchored, otherwise $a \geq 30$

***) $b \geq 1,3 \cdot l_{bd}$; $b \geq 1,0 \cdot l_{bd}$ in compression zone

A.3.7 High performance concrete compression shear bearing (HPCSB)

HPCSB for insulation thickness 80 mm and 120 mm, with plastic cover or casting

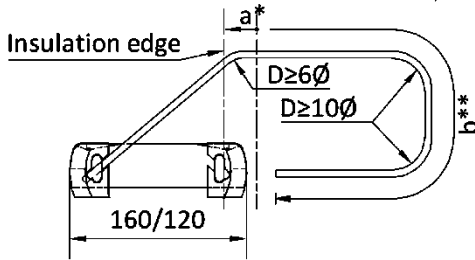


Slab connection ISOPRO®

Product description: Design of the elements ISOPRO®

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Variant with bended shear force bars, with plastic cover or casting



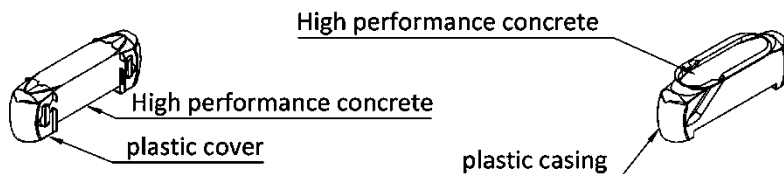
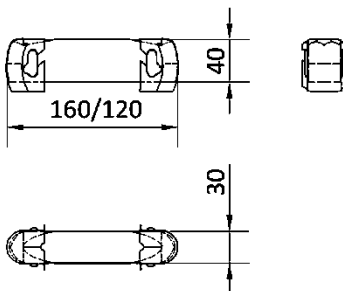
*) $a \geq 0$ for bars to be anchored, otherwise $a \geq 30$

***) $b \geq 1,3 \cdot l_{bd}$; $b \geq 1,0 \cdot l_{bd}$ in compression zone

A.3.8 Compression bearings

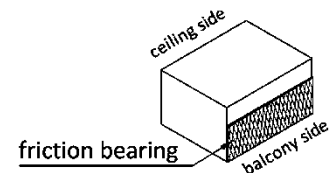
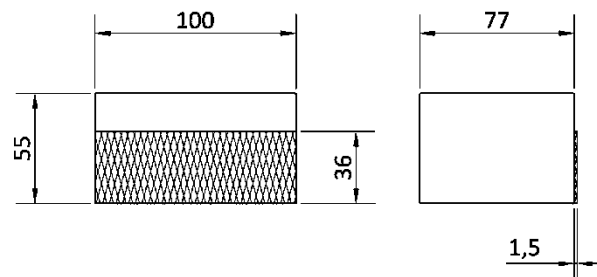
A.3.8.1 High performance concrete compression bearings (HPCB)

HPCB for insulation thickness 80 mm and 120 mm, with plastic cover or casting



A.3.8.2 Concrete compression bearing (CCB)

CCB variant 1 for
insulation thickness
80 mm

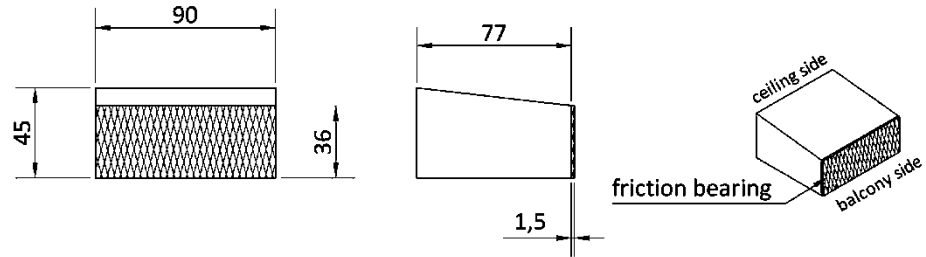


Slab connection ISOPRO®

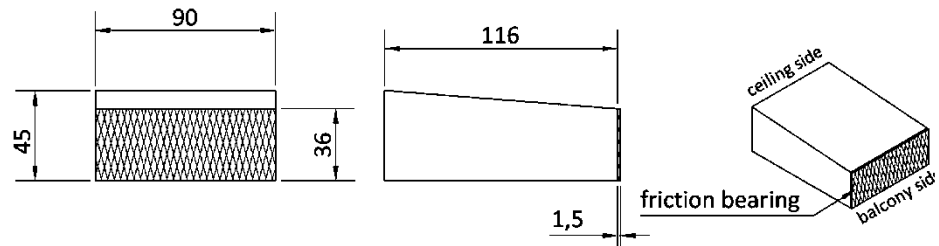
Product description: Design of the elements ISOPRO®

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CCB variant 2 for
insulation thickness
80 mm

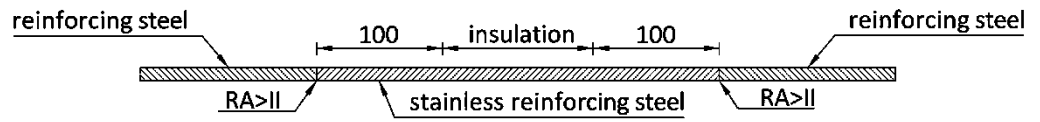


CCB variant for
insulation thickness
120 mm

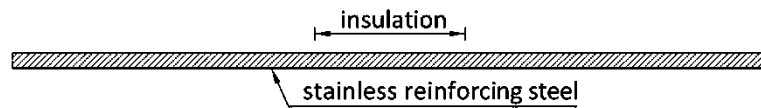


A.3.8.3 Steel compression bearing (SCB)

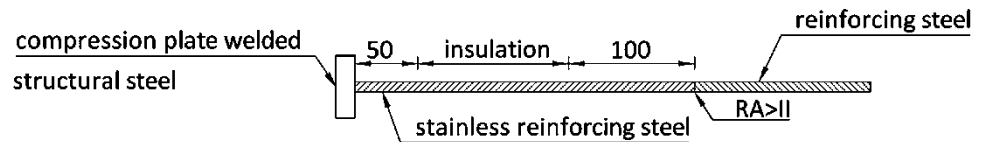
SCB variant 1



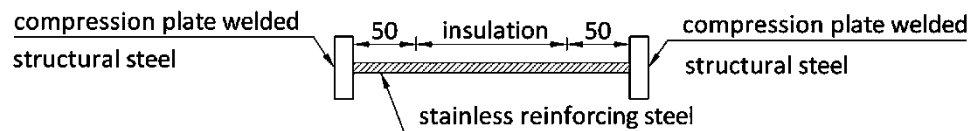
SCB variant 2



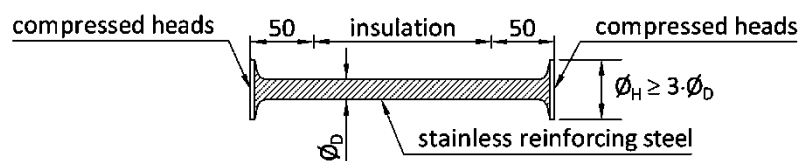
SCB variant 3



SCB variant 4



SCB variant 5



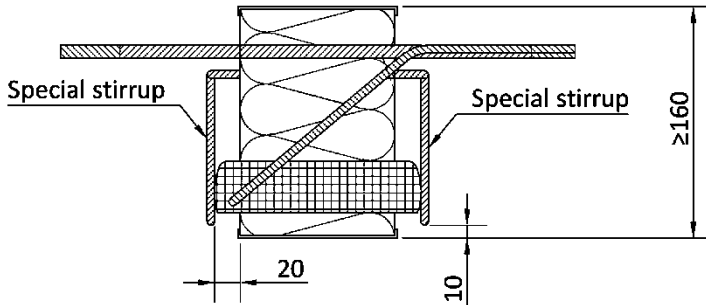
Slab connection ISOPRO®

Product description: Design of the elements ISOPRO®

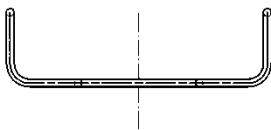
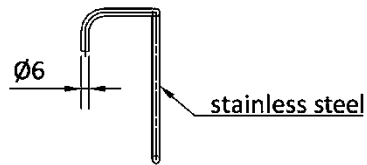
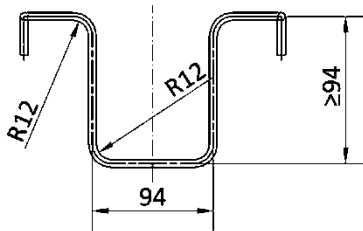
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A.3.9 Special stirrups

optional, only for ISOPRO[®] with HPCB and HPCSB



Special stirrup



Slab connection ISOPRO[®]

Product description: Design of the elements ISOPRO[®]

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A.4 Materials

Reinforcing steel:	B500 B, class A1 acc. to EN 13501-1
Stainless reinforcing steel:	corrosion resistance class III acc. to EN 1993-1-4, class A1 acc. to EN 13501-1
Stainless steel round bars:	min. strength class S460 and max. strength class S690, corrosion resistance class III acc. to EN 1993-1-4, class A1 acc. to EN 13501-1
Structural steel:	S235JR, S235J0, S355J2, S355JR or S355J0 acc. to EN 10025-2 for compression plates, class A1 acc. to EN 13501-1
CCB:	High performance concrete, class A1 acc. to EN 13501-1
Friction bearing:	Material acc. to datasheet, class E-d ₂ acc. to EN 13501-1
HPCB / HPCSB:	High performance concrete acc. to datasheet, class A1 acc. to EN 13501-1
Plastic cover/casing:	PP plastic acc. to datasheet, class E acc. to EN 13501-1
Plastic profiles:	PVC-, PP- or PS- plastic acc. to datasheet, class E acc. to EN 13501-1
Insulation material:	Polystyrene-rigid foam (EPS) acc. to EN 13163, class E acc. to EN 13501-1
Fire protection plate:	Moisture repellent, weather-resistant, UV resistant, class A1 acc. to EN 13501-1
Intumescent coating:	Halogen-free, three-dimensional foaming building material based on graphite, foaming factor min. 14, min. class B-s1-d0 acc. to EN 13501-1

Slab connection ISOPRO®

Product description: Materials

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B Specifications of intended use

B.1 Actions

- Static or quasi-static actions.
- In structures with fire resistance requirements (fire exposure).

B.2 Concrete member

- Minimum concrete strength class of the reinforced components to be connected made of normal-strength concrete acc. to EN 206; C20/25, for exterior components C25/30.

B.3 Dimensions

- For the connections of slabs with thicknesses of 160 mm to 500 mm.
- Thickness of insulation joint 60 mm to 120 mm (depending on the compression bearing, see table B.1).

B.4 Design

- Design acc. to EN 1992-1-1, EN 1993-1-1 (in the insulation joint) and Annex C.
- Expansion joints should be used to divide the connected slabs (arranged acc. to section B.5.1).
- Transmission of the forces from the tension and compression members to the connected structural components acc. to Annex C.
- When steel compression bearings with welded on compression plates (SCB variant 3 and 4) or with compressed heads (SCB variant 5) are used, the introduction of compressive stresses into the concrete shall be considered as partial area loading.
- Deviations from the state of expansion of an identical slab without insulation joint are limited to the joint area and the adjoining edges by compliance with this European Technical Assessment.
- At a distance h from the edge of the joint, the undisturbed state of expansion may be assumed.
- Variable moments and shear forces along the connected edge shall be taken into account.
- Stresses of the slab connections due to local torsional moments shall be avoided.
- Constrained normal forces in the direction of the bars of the slab connection shall be avoided (example see section B.5.2).
- The ratio of height to width of connected components shall be $\leq 1/3$.
- Connecting elements may also be pre-fabricated in two parts, a top part and a bottom part, to facilitate the installation in precast slabs.
- Connecting elements may also be used in short pieces, if the conditions acc. to section A.2 are met.
- Connecting elements of type IP QS may also be used in short pieces (with at least two shear force bars and one concrete compression bearing per element). The shear force bars shall be arranged symmetrically in relation to the compression bearing. These elements can also be installed for the multi-sided support of slabs, provided that it is ensured that the individual short pieces are uniformly loaded and that the slab is supported without constraint in the plan view.
- Connecting elements of type IP QSZ may also be installed in short pieces (with at least two shear force bars per element) and may be installed as freely movable perpendicular to the insulation joint. The tensile force resulting from these types shall be connected frictionally in the supporting structure on both sides of the insulation joint.
- When using graduated tension bars (TB variant 2 and TB variant for type IP MU/MO, see section A.3.5) the additional overlap length Δl_0 acc. to table C.1 shall be taken into account.
- In the area of the slab connections grading of the tensile reinforcement is not permitted.
- The design of a bent shear force bar acc. to section A.3.6 and A.3.7 is possible, if an edge beam is designed with the construction details given in section B.5.4.

Slab connection ISOPRO®

Specifications of intended use: Actions, Concrete member, Dimensions and Design

**Annex
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- For the determination of $z = z_{\text{strut-and-tie}}$ (see section C.2.1), the resulting force in the compression unit has to be assumed in the middle of the friction bearing.
- Shear force bars obtain tension forces only.

B.5 Installation requirements

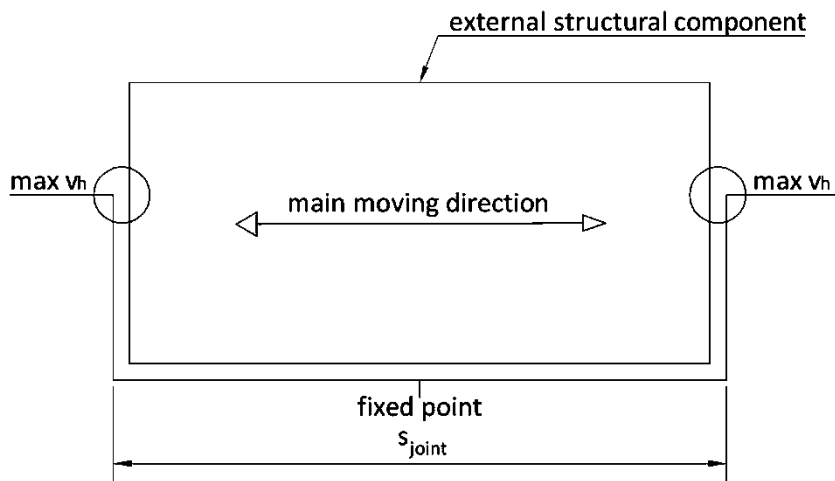
B.5.1 Axial and joint distances

- Axial and edge distances acc. to section A.2.
- External structural components: expansion joints shall be arranged at right angles to the insulation joint.
- Joint distances: see table B.1.

Table B.1: permissible joint distances s_{joint} in [m]

Compression bearing	Thickness of the insulation joint [mm]	Bar diameter in the joint [mm]						
		6,5	8	10	12	14	16	20
CCB	80	13,0	13,0	13,0	11,3	10,1	-	-
	120	21,7	21,7	21,7	19,8	17,0	-	-
SCB	60	7,8	7,8	7,8	6,9	6,3	5,6	5,1
	80	13,0	13,0	13,0	11,3	10,1	9,2	8,0
	120	21,7	21,7	21,7	19,8	17,0	15,5	13,5
HPCB / HPCSB	80	13,0	13,0	13,0	11,3	10,1	-	-
	120	24,0	21,7	21,7	19,8	17,0	-	-

- Installation situation with support on opposite edges:

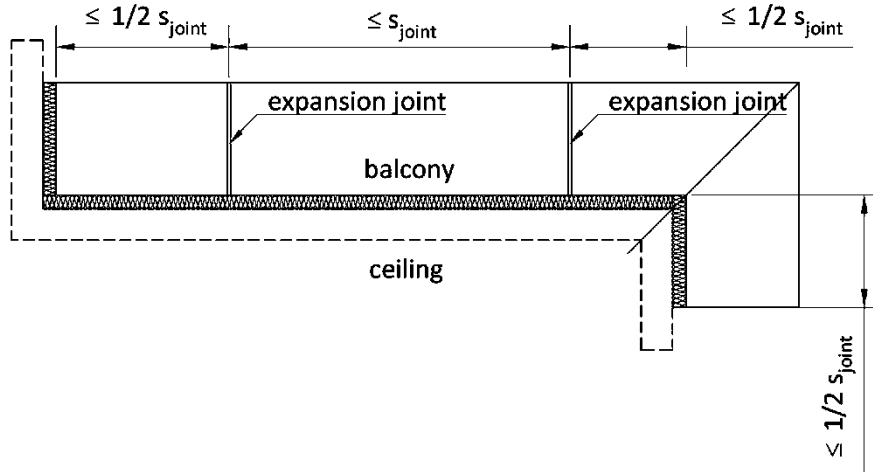


Slab connection ISOPRO®

Specifications of intended use: Design and Installation requirements

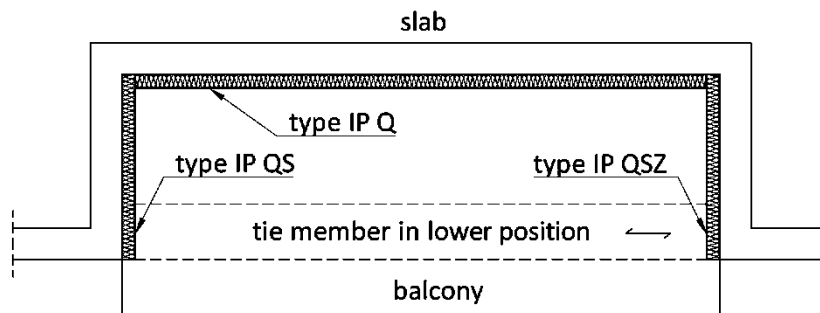
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- Installation situation with expansion joints:



B.5.2 Installation situation: exclusion of constrained normal forces in the compression bearings of slab connection

- Constraint-free application: Example ISOPRO® type QZ or type QSZ with opposing slab connection ISOPRO® type Q or type QS:



B.5.3 Structural design

- Minimum concrete cover acc. to EN 1992-1-1 for tension bars, transverse reinforcement and supplementary reinforcement shall be observed.
- Reinforcement of adjoining concrete components shall be brought up to the insulation layer considering the requirements for concrete covers acc. to EN 1992-1-1.
- Transverse bars of the upper connection reinforcement shall normally lie on the outside of the longitudinal bars of the slab connections. Deviations are possible for diameters smaller than 16 mm, if the following conditions are met:
 - Installation of the transverse bars directly under the longitudinal bar is possible.
 - Installation is checked, e.g., by a construction supervisor.
 - Installation steps shall be described in the installation instructions (example: see section B.5.3.1).
- Front surface of the connected components shall be provided with structural edge reinforcement acc. to EN 1992-1-1, section 9.3.1.4, e.g., with stirrups of $\varnothing \geq 6$ mm, $s \leq 250$ mm and 2 longitudinal bars $\varnothing \geq 8$ mm.
- Lattice girders with a maximum distance of 100 mm from the insulation joint acc. to section B.5.4 may be taken into account.
- Subsequent bending of the bars of the slab connection is not permitted.

Slab connection ISOPRO®

Specifications of intended use: Installation requirements

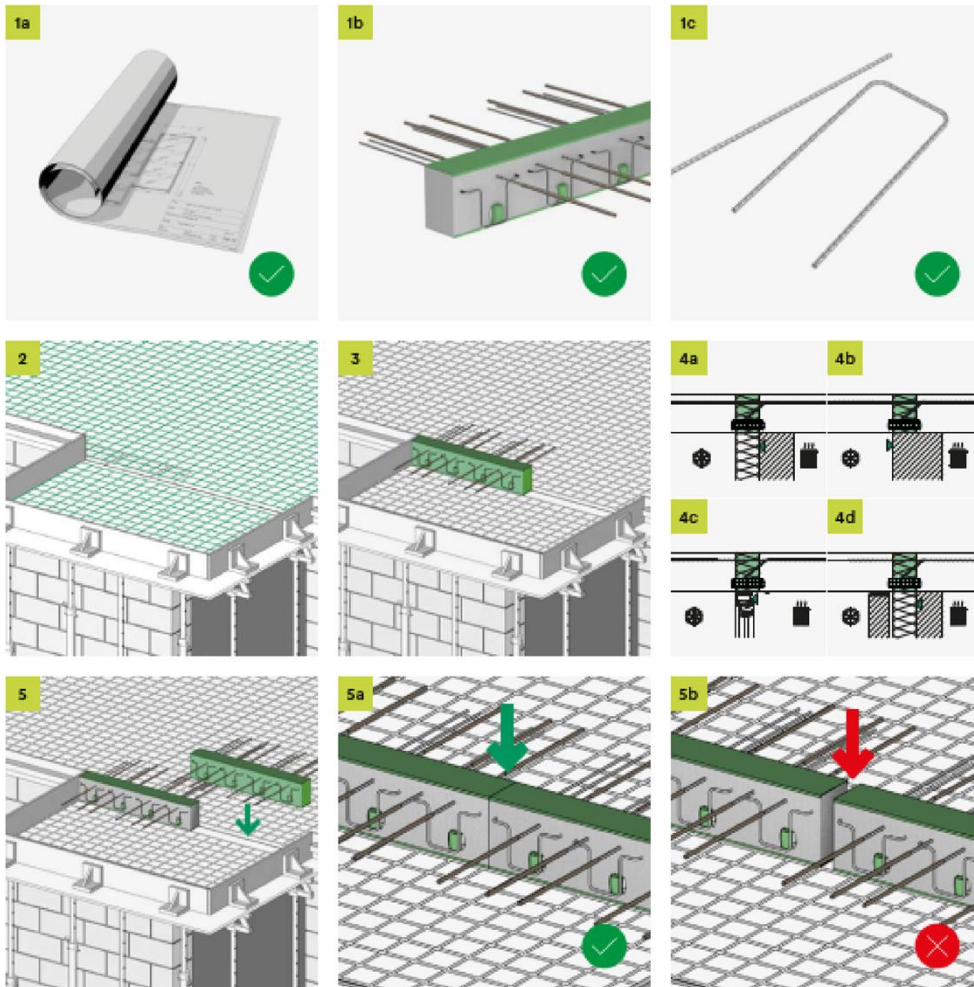
Annex
B 03

B.5.3.1 Installation instructions ISPPRO® IP 120 M



ISOPRO® 120 M

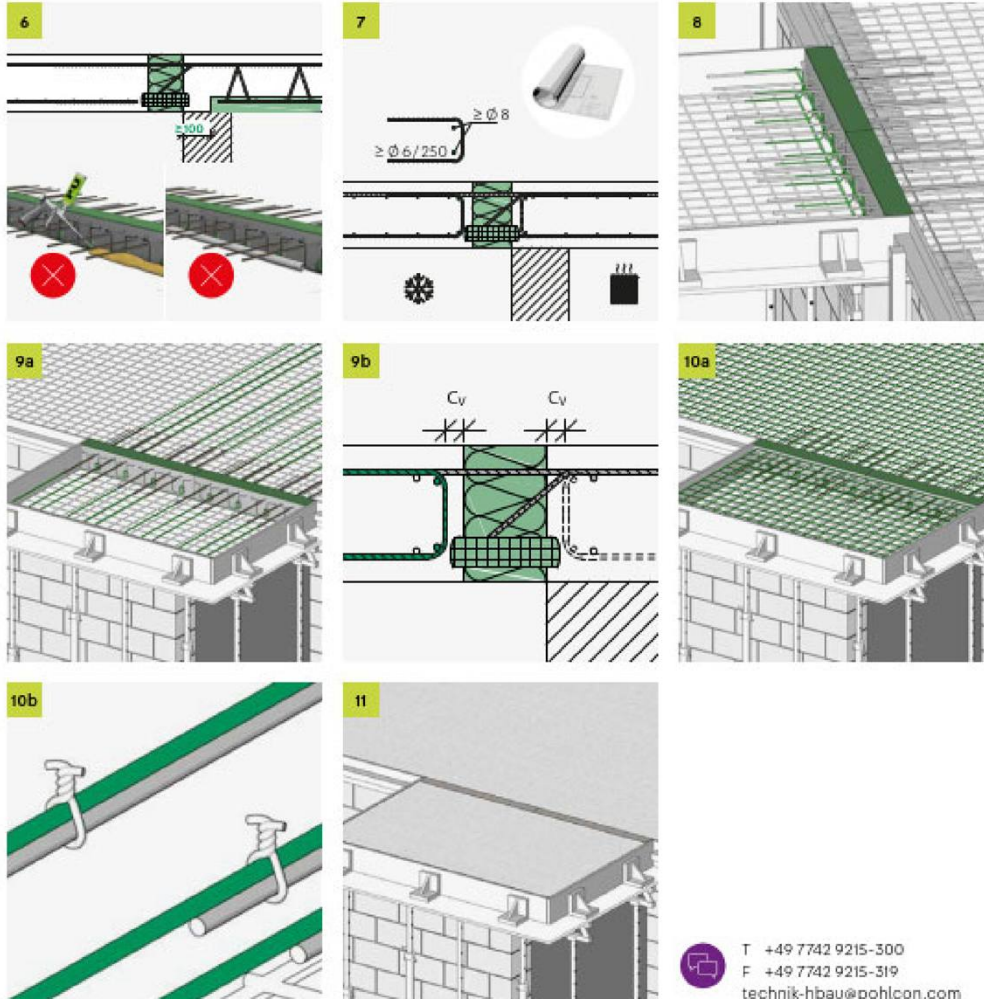
Einbauanleitung/Installation Instructions



Slab connection ISOPRO®

Specifications of intended use: Installation requirements

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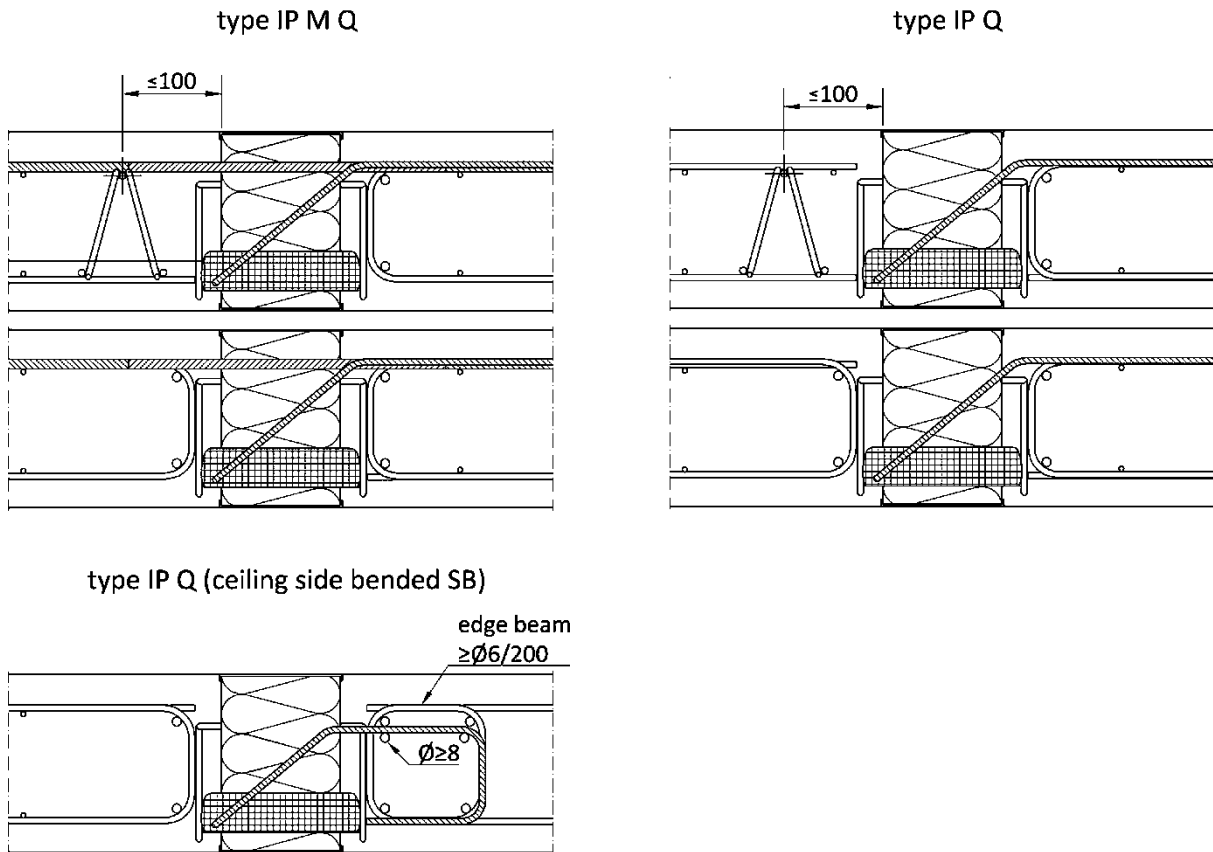
Slab connection ISOPRO®

Specifications of intended use: Installation requirements

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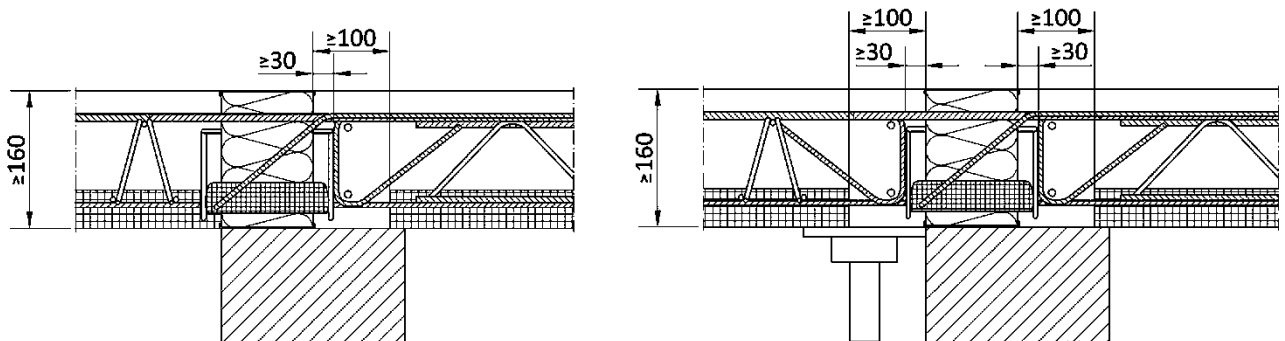
B.5.4 Edge reinforcement with and without lattice girder

exemplary for HPCB and HPCSB (with CCB and SCB identical)



If the adjacent ceiling slabs connecting to slab connectors are designed as precast slabs, the following conditions apply:

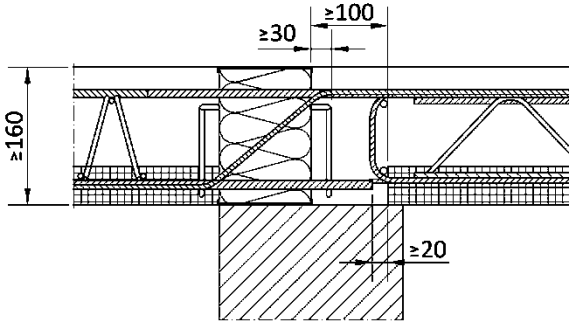
- The concrete mixture of the in-situ concrete joint (maximum aggregate size d_g) shall be adjusted to this distance.
- When using precast slabs and in-situ concrete a grouting strip at least 100 mm wide shall be installed as shown in the following figure:



Slab connection ISOPRO®

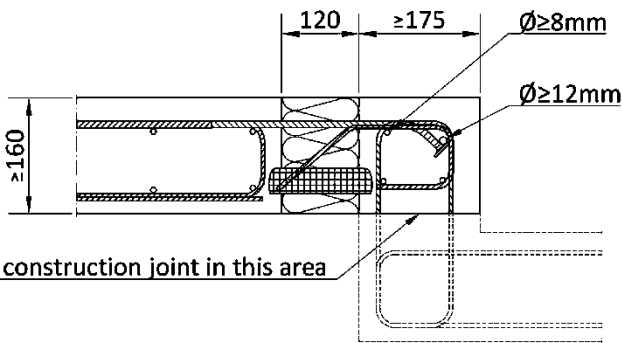
Specifications of intended use: Installation requirements

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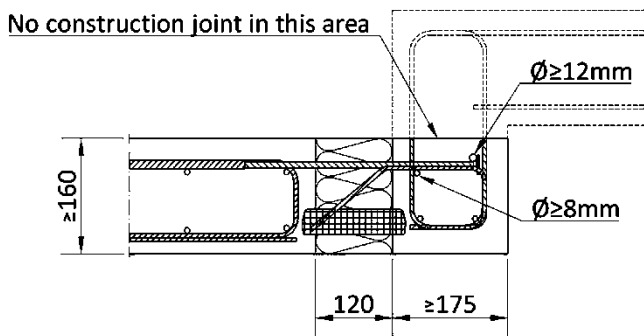


B.5.5 Additional reinforcement for height offset

Construction type IP MO



Construction type IP MU



Slab connection ISOPRO®

Specifications of intended use: Installation requirements

Annex
B 07

C Performance

C.1 Essential characteristics under static and quasi-static loading

Table C.1: Essential characteristics

Tension bar (TB) - variant 1, 3, 4, Type IP A, IP F (without graduated diameter)										
Diameter reinforcing steel	$\varnothing_{1,3}$	[mm]	6	8	10	12	14	16	20	
Diameter stainless reinforcing steel	\varnothing_2	[mm]	6	8	10	12	14	16	20	
Characteristic yield strength	$f_{yk,\varnothing_{1,3}}$	[N/mm ²]	500							
Characteristic yield strength	f_{yk,\varnothing_2}	[N/mm ²]	500							
Partial factor ¹⁾	$\gamma_{s,\varnothing_{1,2,3}}$	[-]	1,15							
E-Modul reinforcing steel	$E_{s,\varnothing_{1,3}}$	[N/mm ²]	200.000							
E-Modul stainless reinforcing steel	E_{s,\varnothing_2}	[N/mm ²]	160.000							
Tension bar (TB) - variant 2 (with graduated diameter)										
Diameter reinforcing steel	$\varnothing_{1,3}$	[mm]	8	8	10	12	14			
Diameter stainless reinforcing steel	\varnothing_2	[mm]	6,5	7	8	10	12			
Characteristic yield strength	$f_{yk,\varnothing_{1,3}}$	[N/mm ²]	500							
Partial factor ¹⁾	$\gamma_{s,\varnothing_{1,3}}$	[-]	1,15							
Characteristic yield strength	f_{yk,\varnothing_2}	[N/mm ²]	800	700	825	760	760			
Partial factor ¹⁾	γ_{s,\varnothing_2}	[-]	1,21	1,15	1,21	1,21	1,21	1,21		
E-Modul reinforcing steel	$E_{s,\varnothing_{1,3}}$	[N/mm ²]	200.000							
E-Modul stainless reinforcing steel	E_{s,\varnothing_2}	[N/mm ²]	160.000							
Additional overlapping length	Δl_0	[mm]	18	12	20	16	14			
Tension bar (TB) - variant for type IP MU, IP MO (with graduated diameter)										
Diameter reinforcing steel	\varnothing_1	[mm]	12							
Diameter stainless reinforcing steel	\varnothing_2	[mm]	10							
Characteristic yield strength	f_{yk,\varnothing_1}	[N/mm ²]	500							
Partial factor ¹⁾	γ_{s,\varnothing_1}	[-]	1,15							
Characteristic yield strength	f_{yk,\varnothing_2}	[N/mm ²]	820							
Partial factor ¹⁾	γ_{s,\varnothing_2}	[-]	1,21							
E-Modul reinforcing steel	E_{s,\varnothing_1}	[N/mm ²]	200.000							
E-Modul stainless reinforcing steel	E_{s,\varnothing_2}	[N/mm ²]	160.000							
Shear force bar (SB)										
Diameter	\varnothing	[mm]	6	6	8	8	10	10	12	12
Inclination in insulation joint	φ	[°]	40	45	40	45	40	45	40	45
Characteristic resistance	$V_{RK}(\varphi)$	[kN]	9,1	10,0	16,2	17,8	25,2	27,8	36,3	40,0
Partial factor ¹⁾	$\gamma_{s,V}$	[-]	1,15							
Shear force bar in High performance concrete compression shear bearings (HPCSB)										
Diameter	\varnothing	[mm]	2x 6				2x 6			
Inclination in insulation joint	φ	[°]	40				45			
Characteristic resistance	$V_{RK}(\varphi)$	[kN]	20,9				23,0			
Partial factor ¹⁾	$\gamma_{s,V}$	[-]	1,15							

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Performance: Essential characteristics under static and quasi-static loading

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Table C.1: continued

Concrete compression bearings (CCB)							
Concrete strength class		≥ C20/25		≥ C25/30		≥ C30/37	
Characteristic resistance	D_{Rk}	[kN]	102,0		118,5		133,7
Partial factor ¹⁾	$\gamma_{c,CCB}$	[-]	1,875				
Compression area (CCB variant 1)	$A_{c,0}$	[N/mm ²]	3.600				
Compression area (CCB variant 2)	$A_{c,0}$	[N/mm ²]	3.240				
E-Modul	E_{cm}	[N/mm ²]	41.000				
High performance concrete compression bearings (HPCB) – connection type IP MU							
Concrete strength class		≥ C25/30					
Beam/wall width	b	[mm]	175 ≤ b ≤ 240			> 240	
Quantity per meter	$n_c \leq$	[-]	10	18	10	18	
Special stirrups ²⁾			no	yes	no	yes	
Minimum center distance	c	[mm]	100	50	100	50	
Minimum edge distance	e	[mm]	50	50	50	50	
Characteristic resistance	D_{Rk}	[kN]	$52,7 \cdot (b/240)^{1,27}$	$38,2 \cdot (b/240)^{0,32}$	52,7	38,2	
Partial factor ¹⁾	$\gamma_{c,HPCB}$	[-]	1,875	1,5	1,875	1,5	
Compression area	$A_{c,0}$	[mm ²]	1.200				
E-Modul	E_{cm}	[N/mm ²]	27.900				
High performance concrete compression bearings (HPCB) – connection type IP MO							
Concrete strength class		≥ C25/30					
Beam/wall width	b	[mm]	$b \geq 175$				
Quantity per meter	$n_c \leq$	[-]	10			18	
Special stirrups ²⁾			no			yes	
Minimum center distance	c	[mm]	50			50	
Minimum edge distance	e	[mm]	100			50	
Characteristic resistance	D_{Rk}	[kN]	76,9			60,5	
Partial factor ¹⁾	$\gamma_{c,HPCB}$	[-]	1,875			1,5	
Compression area	$A_{c,0}$	[mm ²]	1.200				
E-Modul	E_{cm}	[N/mm ²]	27.900				
High performance concrete compression bearings (HPCB) – all other connection types							
Concrete strength class		≥ C20/25		≥ C25/30		≥ C30/37	
Quantity per meter	$n_c \leq$	[-]	10	18	10	18	10 18
Special stirrups ²⁾			no	yes	no	yes	no yes
Minimum center distance	c	[mm]	50	50	50	50	50 50
Minimum edge distance	e	[mm]	100	50	100	50	100 50
Characteristic resistance	D_{Rk}	[kN]	71,8	57,8	76,9	60,5	83,3 63,8
Partial factor ¹⁾	$\gamma_{c,HPCB}$	[-]	1,875	1,5	1,875	1,5	1,875 1,5
Compression area	$A_{c,0}$	[mm ²]	1.200				
E-Modul	E_{cm}	[N/mm ²]	27.900				

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Performance: Essential characteristics under static and quasi-static loading

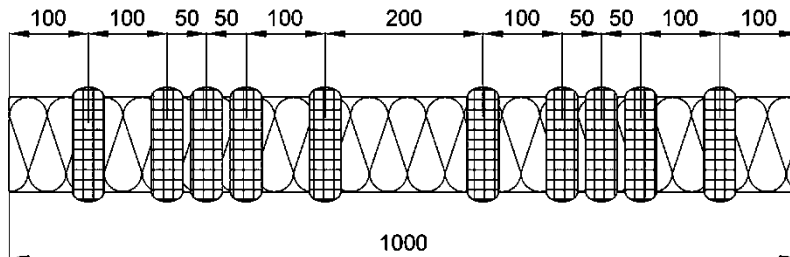
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C 02

Table C.1: continued

Steel compression bearing (SCB) - material no. 1.4571 (stainless reinforcing bar)											
Thickness of insulation	t_{joint}	[mm]	60 / 80				120				
Diameter stainless reinforcing bar	\emptyset	[mm]	8	10	12	14	8	10	12	14	
Characteristic yield strength	f_{yk}	[N/mm ²]	500								
Characteristic resistance	D_{Rk}	[kN]	18,4	30,4	45,4	63,4	15,8	27,3	41,7	58,5	
Partial factor ¹⁾	$\gamma_{s,SCB}$	[-]	1,15								
E-Modul	E_s	[N/mm ²]	160.000								
Steel compression bearing (SCB) - material no. 1.4362 (stainless reinforcing bar)											
Thickness of insulation	t_{joint}	[mm]	60 / 80				120				
Diameter stainless reinforcing bar	\emptyset	[mm]	8	10	12	8	10	12			
Characteristic yield strength	f_{yk}	[N/mm ²]	700								
Characteristic resistance	D_{Rk}	[kN]	26,2	43,7	65,1	20,7	38,0	58,2			
Partial factor ¹⁾	$\gamma_{s,SCB}$	[-]	1,15								
E-Modul	E_s	[N/mm ²]	160.000								
Steel compression bearing (SCB) - material no. 1.4571 (stainless steel round bar)											
Thickness of insulation	t_{joint}	[mm]	60 / 80								
Diameter stainless steel round bar	\emptyset	[mm]	10	12	14	14	16	16	18	20	
Characteristic yield strength	f_{yk}	[N/mm ²]	460	460	460	690	460	690	460	460	
Characteristic resistance	D_{Rk}	[kN]	30,6	45,2	63,5 ³⁾	93,2 ³⁾	84,4 ⁴⁾	125,3 ⁴⁾	107,7	132,6	
Partial factor ¹⁾	$\gamma_{s,SCB}$	[-]	1,1								
E-Modul	E_s	[N/mm ²]	160.000								
Steel compression bearing (SCB) - material no. 1.4571 (stainless steel round bar)											
Thickness of insulation	t_{joint}	[mm]	120								
Diameter stainless steel round bar	\emptyset	[mm]	10	12	14	14	16	16	18	20	
Characteristic yield strength	f_{yk}	[N/mm ²]	460	460	460	690	460	690	460	460	
Characteristic resistance	D_{Rk}	[kN]	27,7	41,5	58,9 ³⁾	85,0 ³⁾	78,9 ⁴⁾	115,9 ⁴⁾	102,0	128,5	
Partial factor ¹⁾	$\gamma_{s,SCB}$	[-]	1,1								
E-Modul	E_s	[N/mm ²]	160.000								

¹⁾ In absence of national regulations.

²⁾ If mentioned, 4 special stirrups per meter shall be arranged uniformly on the balcony and ceiling side, acc. to section A.3.9.
Arrangement of $n_c \leq 10$ HPCB/HPSCB without special stirrups as follows for all connection types except IP MU:



Arrangement of $n_c \leq 10$ HPCB/HPSCB without special stirrups for connection type IP MU: uniformly with minimum edge distance $e = 50$ mm and minimum center distance $c = 100$ mm.

³⁾⁴⁾ For characteristic yield strength between $f_{yk} = 460$ N/mm² and $f_{yk} = 690$ N/mm², linear interpolation of characteristic resistance D_{Rk} permitted.

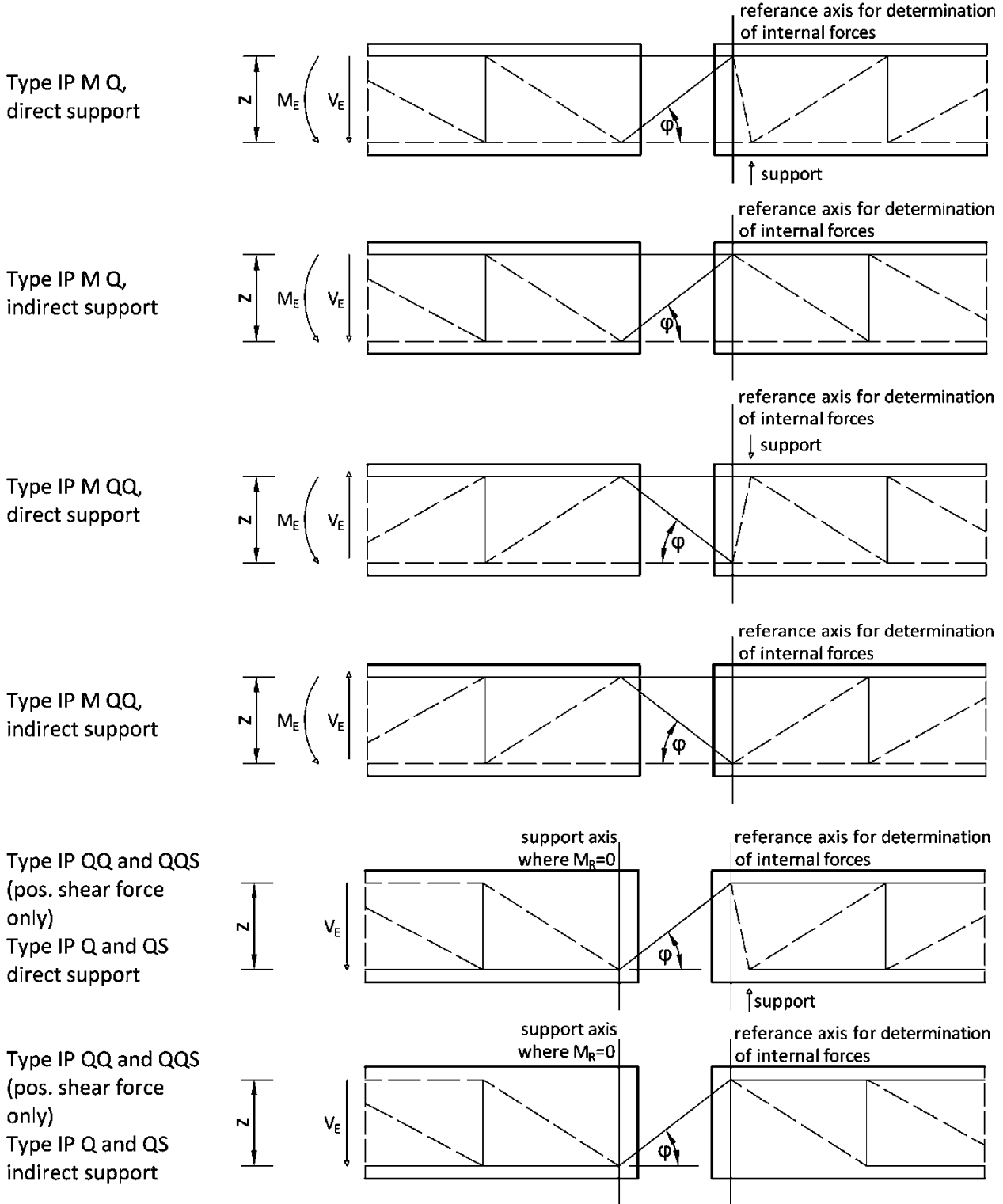
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C.2 Determination of internal forces

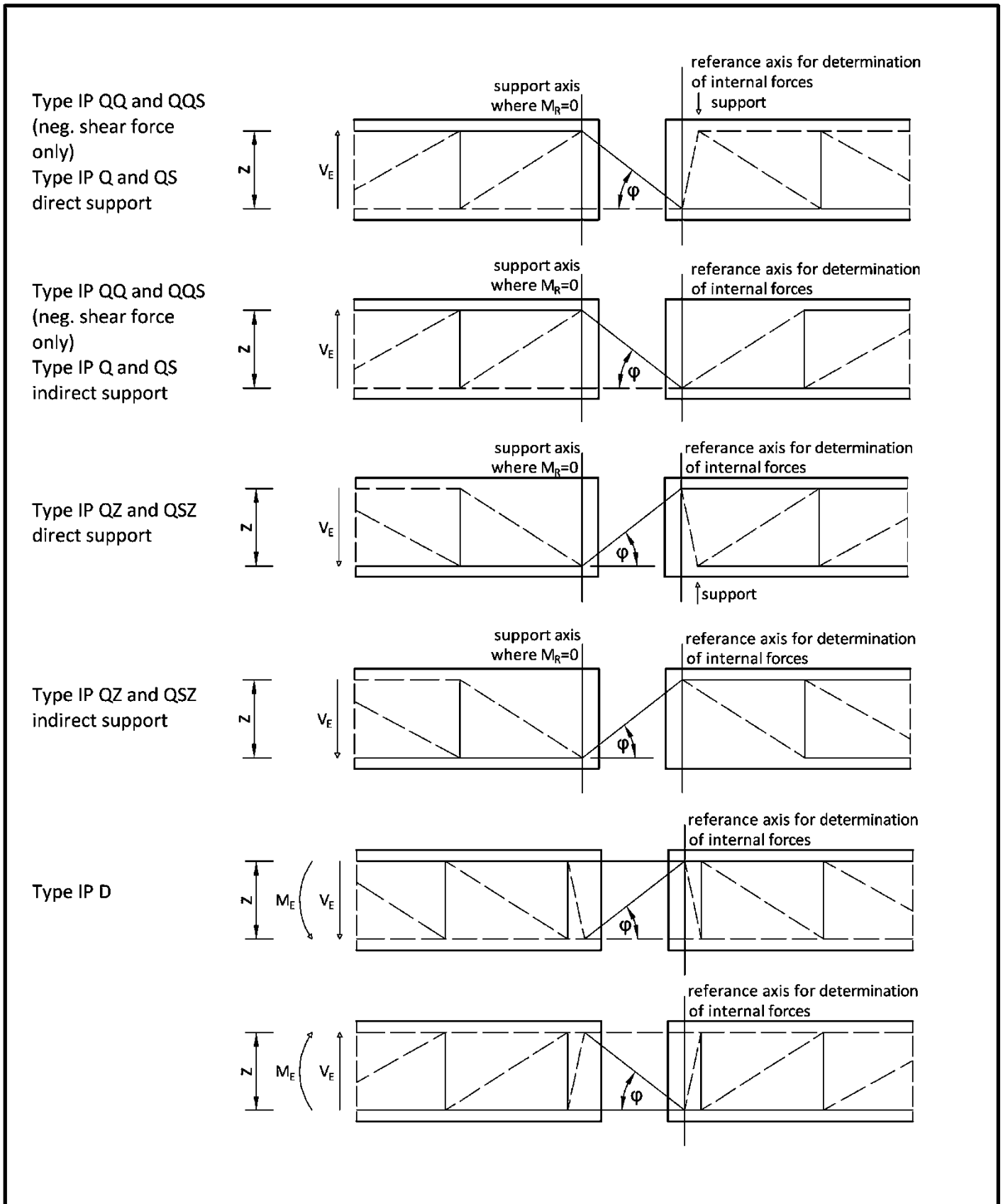
C.2.1 Strut and tie models



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Performance and boundary conditions: Determination of internal forces

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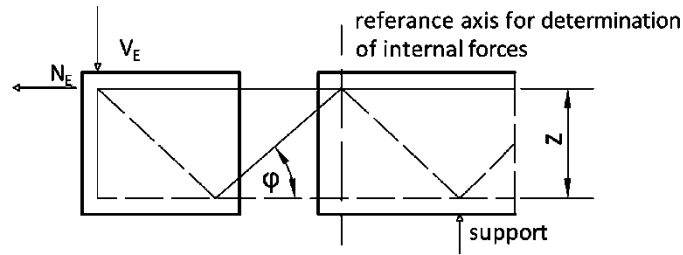


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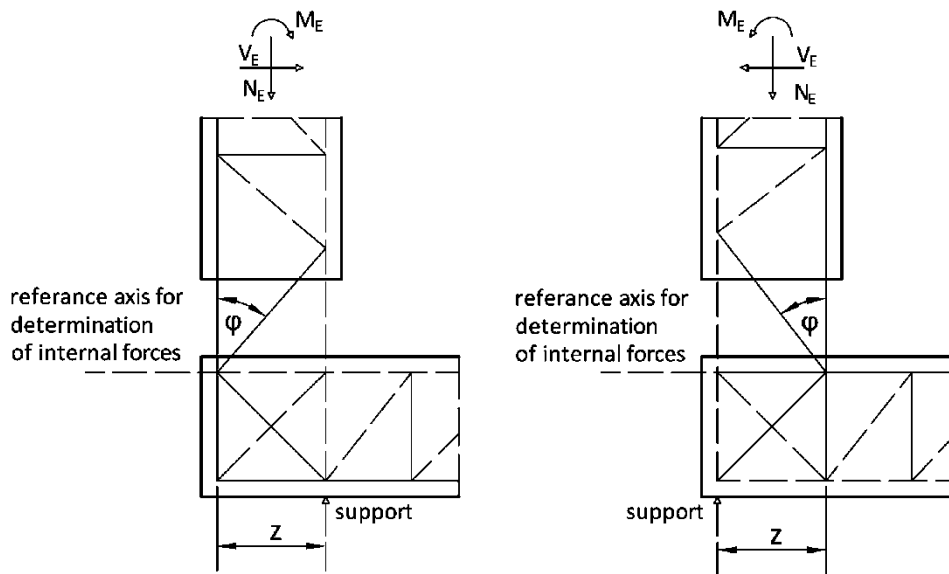
Performance and boundary conditions: Determination of internal forces

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C 05

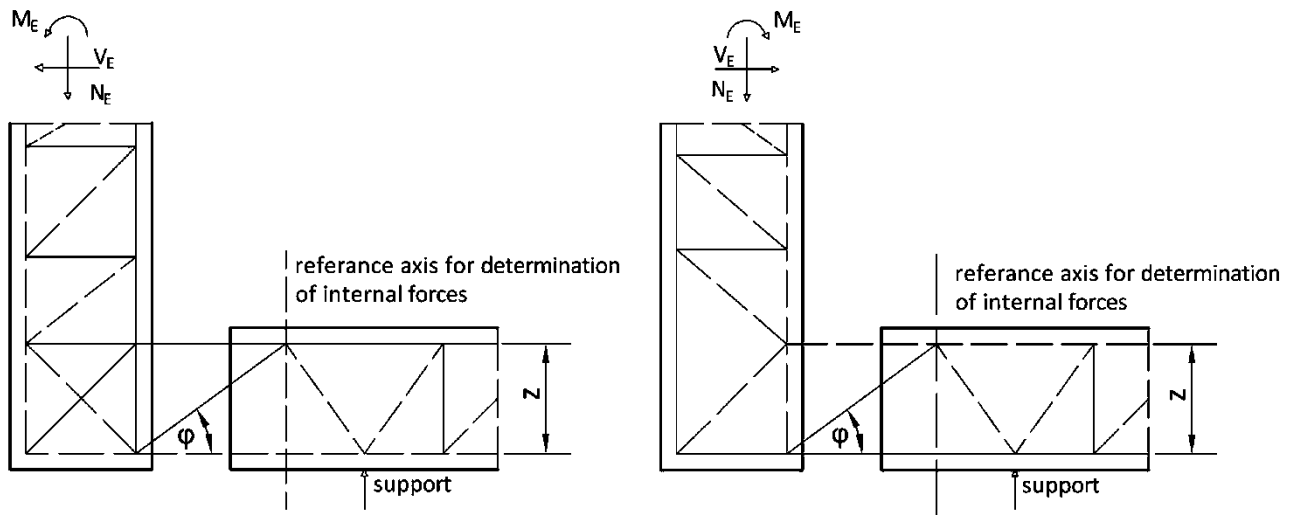
Type IP O



Type IP A



Type IP F

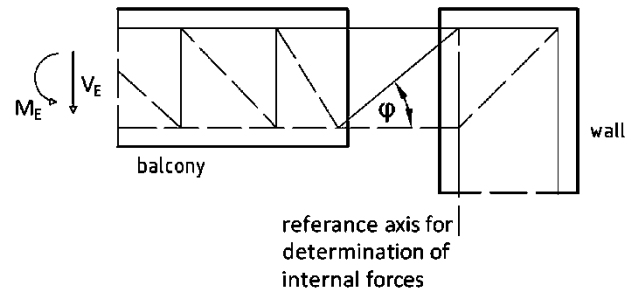
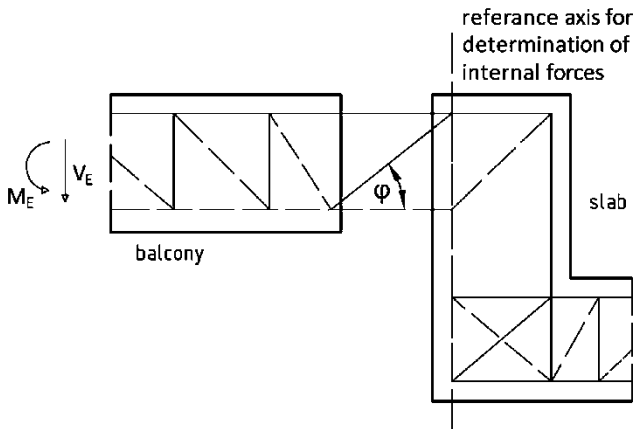


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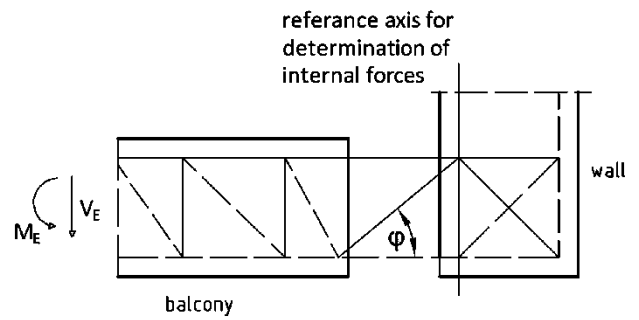
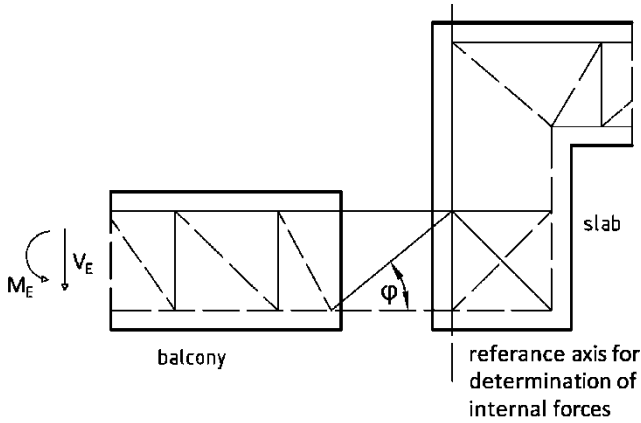
Performance and boundary conditions: Determination of internal forces

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Type IP MO



Type IP MU



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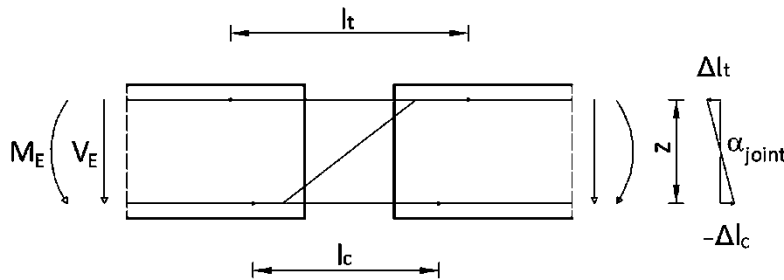
Performance and boundary conditions: Determination of internal forces

Annex
C 07

C.3 Determination of stiffness and deformation

C.3.1 Model for determination of deformation

- The following influencing factors shall be taken into account for the determination of deformation:
 - elastic deformation of the load-bearing thermal insulating element and the adjoining slab concrete considering elastic deformation of tension bars as function of the applicable yield strengths acc. to section C.1,
 - temperature expansions.
- Deformations as a consequence of shear force can be neglected.
- Bending deformation in the joint:



- Angle of rotation in the joint:

$$\alpha = \tan^{-1} \left(\frac{\Delta t_t - \Delta t_c}{z} \right)$$

- Tension bar (TB):

$$\Delta t_t = \frac{F_t}{A_{s,t}} \cdot \left(\frac{l_{t1}}{E_1} + \frac{l_{t2}}{E_1} + \frac{l_{t3}}{E_2} \right)$$

$$F_t = \frac{M/z}{n_t}$$

force per tension bar

n_t

number of tension bars

$$E_1 = 160.000 \text{ N/mm}^2$$

for stainless steel

$$E_2 = 200.000 \text{ N/mm}^2$$

for reinforcing steel

$$l_t = l_{t1} + l_{t2} + l_{t3}$$

l_{t1}

joint width

l_{t2}

effective length of stainless steel

l_{t3}

effective length of reinforcing steel

for stainless reinforcing steel:

$$\varnothing \leq 10 \text{ mm:}$$

$$l_{t2} = 2 \cdot 10 \cdot \varnothing \text{ and } l_{t3} = 0$$

$$\varnothing > 10 \text{ mm:}$$

$$l_{t2} = 2 \cdot 100 \text{ mm and } l_{t3} = 2 \cdot 10 \cdot \varnothing - 2 \cdot 100 \text{ mm}$$

for stainless round steel bars:

$$l_{t2} = 2 \cdot 100 \text{ mm and } l_{t3} = 2 \cdot 10 \cdot \varnothing$$

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Performance and boundary conditions: Limitation of deformation

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- Concrete compression bearing (CCB, HPCB and HPCSB):

$$\Delta_{lc} = \frac{F_c}{A_{co}} \cdot \frac{l_{c,CB}}{E_{cm,CB}}$$

$$F_c = \frac{M/z}{n_c}$$

force per compression bearing

n_c

number of compression bearings

$l_{c,CB}$

joint width

for high performance compression bearing (HPCB and HPCSB acc. to section A.3.8.1 and A.3.7):

$$A_{c,0} = 1.200 \text{ mm}^2$$

$$E_{cm,CB} = 27.900 \text{ N/mm}$$

for concrete compression bearing (CCB acc. to section A.3.8.2):

$$A_{c,0} = 3.600 \text{ mm}^2$$

for CCB variant 1 (acc. to section A.3.8.2)

$$A_{c,0} = 3.240 \text{ mm}^2$$

for CCB variant 2 (acc. to section A.3.8.2)

$$E_{cm,CB} = 41.000 \text{ N/mm}^2$$

- Steel compression bearing (SCB acc. to section A.3.8.3):

(for type IP D: for negative moments, tension and compression bar are changed)

$$\Delta_{lc} = \sigma_c \cdot \frac{l_c}{E_1}$$

$$\sigma_c = \frac{F_{Ed}}{A_{s,c}}$$

$l_{c,S}$

joint width

$$E_1 = 160.000 \text{ N/mm}^2$$

for stainless steel

for stainless reinforcing steel bars: $l_c = l_{c,S} + 2 \cdot 10 \cdot \varnothing$

for stainless round steel bars: $l_c = l_{c,S} + 2 \cdot 10 \cdot \varnothing + 2 \cdot 100 \text{ mm}$

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Performance and boundary conditions: Limitation of deformation

Annex
C 09

C.4 Fire resistance

C.4.1 Performance parameters in case of fire

If the characteristic performance specified in table C.1 are met when verifying the load-bearing capacity at normal temperatures, the load-bearing capacity in case of fire for connection situations according to section A.3.1.2, A.3.2.2 and A.3.3.2 with the ISOPRO® slab connector may be assumed to be given under the following conditions, whereby the fire resistance varies depending on the compression bearing variant used (table C.2):

- fire exposure according to the standard temperature-time curve acc. to DIN EN 1991-1-2, section 3.2.1,
- ratio of the action in case of fire (E_{fi}) to the relevant action at normal temperatures (E) meets the following condition:

$$E_{fi}/E \leq 0,7.$$

The relevant action at normal temperatures is the one for which the load-bearing capacity at normal temperatures has been proven according to table C.1.

Table C.2: fire resistance time depending on the compression bearing variant

Compression bearing variant	Fire resistance period (load-bearing capacity) in minutes
High performance compression bearing (HPCB / HPCSB)	120
Concrete compression bearing (CCB)	120
Steel compression bearing (SCB)	90 ¹⁾

¹⁾ for $E_{fi}/E \leq 0,6$ a fire resistance period (load-bearing capacity) of 120 minutes is guaranteed.

Furthermore, the following boundary conditions shall be observed:

- The connection joint provided with the ISOPRO® slab connector shall be completely covered on the top and bottom side with fire protection plates acc. to section A.3.1.2, A.3.2.2, and A.3.3.2.
- In the area of planned tensile stresses, the fire protection plates shall be designed either with a lateral projection of 10 mm from the insulation body or with additional intumescent coating formers on both side surfaces.

The required thickness t of the fire protection panels and the minimum center-to-center spacing u of the reinforcing steel are given in section A.3.1.2, A.3.2.2, and A.3.3.2.

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Performance in case of fire

Annex
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C.4.2 Fire resistance of structural components (informative)

Ceiling and roof structures as well as balconies and walkways, which are connected to reinforced concrete components acc. to their intended use with the ISOPRO® slab connector, can be classified with regard to fire resistance acc. to EN 13501-2, as shown in table C.3.

The following boundary conditions shall be observed:

- The performance in terms of load-bearing capacity in case of fire has been declared for the ISOPRO® slab connector.
- See section C.4.1.
- Verification of the ceiling and roof construction was carried out.
- In case of ceiling and roof structures, the connections of the remaining edges of the ceiling or roof structures not connected with the ISOPRO® slab connector to adjoining or supporting building components shall be verified in accordance with the regulations of the Member States for the corresponding fire resistance.

Table C.3: classification of component

Design version	Ceiling or roof construction with fire separating function		Balconies and walkways	
	acc. to section A.3.1.2	REI 90	REI 120	R 90
acc. to section A.3.2.2	REI 90	REI 120	R 90	R 120
acc. to section A.3.3.2	REI 90	REI 120 ¹⁾	R 90	R 120 ¹⁾

¹⁾ $E_{fi}/E \leq 0,6$

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Fire resistance of structural components (informative)

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