

ISOPRO® CONCRETE-STEEL CONCRETE-WOOD

Thermal insulating panel for
connecting steel or wooden beams





OUR MISSION: FORWARD CONSTRUCTING.

It is our mission not only to provide the very latest building technology, but to also be one crucial step ahead of the game at all times. That is why we are constantly undertaking pioneering work in all product areas. Our employees consistently put their extensive practical experience and creativity to use in the interests of our customers. In constant dialogue with our target groups on a partnership basis, we are already developing the products today that will be needed tomorrow. Our momentum continues to set new benchmarks in structural engineering – yesterday, today and tomorrow, too. This is what we mean by “forward constructing”.

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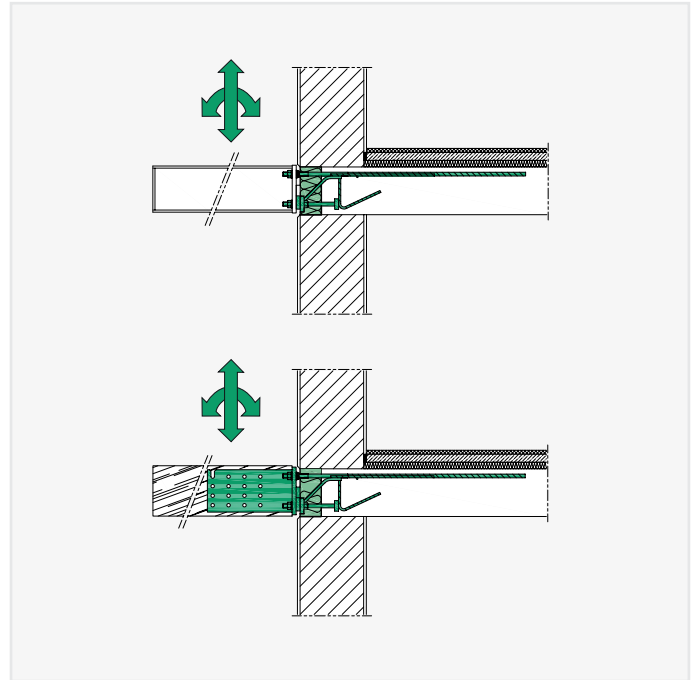
We are at your service.
Wherever you are, you can count on us.

TYPE OVERVIEW

ISOPRO® SBM, HBM

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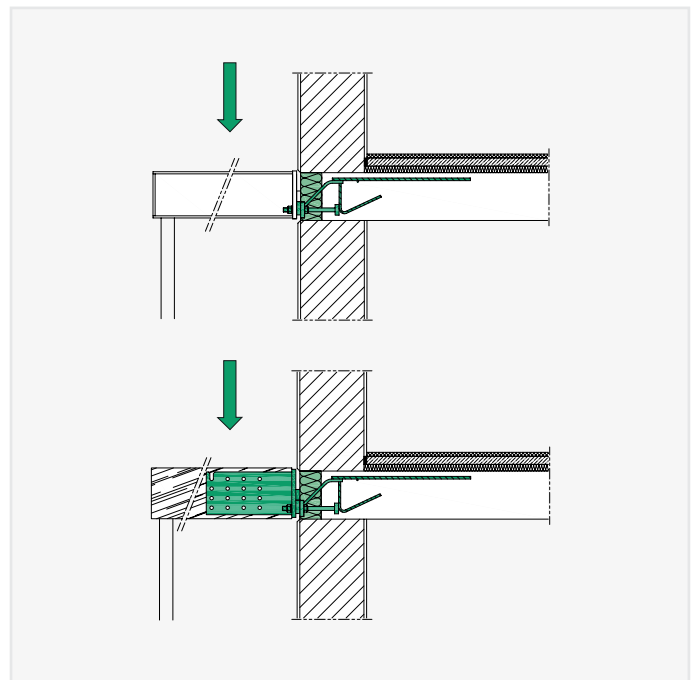
Connects freely projecting steel or wooden constructions with reinforced concrete structural components. Bending moments, lateral and horizontal forces are transmitted.



ISOPRO® SBQ, HBQ

- PAGE 22 + PAGE 42 -

Connects supported steel or wooden constructions with reinforced concrete structural components. Lateral and horizontal forces are transmitted.



MATERIALS AND TEST CERTIFICATES

ISOPRO® COMPONENT CATALOGUE

Reinforcing steel:	B500B
Stainless steel:	S275 - mat. no. 1.4571, 1.4062, 1.4362 S355 - mat. no. 1.4571, 1.4062, 1.4362 S460 - mat. no. 1.4571 in accordance with approval Z-30.3-6
Structural steel:	S235
Insulating body:	NEOPOR®* rigid polystyrene foam $\lambda = 0.031$ W/mK
Steel strut (wood connection):	S235 galvanised

CONNECTING COMPONENTS

CEILING

Concrete:	Standard concrete in accordance with EC2 and DIN EN 206-1 Minimum concrete strength C20/25
Reinforcing steel:	B500B

BALCONY

Structural steel:	Minimum grade S235 Material, dimensions and corrosion protection in accordance with details provided by the structural engineer
Wood:	Solid softwood Laminated timber
Dowel rods:	S235 galvanised

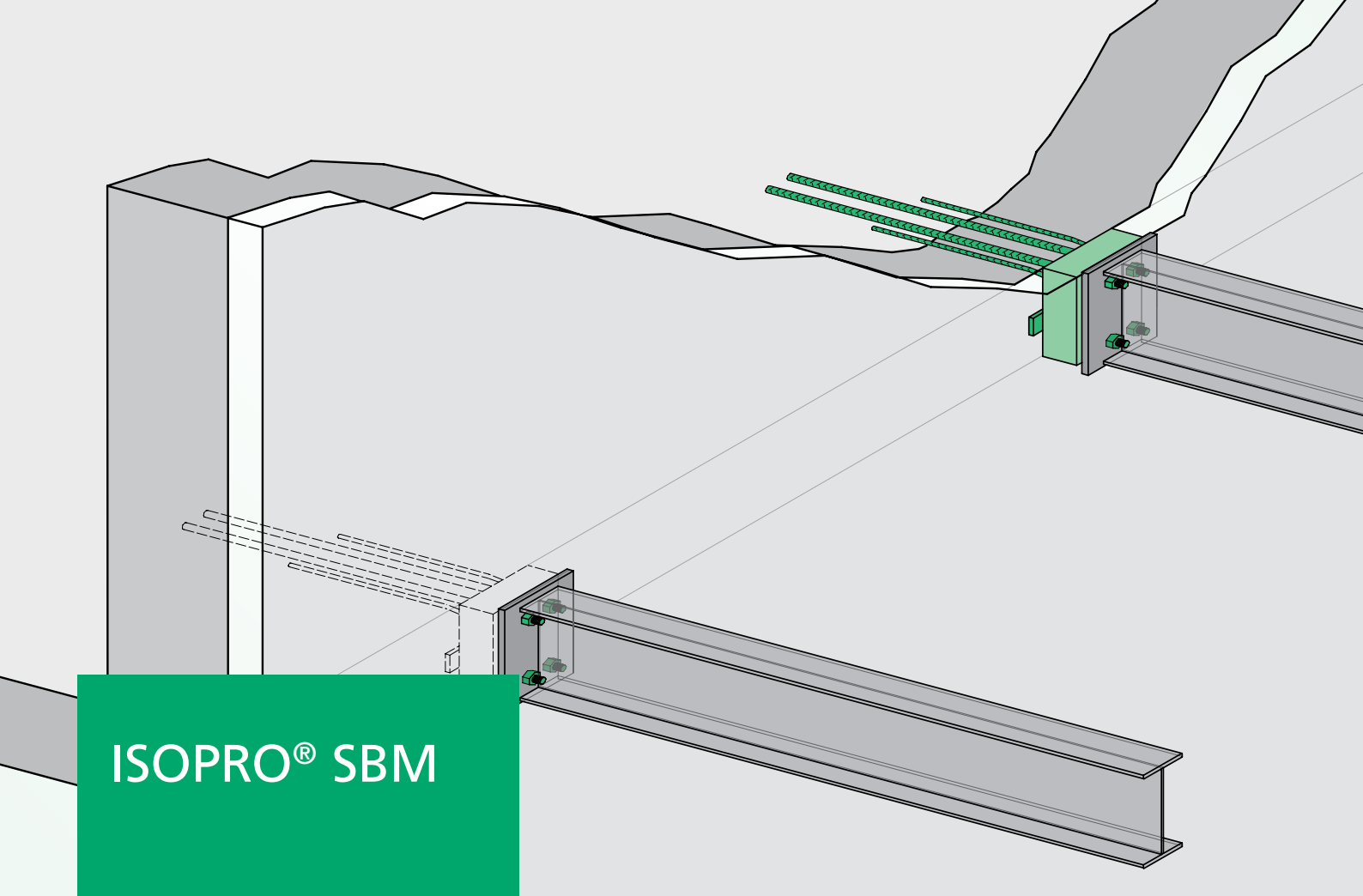
TEST CERTIFICATES

Approvals:	DIBt Berlin General technical approval No. Z-15.7-313
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NOTE:

Technical information about our ISOPRO® thermal insulation elements is available for download at www.h-bau.de.

* NEOPOR® is a registered trade-mark of BASF, Ludwigshafen



ISOPRO® SBM

CONNECTION FOR FREELY PROJECTING STEEL CONSTRUCTIONS

THE PRODUCT

The ISOPRO® SBM thermal insulation element structurally connects freely projecting steel constructions with reinforced concrete components. At the same time, its excellent thermal properties resolve the problem of thermal bridging – a key issue in building engineering physics – at this transition. The element comprises an EPS insulating body with extremely low thermal conductivity and a structurally effective stainless steel truss construction. Both positive and negative bending moments, as well as lateral and horizontal forces, can be transmitted depending on the type.

BENEFITS

- General technical approval No. Z-15.7-313
- Design values established in the approval
- Reduction of thermal bridging in accordance with DIN 4108-2 and EnEV
- Simple and secure assembly by means of continuously variable height adjustment

THE APPLICATION

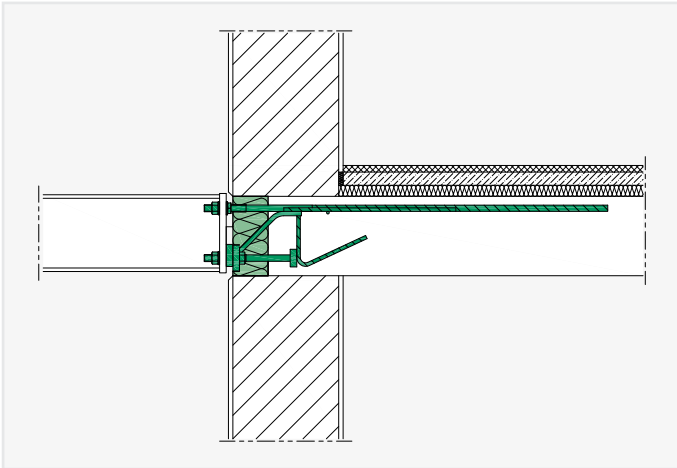
As a solution to the interface between steel construction and reinforced concrete construction, ISOPRO® steel connectors fit perfectly into the ISOPRO® family. ISOPRO® SBM elements were developed specifically for connecting freely projecting steel constructions such as balconies and canopies. The elements are installed in the shell as part of reinforcement and concreting work. Assembly of the steel construction is carried out at a later date by the steel workers.



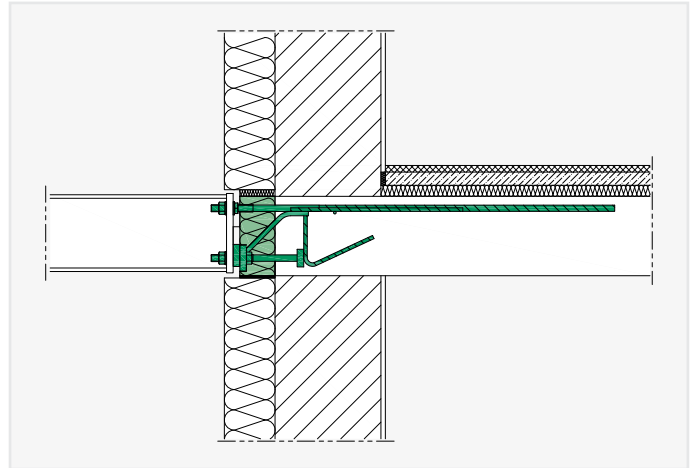
APPLICATION EXAMPLES

ISOPRO® SBM CONNECTION SITUATIONS

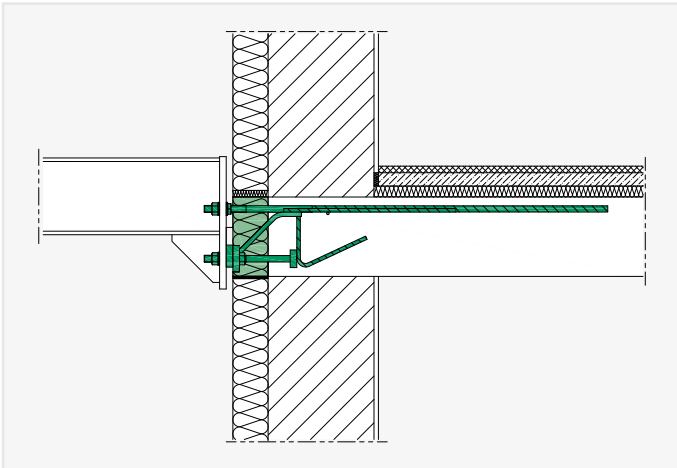
Formwork erection brick work:



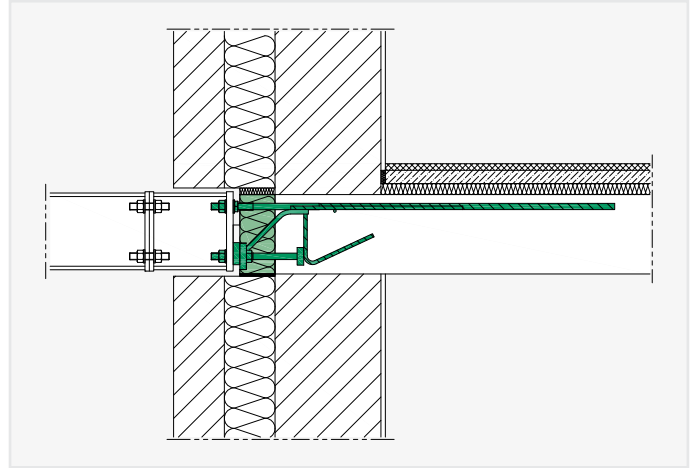
Formwork erection brick work with ETICS:



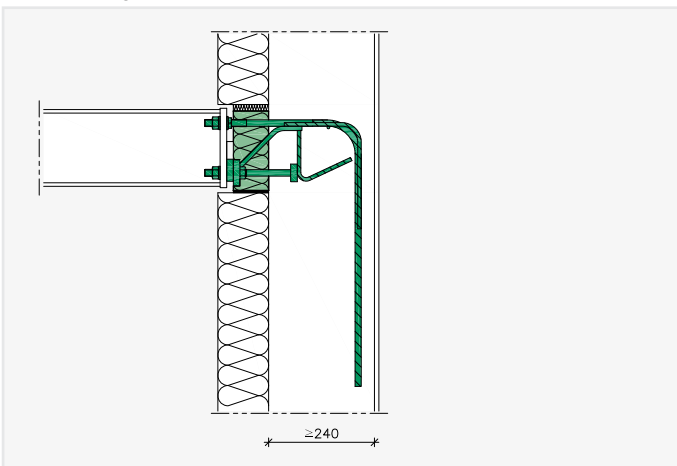
Formwork erection brick work with ETICS and steel constructions with offset heights:



Cavity walls with core insulation – flexible building operation thanks to spacer (to be provided by customer):



Special design for connection to a wall:



Please contact our Application Technology department for further special constructions.

Phone: +49 (0) 7742 9215-300

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DIMENSIONING

DIMENSIONING TABLE FOR ISOPRO® SBM 14 – CONCRETE \geq C20/25

ISOPRO®		SBM 14 Q8			SBM 14 Q10		SBM 14 QQ			
Element height h [mm]	Vertical force V_{Rd} [kN]									
	180-280	10.0	20.0	30.0	30.0		10.0	20.0	30.0	-12.0
	Bending moment M_{Rd} [kNm]									
	180	-10.9	-9.9	-8.8	-9.0		-10.9	-9.9	-8.8	9.2
	200	-12.9	-11.7	-10.3	-10.5		-12.9	-11.7	-10.3	10.8
	220	-14.8	-13.4	-11.9	-12.1		-14.8	-13.4	-11.9	12.4
	240	-16.8	-15.2	-13.5	-13.7		-16.8	-15.2	-13.5	14.0
	250	-17.8	-16.1	-14.2	-14.5		-17.8	-16.1	-14.2	14.9
	260	-18.7	-17.0	-15.0	-15.3		-18.7	-17.0	-15.0	15.7
	280	-20.7	-18.7	-16.6	-16.8		-20.7	-18.7	-16.6	17.3
Horizontal force H_{Rd} [kN]										
180-280	±2.5			±4.0		±2.5				

DIMENSIONING TABLE FOR ISOPRO® SBM 20 – CONCRETE \geq C20/25

ISOPRO®		SBM 20 Q10		SBM 20 Q12			
Element height h [mm]	Vertical force V_{Rd} [kN]						
	180-280	30.0		-12.0	45.0		-12.0
	Bending moment M_{Rd} [kNm]						
	180	-22.2		11.3	-20.6		11.3
	200	-26.3		13.5	-24.4		13.5
	220	-30.4		15.6	-28.2		15.6
	240	-34.5		17.7	-32.0		17.7
	250	-36.5		18.7	-34.0		18.7
	260	-38.6		19.8	-35.9		19.8
	280	-42.7		21.9	-39.7		21.9
Horizontal force H_{Rd} [kN]							
180-280	±4.0		±6.5				

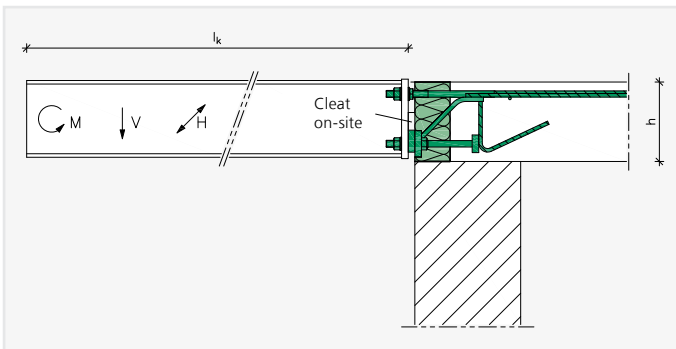
DIMENSIONING

PRODUCT DEFINITION/STRUCTURAL SYSTEM

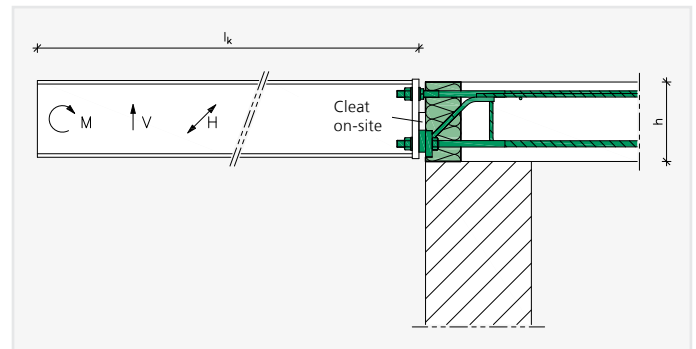
SBM 14 Q8 h200		
Element height	$h = 180-280 \text{ mm}$	
Lateral force load-bearing capacity	SBM 14: Q8, Q10, QQ SBM 20: Q10, Q12	
Type/load-bearing capacity	SBM 14 or SBM 20	

All ISOPRO® SBM elements transfer positive shearing forces, negative moments and horizontal forces in both directions. The ISOPRO® SBM 14 QQ, SBM 20 Q10 and SBM 20 Q12 elements transfer additional negative shearing forces and positive moments.

The system length is measured from the trailing edge of the top plate.



Load case for down loads



Load case for uplift loads

NOTES:

- Structural certification for the connecting components must be provided by the structural engineer.
- For indirect support, verification of the load transfer in the reinforced concrete component must be provided by the structural engineer.
- The ISOPRO® type SBM elements are designed for a top concrete covering of $c_v = 20 \text{ mm}$.
- The ISOPRO® type SBM elements cannot absorb any torsion. Therefore, at least two ISOPRO® type SBM elements must be used for each connected steel construction, which are secured to prevent twisting by means of their connection.
- The moment M_{Rd} that can be absorbed depends directly on the shearing force V_{Rd} that can be absorbed. For intermediate values please contact our Application Technology team.

DEFLECTION AND ELEVATION

DEFORMATION FACTORS TAN α

Element height h [mm]	SBM 14 Q8	SBM 14 Q10	SBM 14 QQ	SBM 20 Q10	SBM 20 Q12
180	0.6	0.6	1.0	1.3	1.3
200	0.5	0.5	0.8	1.1	1.1
220	0.5	0.4	0.7	1.0	0.9
240	0.4	0.4	0.6	0.9	0.8
250	0.4	0.4	0.6	0.8	0.8
260	0.4	0.3	0.6	0.8	0.7
280	0.3	0.3	0.5	0.7	0.7

In order to determine the vertical displacement at the end of the cantilever of the steel construction, the deformation of the ISOPRO® SBM steel connection must be superimposed over the deformation of the connected steel construction.

We recommend providing proof in the limit state of suitability for use (quasi-continuous load combination).

The steel construction must be elevated for the deformation identified. Please note: The results are rounded up or down in accordance with the planned drainage.

The amount of elevation derived from the element's deformation is calculated as follows:

$$w \text{ [mm]} = \tan \alpha \cdot (M_{Ed}/M_{Rd}) \cdot l_k \text{ [m]} \cdot 10$$

$\tan \alpha$	See table above for deformation factor.
M_{Ed}	Bending moment for determining the elevation as a result of the ISOPRO® element. The proper load combination will be determined by the planners.
M_{Rd}	Design torque of the ISOPRO® element in accordance with the dimensioning table, see page 10
l_k	System length [m].

NOTE:

The values indicated are approximations. These may deviate depending on the installation situation and assembly. It may then be necessary to take other influences on deformation into consideration.

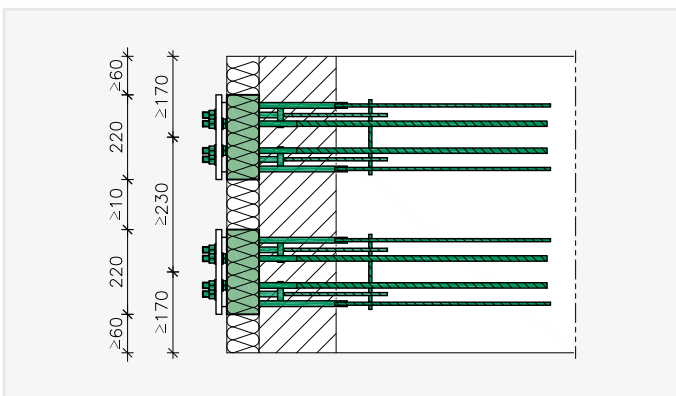
CLEARANCE BETWEEN EXPANSION JOINTS – EDGE CLEARANCES

CLEARANCE BETWEEN EXPANSION JOINTS

A balcony plate which is firmly connected with the steel girders is essential for calculating the maximum permissible clearances between expansion joints. If the connection between the steel girders and the coating is designed to enable it to be relocated, the clearances between the connections that cannot be relocated become important.

ISOPRO®	SBM 14	SBM 20
Maximum clearance between expansion joints [m]	≤ 6.0	≤ 4.0

EDGE AND CENTRE CLEARANCES



NOTES:

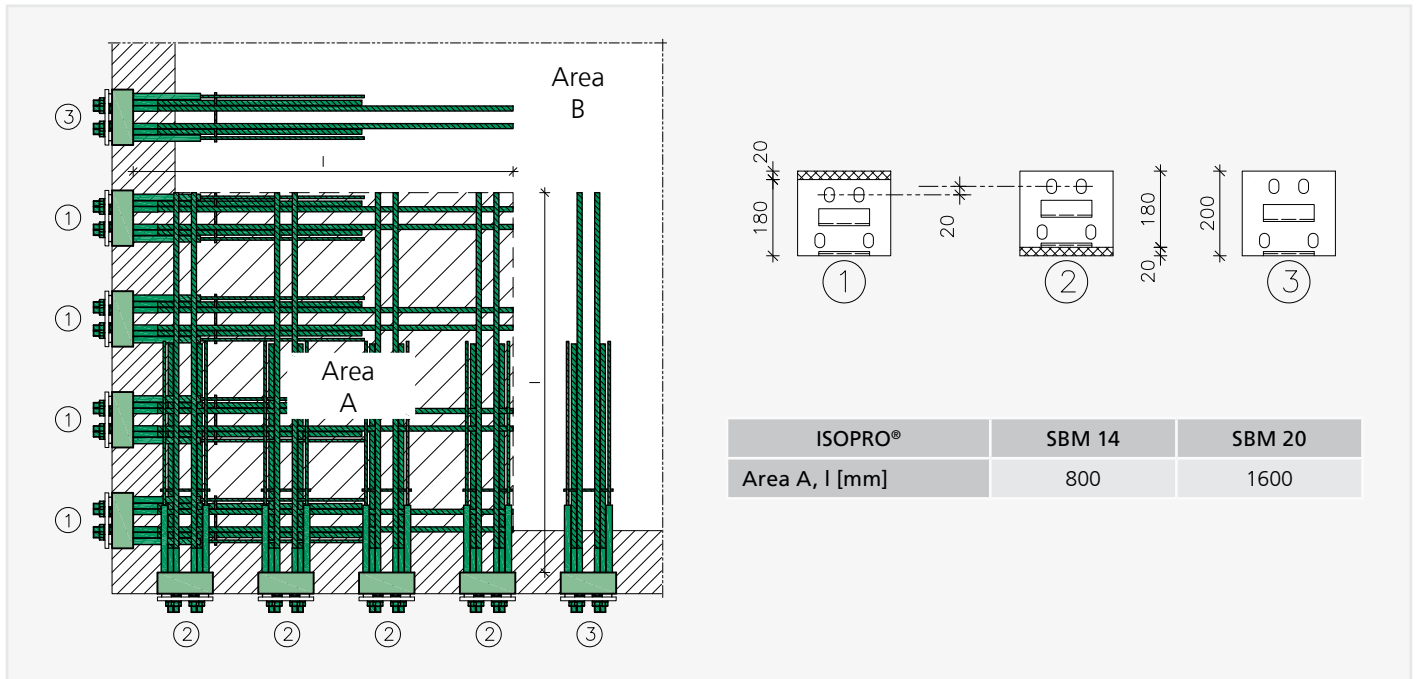
- The minimum edge clearances for the reinforced concrete component and the centre clearances between two ISOPRO® elements in accordance with general technical approval Z-15.7-233 must be observed.
- If the value is below the permissible minimum clearances, the load-bearing capacity of the ISOPRO® elements must be lowered. In this case, please contact our Application Technology team.

Application Technology team
contact details:

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OUTER CORNER

The tensile rods, compression struts and shear rods of the ISOPRO® elements overlap vertically at the outer corner. The height of the elements must therefore be offset by 20 mm in area A. This can be implemented by means of a 20 mm top insulation (provided ex-works).



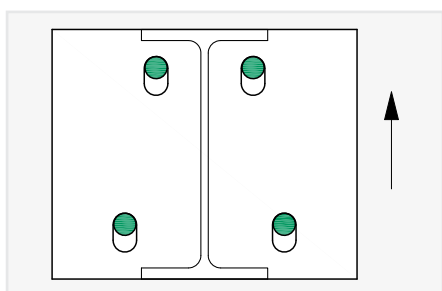
NOTES:

- Connection in the corner area only for ceiling thicknesses ≥ 200 mm
- Proper element bearing capacity for $h - 20$ mm
- Take into account the 20 mm height difference for the face plate (to be provided by the customer)
- Reduced clearance between expansion joints $e/2$ in the corner area
- Example order for elements with top insulation for a ceiling thickness of 200 mm:
e.g. Pos. 1: SBM 14 Q8 h180 + 20 mm top insulation
Pos. 2: SBM 14 Q8 h180 + 20 mm bottom insulation

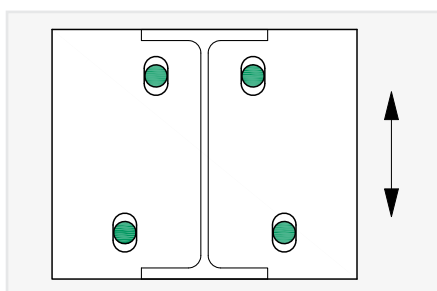
INSTALLATION ACCURACY

INSTALLATION TOLERANCES

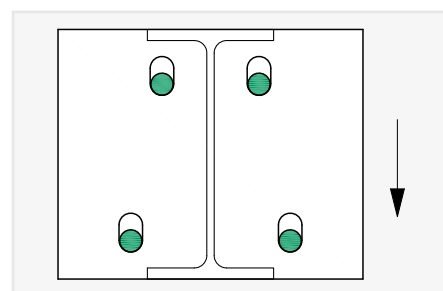
The ISOPRO® type SBM elements create a connection between steel and reinforced concrete components, which raises the question of the permissible tolerances in the transition between the two components. Tolerances must be defined in accordance with DIN 18202:2013-04 "Tolerances in building construction – Buildings" and recorded in the implementation plans. The feasibility of these tolerances must be coordinated with the shell engineer and the steel worker during the planning phase. The ISOPRO® type SBM elements can be used to compensate for inaccuracies of up to 12 mm in a vertical direction. The maximum permissible tolerances in any particular direction depend on the planned initial position of the head plate in relation to the installed ISOPRO® element.



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

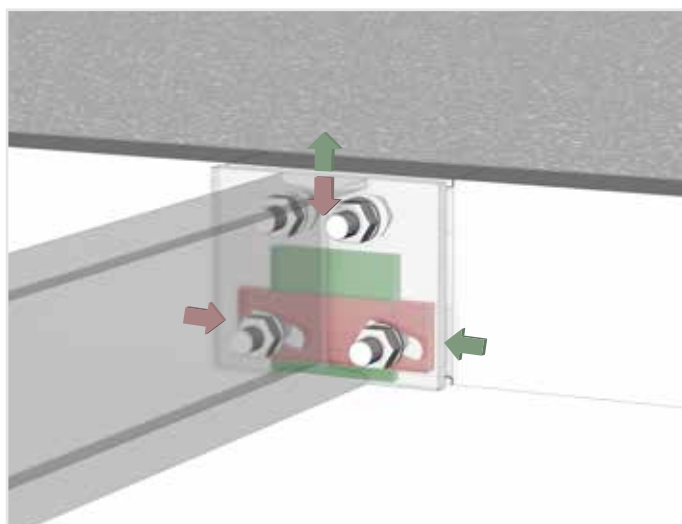


Initial position = centre of slotted hole
Tolerance: ±6 mm



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

ADJUSTABILITY



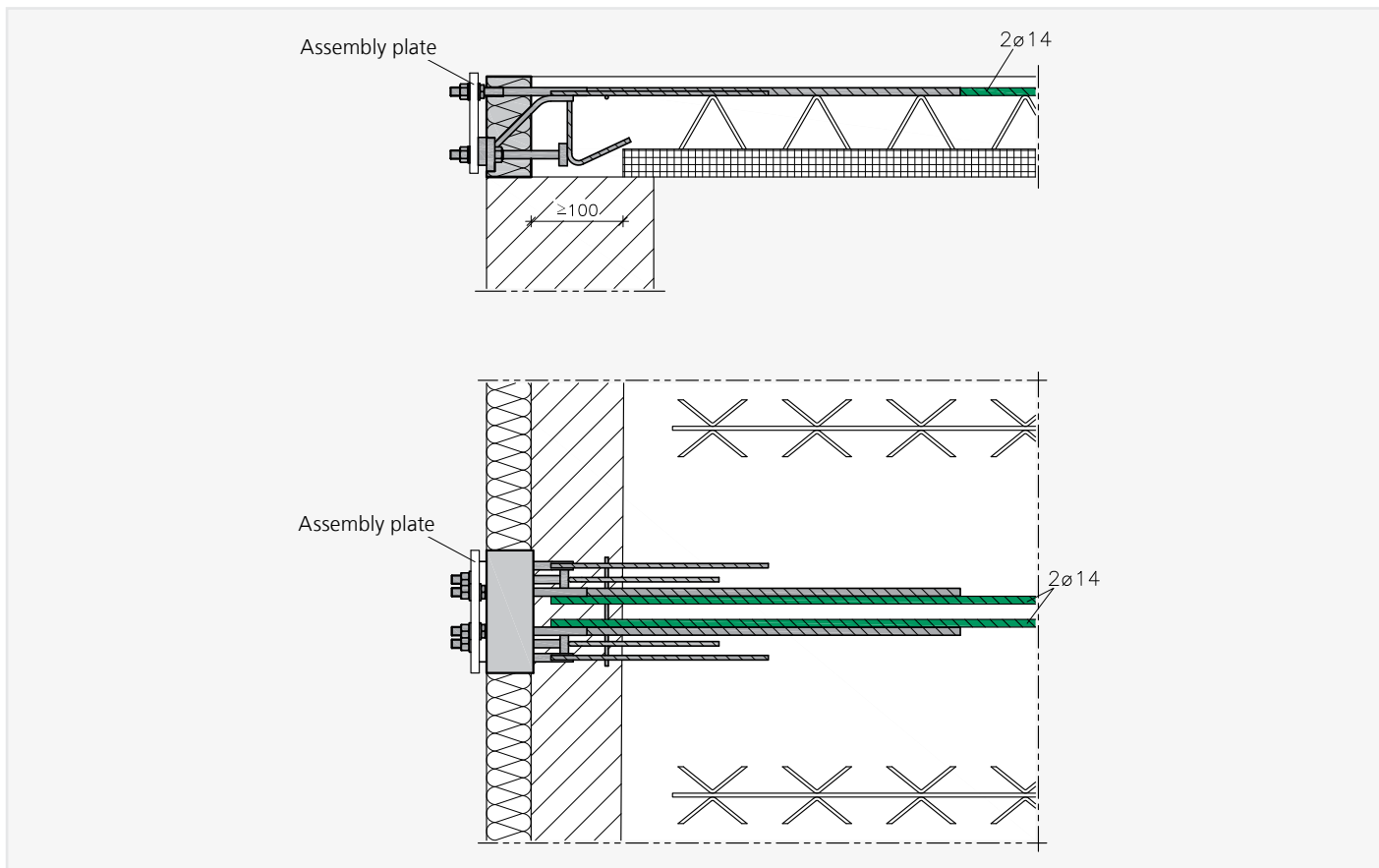
The adjustment plate ensures simple and continuously variable height adjustment.

NOTES:

- The ISOPRO® type SBM element can absorb tolerances of up to -12 mm/+12 mm in a vertical direction.
- Installation tolerances in a horizontal direction cannot be absorbed.
- When pouring concrete, the positioning stability of the ISOPRO® SBM is secured on-site.
- Construction management is responsible for checking the shell dimensions and installation accuracy before concreting.
- The steel construction and the actual shell dimensions must be coordinated between the steel workers and construction management.

ON-SITE REINFORCEMENT

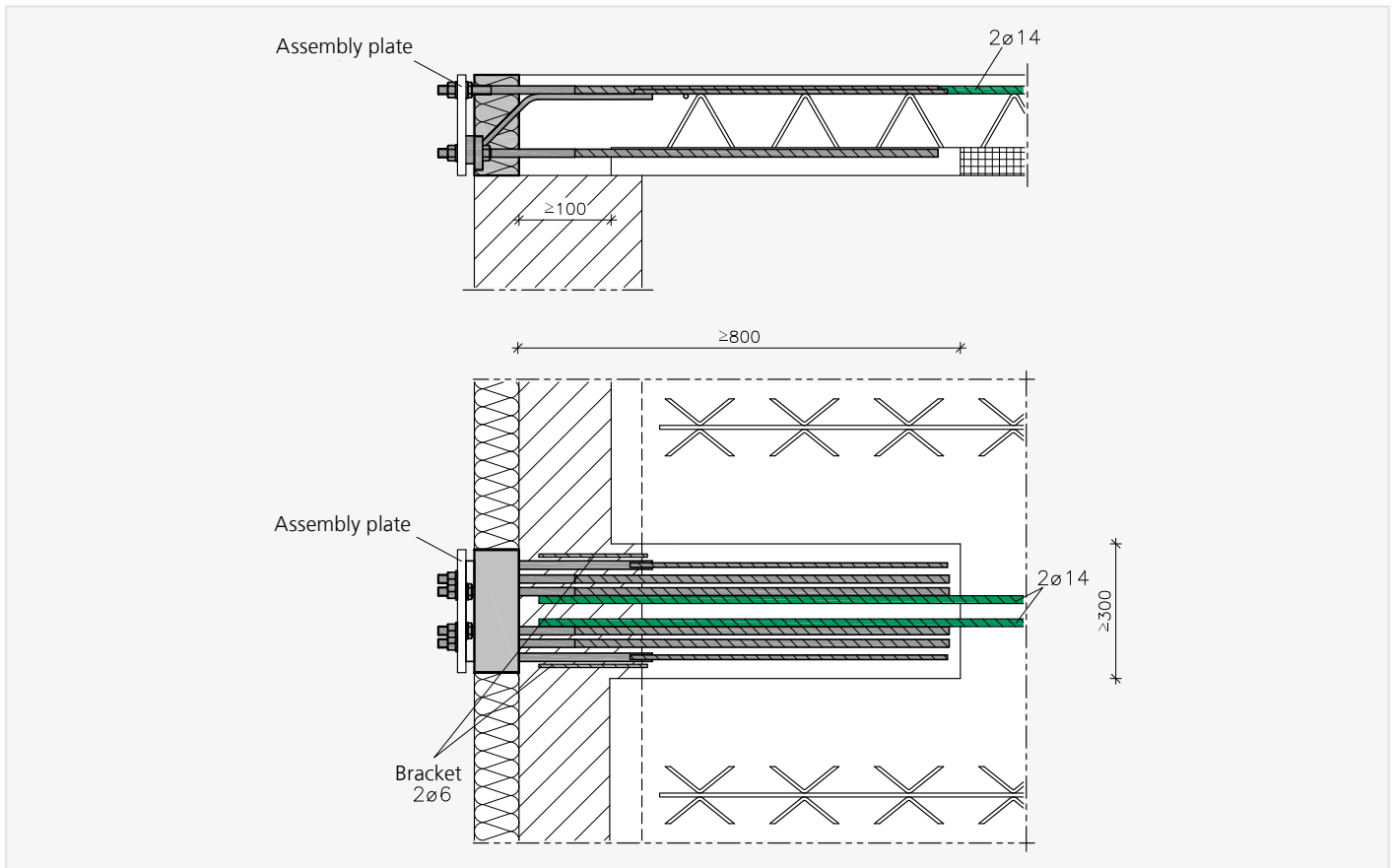
ISOPRO® SBM 14 Q8/Q10 – IN-SITU CONCRETE AND CONSTRUCTION METHOD



- Connection reinforcement for 2 dia. 14 tensile rods, design in accordance with DIN EN 1992-1-1
- Constructional transverse reinforcement in accordance with DIN EN 1992-1-1

ON-SITE REINFORCEMENT

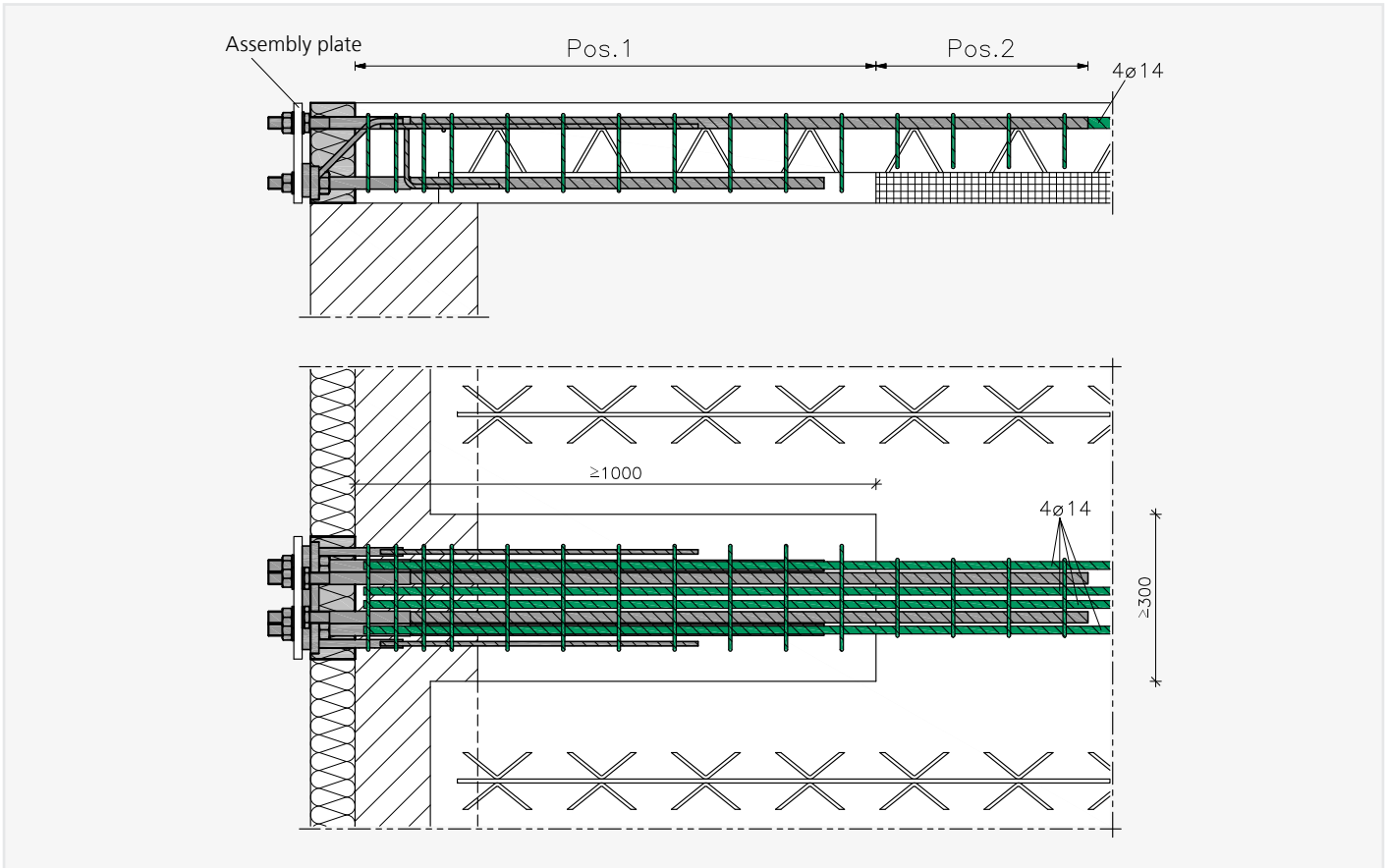
ISOPRO® SBM 14 QQ – IN-SITU CONCRETE AND CONSTRUCTION METHOD



- Connection reinforcement for 2 dia. 14 tensile rods, design in accordance with DIN EN 1992-1-1
- Constructional transverse reinforcement in accordance with DIN EN 1992-1-1
- For uplift loads, stirrups must be arranged on the element at least 2 dia. 6 from the edge banding
- Required connection reinforcement of compression struts for planned uplift loads in accordance with details provided by the structural engineer
- When using element plates, a recess must be provided for the ISOPRO® type SBM 14 QQ element in accordance with the drawing.
- Additional reinforcement in the area of the slot in accordance with details provided by the structural engineer

ON-SITE REINFORCEMENT

ISOPRO® SBM 20 Q10/SBM 20 Q12 – IN-SITU CONCRETE AND CONSTRUCTION METHOD

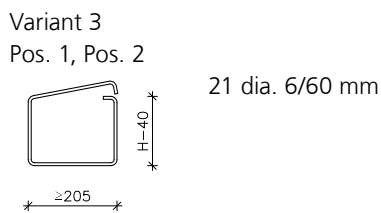
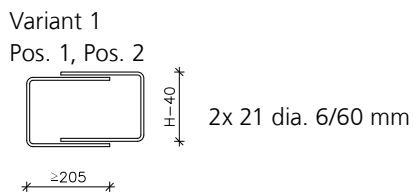


ON-SITE REINFORCEMENT

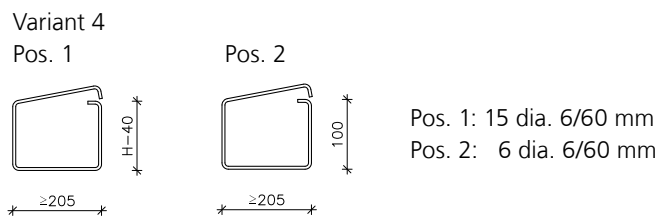
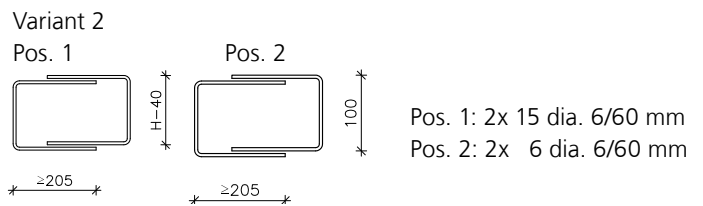
ISOPRO® SBM 20 Q10/SBM 20 Q12 – IN-SITU CONCRETE AND CONSTRUCTION METHOD

- Connection reinforcement for 4 dia. 14 tensile rods, design in accordance with DIN EN 1992-1-1
- When using element plates, a recess must be provided for the ISOPRO® element in accordance with the drawing.
- Bracket reinforcement dependent on slot length and ceiling thickness H

RECESS ALONG THE ENTIRE TENSILE ROD LENGTH



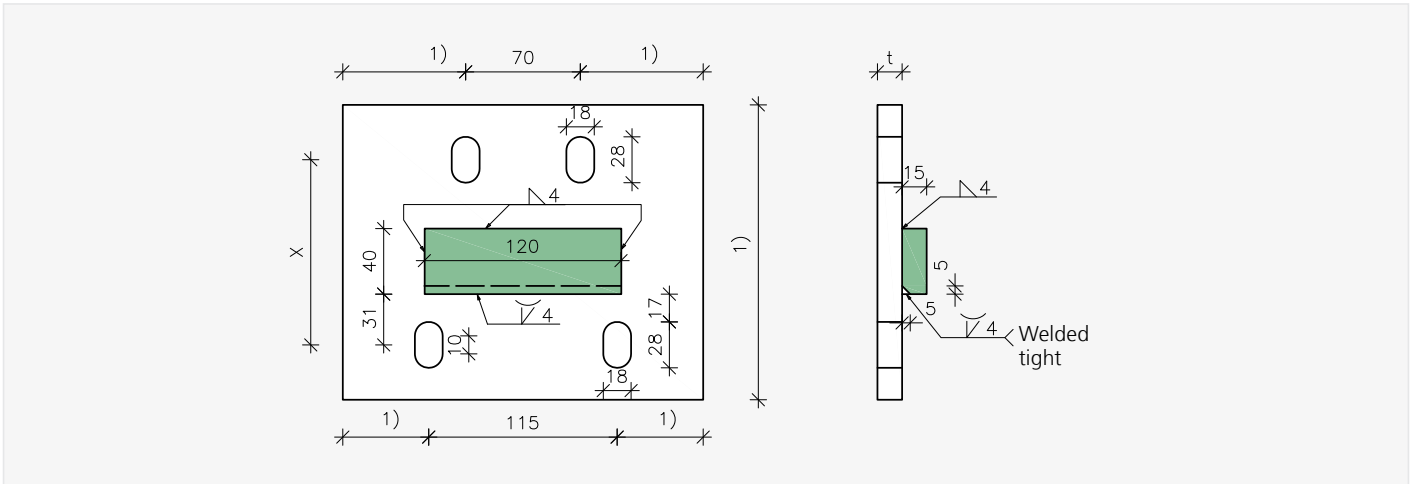
RECESS WITH L = 1000 MM



- Connection reinforcement of compression struts for planned uplift loads in accordance with details provided by the structural engineer
- For uplift loads, stirrups must be arranged on the element at least 2 dia. 6 from the edge banding
- Additional reinforcement in the area of the slot in accordance with details provided by the structural engineer

ON-SITE FACE PLATE

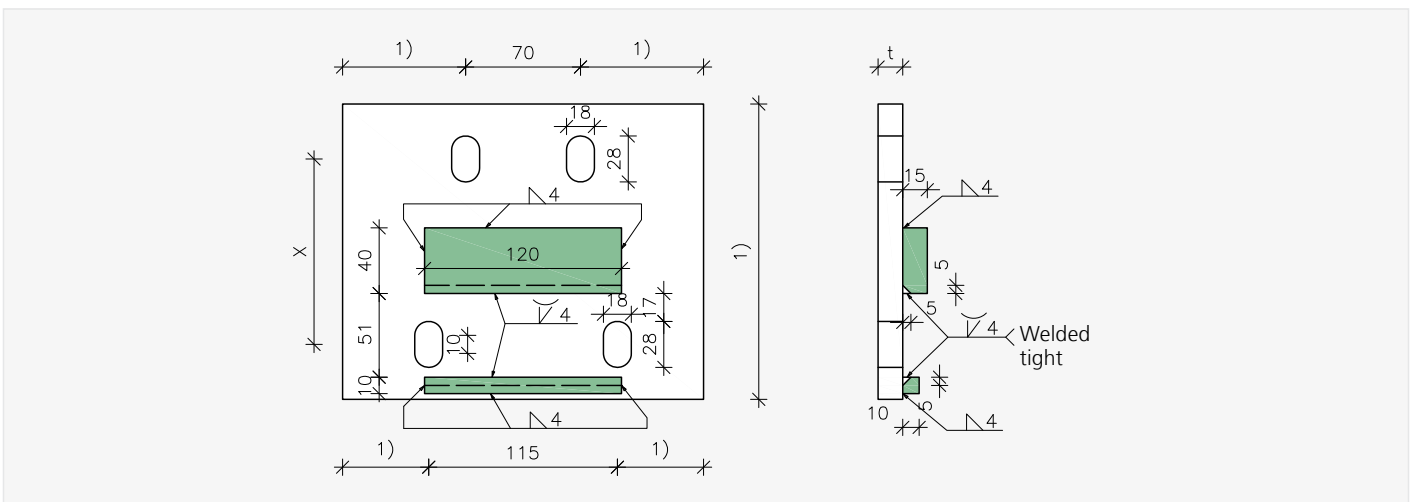
ISOPRO® SBM 14 Q8/SBM 14 Q10



Element height h [mm]	180	200	220	240	250	260	280
Distance between holes x [mm]	113	133	153	173	183	193	213

Open grip length: 30 mm.

ISOPRO® SBM 14 QQ

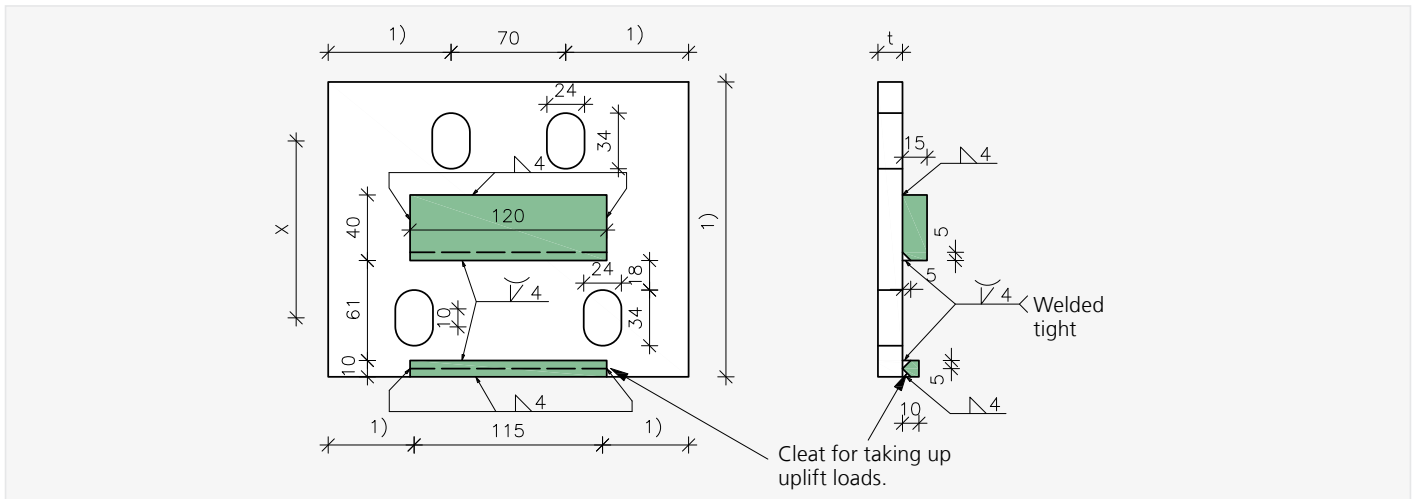


Element height h [mm]	180	200	220	240	250	260	280
Distance between holes x [mm]	113	133	153	173	183	193	213

Open grip length: 30 mm.

ON-SITE FACE PLATE

ISOPRO® SBM 20 Q10/SBM 20 Q12



Element height h [mm]	180	200	220	240	250	260	280
Distance between holes x [mm]	108	128	148	168	178	188	208

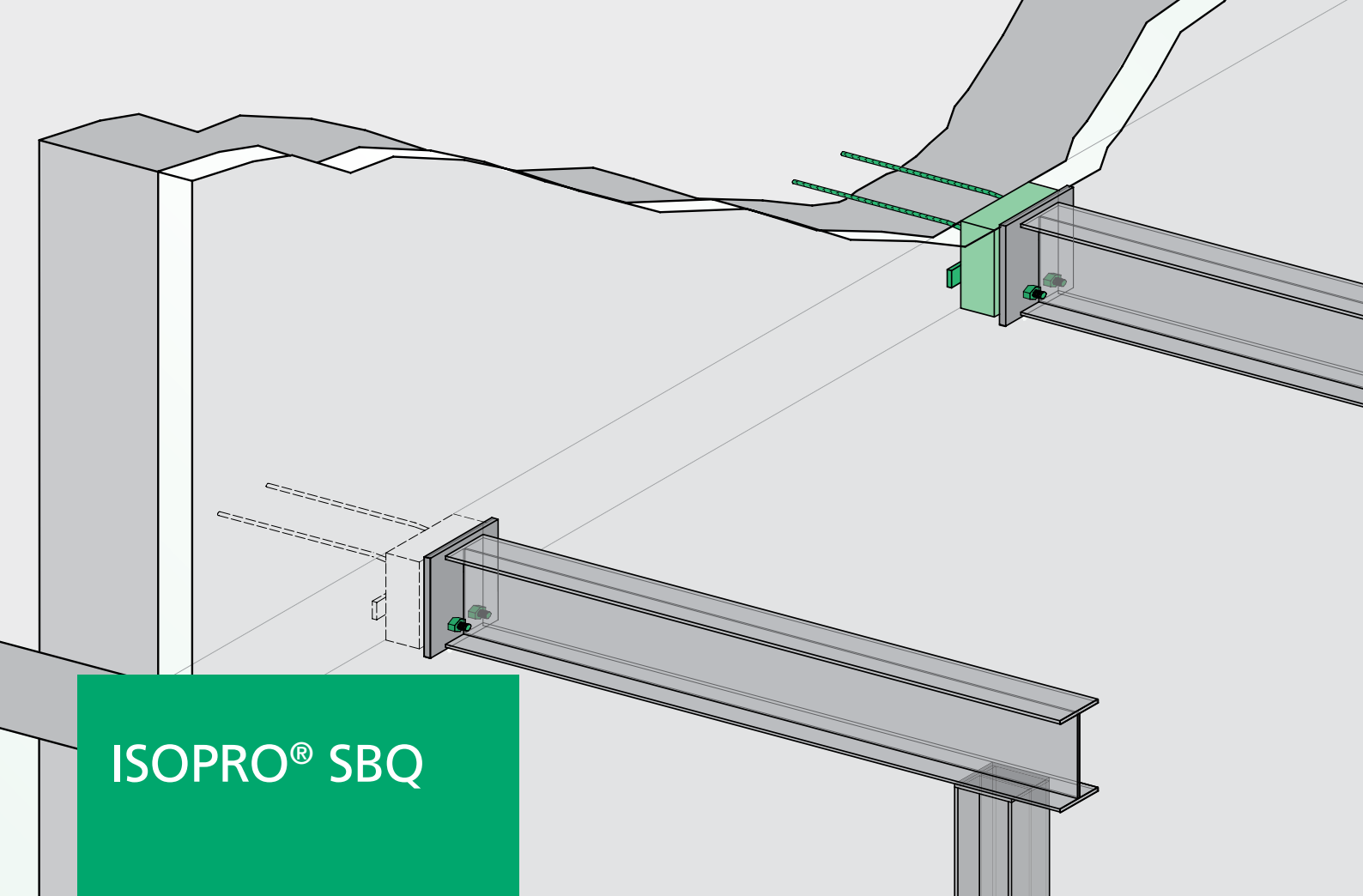
Open grip length: 35 mm.

NOTES:

- A support cleat for transmitting lateral forces is always required
- Apply corrosion protection following welding
- Material and dimensions 1) and t in accordance with details provided by the structural engineer
- Take into account the open grip length for the max. top plate thickness

DXF FILES

are available for
download at
www.h-bau.de



ISOPRO® SBQ

CONNECTION FOR SUPPORTED STEEL CONSTRUCTIONS

THE PRODUCT

The ISOPRO® SBQ thermal insulation element structurally connects supported steel constructions with reinforced concrete components. At the same time, its excellent thermal properties resolve the problem of thermal bridging – a key issue in building engineering physics – at this transition. The element comprises an EPS insulating body with extremely low thermal conductivity and a structurally effective stainless steel truss construction.

Both positive shearing forces and horizontal forces can be transmitted.

BENEFITS

- General technical approval No. Z-15.7-313
- Design values established in the approval
- Reduction of thermal bridging in accordance with DIN 4108-2 and EnEV
- Simple and secure assembly by means of continuously variable height adjustment

THE APPLICATION

As a solution to the interface between steel construction and reinforced concrete construction, ISOPRO® steel connectors fit perfectly into the ISOPRO® family. ISOPRO® SBQ elements were developed specifically for connecting supported steel constructions such as balconies and canopies.

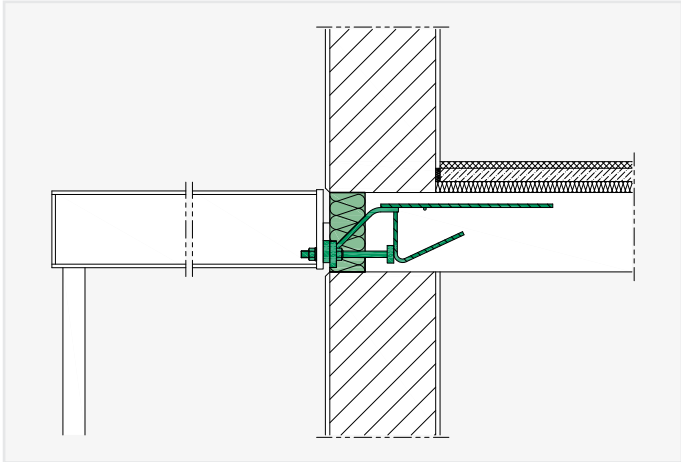
The elements are installed in the shell as part of reinforcement and concreting work. Assembly of the steel construction is carried out at a later date by the steel workers.



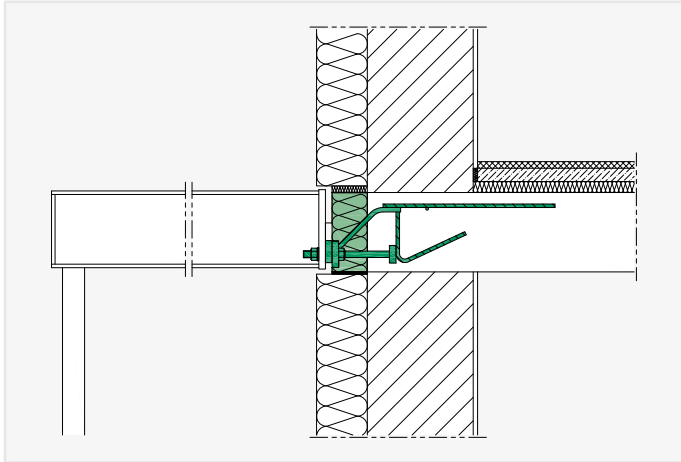
APPLICATION EXAMPLES

ISOPRO® SBQ CONNECTION SITUATIONS

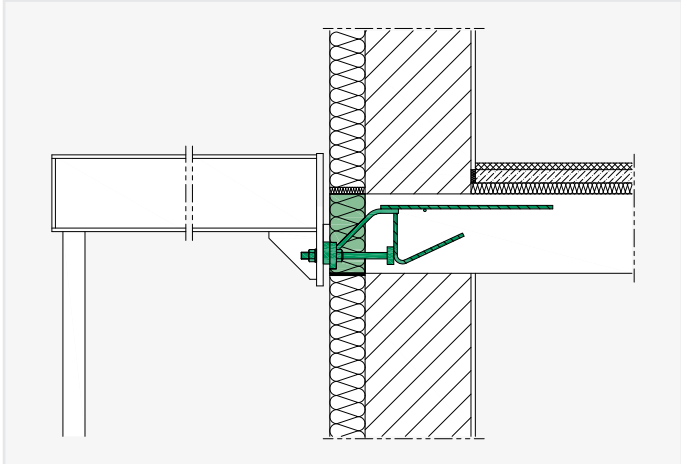
Formwork erection brick work:



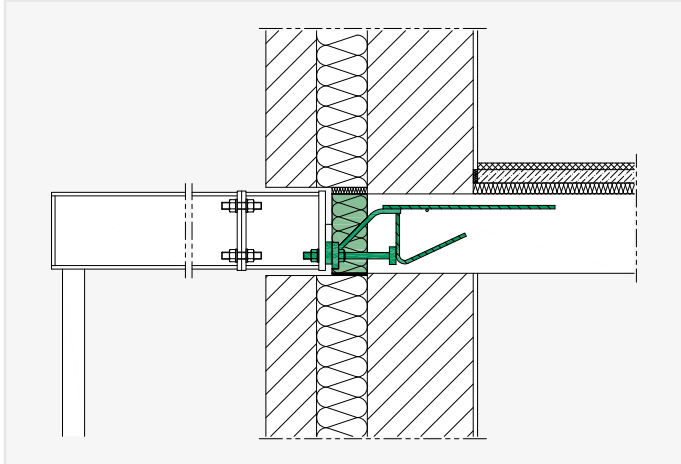
Formwork erection brick work with ETICS:



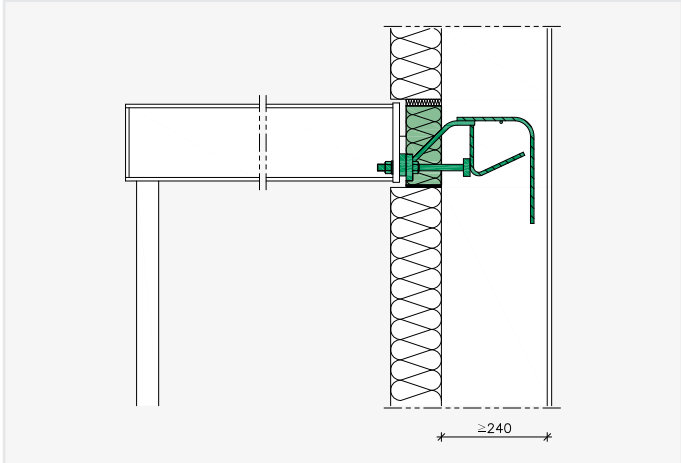
Formwork erection brick work with ETICS and steel constructions with offset heights:



Cavity walls with core insulation – flexible building operation thanks to spacer (to be provided by customer):



Special design for connection to a wall:

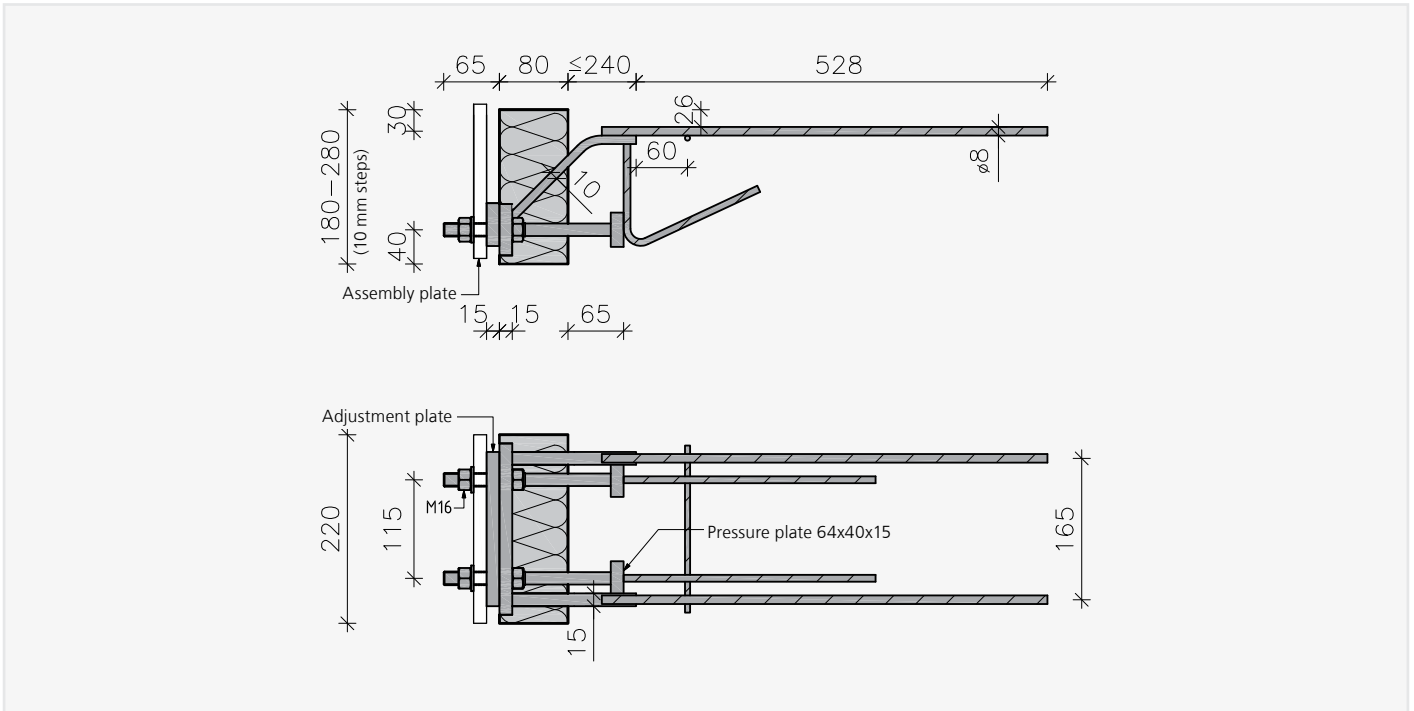


Please contact our Application Technology team for further special constructions.

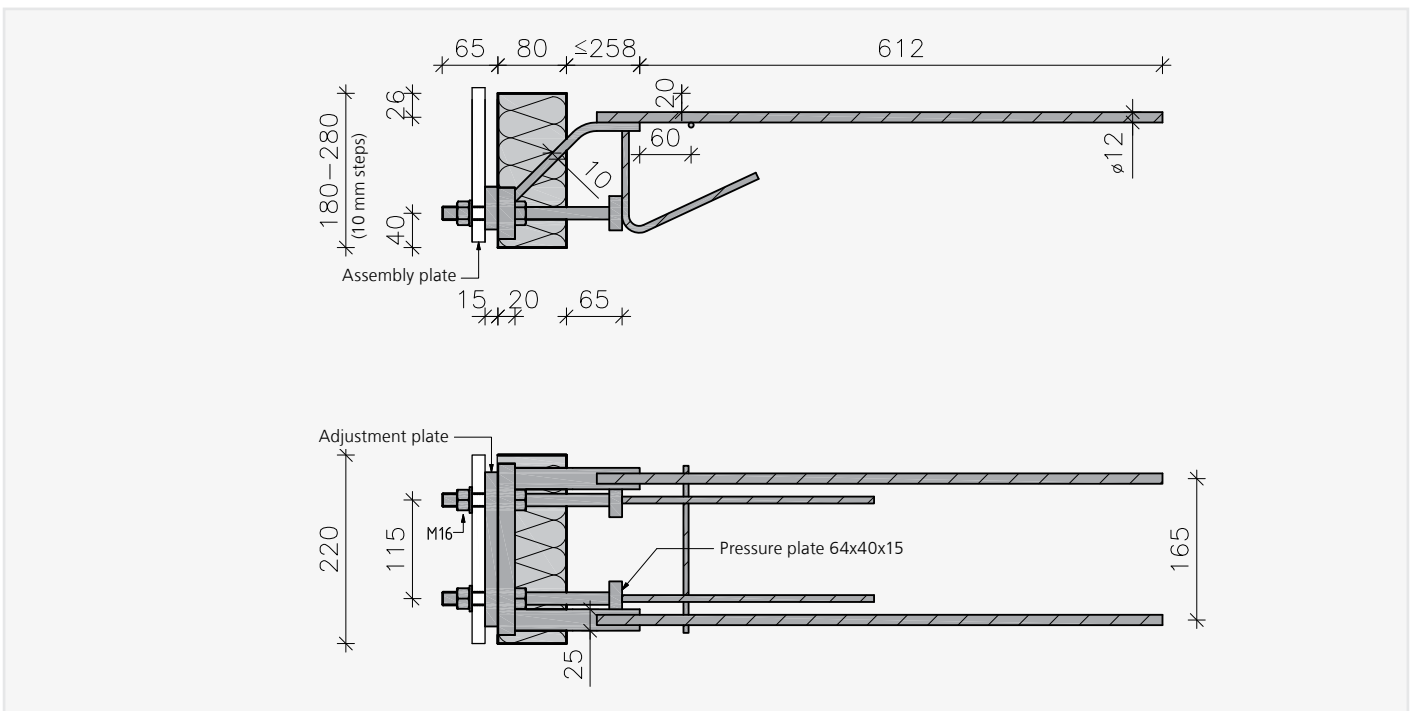
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E-mail: technik@h-bau.de

DESIGN AND DIMENSIONS

ISOPRO® SBQ 8

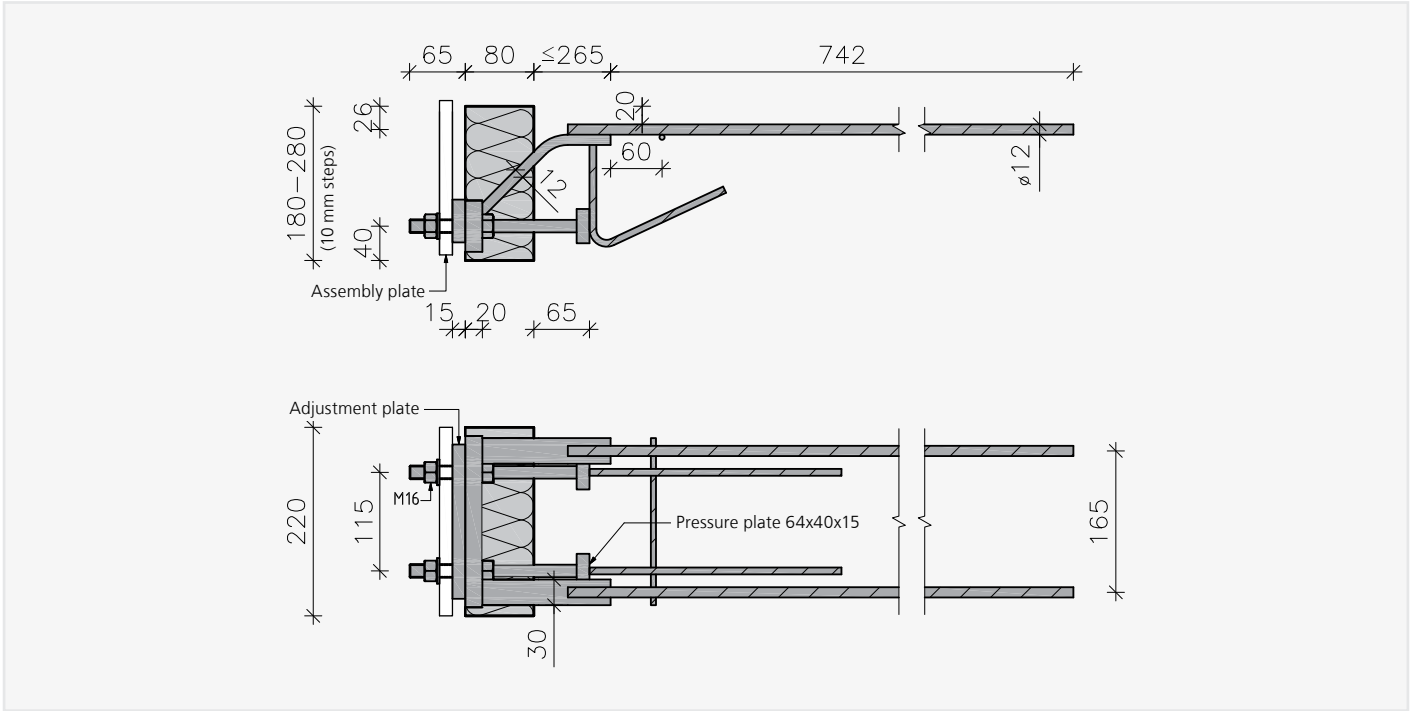


ISOPRO® SBQ 10

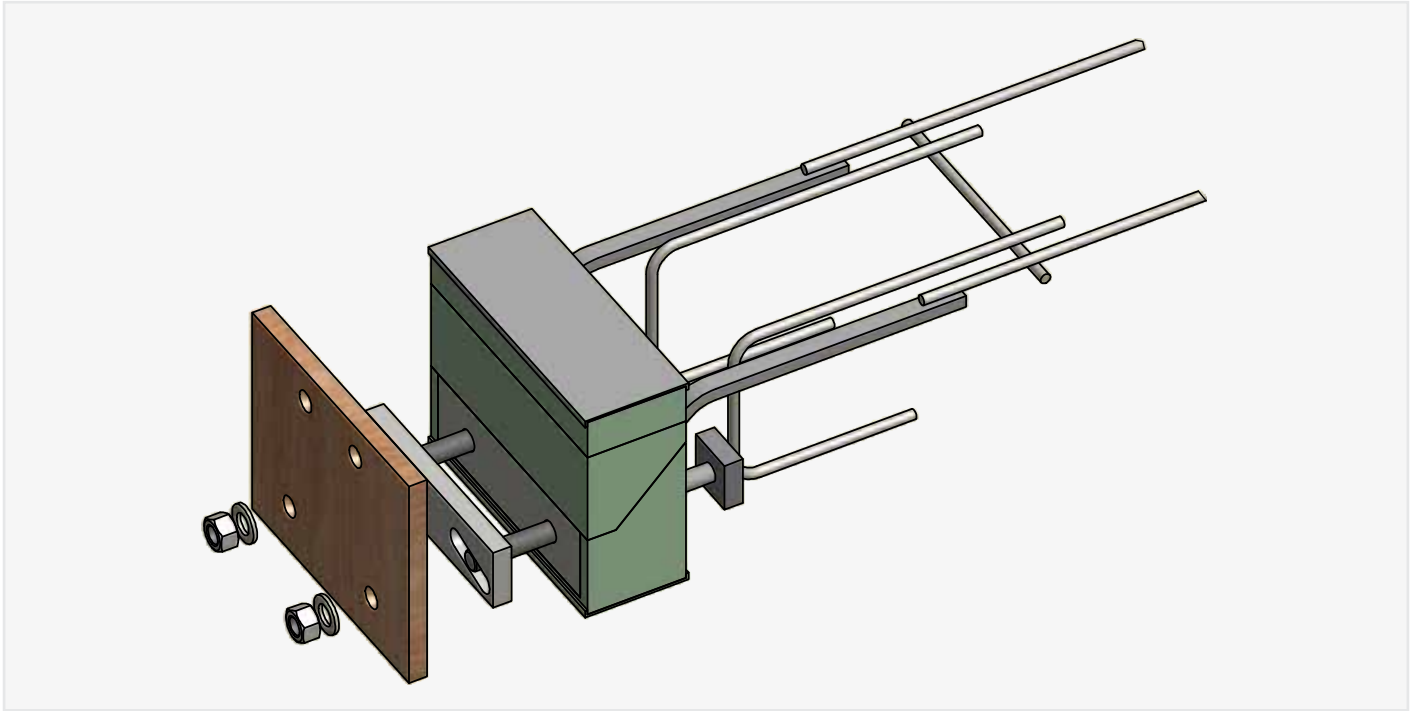


DESIGN AND DIMENSIONS

ISOPRO® SBQ 12



MODEL WITH WOODEN ASSEMBLY PLATE



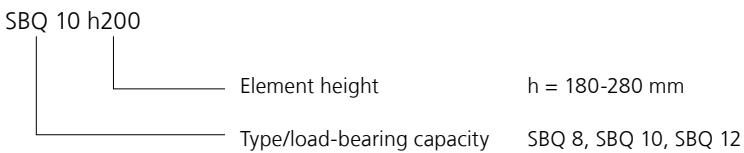
Sample illustration

DIMENSIONING

DIMENSIONING TABLE FOR ISOPRO® SBQ – CONCRETE \geq C20/25

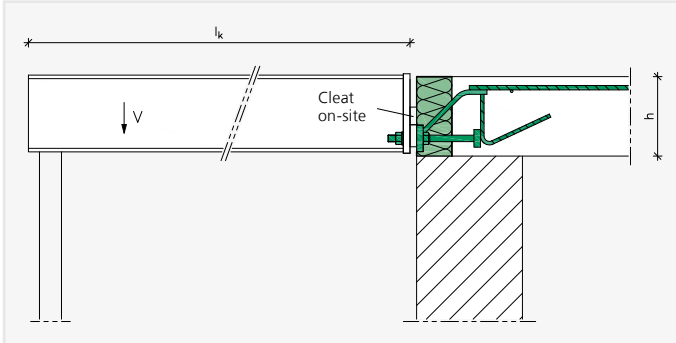
ISOPRO®	SBQ 8	SBQ 10	SBQ 12
Element height h [mm]	180-280		
Vertical force V_{Rd} [kN]	30.4	51.8	62.5
Horizontal force H_{Rd} [kN]	± 2.5	± 4.0	± 5.5

PRODUCTION DEFINITION



SYSTEM LENGTH

The system length is measured from the trailing edge of the top plate.



NOTES:

- Structural certification for the connecting components must be provided by the structural engineer.
- For indirect support, verification of the load transfer in the reinforced concrete component must be provided by the structural engineer.
- The ISOPRO® type SBQ elements are designed for a top concrete covering of $c_v = 20$ mm.
- The ISOPRO® type SBQ elements cannot absorb any torsion. Therefore, at least two ISOPRO® type SBQ elements must be used for each connected steel construction, which are secured to prevent twisting by means of their connection.

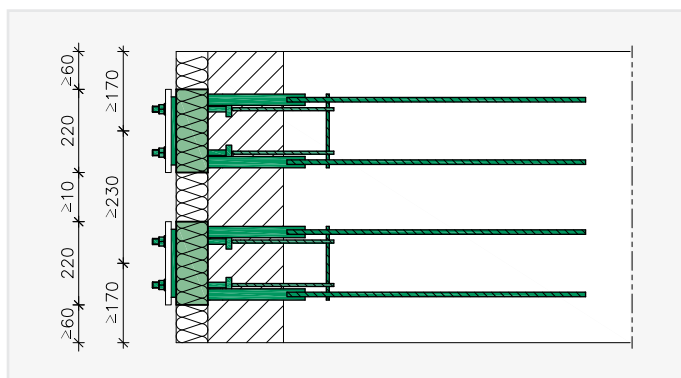
CLEARANCE BETWEEN EXPANSION JOINTS – EDGE CLEARANCES

CLEARANCE BETWEEN EXPANSION JOINTS

A balcony plate which is firmly connected with the steel girders is essential for calculating the maximum permissible clearances between expansion joints. If the connection between the steel girders and the coating is designed to enable it to be relocated, the clearances between the connections that cannot be relocated become important.

ISOPRO®	SBQ 8/SBQ 10	SBQ 12
Maximum clearance between expansion joints [m]	≤ 6.0	≤ 4.0

EDGE AND CENTRE CLEARANCES



NOTES:

- The minimum edge clearances for the reinforced concrete component and the centre clearances between two ISOPRO® elements in accordance with general technical approval Z-15.7-233 must be observed.
- If the value is below the permissible minimum clearances, the load-bearing capacity of the ISOPRO® elements must be lowered. In this case, please contact our Application Technology team.

Application Technology team
contact details:

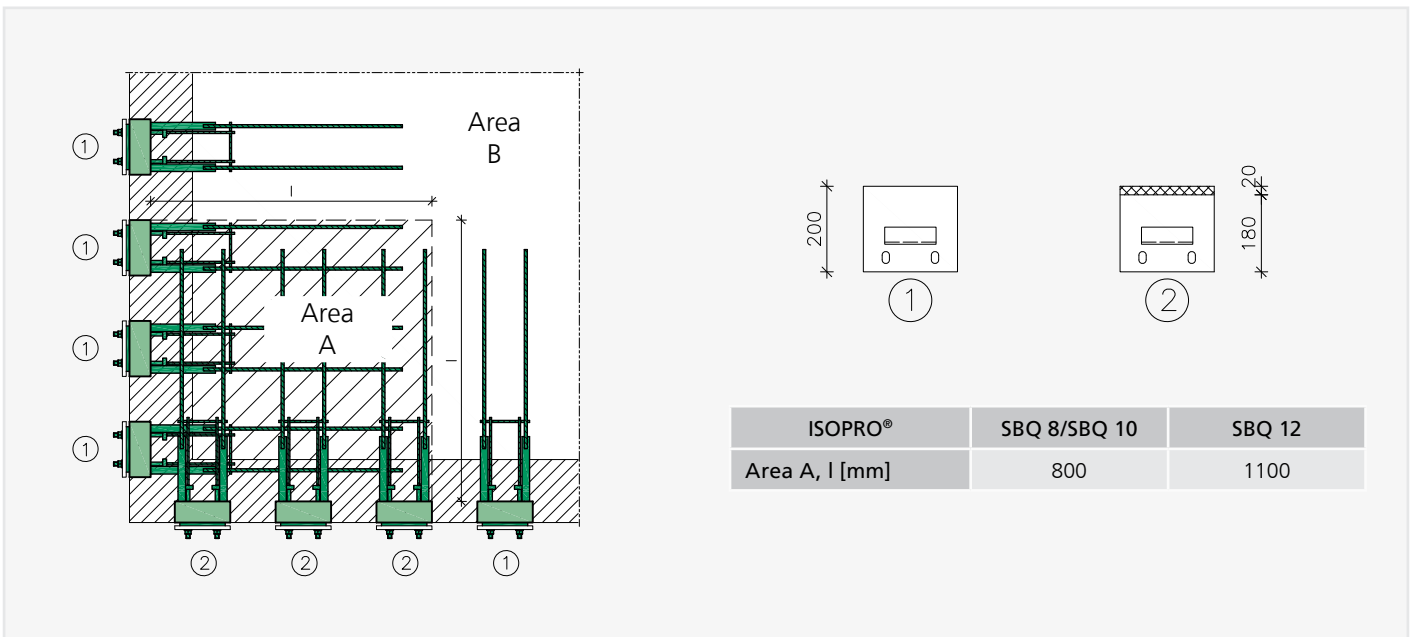
Phone: +49 (0) 7742 9215-300

Fax: +49 (0) 7742 9215-319

E-mail: technik@h-bau.de

OUTER CORNER

The shear rods of the ISOPRO® elements overlap vertically at the outer corner. The height of the elements must therefore be offset by 20 mm in area A. This can be implemented by means of a 20 mm top insulation (provided ex-works).



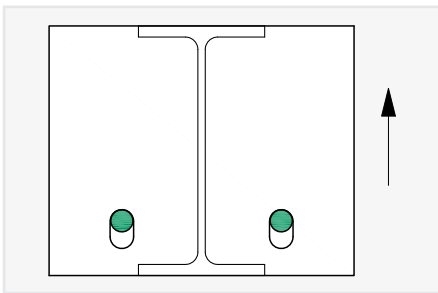
NOTES:

- Connection in the corner area only for ceiling thicknesses ≥ 200 mm
- Take into account the 20 mm height difference for the face plate (to be provided by the customer)
- Reduced clearance between expansion joints $e/2$ in the corner area
- Example order for elements with top insulation for a ceiling thickness of 200 mm:
e.g. Pos. 1: SBQ 8 h200
Pos. 2: SBQ 8 h180 + 20 mm top insulation

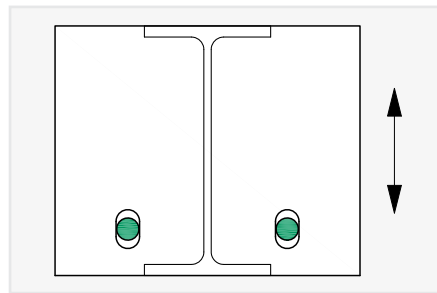
INSTALLATION ACCURACY

INSTALLATION TOLERANCES

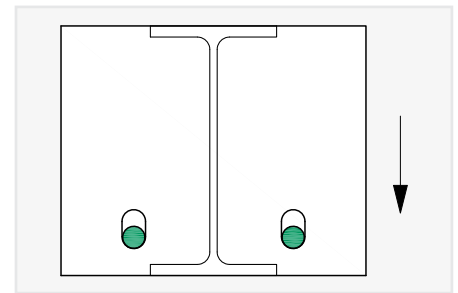
The ISOPRO® type SBQ elements create a connection between steel and reinforced concrete components, which raises the question of the permissible tolerances in the transition between the two components. Tolerances must be defined in accordance with DIN 18202:2013-04 "Tolerances in building construction – Buildings" and recorded in the implementation plans. The feasibility of these tolerances must be coordinated with the shell engineer and the steel worker during the planning phase. The ISOPRO® type SBQ elements can be used to compensate for inaccuracies of up to 12 mm in a vertical direction. The maximum permissible tolerances in any particular direction depend on the planned initial position of the head plate in relation to the installed ISOPRO® element.



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

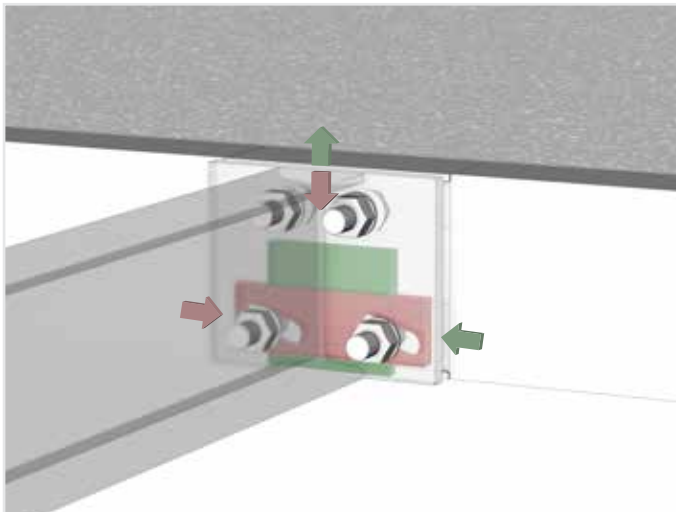


Initial position = centre of slotted hole
Tolerance: ± 6 mm



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

ADJUSTABILITY



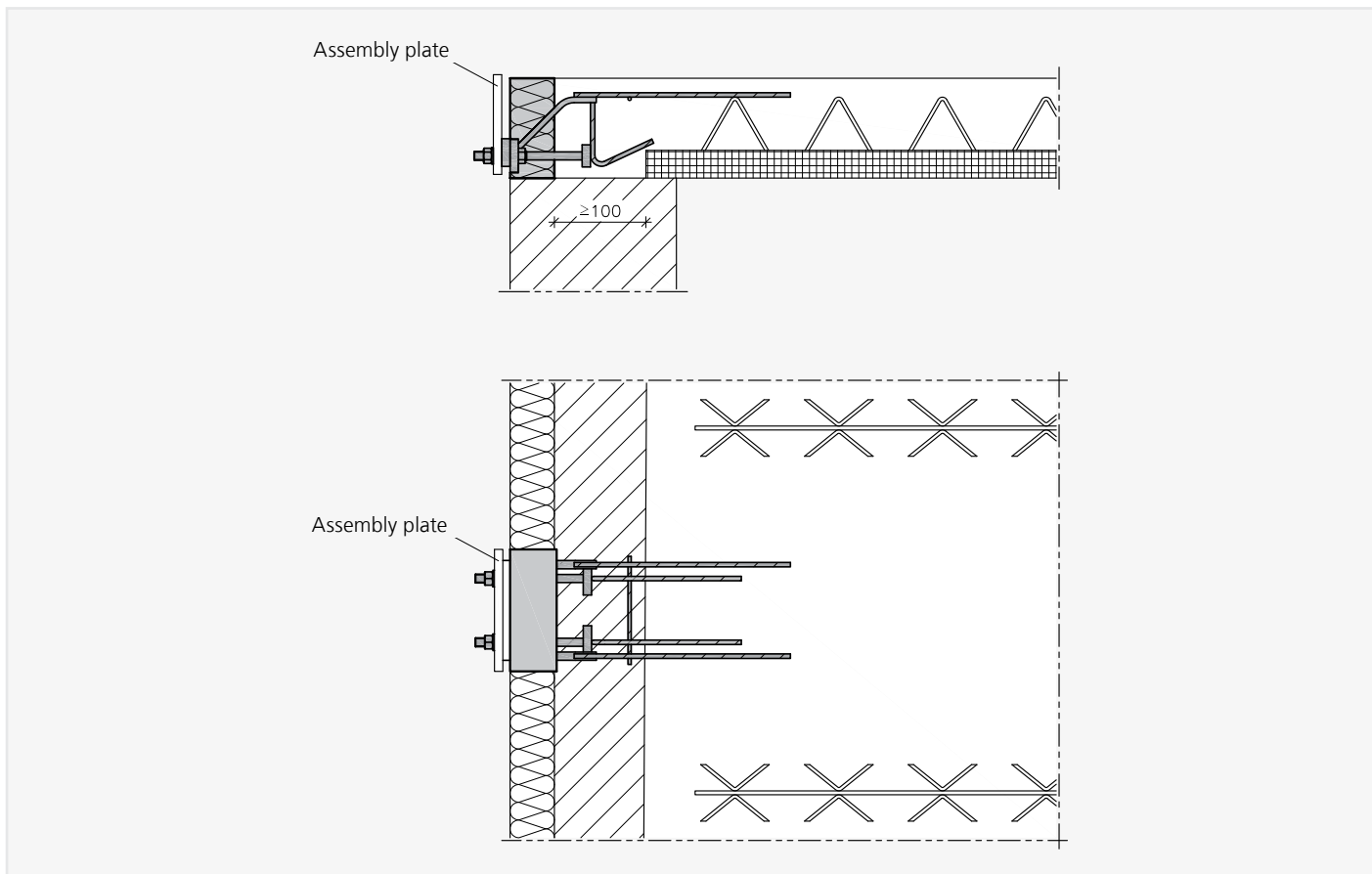
The adjustment plate ensures simple and continuously variable height adjustment.

NOTES:

- The ISOPRO® type SBQ element can absorb tolerances of up to -12 mm/+12 mm in a vertical direction.
- Installation tolerances in a horizontal direction cannot be absorbed.
- When pouring concrete, the positioning stability of the ISOPRO® SBQ is secured on-site.
- Construction management is responsible for checking the shell dimensions and installation accuracy before concreting.
- The steel construction and the actual shell dimensions must be coordinated between the steel workers and construction management.

ON-SITE REINFORCEMENT

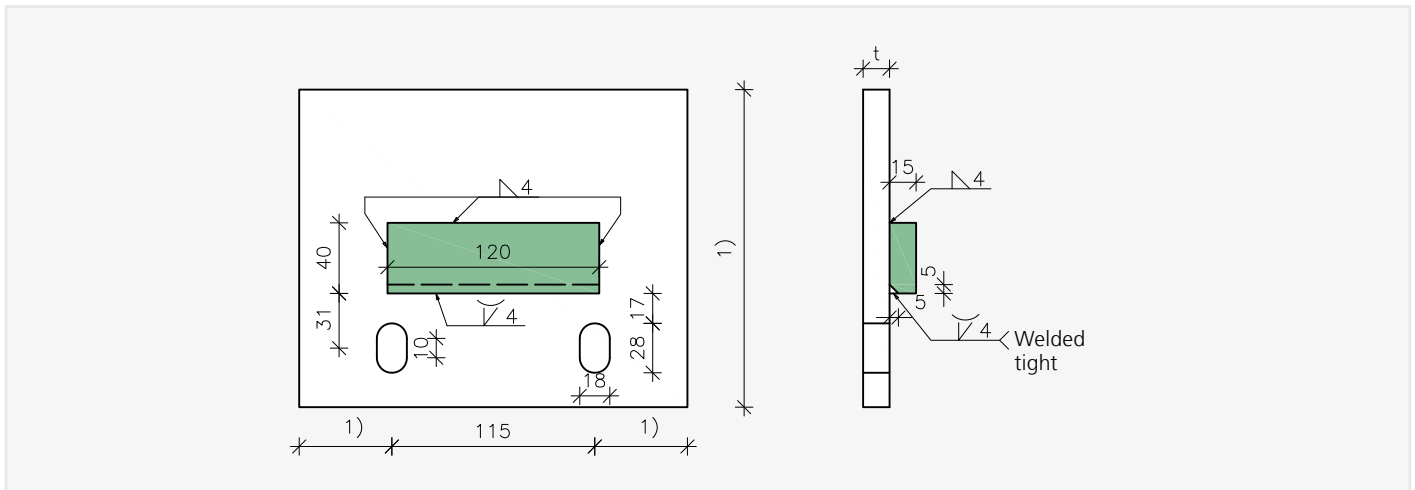
ISOPRO® SBQ ON-SITE REINFORCEMENT – IN-SITU CONCRETE AND CONSTRUCTION METHOD



- The constructive stirrup 2 dia. 8 is available ex-works.
- The ISOPRO® type SBQ element does not require any additional reinforcement.

ON-SITE FACE PLATE

ON-SITE FACE PLATE ISOPRO® SBQ

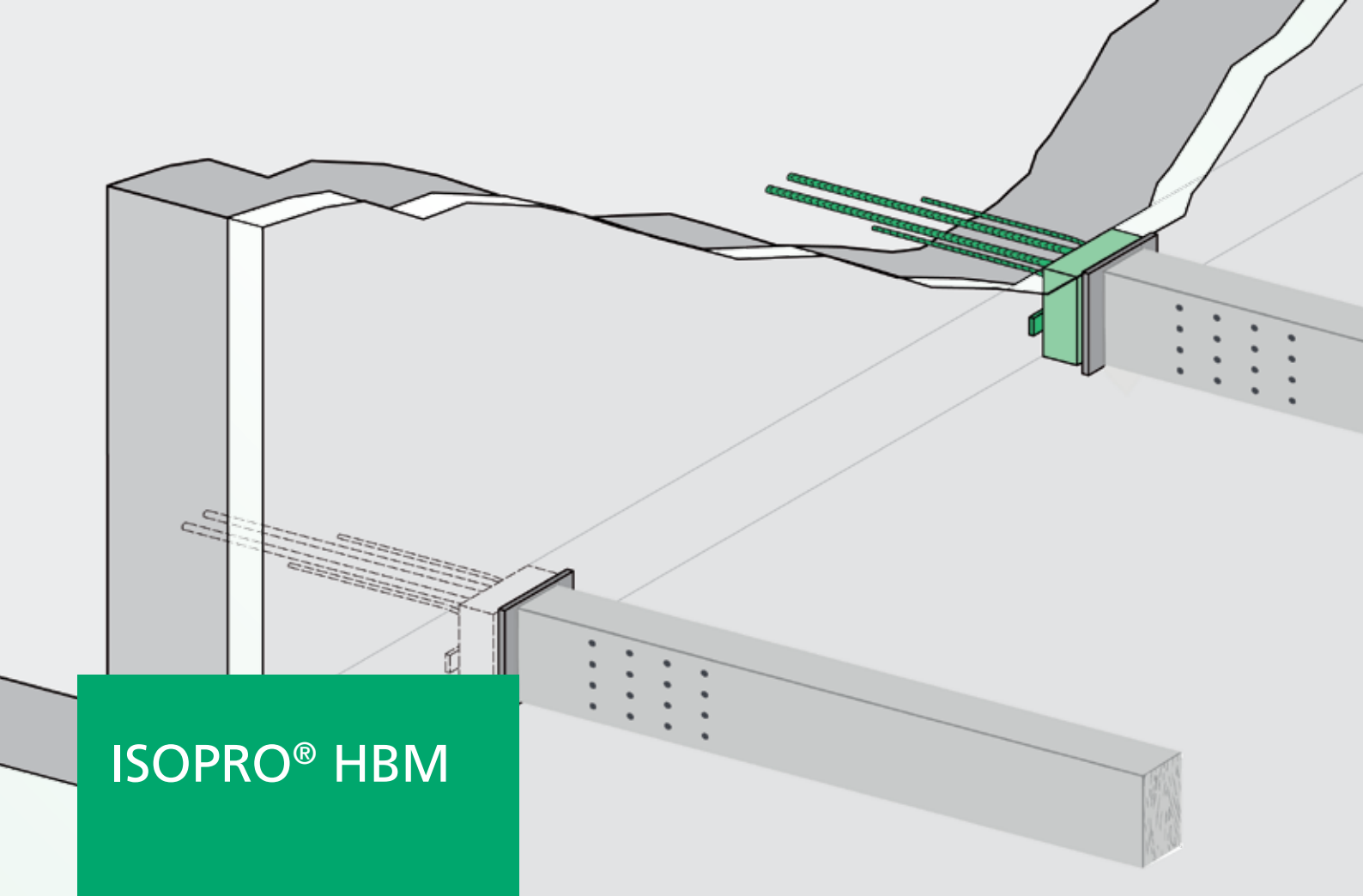


NOTES:

- A support cleat for transmitting lateral forces is always required
- Apply corrosion protection following welding
- Material and dimensions 1) and t in accordance with details provided by the structural engineer
- Take into account the open grip length of 30 mm for the max. top plate thickness

DXF FILES

are available for
download at
www.h-bau.de



ISOPRO® HBM

CONNECTION FOR FREELY PROJECTING WOODEN CONSTRUCTIONS

THE PRODUCT

The ISOPRO® HBM thermal insulation element structurally connects freely projecting wooden constructions with reinforced concrete components. At the same time, its excellent thermal properties resolve the problem of thermal bridging – a key issue in building engineering physics – at this transition. The element comprises an EPS insulating body with extremely low thermal conductivity and a structurally effective stainless steel truss construction. Bending moments, lateral forces and horizontal forces are transmitted.

BENEFITS

- General technical approval No. Z-15.7-313
- Reduction of thermal bridging in accordance with DIN 4108-2 and EnEV
- Simple and secure assembly by means of continuously variable height adjustment

THE APPLICATION

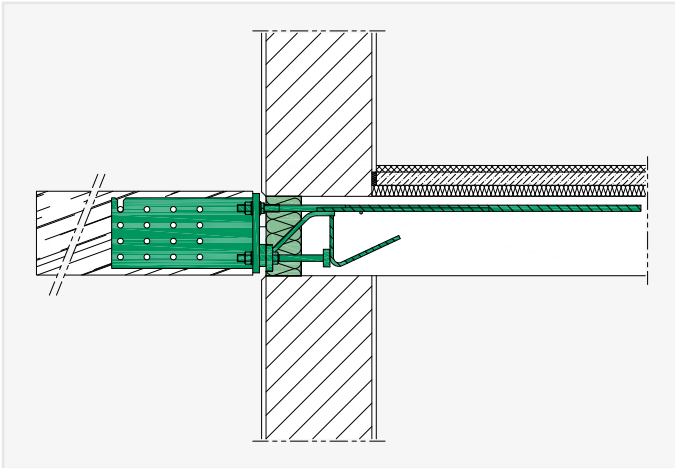
As a solution to the interface between wooden constructions and reinforced concrete constructions, ISOPRO® wood connectors fit perfectly into the ISOPRO® family. ISOPRO® HBM elements were developed specifically for connecting freely projecting wooden constructions such as balconies and canopies. The elements are installed in the shell as part of reinforcement and concreting work. Assembly of the wooden construction is carried out at a later date by the carpenter.



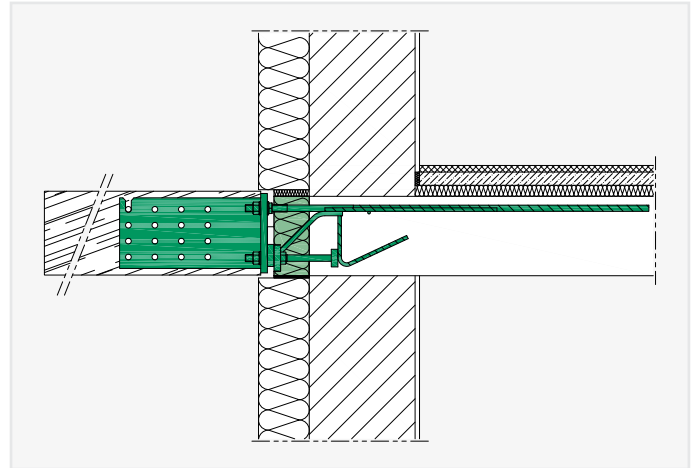
APPLICATION EXAMPLES

ISOPRO® HBM CONNECTION SITUATIONS

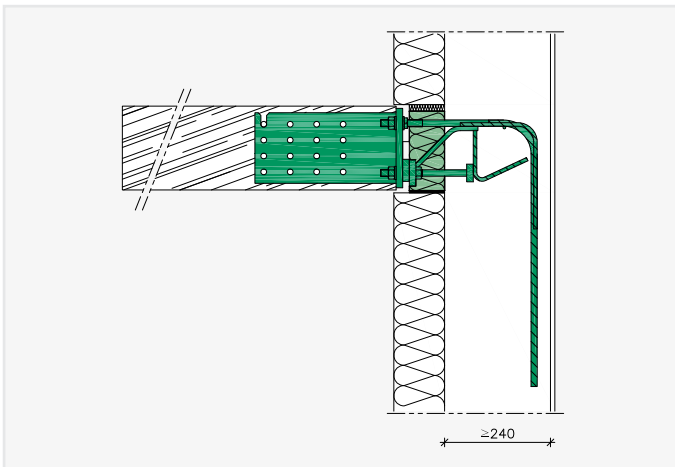
Formwork erection brick work:



Formwork erection brick work with ETICS:



Special design for connection to a wall:



Please contact our Application Technology department for further special constructions.

Phone: +49 (0) 7742 9215-300

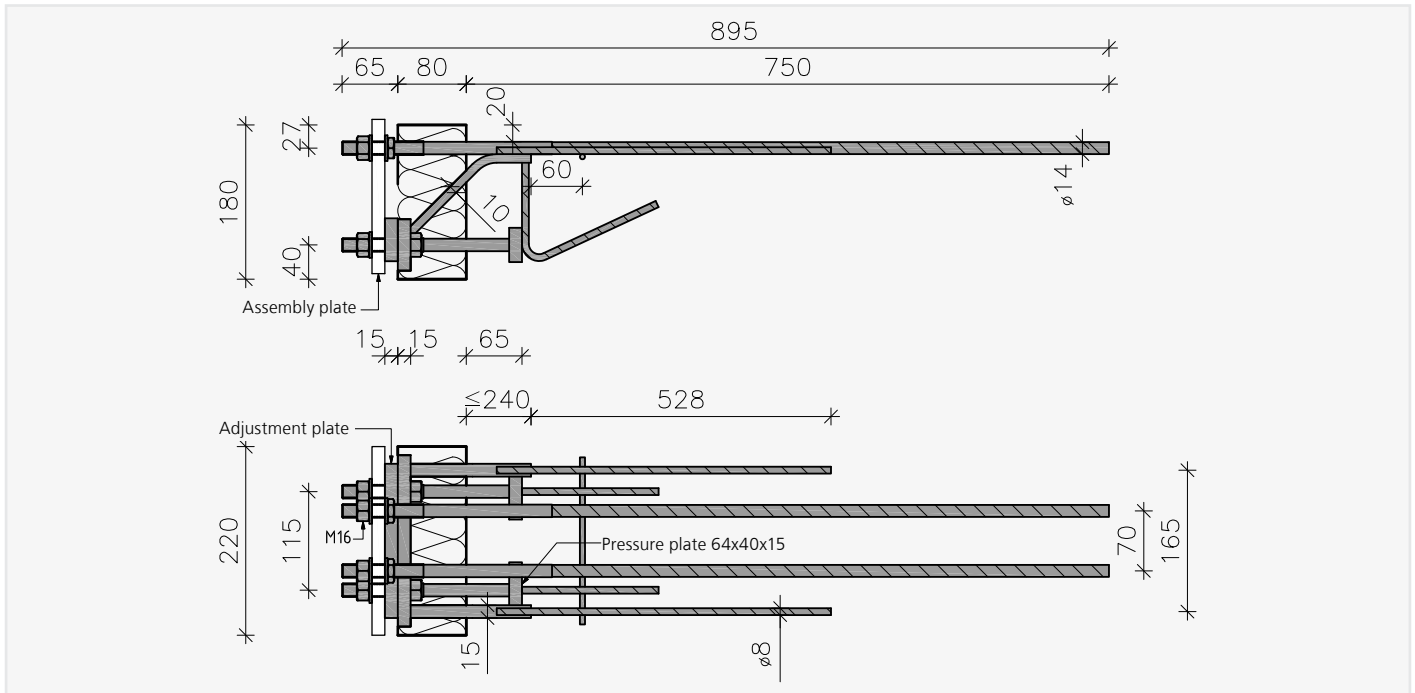
Fax: +49 (0) 7742 9215-319

E-mail: technik@h-bau.de

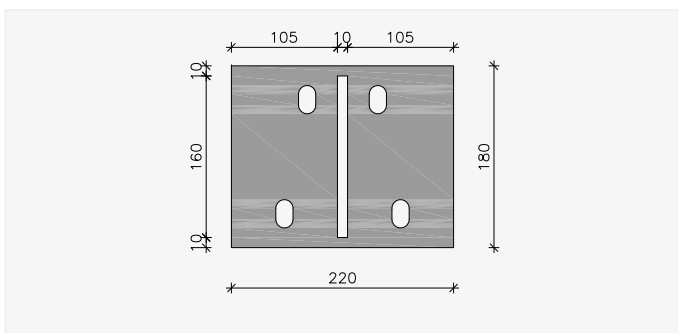
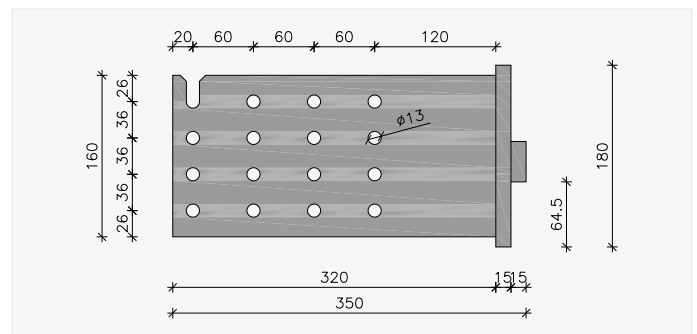
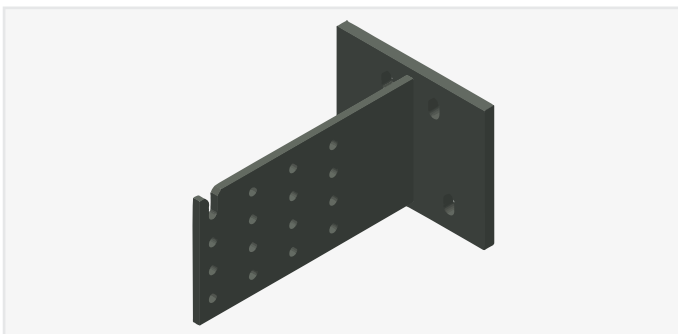
DESIGN AND DIMENSIONS

ISOPRO® HBM 14 Q8

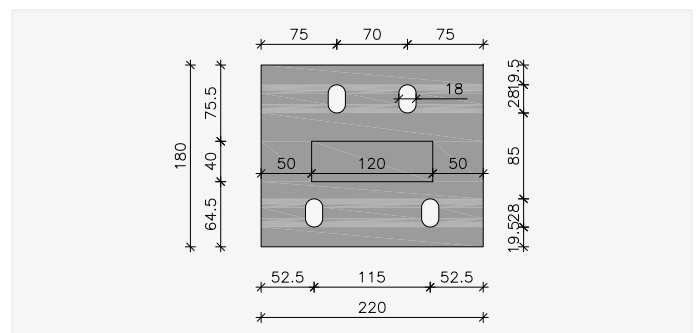
The wood connection consists of an ISOPRO® SBM 14 Q8 h180 element (see page 8) and a galvanised connection strut. The relevant dowel rods must be added on site.



ISOPRO® SBM 14 Q8 element



Connection strut



DIMENSIONING

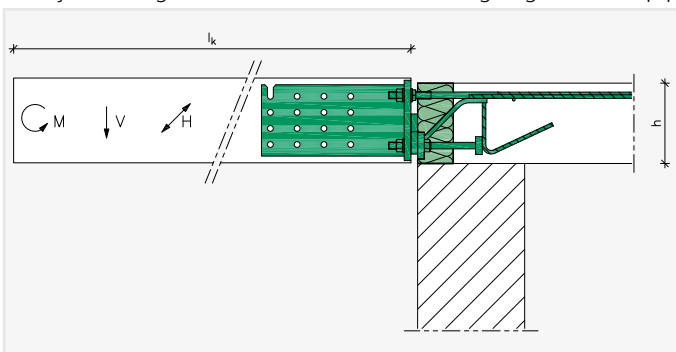
DIMENSIONING TABLE FOR ISOPRO® HBM 14 Q8 – CONCRETE \geq C20/25 / USAGE CLASS 2, LOAD DURATION CLASS MEDIUM

Wooden balcony width b [mm]	C24 softwood GL24c laminated timber			C30 softwood GL28c laminated timber		
	M_{Rd} [kNm]	V_{Rd} [kN]	H_{Rd} [kN]	M_{Rd} [kNm]	V_{Rd} [kN]	H_{Rd} [kN]
120	-6.3	10.1	± 2.5	-6.8	10.1	± 2.5
140	-7.0	10.1	± 2.5	-7.5	10.1	± 2.5
160	-7.8	10.1	± 2.5	-8.3	10.1	± 2.5

Example dimensioning on the basis of DIN EN 1995-1-1 : 2010-12 and DIN EN 1995-1-1/NA : 2010-12

SYSTEM LENGTH

The system length is measured from the trailing edge of the top plate.



NOTES:

- Structural certification for the connecting components must be provided by the structural engineer.
- For indirect support, verification of the load transfer in the reinforced concrete component must be provided by the structural engineer.
- The ISOPRO® type HBM element is designed for a top concrete covering of $c_v = 20$ mm at $h = 180$ mm.
- Minimum wooden balcony dimensions: $w \times h = 120 \times 180$ mm
- Connection of the wooden balcony to the strut: 16 dowel rods, dia. 12, S 235 galvanised
- With reinforced concrete component dimensions of $h > 180$ mm, the ISOPRO® element can be ordered with top insulation provided ex-works, e.g. for height 220 mm, HBM 14 Q8 h180 + 40 mm bottom insulation.
- The ISOPRO® type HBM elements cannot absorb any torsion. Therefore, at least two ISOPRO® type HBM elements must be used for each connected wooden construction, which are secured to prevent twisting by means of their connection.

DEFLECTION AND ELEVATION

DEFORMATION FACTORS TAN α

ISOPRO® HBM 14 Q8	0.60
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In order to determine the vertical displacement at the end of the cantilever of the wooden construction, the deformation of the ISOPRO® HBM wood connection must be superimposed over the deformation of the connected wooden construction.

We recommend providing proof in the limit state of suitability for use (quasi-continuous load combination).

The steel construction must be elevated for the deformation identified. Please note: The results are rounded up or down in accordance with the planned drainage.

The amount of elevation derived from the element's deformation is calculated as follows:

$$w \text{ [mm]} = \tan \alpha \cdot (M_{Ed}/M_{Rd}) \cdot l_k \text{ [m]} \cdot 10$$

$\tan \alpha$	See table above for deformation factor.
M_{Ed}	Bending moment for determining the elevation as a result of the ISOPRO® element. The proper load combination will be determined by the planners.
M_{Rd}	Design torque of the ISOPRO® element in accordance with the dimensioning table, see page 10
l_k	System length [m].

NOTE:

The values indicated are approximations. These may deviate depending on the installation situation and assembly. It may then be necessary to take other influences on deformation into consideration.

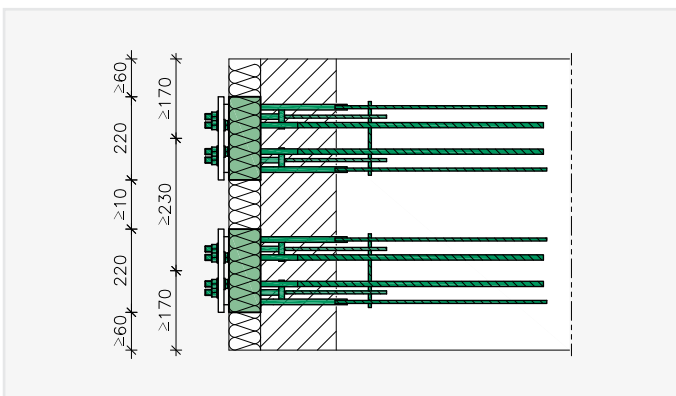
CLEARANCE BETWEEN EXPANSION JOINTS – EDGE CLEARANCES

CLEARANCE BETWEEN EXPANSION JOINTS

A balcony plate which is firmly connected with the wooden girders is essential for calculating the maximum permissible clearances between expansion joints. If the connection between the wooden girders and the coating is designed to enable it to be relocated, the clearances between the connections that cannot be relocated become important.

ISOPRO® HBM 14 Q8	
Maximum distance between expansion joints	≤ 6.0 m

EDGE AND CENTRE CLEARANCES



NOTES:

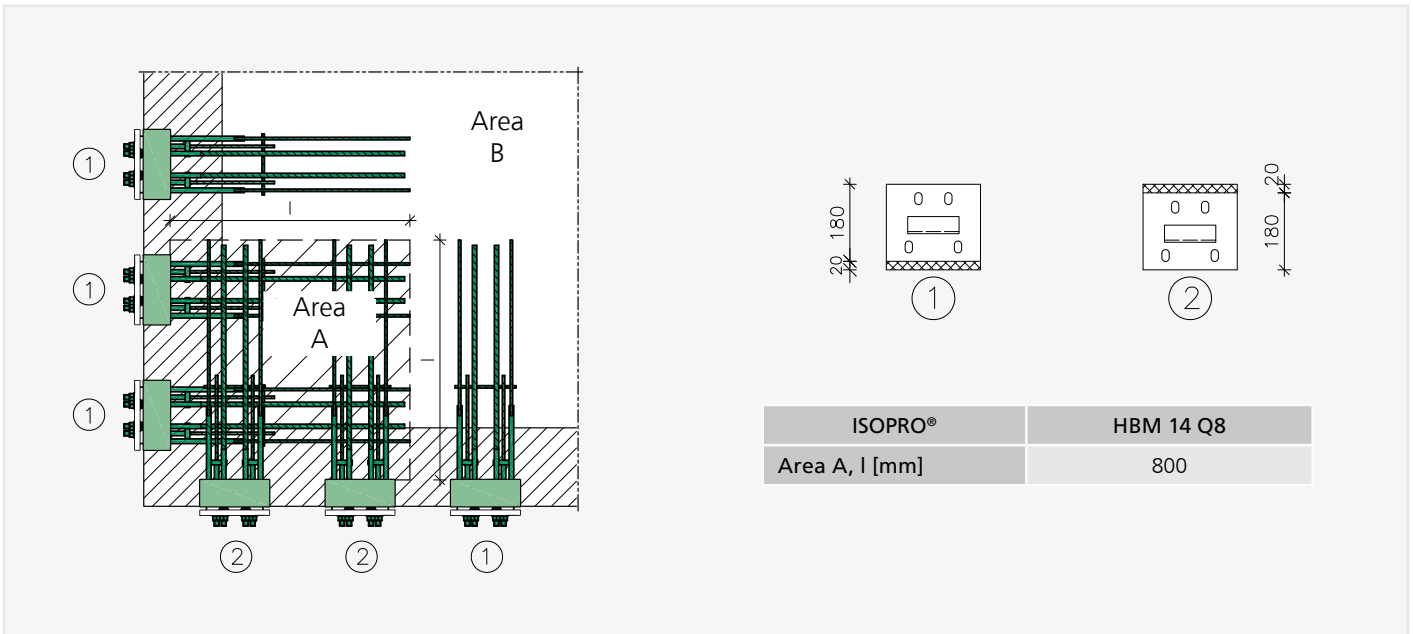
- The minimum edge clearances for the reinforced concrete component and the centre clearances between two ISOPRO® elements in accordance with general technical approval Z-15.7-233 must be observed.
- If the value is below the permissible minimum clearances, the load-bearing capacity of the ISOPRO® elements must be lowered. In this case, please contact our Application Technology team.

Application Technology team
contact details:

Phone: +49 (0) 7742 9215-300
Fax: +49 (0) 7742 9215-319
E-mail: technik@h-bau.de

OUTER CORNER

The tensile rods, compression struts and shear rods of the ISOPRO® elements overlap vertically at the outer corner. The height of the elements must therefore be offset by 20 mm in area A. This can be implemented by means of a 20 mm top insulation (provided ex-works).



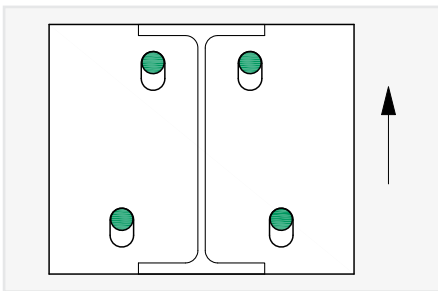
NOTES:

- Connection in the corner area only for ceiling thicknesses ≥ 200 mm
- Take into account the 20 mm height difference for the face plate (to be provided by the customer)
- Reduced clearance between expansion joints $e/2$ in the corner area
- Example order for elements with top insulation for a ceiling thickness of 200 mm:
 e.g. Pos. 1: HBM 14 Q8 h180 + 20 mm bottom insulation
 Pos. 2: HBM 14 Q8 h180 + 20 mm top insulation

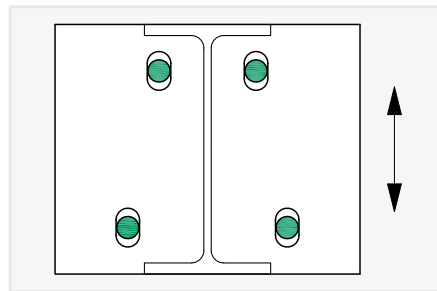
INSTALLATION ACCURACY

INSTALLATION TOLERANCES

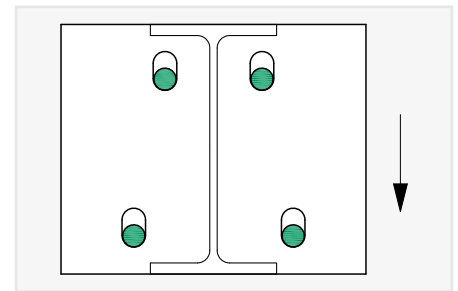
The ISOPRO® type HBM element creates a connection between wooden and reinforced concrete components, which raises the question of the permissible tolerances in the transition between the two components. Tolerances must be defined in accordance with DIN 18202:2013-04 "Tolerances in building construction – Buildings" and recorded in the implementation plans. The feasibility of these tolerances must be coordinated with the shell engineer and the carpenter during the planning phase. The ISOPRO® type HBM element can be used to compensate for inaccuracies of up to 12 mm in a vertical direction. The maximum permissible tolerances in any particular direction depend on the planned initial position of the head plate in relation to the installed ISOPRO® element.



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

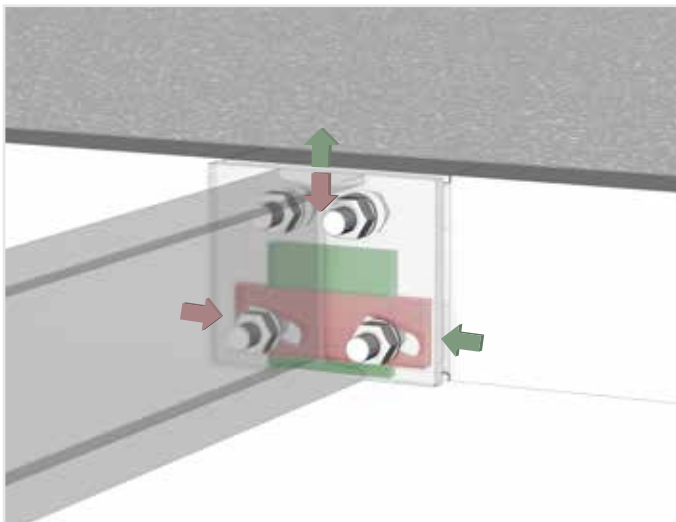


Initial position = centre of slotted hole
Tolerance: ±6 mm



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

ADJUSTABILITY



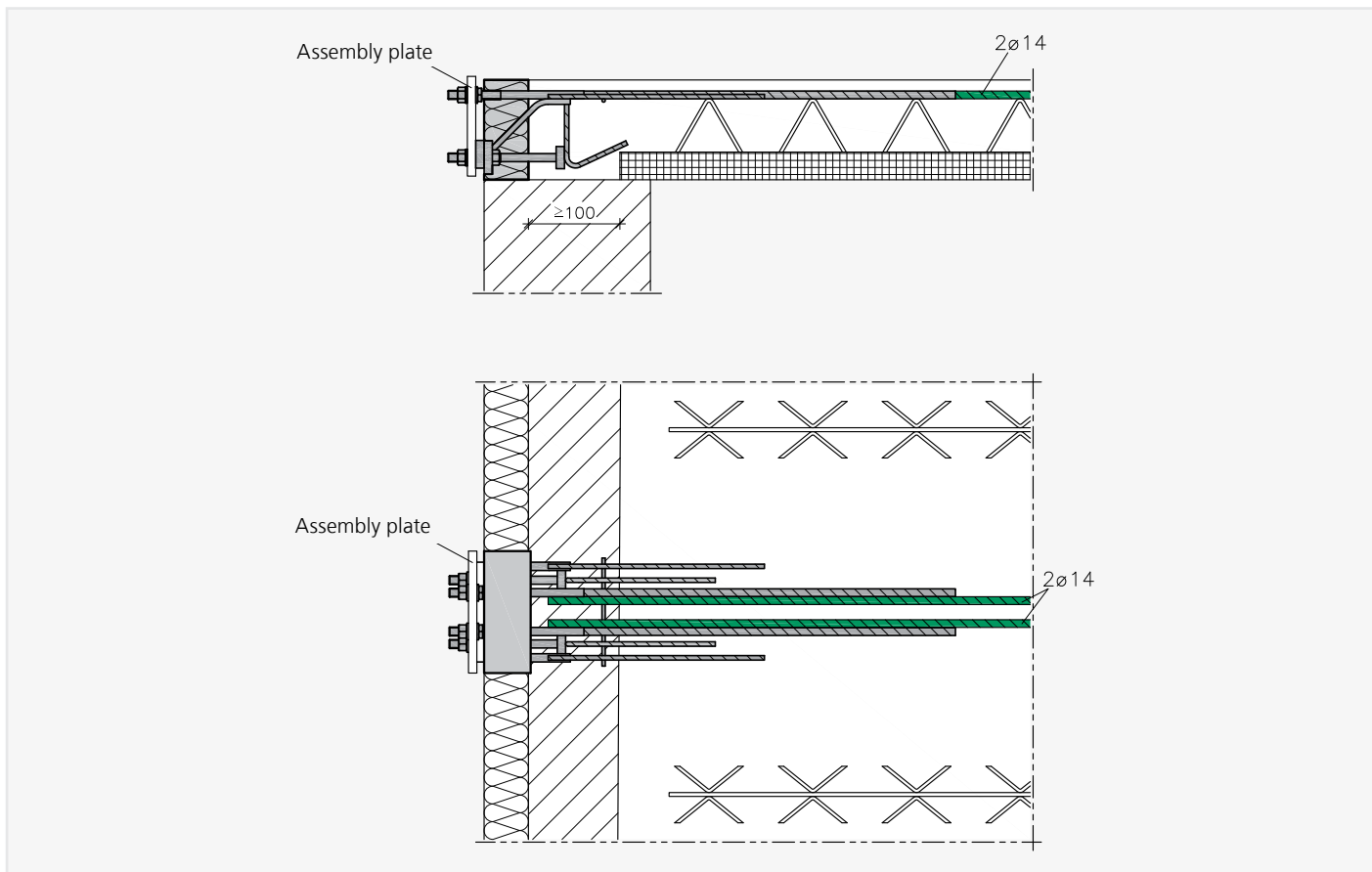
The adjustment plate ensures simple and continuously variable height adjustment.

NOTES:

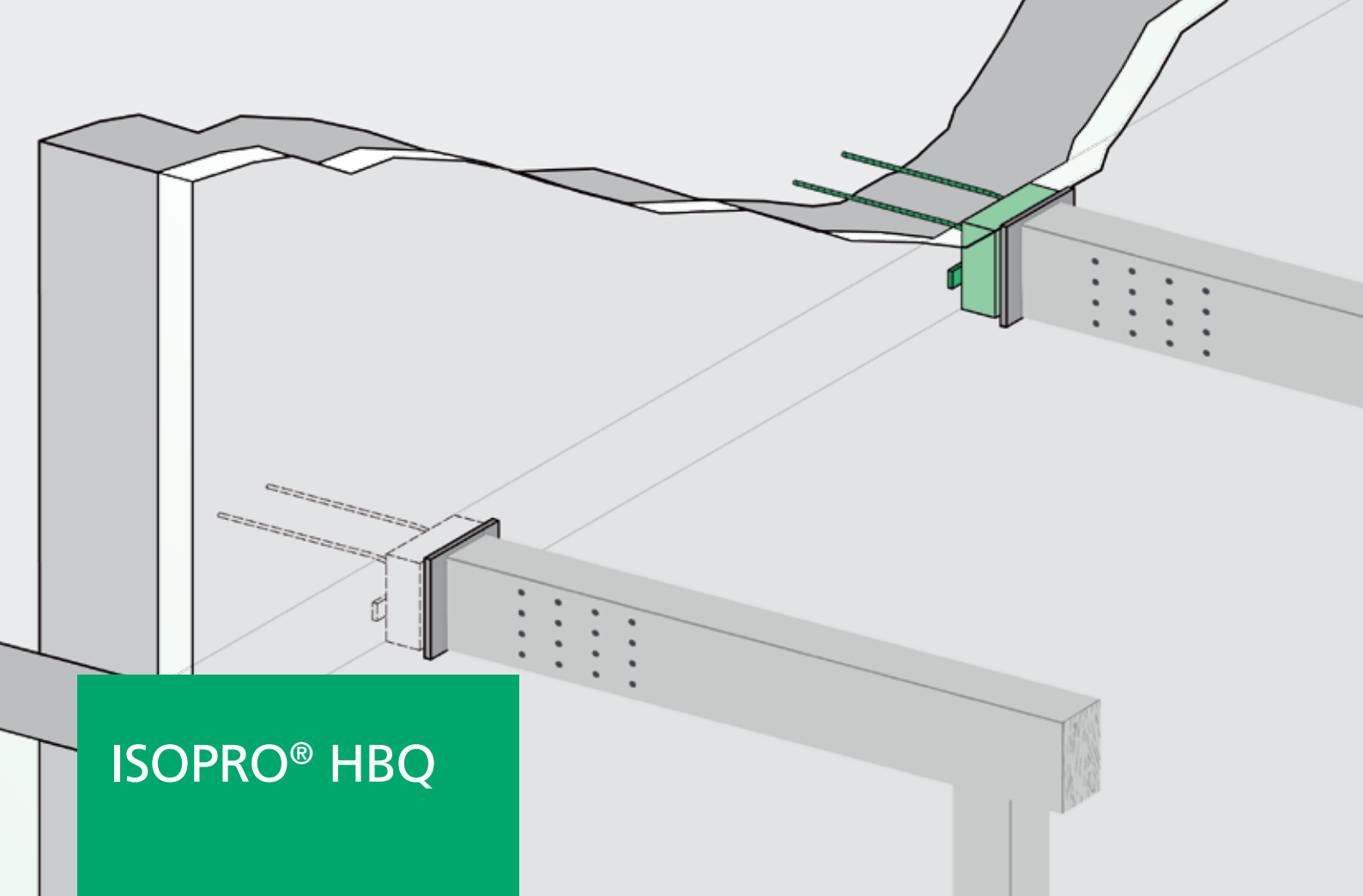
- The ISOPRO® type HBM element can absorb tolerances of up to -12 mm/+12 mm in a vertical direction.
- Installation tolerances in a horizontal direction cannot be absorbed.
- When pouring concrete, the positioning stability of the ISOPRO® HBM is secured on-site.
- Construction management is responsible for checking the shell dimensions and installation accuracy before concreting.
- The wooden construction and the actual shell dimensions must be coordinated between the carpenters and construction management.

ON-SITE REINFORCEMENT

ISOPRO® HBM 14 Q8 – IN-SITU CONCRETE AND CONSTRUCTION METHOD



- Connection reinforcement for 2 dia. 14 tensile rods, design in accordance with DIN EN 1992-1-1
- Constructional transverse reinforcement in accordance with DIN EN 1992-1-1



ISOPRO® HBQ

CONNECTION FOR SUPPORTED WOODEN CONSTRUCTIONS

THE PRODUCT

The ISOPRO® HBQ thermal insulation element structurally connects supported wooden constructions with reinforced concrete components. At the same time, its excellent thermal properties resolve the problem of thermal bridging – a key issue in building engineering physics – at this transition. The element comprises an EPS insulating body with extremely low thermal conductivity and a structurally effective stainless steel truss construction. Both positive shearing forces and horizontal forces can be transmitted.

BENEFITS

- General technical approval no. Z-15.7-313
- Reduction of thermal bridging in accordance with DIN 4108-2 and EnEV
- Simple and secure assembly by means of continuously variable height adjustment

THE APPLICATION

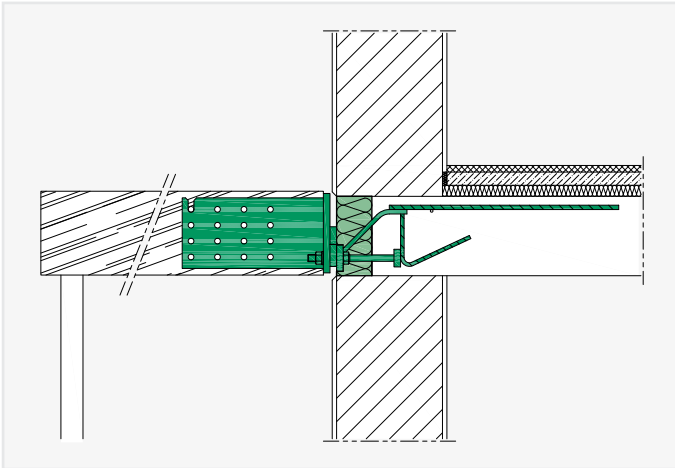
As a solution to the interface between wooden constructions and reinforced concrete constructions, ISOPRO® wood connectors fit perfectly into the ISOPRO® family. ISOPRO® HBQ elements were developed specifically for connecting supported wooden constructions such as balconies and canopies. The elements are installed in the shell as part of reinforcement and concreting work. Assembly of the wooden construction is carried out at a later date by the carpenters.



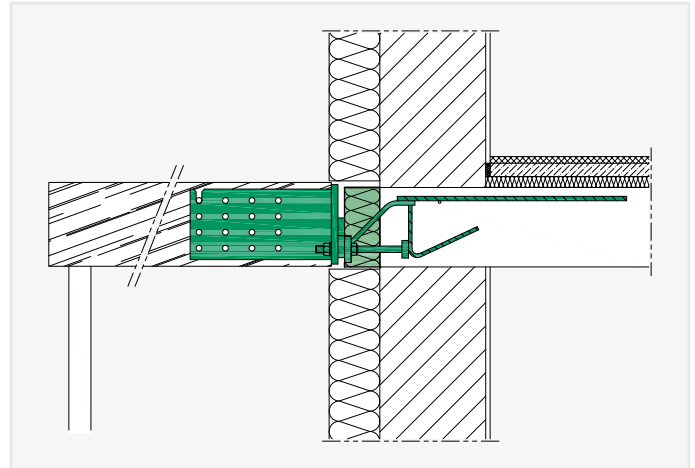
APPLICATION EXAMPLES

ISOPRO® HBQ CONNECTION SITUATIONS

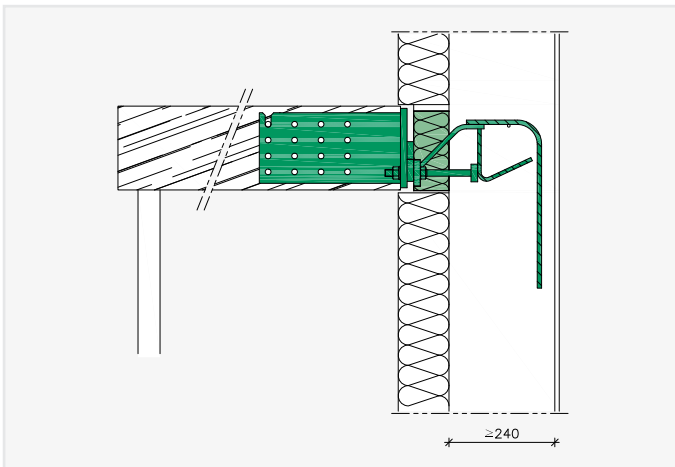
Formwork erection brick work:



Formwork erection brick work with ETICS:



Special design for connection to a wall:



Please contact our Application Technology department for further special constructions.

Phone: +49 (0) 7742 9215-300

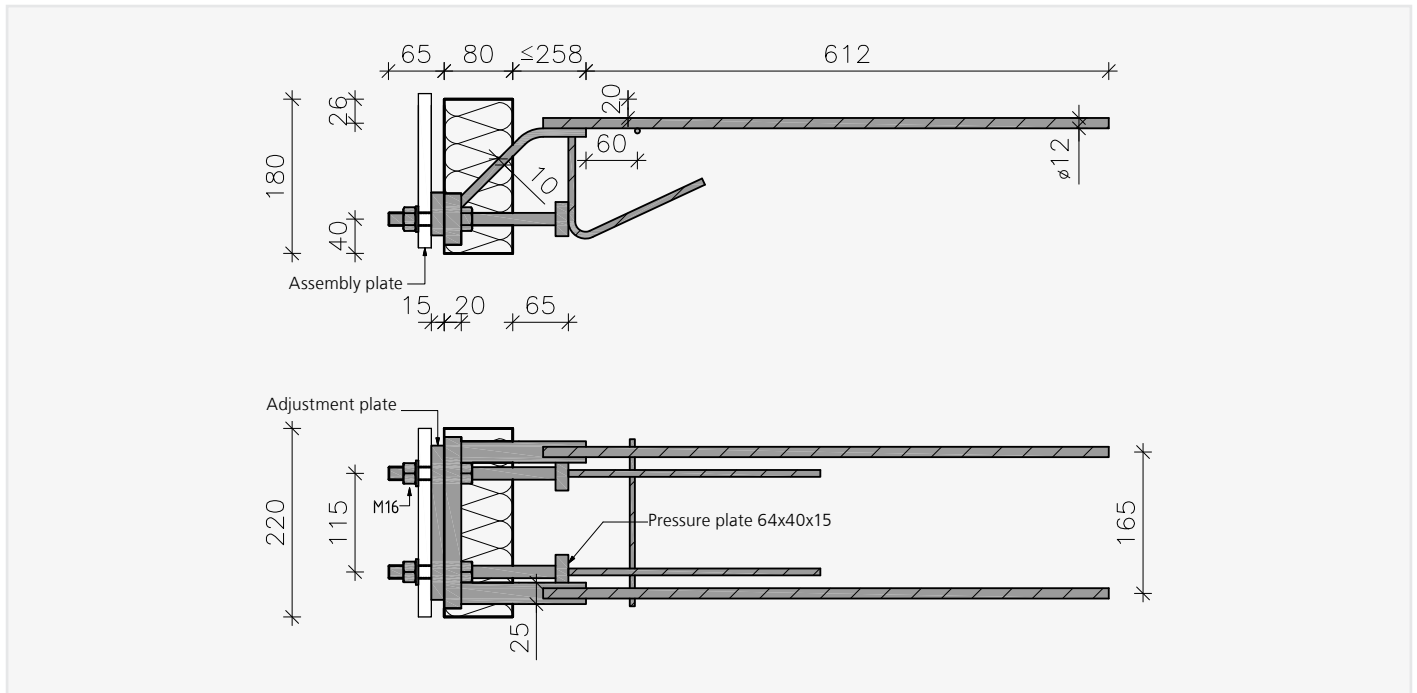
Fax: +49 (0) 7742 9215-319

E-mail: technik@h-bau.de

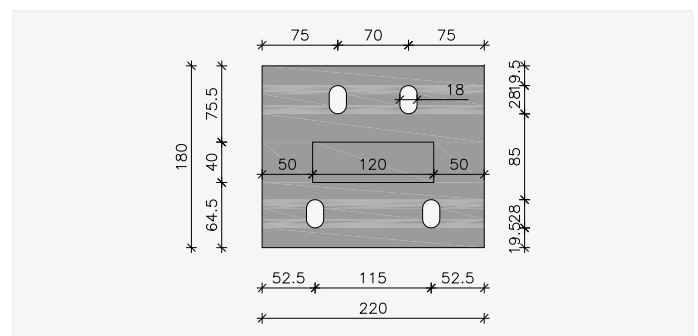
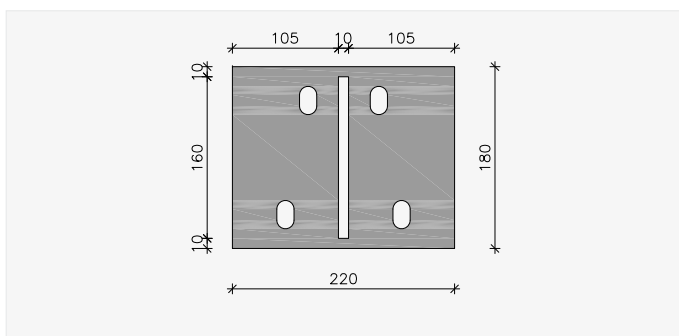
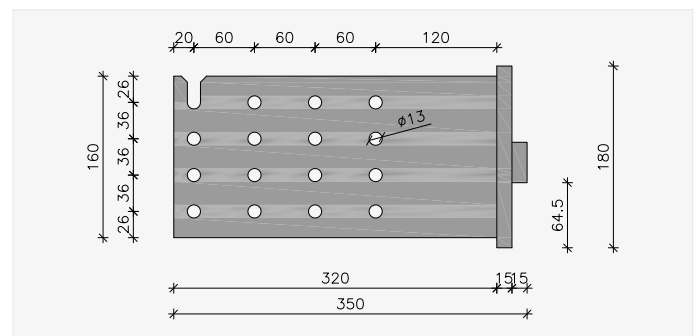
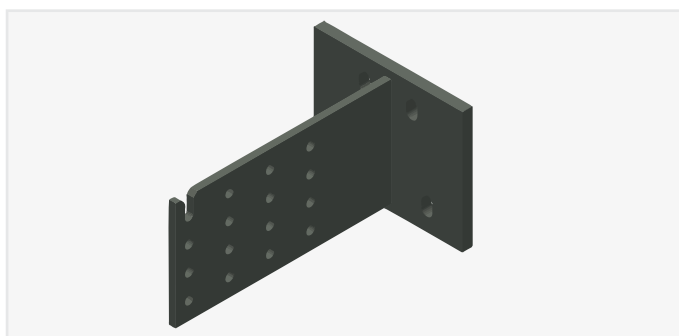
DESIGN AND DIMENSIONS

ISOPRO® HBQ 10

The wood connection consists of an ISOPRO® SBQ 10 h180 element (see page 24) and a galvanised connection strut. The relevant dowel rods must be added on site.



ISOPRO® HBQ 10 element



Connection strut

DIMENSIONING

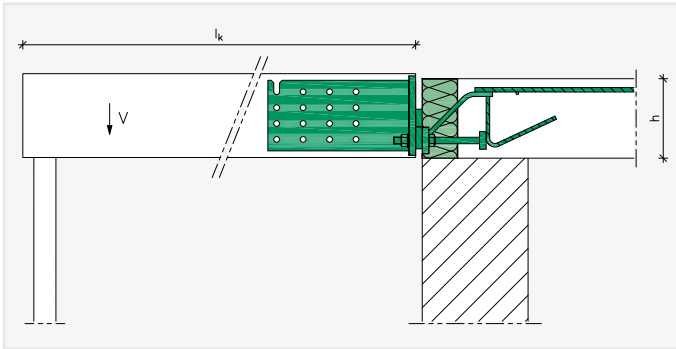
DIMENSIONING TABLE FOR ISOPRO® HBQ 10 – CONCRETE \geq C20/25 / USAGE CLASS 2, LOAD DURATION CLASS MEDIUM

Wooden balcony w x h [mm]	C24 softwood C30 softwood				GL24c laminated timber GL28c laminated timber				
	Vertical force V_{Rd} [kN]								
Height h [mm]	180	200	220	240	180	200	220	240	
Width w [mm]	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} [kN]							
120-160		± 2.5							

Example dimensioning on the basis of DIN EN 1995-1-1 : 2010-12 and DIN EN 1995-1-1/NA : 2010-12

SYSTEM LENGTH

The system length is measured from the trailing edge of the top plate.



NOTES:

- Structural certification for the connecting components must be provided by the structural engineer.
- For indirect support, verification of the load transfer in the reinforced concrete component must be provided by the structural engineer.
- The ISOPRO® type HBQ element is designed for a top concrete covering of $c_v = 20$ mm at $h = 180$ mm.
- Minimum wooden balcony dimensions: $w \times h = 120 \times 180$ mm
- Connection of the wooden balcony to the strut: 16 dowel rods, dia. 12, S 235 galvanised
- With reinforced concrete component dimensions of $h > 180$ mm, the ISOPRO® element can be ordered with top insulation provided ex-works, e.g. for height 220 mm, HBQ 10 h180 + 40 mm bottom insulation.
- The ISOPRO® type HBQ elements cannot absorb any torsion. Therefore, at least two ISOPRO® type HBQ elements must be used for each connected wooden construction, which are secured to prevent twisting by means of their connection.

CLEARANCE BETWEEN EXPANSION JOINTS – EDGE CLEARANCES

CLEARANCE BETWEEN EXPANSION JOINTS

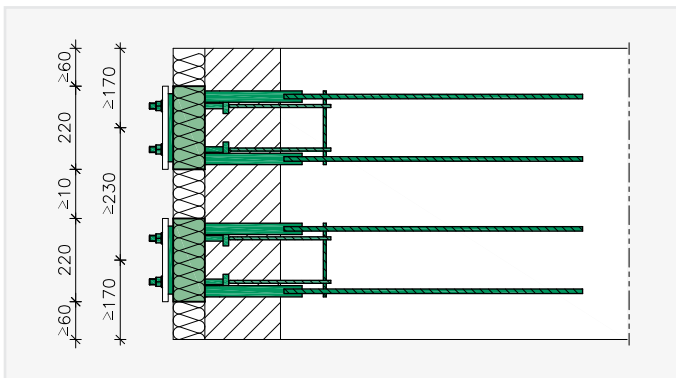
A balcony plate which is firmly connected with the wooden girders is essential for calculating the maximum permissible clearances between expansion joints. If the connection between the wooden girders and the coating is designed to enable it to be relocated, the clearances between the connections that cannot be relocated become important.

ISOPRO® HBQ 10

Maximum distance between expansion joints [m]

≤ 6.0

EDGE AND CENTRE CLEARANCES



NOTES:

- The minimum edge clearances for the reinforced concrete component and the centre clearances between two ISOPRO® elements in accordance with general technical approval Z-15.7-233 must be observed.
- If the value is below the permissible minimum clearances, the load-bearing capacity of the ISOPRO® elements must be lowered. In this case, please contact our Application Technology team.

Application Technology team
contact details:

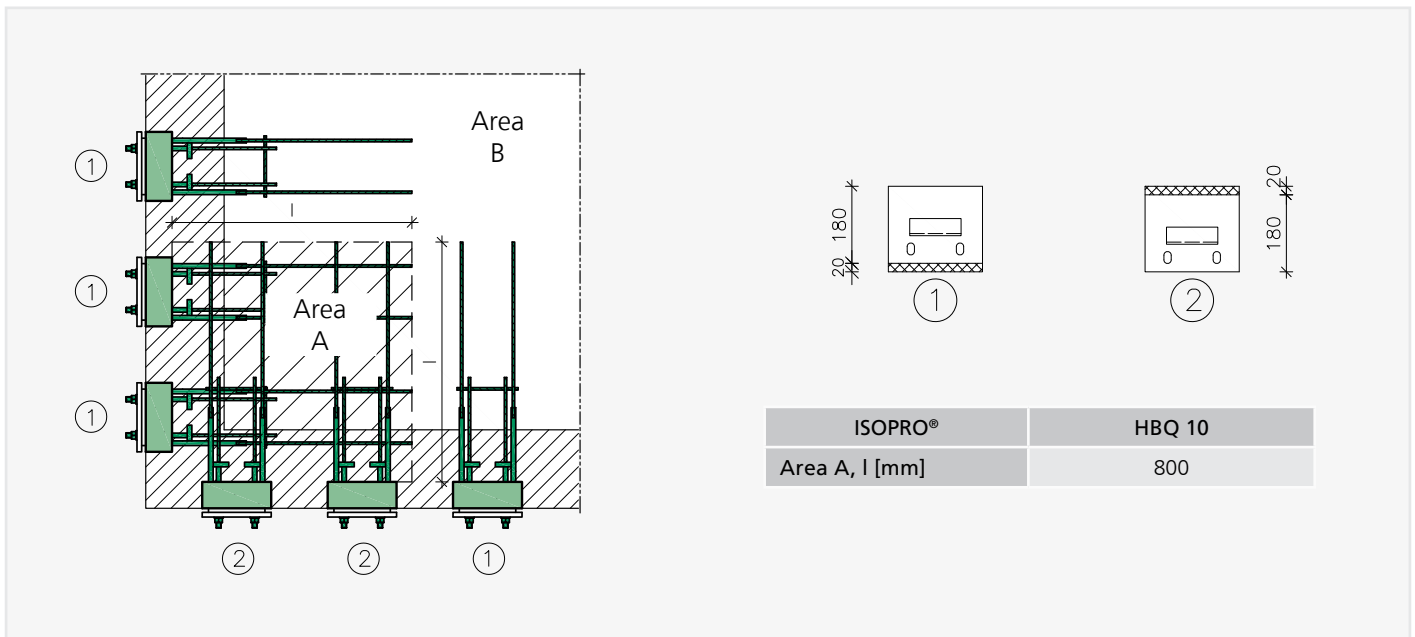
Phone: +49 (0) 7742 9215-300

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E-mail: technik@h-bau.de

OUTER CORNER

The shear rods of the ISOPRO® elements overlap vertically at the outer corner. The height of the elements must therefore be offset by 20 mm in area A. This can be implemented by means of a 20 mm top insulation (provided ex-works).



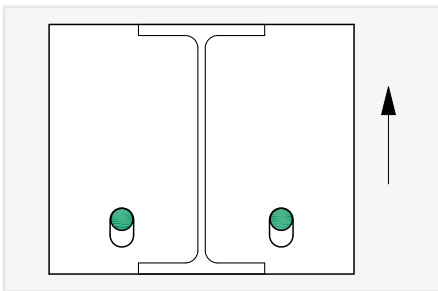
NOTES:

- Connection in the corner area only for ceiling thicknesses ≥ 200 mm
- Take into account the 20 mm height difference for the face plate (to be provided by the customer)
- Reduced clearance between expansion joints $e/2$ in the corner area
- Example order for elements with top insulation for a ceiling thickness of 200 mm:
 e.g. Pos. 1: HBQ 10 h180 + 20 mm bottom insulation
 Pos. 2: HBQ 10 h180 + 20 mm top insulation

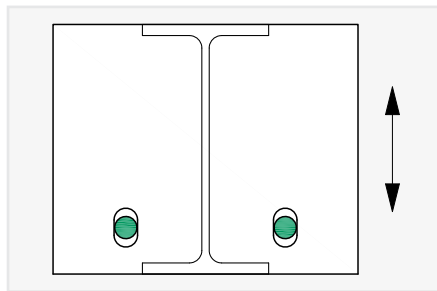
INSTALLATION ACCURACY

INSTALLATION TOLERANCES

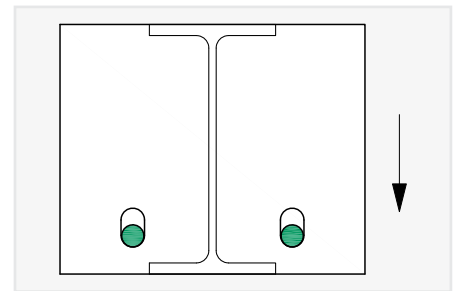
The ISOPRO® type HBQ elements create a connection between wooden and reinforced concrete components, which calls into question the permissible tolerances in the transition between the two components. Tolerances must be defined in accordance with DIN 18202:2013-04 "Tolerances in building construction – Buildings" and recorded in the implementation plans. The feasibility of these tolerances must be coordinated with the shell engineer and the carpenter during the planning phase. The ISOPRO® type HBQ element can be used to compensate for inaccuracies of up to 12 mm in a vertical direction. The maximum permissible tolerances in any particular direction depend on the planned initial position of the head plate in relation to the installed ISOPRO® element.



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

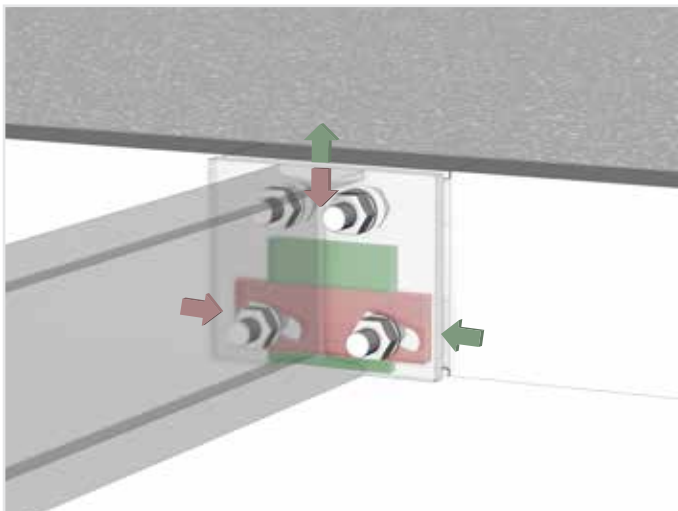


Initial position = centre of slotted hole
Tolerance: ±6 mm



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

ADJUSTABILITY



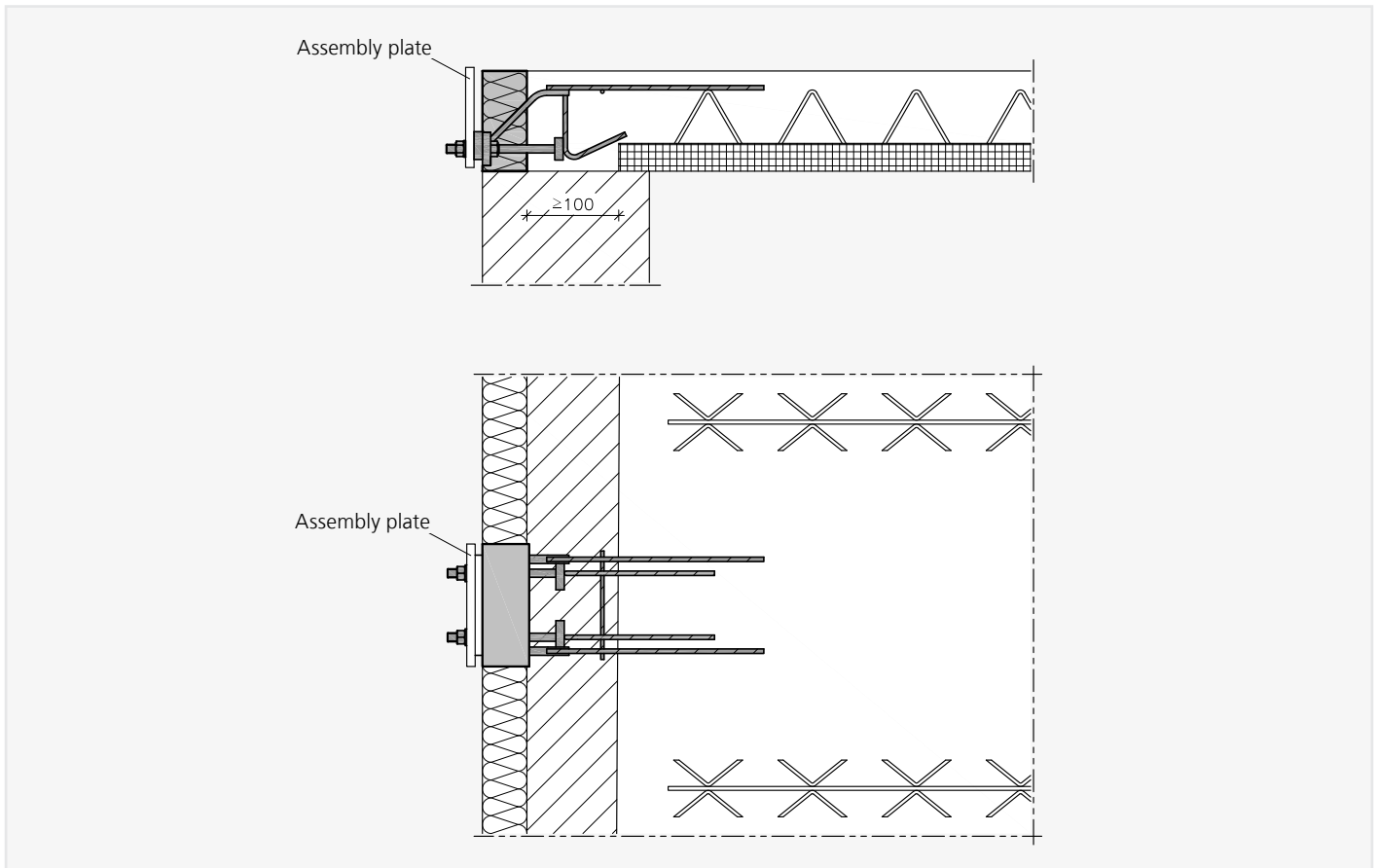
The adjustment plate ensures simple and continuously variable height adjustment.

NOTES:

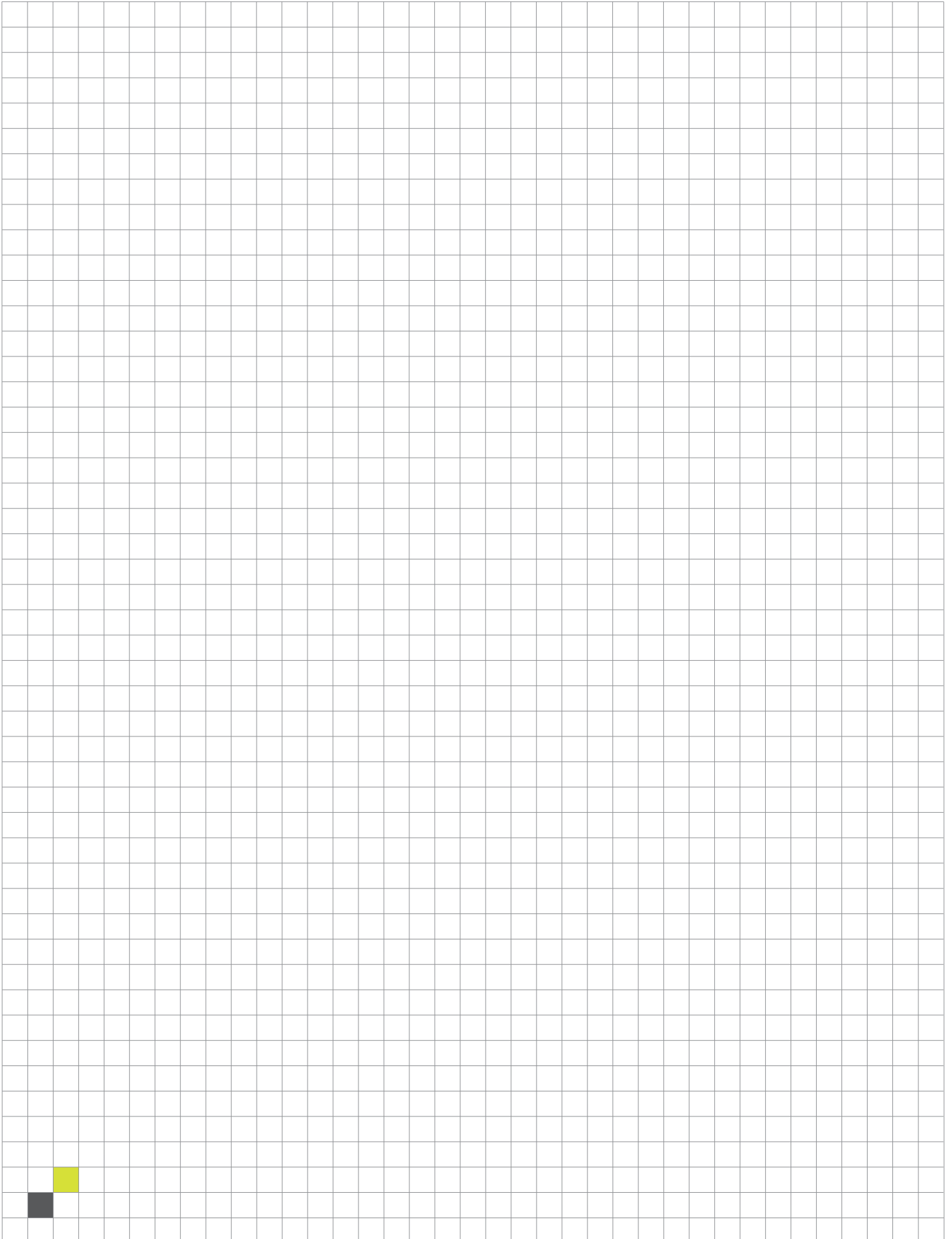
- The ISOPRO® type HBQ element can absorb tolerances of up to -12 mm/+12 mm in a vertical direction.
- Installation tolerances in a horizontal direction cannot be absorbed.
- When pouring concrete, the positioning stability of the ISOPRO® HBQ is secured on-site.
- Construction management is responsible for checking the shell dimensions and installation accuracy before concreting.
- The wooden construction and the actual shell dimensions must be coordinated between the carpenters and construction management.

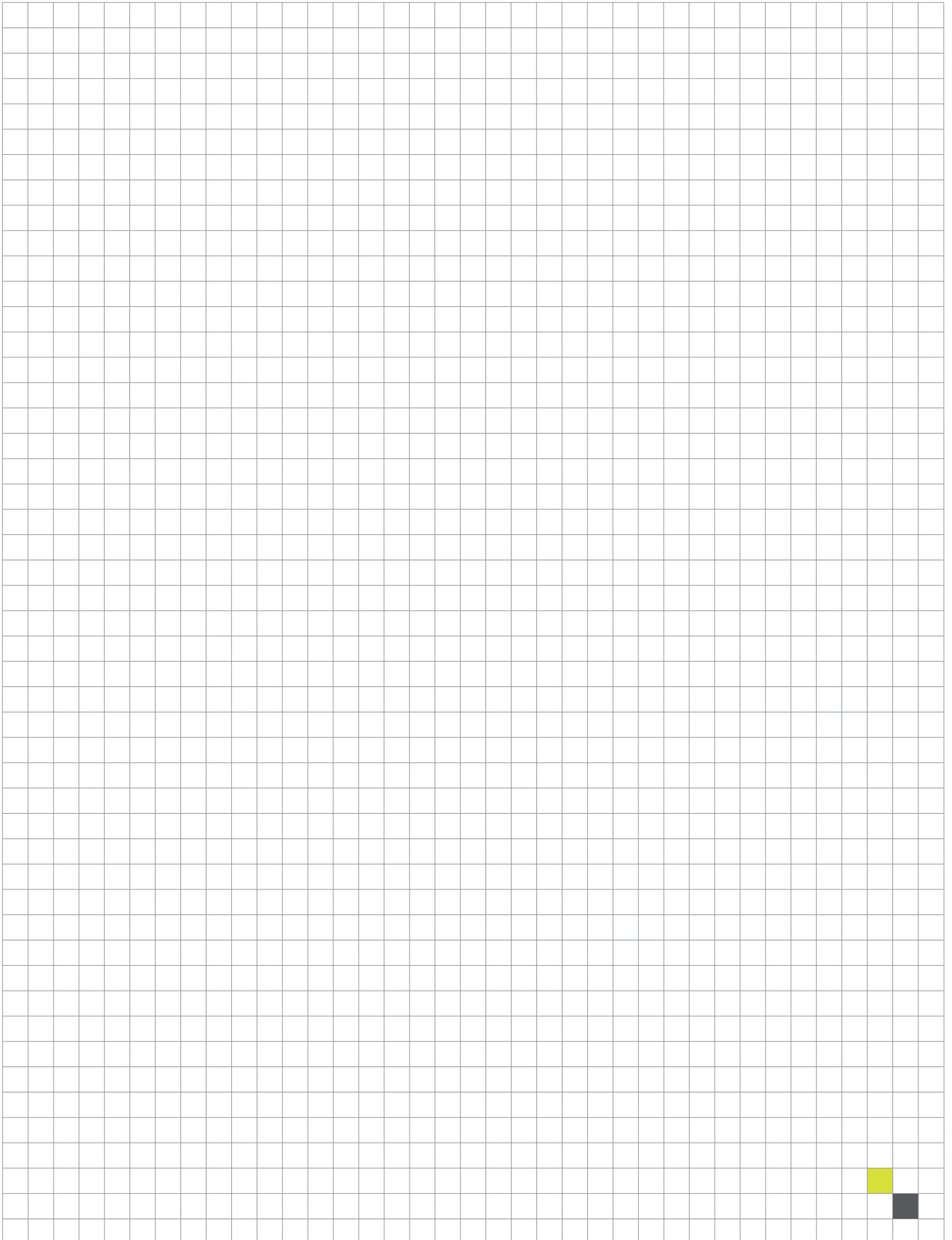
ON-SITE REINFORCEMENT

ISOPRO® HBQ 10 – IN-SITU CONCRETE AND CONSTRUCTION METHOD



- The constructive stirrup 2 dia. 8 is available ex-works.
- The ISOPRO® type HBQ element does not require any additional reinforcement.





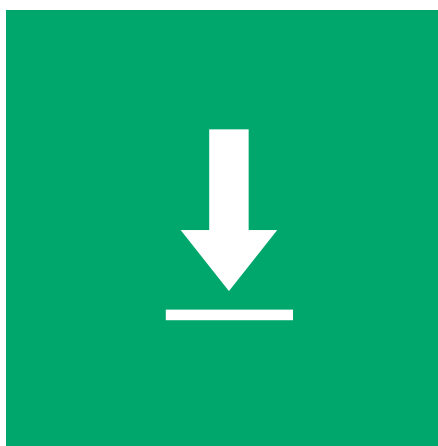
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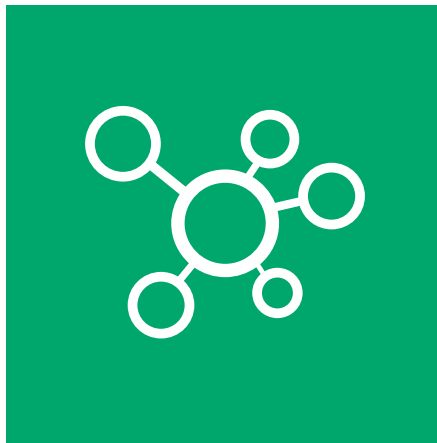
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