

# ISOPRO® 80/120 Thermal insulation elements for steel and timber connections



Technical information

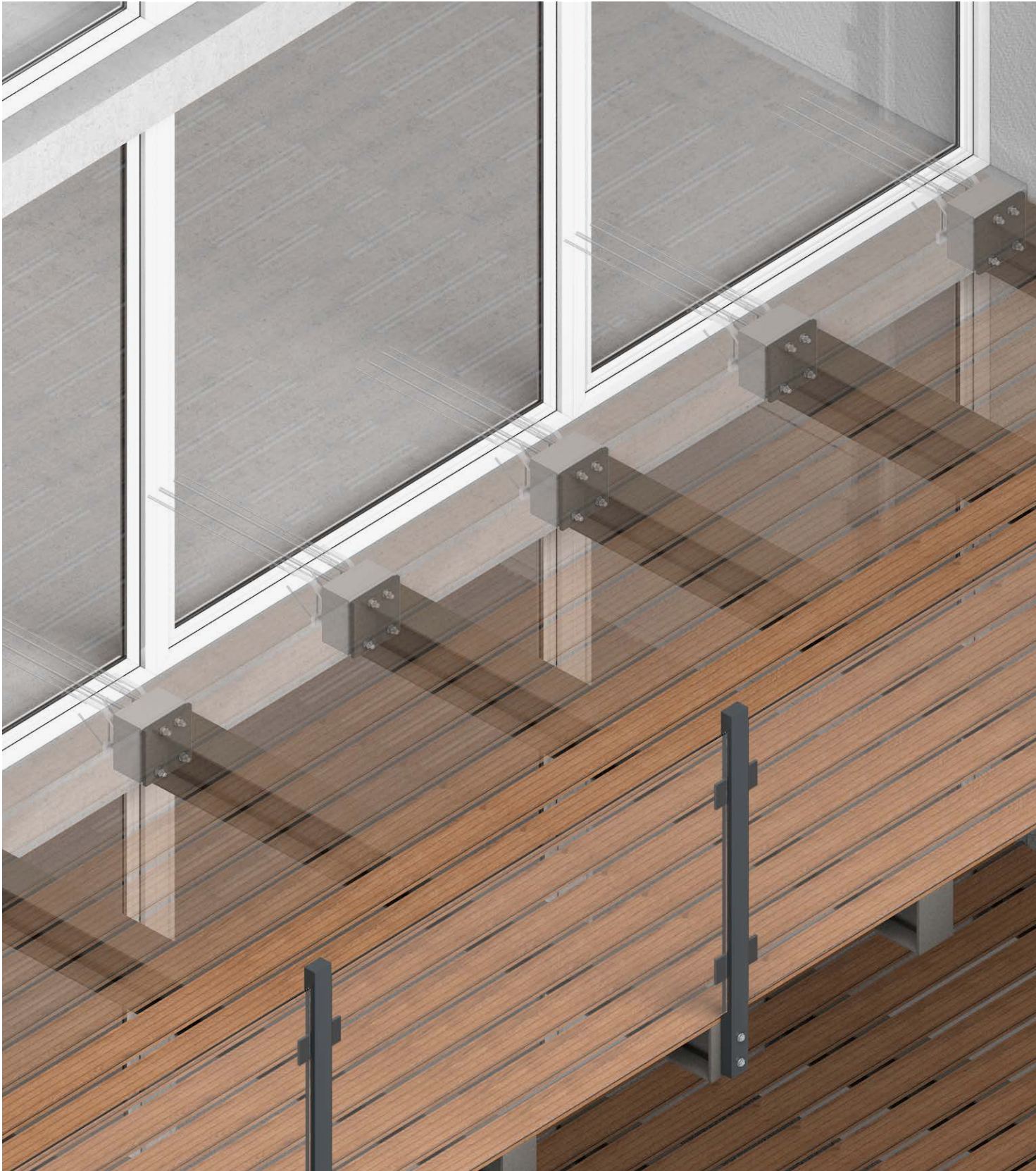


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# Balcony solutions





### **PohlCon solutions for balconies**

A balcony should enhance the comfort of your home, but not add to your energy bills. To ensure that your balcony is securely anchored and that adjacent rooms lose as little heat as possible, we have revolutionised balcony construction – from load-bearing thermal insulation elements to railing attachment methods. Our optimised solutions reduce energy loss and hold components securely in place. We can also provide you with the expert advice you need and a tailor-made software solution for structural design. This allows you to design even architecturally complex balconies quickly, easily and safely.

### **ISOPRO® 80/120 Steel/Wood**

The ISOPRO® 80/120 Steel/Wood load-bearing thermal insulation element creates a friction-locked connection to steel or timber structures. It acts as an interface between reinforced concrete and balconies, canopies or other framed structures. It combines reliable force transmission with the lowest possible thermal conductivity.

### **Balcony solutions – Product categories**

- Thermal insulation
- Mounting technology
- Connection technology
- Façade connection systems

# Product information



## Product description

The ISOPRO® 80/120 Steel/Wood series comprises load-bearing thermal insulation elements for connecting external components to buildings. Types M and Q are specially designed for connecting timber and steel frame structures. ISOPRO® 80/120 Steel/Wood has an insulating body 80/120 mm thick for optimum thermal insulation at the transition between interior and exterior components. The elements are available with various load-bearing capacity ratings and element heights. They are easy to install on site using an adjustment plate for millimetre-accurate alignment. In addition, the H-BAU Application Technology department will be happy to assist with any custom solutions.



## Advantages

- Optimised materials and cross-sections for good thermal insulation
- Variety of different types and designs for all common applications
- Product range can also be customised to cover unusual applications working in close cooperation with the Application Technology department
- Thermal bridges reduced in accordance with GEG
- Continuous height adjustment for simple and safe assembly

### Application

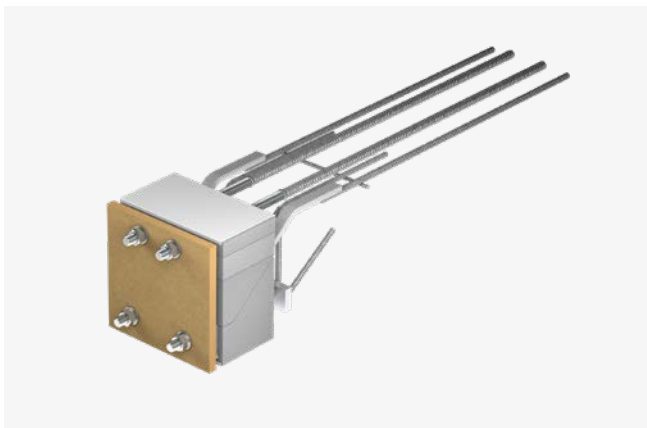
As a load-bearing thermal insulation element, ISOPRO® 80/120 Steel/Wood provides thermal separation between reinforced concrete and steel/timber components to solve building physics problems at the transition between interior and exterior components. It also creates a friction-locked connection across the insulation joint. The ISOPRO® 80/120 Steel/Wood series can be used in a wide range of applications

in addition to balcony connections. ISOPRO® SM elements have been specially developed for connecting cantilevered structures, while ISOPRO® SQ elements are used for supported structures. The elements are installed in the shell during the reinforcement and casting work. The steel/timber structure is installed later.

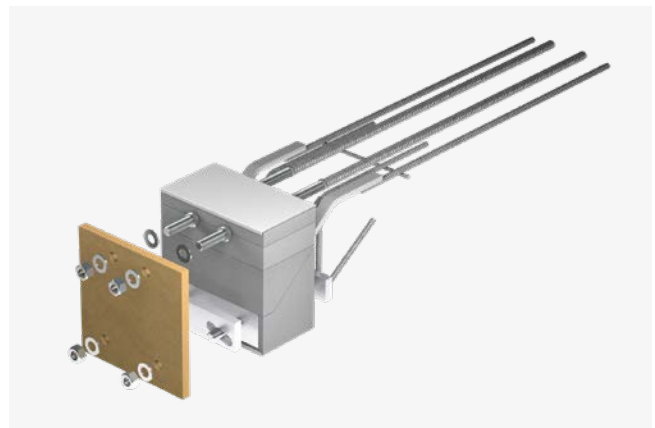
### National technical approvals (abZ)

ISOPRO® 120: abZ/aBG Z-15.7-313, DIBt Berlin.  
Date 17/11/2022

## Product components



ISOPRO® 120 SM



ISOPRO® 120 SM Exploded view

### Materials

Reinforcing steel:	B500B in line with DIN 488-1
Stainless steel:	Steel, corrosion resistance class III according to Z-30.3-6 as per data sheet
Structural steel:	S235 for the pressure plates
Insulating body:	Rigid polystyrene foam (EPS) according to DIN EN 13163, class E in line with DIN EN 13501-1
Steel strut (timber connection):	S235 galvanised

## Materials of adjoining components

### Ceiling

Concrete:	Normal concrete according to EC2 or DIN EN 206-1 Minimum concrete strength C20/25
Reinforcing steel:	B500B

### Balcony

Structural steel:	Minimum grade S235 Material, dimensions and corrosion protection according to the specifications of the structural engineer
Timber:	Solid softwood Glulam
Rod dowels:	S235 galvanised

# Fire protection

## Fire protection regulations for balconies and access balconies

DIN EN 13501-2:2010-02 (1a) defines balconies and access balconies as load-bearing building components without a separating function. Section 31 of the Model Building Code (MBO) does not define any specific fire protection requirements for balconies and access balconies that do not function as a “necessary corridor”. If they do fulfil a function as a

“necessary corridor”, their thermal insulation elements must be either fire-resistant, highly fire-retardant or fire-retardant depending on the building class.

Therefore, it is always essential to check fire protection requirements for each individual case and whether the thermal insulation connection must form a physical barrier.

### Requirements for access balconies as necessary corridors

Building class in line with Section 2 of the Model Building Code	Section 31 of the Model Building Code	DIN EN 13501-2	DIN 4102-2
1	Load-bearing and separating	Not specified	Not specified
2	Load-bearing, separating, fire-retardant	REI 30	F 30-B
3	Load-bearing, separating, fire-retardant	REI 30	F 30-AB (separating)
4	Load-bearing, separating, highly fire-retardant	REI 60	F 60-AB (separating)
5	Load-bearing, separating, fire-resistant	REI 90	F 90-AB (separating)

### Fireproof barrier\*

Buildings that are more than three storeys high must have fireproof barriers and an ETICS made of EPS insulation materials more than 100 mm thick on every second storey. This is achieved by completely interrupting the insulation horizontally. Balconies, loggias and access balconies that completely interrupt an ETICS horizontally can function as a fire barrier.

It is then not necessary to install an additional fireproof barrier in these areas. However, the fireproof barrier must connect laterally to the insulation elements to ensure that the horizontal interruption of the insulation for fire protection is continuous. ISOPRO® 120 elements in the fire protection version REI 120 must be used in the situation described.



### Notes

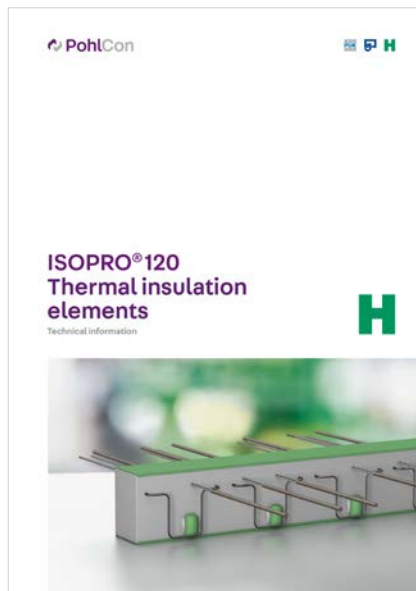
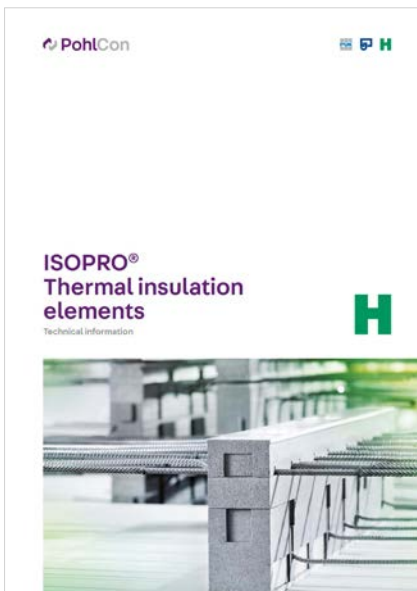
To satisfy fire protection requirements, it must be ensured that any on-site insulation between individual ISOPRO® 80/120 elements also meets the fire protection requirements. ISOPRO® 120 Z-ISO FP1 of type EI 120 can be used for this purpose.



# Construction physics

General information on construction physics can be found in the technical information for our thermal insulation elements in the Construction physics chapter.

- IP 80 steel and timber connection elements:  
ISOPRO® thermal insulation elements
- IP 120 steel and timber connection elements:  
ISOPRO®120 thermal insulation elements



You can download the technical information from:  
[www.pohlcon.com](http://www.pohlcon.com)



Our Application Technology department will be happy to provide you with further information.

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[technik-hbau@pohlcon.com](mailto:technik-hbau@pohlcon.com)

# Structural design principles

## General information

- Verification and reinforcement of adjacent reinforced concrete components is performed by the structural engineer. It is vital to consider the casting properties when designing the reinforcement. This applies in particular to ISOPRO® elements with a high reinforcement ratio.
- If the adjacent components are made of different grades of concrete (e.g. slab C20/25), the lower concrete grade is decisive for the structural design.
- The table values given for the on-site reinforcement apply to fully loaded ISOPRO® elements. A reduction of  $m_{Ed}/m_{Rd}$  or  $v_{Ed}/v_{Rd}$  is permissible.

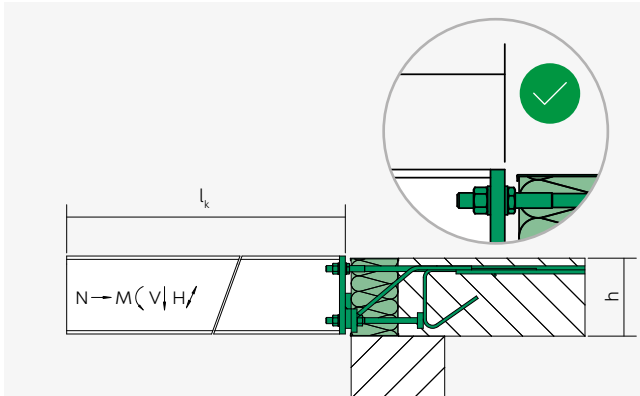
The structural engineer must provide verified structural analyses for the adjoining components.

- In cases using indirect support, the structural engineer must verify load transfer in the reinforced concrete component.
- ISOPRO® elements cannot withstand torsion. Therefore, at least two ISOPRO® elements must be used per connected steel structure and secured in position and against torsion via their connections.

### Load assumptions

$g_k$ :	Permanent loads (dead weight + imposed load)
$q_k$ :	Live load
$V_k$ :	Edge load (railing, parapet, plinth etc.)
$M_k$ :	Edge moment (due to horizontal load on railing, parapet etc.)

## System calculation and support conditions

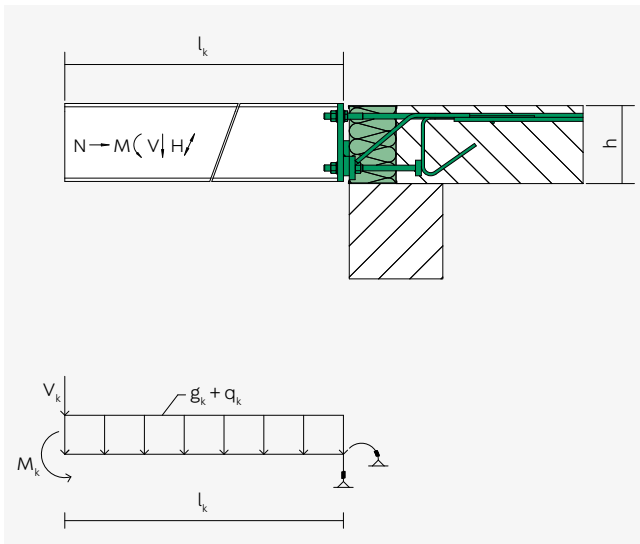


The system length is always measured from the rear edge of the head plate.

### IP 80/120 SM

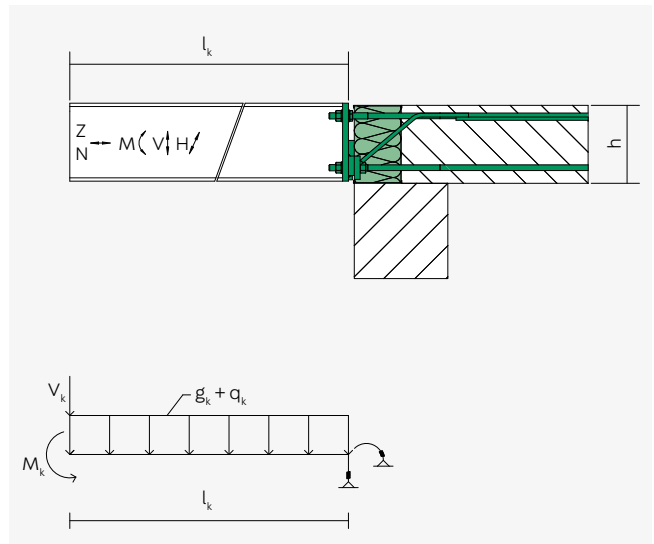
All ISOPRO® SM elements transfer positive shear forces, negative moments, horizontal forces and compressive/tensile forces. The elements ISOPRO® SM 14 QQ, SM 20 Q10 and SM 20 Q12 also transmit negative shear forces and positive moments.

#### IP 80/120 SM Q8



ISOPRO® 120 SM: system above, model below

#### IP 80/120 SM20 Q10/Q12



ISOPRO® 120 SM: system above, model below



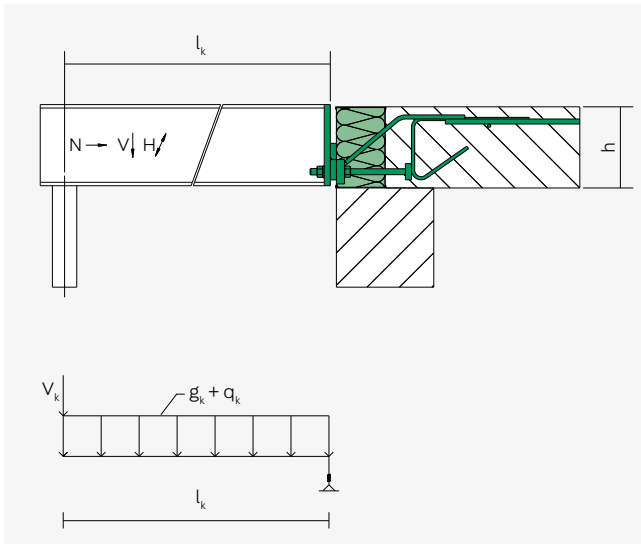
#### Notes

ISOPRO® type SM elements are designed for a top concrete cover of  $c_v = 20$  mm.  
 The moment  $M_{Rd}$  it can withstand depends directly on the shear force  $V_{Rd}$  it can withstand.  
 Intermediate values are possible in consultation with our Application Technology department.

## IP 80/120 SQ

All ISOPRO® SQ elements transmit positive shear forces and horizontal forces in both directions.

### IP80/120 SQ Q8/Q10/Q12



ISOPRO® 120 SQ: system above, model below



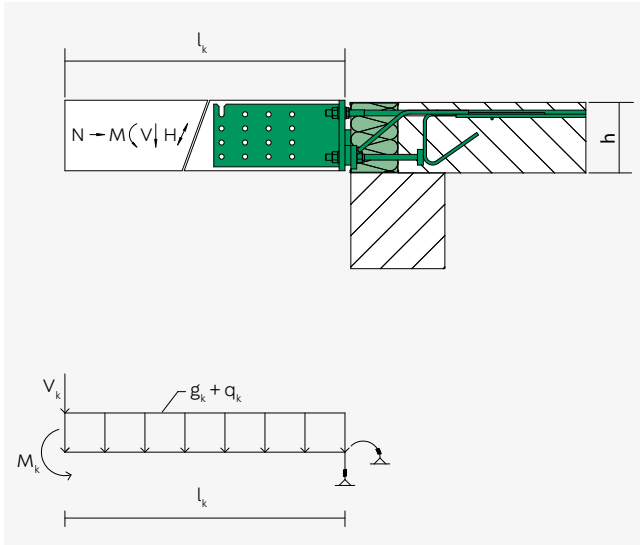
#### Notes

ISOPRO® type SQ elements are designed for a top concrete cover of  $c_v = 20$  mm.

## IP 80/120 HM, IP 80/120 HQ

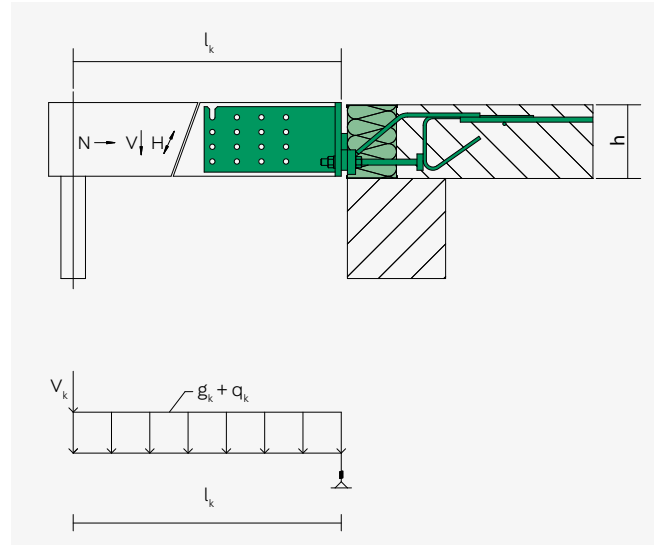
All ISOPRO® HM elements transmit positive shear forces, negative moments and horizontal forces in both directions.  
 All ISOPRO® HQ elements transmit positive shear forces and horizontal forces in both directions.

### IP80/120 HM



ISOPRO® 120 HM: system above, model below

### IP80/120 HQ



ISOPRO® 120 HQ: system above, model below



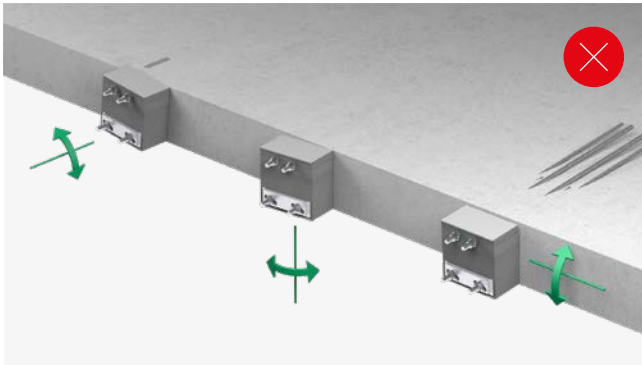
### Notes

The ISOPRO® type HM/HQ element with  $h = 180$  mm is designed for a top concrete cover of  $c_v = 20$  mm.  
 Minimum dimensions of the wooden beam:  
 $w \times h = 120 \times 180$  mm  
 Connection of the wooden beam to the strut:  
 16 rod dowels dia. 12, S 235 galvanised  
 For reinforced concrete components with dimensions  $h > 180$  mm, the ISOPRO® element can be ordered with factory-fitted additional insulation,  
 e.g. for height 220 mm, HM 14 Q8 h180 + 40 mm additional insulation below.

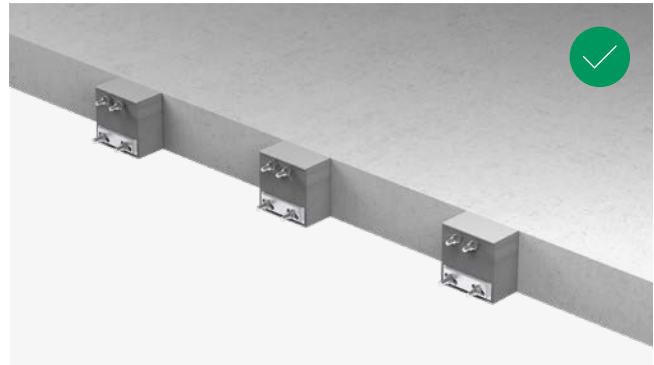
# General installation instructions

## Element alignment - Securing in position

ISOPRO® elements should be aligned straight and parallel on the concrete slab.



Skewed and incorrectly aligned ISOPRO® SM elements that were insufficiently secured in position during concreting.

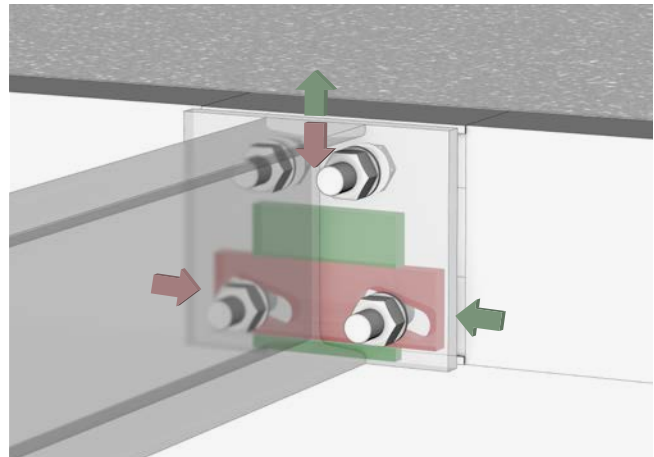


Correct element alignment and installation accuracy is achieved by sufficiently securing them in position on site.

## Adjustability

ISOPRO® type SQ and SM elements can accommodate tolerances of  $-12/0$  mm to  $0/+12$  mm in the vertical direction. There is no provision for installation tolerances in the horizontal direction. The maximum permissible tolerances must be included in the execution plans after consultation with the structural engineer and the steel fabricator. ISOPRO® type SQ and SM elements are secured in position on site during concreting.

Installation templates are used to achieve optimum positional stability, installation accuracy and element alignment. The structural dimensions and installation accuracy must be carefully verified by the site management prior to concreting. The steel structure is matched to the actual shell dimensions; this is coordinated between the steel fabricator and site management.



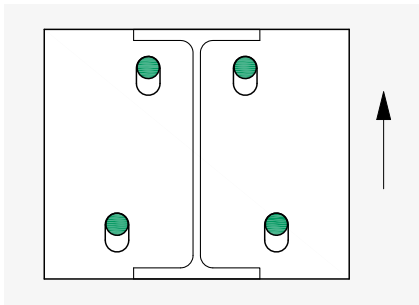
The adjustment plate facilitates easy and continuous height adjustment.

## Installation tolerances

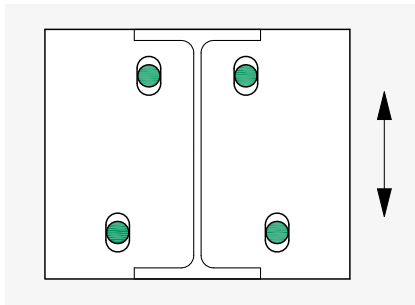
ISOPRO® elements type SQ and SM create a connection between steel and reinforced concrete components, which raises the question of permissible limit deviations in the transition between the two components. Limit deviations must be defined and included in the execution plans in compliance with DIN 18202:2013-04 Tolerances in building construction - Buildings. The feasibility of these limit deviations must be

agreed with the structural engineer and the steel fabricator during the planning phase. ISOPRO® elements type SQ and SM can be used to compensate for inaccuracies of up to 12 mm in the vertical direction. The maximum tolerances that can be compensated for in one direction depend on the planned initial position of the head plate in relation to the installed ISOPRO® element.

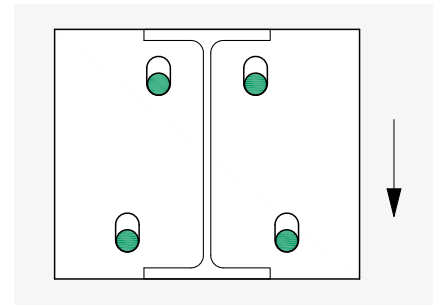
### IP 80 SM, IP 80 HM, IP 120 SM, IP 120 HM



Starting position = upper edge of slotted hole  
 Tolerance: +12 / -0 mm

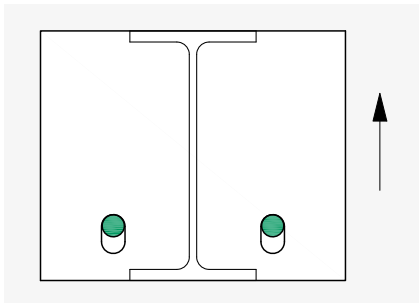


Starting position = middle of slotted hole  
 Tolerance: ±6 mm

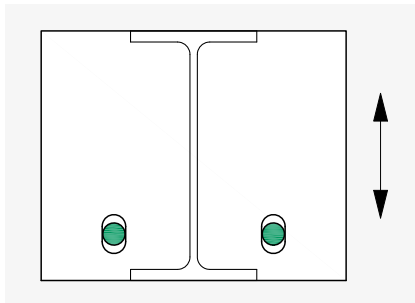


Starting position = lower edge of slotted hole  
 Tolerance: +0 / -12 mm

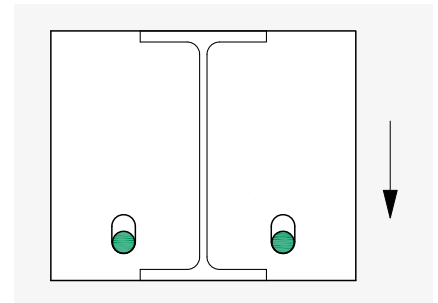
### IP 80 SQ, IP 80 HQ, IP 120 SQ, IP 120 HQ



Starting position = upper edge of slotted hole  
 Tolerance: +12 / -0 mm



Starting position = middle of slotted hole  
 Tolerance: ±6 mm



Starting position = lower edge of slotted hole  
 Tolerance: +0 / -12 mm

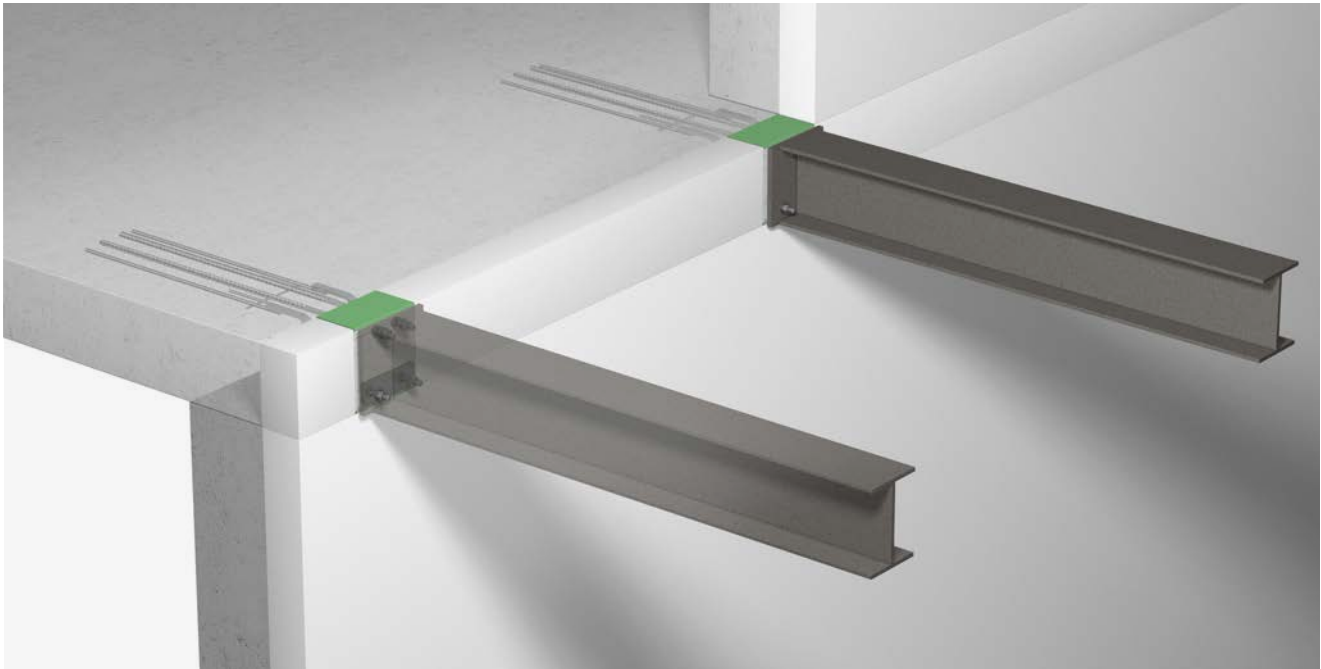




# Concrete-steel connection

# IP 80 SM, IP 120 SM

Connection for cantilevered steel structures



## IP 80 SM, IP 120 SM

- For transmitting moments and shear forces.
- Concrete cover cv20/26
- Element height 180 to 280 mm

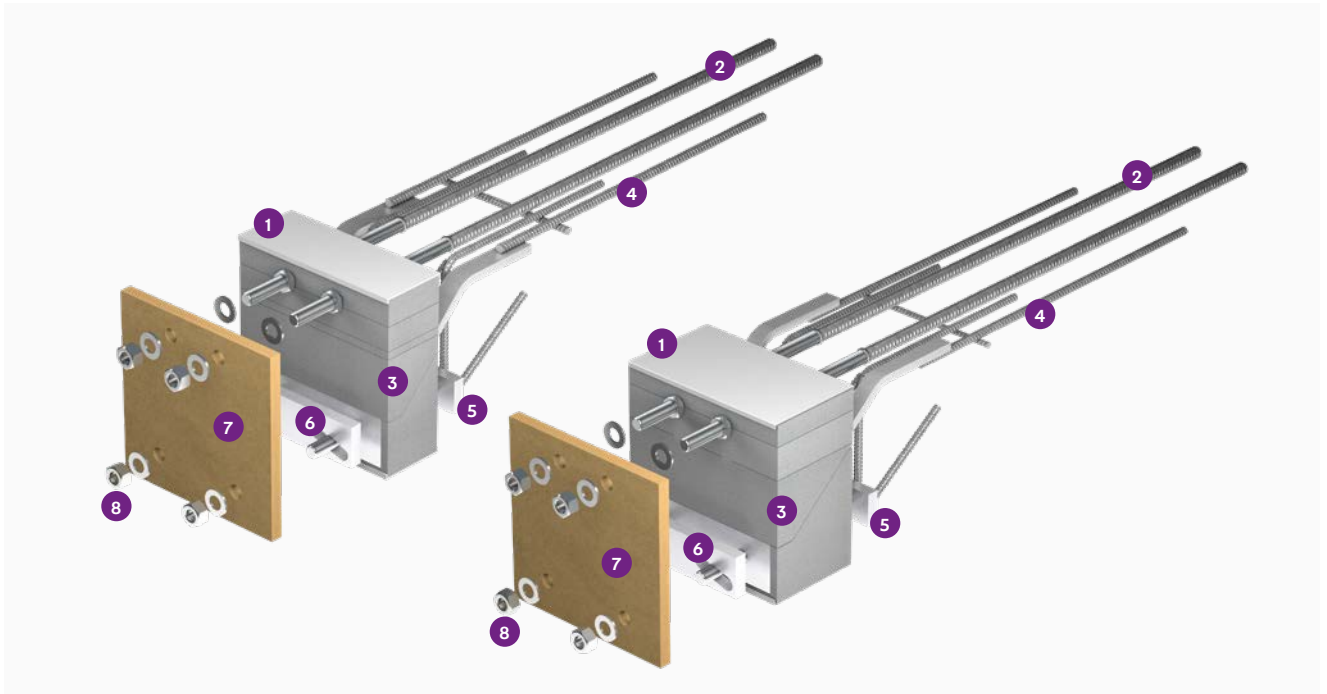


## Type designation

IP120 SM 14 Q8 h200

Type (insulating body thickness) \_\_\_\_\_  
Moment load-bearing capacity \_\_\_\_\_  
Shear force load-bearing capacity \_\_\_\_\_  
Element height \_\_\_\_\_

## Element design



Element design using ISOPRO® 80 SM 14 Q8 and ISOPRO® 120 SM 14 Q8 as an example

- 1 Cover profile**
  - Plastic
- 2 Tie bars**
  - Structural steel
  - Stainless steel
- 3 Insulating body**
  - Neopor
- 4 Shear bars**
  - Structural steel
  - Stainless steel
- 5 Compression struts**
  - Structural steel
  - Stainless steel
- 6 Adjustment plate**
  - For millimetre-precise alignment of the steel structure
  - Stainless steel
- 7 Wooden mounting plate**
  - For mounting the insulating element
- 8 Nuts, washers**
  - Included in scope of delivery

## Dimensioning table for IP 80 SM 14

Vertical force  $V_{Rd,z}$  and bending moment  $M_{Rd,y}$  for concrete C20/25

Element height h mm	SM 14 Q8			SM 14 Q10			SM 14 QQ	
	Vertical force $V_{Rd,z}$ in kN							
<b>180 - 280</b>	<b>10.0</b>	<b>20.0</b>	<b>30.0</b>	<b>30.0</b>	<b>10.0</b>	<b>20.0</b>	<b>30.0</b>	<b>-12.0</b>
	Bending moment $M_{Rd,y}$ in kNm							
<b>180</b>	-10.9	-9.9	-8.8	-9.0	-10.9	-9.9	-8.8	9.2
<b>200</b>	-12.9	-11.7	-10.3	-10.5	-12.9	-11.7	-10.3	10.8
<b>220</b>	-14.8	-13.4	-11.9	-12.1	-14.8	-13.4	-11.9	12.4
<b>240</b>	-16.8	-15.2	-13.5	-13.7	-16.8	-15.2	-13.5	14.0
<b>250</b>	-17.8	-16.1	-14.2	-14.5	-17.8	-16.1	-14.2	14.9
<b>260</b>	-18.7	-17.0	-15.0	-15.3	-18.7	-17.0	-15.0	15.7
<b>280</b>	-20.7	-18.7	-16.6	-16.8	-20.7	-18.7	-16.6	17.3

C: Concrete grade

Horizontal force  $H_{Rd,y}$  in kN

Element height h mm	SM 14 Q8	SM 14 Q10	SM 14 QQ
<b>180 - 280</b>	± 2.5	± 4.0	± 2.5

## Dimensioning table for IP 80 SM 20

Vertical force  $V_{Rd,z}$  and bending moment  $M_{Rd,y}$  for concrete C20/25

Element height h mm	SM 20 Q10				SM 20 Q12			
	Vertical force $V_{Rd,z}$ in kN							
<b>180 - 280</b>	<b>25.0</b>	<b>35.0</b>	<b>45.0</b>	<b>-12</b>	<b>45.0</b>	<b>55.0</b>	<b>65.0</b>	<b>-12.0</b>
	Bending moment $M_{Rd,y}$ in kNm							
<b>180</b>	-22.7	-21.6	-20.5	11.3	-20.6	-19.0	-17.9	11.3
<b>200</b>	-26.9	-25.6	-24.3	13.5	-24.4	-22.6	-21.3	13.5
<b>220</b>	-31.1	-29.6	-28.1	15.6	-28.2	-26.1	-24.6	15.6
<b>240</b>	-35.3	-33.6	-31.8	17.7	-32.0	-29.7	-27.9	17.7
<b>250</b>	-37.4	-35.6	-33.7	18.7	-34.0	-31.4	-29.5	18.7
<b>260</b>	-39.5	-37.6	-35.6	19.8	-35.9	-33.2	-31.2	19.8
<b>280</b>	-43.7	-41.6	-39.4	21.9	-39.7	-36.7	-34.5	21.9

C: Concrete grade

Horizontal force  $H_{Rd,y}$  in kN

Element height h mm	SM 20 Q10	SM 20 Q12
<b>180 - 280</b>	± 4.0	± 6.5

## Dimensioning table for IP 120 SM 14

Vertical force  $V_{Rd,z}$  and bending moment  $M_{Rd,y}$  for concrete C25/30

Element height h mm	SM 14 Q8			SM 14 Q10			SM 14 QQ		
	Vertical force $V_{Rd,z}$ in kN								
<b>180 - 280</b>	<b>7.0</b>	<b>26.0</b>	<b>8.2</b>	<b>39.2</b>	<b>6.0</b>	<b>26.0</b>	<b>-12.0</b>		
	Bending moment $M_{Rd,y}$ in kNm								
<b>180</b>	-13.2	-10.6	-12.7	-8.5	-13.3	-10.6	11.5		
<b>190</b>	-14.3	-11.6	-13.8	-9.3	-14.4	-11.6	12.5		
<b>200</b>	-15.5	-12.5	-14.9	-10.0	-15.7	-12.5	13.5		
<b>210</b>	-16.7	-13.4	-16.1	-10.8	-16.8	-13.4	14.5		
<b>220</b>	-17.8	-14.4	-17.2	-11.5	-18.0	-14.4	15.6		
<b>230</b>	-19.1	-15.3	-18.3	-12.3	-19.2	-15.3	16.6		
<b>240</b>	-20.2	-16.3	-19.4	-13.0	-20.4	-16.3	17.6		
<b>250</b>	-21.3	-17.2	-20.5	-13.8	-21.6	-17.2	18.6		
<b>260</b>	-22.5	-18.1	-21.7	-14.5	-22.7	-18.1	19.6		
<b>270</b>	-23.7	-19.1	-22.8	-15.3	-23.9	-19.1	20.7		
<b>280</b>	-24.8	-20.0	-23.9	-16.0	-25.1	-20.0	21.7		

C: Concrete grade

Horizontal force  $H_{Rd,y}$  in kN

Element height h mm	SM 14 Q8	SM 14 Q10	SM 14 QQ
<b>180 - 280</b>	± 2.5	± 4.0	± 2.5

## Dimensioning table for IP 120 SM 20

Vertical force  $V_{Rd,z}$  and bending moment  $M_{Rd,y}$  for concrete C25/30

Element height h mm	SM 20 Q10			SM 20 Q12		
	Vertical force $V_{Rd,z}$ in kN					
<b>180 - 280</b>	<b>14.0</b>	<b>40.0</b>	<b>-12.0</b>	<b>14</b>	<b>56.4</b>	<b>-12</b>
	Bending moment $M_{Rd,y}$ in kNm					
<b>180</b>	-27.3	-24.0	14.8	-27.2	-21.8	14.6
<b>190</b>	-29.9	-26.2	16.1	-29.8	-23.8	16.0
<b>200</b>	-32.4	-28.4	17.5	-32.3	-25.8	17.4
<b>210</b>	-34.9	-30.7	18.9	-34.8	-27.8	18.7
<b>220</b>	-37.5	-32.9	20.2	-37.3	-29.8	20.1
<b>230</b>	-40.0	-35.1	21.3	-39.8	-31.9	21.4
<b>240</b>	-42.5	-37.3	23.0	-42.4	-33.9	22.8
<b>250</b>	-45.1	-39.6	24.5	-44.9	-35.9	24.1
<b>260</b>	-47.6	-41.8	25.7	-47.4	-37.9	25.5
<b>270</b>	-50.1	-44.0	27.1	-49.9	-39.9	26.8
<b>280</b>	-52.7	-46.2	28.4	-52.4	-42.0	28.2

C: Concrete grade

Horizontal force  $H_{Rd,y}$  in kN

Element height h mm	SM 20 Q10	SM 20 Q12
<b>180 - 280</b>	± 4.0	± 6.5

# Serviceability

## Deformation

To determine the vertical displacement at the cantilever end of the steel structure, the deformation of the ISOPRO® 80/120 SM steel connection must be superimposed with the deformation of the adjoining steel structure.

We recommend performing verification calculations in the serviceability limit state (quasi-permanent combined load).

The steel structure must be precambered to compensate the determined deformation. It should be noted that the results are rounded up or down according to the direction of the planned drainage.

## Deformation due to the ISOPRO® element SM:

$w_1$  = deformation from thermal insulation element  
 $w_2$  = deformation from steel beam

$$w_1 = \tan \alpha \cdot (m_{Ed}/m_{Rd}) \cdot l_k \cdot 10$$

Where:

- $w_1$  = deformation at the end of the cantilever in mm due to thermal insulation element
- $\tan \alpha$  = deformation factor, see table
- $m_{Ed}$  = bending moment for calculating the precamber due to the ISOPRO® element.  
 The design engineer determines the definitive load combination in the serviceability limit state.
- $m_{Rd}$  = section modulus of the ISOPRO® element, see pages 21 - 22
- $l_k$  = system length in m

## Deformation factor $\tan \alpha$ for concrete $\geq$ C 20/25

Type	$Z_{Rd}$ kN	$D_{Rd}$ kN	$l_z$ mm	$l_d$ mm	Element height h mm											
					180	190	200	210	220	230	240	250	260	270	280	
IP 80 SM 14 Q8	89.4	110.2	320	130	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.3
IP 80 SM 14 Q10	79.8	110.5	320	130	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
IP 80 SM 14 QQ	89.4	115.5	320	320	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5
IP 80 SM 20 Q10	205.2	233.1	380	380	1.3	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7
IP 80 SM 20 Q12	191.0	229.2	380	380	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7
IP 120 SM 14 Q8	74.4	109.3	360	170	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4
IP 120 SM 14 Q10	64.2	109.3	360	170	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3
IP 120 SM 14 QQ	94.0	126.6	360	360	1.1	1.0	1.0	0.9	0.8	0.8	0.8	0.7	0.7	0.6	0.6	0.6
IP 120 SM 20 Q10	222.4	260.7	420	420	1.6	1.5	1.4	1.3	1.2	1.1	1.0	1.0	1.0	0.9	0.8	0.8
IP 120 SM 20 Q12	201.8	229.2	420	420	1.5	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.8



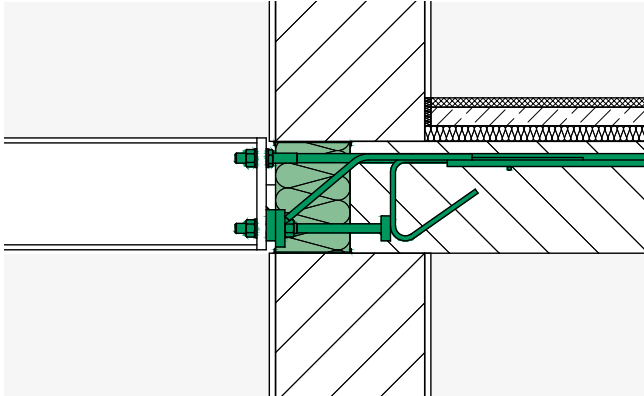
### Notes

The values given are approximations. They may deviate from the actual values depending on the installation situation and assembly. Additional influences on the deformation may need to be taken into account.

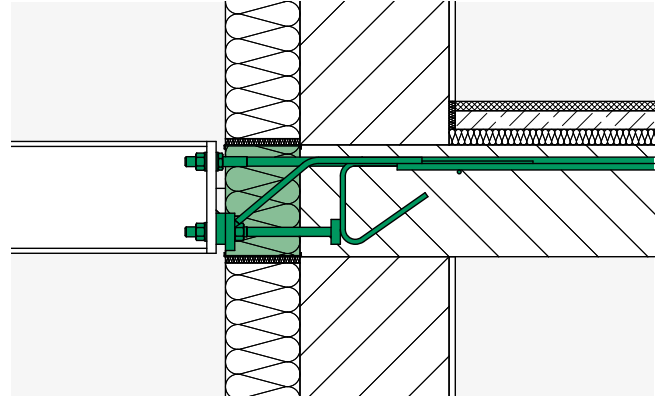
## Application

This section contains planning aids and specific information on this product type. In addition, the general notes on materials,

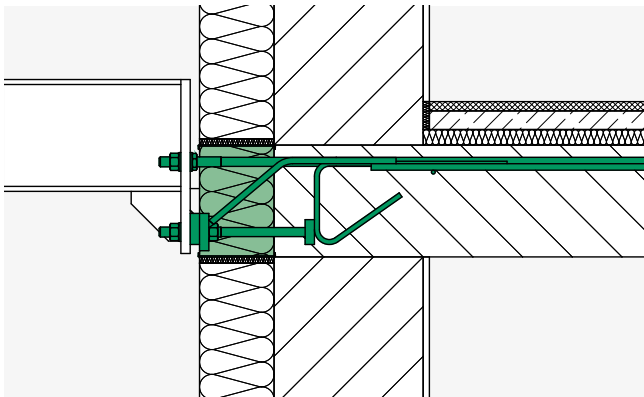
structural design, thermal insulation and fire protection, installation on site etc. on pages 10 – 17 must also be taken into account.



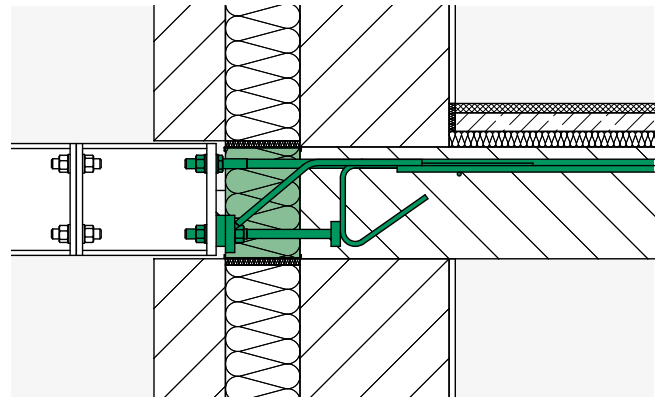
ISOPRO® SM - Installation cross-section, solid wall



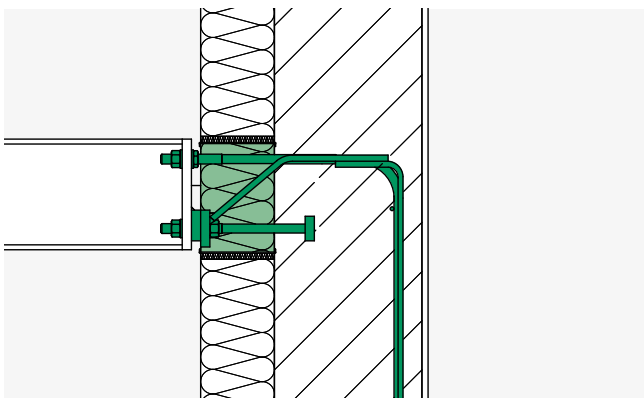
ISOPRO® SM - Installation cross-section, external thermal insulation composite system



ISOPRO® SM - Installation cross-section, external thermal insulation composite system with height-offset steel structure

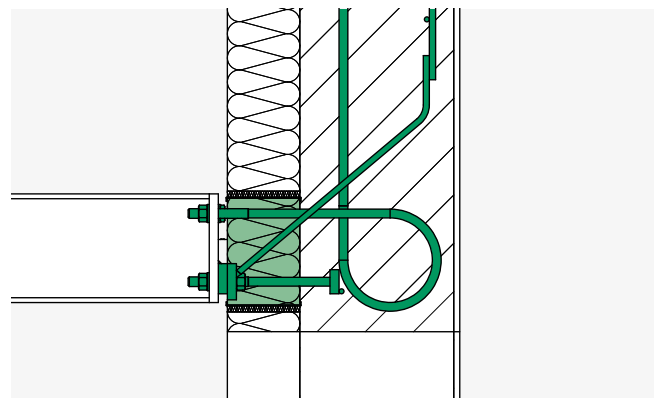


ISOPRO® SM - Installation cross-section, cavity walls with core insulation - flexible construction sequence with on-site spacer



ISOPRO® SM - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall below:

- Only possible for SM 14 Q8 / Q10 with wall thickness  $\geq 200$  mm



ISOPRO® SM - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall above:

- Possible for SM 14 Q8 / Q10 with element height  $\geq 180$  mm, wall thickness  $\geq 255$  mm and lower edge of wall  $\geq 30$  mm lower edge of thermal insulation element
- Possible for SM 14 Q8 / Q10 from element height  $\geq 240$  mm, and wall thickness  $\geq 240$  mm



Our Application Technology department will be happy to provide you with further information regarding your individual installation situation.

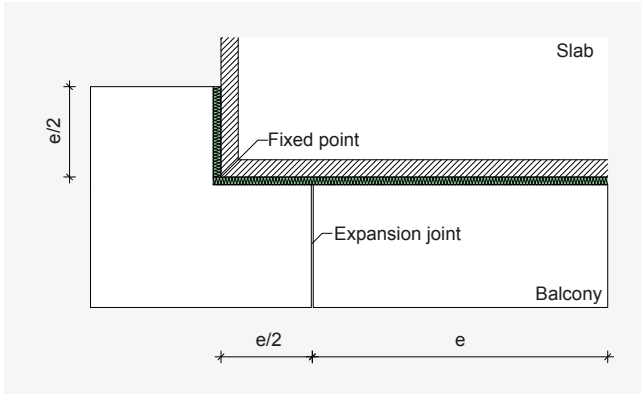
T +49 7742 9215-300  
 technik-hbau@pohlcon.com

# Element layout

## Expansion joint spacing

The decisive factor for determining the maximum permissible expansion joint spacing is a balcony slab that is firmly connected to the steel beams. If the connection between the

steel beams and the covering is movable, the distances of the non-moveable connections are decisive.



Expansion joint spacing with fixed point on outside corner

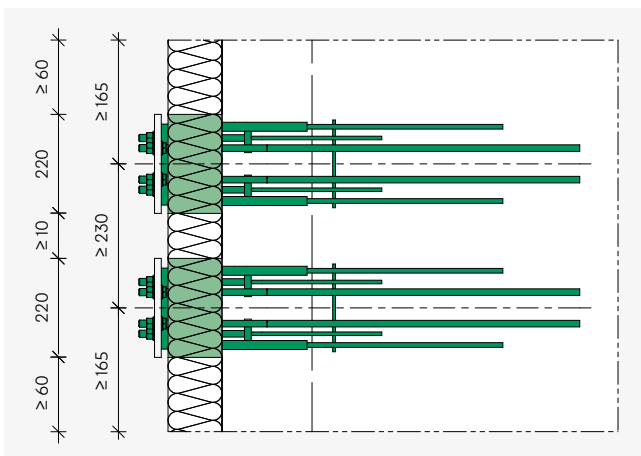
### Maximum permissible expansion joint spacing for IP 80 SM

Type	Joint spacing e m
IP 80 SM 14 Q8	≤ 6.0
IP 80 SM 14 Q10	
IP 80 SM 14 QQ	
IP 80 SM 20 Q10	≤ 3.5
IP 80 SM 20 Q12	

### Maximum permissible expansion joint spacing for IP 120 SM

Type	Joint spacing e m
IP 120 SM 14 Q8	≤ 9.6
IP 120 SM 14 Q10	
IP 120 SM 14 QQ	
IP 120 SM 20 Q10	≤ 5.3
IP 120 SM 20 Q12	

## Edge spacings and centre-to-centre distances



Minimum edge spacings



### Notes

The minimum edge spacing for reinforced concrete components and centre-to-centre distances between two ISOPRO® elements must be observed in accordance with national technical approval abZ Z-15.7-313.

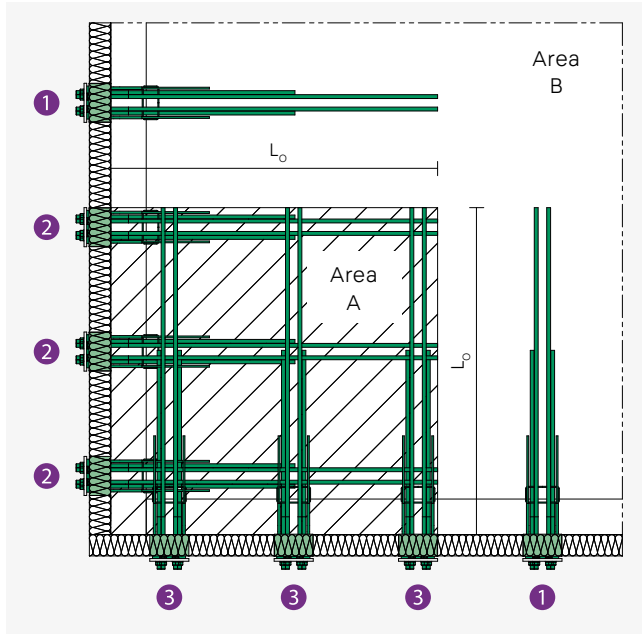
If the permissible minimum distances cannot be achieved, the load-bearing capacity of the ISOPRO® elements must be reduced in consultation with our Application Technology department.



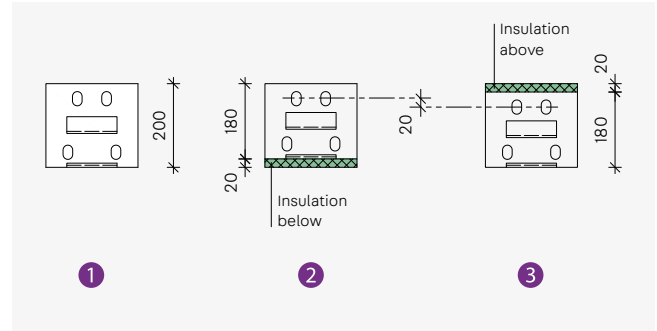
## Element layout in corners

The tie bars, compression struts and shear bars of the ISOPRO® elements overlap at the outer corner perpendicular to each other due to their position. For this reason, the

elements in area A must be positioned at a height offset of 20 mm. This can be implemented by adding 20 mm of insulation at the factory.



Cantilevered external balcony



### Sample order for elements with additional insulation for a slab 200 mm thick

- ❶: SM 14 Q8 h200
- ❷: SM 14 Q8 h180 + 20 mm additional insulation below
- ❸: SM 14 Q8 h180 + 20 mm additional insulation above

### Overlap length $L_o$ area A in corner

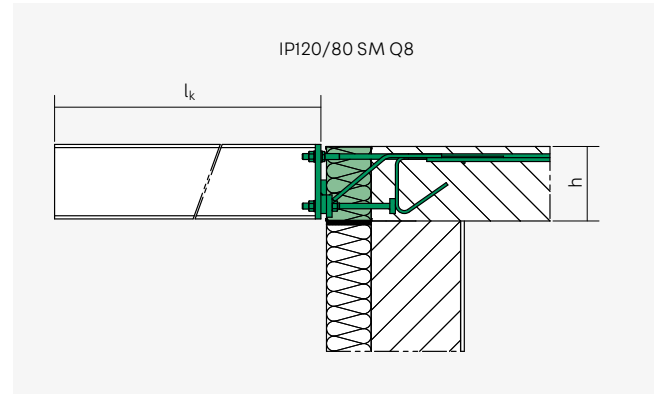
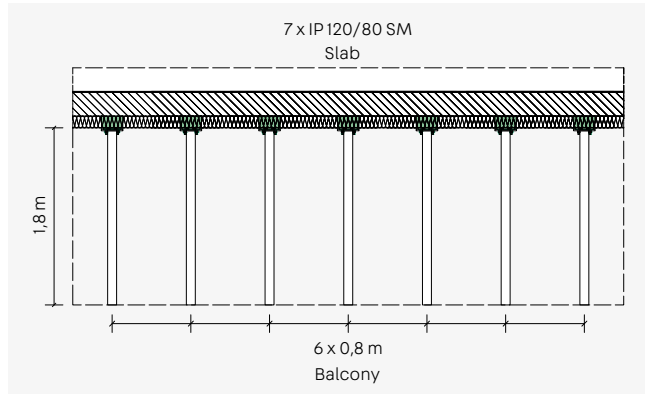
Type	Area A, $L_o$ mm	
	IP80	IP120
SM 14	825	910
SM 20	1585	1840



### Notes

- Connection in corner only for slab thicknesses  $\geq 200$  mm
- Specified element load-bearing capacity for  $h - 20$  mm
- Take 20 mm height difference into account for the on-site end plate
- Reduced expansion joint spacing  $e/2$  in the corner

## Calculation example



### Structural system and load assumptions

#### Geometry

Cantilever length	$l_k = 1.80 \text{ m}$
Balcony width	$w = 4.80 \text{ m}$
Thickness of the inner reinforced concrete ceiling slab	$h = 200 \text{ mm}$
Centre-to-centre distance of the connections	$a = 0.8 \text{ m}$

#### Load assumptions

Dead weight with light covering	$g = 0.5 \text{ kN/m}^2$
Live load	$q = 4.0 \text{ kN/m}^2$
Dead weight of railing	$F_G = 0.60 \text{ kN/m}$
Horizontal load on railing	$H_G = 0.50 \text{ kN/m}$

#### Exposure class

Selected:	Interior XC 1
	Concrete grade C25/30 for the slab
	Concrete cover $c_v = 20 \text{ mm}$

#### Connection geometry

No height offset

#### Balcony support

Clamped cantilevers

### Verification in load-bearing capacity limit state (moment load and shear force)

#### Internal forces:

$$M_{Ed} = -[(\gamma_G \cdot g_B + \gamma_Q \cdot q) \cdot l_k^2 / 2 \cdot a + \gamma_G \cdot F_G \cdot a \cdot l_k + \gamma_Q \cdot \Psi_0 \cdot H_G \cdot 1.0 \cdot a]$$

$$M_{Ed} = -[(1.35 \cdot 0.5 + 1.5 \cdot 4.0) \cdot 1.8^2 / 2 \cdot 0.8 + 1.35 \cdot 0.6 \cdot 0.8 \cdot 1.8 + 1.5 \cdot 0.7 \cdot 0.5 \cdot 1.0 \cdot 0.8]$$

$$M_{Ed} = -10.3 \text{ kNm}$$

$$V_{Ed} = (\gamma_G \cdot g_B + \gamma_Q \cdot q) \cdot a \cdot l_k + \gamma_G \cdot F_G \cdot a$$

$$V_{Ed} = (1.35 \cdot 0.5 + 1.5 \cdot 4.0) \cdot 0.8 \cdot 1.8 + 1.35 \cdot 0.6 \cdot 0.8$$

$$V_{Ed} = +10.3 \text{ kN}$$

## Calculation

### Alternative IP 120

Selected:

7 x IP 120 SM 14 Q8 h200

$$M_{Rd} = -12.5 \text{ kN/m} > M_{Ed} = -10.3 \text{ kN/m}$$

$$V_{Rd} = +26.0 \text{ kN} > V_{Ed} = +10.3 \text{ kN}$$

### Alternative IP 80

Selected:

7 x IP 80 SM 14 Q8 h200

$$M_{Rd} = -11.7 \text{ kN/m} > M_{Ed} = -10.3 \text{ kN/m}$$

$$V_{Rd} = +20.0 \text{ kN} > V_{Ed} = +10.3 \text{ kN}$$

## Verification for deformation in serviceability limit state

### Selected load combination:

$$g + 0.3 q$$

Determine

$M_{Ed, GZG}$  in serviceability limit state

$$M_{Ed, GZG} = -[(g_B + \Psi_{2j} \cdot q) \cdot l_k^2 / 2 \cdot a + F_G \cdot a \cdot l_k + \Psi_{2j} \cdot H_G \cdot 1.0 \cdot a]$$

$$M_{Ed, GZG} = -[(0.5 + 0.3 \cdot 4.0) \cdot 1.8^2 / 2 \cdot 0.8 + 0.60 \cdot 0.8 \cdot 1.8 + 0.3 \cdot 0.5 \cdot 1.0 \cdot 0.8] = -3.19 \text{ kNm}$$

### Deformation:

#### Alternative IP 120

$$W_D = -[\tan \alpha \cdot l_k \cdot (M_{Ed, GZG} / M_{Rd})] \cdot 10 \text{ [mm]}$$

$$W_D = [0.7 \cdot 1.80 \cdot (-3.19 / -12.50)] \cdot 10 = 3.21 \text{ mm}$$

#### Alternative IP 80

$$W_D = -[\tan \alpha \cdot l_k \cdot (M_{Ed, GZG} / M_{Rd})] \cdot 10 \text{ [mm]}$$

$$W_D = [0.5 \cdot 1.80 \cdot (-3.19 / -12.50)] \cdot 10 = 2.29 \text{ mm}$$

## Arrangement of expansion joints

### Alternative IP 120

Balcony length:  $4.80 \leq 8.60 \text{ m} \geq$  Upper edge

Selected:

7 x IP 120 SM 14 Q8 h200

### Alternative IP 80

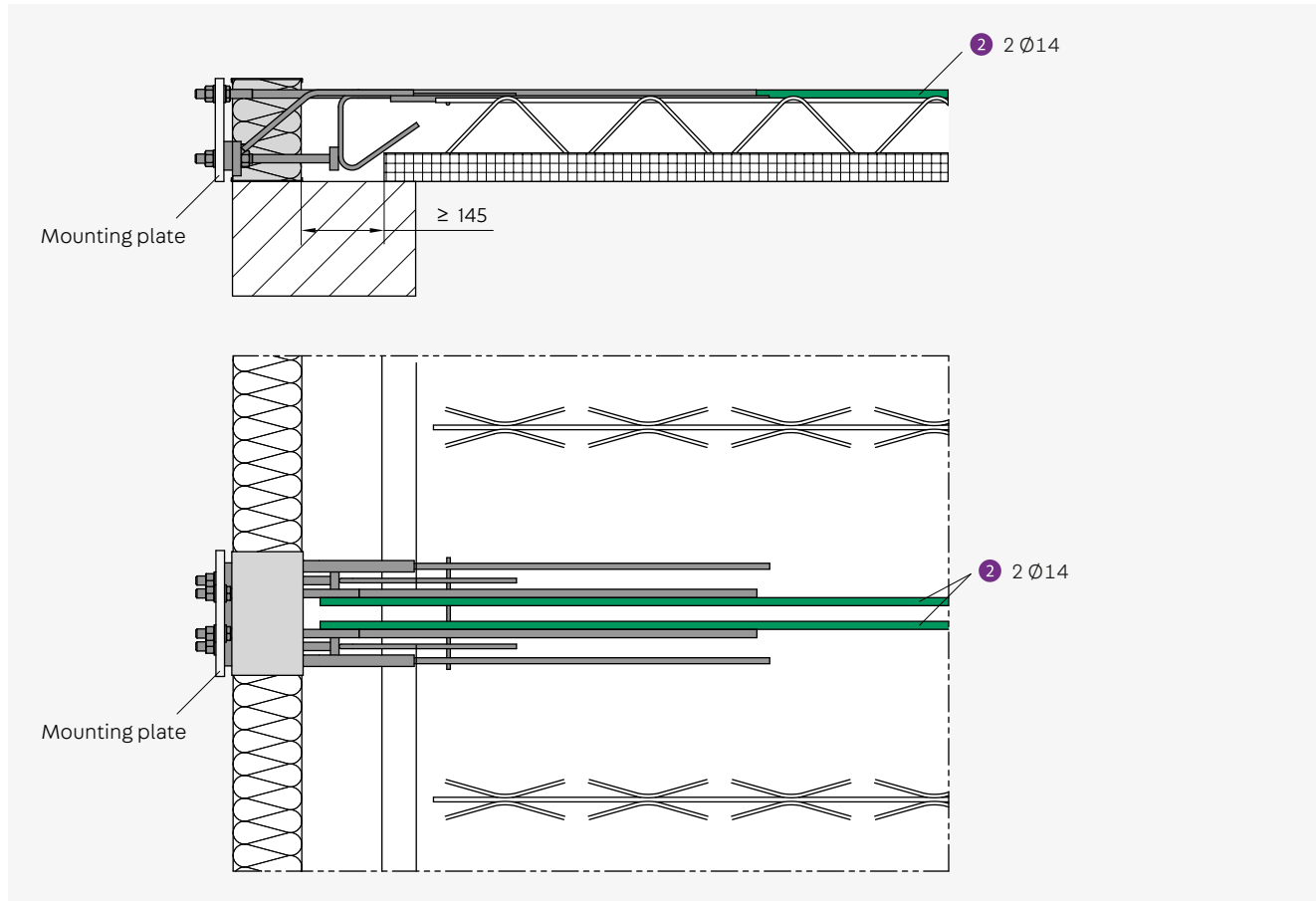
Balcony length:  $4.80 \leq 6.00 \text{ m} \geq$  Upper edge

Selected:

7 x IP 80 SM 14 Q8 h200

## On-site reinforcement

### ISOPRO® 80/120 SM 14 Q8 and SM 14 Q10 – In-situ concrete and precast construction



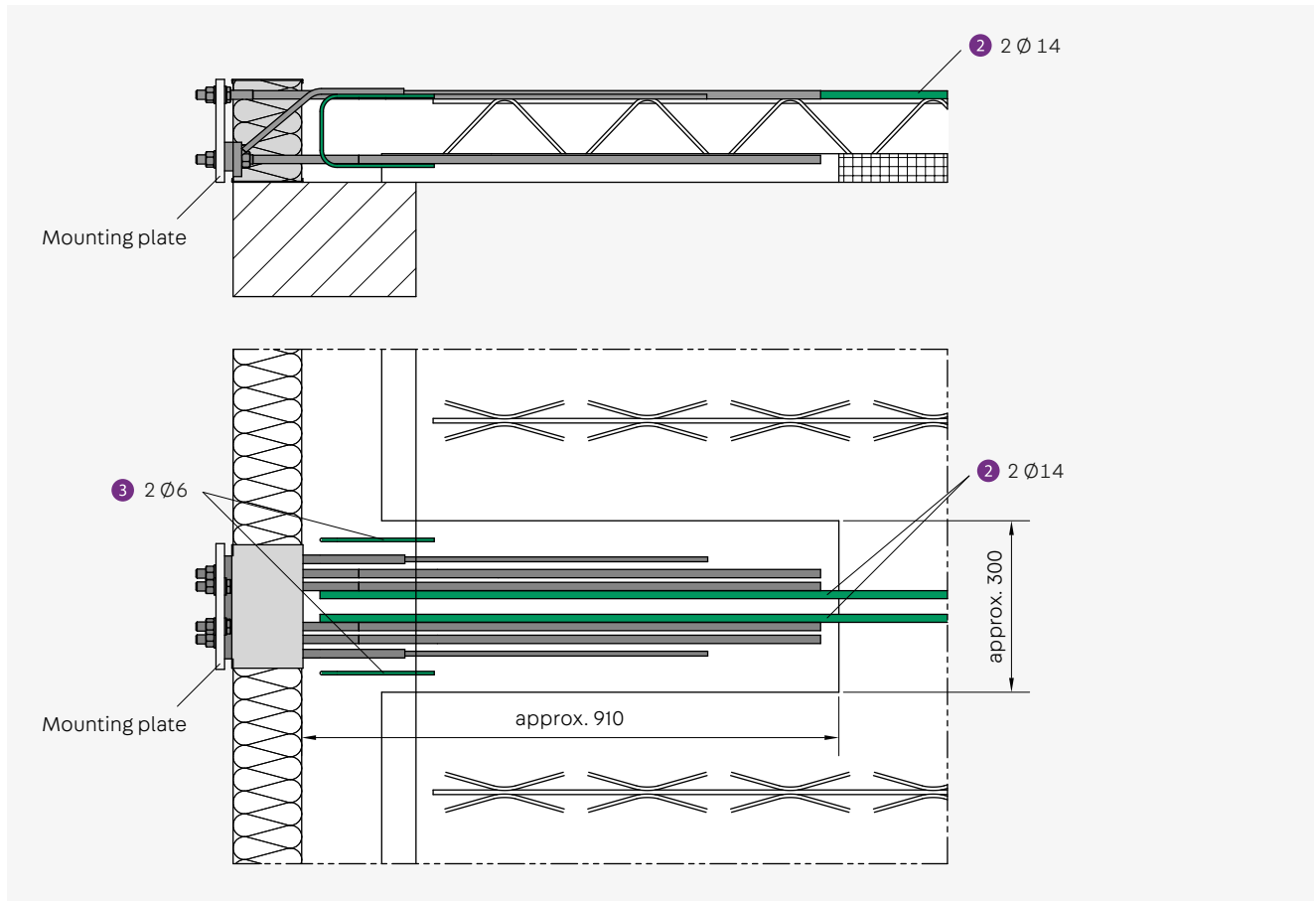
ISOPRO® 120 SM 14 Q10



#### Notes

- The tie bars must be reinforced with 2 x dia. 14 in accordance with DIN EN 1992-1-1. ②
- Structural transverse reinforcement according to DIN EN 1992-1-1

## ISOPRO® 80/120 SM 14 QQ – In-situ concrete and precast construction



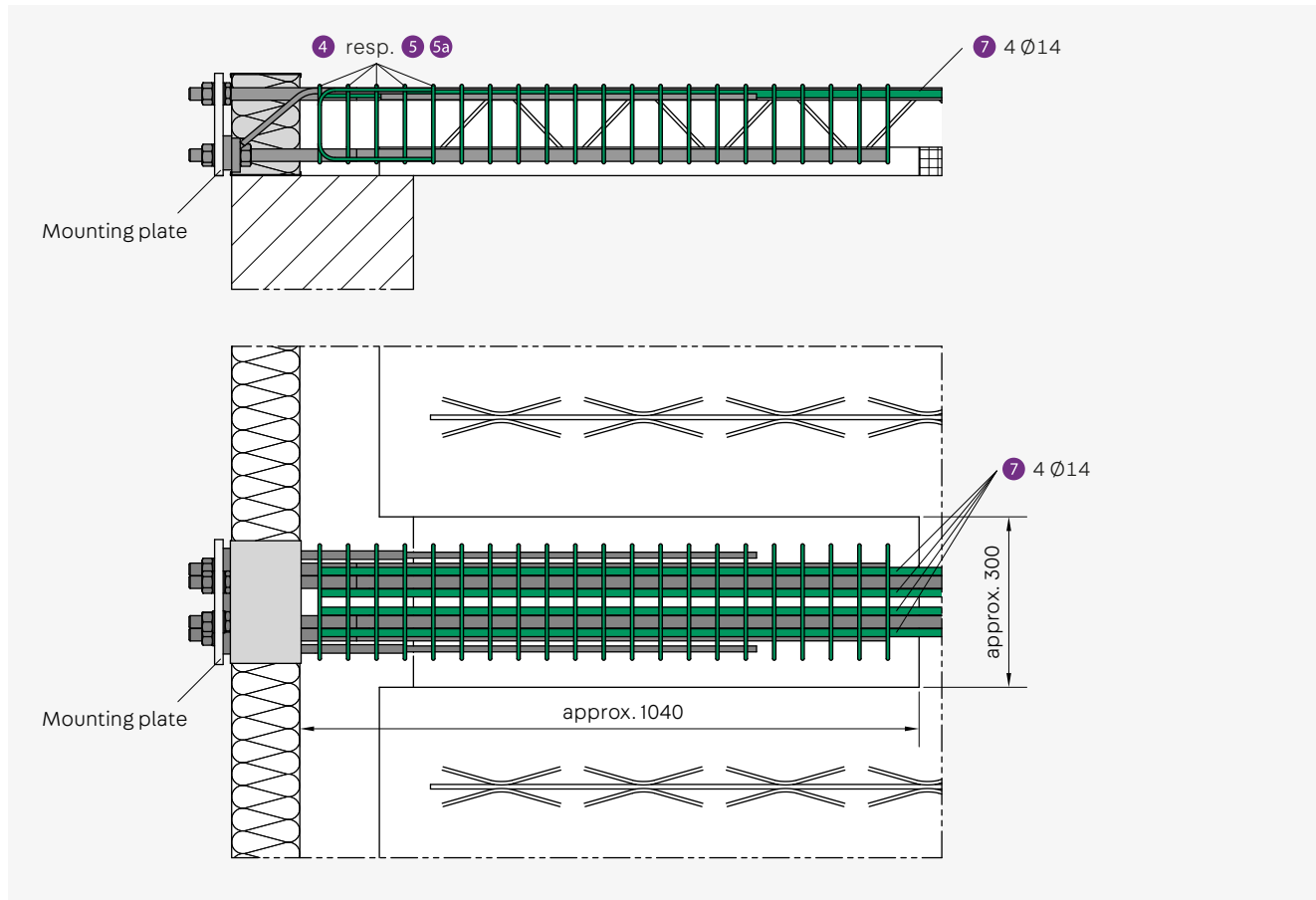
ISOPRO® SM 14 QQ



### Notes

- The tie bars must be reinforced with 2 x dia. 14 in accordance with DIN EN 1992-1-1. **2**
- Structural transverse reinforcement according to DIN EN 1992-1-1
- Two stirrups with  $d_s = 6$  mm or greater must be installed on site for lifting shear forces. **3**
- In precast slabs, recesses of 910 mm (as shown in drawing) will need to be provided for the ISOPRO® element type SM 14 QQ.
- The compression strut connections must be suitably reinforced to withstand the planned lifting loads according to the structural engineer's specifications
- Additional reinforcement in the area of the recess according to the structural engineer's specifications

## ISOPRO® 80/120 SM 20 Q10 and SM 20 Q12 – In-situ concrete and precast construction



ISOPRO® SM 20 Q10



### Notes

- The tie bars must be reinforced with 4 x dia. 14 in accordance with DIN EN 1992-1-1. **7**
- The external transverse reinforcement must be installed in accordance with item 4 (for IP80 SM20 Q10 or IP120 SM20 Q10), or item 5 and 5a (for IP80 SM20 Q12 or IP120 SM20 Q12). **4 5 5a**
- In the event of lifting transverse forces, brackets (item 3) must be provided on site. (see IP 80/120 SM 14 QQ) **3**
- In precast slabs, a recess of 1040 mm (as shown in drawing) will need to be provided for the ISOPRO® element.
- The compression strut connections must be suitably reinforced to withstand the planned lifting loads according to the structural engineer's specifications.
- Provide additional reinforcement in the area of the recess according to the structural engineer's specifications

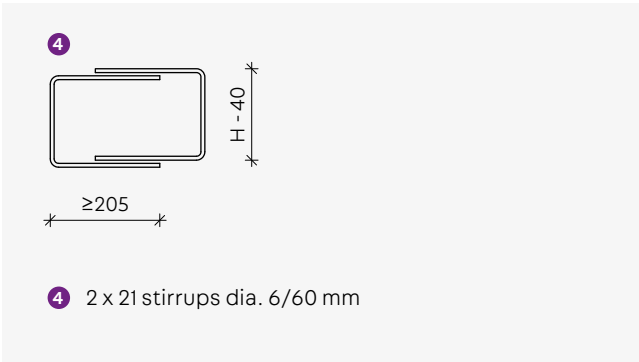


**Notes**

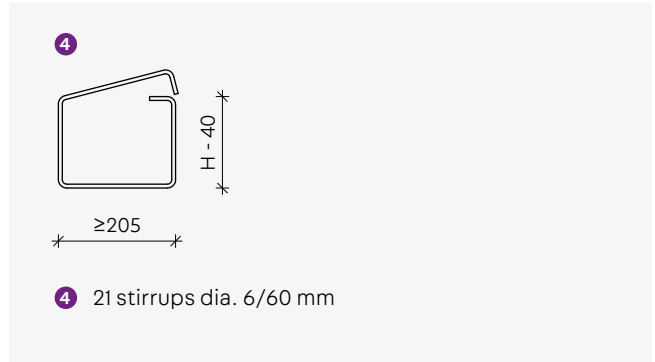
Provide external transverse reinforcement depending on the recess length and the ceiling slab thickness H.

**External transverse reinforcement for recess over the entire length of the tie bar**

**Variant 1 (in-situ concrete slab)**

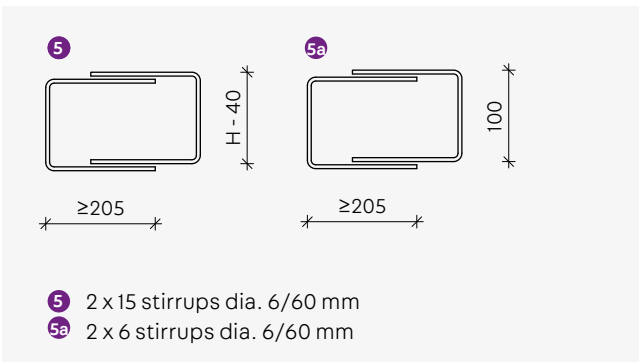


**Variant 3 (precast slab)**

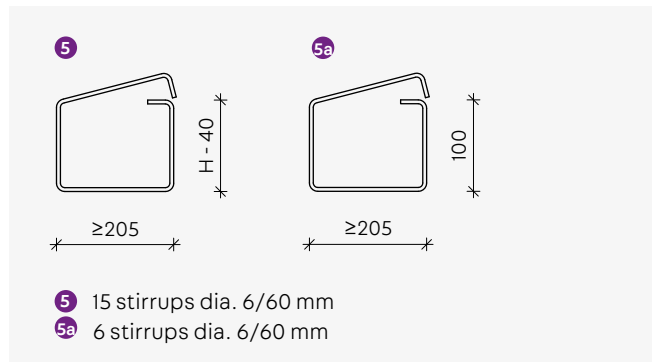


**External transverse reinforcement for recess with L = 1040 mm**

**Variant 2 (in-situ concrete slab)**



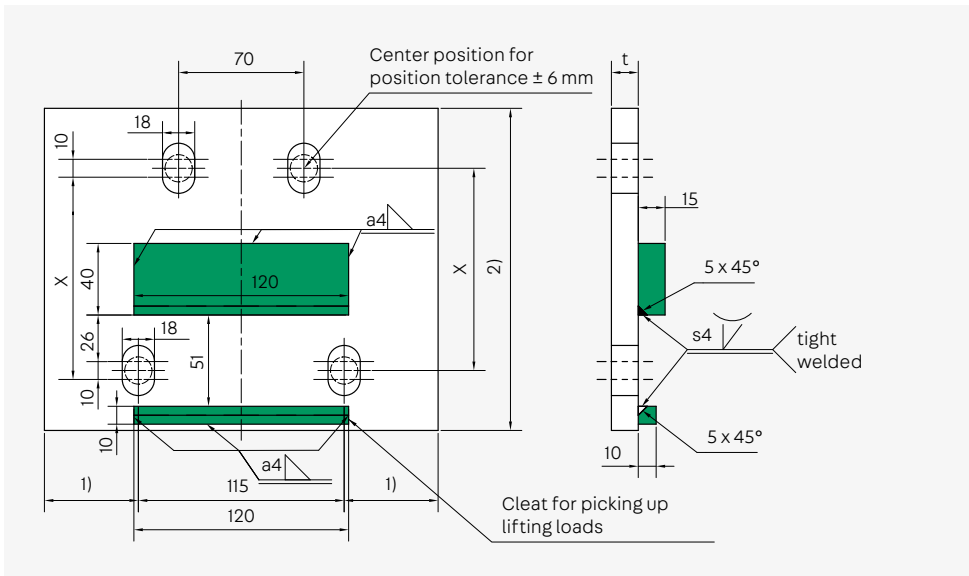
**Variant 4 (precast slab)**







## ISOPRO® 80/120 SM 14 QQ



### Torques\*

**IP80 SM14 QQ**  
 $155 \text{ Nm} \leq M_A \leq 175 \text{ Nm}$

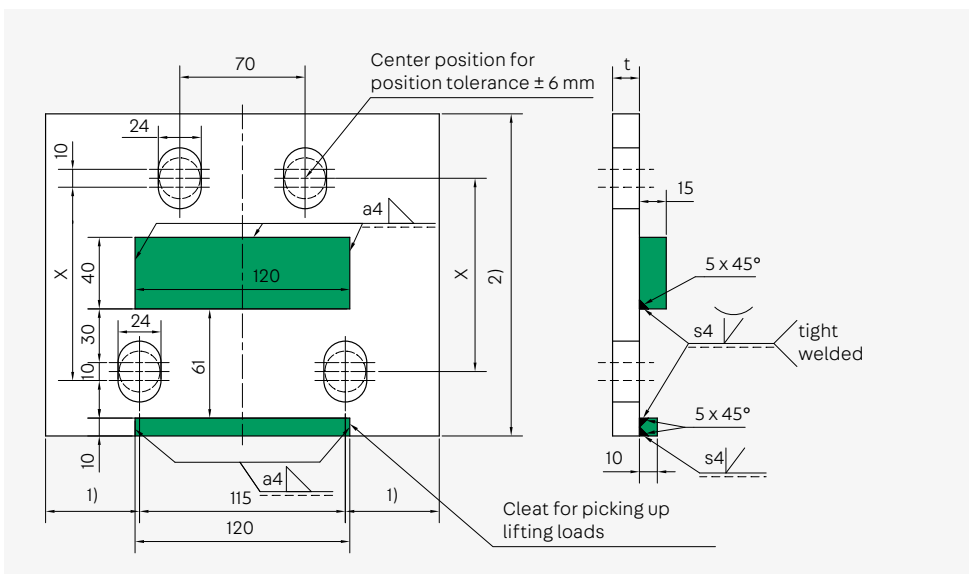
**IP120 SM14 QQ**  
 $190 \text{ Nm} \leq M_A \leq 265 \text{ Nm}$



**Free clamping length**  
 30 mm

Element height h mm	180	200	220	240	250	260	280
Hole spacing X mm	113	133	153	173	183	193	213

## ISOPRO® 80/120 SM 20 Q10 and SM 20 Q12



### Torques\*

**IP80 SM20 Q10 and  
 IP80 SM20 Q12,**  
 $260 \text{ Nm} \leq M_A \leq 460 \text{ Nm}$

**IP120 SM20 Q10 and  
 IP120 SM20 Q12,**  
 $290 \text{ Nm} \leq M_A \leq 690 \text{ Nm}$



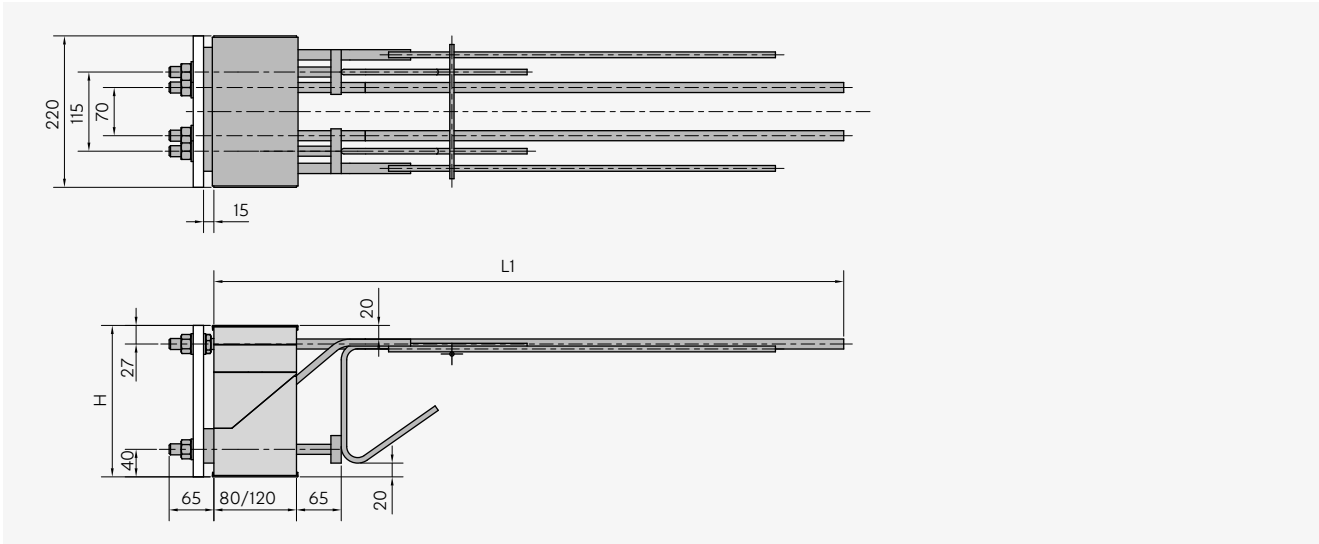
**Free clamping length**  
 35 mm

Element height h mm	180	200	220	240	250	260	280
Hole spacing X mm	108	128	148	168	178	188	208

\*Regardless of the rated loads, the bolts must be preloaded with the tightening torques specified above based on their type.

# Element dimensions

## ISOPRO® 80/120 SM 14 Q8 and SM 14 Q10

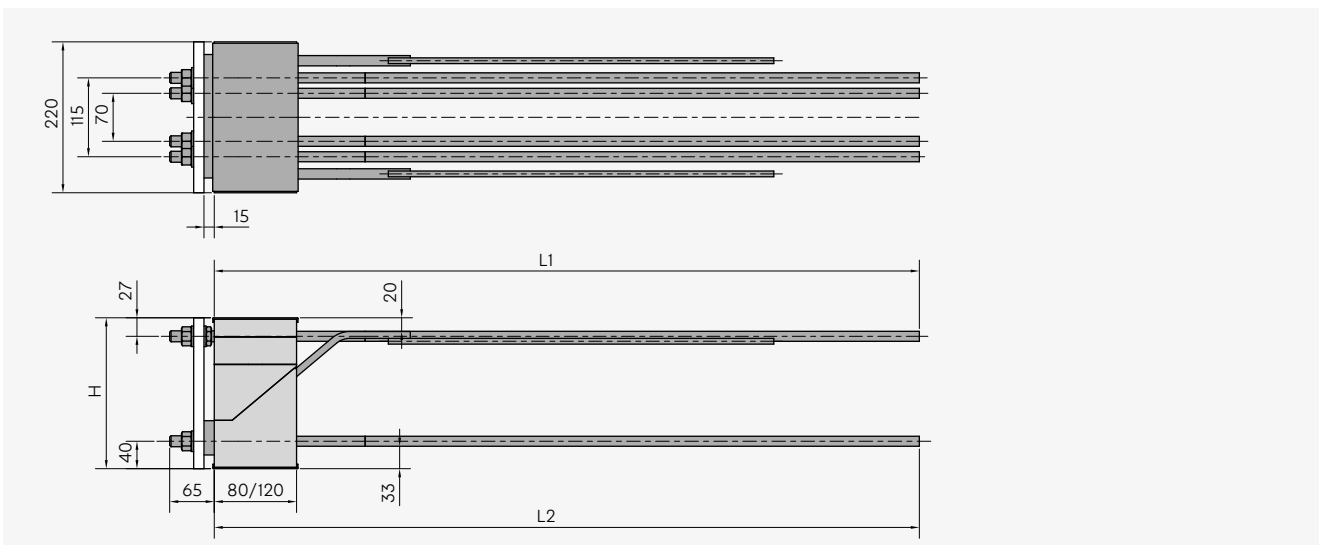


IP 120 SM 14 Q8 top view and cross-section | H: Element height as per customer's specifications

### Dimensions in mm

Type	SM 14 Q8/Q10	
	IP 80	IP 120
<b>L1</b>	915	996

## ISOPRO® 80/120 SM 14 QQ

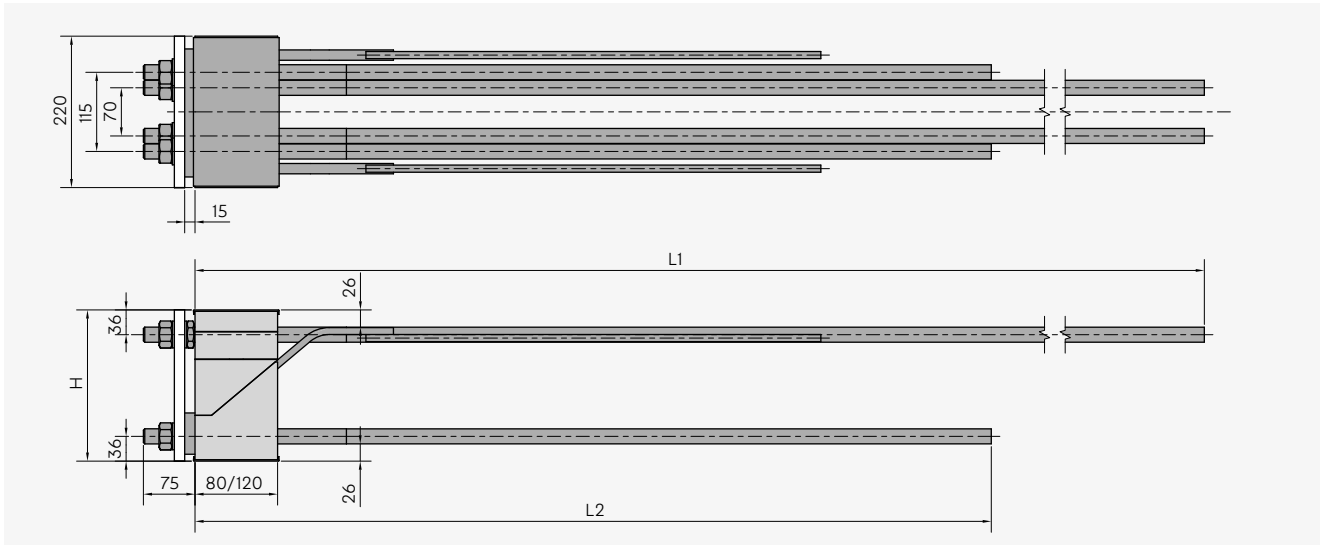


IP 120 SM 14 QQ top view and cross-section | H: Element height as per customer's specifications

### Dimensions in mm

Type	SM 14 QQ	
	IP 80	IP 120
<b>L1</b>	915	1028
<b>L2</b>	870	1028

## ISOPRO® 80/120 SM 20 Q10 and SM 20 Q12



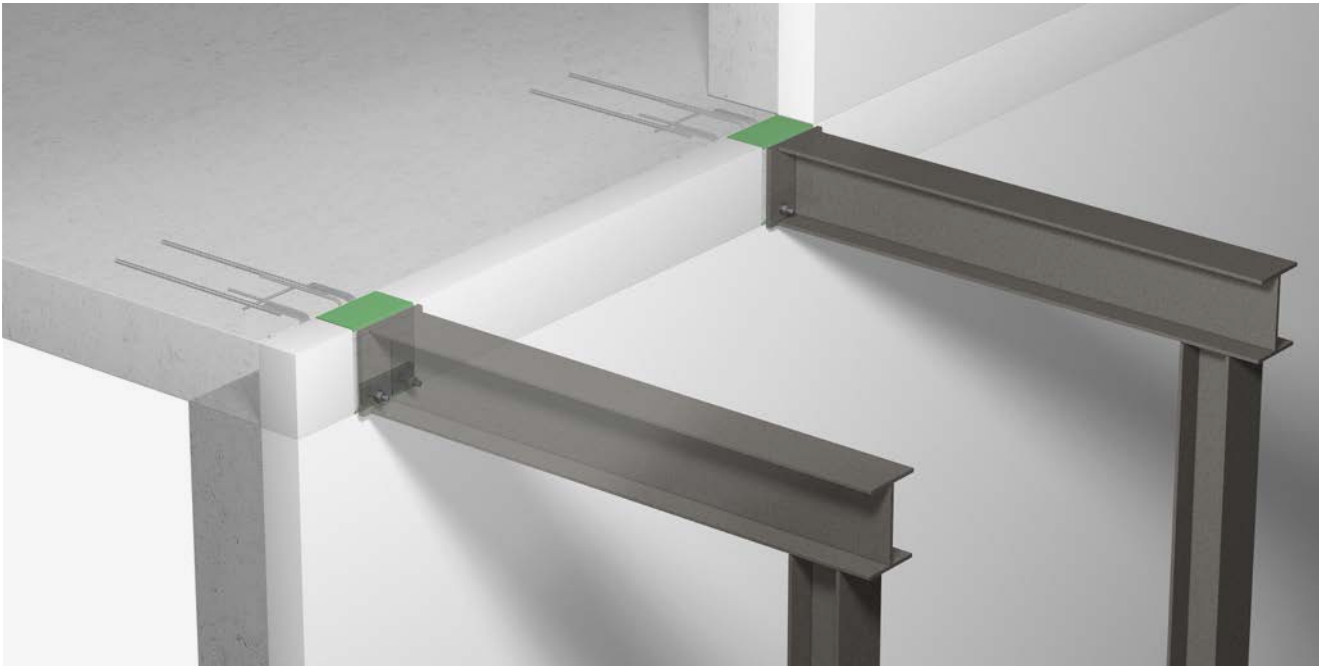
IP 120 SM 20 Q10 top view and cross-section | H: Element height as per customer's specifications

### Dimensions in mm

Type	SM 20 Q10/Q12	
	IP 80	IP 120
<b>L1</b>	1665	1960
<b>L2</b>	1040	1157

# IP 80 SQ, IP 120 SQ

Connection for supported steel structures



## IP 80/120 SQ

- For transferring shear forces
- Concrete cover cv20
- Element heights from 180 mm

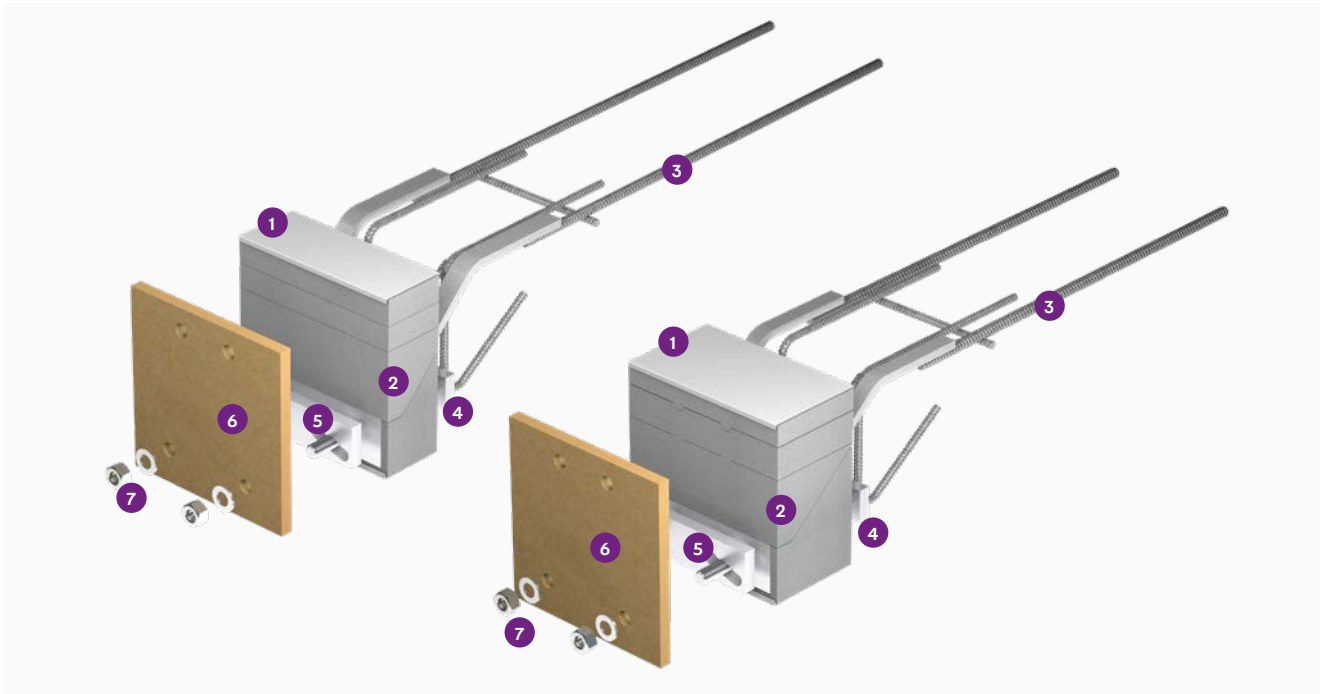


## Type designation

IP120 SQ 8 h200

Type (insulating body thickness) ————  
Shear force load-bearing capacity ————  
Element height ————

## Element design



Element design using ISOPRO® 80 SQ 8 and ISOPRO® 120 SQ 8 as an example

- 1 Cover profile**
  - Plastic
- 2 Insulating body**
  - Neopor
- 3 Shear bars**
  - Structural steel
  - Stainless steel
- 4 Compression struts**
  - Structural steel
  - Stainless steel
- 5 Adjustment plate**
  - For millimetre-precise alignment of the steel structure
  - Stainless steel
- 6 Wooden mounting plate**
  - For mounting the insulating element
- 7 Nuts, washers**
  - Included in scope of delivery

## Dimensioning table for IP 80 SQ

Vertical force  $V_{Rd,z}$  in kNm for concrete C20/25

Element height h mm	SQ 8	SQ 10	SQ 12
180 - 280	30.4	51.8	62.5

C: Concrete grade

Horizontal force  $H_{Rd,y}$  in kN

Element height h mm	SQ 8	SQ 10	SQ 12
180 - 280	± 2.5	± 4.0	± 5.5

## Dimensioning table for IP 120 SQ

Vertical force  $V_{Rd,z}$  in kNm for concrete C25/30

Element height h mm	SQ 8	SQ 10	SQ 12
180 - 280	27.4	47.8	59.6

C: Concrete grade

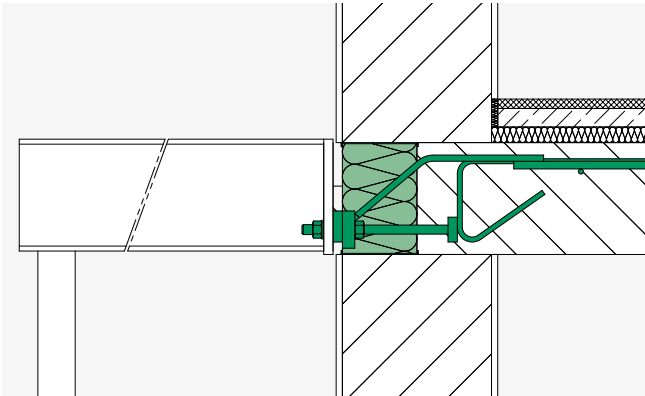
Horizontal force  $H_{Rd,y}$  in kN

Element height h mm	SQ 8	SQ 10	SQ 12
180 - 280	± 2.5	± 4.0	± 6.5

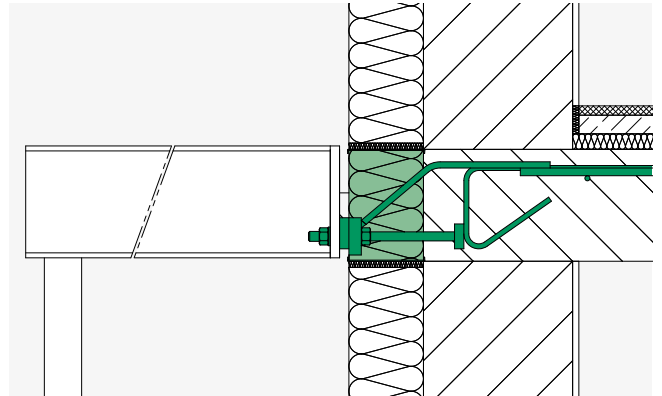
## Application

This section contains planning aids and specific information on the product. In addition, the general notes on materials,

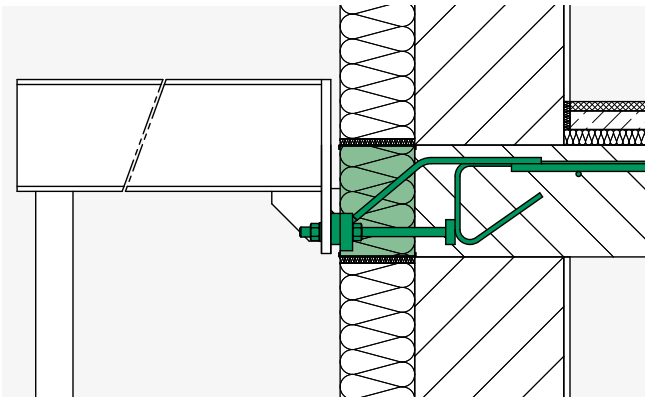
structural design, thermal insulation and fire protection, installation on site etc. on pages 10 - 17 must also be taken into account.



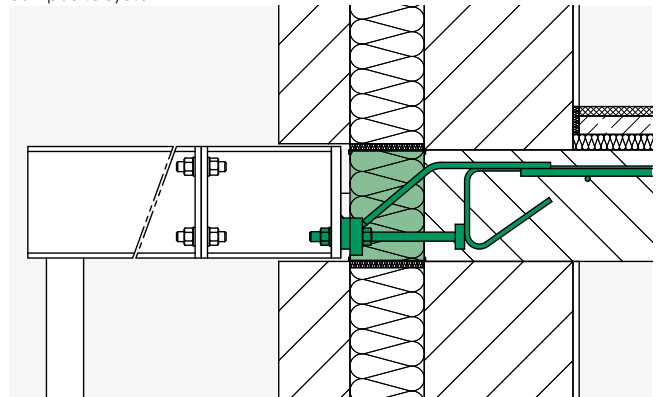
ISOPRO® SQ - Installation cross-section, solid wall



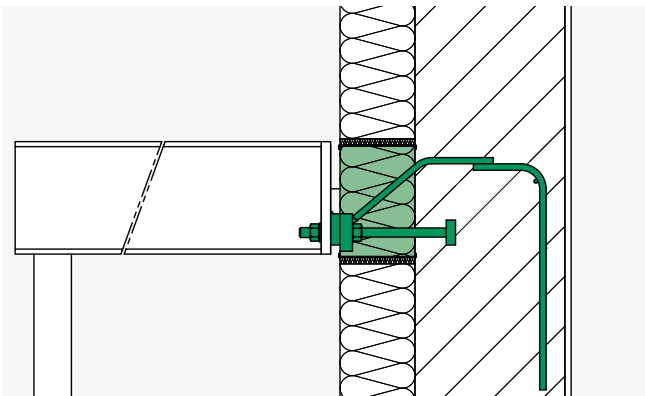
ISOPRO® SQ - Installation cross-section, external thermal insulation composite system



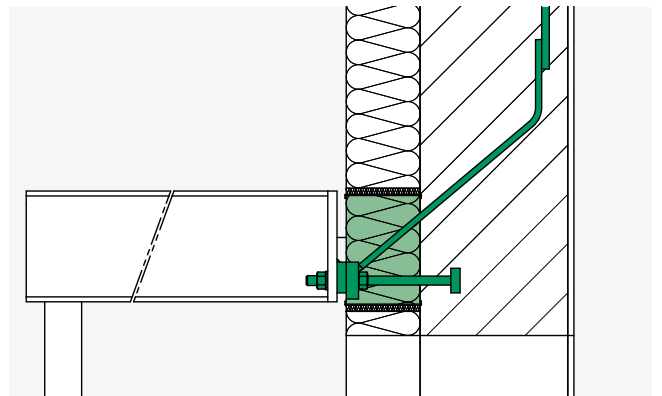
ISOPRO® SQ - Installation cross-section, external thermal insulation composite system with height-offset steel structure



ISOPRO® SQ - Installation cross-section, cavity walls with core insulation - flexible construction sequence with on-site spacer



ISOPRO® SQ - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall below:  
• Possible for SQ 8 / SQ 10 / SQ 12 for wall thickness  $\geq 200$  mm



ISOPRO® SQ - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall above:  
• Possible for SQ 8 / SQ 10 / SQ 12 for wall thickness  $\geq 200$  mm



Our Application Technology department will be happy to provide you with further information regarding your individual installation situation.

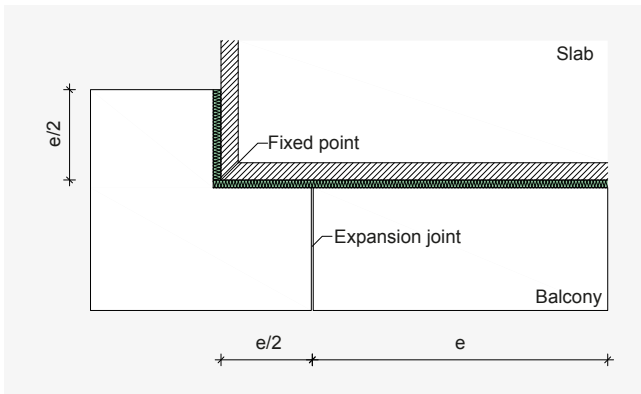
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technik-hbau@pohlcon.com

# Element layout

## Expansion joint spacing

The decisive factor for determining the maximum permissible expansion joint spacing is a balcony slab that is firmly connected to the steel beams. If the connection between the

steel beams and the covering is movable, the distances of the non-moveable connections are decisive.



Expansion joint spacing with fixed point on outside corner

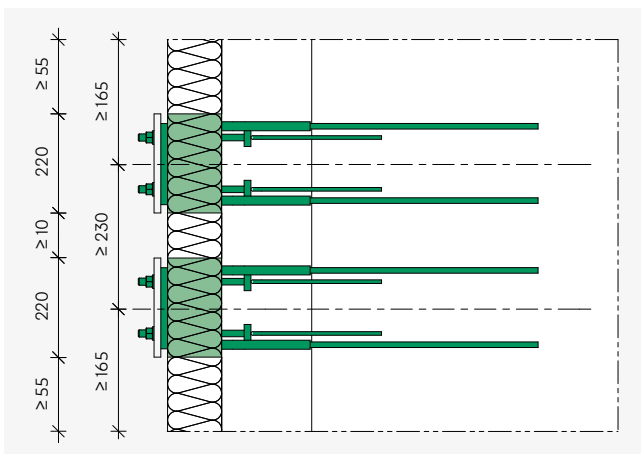
### Maximum permissible expansion joint spacing for IP 80 SQ

Type	Joint spacing e m
IP 80 SQ 8	≤ 6.0
IP 80 SQ 10	
IP 80 SQ 12	

### Maximum permissible expansion joint spacing for IP 120 SQ

Type	Joint spacing e m
IP 120 SQ 8	≤ 8.6
IP 120 SQ 10	
IP 120 SQ 12	

## Edge spacings and centre-to-centre distances



Minimum edge spacings



### Notes

The minimum edge spacing for reinforced concrete components and centre-to-centre distances between two ISOPRO® elements must be observed in accordance with national technical approval abZ Z-15.7-313.

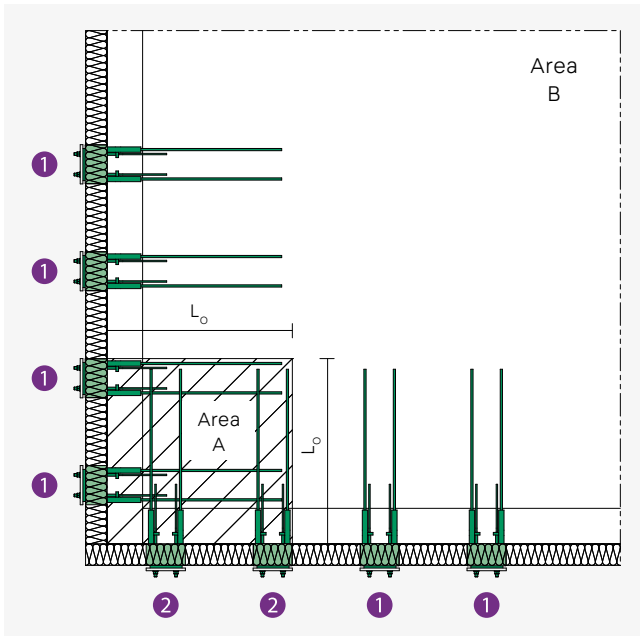
If the permissible minimum distances cannot be achieved, the load-bearing capacity of the ISOPRO® elements must be reduced in consultation with our Application Technology department.



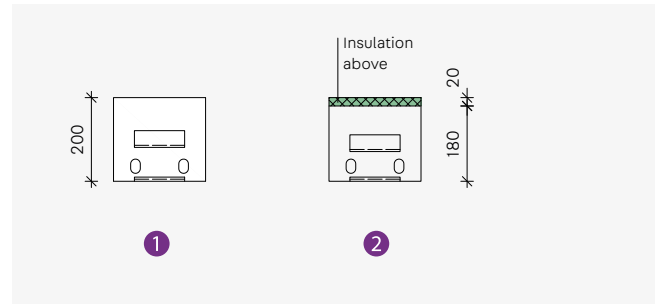
## Element layout in corners

The tie bars, compression struts and shear bars of the ISOPRO® elements overlap at the outer corner perpendicular to each other due to their position. For this reason, the

elements in area A must be positioned at a height offset of 20 mm. This can be implemented by adding 20 mm of insulation at the factory.



Supported external balcony



**Sample order for elements with additional insulation for a slab 200 mm thick**

- ①: SQ 8 h200
- ②: SQ 8 h180 + 20 mm additional insulation above

### Overlap length $L_o$ area A in corner

Type	Area A, $L_o$ mm
SQ 8, SQ 10	870
SQ 12	1040

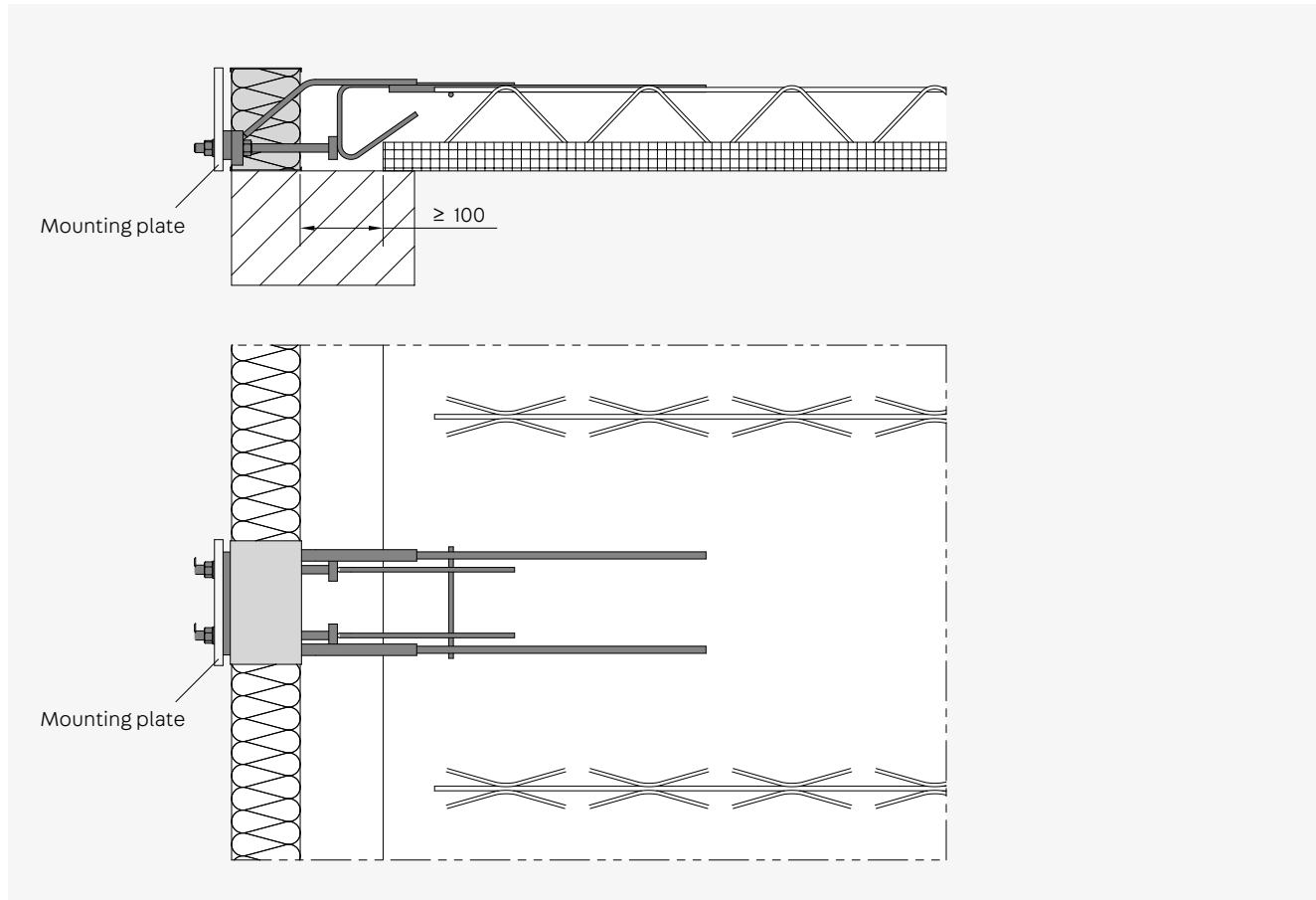


#### Notes

- Connection in corner only for slab thicknesses  $\geq 200$  mm
- Take 20 mm height difference into account for the on-site end plate
- Reduced expansion joint spacing  $e/2$  in the corner

## On-site reinforcement

### ISOPRO® SQ – In-situ concrete and precast construction



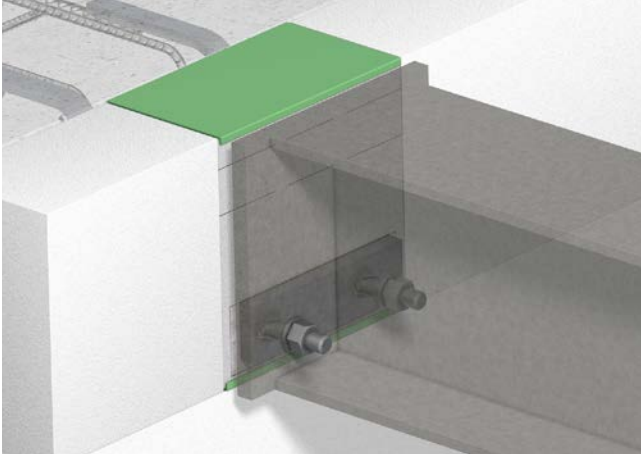
ISOPRO® 120 SQ Q10



#### Notes

- The structural edge reinforcement 2 x dia. 8 is fitted at the factory.
- No additional reinforcement is required for the ISOPRO® 80/120 element type SQ.

## On-site end plate

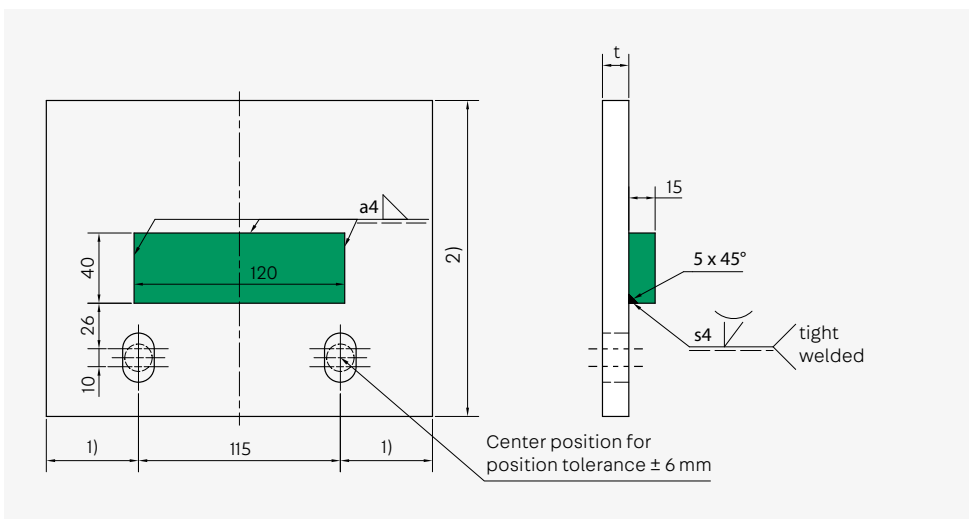


### Notes

Dimensions labelled 1) and 2) and choice of material according to the structural engineer's specifications. The choice of the end plate thickness  $t$  is based on the minimum thickness of the plate as specified by the structural engineer. The end plate thickness  $t$  must not be greater than the free clamping length of the threaded rods on the ISOPRO®.

Apply corrosion protection after welding.

## ISOPRO® 80/120 SQ



### Torques\*

#### IP80 SQ 8

$70 \text{ Nm} \leq M_A \leq 175 \text{ Nm}$

#### IP80 SQ 10

$115 \text{ Nm} \leq M_A \leq 175 \text{ Nm}$

#### IP80 SQ 12

$140 \text{ Nm} \leq M_A \leq 175 \text{ Nm}$

#### IP120 SQ 8

$65 \text{ Nm} \leq M_A \leq 265 \text{ Nm}$

#### IP120 SQ 10

$105 \text{ Nm} \leq M_A \leq 265 \text{ Nm}$

#### IP120 SQ 12

$130 \text{ Nm} \leq M_A \leq 265 \text{ Nm}$



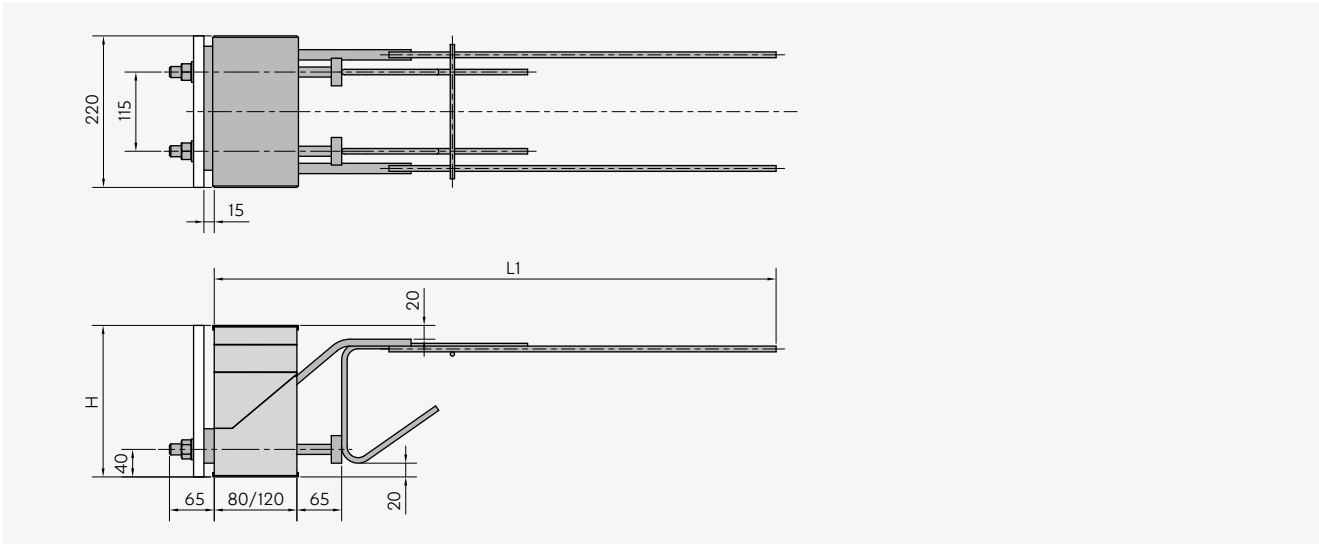
### Free clamping length

30 mm

\*Regardless of the rated loads, the bolts must be preloaded with the tightening torques specified above based on their type.

# Element dimensions

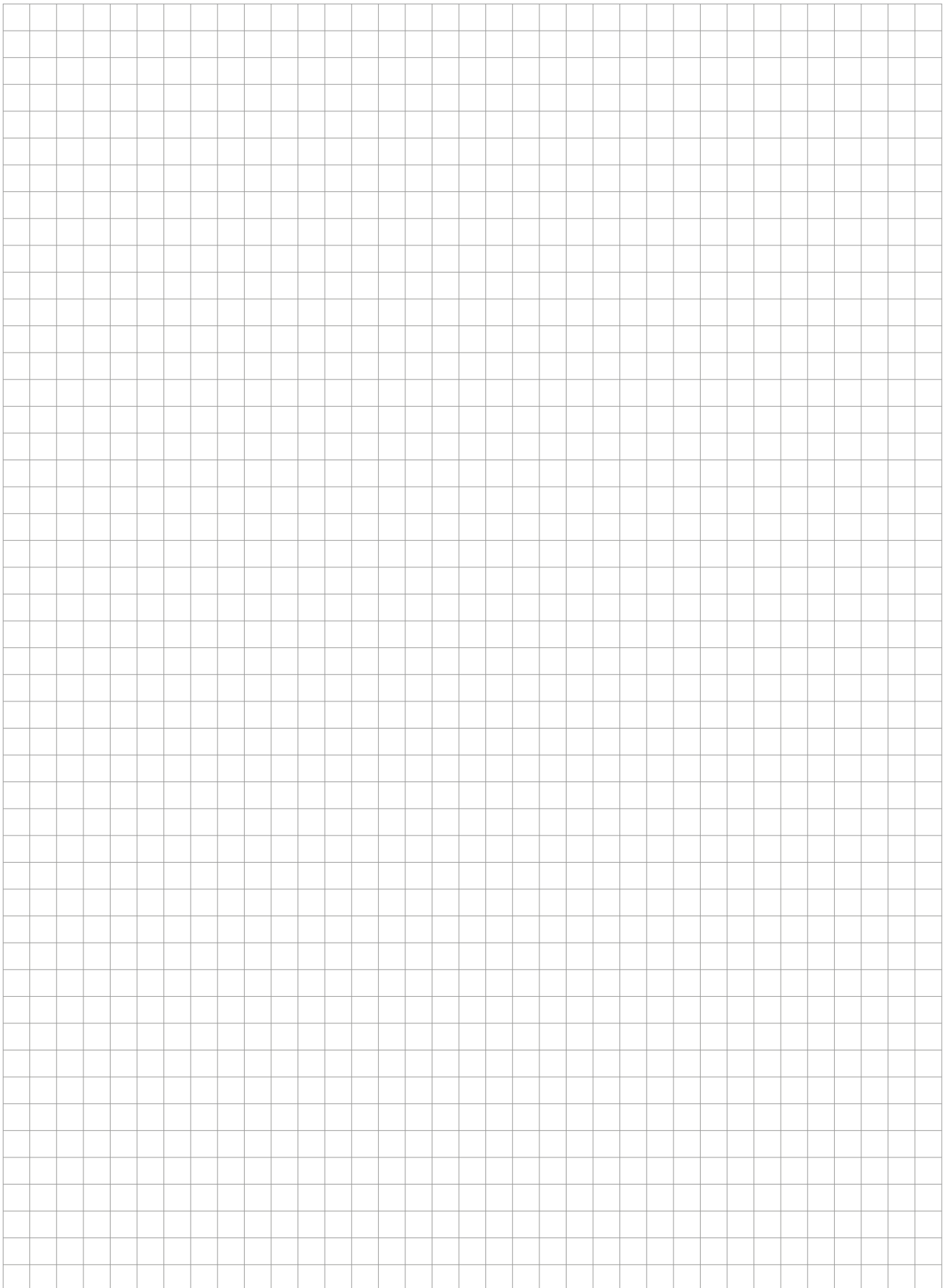
## ISOPRO® 80/120 SQ 8/SQ 10/SQ 12



IP 120 SQ 8 top view and cross-section | H: Element height as per customer's specifications

### Dimensions in mm

Type	SQ 8		SQ 10		SQ 12	
	IP 80	IP 120	IP 80	IP 120	IP 80	IP 120
<b>l1</b>	884	889	969	888	1166	1172

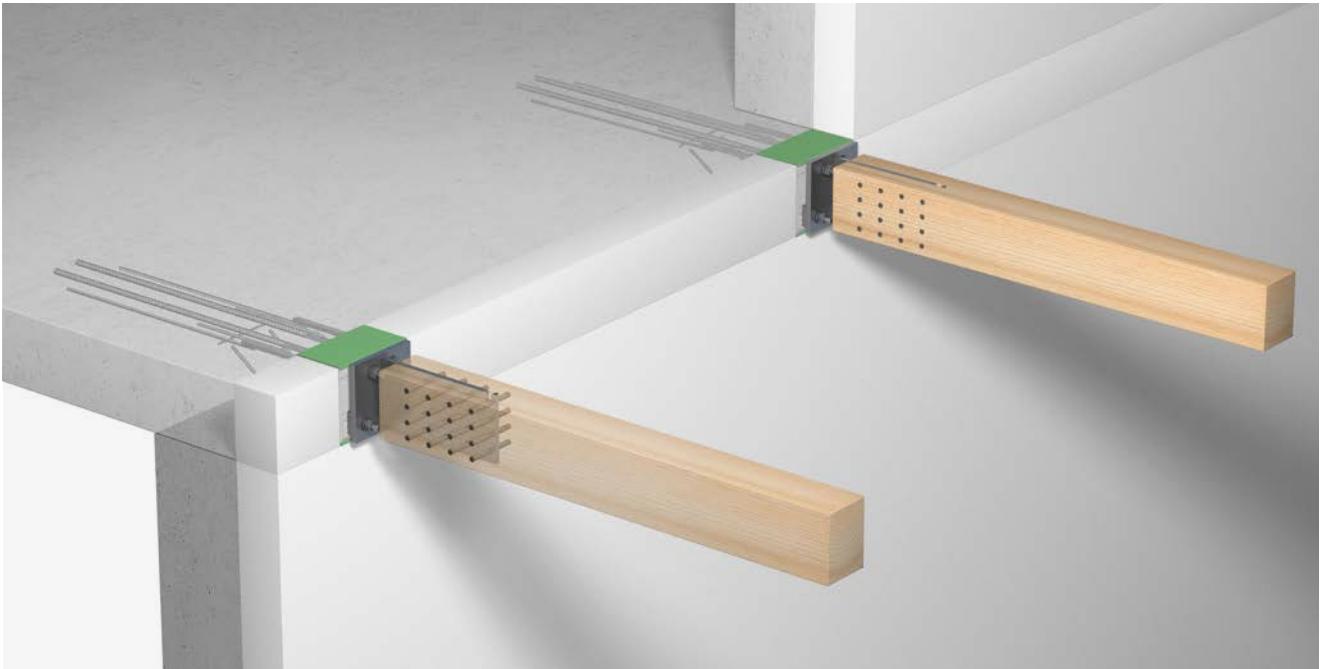




# Concrete-timber connection

# IP 80 HM, IP120 HM

Connection for cantilevered timber structures



## IP 80, 120 HM

- Transfers negative moments and positive shear forces
- Load-bearing capacity in connection with SM 14 Q8
- Concrete cover  $c_{v20}$
- Element heights from 180 mm



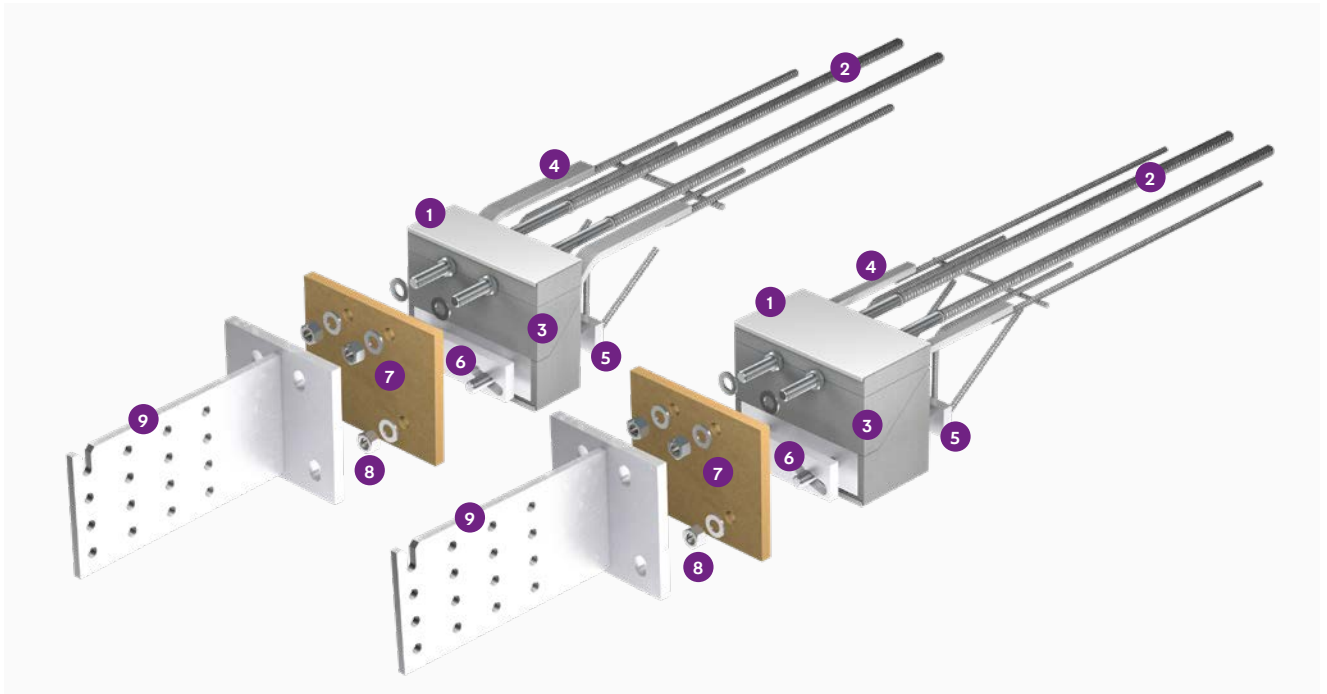
## Type designation

IP120 HM 14 Q8 h200

Type (insulating body thickness) \_\_\_\_\_  
Moment load-bearing capacity \_\_\_\_\_  
Shear force load-bearing capacity \_\_\_\_\_  
Element height \_\_\_\_\_



## Element design



Element design using ISOPRO® 80 HM 14 Q8 and ISOPRO® 120 HM 14 Q8 as an example

- 1 Cover profile**
  - Plastic
- 2 Tie bars**
  - Structural steel
  - Stainless steel
- 3 Insulating body**
  - Neopor
- 4 Shear bars**
  - Structural steel
  - Stainless steel
- 5 Compression struts**
  - Structural steel
  - Stainless steel
- 6 Adjustment plate**
  - For millimetre-precise alignment of the steel structure
  - Stainless steel
- 7 Wooden mounting plate**
  - For mounting the insulating element
- 8 Nuts, washers**
  - Included in scope of delivery
- 9 Connection strut**
  - Included in scope of delivery

## Dimensioning table for IP 80/120 HM 14 Q 8

### Rated forces

Wooden beam width w mm	Softwood C24 Glulam GL24c			Softwood C30 Glulam GL28c		
	$M_{Rd,y}$ kN	$V_{Rd,z}$ kN	$H_{Rd,y}$ kN	$M_{Rd,y}$ kN	$V_{Rd,z}$ kN	$H_{Rd,y}$ kN
<b>120</b>	-6.3	10.1	± 2.5	-6.8	10.1	± 2.5
<b>140</b>	-7.0	10.1	± 2.5	-7.5	10.1	± 2.5
<b>160</b>	-7.8	10.1	± 2.5	-8.3	10.1	± 2.5

MRd,y: moment capacity, VRd,z: vertical force, HRd,y: horizontal force

Example calculations based on DIN EN 1995-1-1: 2010-12 and DIN EN 1995-1-1/NA: 2010-12  
 and utilisation class 2, medium load-duration class

# Serviceability

## Deformation

To determine the vertical displacement at the cantilever end of the timber structure, the deformation of the ISOPRO® HBM timber connection must be superimposed with the deformation of the adjoining timber structure.

We recommend performing verification calculations in the serviceability limit state (quasi-permanent combined load).

The steel structure must be precambered to compensate the determined deformation. It should be noted that the results are rounded up or down according to the direction of the planned drainage.

## Deformation due to the ISOPRO® element HM:

$w_1$  = deformation from thermal insulation element  
 $w_2$  = deformation from wooden beam

$$w = \tan \alpha \cdot (M_{Ed}/M_{Rd}) \cdot l_k \cdot 10$$

Where:

- $w_1$  = deformation at the end of the cantilever in mm due to thermal insulation element
- $\tan \alpha$  = deformation factor, see table
- $m_{Ed}$  = bending moment for calculating the precamber due to the ISOPRO® 120 element.  
 The design engineer determines the definitive load combination in the serviceability limit state.
- $m_{Rd}$  = section modulus of the ISOPRO® 120 element, see page 10
- $l_k$  = system length in m

## Deformation factor $\tan \alpha$ for concrete $\geq C 20/25$

Type	Element height h mm
IP HM 14 Q8	0.6



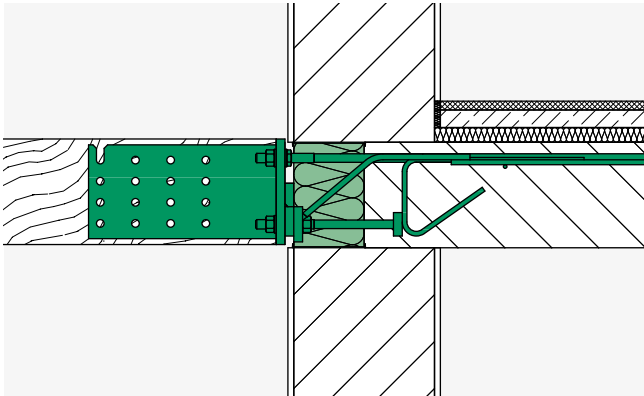
### Notes

The values given are approximations. They may deviate from the actual values depending on the installation situation and assembly. Additional influences on the deformation may need to be taken into account.

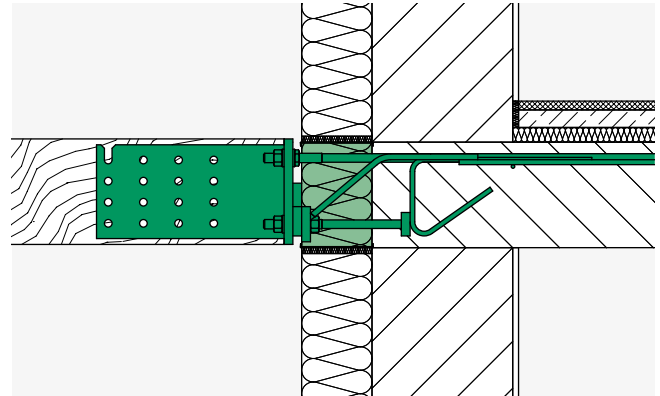
## Application

This section contains planning aids and specific information on the product. In addition, the general notes on materials, structural design, thermal insulation and fire protection,

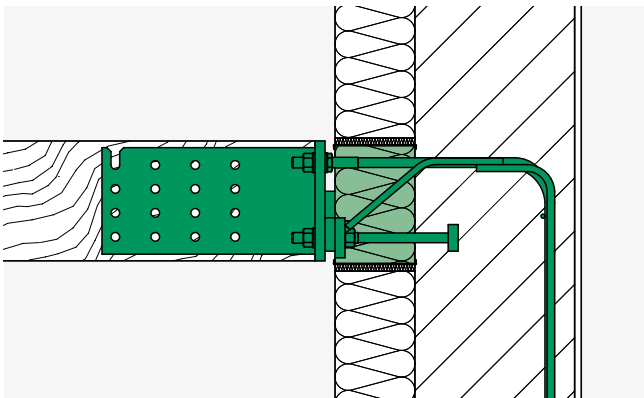
installation on site etc. on pages 10 – 17 must also be taken into account.



ISOPRO® HM - Installation cross-section, solid wall

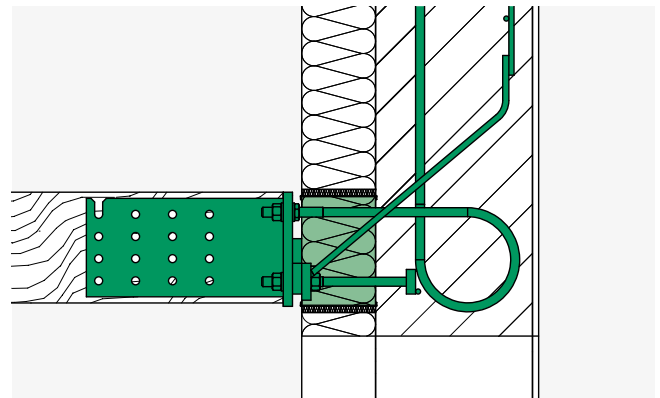


ISOPRO® HM - Installation cross-section, external thermal insulation composite system



ISOPRO® HM - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall below:

- Possible for HM 14 Q8 / Q10 for element height 180 mm and wall thickness  $\geq 200$  mm



ISOPRO® HM - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall above:

- Possible for HM 14 Q8 / Q10 with element height 180 mm, wall thickness  $\geq 255$  mm and lower edge of wall  $\geq 30$  mm lower edge of thermal insulation element



Our Application Technology department will be happy to provide you with further information regarding your individual installation situation.

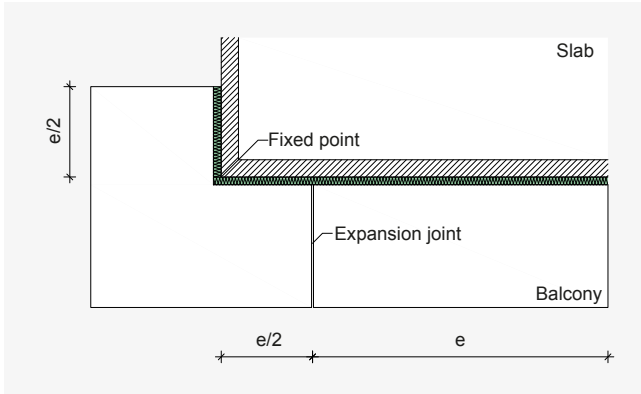
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technik-hbau@pohlcon.com

# Element layout

## Expansion joint spacing

The decisive factor for determining the maximum permissible expansion joint spacing is a balcony slab that is firmly connected to the steel beams. If the connection between the

steel beams and the covering is movable, the distances of the non-moveable connections are decisive.

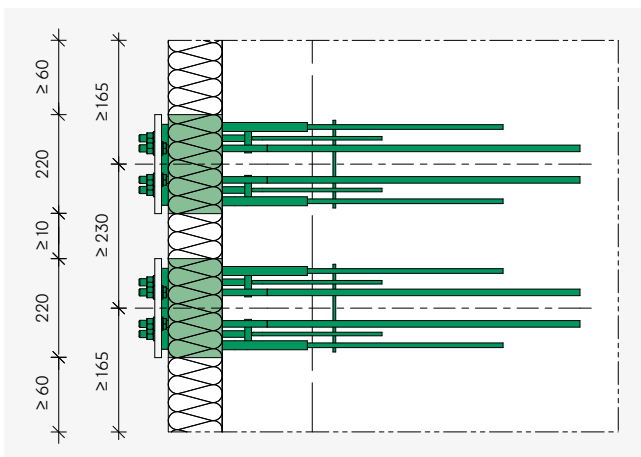


Expansion joint spacing with fixed point on outside corner

### Maximum permissible expansion joint spacing for IP 80/120 HM 14

Type	Joint spacing $e$ m
IP 80	$\leq 6.0$
IP 120	$\leq 9.6$

## Edge spacings and centre-to-centre distances



Minimum edge spacings



### Notes

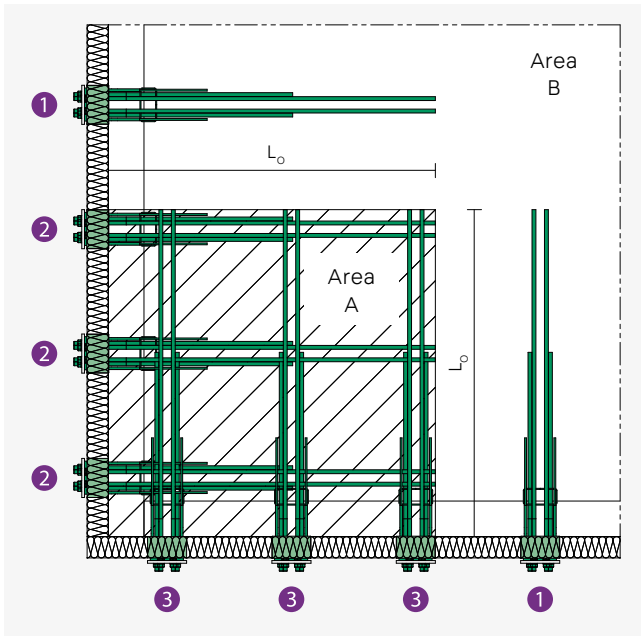
The minimum edge spacing for reinforced concrete components and centre-to-centre distances between two ISOPRO® elements must be observed in accordance with national technical approval abZ Z-15.7-313.

If the permissible minimum distances cannot be achieved, the load-bearing capacity of the ISOPRO® elements must be reduced in consultation with our Application Technology department.

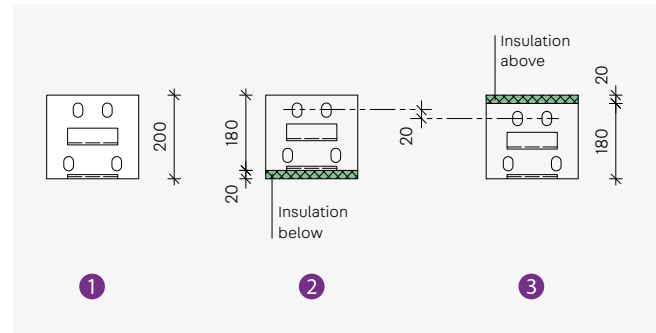
## Element layout in corners

The tie bars, compression struts and shear bars of the ISOPRO® elements overlap at the outer corner perpendicular to each other due to their position. For this reason, the

elements in area A must be positioned at a height offset of 20 mm. This can be implemented by adding 20 mm of insulation at the factory.



Cantilevered external balcony



### Sample order for elements with additional insulation for a slab 200 mm thick

- ①: HM 14 Q8 h200
- ②: HM 14 Q8 h180 + 20 mm additional insulation below
- ③: HM 14 Q8 h180 + 20 mm additional insulation above

### Overlap length $L_o$ area A in corner

Type	Area A, $L_o$ mm
HM 14 Q8	910

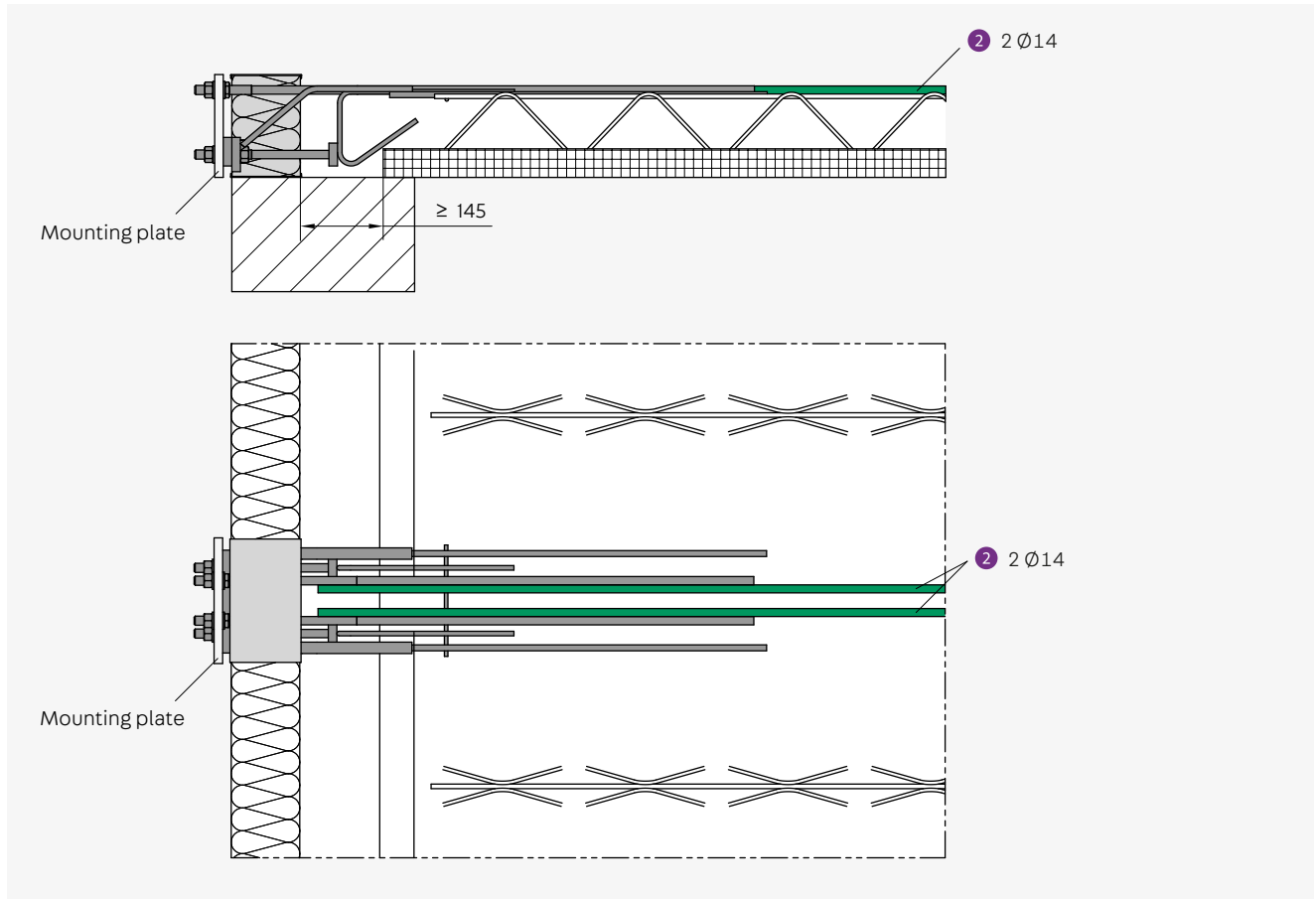


#### Notes

- Connection in corner area only for slab thicknesses  $\geq 200$  mm
- Take 20 mm height difference into account for the on-site end plate
- Reduced expansion joint spacing  $e/2$  in the corner

## On-site reinforcement

### ISOPRO® HM 14 Q8 – In-situ concrete and precast construction



ISOPRO®120 HM14 Q8

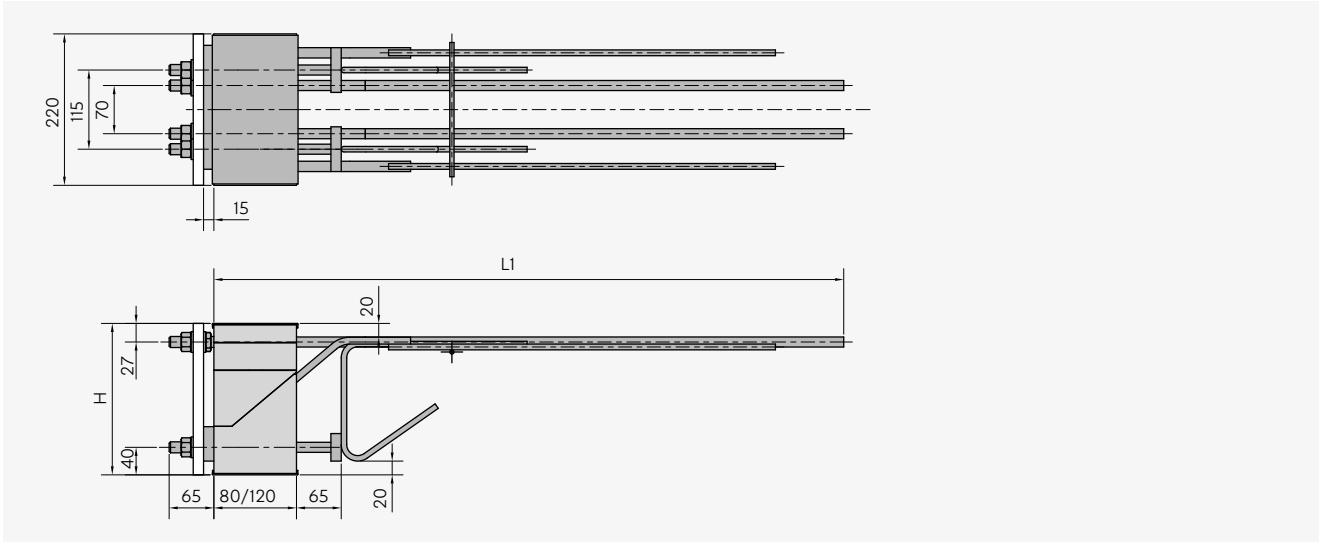


#### Notes

- The tie bars must be reinforced with 2 x dia. 14 in accordance with DIN EN 1992-1-1. ②
- Structural transverse reinforcement according to DIN EN 1992-1-1

# Element dimensions

## ISOPRO® 80/120 HM 14 Q8

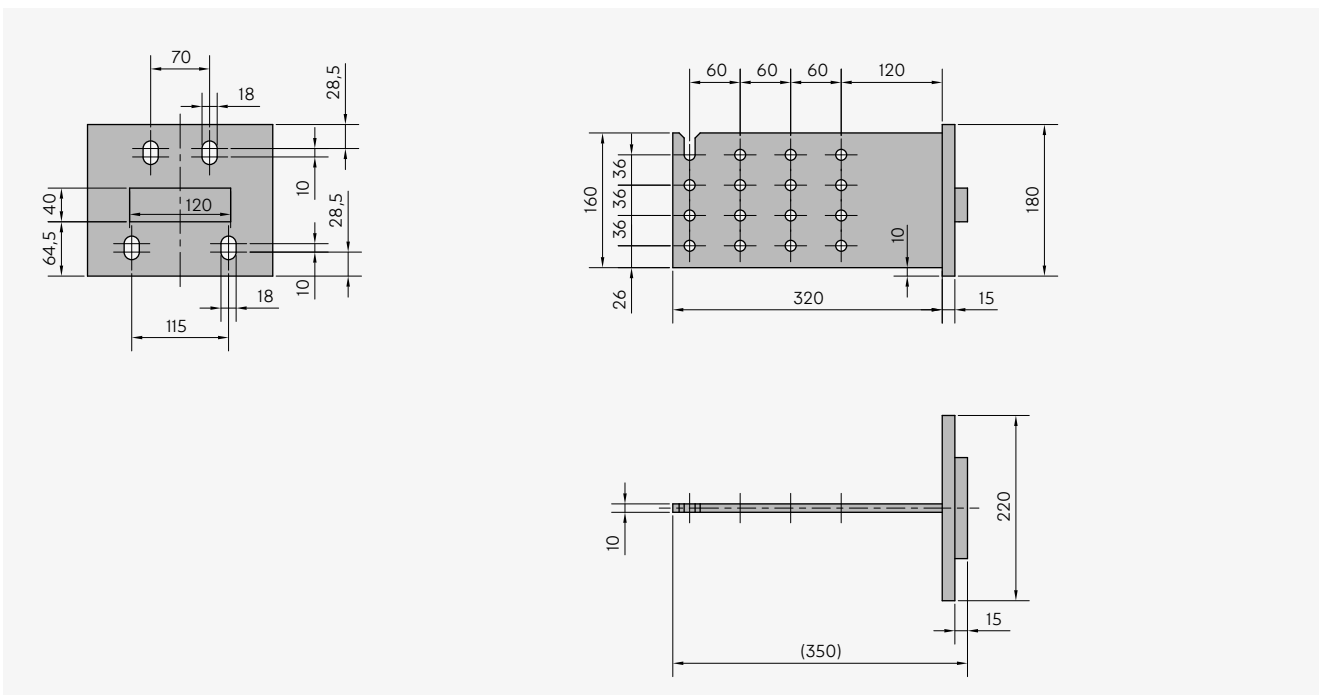


IP 120 HM 14 Q8 top view and cross-section

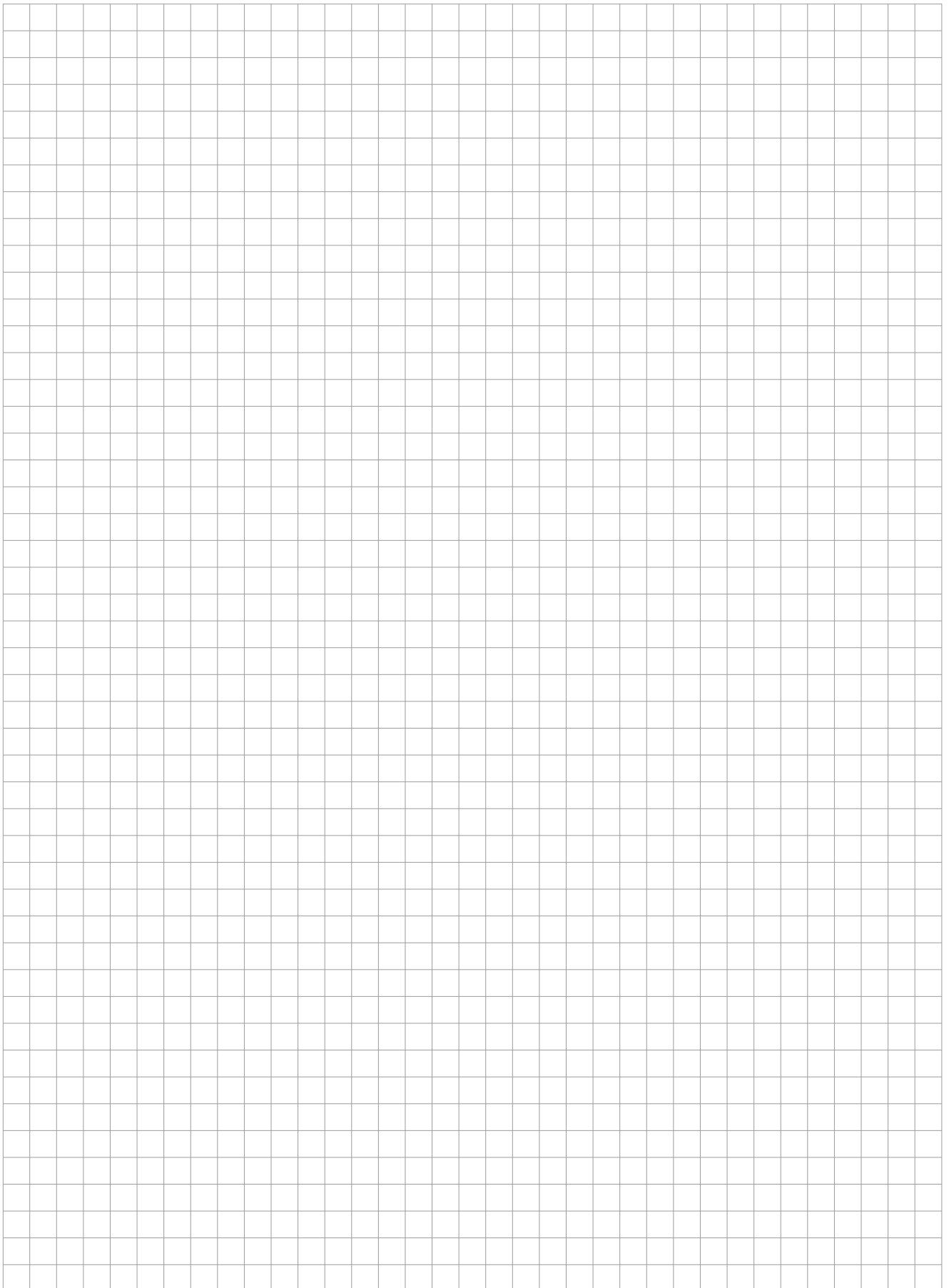
### Dimensions in mm

Type	HM 14 Q8	
	IP 80	IP 120
<b>l1</b>	915	996

### Connection strut

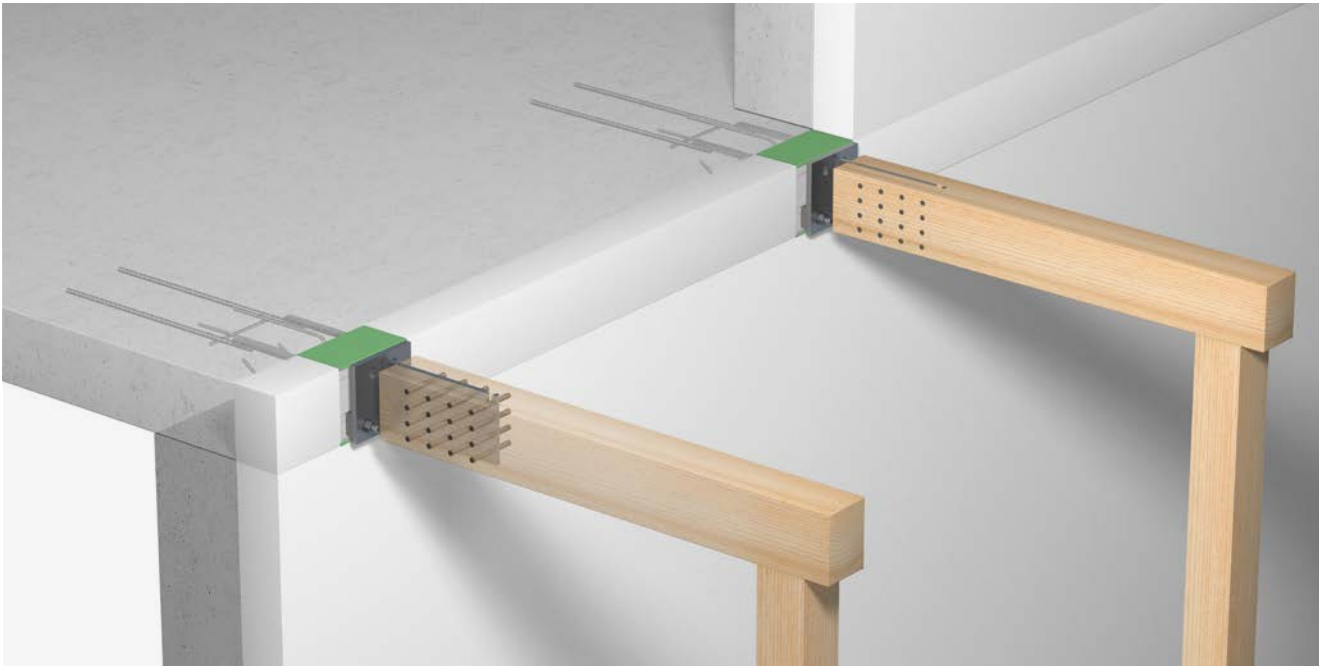






# IP 80 HQ, IP120 HQ

Connection for supported timber structures



## IP 80/120 HQ

- For transferring shear forces
- Load-bearing capacity in connection with SQ 10
- Concrete cover cv20
- Element heights from 180 mm

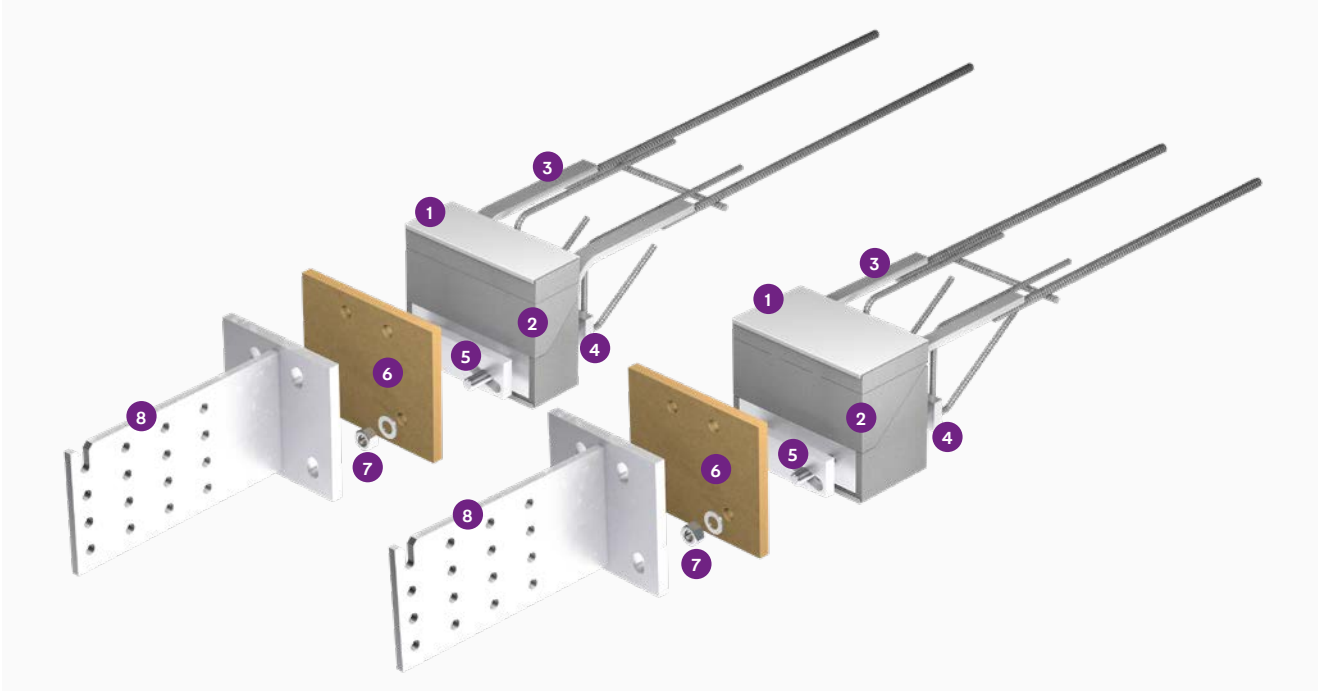


## Type designation

IP120 HQ 10 h200

Type (insulating body thickness) \_\_\_\_\_  
Shear force load-bearing capacity \_\_\_\_\_  
Element height \_\_\_\_\_

## Element design



Element design using ISOPRO® 80 HQ 10 and ISOPRO® 120 HQ 10 as an example

- 1 Cover profile**
  - Plastic
- 2 Insulating body**
  - Neopor
- 3 Shear bars**
  - Structural steel
  - Stainless steel
- 4 Compression struts**
  - Structural steel
  - Stainless steel
- 5 Adjustment plate**
  - For millimetre-precise alignment of the steel structure
  - Stainless steel
- 6 Wooden mounting plate**
  - For mounting the insulating element
- 7 Nuts, washers**
  - Included in scope of delivery
- 8 Connection strut**
  - Included in scope of delivery

## Dimensioning table for IP 80/120 HQ 10

### Vertical force $V_{Rd,z}$ in kN

Wooden beam width w mm	Softwood C24 Glulam GL24c				Softwood C30 Glulam GL28c			
	Height h mm				Height h mm			
	180	200	220	240	180	200	220	240
120	16.3	18.1	19.9	21.8	20.4	22.6	24.7	24.7
140	19.3	21.4	23.6	25.7	24.1	26.8	27.2	27.2
160	22.3	24.7	27.2	29.7	27.8	29.8	29.8	29.8

### Horizontal force $H_{Rd,y}$ in kN

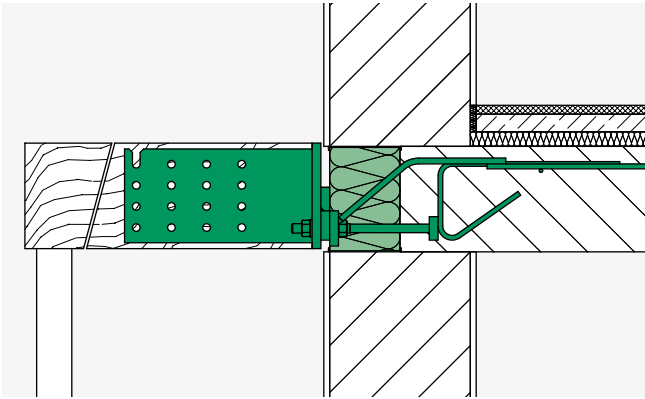
Wooden beam width w mm	Softwood C24 Glulam GL24c				Softwood C30 Glulam GL28c			
	Height h mm				Height h mm			
	180	200	220	240	180	200	220	240
120 - 160	± 2.5	± 2.5	± 2.5	± 2.5	± 2.5	± 2.5	± 2.5	± 2.5

Example calculations based on DIN EN 1995-1-1: 2010-12 and DIN EN 1995-1-1/NA: 2010-12  
 and utilisation class 2, medium load-duration class

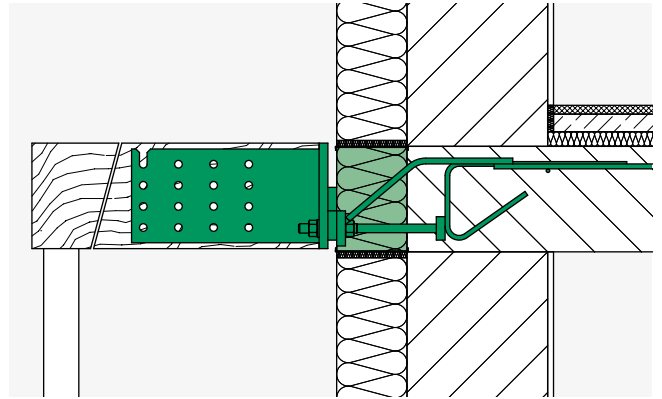
## Application

This section contains planning aids and specific information on the product. In addition, the general notes on materials, structural design, thermal insulation and fire protection,

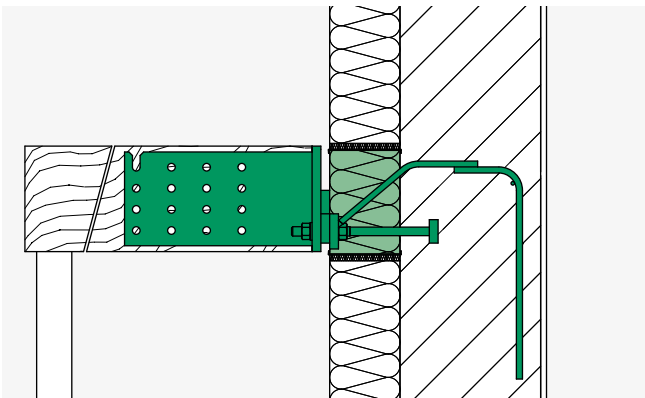
installation on site etc. on pages 10 – 17 must also be taken into account.



ISOPRO® HQ - Installation cross-section, solid wall

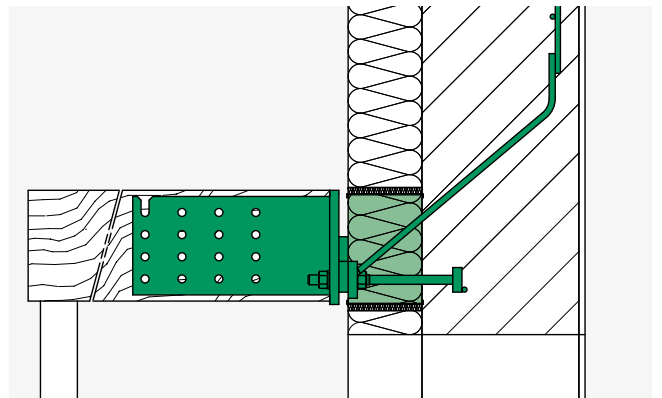


ISOPRO® HQ - Installation cross-section, external thermal insulation composite system



ISOPRO® HQ - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall below:

- Possible for HQ 10 for element height 180 mm and wall thickness  $\geq 200$  mm



ISOPRO® HQ - Installation cross-section, external thermal insulation composite system, special version for connecting to a wall above:

- Possible for HQ 10 for element height 180 mm and wall thickness  $\geq 200$  mm



Our Application Technology department will be happy to provide you with further information regarding your individual installation situation.

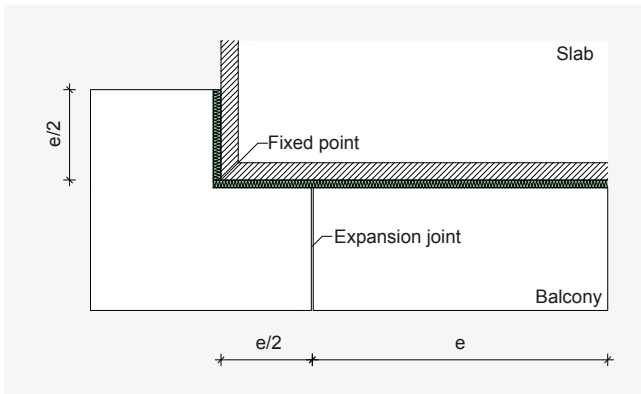
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technik-hbau@pohlcon.com

# Element layout

## Expansion joint spacing

The decisive factor for determining the maximum permissible expansion joint spacing is a balcony slab that is firmly connected to the steel beams. If the connection between the

steel beams and the covering is movable, the distances of the non-moveable connections are decisive.

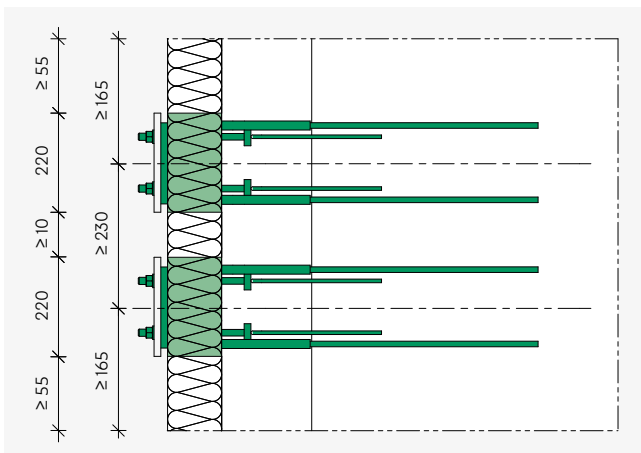


Expansion joint spacing with fixed point on outside corner

### Maximum permissible expansion joint spacing

Type	Joint spacing e m
IP 80	≤ 6.0
IP 120	≤ 8.6

## Edge spacings and centre-to-centre distances



Minimum edge spacings



### Notes

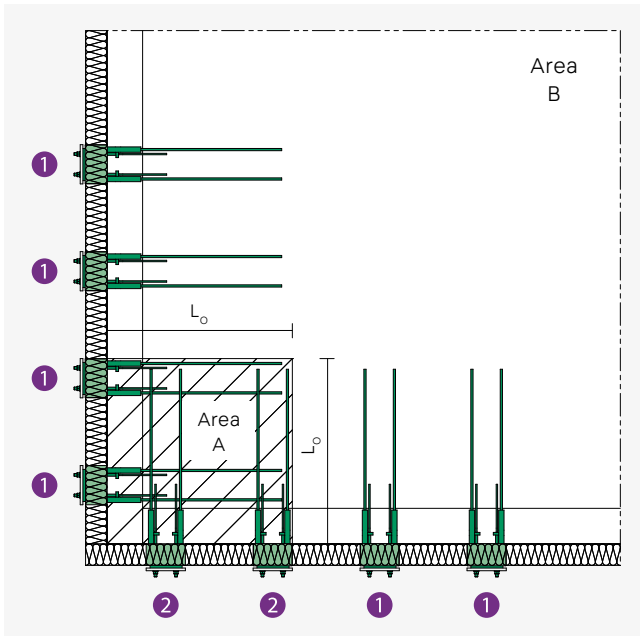
The minimum edge spacing for reinforced concrete components and centre-to-centre distances between two ISOPRO® elements must be observed in accordance with national technical approval abZ Z-15.7-313.

If the permissible minimum distances cannot be achieved, the load-bearing capacity of the ISOPRO® elements must be reduced in consultation with our Application Technology department.

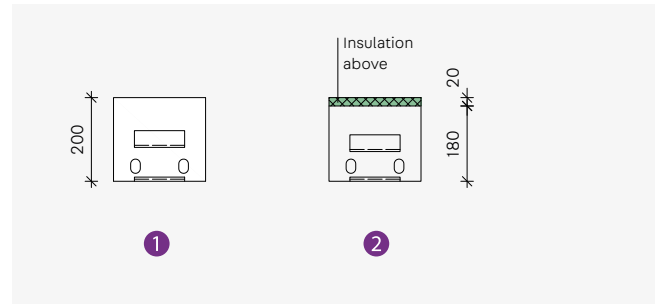
## Element layout in corners

The tie bars, compression struts and shear bars of the ISOPRO® elements overlap at the outer corner perpendicular to each other due to their position. For this reason, the

elements in area A must be positioned at a height offset of 20 mm. This can be implemented by adding 20 mm of insulation at the factory.



Supported external balcony



**Sample order for elements with additional insulation for a slab 200 mm thick**

- ①: HQ 10 h200
- ②: HQ 10 h180 + 20 mm additional insulation above

### Overlap length $L_o$ area A in corner

Type	Area A, $L_o$ mm
HQ 10	888

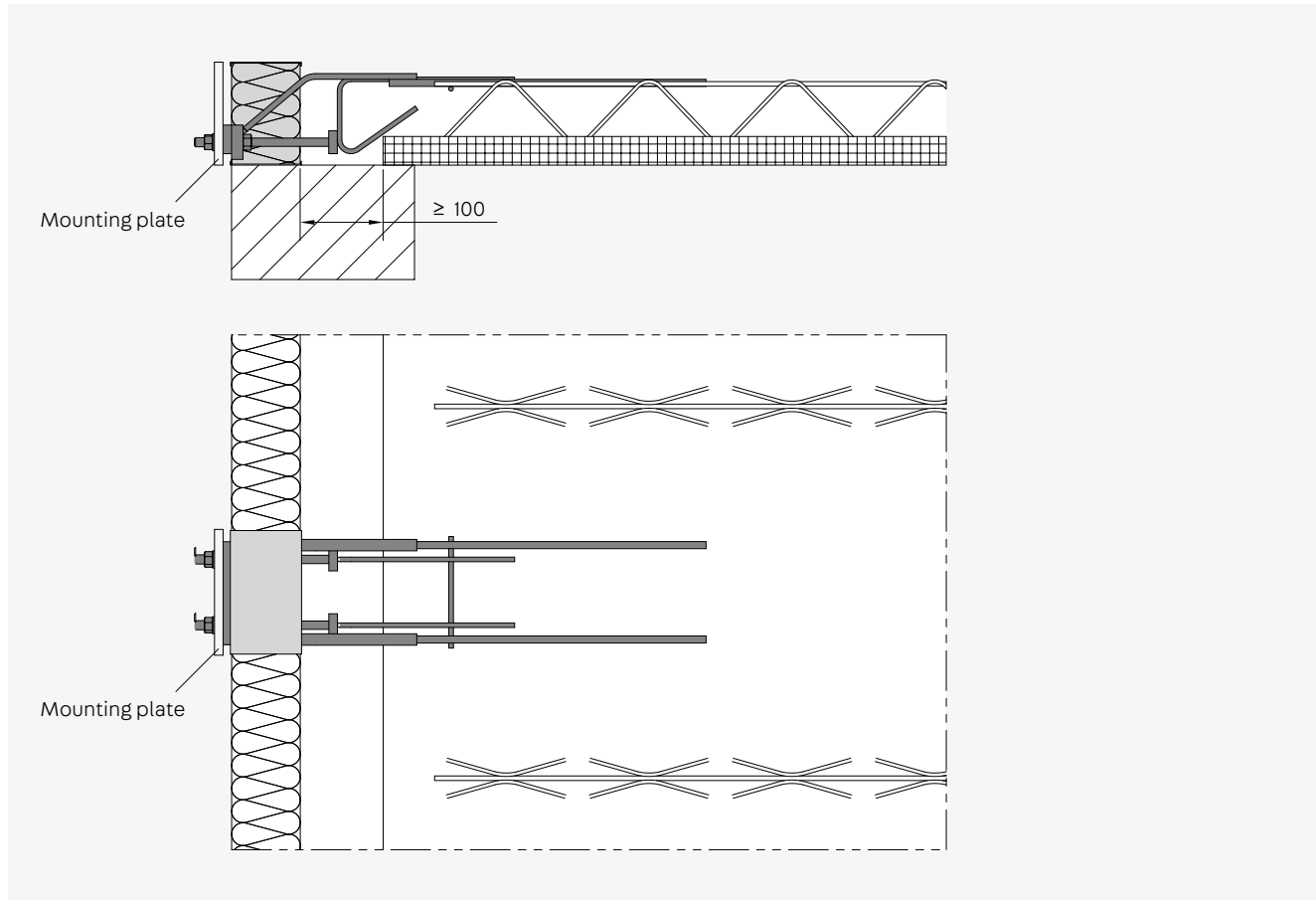


#### Notes

- Connection in corner only for slab thicknesses  $\geq 200$  mm
- Take 20 mm height difference into account for on-site connection value
- Reduced expansion joint spacing  $e/2$  in the corner

## On-site reinforcement

### ISOPRO® HQ 10 – In-situ concrete and precast construction



ISOPRO® 120 HQ Q10



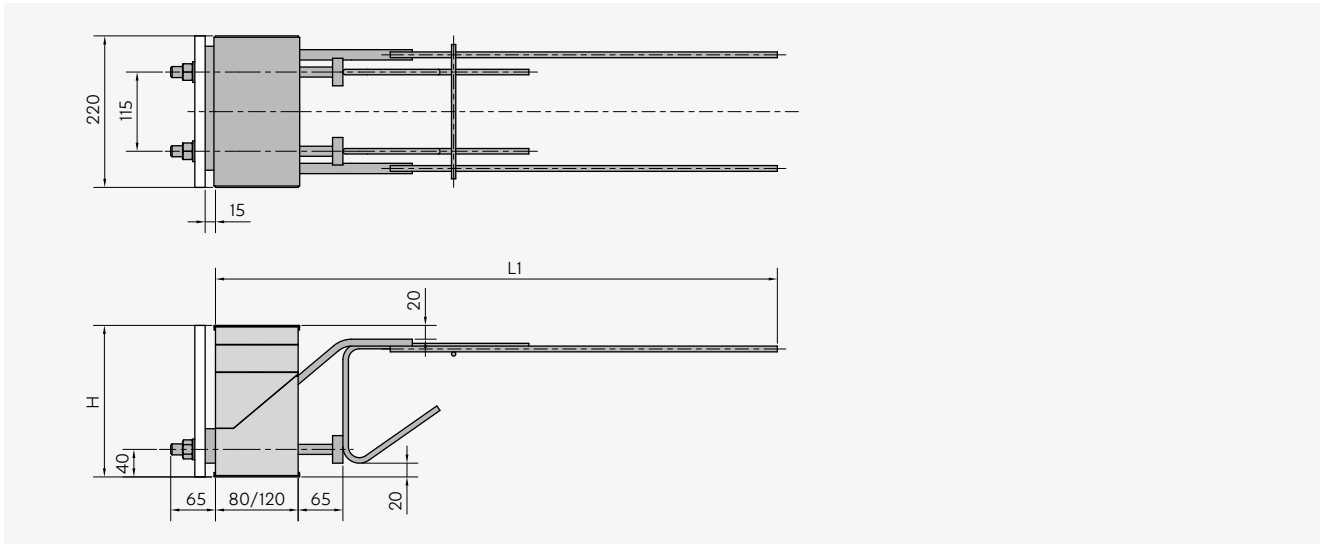
#### Notes

- The structural edge reinforcement 2 x dia. 8 is fitted at the factory.
- No additional reinforcement is required for the ISOPRO® 80/120 element type HQ.



# Element dimensions

## ISOPRO® 80/120 HQ 10

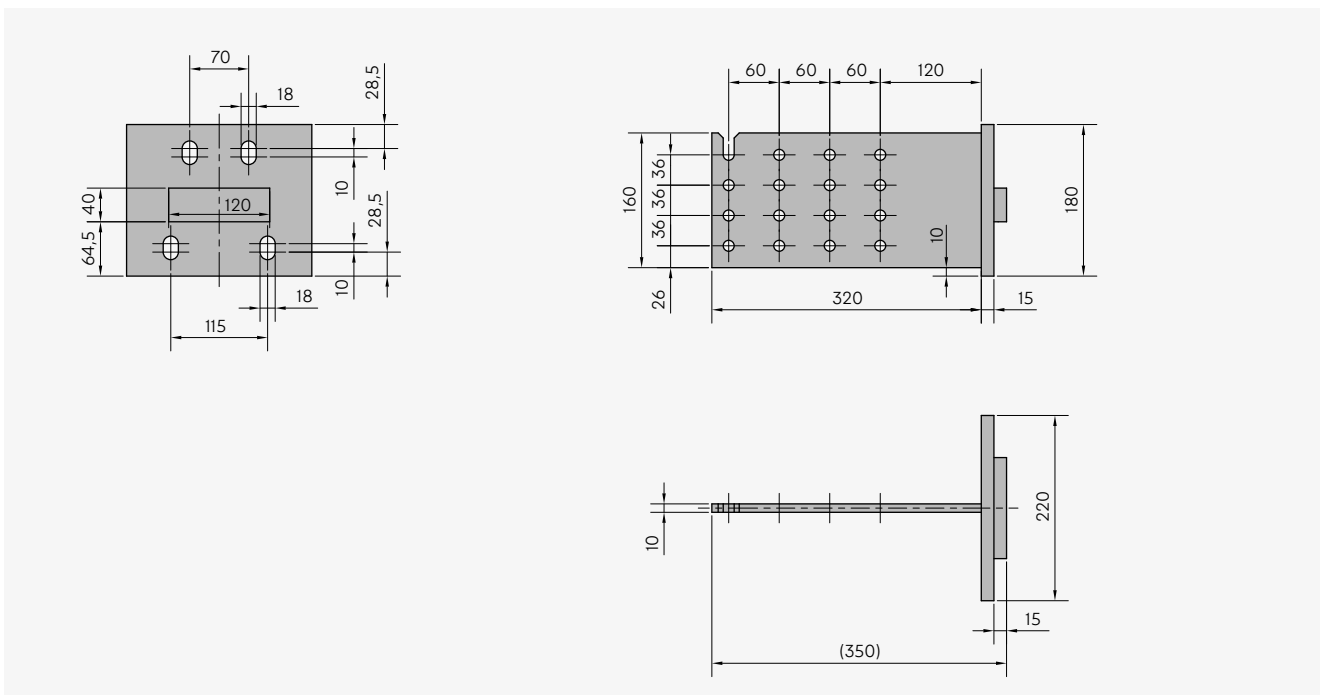


IP 120 HQ 10 top view and cross-section

### Dimensions in mm

Type	HQ 10	
	IP 80	IP 120
<b>l1</b>	969	888

### Connection strut



# Our synergy concept for your benefit

**With us, you benefit from the collective experience of three established manufacturers, who combine products and expertise in a comprehensive range. That is the PohlCon synergy concept.**



## **Full-service consulting**

Our extensive network of consultants is available to answer all your questions about our products on site. From planning to use, you can enjoy personal support from our qualified employees.



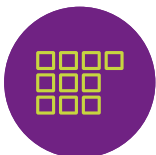
## **Digital solutions**

Our digital solutions provide targeted support in planning with our products. From tender texts to CAD details and BIM data, right through to modern software solutions, we offer customized support for your planning process.



## **7 fields of application**

We think in terms of holistic solutions. This is why we have combined our products into seven fields of application, where you can benefit from their synergy and the overall PohlCon product portfolio.



## **10 product categories**

In order to find the right product in our extensive range even faster, we have divided our products into ten product categories. This way you can navigate unerringly between our products.



## **Individual solutions**

No series product on the market is suitable for your project? We realize unique construction projects and exceptional challenges with the many years of expertise of the three manufacturing brands.



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