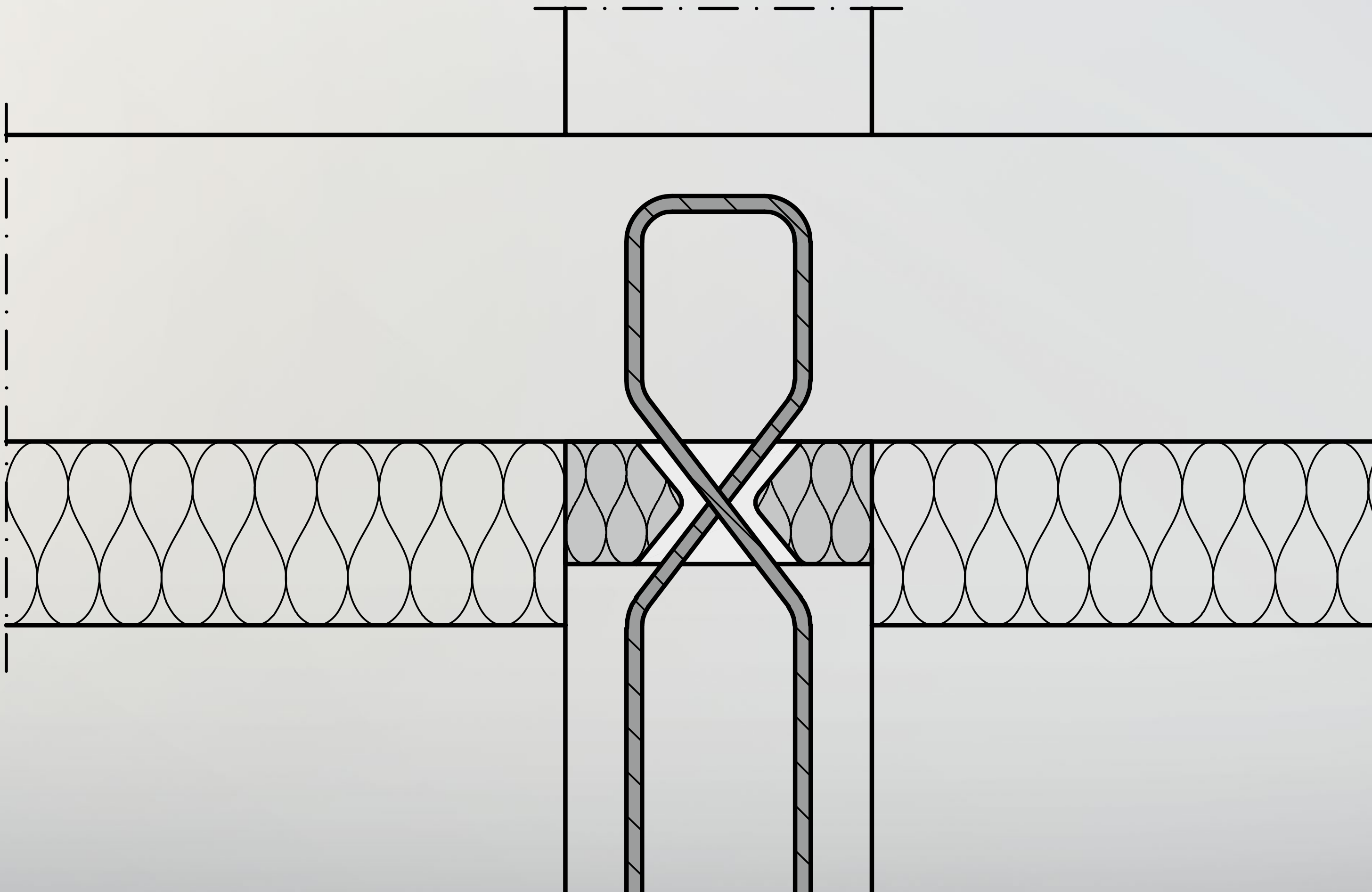
SCHÖCK
Dependable by design



TECHNICAL INFORMATION – JANUARY 2023

Sconnex® for walls and columns

Load-bearing thermal insulation elements for the effective reduction of thermal bridges in walls and columns.

Planning and consulting service

The engineers of Schöck's application engineering department would be very happy to advise you on static, structural and building-physics questions and will produce for you proposals for your solution with calculations and detailed drawings.
For this please send your planning documentation (general arrangements, sections, static data) with the address of the building project to:

Schöck Ltd
Staniford House
4 Wedgwood Road
Bicester
Oxfordshire
OX26 4UL

Telephone hotline for design support services
Tel.: 01865 290 890
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E-Mail: design-uk@schoeck.com

Planning tools – downloads and requests
Tel.: 01865 290 890
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Web: www.schoeck.com

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Tel.: 01865 290 890
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Notes | Symbols

Technical Information

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Special constructions

Some connection situations cannot be realised with those standard product variants presented in this Technical Information. In this case special designs can be requested from the application engineering department (for contact details see page3). This applies, for example, with additional requirements as a result of prefabricated construction (limitations due to technical manufacturing constraints or through transportation width), which can possibly be met using coupler bars.

Bending of reinforcing steels

If Schöck Sconnex® reinforcing steels are bent on-site or are bent back and forth, compliance with and the monitoring of the relevant conditions is outside the influence of Schöck Bauteile GmbH. Therefore, in such cases, our warranty is invalidated.

Notes Symbols

⚠ Hazard note

The triangle with exclamation mark indicates a hazard warning. This means there is a danger to life and limb if compliance is not observed.

Info

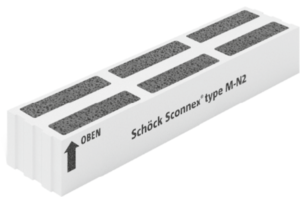
The square with an “i” indicates important information which, for example, must be read in conjunction with the design.

☑ Check list

The square with a tick indicates the check list. Here, the essential points of the design are briefly summarised.

Table of contents

Summary of types

Structural element	Structural element material	Schöck Sconnex® type
Wall	Reinforced concrete	Type W 
	Masonry	Type M 
Column	Reinforced concrete	Type P 

Summary of types

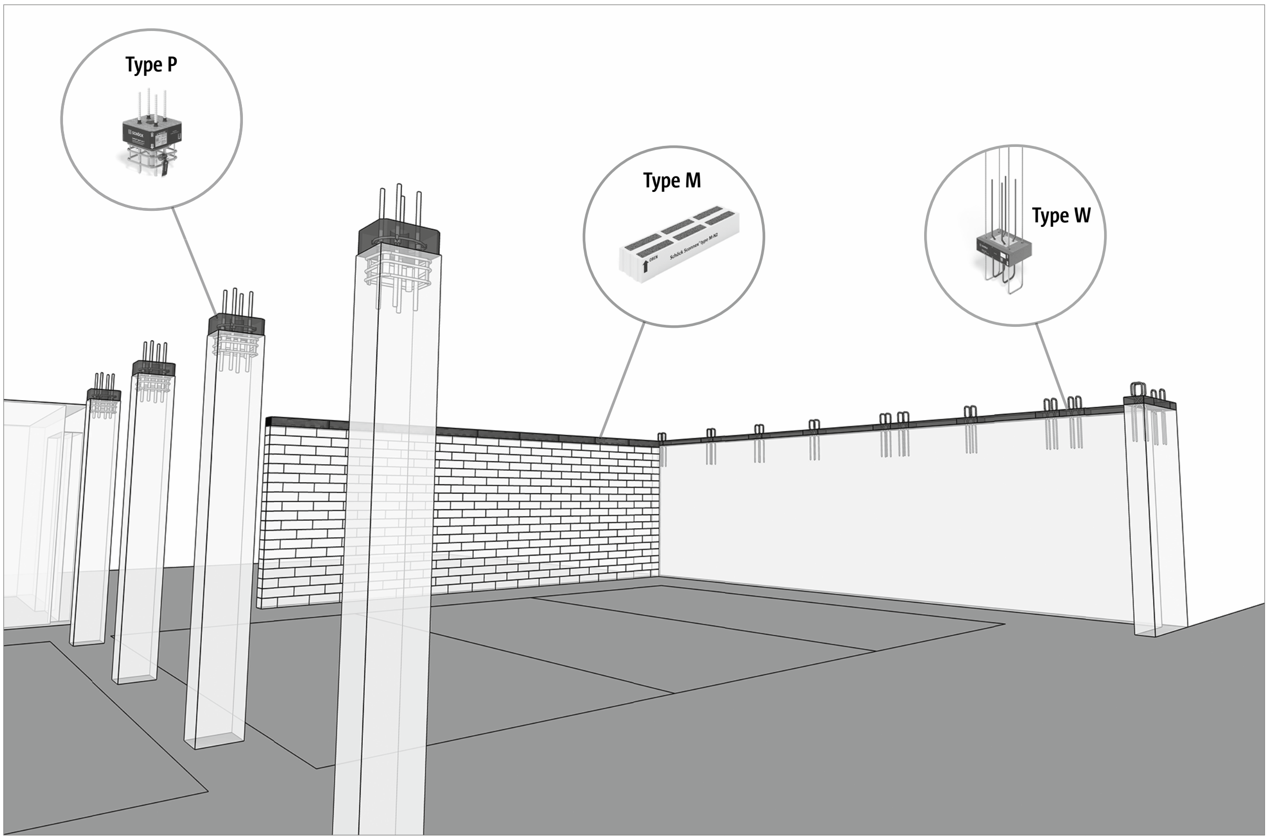


Fig. 1: Under-slab insulation using Schöck Sconnex®

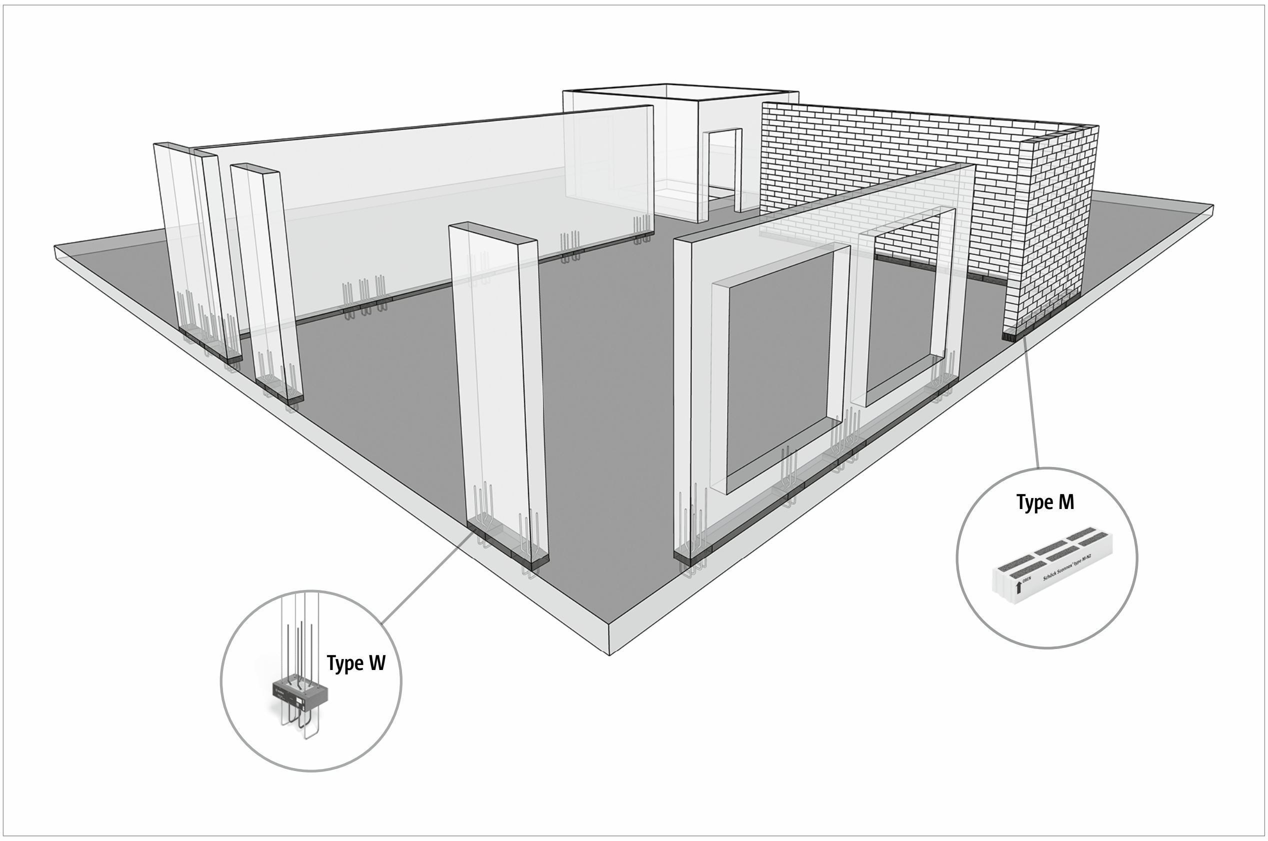
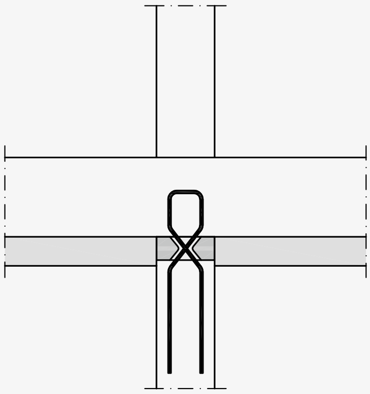


Fig. 2: Above-slab insulation using Schöck Sconnex®

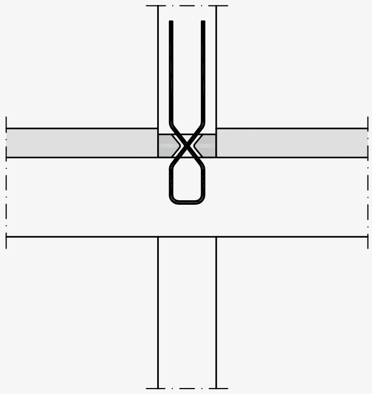
Summary of types

Under-slab insulation	Above-slab insulation	Force absorption

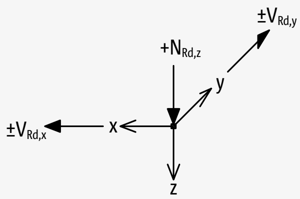
Connection of walls to floors



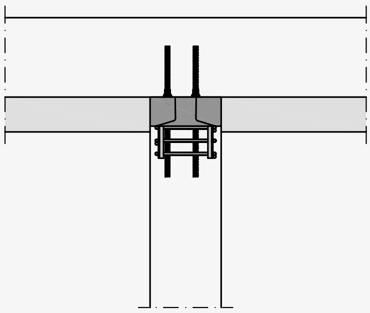
Type W-N-VH



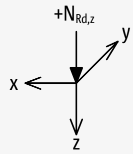
Type W-N-VH



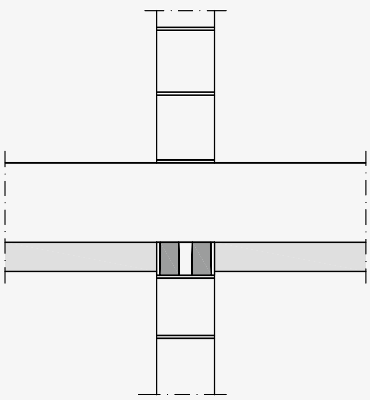
Connection of columns to floors



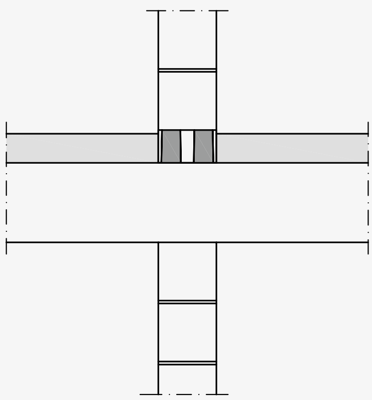
Type P



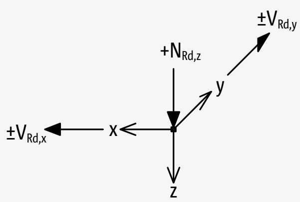
Connection of walls to floors



Type M



Type M



Principles

Thermal insulation of walls and columns

Reduce 40% of all thermal bridges
Thermal bridges to underground garages and basements represent up to 40% of all constructional thermal bridges present in the building and thus belong to the greatest causers of constructionally conditioned energy losses. Frequently, structural damage due to condensation or mould occurs.
Now there is a solution in order to insulate the thermal bridges in walls and columns. Schöck Sconnex® results in a reduction of the transmission heat losses of the whole building by up to 10% and a construction that is free of structural damage.

Footing and balcony thermal bridges are comparable
The energy-saving potential through the use of Schöck Sconnex® on a reinforced concrete wall is comparable with the energy-saving potential using Schöck Isokorb® on a balcony. As is shown on the model building, the overall energy-saving potential is many times higher due to the generally larger connection length of walls and columns in comparison with the connection length of balconies. This shows the importance of the optimization of thermal bridges on walls and columns.

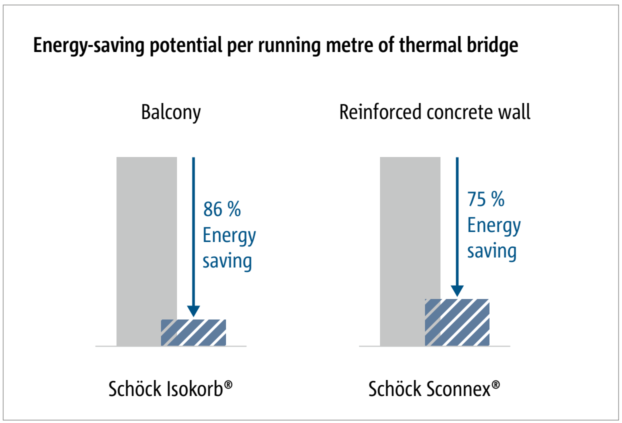


Fig. 3: Energy-saving in balconies and reinforced concrete walls through the use of Schöck products

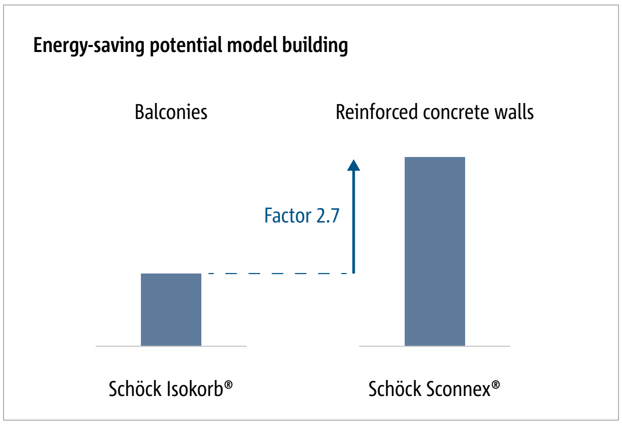


Fig. 4: Energy-saving potential of reinforced concrete walls in comparison with balconies on a model building

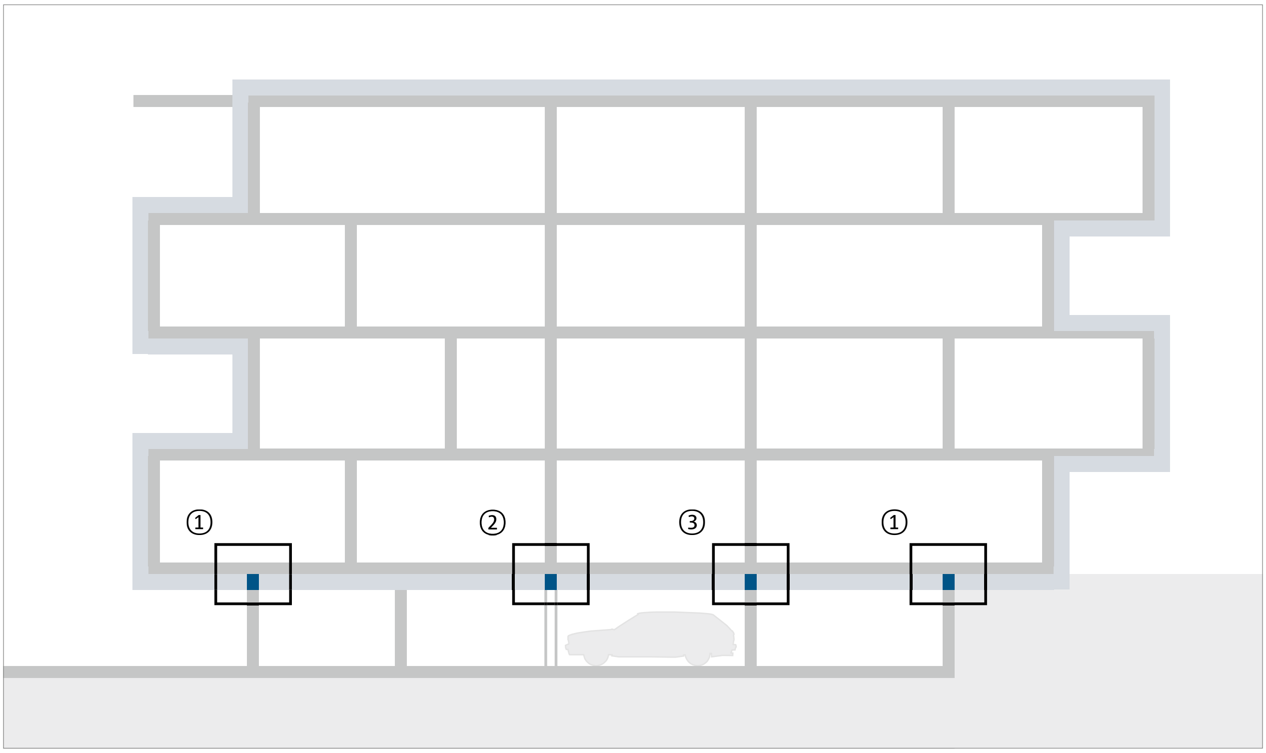
Model building block of flats
- Wall thermal insulation compound system: U = 0.21 W/(m²•K)
- Insulation thickness d = 160 mm
- 4 full storeys, 11 flats, on average 150 m² living area per flat
- 115 m reinforced concrete wall
- 6 balconies each 4 m in length
- Complete underground level with garage

Schöck Sconnex® principles

Schöck Sconnex® applications

The requirement for a solution for the reduction of thermal bridges in walls and columns is constantly on the increase. With the Schöck Sconnex® product family, walls and columns can now be insulated directly in the connection details for floor slabs and floor ceilings. This enables the planning of a visually appealing and energy efficient solution.

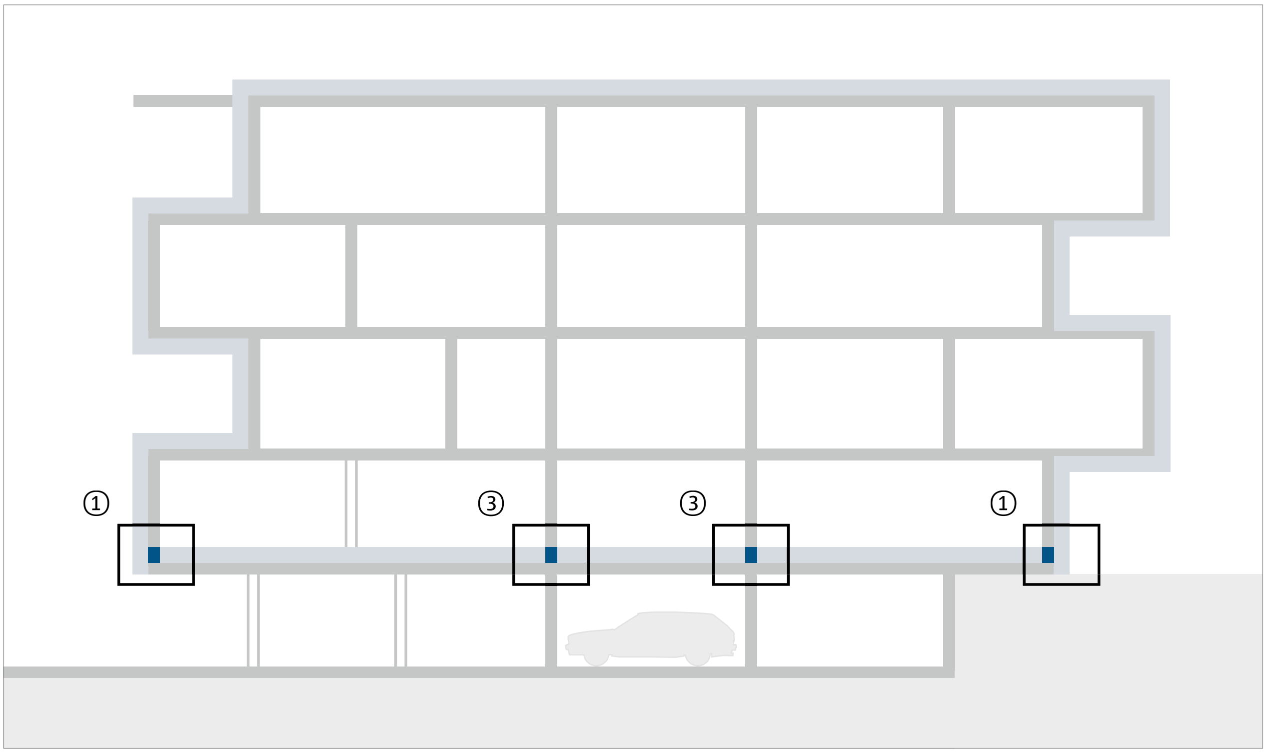
Schöck Sconnex® application examples with under-slab insulation



The thermal bridge can be efficiently insulated using the Schöck Sconnex® in the top of walls and columns. The floor located in the thermal zone and the thermal bridges in walls and columns minimized by Schöck Sconnex® leads to an insulation concept that is optimal from a building physics point of view, in which flank insulation is dispensed with and at the same time prevents building damage due to condensation and mould.

Schöck Sconnex® applications

Schöck Sconnex® application examples with above-slab insulation



With the employment of Schöck Sconnex® at the foot of the wall or column the floor or footing can be insulated using a more economic above-slab insulation. The direct insulation of the thermal bridge at the foot of the wall or column through the use of Schöck Sconnex® eliminates the risk of building damage even with poor constraints. The concept of an visually appealing underground garage is enabled through the omission of flank insulation and the omission or reduction of the under-slab insulation. Special attention must be paid to the dew point, depending on the ambient conditions and the construction of the floor.

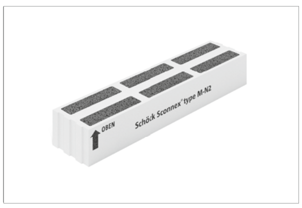
① **Schöck Sconnex® type W**

Load-bearing thermal insulation element for reinforced concrete walls. The element transfers, depending on load-bearing level, compressive and shear forces in the longitudinal and transverse directions of the wall.

② **Schöck Sconnex® type P**

Load-bearing thermal insulation element for reinforced concrete columns. The element transfers primarily compressive forces.

③ **Schöck Sconnex® type M**



Load-bearing, water-repellent thermal insulation element for the avoidance of thermal bridges in masonry walls. The element transfers primarily compressive forces.

Schöck Sconnex® applications

Thermally exposed components, which are subject to particular thermal loading, create lower surface temperatures. Flank insulation is applied for the avoidance of building damage. The result is restrictions with regard to visual effect and freedom of design. The reduction of these thermal bridges in the wall and column structural components therefore increases not only the quality of the building physics but also the freedom of design, especially with demanding building geometries.

Under-crossings, facade projections

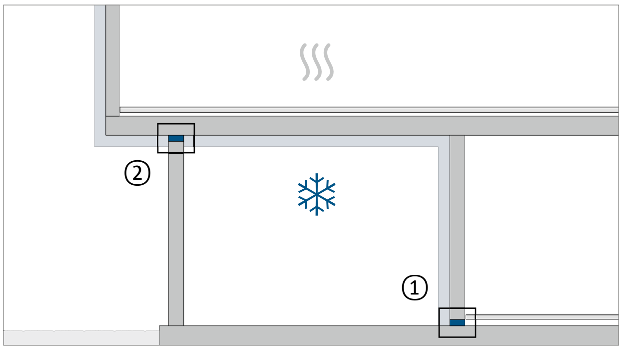


Fig. 5: External underground garage walls and columns using Schöck Sconnex®

External columns in particular, such as those common in façade projections, benefit from Schöck Sconnex®. Flanking insulation is dispensed with and the column appears to be optically more slender.
With the walls of underground garages, flanking insulation usually cannot be satisfactorily implemented. The direct separation of structural elements also offers numerous benefits.

Cold sections of the building on flat roofs, e.g. machine rooms

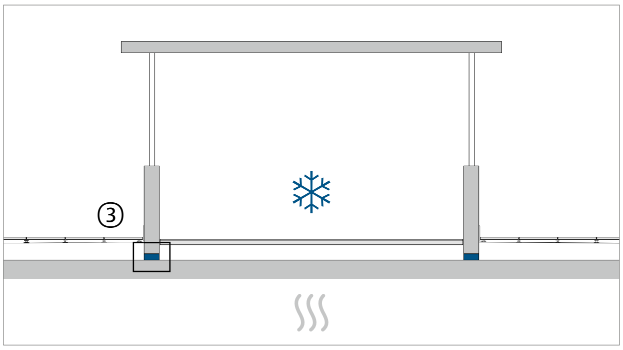


Fig. 6: Roof structure using Schöck Sconnex®

Superstructures or supporting structures on flat roofs often result in high compressive forces. These compressive forces can be transferred safely to the floor using Schöck Sconnex® without the requirement for flanking insulation.

Entries to underground garages

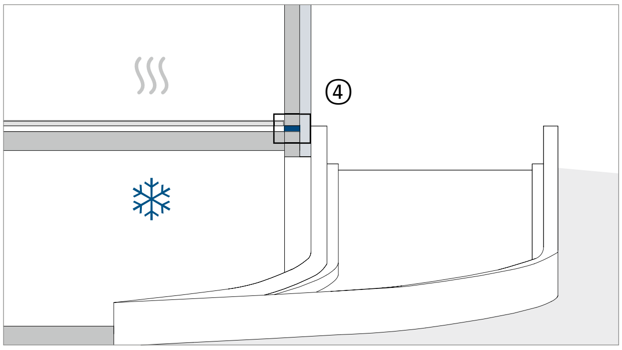


Fig. 7: Underground garage entrance using Schöck Sconnex®

With entries, particularly combined with overhead door structures, a satisfactory insulation is often difficult. The height is severely reduced due to the thick insulation, which leads to problems. Using Schöck Sconnex® these areas can be resolved elegantly and with minimum space requirements.

Schöck Sconnex® applications

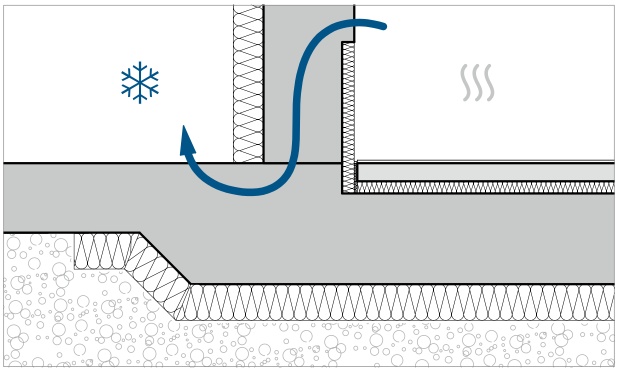


Fig. 8: Pos. ①: Heat flow in underground garage wall with flank insulation

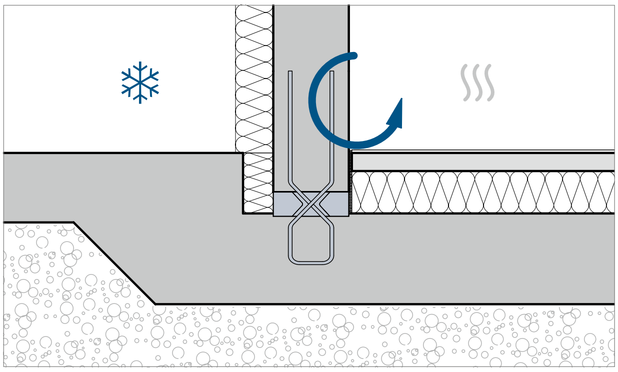


Fig. 9: Pos. ①: Heat flow in underground garage wall with Schöck Sconnex® type W

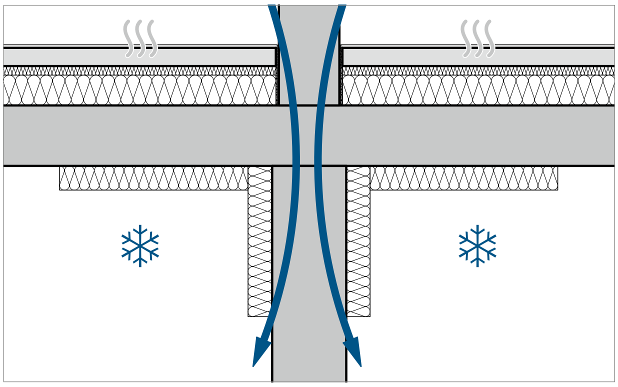


Fig. 10: Pos. ②: Heat flow with external column with flank insulation

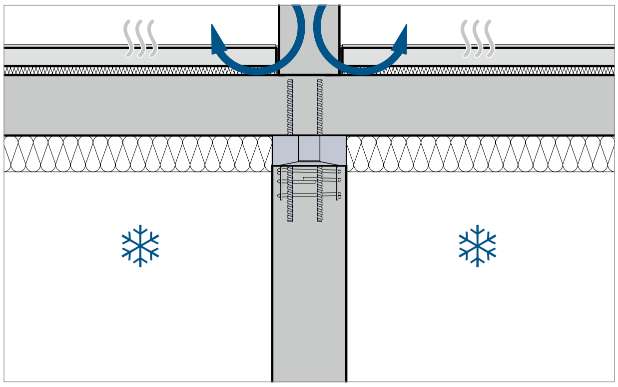


Fig. 11: Pos. ②: Heat flow with external column using Schöck Sconnex® type P

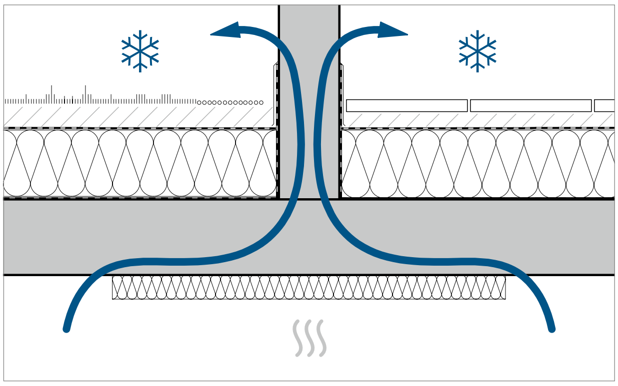


Fig. 12: Pos. ③: Heat flow in roof construction with flank insulation

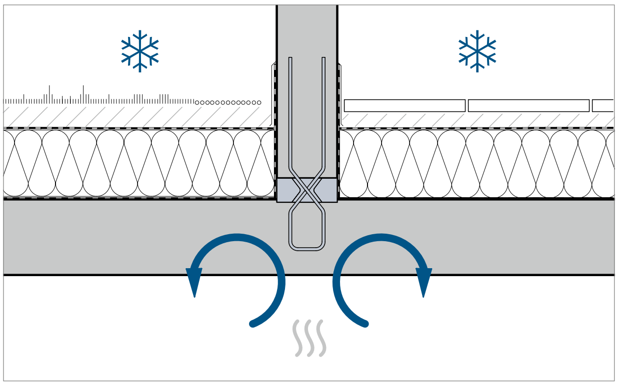


Fig. 13: Pos. ③: Heat flow in roof construction with Schöck Sconnex® type W

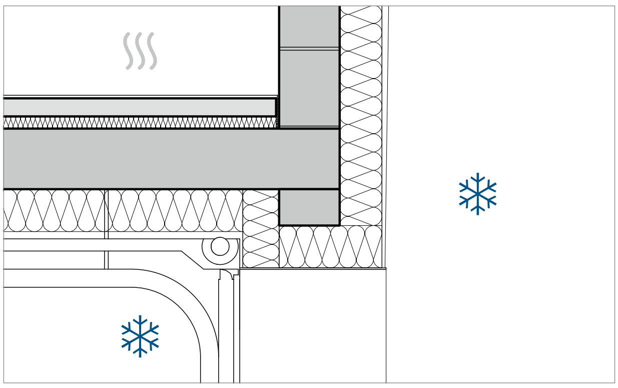


Fig. 14: Pos. ①: Insulated overhead door

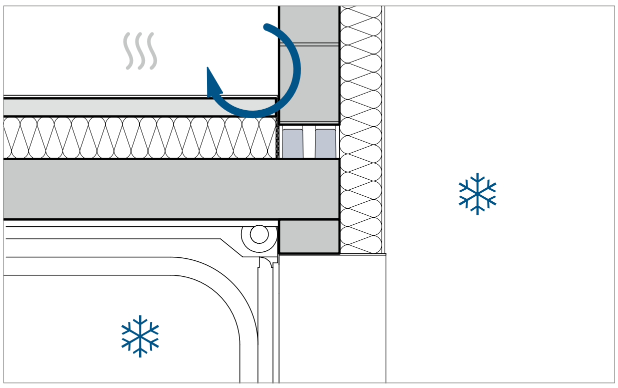


Fig. 15: Pos. ①: Heat flow with underground garage wall with Schöck Sconnex® type M

Product features and components

The great challenge with the insulation of reinforced concrete walls and columns in the connection detail to the floor or foundation slab is the transfer of resultant loads. This was first enabled through the development and the specific adjustment of high-performance concrete to the respective requirement for the transfer of force to wall or column. Combined with the existing knowledge from classical reinforcement work it is now possible to insulate reinforced concrete walls and columns securely and straightforwardly.

Schöck Sconnex® type W

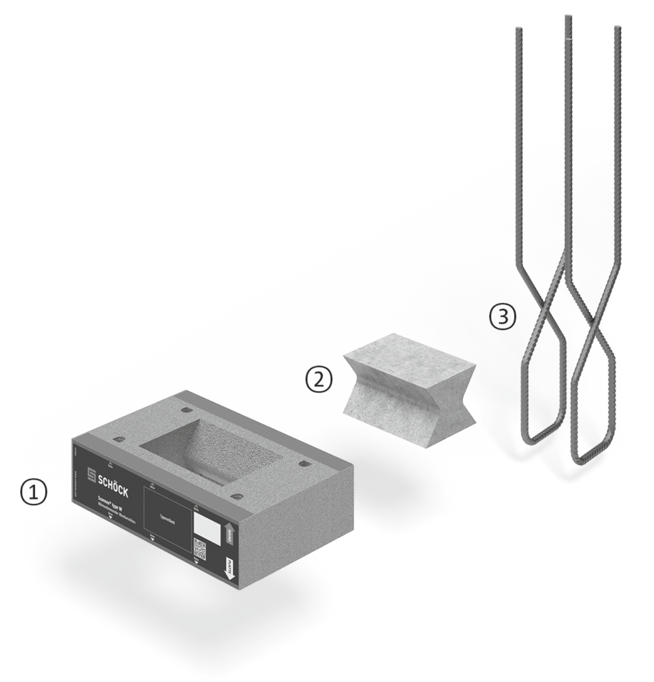


Fig. 16: Schöck Sconnex® type W-N-VH

① Insulating element	The insulating material used around the concrete pressure bearing is Neopor®, a registered brand of BASF. Unit weight= 70 g/l
② Concrete pressure bearing	The Schöck Sconnex® type W concrete pressure bearing consists of a microfibre-reinforced ultra-high performance concrete (UHPC). This material achieves very high compressive strengths with simultaneous high flexural strength. The addition of steel fibres also produces excellent post-cracking behaviour. The failure criterion of the system always lies in the adjacent in-situ concrete.
③ Crossed shear force bars	The crossed shear force bars for the transfer of shear force in the concrete pressure bearing consists of normative B550B • H10 mm. In standard application cases the steels are protected against corrosion using a sufficient concrete cover.

Product features and components

Schöck Sconnex® type P

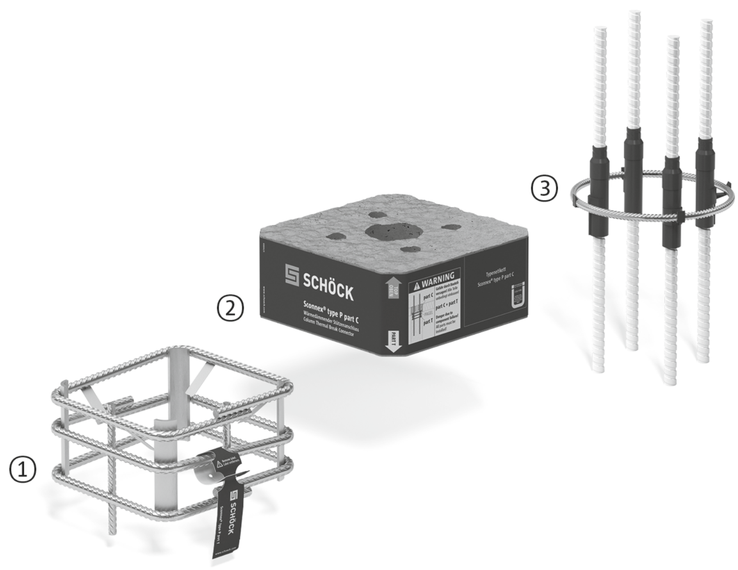


Fig. 17: Schöck Sconnex® type P-B250

① **Reinforcing element (Part T)**	The reinforcement element (Part T) consists of three welded • H10 mm stirrups and four stainless steel bending shape elements. It is installed immediately below Part C in the reinforcement cage. Through its strapping effect it increases the load-bearing capacity of the connection and is therefore absolutely vital to be installed in accordance with the manufacturer's specifications.
② **Insulating element (Part C) and PAGEL® grouting V1/50**	The insulating element consists of a pressure-resistant load-bearing structure made of lightweight concrete with PP fibres in an insulation layer 100 mm thick. Its special properties reduce the flow of heat considerably and eliminate the need for flank insulation. The funnel-shaped opening in the middle of the lightweight concrete element ensures the subsequent grouting with PAGEL® V1/50 and thus a jointless and friction-locked connection between Schöck Sconnex® type P and the column.
③ **Reinforcement (Part C)**	The glass fibre reinforcement of Part C consists of four bars of Schöck Combar® • H16 mm. It serves additionally as an installation aid.

Structure

Schöck Sconnex® type P is a two-part system solution for the reducing the heat flow of reinforced concrete columns at the column head. The product consists of Part C and Part T. Both parts are absolutely necessary to achieve the specified bearing loads.

Product features and components

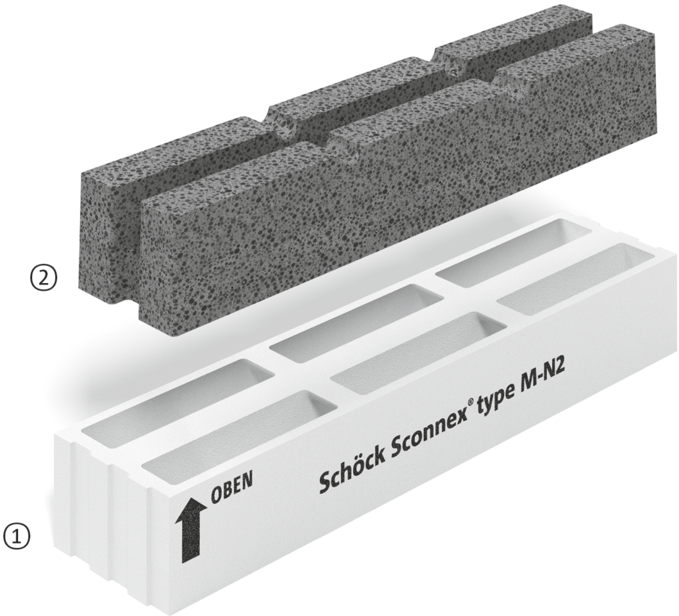


Fig. 18: Schöck Sconnex® type M-N2

① Insulating element	Polystyrene hard foam is used as insulating material around the concrete pressure bearing.
② Concrete pressure bearing	The Schöck Sconnex® type M concrete pressure bearing has a pressure-resistant bearing structure made of lightweight concrete. Its special properties reduce the flow of heat considerably and eliminate the need for flank insulation.

Schöck Sconnex® type M may be used in masonry made from the following materials:

- Solid sand-lime bricks and sand-lime blocks (hole content ≤ 15 %) according to DIN EN 771-2 in conjunction with DIN 20000-402 of compressive strength class ≥ 12 or
- normal masonry mortar of mortar class M 5 or M 10 or thin-bed mortar according to DIN EN 998-2 in conjunction with DIN 20000-412 or DIN V 18580

Application cases with under-slab insulation

Connection of an external wall using Schöck Sconnex® type W

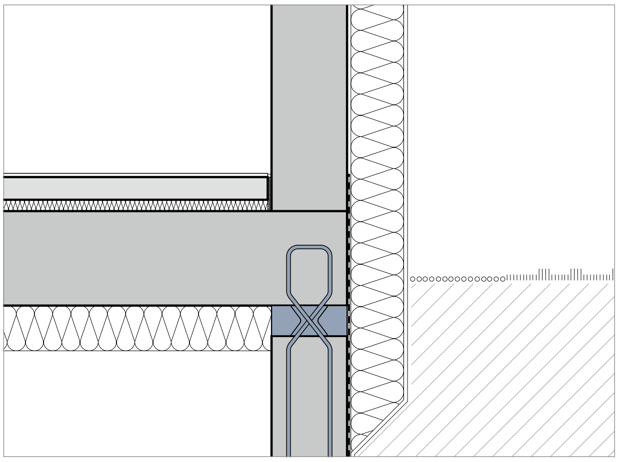


Fig. 19: Schöck Sconnex® type W with external wall and under-slab insulation

For the exterior wall against the soil, make sure that the joint is adequately protected against moisture penetration (for example, from splash and backwater) by an exterior sealing membrane. In order to satisfy fire protection requirements the choice of material and the thickness of the insulating layer must be implemented in accordance with the image for the connection of the internal wall. The insulation layer of the external wall in the area of the joint is also to be fitted with a fireproof insulation. In order to achieve an optimum insulation value it is normal to extend the external wall insulation over the area of the Schöck Sconnex® type W into the soil.

Connection of a column using Schöck Sconnex® type P

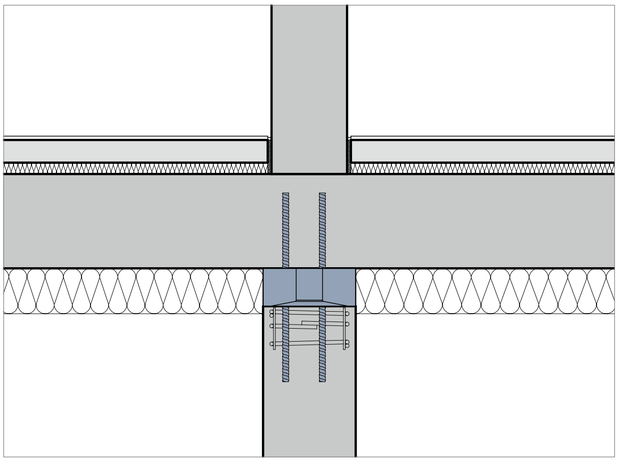


Fig. 20: Schöck Sconnex® type P with internal columns and under-slab insulation

Schöck Sconnex® type P Part C has an insulation element thickness of 100 mm. To ensure that the element is no longer visible after completion, it is advisable to install at least 100mm thick under-slab insulation. Due to the grouting of the pressure area, a small strip with different concrete colouring can occur directly in the transition area of the insulating element to the column. Thus a thickness of the insulation layer of 120 mm is recommended for a higher exposed concrete quality of the column. Depending on the moment-normal force combination and in-situ concrete strength class the Schöck Sconnex® type P has a defined load-bearing capacity in the case of fire. This fire requirement must be verified by the engineer.

Connection Schöck Sconnex® type M for masonry walls

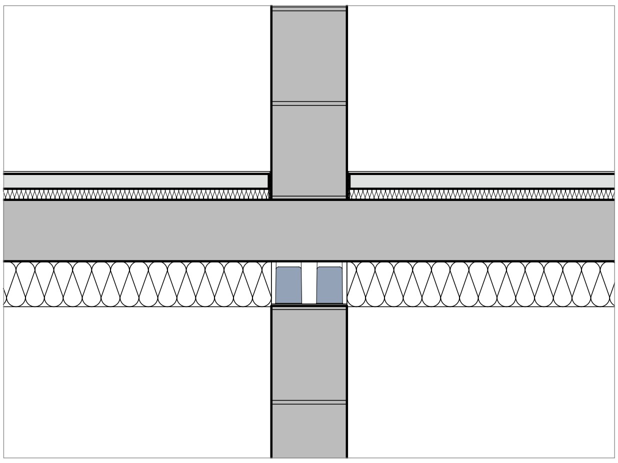


Fig. 21: Schöck Sconnex® type M in masonry with internal walls and under-slab insulation

With a masonry wall it is to be noted that the insulation must have at least the thickness of the Schöck Sconnex® type M in order to achieve the best thermal insulation. Separation using a highly energy-efficient insulation block is a particularly good solution for brick walls.
Additional measures are required to fulfil the EI-criterion in addition to the R-criterion (see page 135).

Application cases with above slab insulation

Connection of an external wall using Schöck Sconnex® type W

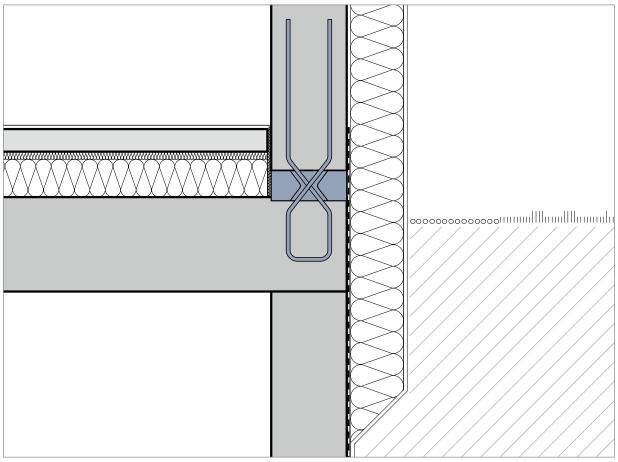


Fig. 22: Schöck Sconnex® type W with external wall and under-slab insulation

For the exterior wall against the soil, make sure that the joint is adequately protected against moisture penetration by an exterior sealing membrane. In the example presented the element is located in the splash water zone. In order to have a barrier against moisture and fire at the same time, the use of non-combustible, moisture-resistant and insulating materials is recommended in this area.

Connection of an external wall using Schöck Sconnex® type W above a garage entry

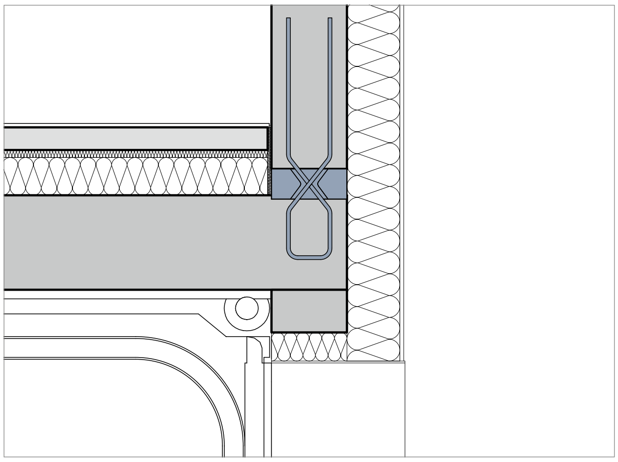


Fig. 23: Sconnex® type W with external wall and under-slab insulation over underground garage entry

Schöck Sconnex® type W is particularly suitable in areas where the temperature differences between indoor and outdoor air are very large (for example in the area of the underground car park entrance). In order to avoid a thick insulating material surrounding the structure, the main insulation layer can be laid on the inside and through the arrangement of Schöck Sconnex® type W the resultant thermal bridge in the connection detail to the external wall can be solved directly.

Connection of an external wall using Schöck Sconnex® type W with offset walls

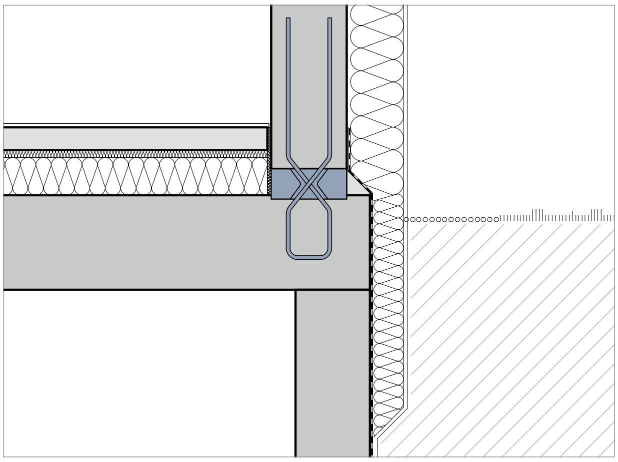


Fig. 24: Possible reduction of the insulation perimeter in the soil

A reduction of the insulation thickness in the basement can take place via the offset between basement and ground floor wall. This reduces the costs and leads to a gain in useful area in the basement.

Application cases with above slab insulation

Connection using Schöck Sconnex® type M with masonry walls

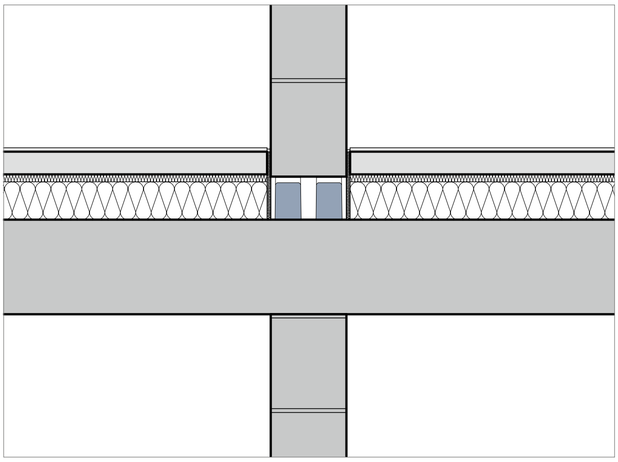


Fig. 25: Schöck Sconnex® type M in masonry with internal walls and above-slab insulation

In addition improvement of thermal performance the Schöck Sconnex® type M prevents moisture penetration of the masonry during construction. Due to the low moisture penetration of the block the risk of mould at a later stage is significantly reduced. To achieve the best thermal results, the Schöck Sconnex® Type M should be embedded in the insulation under the screed. For fire protection reasons the upper edge of the Schöck Sconnex® type M must, lie below the top edge of the screed.

Connection using Schöck Sconnex® type M with masonry external walls

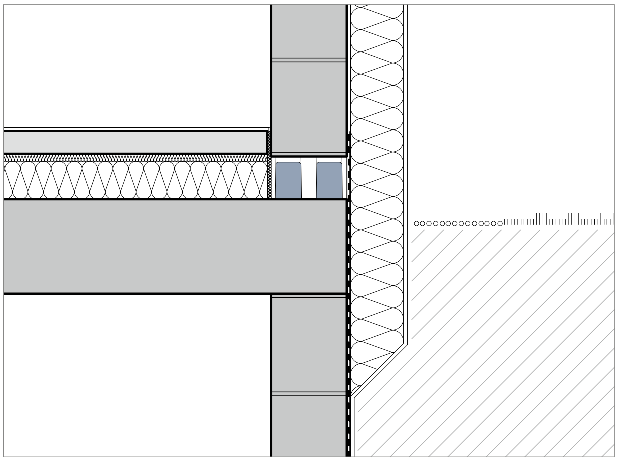


Fig. 26: Schöck Sconnex® type M in masonry with internal wall and under-slab insulation

In the area of the external wall the Schöck Sconnex® type M can be applied similarly to the internal walls. For reasons of protection against moisture, it is recommended that also here a sealing membrane is to be arranged to counter dampness.

Application cases with insulation on the foundation slab

Connection of an external wall using Schöck Sconnex® type W on a strip footing

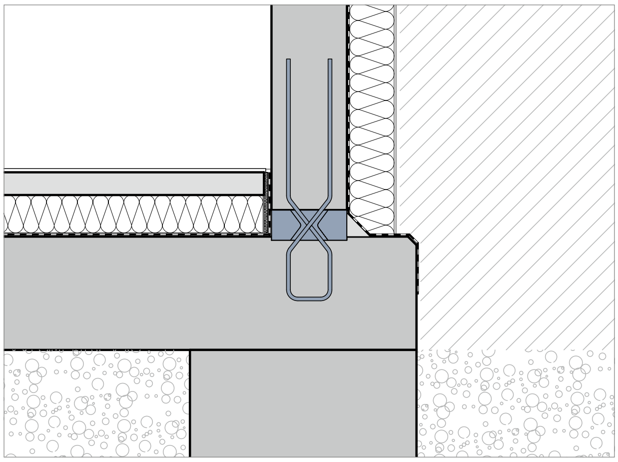


Fig. 27: Schöck Sconnex® type W external wall on strip footing/frost-proof course

With the employment of a Schöck Sconnex® type W in an external wall on a strip footing (or frost-proof course) the necessary insulation of the foundation can be dispensed with. In addition, an even pressure can be achieved by a constructive foundation overhang and thus the subsoil load-bearing capacity can be better utilised. The sealing of the joint between foundation slab and wall takes place using external waterproofing solutions (e.g. liquid plastics), which are arranged and implemented in a similar way to the expansion joints.

Connection of an external wall using Schöck Sconnex® type W

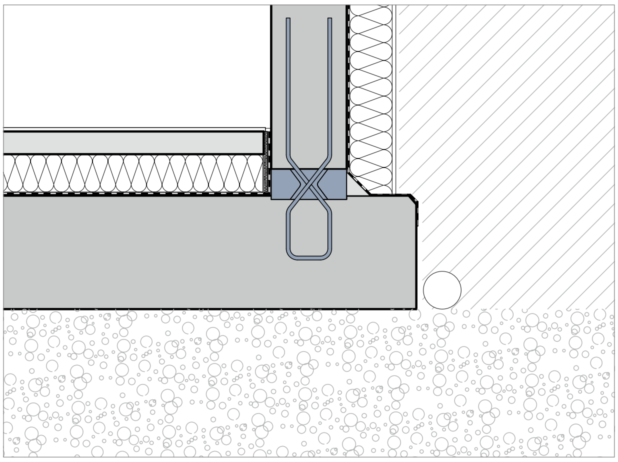


Fig. 28: Schöck Sconnex® type W external wall on foundation slab

In good subsoil conditions, the subsoil strength cannot be utilised when using insulation below the floor slab. A foundation slab projection is necessary for a centralized force transfer, particularly with large forces. Using the Schöck Sconnex® type W the costly insulation of these structural details is eliminated. A subsoil drain at the height of the base of the foundation slab drains accumulating water and prevents standing water.

Application cases with insulation on the foundation slab

Connection Schöck Sconnex® type M for masonry walls

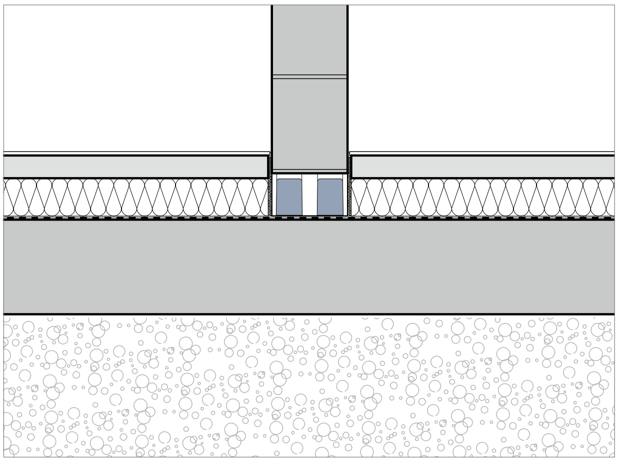


Fig. 29: Schöck Sconnex® type M internal wall on foundation component

Whether on a strip footing or a foundation slab, the arrangement of a Schöck Sconnex® type M means that the compression-resistant insulation under the floor slab can be omitted. Thus the foundation slab or the foundation can be put down directly on the earth and a negative impacting of the foundation due to the insulation does not apply. Above all, with the soil being able to take a load, this can lead to very high energy-saving potential.

Connection Schöck Sconnex® type M with external wall detail

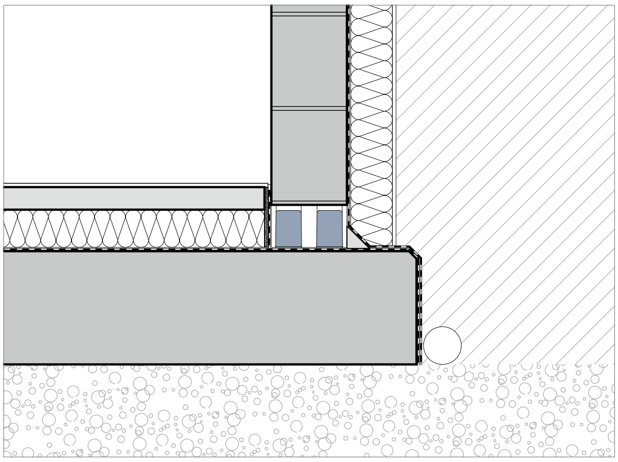


Fig. 30: Schöck Sconnex® type M external wall on foundation component

Particularly with very good subsoil conditions it is desirable not to lay the foundation slab on insulation under the slab. The thermal separation using Schöck Sconnex® type M enables a foundation slab projection, which does not have to be boxed in. A subsoil drain at the height of the base of the foundation slab drains accumulating water and prevents standing water.

Application cases – special applications

Connection Schöck Sconnex® type M with double-leaf masonry

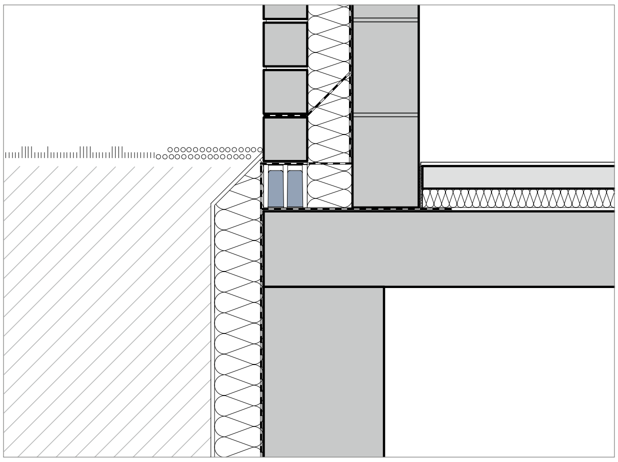


Fig. 31: Schöck Sconnex® type M with double-leaf masonry

Schöck Sconnex® type M can also be used as the lowest insulation layer in double-skin masonry walls. In the example shown, the outer leaf has been separated thermally from the warm basement. In such a case with contact with the ground, particular attention must be paid to the arrangement of the waterproof membranes.

Connection Schöck Sconnex® type M with parapets

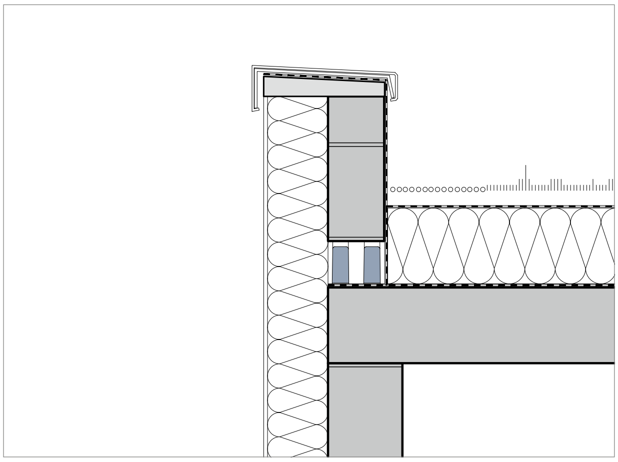


Fig. 32: Schöck Sconnex® type M in the attic

Fundamentally brick-built parapets are feasible. However, the load-bearing safety due to bending moments from guardrails must be taken into account with this type of design. Also, with the implementation of parapets, a sealing membrane against moisture must be arranged, in order that the joints between insulation and concrete are protected against the penetration of water.

Connection Schöck Sconnex® type M with external basement walls

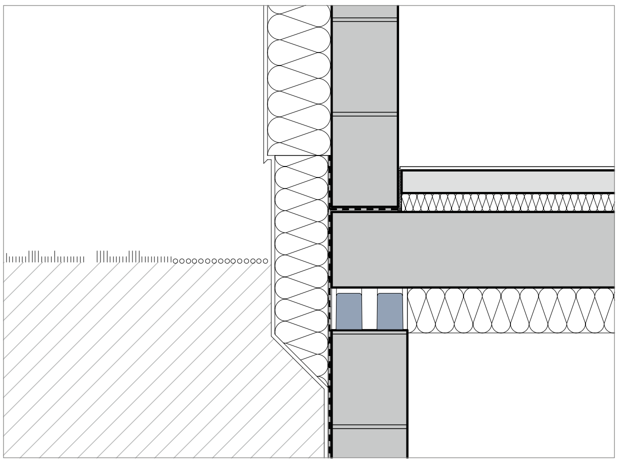


Fig. 33: Schöck Sconnex® type M underneath the basement floor

If Schöck Sconnex® type M is used with an under-slab insulation, its thickness should not be less than that of the product height in order to guarantee an optimum thermal protection.

Application cases with semi-precast constructions

Twin walls with Schöck Sconnex® type W

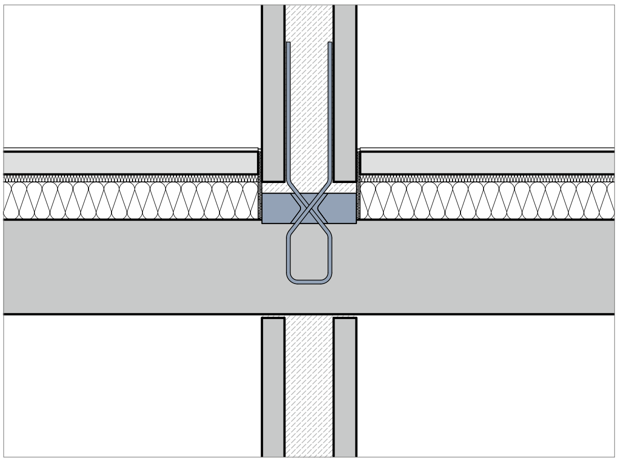


Fig. 34: Schematic diagram Schöck Sconnex® type W with twin walls and above-slab insulation

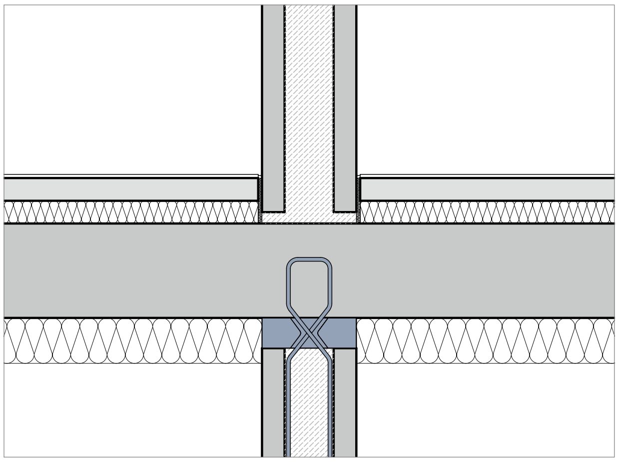


Fig. 35: Schematic diagram Schöck Sconnex® type W with twin walls and under-slab insulation

Schöck Sconnex® type W can also be employed for the insulation of twin walls. Due to the design, the interior of the twin wall must have a clear dimension of at least 130mm. With an arrangement at the foot of the wall it is recommended that there is an area in which the concrete quality above the Schöck Sconnex® type W can be checked visually. In this area the transverse reinforcement (3 • H12 mm) can be arranged through simple measures.
The possibility of a visual check is also recommended with an application in the top of the wall. With sandwich walls it is to be additionally noted that the axis of the Schöck Sconnex® type W runs in the axis of the wall. From this approach there results for the majority of designs a minimum wall thickness of 250 mm.

Sandwich walls with Schöck Sconnex® type W

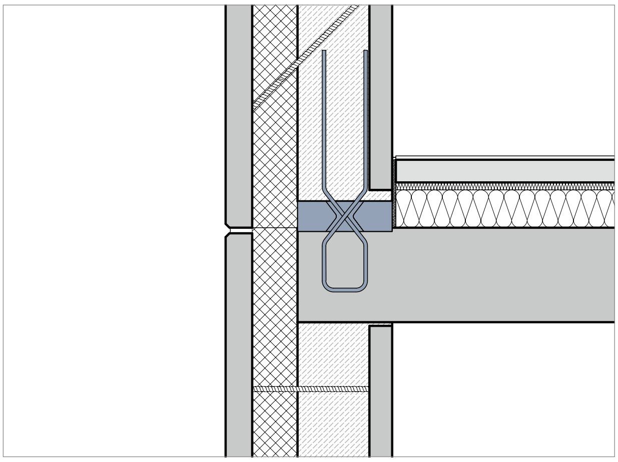


Fig. 36: Schematic diagram Schöck Sconnex® type W with sandwich walls and above-slab insulation

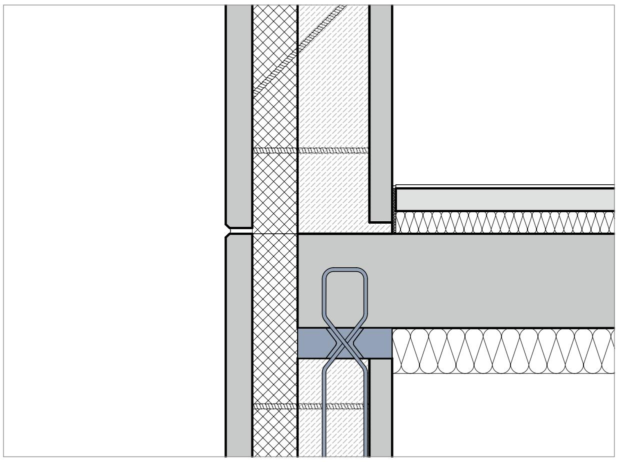


Fig. 37: Schematic diagram Schöck Sconnex® type W with sandwich walls and under-slab insulation

Building physics

Thermal protection | Moisture proofing | Requirements

Thermal insulation at the base of the building
Walls and columns represent penetrations of the building envelope and thus of the insulation layer, so-called thermal bridges. Thermal bridges are local component areas in the building envelope, with which an increased heat loss is present. Thereby, lower wall surface temperatures and the danger of mould formation and the accumulation of condensation also result. The thermal bridge is evaluated via the heat transfer coefficients ψ and χ as characteristic values for the energy loss both through the temperature factor f_{Rsi}, which is based on the warm side wall surface temperature, and which represents the dimension for the danger of the condensation accumulation and mould formation.

Protection against moisture on the building footing
Protection against moisture on the building is synonymous with prevention of building damage. Therefore the building, already in the planning, is to be checked for potential points where condensation may occur. Particular attention must be given to the simultaneous occurrence of material conditioned and geometric thermal bridges. Primarily, external corners, due to this combination, tend to have particularly low wall surface temperatures. Rooms with increased air humidity (bedrooms, bathrooms and kitchens etc.), which border on external walls or above cold areas such as, for example, underground garages, are also particularly vulnerable. Furthermore, there can also be a large input of water into the building footing in the construction phase, which in combination with the thermal bridges, involves an increased hazard for the formation of mould.

Along with the danger of occurrence of condensation and the formation of mould, the thermal conductivity of wet building material also deteriorates: The wetter the building material is, the higher the thermal conductivity and the lower the thermal insulation effect.
Fundamentally, the prevention of condensation water in thermal bridges to the underground garage and unheated basements is always to be checked.

Effects of thermal bridges
- Danger of the formation of mould
- Danger of impairments to health (allergies etc.)
- Danger of occurrence of condensation
- Increased thermal energy loss
- Danger of structural damage

Requirements on the thermal insulation
Because the thermal quality of our buildings is increasing, the influence of the existing thermal bridges is increasing too. That´s why thermal bridges are getting more important. An overview of the requirements is presented in the following table.

	Requirements
Moisture proofing	
Temperature factor	$f_{Rsi} \geq 0.75$
Thermal insulation with thermal bridges	
Without thermal bridge verification	an addition on the U value for the thermal bridges must be concidered
Detailed thermal bridge verification	accurate verification via ψ value calculation

Info
1) Constraints according to BRE Information Paper IP1/06: Inside temperature 20 °C in living rooms, 50% room air humidity, outside temperature 0 °C

Characteristic values of thermal insulation products

Characteristic values for the describing of thermal bridges
Several characteristic values exist for describing the effects of a thermal bridge. The property of a Schöck Sconnex® for preventing heat transfer is described by the equivalent thermal conductivity λ_{eq}. Thus it constitutes a product characteristic value.

In addition, there are also characteristic values to describe the requirements relating to moisture proofing: $\Theta_{si,min}$ and f_{Rsi} are requirements relating to the temperature of the heat-side wall surface temperature of a building to rule out condensation and mould formation.
There are also requirements relating to the energy loss through the thermal bridge. These are described for linear thermal bridges using the ψ value (length-related heat transfer coefficient) and the point thermal bridges using the χ value (point-related heat transfer coefficient).

Thermal effects	Characteristic value	Type of thermal bridge
Moisture proofing		
Condensation result, mould formation	f_{Rsi} $\Theta_{si,min}$	all
Thermal insulation with thermal bridges		
Energy loss	ψ	linear
	χ	punctual

Info
ψ, χ, $\Theta_{si,min}$ and f_{Rsi} are calculated for a specific thermal bridge – a designated design detail where Schöck Sconnex® is embedded. Therefore, these values depend on the construction. Whereas λ_{eq} and R_{eq} only describe the thermal insulation effect of a Schöck Sconnex®. Therefore, if one modifies characteristics of the construction by adjustment of the insulation thickness of the floor insulation or the type of Schöck Sconnex® used, one also modifies the heat transfer through the thermal bridge (and with this ψ, χ, $\Theta_{si,min}$ and f_{Rsi}).

The application of λ_{eq} and the calculation of ψ, χ, $\Theta_{si,min}$ and f_{Rsi} are explained in the verification procedure section.

Equivalent thermal conductivity λ_{eq}
The equivalent thermal conductivity λ_{eq} is the overall thermal conductivity of all components of a Schöck Sconnex® and is, with the same insulting element thickness, a measure for the thermal insulating effect of the connection. The smaller the λ_{eq}, the higher the thermal insulation effect. λ_{eq} values are determined through detailed thermal bridge calculations. Since each product has an individual geometry and placement specification, each Schöck Sconnex® has an individual value.

It is possible to do the calculations using commercially available thermal bridge software by means of the thermal boundary conditions according to BS EN ISO 6946. In doing so, surface temperatures Θ_{si} and the resulting temperature factor f_{Rsi} can be calculated in addition to the heat loss through the thermal bridge (ψ value).

Verification procedure thermal insulation

Detailed thermal bridge verification

The thermal bridge details are contained in the relevant thermal bridge guides or the thermal bridges are calculated with the aid of FE programs.

Detailed thermal bridge verification

Verification via ψ value

- Detailed calculation
  - Using software (FE, FD) for the thermal bridge analysis
  - Simplified substitute model of the Schöck product is placed in the insulation layer
  - The λ_{eq} value of the matching product is selected from λ_{eq} tables. (Sconnex® type W see page 34, type P see page 37)
  - ψ value or χ value is calculated
- Values from catalogue

ψ value or χ value is included in the transmission heat losses

$$H_T = \sum U \cdot A + H_{WB}$$

Where a detailed thermal bridge calculation is to be provided for the determination of ψ or f_{Rsi} values, the λ_{eq} value can be used in the modelling of the connection details. For this purpose, a homogeneous rectangle of the same dimensions as the Schöck Sconnex® insulting element is placed into the model in its position and the equivalent thermal conductivity λ_{eq} assigned, refer to figure. In this way, the building physics characteristic values of a design can be simply calculated.

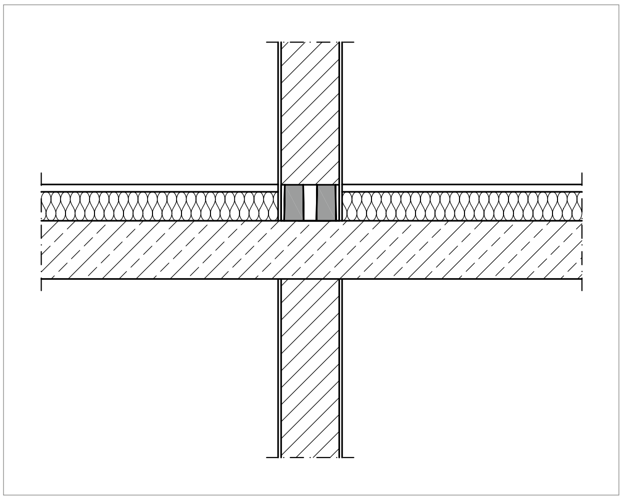


Fig. 38: Representation of a sectional drawing with detailed Schöck Sconnex® model

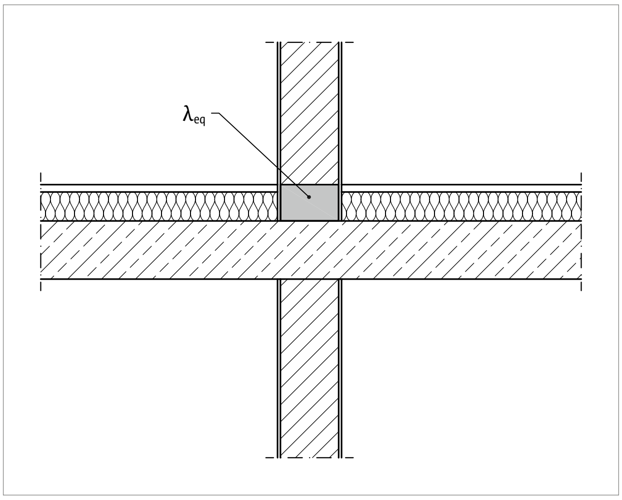


Fig. 39: Representation of a sectional drawing with simplified substitute insulating element

Please note that a large section from the construction for the model is selected so that the areas of the surrounding construction being influenced by the thermal bridge are shown in the model. A spacing of 2 metres around the thermal bridge is normally sufficient to take these boundary effects into account.

Thermal insulation using Schöck Sconnex® type W

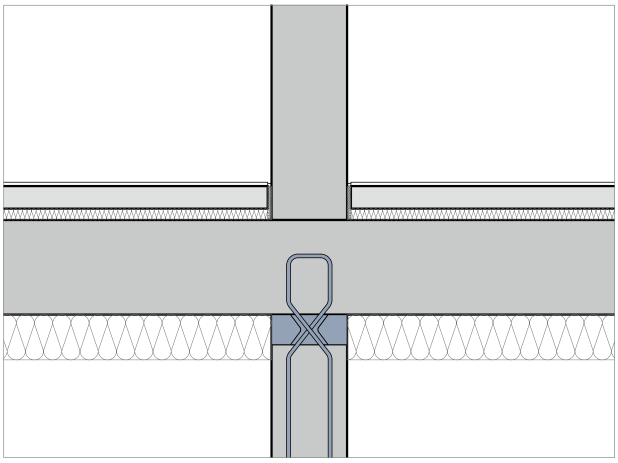


Fig. 40: Schöck Sconnex® type W with internal wall and under-slab insulation

Schöck Sconnex® type W is used in reinforced concrete walls for the insulation of the resultant thermal bridge in the connection detail to the floor and foundation slab at the foot of the wall or below the ceiling slab at the top of the wall.

Passive House standard with Schöck Sconnex® type W

Due to the very good thermal insulation performance, the wall connected with the Sconnex® type W is certified as a passive house component from the Passive House Institute (PHI) in Darmstadt. Therefore, the Schöck Sconnex® type W corresponds to the highest energetic standards.
For the certification, the heat transfer coefficient ψ and the minimum internal surface temperature for a Schöck Sconnex® type W are determined in a specified Passive House construction. These values must correspond to the quality requirements and the limit values defined by the Passive House Institute.

Types of a wall connection

Wall connections, due in particular to the large number of running metres, are a substantial thermal bridge. Thereby, the Schöck Sconnex® type W is placed flush with the floor in the insulation layer under or optionally on top of the floor.

On the following pages you will find an overview of the possible configurations of wall connections and the associated technical thermal or humidity characteristics. Constructions using comparable U values were selected.

Building-physical properties of a wall connection

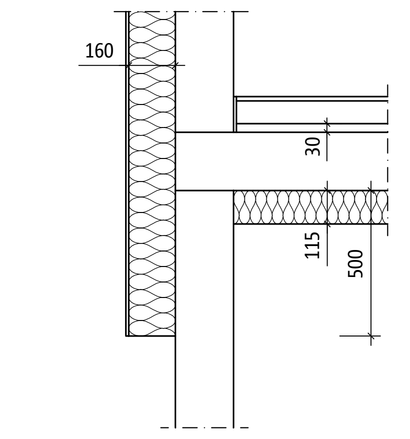
- The construction of continuous concrete walls, which penetrate the insulation layer of the floor, leads frequently to structural damage as the heat-side wall surface temperature drops too much, see example on page 32.
- If wall connections are constructed with flank insulation, the situation improves in terms of energy, but structural damage cannot be ruled out.
- Designing with Schöck Sconnex® type W guarantees solutions without structural damage and moreover reduces the energy loss through the thermal bridges considerably. As the type W is installed at a point, the intermediate area is insulated undisturbed. That and the low thermal conductivity of the product components lead to very low energy losses.
- External walls and in particular outer corners are situations where low wall surface temperatures occur on the heat side, especially if there is also an underground garage underneath. In general, the following applies: The greater the temperature difference between the internal and external air, the more critical the situation. A heated room adjacent to a ventilated underground garage is therefore more critical than a room adjacent to a closed basement . However, with basements the case is critical if this borders directly on the ground.
- With an above-slab insulation the condensation water situation can be critical in the component verification. With this the condensation water falls initially between floor slab and the insulation lying above. The situation, however, is massively improved through the arrangement of a vapour barrier under the screed and leads in many cases to a successful component verification. With over-slab only insulation the arrangement of a vapour barrier is strongly recommended.

Building physics

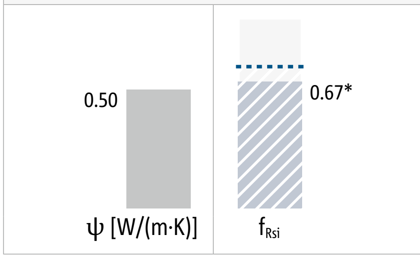
Thermal comparison with Schöck Sconnex® type W

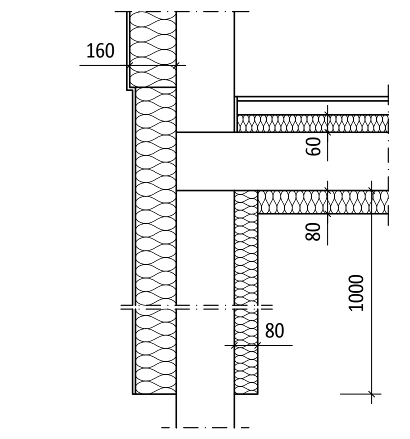
External wall

Under-slab insulation

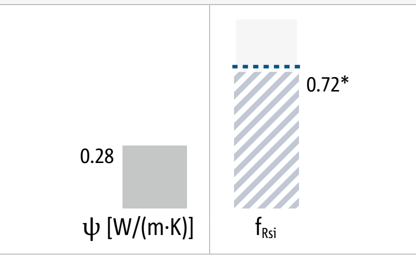


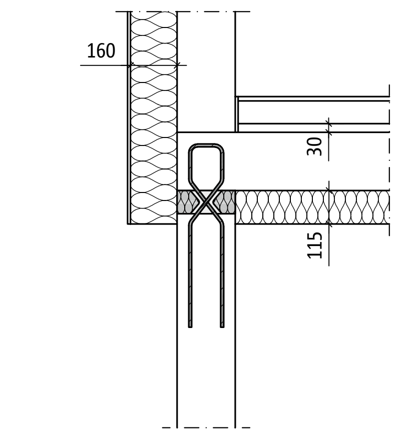
Continuous cast through concrete without flank insulation



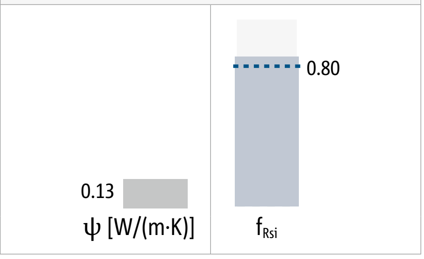


Continuous cast through concrete with flank insulation



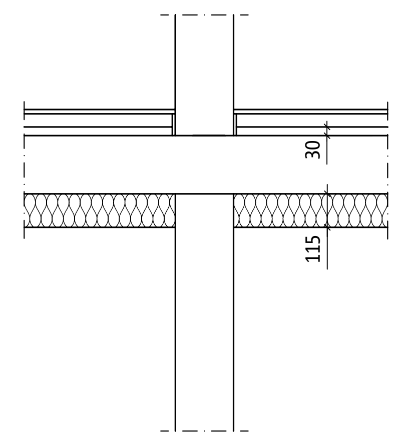


Construction with Schöck Sconnex®

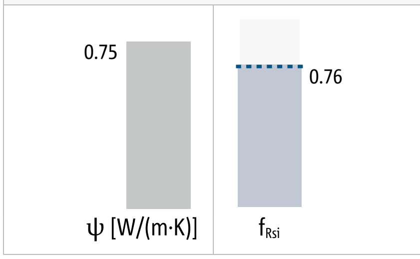


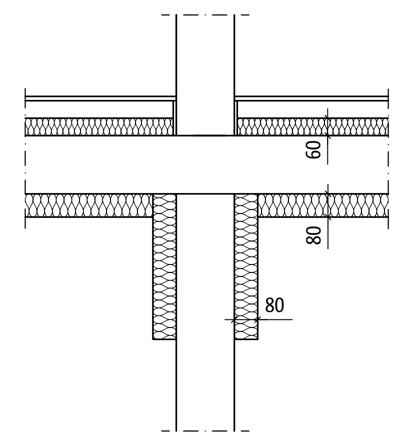
Inside wall

Under-slab insulation

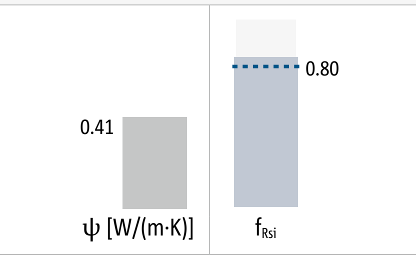


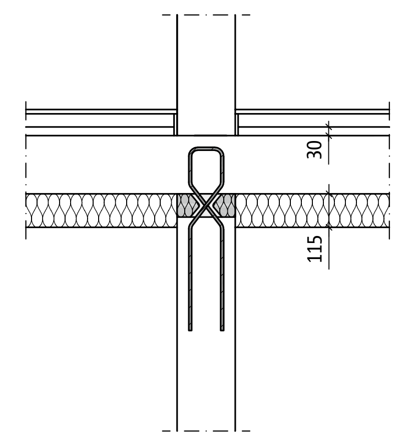
Continuous cast through concrete without flank insulation



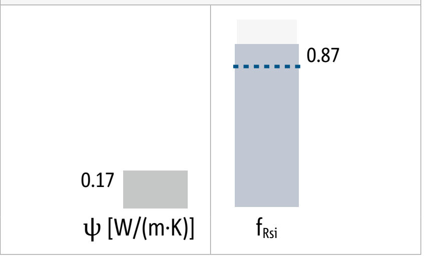


Continuous cast through concrete with flank insulation





Construction with Schöck Sconnex®

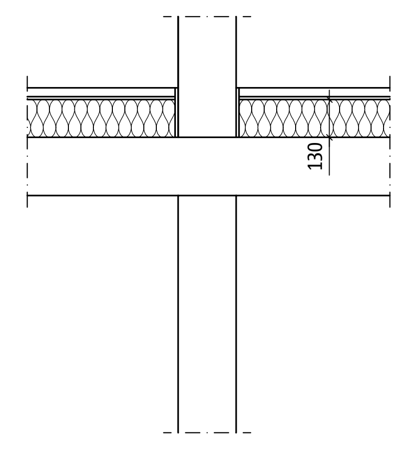


*) Target value $f_{Rsi,min} \geq 0.75$ according to BRE Information Paper IP1/06 not complied with.

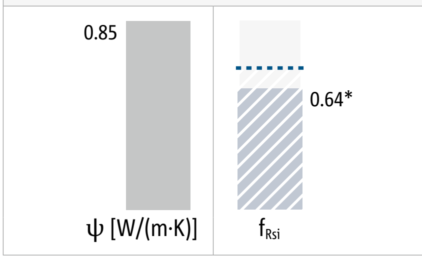
Thermal comparison with Schöck Sconnex® type W

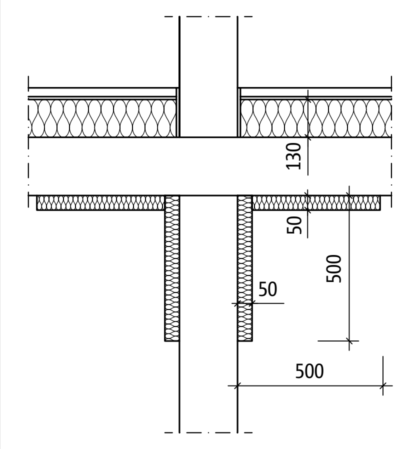
Inside wall

Above-slab insulation

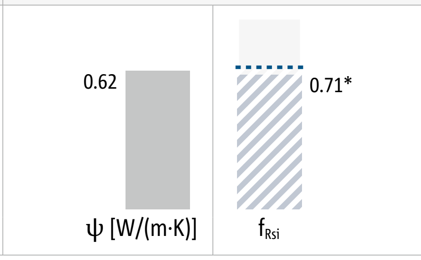


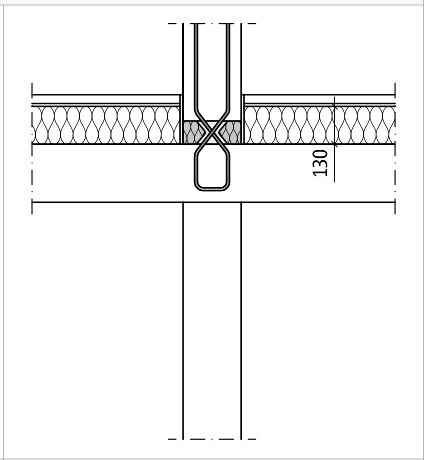
Continuous cast through concrete without flank insulation



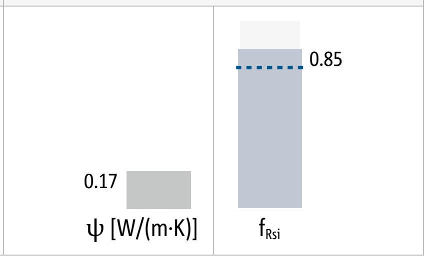


Continuous cast through concrete with flank insulation



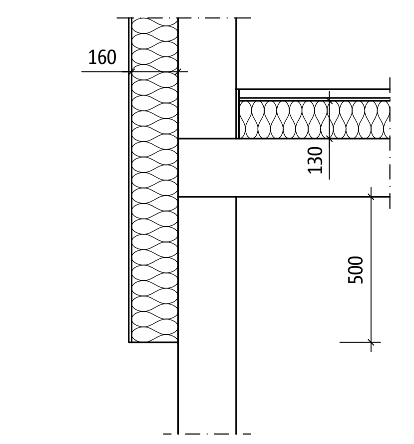


Construction with Schöck Sconnex®

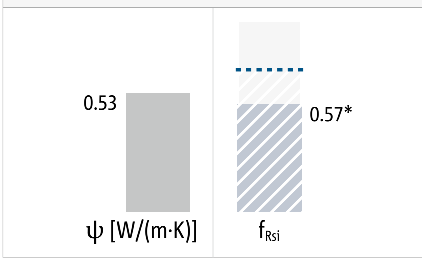


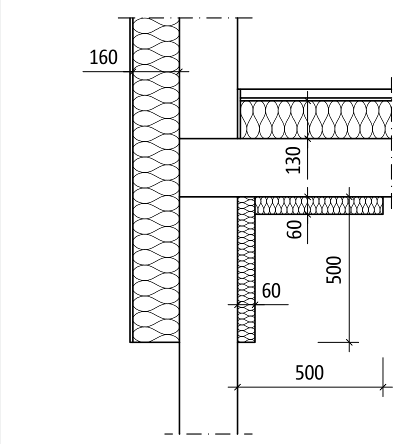
External wall

Above-slab insulation

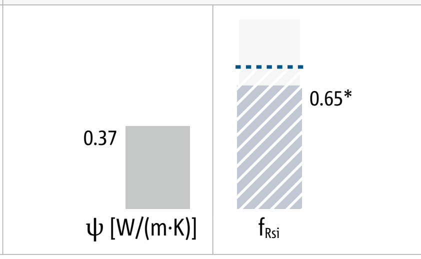


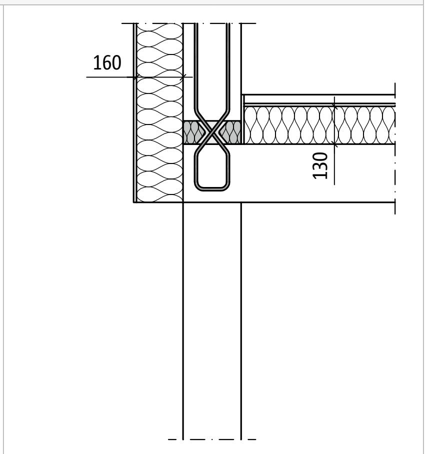
Continuous cast through concrete without flank insulation



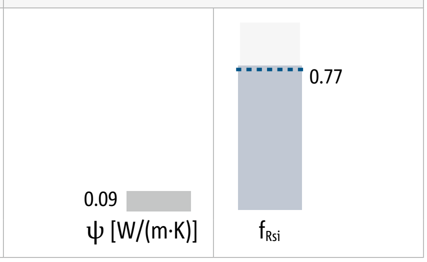


Continuous cast through concrete with flank insulation





Construction with Schöck Sconnex®



*) Target value $f_{Rsi,min} \geq 0.75$ according to BRE Information Paper IP1/06 not complied with.

Thermal comparison | Schöck Sconnex® type W product characteristic values

In the overview, it is clear that even solutions with flank insulation, the requirements on the minimum protection against moisture and thus the normal requirements in many cases are not met. Here a particular risk exists for structural damage. Even if the requirements for moisture protection are met, the energy loss for the through-concreted solutions is many times higher than that of a solution using Schöck Sconnex®.

Boundary conditions for the example constructions on page 32 and 33

- Above-slab insulation: $\lambda = 0.035$ W/(m·K)
  Under-slab insulation: $\lambda = 0.04$ W/(m·K)
- U value of the floor with above-slab insulation: U = 0.25 W/(m²·K)
- U value of the floor with under-slab insulation: U = 0.25 W/(m²·K)
- U value of the external wall: U = 0.21 W/(m²·K)
- Spacing Schöck Sconnex® type W-N1-V1H1: 1 per metre
- Wall thickness: 200 mm
- Building physics boundary conditions: Were selected as per BS EN ISO 6946 and BRE IP 1/06.

Schöck Sconnex® type W product characteristic values

Schöck Sconnex® type W	N1-V1H1	Part Z
Force absorption		
B [mm]	λ_{eq}	λ_{eq}
150	0.573	0.031
180	0.471	0.031
200	0.421	0.031
250	0.336	0.031
300	0.281	0.031

- A type summary with the matching application areas can be found on page 8.
- λ_{eq} Equivalent thermal conductivity in W/(m·K)
- Component height to be applied = 80 mm
- Product depth to be applied = 300 mm
- The component width to be applied is given in the table. For other widths the intermediate values for λ_{eq} may be interpolated.
- For further information on the determination of the mean thermal conductivity see page 35

Verification procedure thermal insulation

Detailed thermal bridge verification

As described on page 30, a homogeneous block with the equivalent thermal conductivity λ_{eq} for the product can be applied. For this see following diagrams. For a Schöck Sconnex® type W an insulation element with length 300 mm, height 80 mm and the λ_{eq} value of the respective type W is applied in a 3D model. The insulation value of the intermediate insulation is applied for the intermediate area A. With this model, the ψ value of the wall connection can be easily calculated.

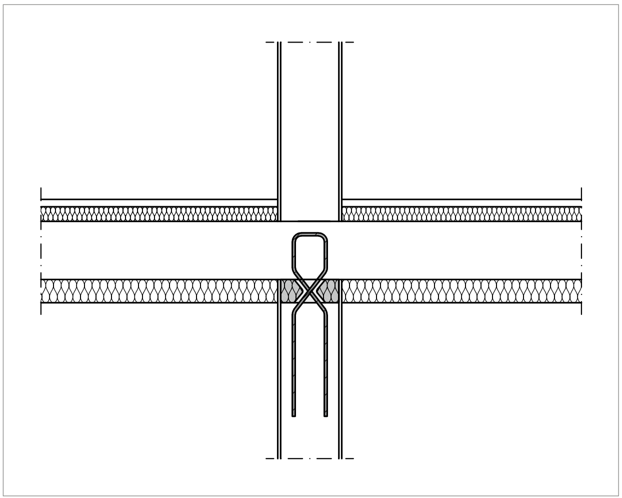


Fig. 41: Representation of a sectional drawing with detailed Schöck Sconnex® model

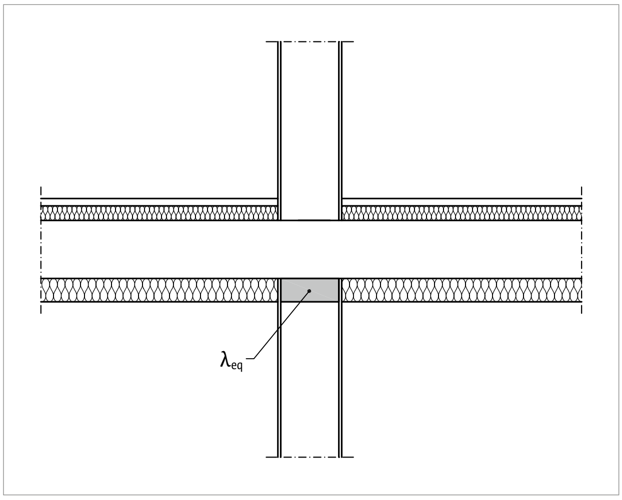


Fig. 42: Representation of a sectional drawing with simplified substitute insulating element

If a two-dimensional calculation for the determination of the ψ value is to be carried out, the thermal conductivity of the Schöck Sconnex® type W and the intermediate insulation can be determined (see following diagram). The mean thermal conductivity $\lambda_{eq,mean}$ can then be applied in a two-dimensional model (see diagrams on page 35).

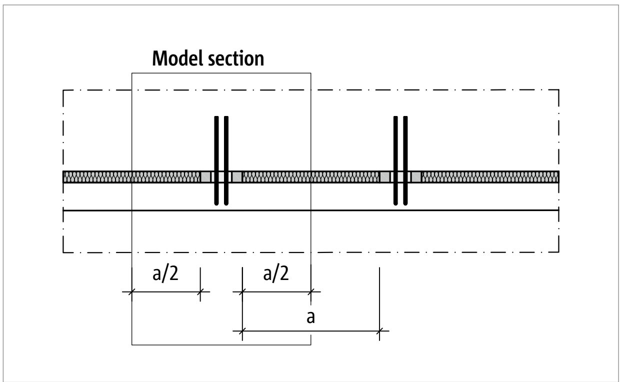


Fig. 43: Representation of a possible model section for a three-dimensional modelling of a wall connection detail with point-sited Schöck Sconnex® type W and insulation in between

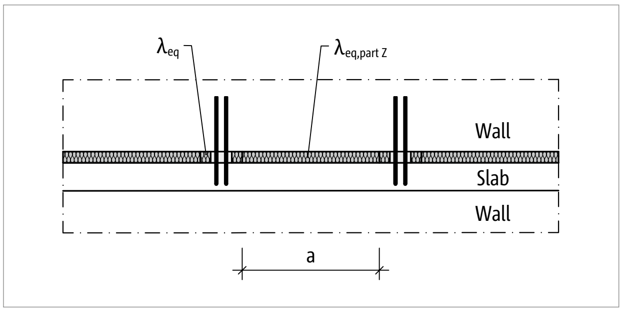


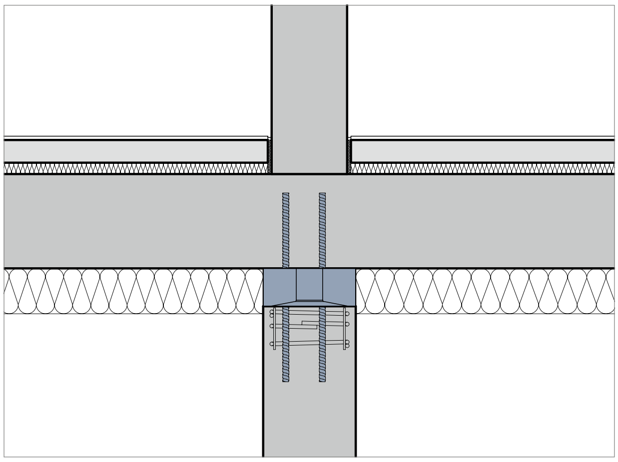
Fig. 44: Representation of two sectional axes for the determination of $\lambda_{eq,mean}$ of a wall connection detail with point-sited Schöck Sconnex® type W and insulation in between

$$\lambda_{eq,Mittel} = \frac{\lambda_{eq} \cdot 0{,}3\ \mathrm{m} + \lambda_{eq,Part\ Z} \cdot a}{0{,}3\ \mathrm{m} + a}$$

Info

- $\lambda_{eq,mean}$ = mean thermal conductivity of the connection
- λ_{eq} = equivalent thermal conductivity of Schöck Sconnex®
- $\lambda_{eq,part\ Z}$ = thermal conductivity of the intermediate insulation with the employment of Schöck Sconnex® type W part Z: λ_{eq} = 0.031 W/(m·K)
- a = length of the intermediate insulation = element centre distance – 0.3 m
- Product characteristic values λ_{eq} for Schöck Sconnex® type W and type W part Z see page 34.

Thermal insulation using Schöck Sconnex® type P



ZERTIFIZIERTE KOMPONENTE
Passivhaus Institut

Fig. 45: Schöck Sconnex® type P with internal columns and under-slab insulation

Schöck Sconnex® type P is used in reinforced concrete columns to insulate the thermal bridge at the top of the column. In some cases, employment at the foot of columns is possible with foundation slabs.

Columns have to transfer high loads. Continuous cast through columns due to the high heat transfer are point thermal bridges. Even if a column is designed with flank insulation this energy loss can only be partially reduced. Schöck Sconnex® type P, on the other hand, is specifically installed in the insulation layer.

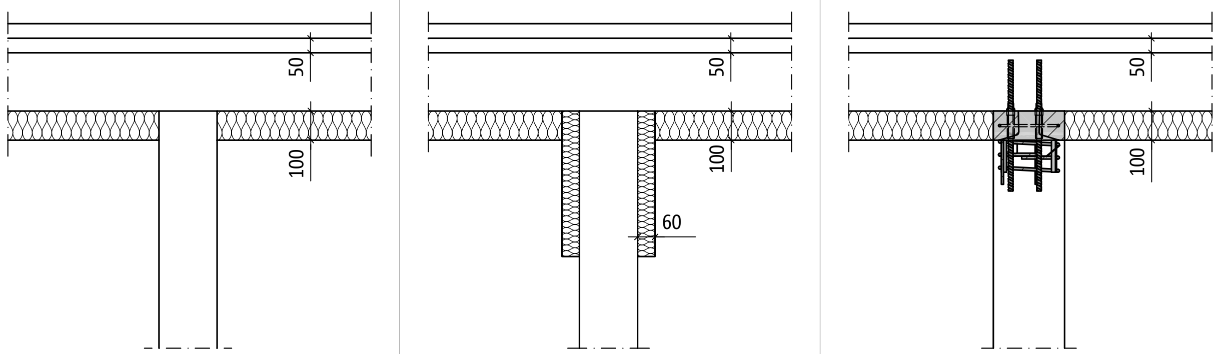
While concrete with a thermal conductivity λ = 1.6 W/(m·K) and reinforcing steel with λ = 50 W/(m·K) penetrate the insulation layer in a continous cast through concrete column, the Schöck Sconnex® type P interrupts the reinforced concrete construction with an equivalent thermal conductivity of λ_{eq} = 0.61 W/(m·K). This low value is achieved due to an energy optimised lightweight concrete and fibreglass reinforcement with λ = 0.9 W/(m·K).

Passive House standard using Schöck Sconnex® type P
Due to the very good thermal insulation performance of the Schöck Sconnex® type P, the column connected with the Sconnex® type P is certified as a passive house component by the Passive House Institute (PHI) in Darmstadt. As a result the Schöck Sconnex® type P corresponds to the highest energy requirements.
For the certification the thermal conductivity coefficient χ and the minimum internal surface temperature for a Schöck Sconnex® type P are determined in a Passive House construction. These values must correspond to the quality requirements and the limit values defined by the Passive House Institute.

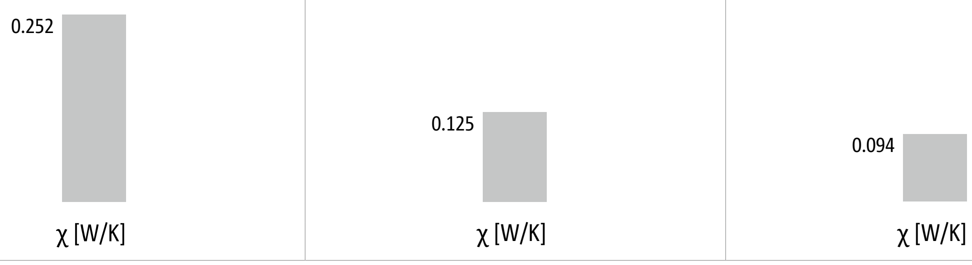
Thermal comparison | Schöck Sconnex® type P product characteristic values

Thermal comparison Schöck Sconnex® type P with constructive insulation

For a typical construction the heat loss through an uninsulated reinforced concrete column is χ = 0.252 W/K. With a column with 50 cm length and 6 cm thick flank insulation the χ-value reduces to χ = 0.125 W/K. With Schöck Sconnex® type P the χ value falls to χ = 0.094 W/K.



Column without insulation	Column with flank insulation	Column with Schöck Sconnex® type P



As a result, the solution using the Schöck Sconnex® type P is about 63% better than the uninsulated thermal bridge, and about 23% better than the configuration with flank insulation.

Boundary conditions

- λ Insulation: 0.04 W/(m·K)
- U value of the floor: 0.24 W/(m²·K)
- Building physics boundary conditions: Were selected as per BS EN ISO 6946 and BRE IP 1/06.

Schöck Sconnex® type P product characteristic values

Schöck Sconnex® type		P
B [mm]	L [mm]	λ_{eq}
245	245	0.610
295	295	0.600
345	345	0.590
395	395	0.580

- Possible column geometries are 250 × 250, 300 × 300, 350 × 350 and 400 × 400 mm.
- λ_{eq} Equivalent thermal conductivity in W/(m·K)
- Component height to be applied = 100 mm

Building physics

Verification procedure thermal insulation

Detailed thermal bridge verification

A detailed verification according to the following method can be carried out.

Schöck Sconnex® type P is a point connection and a detailed calculation is best carried out three-dimensionally. The model is produced with the product dimensions and for that purpose the equivalent thermal conductivity λ_{eq} applied. The heat loss occurring in addition to the U-value of the ceiling is thus the determined χ-value of the column.

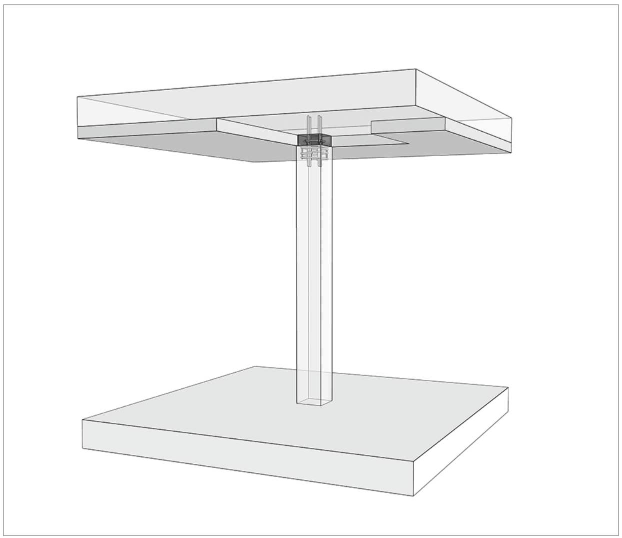


Fig. 46: Connection detail with detailed Schöck Sconnex® model

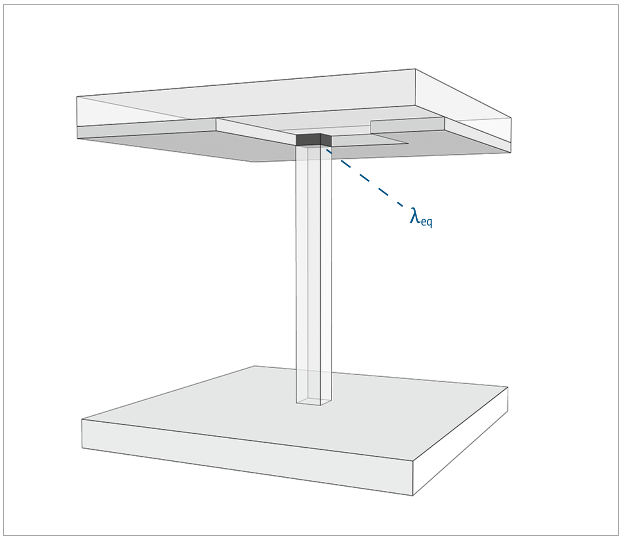


Fig. 47: Connection detail with simplified substitute insulation element

Thermal insulation using Schöck Sconnex® type M

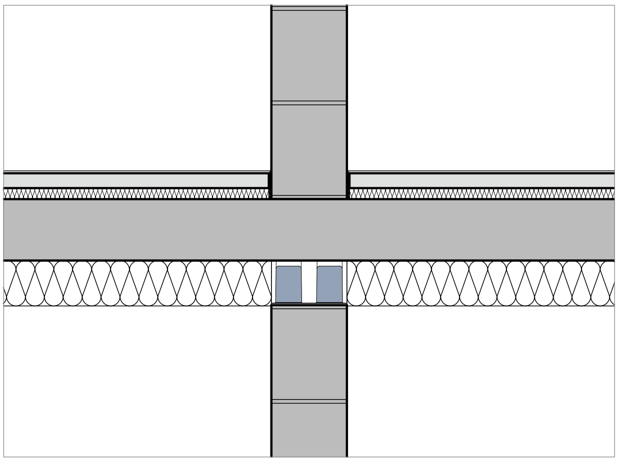


Fig. 48: Schöck Sconnex® type M in masonry with internal walls and under-slab insulation

The Schöck Sconnex® type M is an insulating element for the thermal separation of masonry. The thermal insulation elements are installed mainly as thermal protection and protection against moisture on footings. In accordance with the Approval they serve as first alignment of the masonry above or below the basement floor.

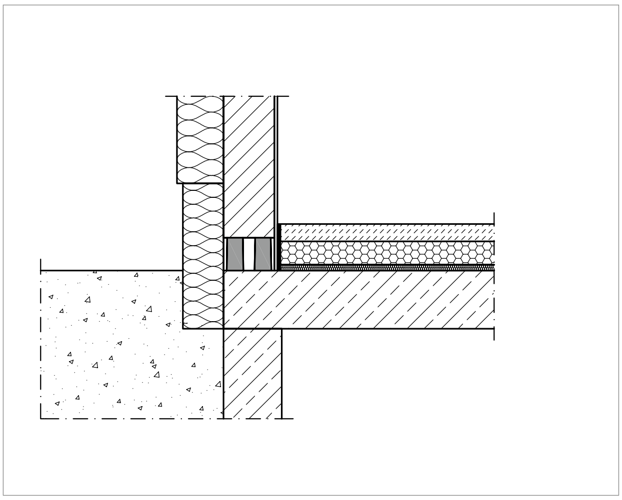


Fig. 49: Efficient thermal insulation using Schöck Sconnex® type M

Protection against moisture at foot of wall

During the construction phase a great deal of water enters the shell at the foot of the wall. In particular the layer of blocks above the basement floor or on the foundation slab is affected with a high moisture load.

Porous insulating materials, which are capillary absorptive, can absorb large amounts of moisture. Due to increased moisture content in the material there is a drastic decrease of the insulating property. The wetter a building material is, the higher the thermal conductivity is and the lower the thermal insulating effect.

The lowest layer of blocks on the floor or foundation slab (calibrating layer), through the increased moisture content over a very long period, displays an increased thermal conductivity. This results in reduced thermal insulating performance at the foot of the wall, which is accompanied with reduced surface temperatures. This leads to problems such as the accumulation of condensation and the formation of mould as well as increased heat loss.

Building physics

Thermal bridge at footing

With the increasing energy efficiency of buildings the minimization of thermal bridges is evermore decisive. With highly thermally insulated buildings (Passive House standard) the share of thermal bridges in the overall transmission heat loss of buildings is currently approx. 15 to 20%, whereby this share is determined mainly through the thermal bridges window flanning (approx. 6%), balcony connections (approx. 3% with projecting balconies) as well as external and internal wall connections (approx. 10%). This shows that the footing, due to its large developed length and the geometric conditions, represents a serious thermal bridge. The controversial combination of statically highly loaded external and internal walls ($\lambda \approx 1.0$- 2.3 W/(m•K)), which through their unavoidable positioning on the basement floor penetrate the thermal insulation envelope of the building ($\lambda \approx 0.04$ (W/(m•K)) (thermal insulation layer on the external wall as well as the thermal insulation layer on the basement or underground garage floor), represent a great challenge on an efficient thermal insulation envelope.

Influencing variables, which affect the energy loss in the footing
By insulating the exterior walls and providing flat insulating materials underneath and/or on top in the area of the ground floor ceiling, the heat transfer through the flat building components is minimised to a large extent.

As a result of these increasing two-dimensional thermal insulation measures the thermal bridges are increasingly gaining in significance.
Through flanking insulation measures of the structurally-conditioned thermal bridges (The pulling down of the perimeter insulation to over the interface wall/floor (50–100 cm from underside of floor)) there is an attempt to mitigate this critical detail.

Implementation using flank insulation, however, involves the risk that here the minimum requirement on $f_{Rsi} > 0.75$ according to BRE Information Paper IP1/06 is no longer met. Therefore, it is always to be noted that the implementation with flank insulation functions.

This problem is additionally amplified through the material-induced moisture affinity of the wall materials. In particular during the period of building construction, these are exposed to an impact of moisture coming from outside. The high capillary absorption capacity of porous structural elements leads to a moisture penetration and thus to the loss of thermal insulation effect.
A significant drop of the thermal insulation effect is the result, which due to a general “wrapping” of the first layer of blocks using insulation material, flooring installation, plastering etc., leads to a protracted continuous drying out of the wall materials over several years. During this period the wall material has a drastically reduced thermal insulation property, which lies far below the applied mathematical one. Moreover, this moisture can escape on the inside surfaces – thus the risk of mould formation increases.

Thermal comparison Schöck Sconnex® type M with load-bearing insulation

Uninsulated footing

With an uninsulated footing the rising masonry interrupts the thermal insulating envelope of the building between the external wall insulation and the insulation above the basement floor. Through this, together with the high thermal conductivity of the masonry blocks (λ ≈ 1.0 W/(m•K)), a massive thermal bridge is formed at the footing.
This means:

- Increased heat loss and through this increased heating costs
- Reduction of the room-side surface temperature
- Danger of occurrence of condensation and mould formation

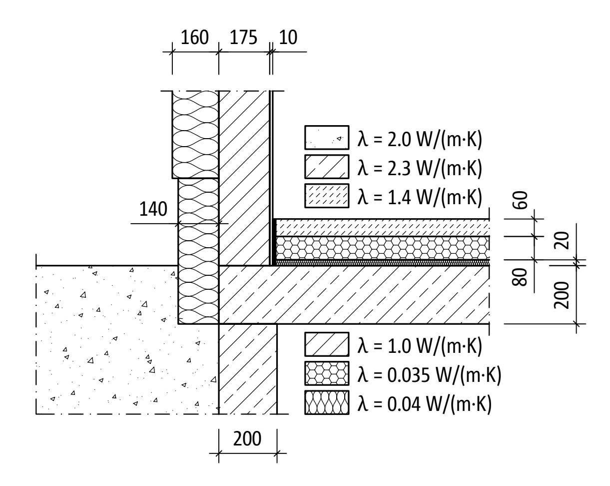


Fig. 50: Structural layout with uninsulated footing

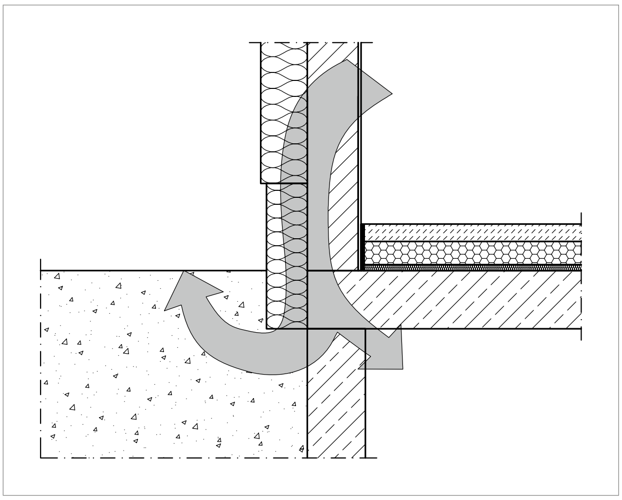
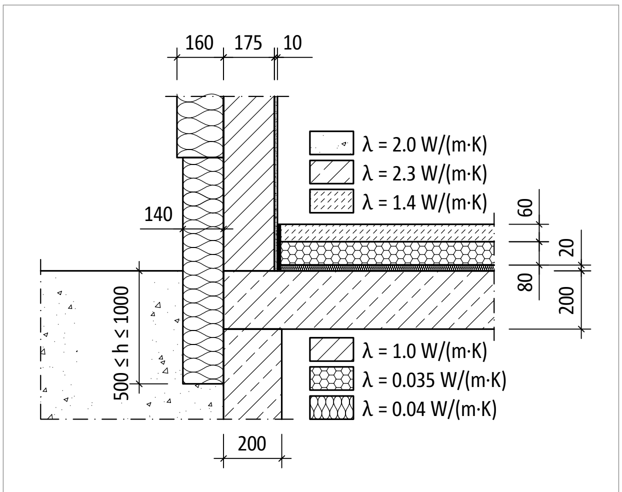


Fig. 51: Structural layout with uninsulated footing

Load-bearing insulation measures

For the reduction of the thermal bridge at the footing, the external wall insulation, in the form of a perimeter insulation, is frequently continued into the ground (see following diagram). In addition to the considerable costs of this measure, the insulation effect that can be achieved with it is also unsatisfactory. In particular, from a depth h of approx. 0.5 m, no increase of the insulation effect through further pulling down of the perimeter insulation is longer detectable.



Overall, through this structural measure – independent of the depth – the thermal insulation effect can be improved only by approx. 50%.

Building physics

Thermal comparison | Schöck Sconnex® type M product characteristic values

Insulation using Schöck Sconnex® type M

The load-bearing Schöck Sconnex® type M thermal insulating element closes the gap in the thermal insulation between the external wall insulation and the insulation above the basement floor. Through this, there results a continuous, very efficient thermal insulation.

This means:

- Minimized heat loss and through this savings in heating costs
- Increasing the surface temperature inside the room considerably above the critical mould temperature
- No danger of mould formation and condensation
- Healthy indoor climate

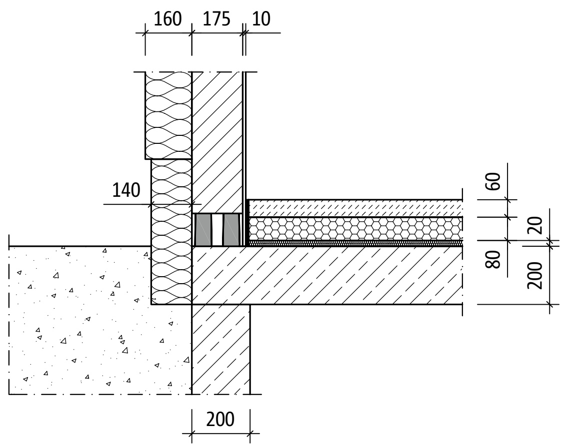


Fig. 52: Efficient thermal insulation using Schöck Sconnex® type M

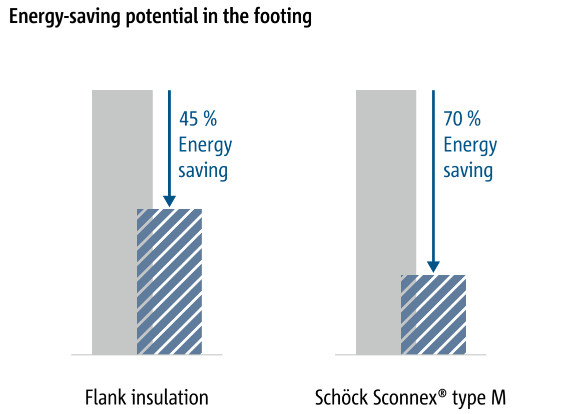


Fig. 53: Energy saving potential of possible insulation measures in comparison with uninsulated footing

In comparison to the theoretically ideally insulated footing it is clear that the Schöck Sconnex® type M displays the best thermal insulation effect of the alternatives shown here. Through a constructive insulation measure only less than half of the ideally insulated footing can be obtained, whereas the employment of Schöck Sconnex® type M a 70% insulation effect is achieved.

Moreover, Schöck Sconnex® type M, through the water repellent properties of its materials, in the construction phase takes only a negligible amount of water. Through this the high thermal insulation effect exists from the outset.

Schöck Sconnex® type M product characteristic values

Schöck Sconnex® type M	N1	N2
B [mm]	λ_{eq}	λ_{eq}
115	0.182	0.248
150		
175		
200		
240		

- λ_{eq} Equivalent thermal conductivity in W/(m·K)

This value can be used to determine in suitable software the insulation resistance (ψ-value) for a construction.

Building physics

Verification procedure thermal insulation | Sound insulation

Detailed thermal bridge verification

The detailed thermal bridge verification is carried out as presented on page 30 .
As a result the Schöck Sconnex® type M can be modified simply as in the following diagram and the λ_{eq} values from page 42 can be applied.

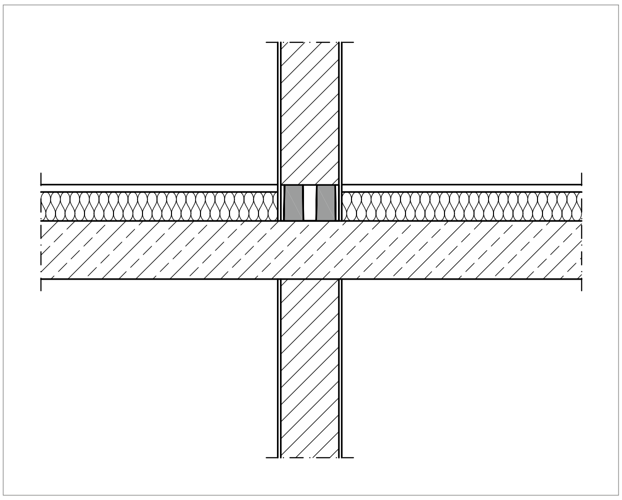


Fig. 54: Representation of a sectional drawing with detailed Schöck Sconnex® model

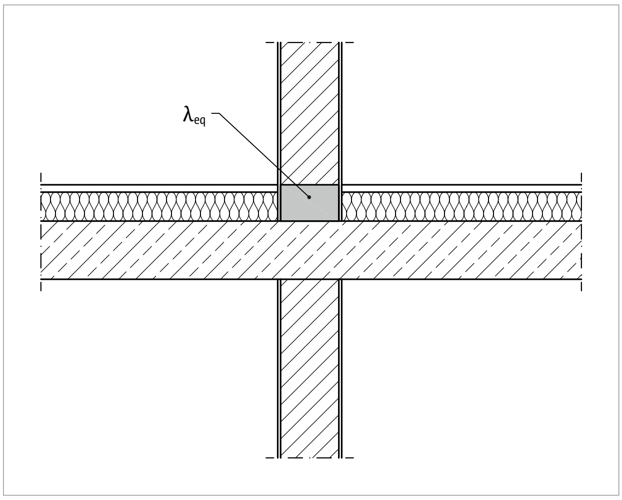


Fig. 55: Representation of a sectional drawing with simplified substitute insulating element

Sound insulation

According to the result of the sonic measurements in the test rig, the airborne sound insulation behaviour of a wall with integrated Schöck Sconnex® type M is not impaired (see Test Report No.: L 97.94 – P 18 and Supplement P 225/02 dated 29/07/2002, ITA (Engineering Society for technical acoustics), Wiesbaden).

With this it is to be noted that, for example, due to the complete (a least on one side) rendering of the wall, no “airborne sound bridges” occur through leakages in the wall (e.g. leaking junctions).

Reinforced concrete – reinforced concrete

Construction materials

Schöck Sconnex® type W material

Approval	Approval OIB BTZ-0002
Reinforcing steel	B550B according to BS EN 10080, BS EN 1992-1-1 and NA
Concrete pressure bearing	Microfibre reinforced high performance concrete (UHPC); prismatic beam crushing strength ≥ 175 N/mm²; class A1 as per BS EN 13501-1; the pressure bearing is regulated in the Approval BTZ-0002 of the OIB
Insulating material	Neopor® polystyrene hard foam and a registered brand of the BASF volumetric weight = 70 g/l, building material classification B1 (low flammability)

Schöck Sconnex® type P material

Approval	Approval Z-15.7-351
Stainless steel	Part C and T; B500 NR or stainless steel (S460, S690) with corrosion resistant class III as per BS EN 1993-1-4, Class A1 as per BS EN 13501-1
Bending segment	Part T; stainless round steel with corrosion resistant class III as per BS EN 1993-1-4, Class A1 as per BS EN 13501-1
Lightweight concrete	Part C; high performance lightweight concrete, Class A1 as per BS EN 13501-1
Combar®	Part C; in accordance with the general building supervisory approval Z-1.6-238
Grouting concrete	PAGEL® grouting V1/50 in accordance with DAfStb (German Committee for reinforced concrete) Directive “Production and use of cement-bonded poured concrete and grouting mortar”

Connecting structural elements

Reinforcing steel	B500A or B500B as per DIN 488-1, and/or BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA
Concrete	Standard concrete a per DIN 1045-2 and/or. BS EN 206-1 with a dry density of 2000 kg/m³ to 2600 kg/m³ (lightweight concrete is not permitted) **Indicative minimum strength class of the external structural elements:** At least C25/30 and depending on the environmental classification as per BS-EN 1992-1-1/NA, table NA.E.1 **Indicative concrete strength class of the internal structural elements:** At least C20/25 and depending on the environmental classification as per BS-EN 1992-1-1/NA, table NA.E.1 Type W: C25/30 or C30/37 Type P: C25/30 to C50/60

Construction materials

Information on the bending of reinforcing steel
With the production of the Schöck Sconnex® type W in the factory, through monitoring it is ensured that the conditions of the standard with regard to bending of reinforcing steels are complied with.

Attention: If original Schöck Sconnex® reinforcing steels are bent or bent and bent back on-site, the observation and the monitoring of the respective conditions lie outside the influence of Schöck Bauteile GmbH. Therefore, in such cases, the warranty is invalidated.

Schöck Sconnex® type W

Schöck Sconnex® type W
Load-bearing thermal insulation element for reinforced concrete walls. The element transfers, depending on load-bearing level, compressive and shear forces in the longitudinal and transverse directions of the wall.

Element arrangement – with linear loading

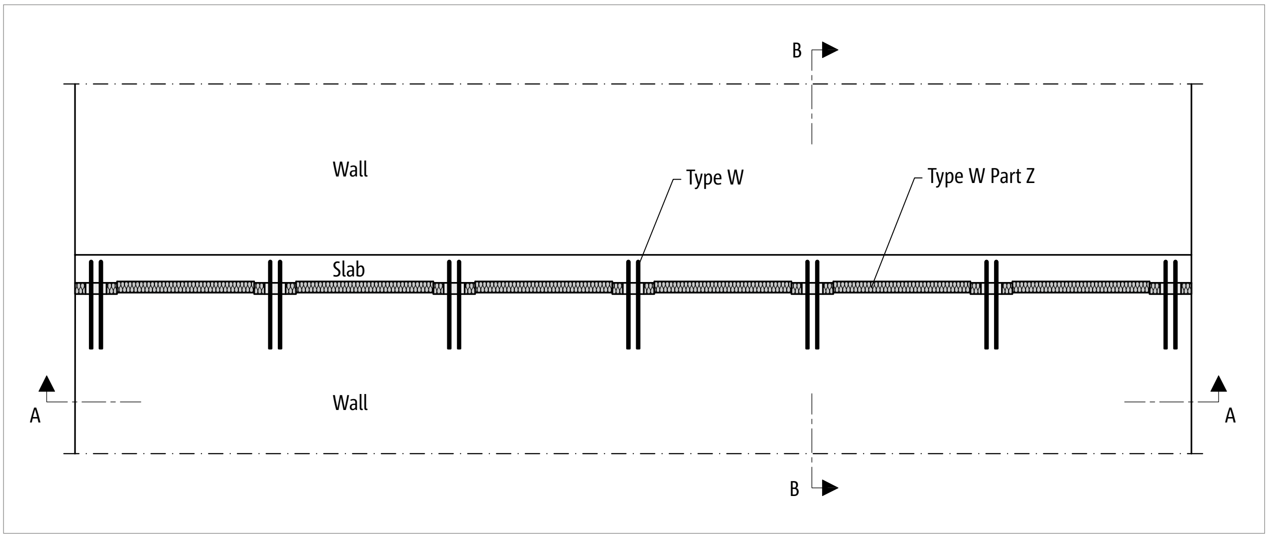


Fig. 56: Schöck Sconnex® type W: Connection between wall and slab above – installation at the top of the wall

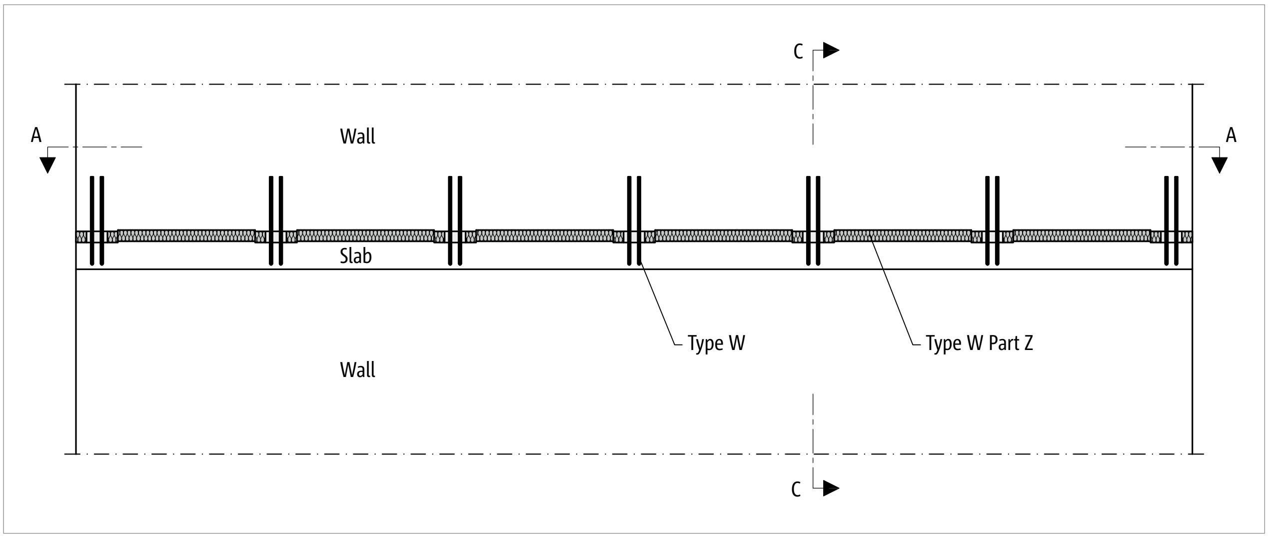


Fig. 57: Schöck Sconnex® type W: Connection between floor and rising wall – installation at the foot of the wall

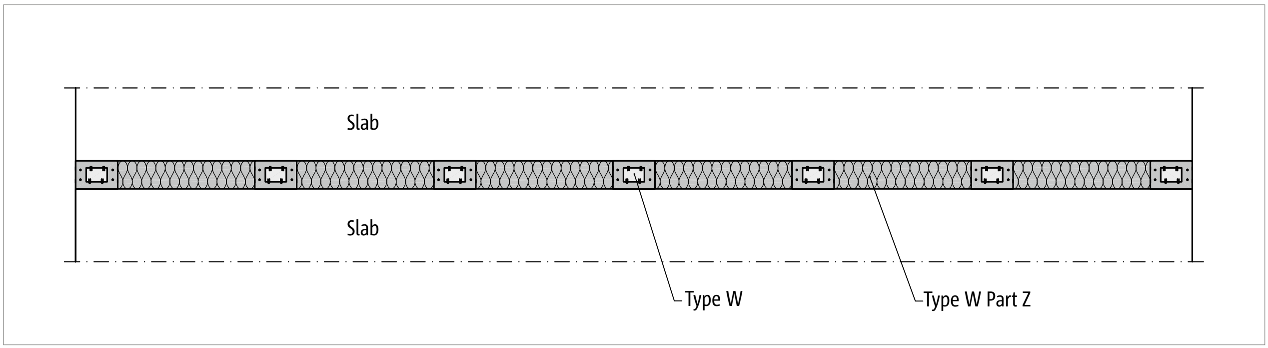


Fig. 58: Schöck Sconnex® type W: Section A-A

Installation cross sections

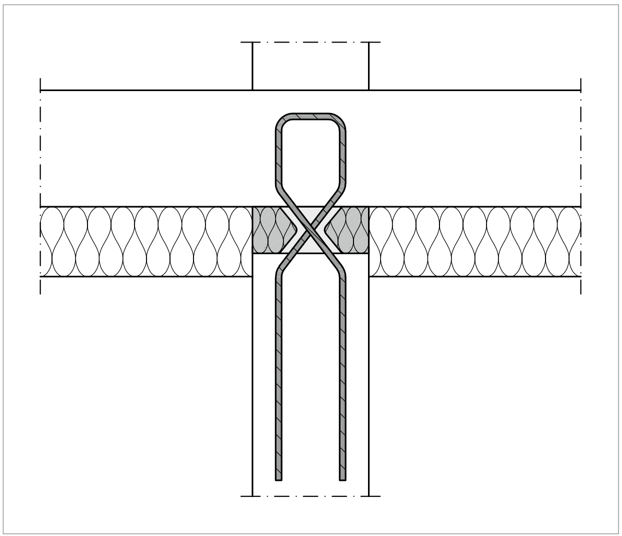


Fig. 59: Schöck Sconnex® type W-N-VH: Section B-B, internal wall; below-slab insulation

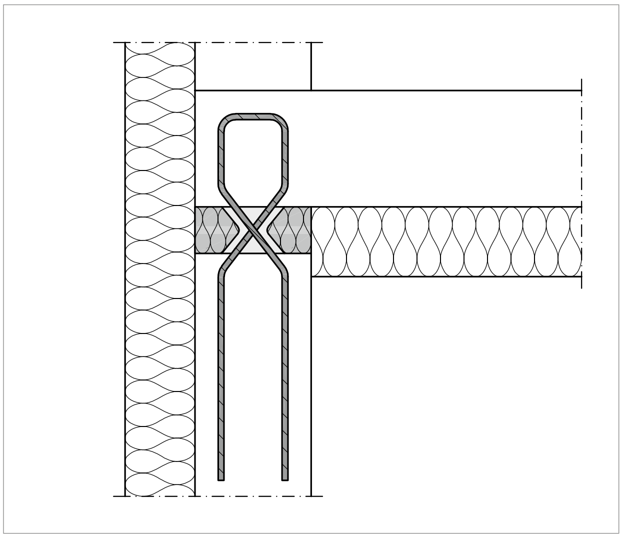


Fig. 60: Schöck Sconnex® type W-N-VH: External wall; below-slab insulation corresponding to Section B-B

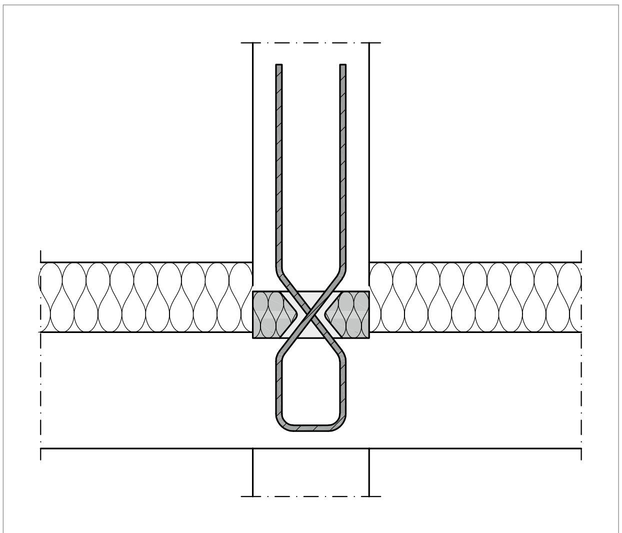


Fig. 61: Schöck Sconnex® type W-N-VH: Section C-C, internal wall; above-slab insulation

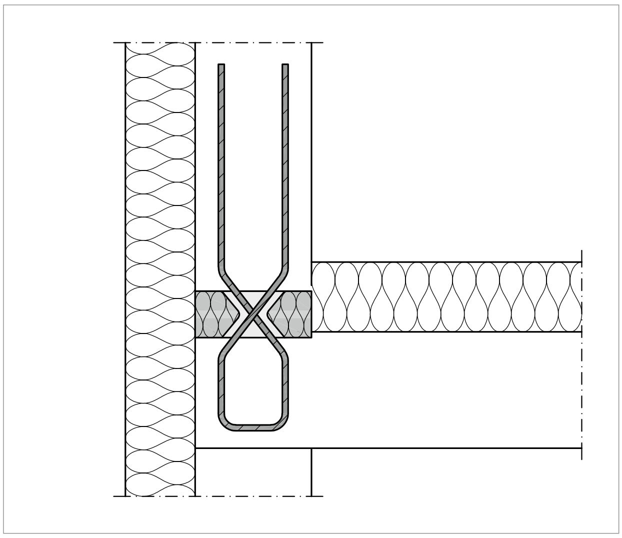


Fig. 62: Schöck Sconnex® type W-N-VH: External wall; above-slab insulation corresponding to Section C-C

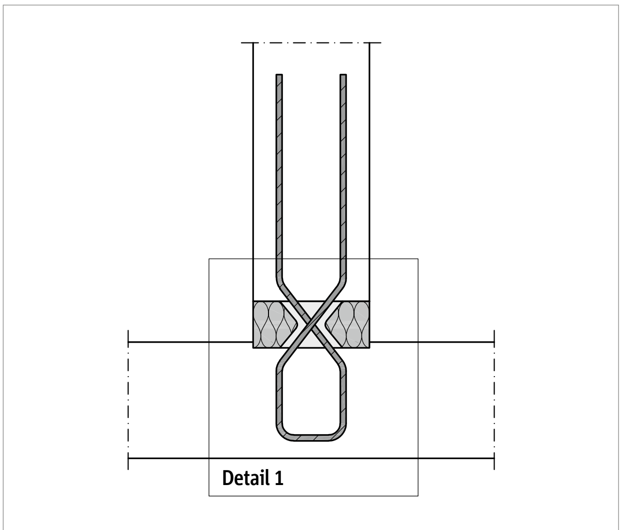


Fig. 63: Schöck Sconnex® type W: Tight fit between the upper edge of the floor and the lower edge of the pressure bearing is ensured

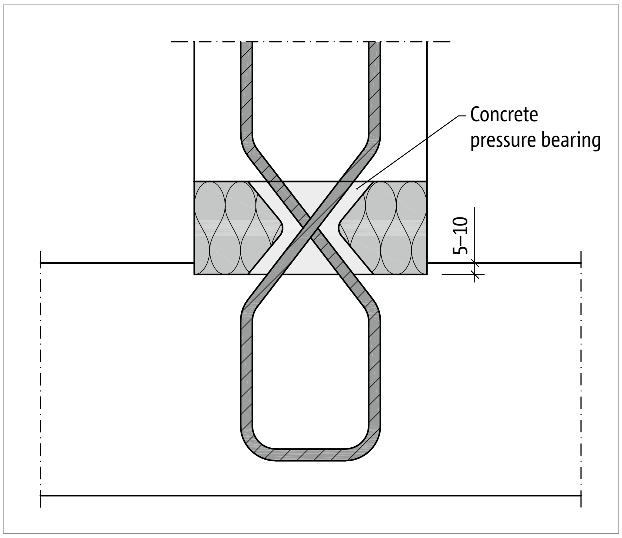


Fig. 64: Schöck Sconnex® type W: Tight fit through 5-10 mm deep counter-sinking of the insulating element in the floor

Element arrangement – for special applications

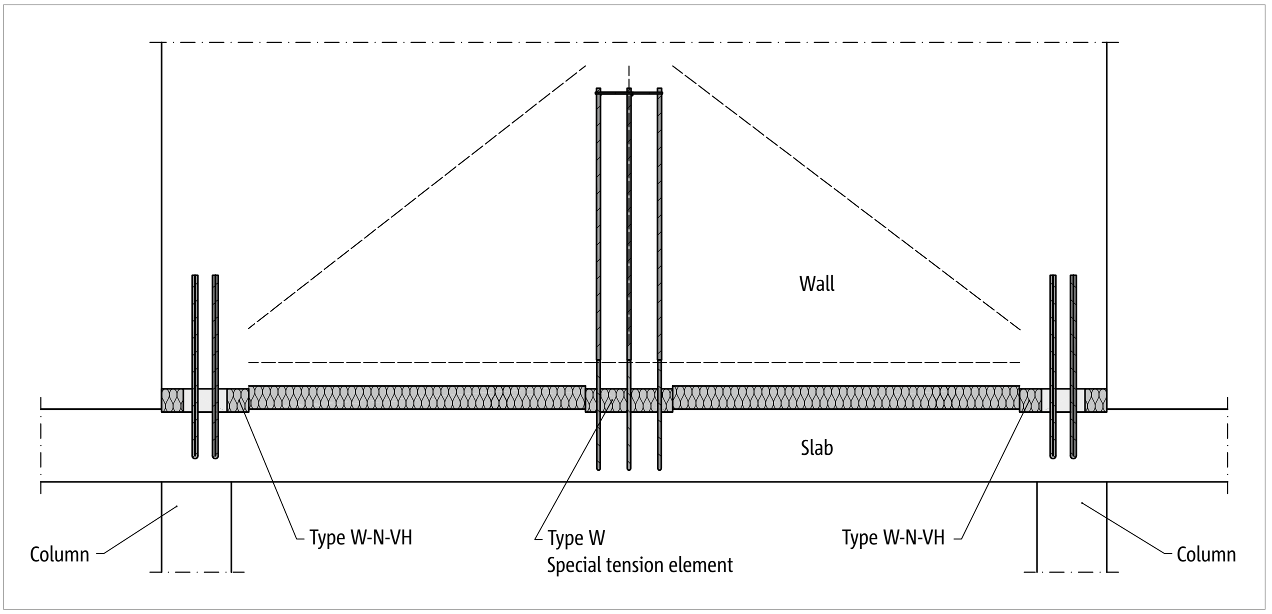


Fig. 65: Schöck Sconnex® type W: Combined product variants for the connection of a wall type beam with ceiling suspension

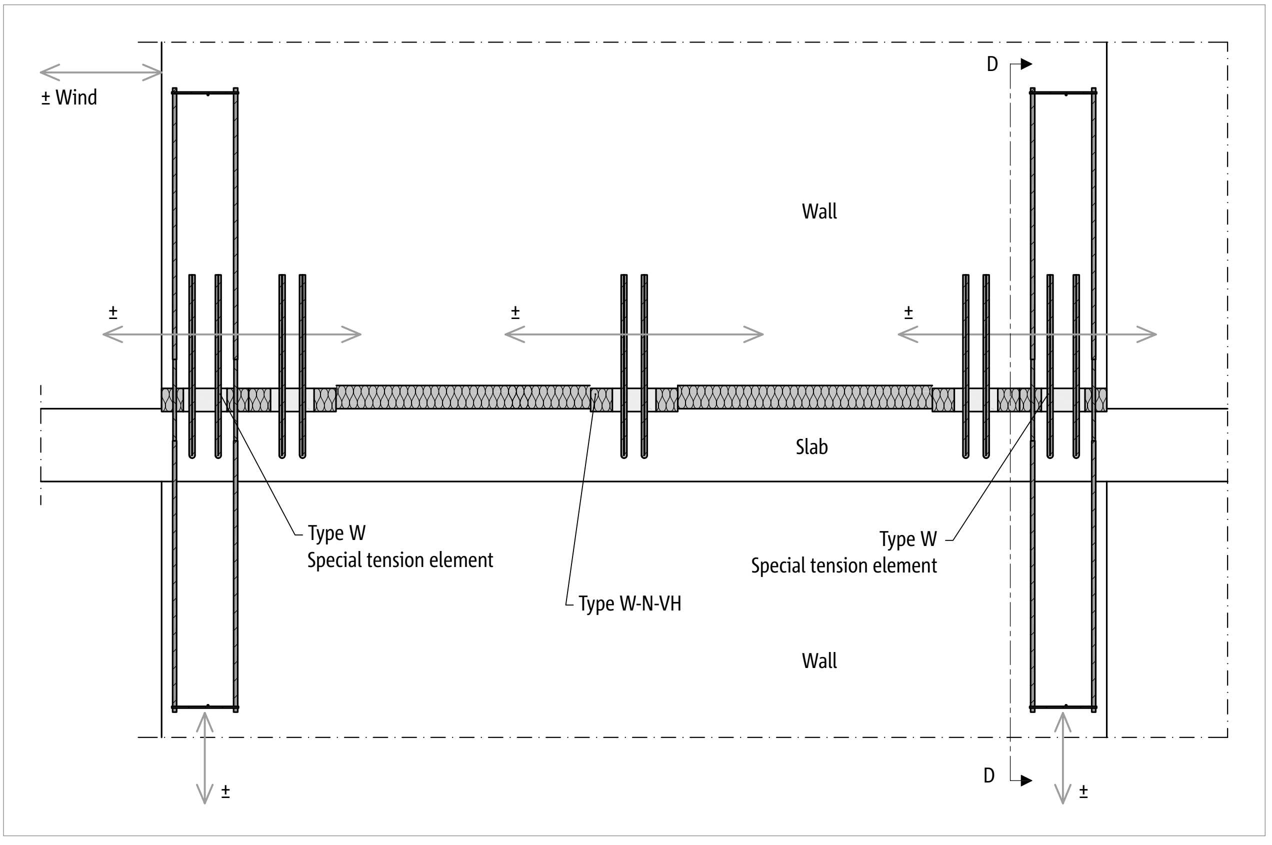


Fig. 66: Schöck Sconnex® type W: Combined product variants for the connection of a horizontal, loaded, stabilized wall

Element arrangement – for special applications

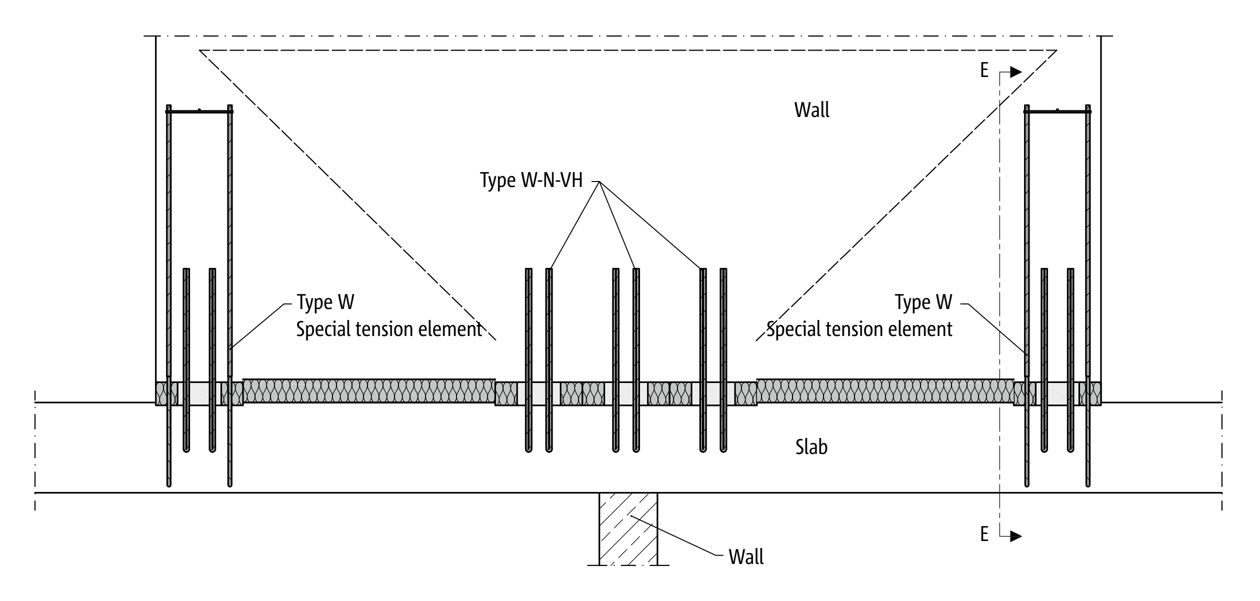


Fig. 67: Schöck Sconnex® type W: Combined product variants in the application case of intersecting walls

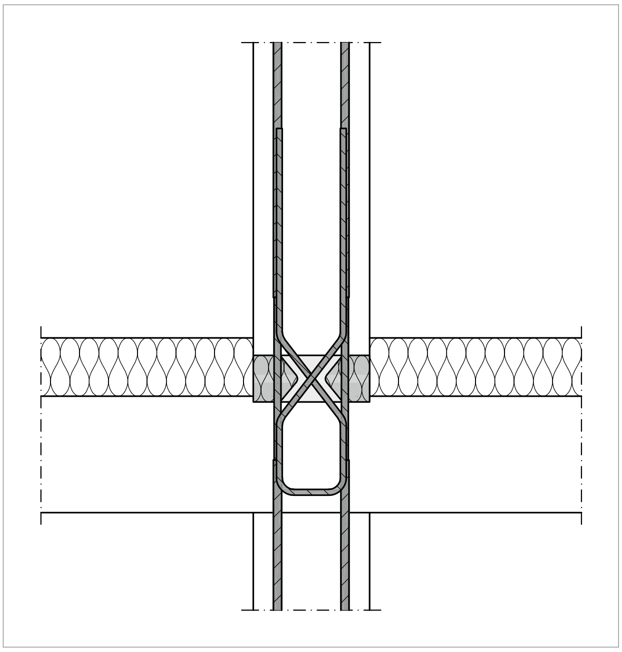


Fig. 68: Schöck Sconnex® type W special tension element: Section D-D; Tensile force connection of the walls straight through the floor

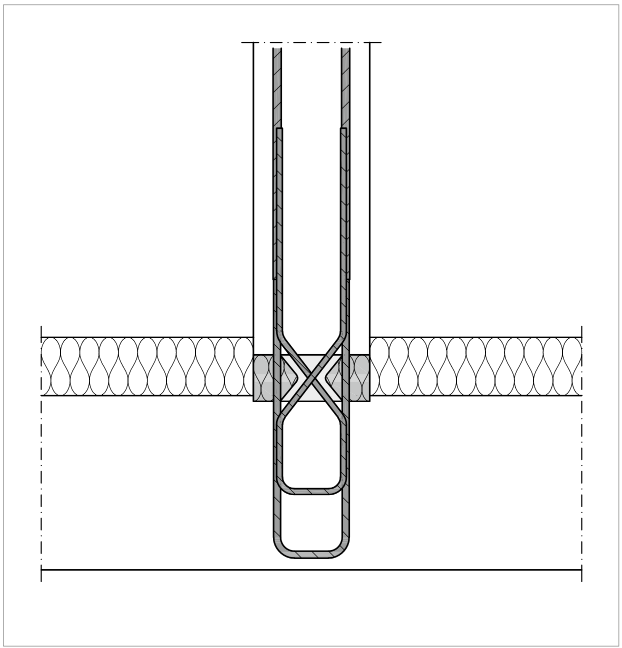


Fig. 69: Schöck Sconnex® type W special tension element: Section E-E; suspension of a floor on a wall

Type W

Reinforced concrete – reinforced concrete

Product selection | Type designations

Fig. 70: Schöck Sconnex® type W

Schöck Sconnex® type W variants

The configuration of the Schöck Sconnex® type W can be varied as follows:

- Main bearing level with the N:
  N1 feature: Compressive force bearing capacity
- Secondary load level with the V and H:
  V1H1 features: Shear force bearing capacity in x- and y-directions
- Schöck Sconnex® width:
  B = 150, 180, 200, 250, 300 mm = wall thickness
  (other widths on request from the application engineering department; contact see page 3)
- Generation:
  1.0
- Fire resistance class:
  R 30 to REI 120
  Achievement of the various fire resistance classes is ensured through the appropriate formation of the adjoining construction (e.g. incombustible screed, mineral wool etc.) (see page 69).

Type designation in planning documents

Schöck Sconnex®
Type
Main load-bearing level
Secondary load-bearing level
Sconnex® width
Generation

Sconnex® Type W-N1-V1H1-B200-1.0

Product selection | Type designations

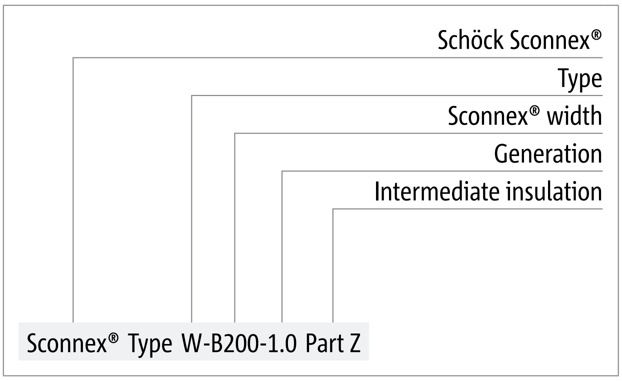
Fig. 71: Schöck Sconnex® type W Part Z

Schöck Sconnex® type W Part Z variants

Schöck Sconnex® type W Part Z is a non-load-bearing insulating element for arrangement between Schöck Sconnex® type W. Part Z has the insulation thickness X = 80 mm and the element length L = 1000 mm.
The configuration of the Schöck Sconnex® type W Part Z can vary as follows:

- Part Z: Non-load-bearing intermediate insulation made of Neopor® for wall connection
- Schöck Sconnex® width:
  B = 150, 180, 200, 250, 300 mm = wall thickness
  (other widths on request with the application engineering department; contact see page 3)
- Generation:
  1.0
- Fire resistance class:
  EI 0 to EI 120
  Achievement of the various fire resistance classes is ensured through the corresponding formation of the adjoining construction (e.g. incombustible screed, mineral wool etc.) (see page 69).

Type designation in planning documents



Product selection | Type designations

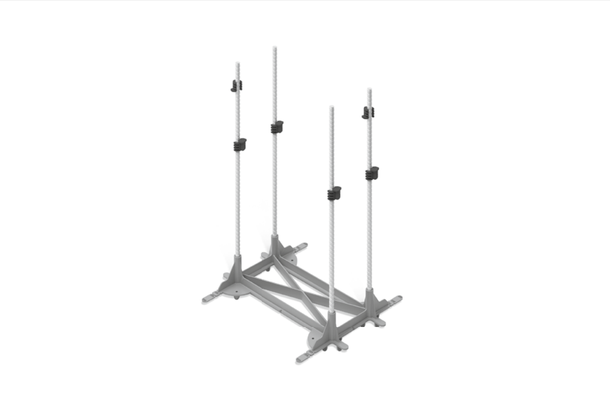


Fig. 72: Schöck Sconnex® type W Part M

Schöck Sconnex® type W Part M variants

With an application of Schöck Sconnex® type W at the foot of the wall the use of an installation aid is recommended (type W Part M, see Installation instruction page 83). With an application at the top of the wall no installation aid (type W Part M) is required (see page 81).

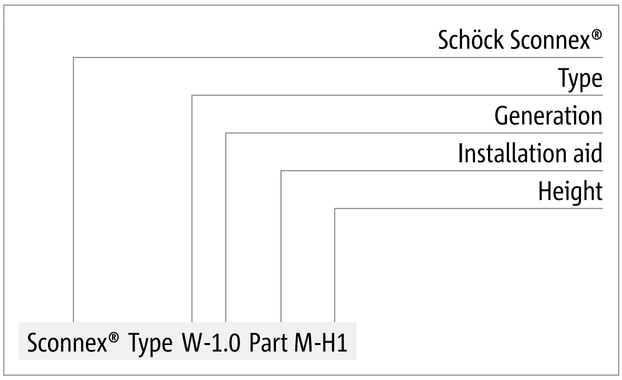
The configuration of the Schöck Sconnex® Part M installation aid can be varied as follows:

- Part M: Installation aid
- Variant:

  H1: for H ≤ 400 mm; Height H see product description page 68

  H2: for 405 mm ≥ H ≤ 900 mm

Type designation in planning documents



Application Schöck Sconnex® type W

High load concentration wall end / building floor with Schöck Sconnex® type W

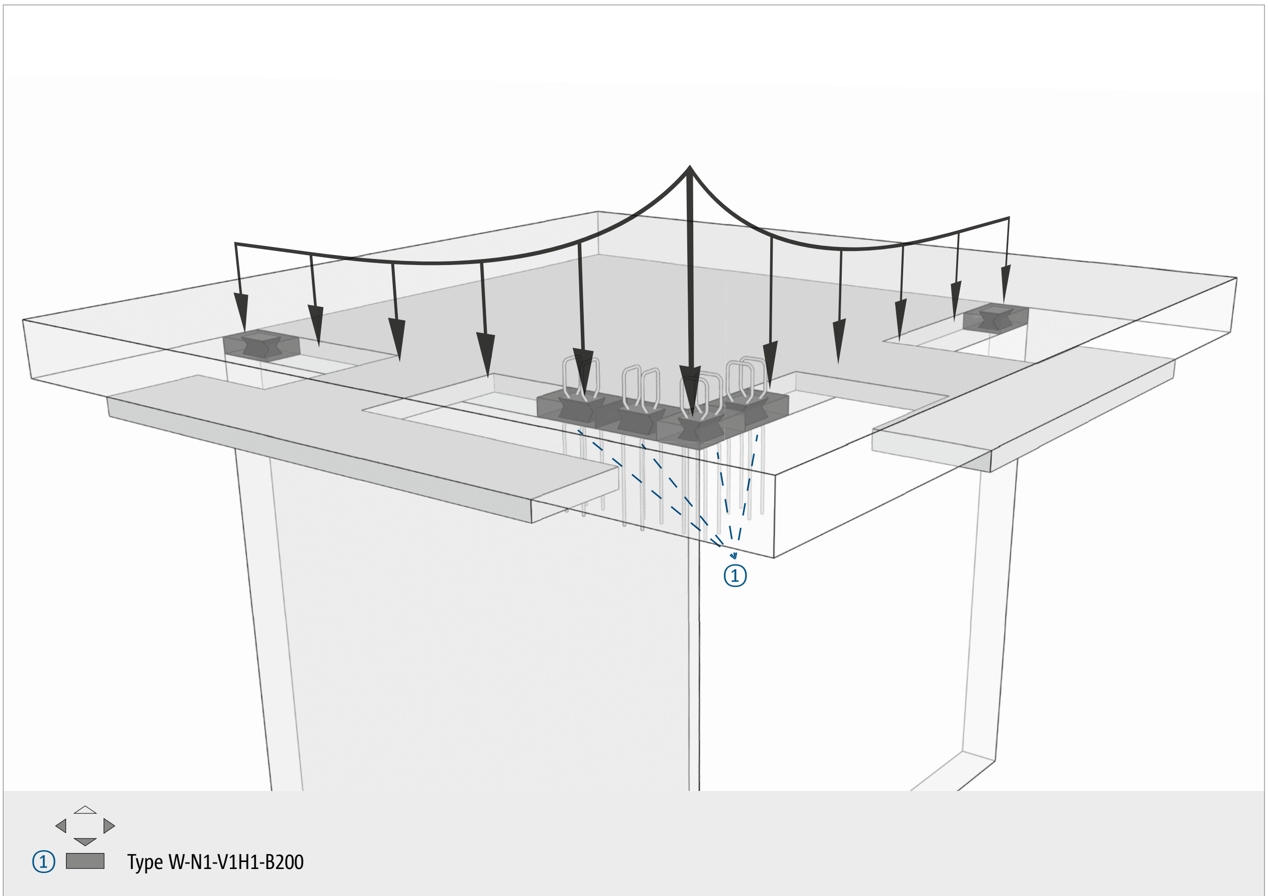


Fig. 73: Wall corner separated under floor

In the example presented a wall corner is separated under the floor. Typically, very high loads concentrate in such construction points (corners attract load). In order to separate such wall corners sensibly the relevant Schöck Sconnex® types are to be laid in a more concentrated manner. In the figure, this takes place through the dense arrangement of shear force transmitting Schöck Sconnex® type W-N-VH.
Along with this area with high load concentration, there is typically an area with reduced loading to be found. Here the element spacings of the required Schöck Sconnex® types can be planned larger.
Due to the changed pressure area of the Schöck Sconnex® type W, the punching through of the floor with the pressure area of the Schöck Sconnex® of 150 × 100 mm must be verified.

Application Schöck Sconnex® type W

Earth pressure loaded wall with Schöck Sconnex® type W

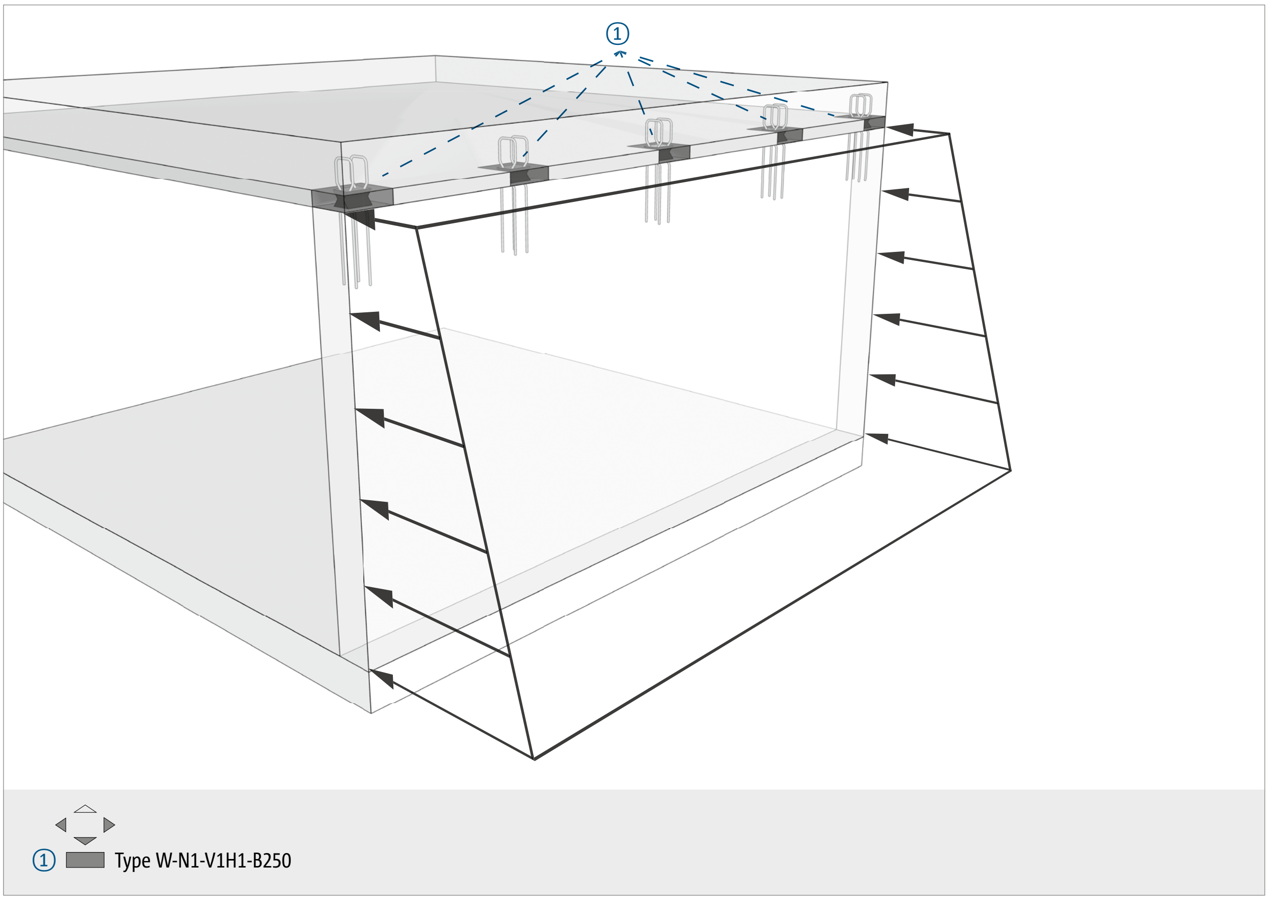


Fig. 74: Earth pressure loaded wall separated below floor

If Schöck Sconnex® type W is used on an exterior wall standing in the ground, the shear from earth pressure must be taken into account in addition to the normal force. This loading can often be relevant. Schöck Sconnex® type W-N-VH is suitable for this application. For the floor it should be noted that the support changes from a linear support to a point support. The design of the slab must be analogous to a column-supported system with a load application area of 150 × 100 mm.

Application Schöck Sconnex® type W

Wind loaded facade wall with Schöck Sconnex® type W

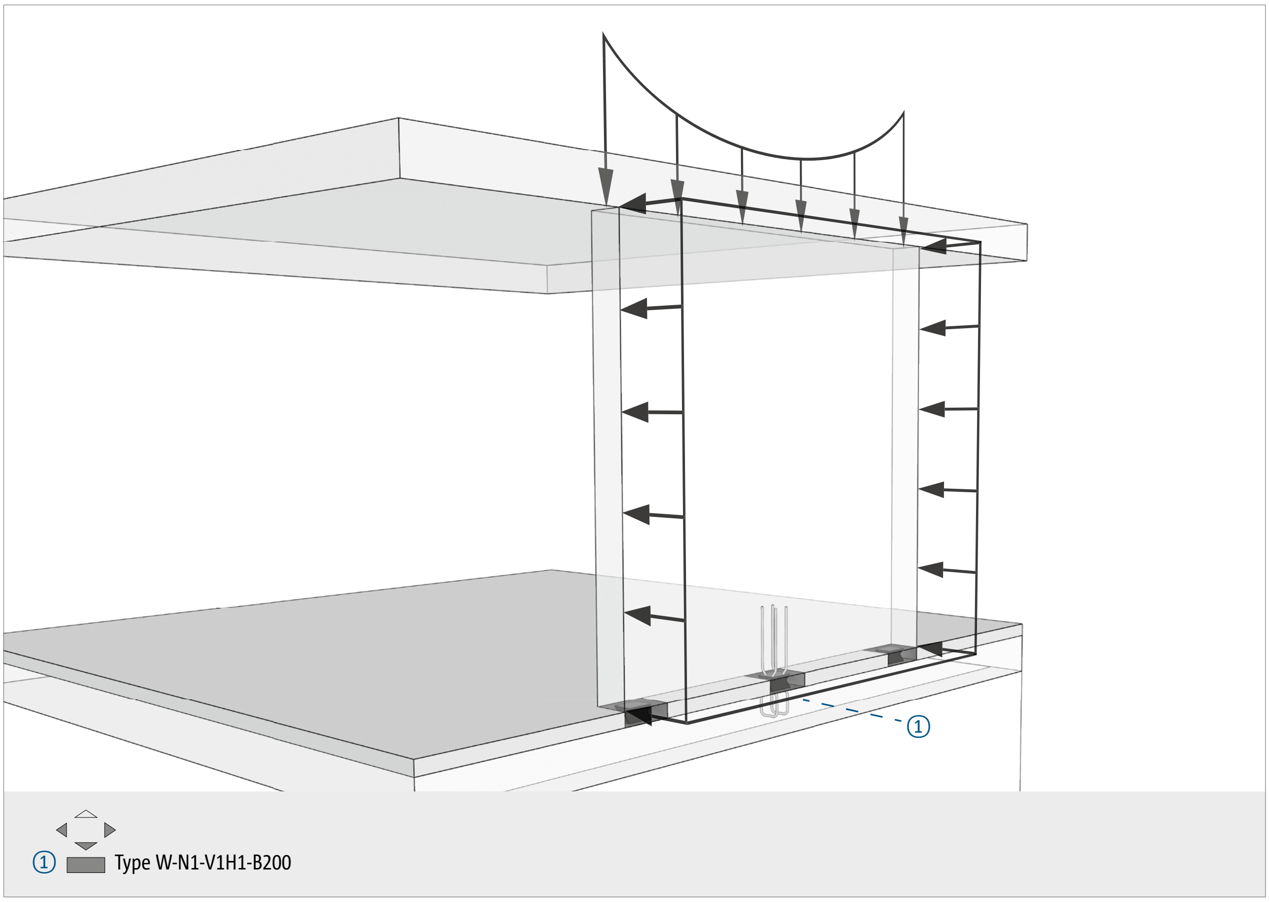


Fig. 75: Wind loaded facade wall separated on the floor

Wind-loaded facade walls are essentially loaded by compressive and horizontal forces. Typically, the wind forces on the facade are small. The separation of the joint can thus take place optimally using Schöck Sconnex® type W-N-VH.

Application Schöck Sconnex® type W

Cross wall, mounted one-sided, with Schöck Sconnex® type W

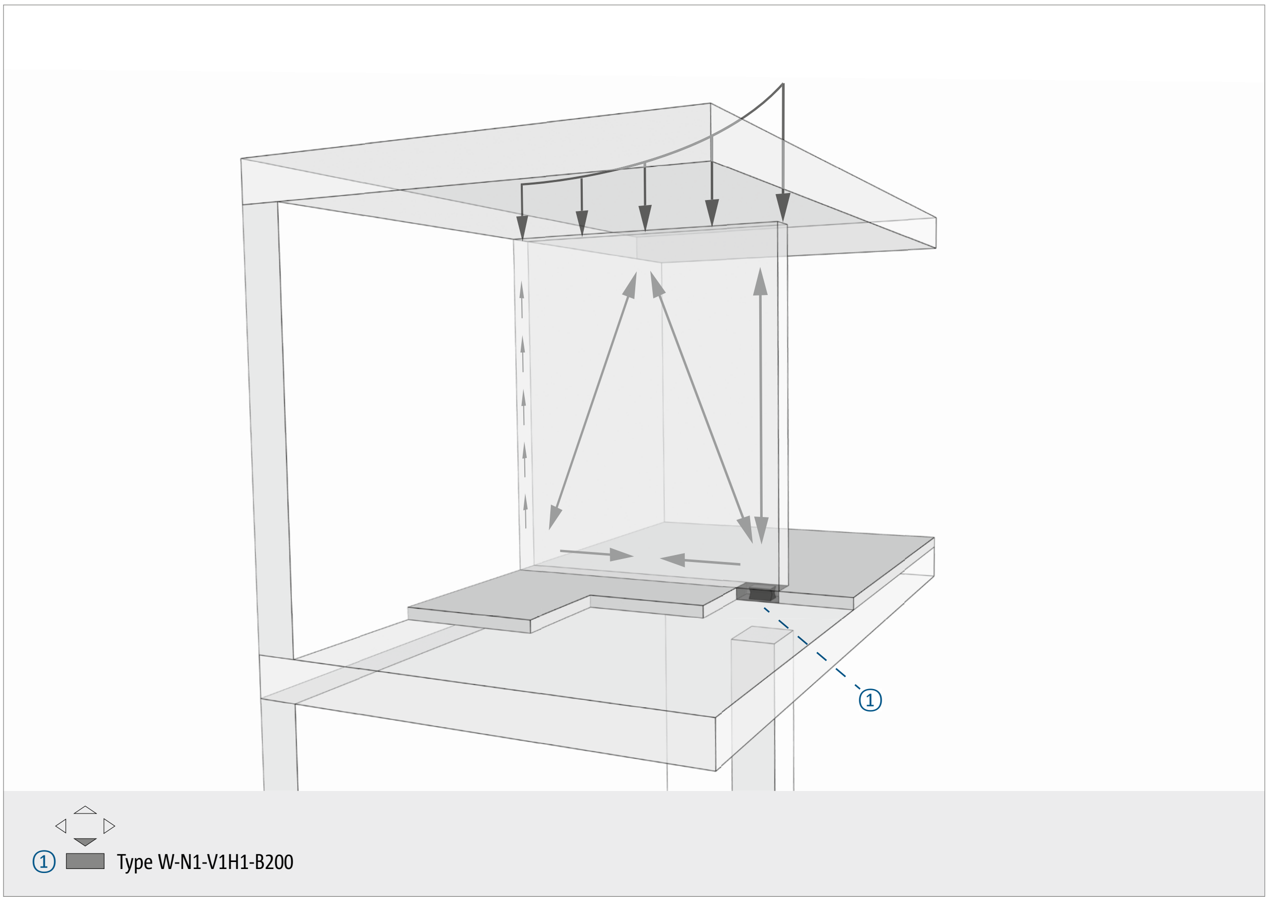


Fig. 76: Wall at stairwell, separated at the floor, point support

In contrast to the projecting shear wall, this shear wall is mounted directly on the underlying column and indirectly to the connected rear wall. With this, at the wall end over the column, an input compressive force arises, which is transmitted by a Schöck Sconnex® type W-N-VH. With very high loads several Schöck Sconnex® type W-N-VH can be laid directly on each other in order to guarantee a sufficient transfer.

Application Schöck Sconnex® type W

Floor suspension via wall-type support with Schöck Sconnex® type W

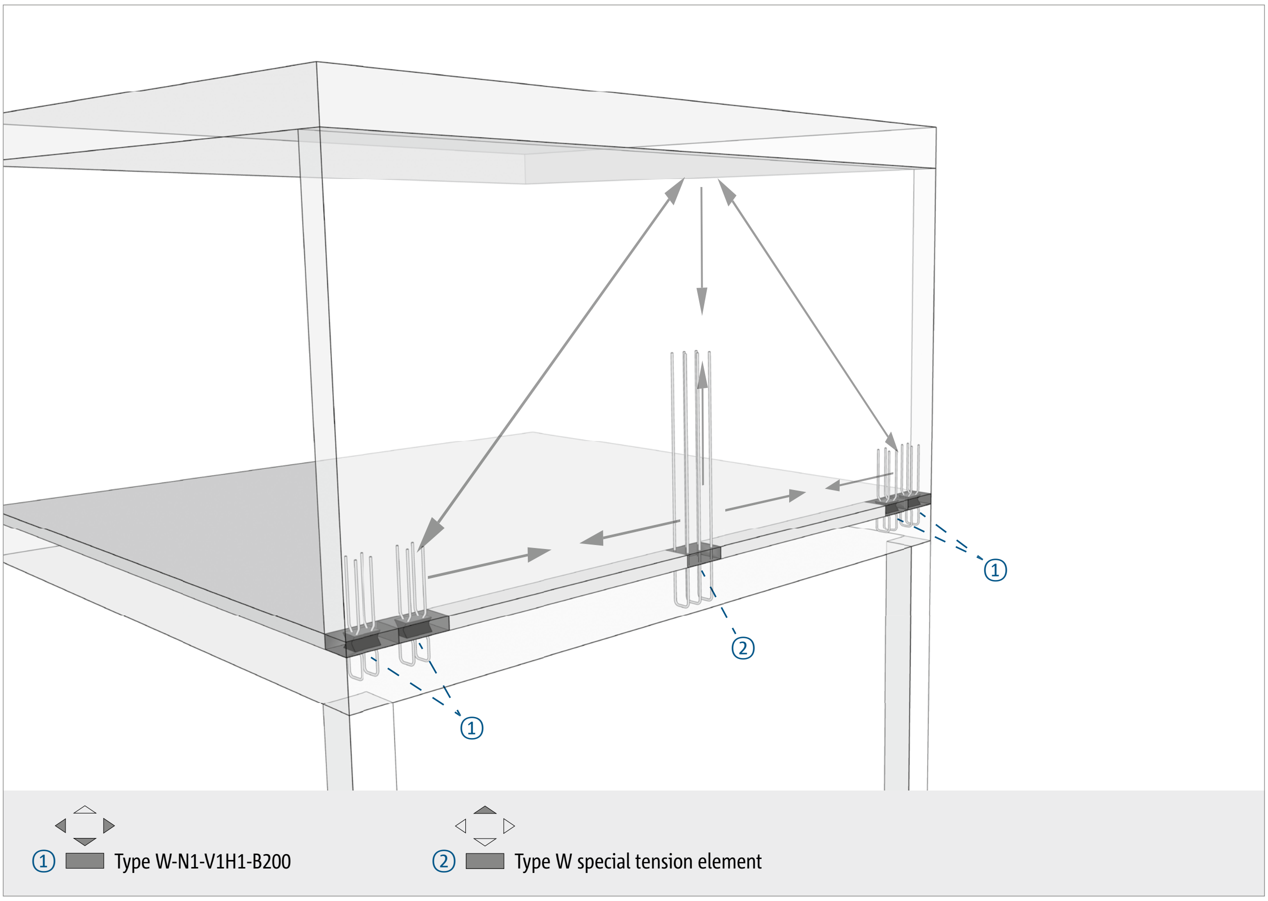


Fig. 77: Wall-type beam separated at the floor

The example presented involves a wall-like beam. The support of the beam element takes place on the columns in the basement. The Schöck Sconnex® types W-N-VH are suitable for the removal of the high support forces. An increased punching shear load only occurs if the required Schöck Sconnex® type W is not located in the punching cone of the support below. In the room, typically the lower floor must be hung on the shear wall. With the verification of the shear wall, attention is to be paid that the tie member lies against the concreted solution in the wall.

Design normal force

Feature of performance N – acceptable normal force $N_{Rd,z}$ (compression)

Schöck Sconnex® type W		N1	
Design values with		Concrete strength class ≥ C25/30	Concrete strength class ≥ C30/37
		Floor thickness ≥ 200 mm	
		$N_{Rd,z,wall}$ [kN/element]	
Wall thickness [mm]	150	250.0	300.0
	180	450.0	540.0
	≥ 200	500.0	600.0

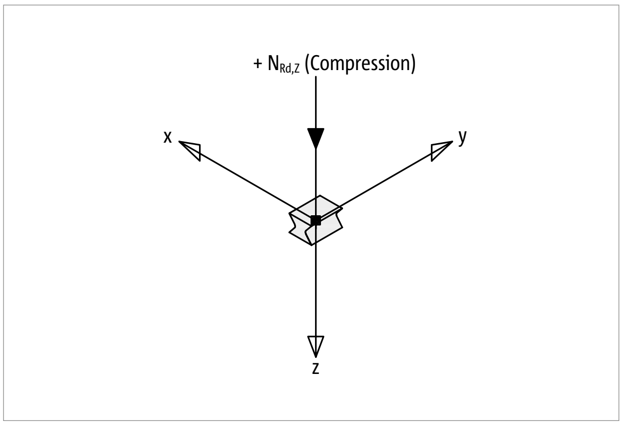


Fig. 78: Schöck Sconnex® type W-N: The design force +$N_{Rd,z}$ (compression) in the coordinate system

Notes on design

- The design values have been determined according to BS EN 1992-1-1, Section 6.7.
- Wall thickness 150 mm: Reduced table value N_{Rd} due to a design without splitting tension reinforcement (Pos. 3). Part TB with a stirrup width ≥ 130 mm, independent of the concrete cover c_{nom}, in general requires wall thicknesses ≥ 180 mm.
- The lowering depth of the Schöck Sconnex®, with the performance feature N1, in the floor is with 10 mm taken into account with the presented design values $N_{Rd,z}$ (compression). See solid pairing page 51.

Shear force dimensioning

- The shear force resistances of all adjacent structural elements are to be verified as per BS EN 1992-1-1 (EC2) by the structural engineer. Thus, for example, the punching-through of the floor with a bearing surface of the Sconnex® type W of 150 × 100 mm is to taken into account by the structural engineer.

Design shear force

Secondary load-bearing level V1H1 – acceptable shear forces $V_{Rd,x}$ and $V_{Rd,y}$

Schöck Sconnex® type W	Feature N
Design values with	Secondary load-bearing level V1H1
	Concrete strength class ≥ C25/30
Shear force in x-direction	$V_{Rd,x}$ [kN/Element]
Variant A – on-site reinforcement on the outside	±88.0
Variant B – on-sitel reinforcement on the inside	±46.3
Shear force in y-direction	$V_{Rd,y}$ [kN/element]
	±59.0
Interaction	$V_{Ed,y}/V_{Rd,y} + V_{Ed,x}/V_{Rd,x} \leq 1$

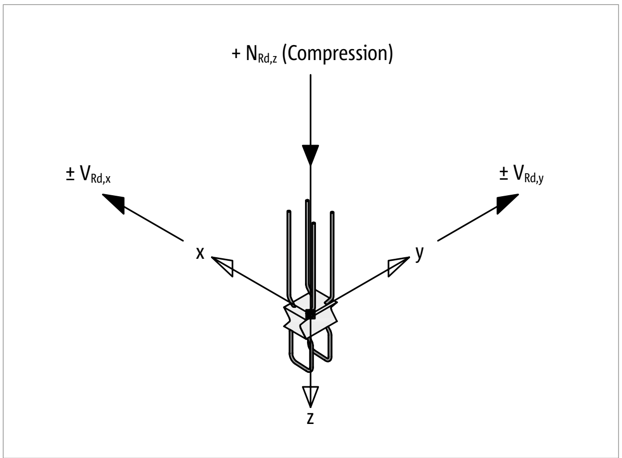


Fig. 79: Schöck Sconnex® type W-N-VH: The design forces +$N_{Rd,z}$ (compression), +$V_{Rd,x}$ and -$V_{Rd,y}$ in the coordinate system

Variants A

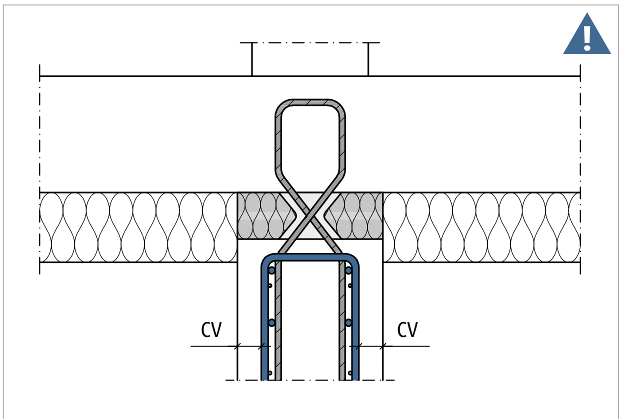


Fig. 80: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement; the outer longitudinal reinforcement supports the shear force bars of the Schöck Sconnex® against the structural element surface

Variants B

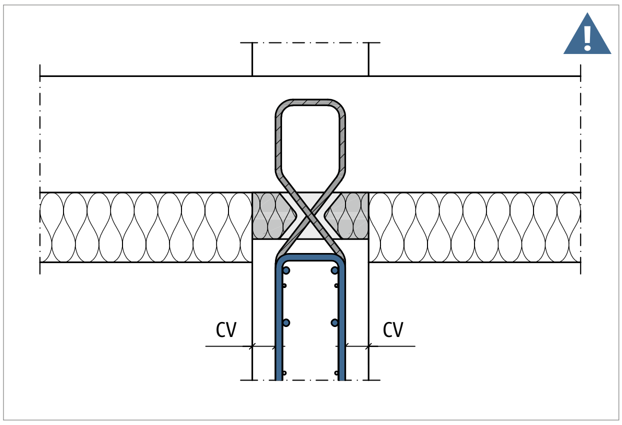


Fig. 81: Schöck Sconnex® type W-N-VH: Variant B (for small wall thicknesses) – on-site reinforcement; the longitudinal reinforcement supports the shear force bars of the Schöck Sconnex® against the inside of the reinforced concrete structural element

Design

Schöck Sconnex® type	W
Placement with	Main load-bearing level
	N1
Pressure bearing	1
Additional placement for	Secondary load-bearing level
	V1H1
Shear force bars	2 × 2 ⌀ 10

Notes on design

- With a connection using Schöck Sconnex® type W a freely rotating bearing (torque hinge) is assumed as static system. The extension spring rigidity in accordance with page 66 is to be noted.
- For a combined loading in the X- and Y- direction a linear interaction must be carried out.
- The design values $V_{Rd,x}$ depend on the support of the shear force bars in the force introduction area. See the differentiation of the on-site variants A and B page 77.
- Information on the centre-to-centre distances e_A are to be noted, see page 65.

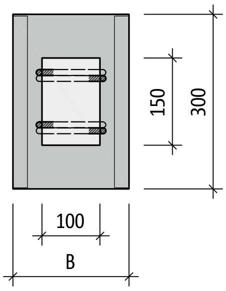


Fig. 82: Schöck Sconnex® type W-N-VH: Product plan view; pressure bearing area 150 mm × 100 mm

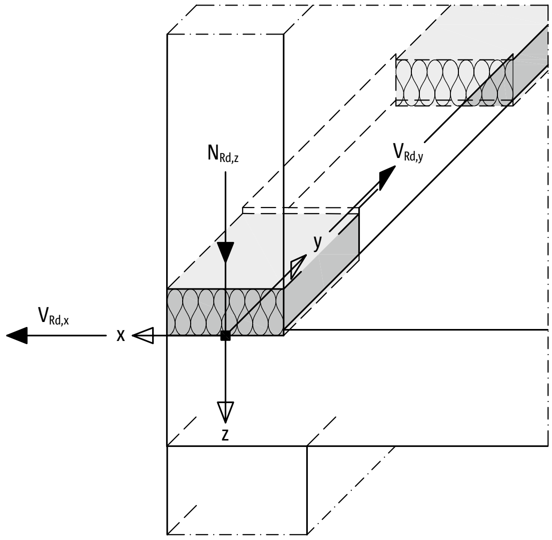


Fig. 83: Schöck Sconnex® type W: Sign convention for the design

Information on earthquakes

- In earthquake zones we recommend ensuring the stiffening of the buildings with walls, which have not been separated using Schöck Sconnex®.

Centre-to-centre distances

Centre-to-centre distances
Schöck Sconnex® type W must be so positioned that minimum and maximum values for the centre-to centre distances are maintained:

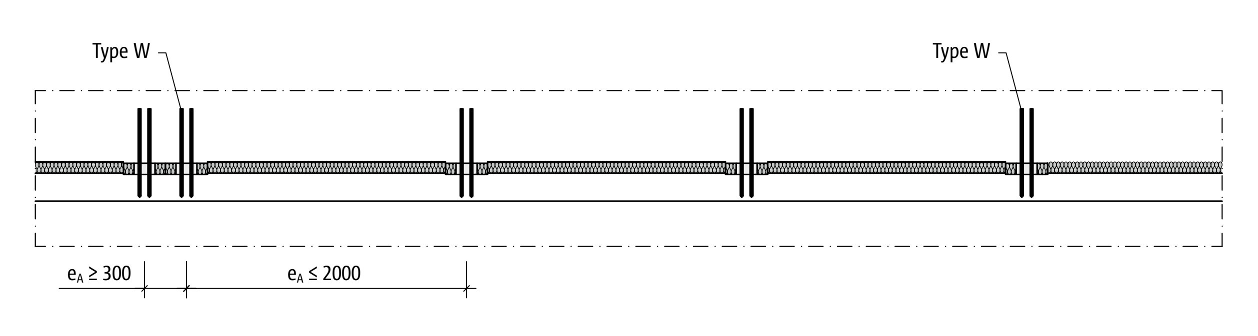


Fig. 84: Schöck Sconnex® type W: Minimum and maximum centre distance e_A

Temperature effect | Fatigue | Extension spring stiffness

Deformation from temperature effect

Temperature differences in buildings are to be taken into account with the design of the structural element according to BS EN 1991-1-5, Section 5. The deformations of the Schöck Sconnex® type W due to the effects of temperature must be limited to +/- 1.0 mm. Accordingly, the limitation applies for horizontal displacements due to the effects of temperature between floor and wall. The reduction of the cross-section areas and wall lengths due to door openings, window openings, balustrades and other recesses/inlays and the crack formation associated with this is to be taken into account with the displacement verification. Should the temperature deformation with long shear walls be problematic, expansion joints or through-concreted fixed points must be arranged. The connection between the floor and wall with Schöck Sconnex® type W is to be made permanently fatigue-proof in compliance with the maximum expansion joint spacings which are to be dimensioned.

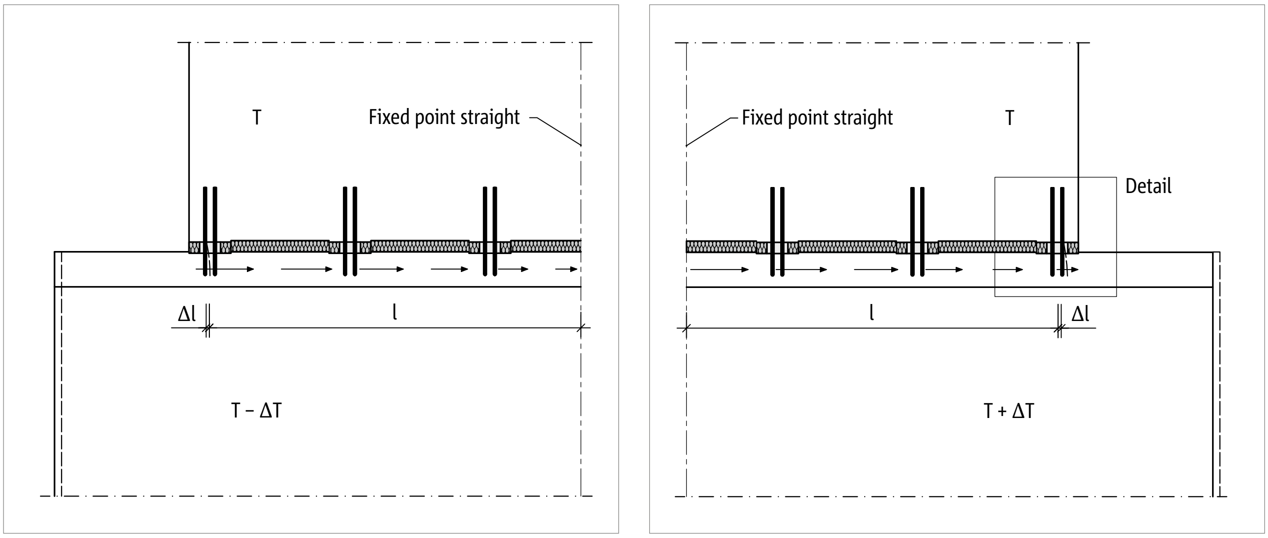


Fig. 85: Schöck Sconnex® type W: Displacement of the outer bars of a wall by Δl as a result of temperature deformation

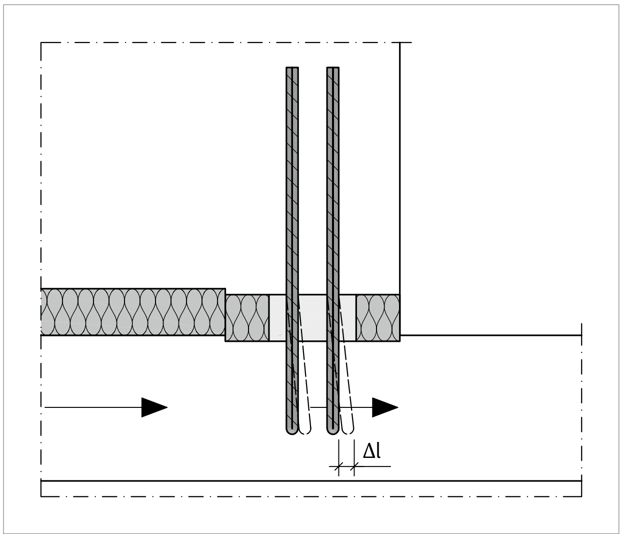


Fig. 86: Schöck Sconnex® type W: Δl as a result of temperature deformation in detail

Schöck Sconnex® type W	Feature N
Extension spring stiffness in	$K_{w,z}$ [kN/m/element]
z-direction	700000

Schöck Sconnex® type W	Secondary load-bearing level V1H1	
Extension spring stiffness in	$K_{w,x}$ [kN/m/element]	$K_{w,y}$ [kN/m/element]
x-, y-direction	87500	125000

Product description

Schöck Sconnex® type W-N-VH

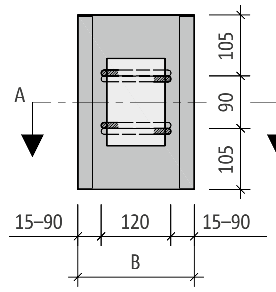


Fig. 87: Schöck Sconnex® type W-N-VH: Product plan view; positioning of shear force bars

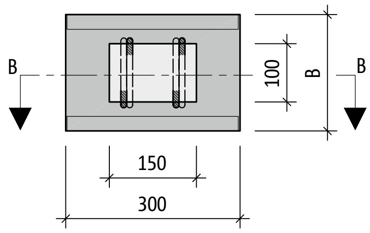


Fig. 88: Schöck Sconnex® type W-N-VH: Product plan view, pressure bearing area 150 × 100 mm

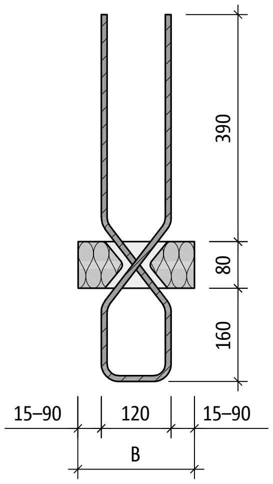


Fig. 89: Schöck Sconnex® type W-N-VH: Product section A-A

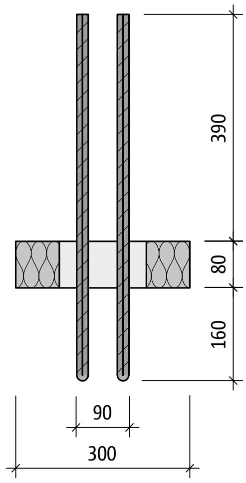


Fig. 90: Schöck Sconnex® type W-N-VH: Product section B-B

Product information

- Download further product plan views and cross-sections at cad.schoeck.co.uk

Type W

Reinforced concrete – reinforced concrete

Product description

Installation aid Part M

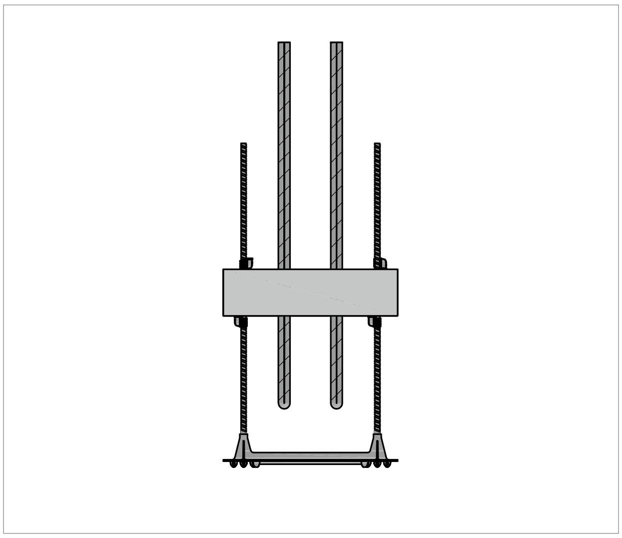


Fig. 91: Schöck Sconnex® type W: Product view with installation aid

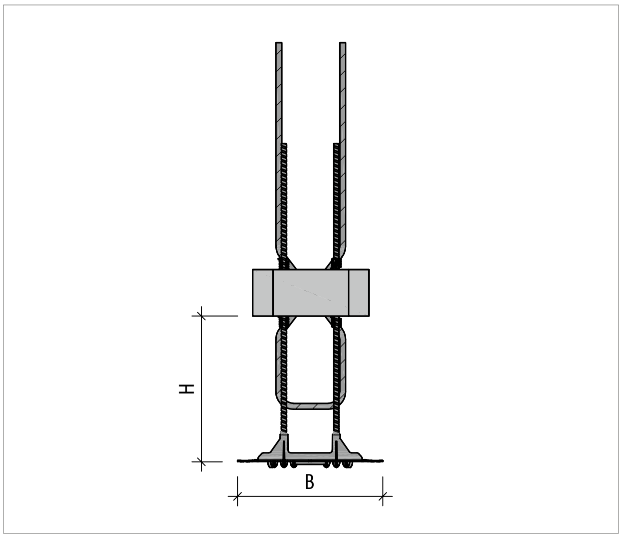


Fig. 92: Schöck Sconnex® type W: Product section with installation aid

Product information

- With the application of Schöck Sconnex® type W at the foot of the wall it is recommended that an installation aid is used (type W Part M, see Installation instructions page 83). With application at the top of the wall no installation aid (type W Part M) is required (see Installation instructions page 81).

Fire protection

As a rule, the fire protection is ensured by the surrounding construction and, if necessary, through the arrangement of mineral wool.
For the exact determination of the fire protection measures, there are expert opinions for the Schöck Sconnex® type W.
The fire protection expert opinions can be found under:
www.schoeck.com/download/uk

Notes

- The details listed are excerpts from the fire protection expert opinions. The complete fire protection reports must be observed with the planning.
- The additional fire protection measures shown in the details must be carried out along the entire length of the wall.
- The mineral wool used must be non-combustible and dimensionally stable up to 1000 °C.
- Edge strips or fire protection strips made of mineral wool must be fixed in a fire-safe manner and in accordance with the manufacturer's specifications.
- The installation of the thermal insulation composite system and, if applicable, the fire bar must be carried out professionally according to the specifications of the usability certificate of the ETICS.

Connection interior wall to floor

R 120 / REI 30

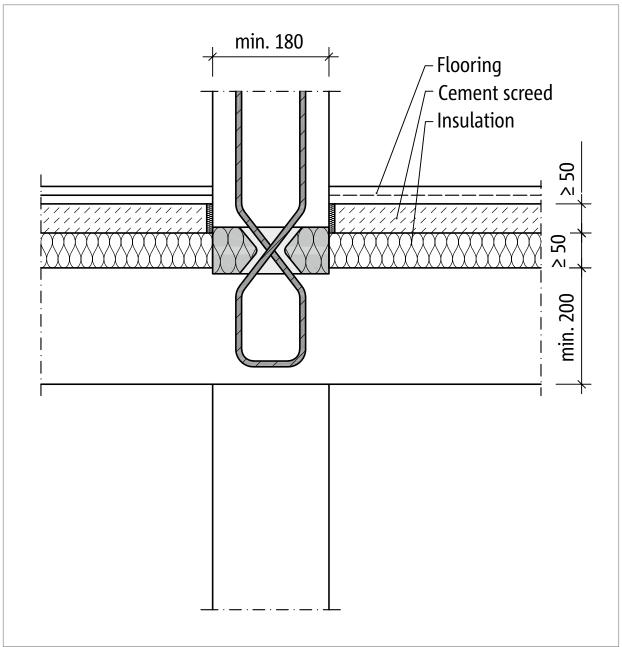


Fig. 93: Schöck Sconnex® type W: With EPS impact sound insulation

R 120 / REI 120

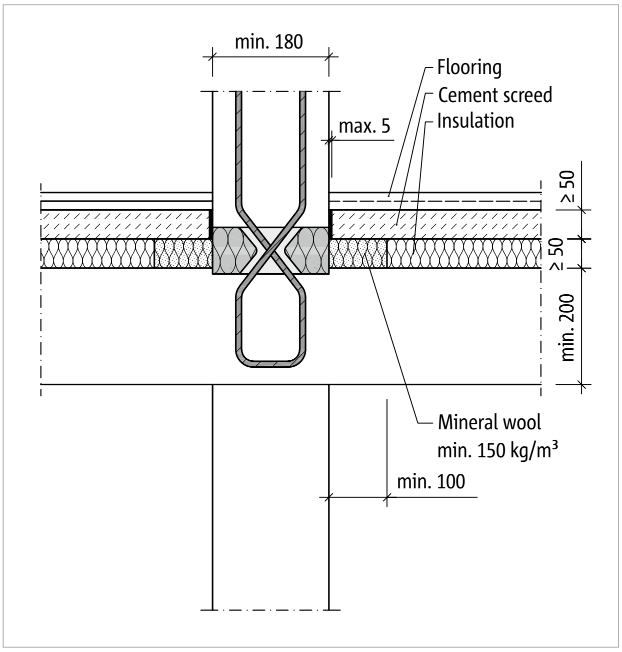


Fig. 94: Schöck Sconnex® type W: With mineral wool edge strips in the area of impact sound insulation

Type W

Reinforced concrete – reinforced concrete

Fire protection

R 120 / REI 60

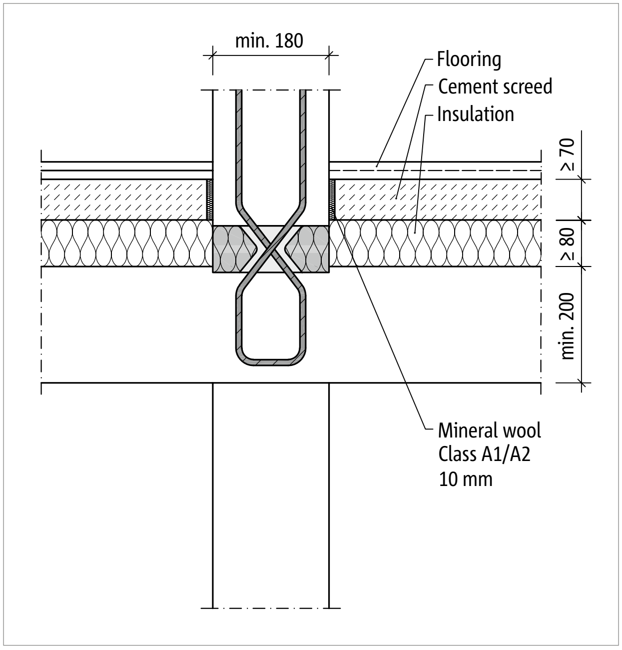


Fig. 95: Schöck Sconnex® type W: With mineral wool fire protection strips in the screed edge area

Connection exterior wall to floor

R 30 / REI 0

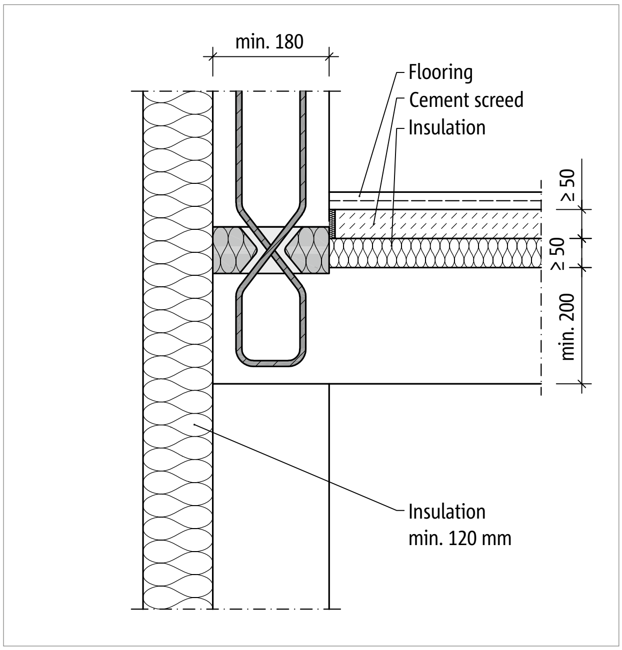


Fig. 96: Schöck Sconnex® type W: For combustible ETICS (exterior) without fire protection measures

R 120 / REI 120

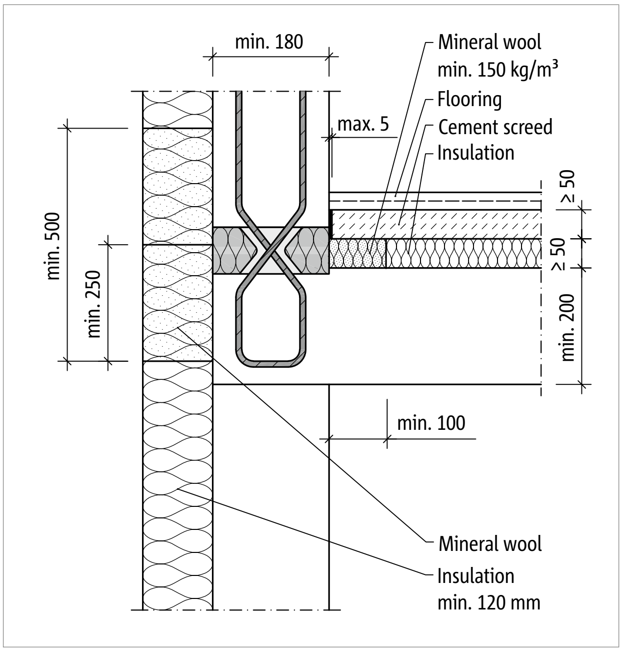


Fig. 97: Schöck Sconnex® type W: For combustible ETICS (exterior) with fire bar and edge strips made of mineral wool in the area of impact sound insulation

Fire protection

R 120 / REI 60

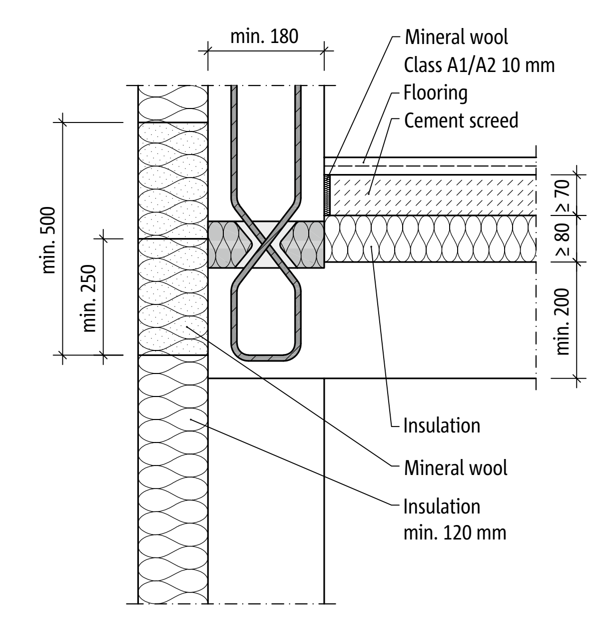


Fig. 98: Schöck Sconnex® type W: For combustible ETICS with mineral wool fire bar

Connection interior wall below floor

R 30 / REI 0

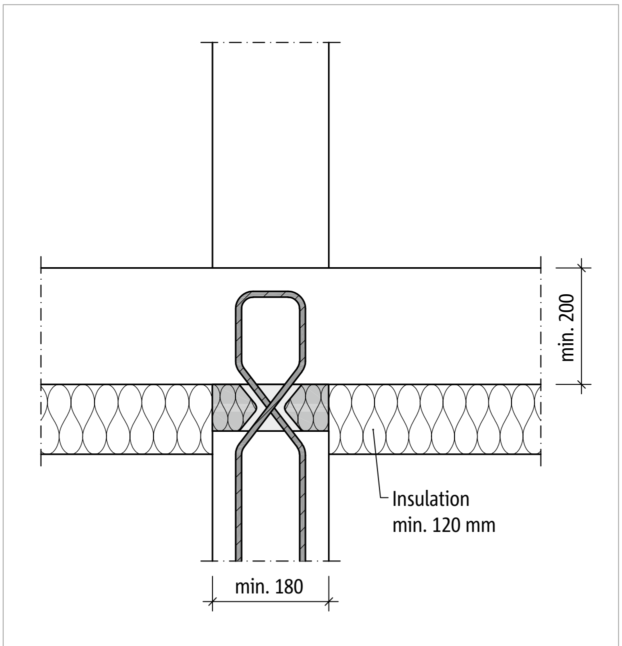


Fig. 99: Schöck Sconnex® type W: For suspended ceiling insulation without fire protection measures

R 120 / REI 120

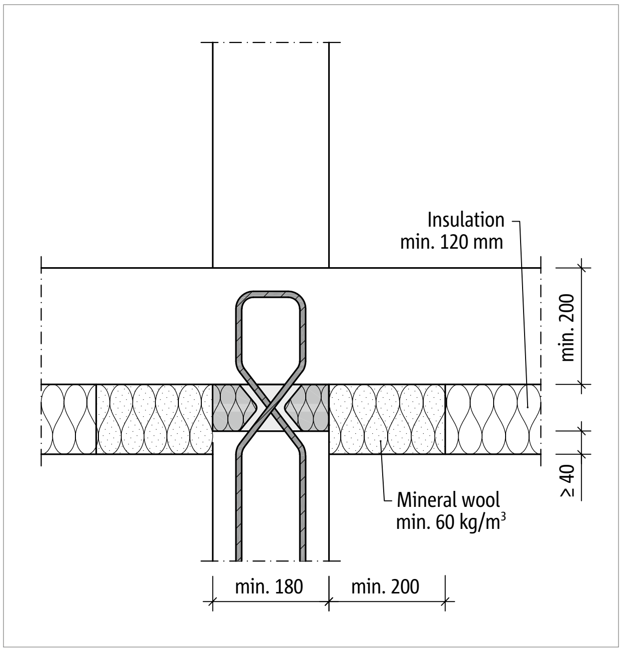


Fig. 100: Schöck Sconnex® type W: With mineral wool edge strips in the area of suspended ceiling insulation

Fire protection

R 120 / REI 120

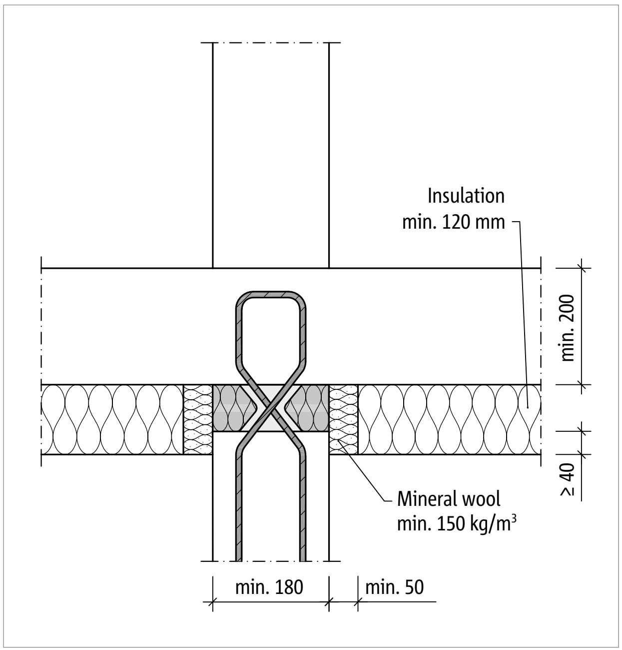


Fig. 101: Schöck Sconnex® type W: With mineral wool fire protection strips in the area of suspended ceiling insulation

Connection exterior wall below floor (analogue for parapet)

R 30 / REI 0

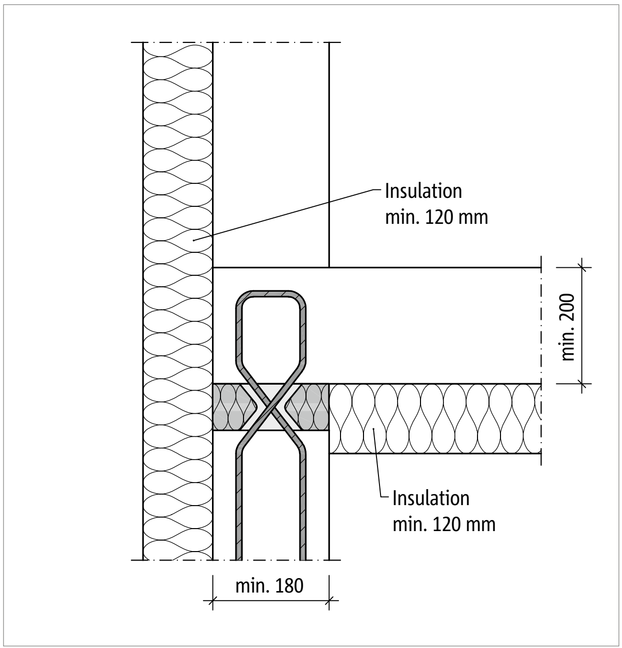


Fig. 102: Schöck Sconnex® type W: For combustible ETICS (exterior) without fire protection measures

Fire protection

R 120 / REI 120

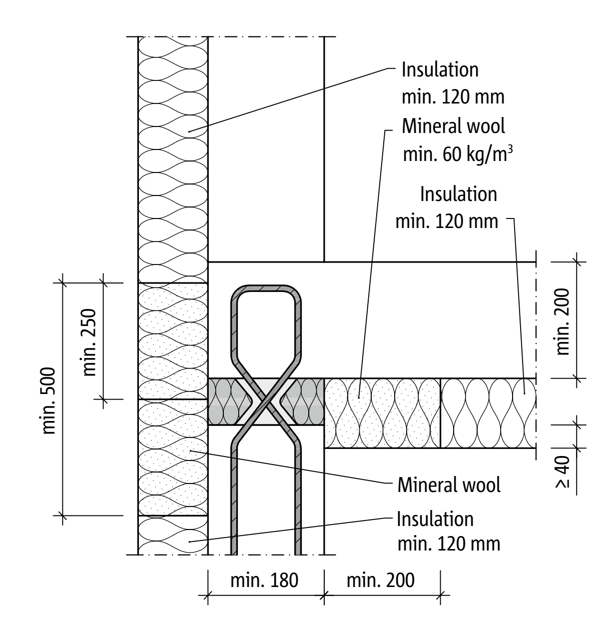


Fig. 103: Schöck Sconnex® type W: For combustible ETICS with fire bar (exterior) and edge strips made of mineral wool (interior)

R 120 / REI 120

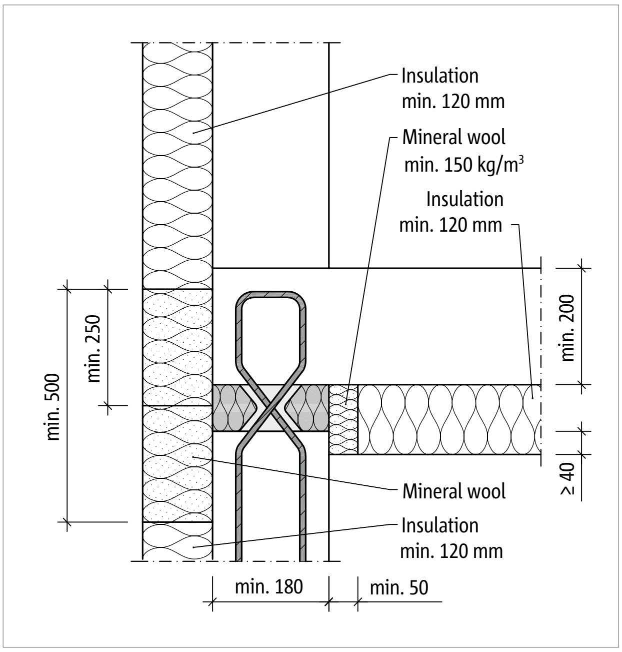


Fig. 104: Schöck Sconnex® type W: For combustible ETICS with fire bar (exterior) and fire protection strips made of mineral wool (interior)

On-site reinforcement

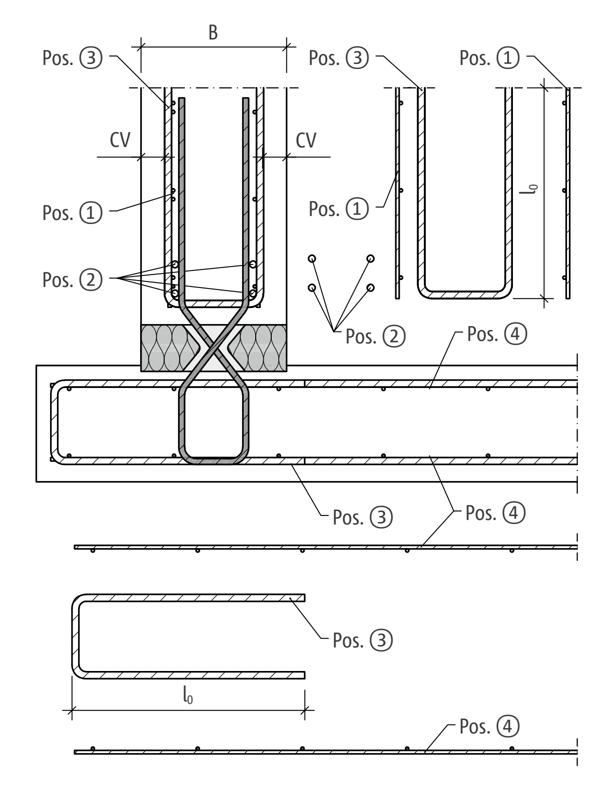


Fig. 105: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement for connection at base of wall

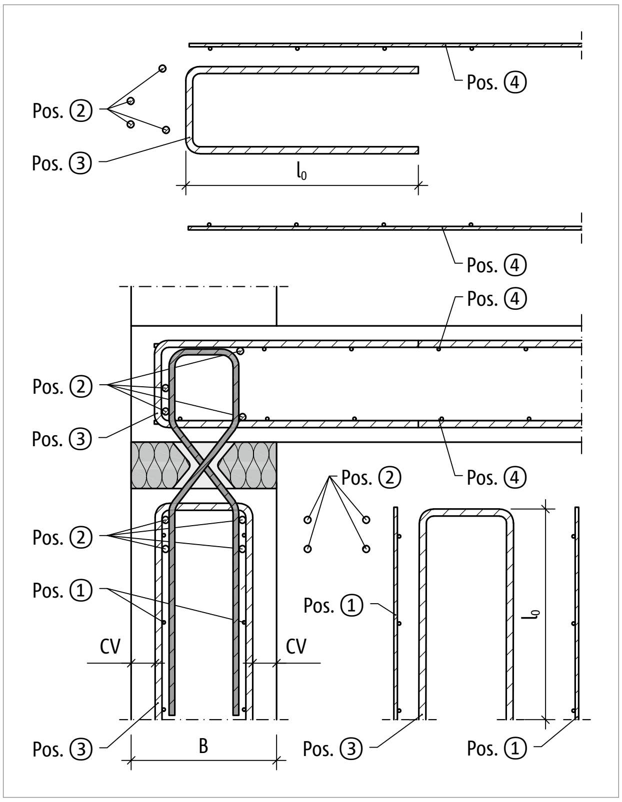


Fig. 106: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement for connection at top of wall

Type W

Reinforced concrete – reinforced concrete

On-site reinforcement

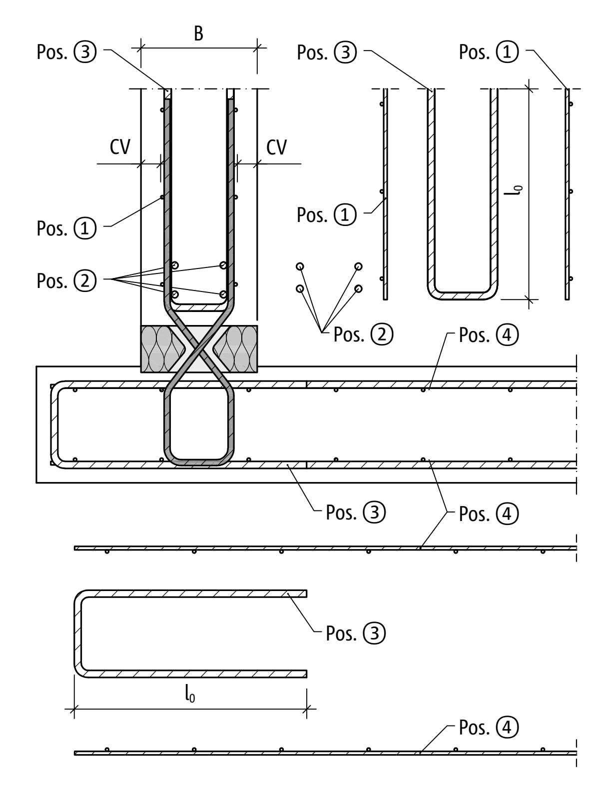


Fig. 107: Schöck Sconnex® type W-N-VH: Variant B – on-site reinforcement for connection to the foot of wall

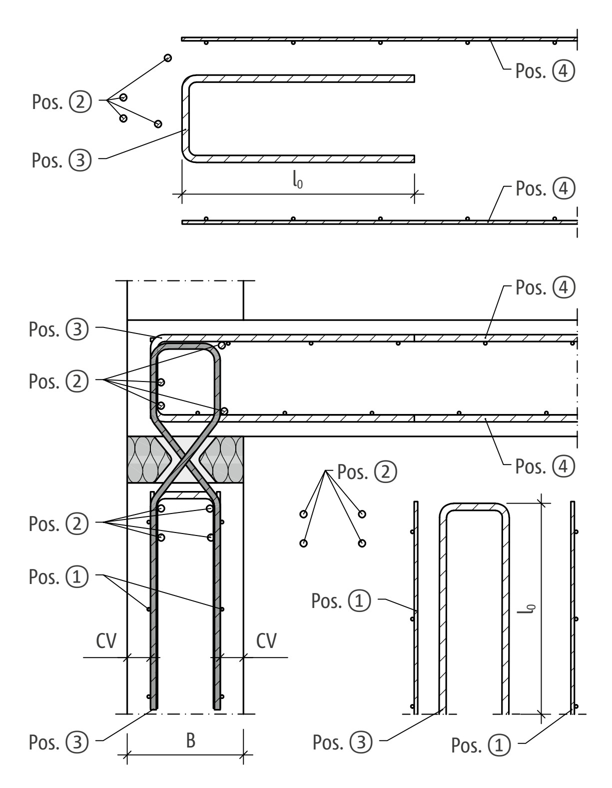


Fig. 108: Schöck Sconnex® type W-N-VH: Variant B – on-site reinforcement for connection to top of wall

Information about on-site reinforcement

- The requirements on the on-site reinforcement apply both for the connection at the foot of the wall and also for the connection at the top of the wall.
- The rules as per BS EN 1992-1-1 apply for the determination of the lap length.
- The requirements on the on-site reinforcement apply both for the connection at the foot of the wall and also for the connection at the top of the wall.
- Pos. 3: Stirrup width ≥ 130 mm for Schöck Sconnex® type W width B ≥ 180 mm. Take note of concrete cover c_{nom} in the wall.

On-site reinforcement

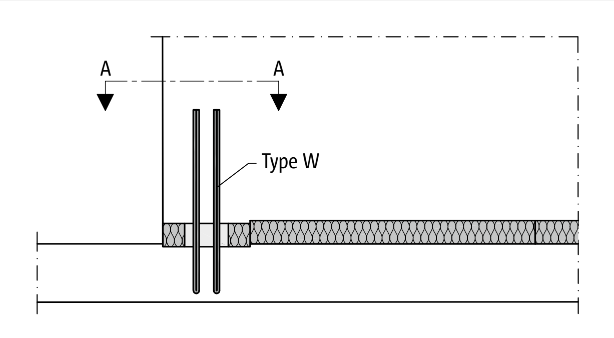


Fig. 109: Schöck Sconnex® type W-N-VH: On-site reinforcement for connection to end of wall

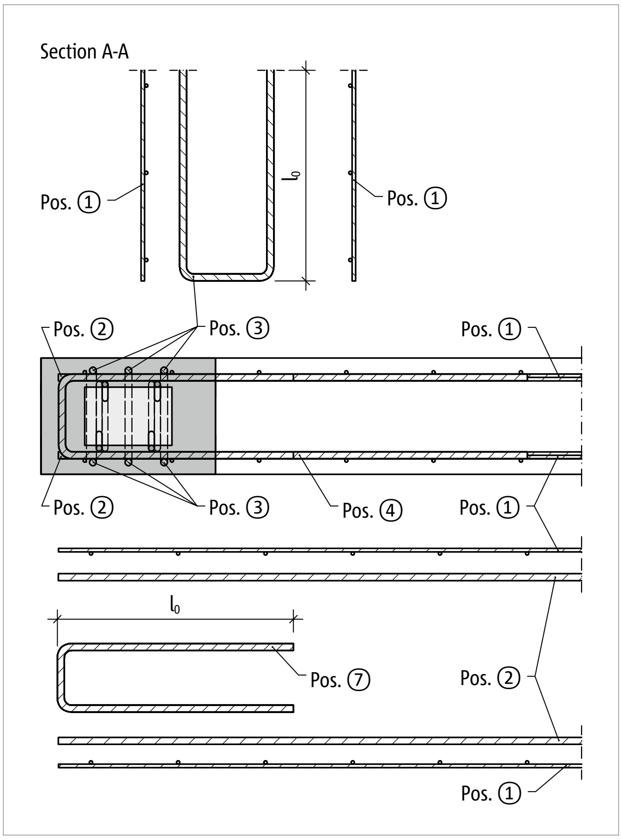


Fig. 110: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement with Pos. 4 for connection to end of wall

Schöck Sconnex® type W		N1-V1H1
On-site reinforcement	Location	Concrete strength class ≥ C25/30
Overlapping reinforcement		
Pos. 1	Wall	–
Steel bars along the insulation joint		
Pos. 2	Wall	2 • 2 • H12/50
Pos. 2	Floor	2 • H12/50 + 2 • H12
Splitting tensile reinforcement		
Pos. 3	Wall	3 • H12/65
Pos. 3	Floor	3 • H12/60
Bending tensile reinforcement		
Pos. 4	Floor	According to structural engineer's data
Additional reinforcement transverse to the wall		
Pos. 5	Floor	–
Steel bars along the insulation joint		
Pos. 6	Floor	–
Lateral reinforcement		
Pos.7	Floor	According to structural engineer's data
Edging		
Pos. 8	Wall	2 • H12/50

Support of the shear force bars in the force application area | Failure-free force application

Variant A on-site reinforcement

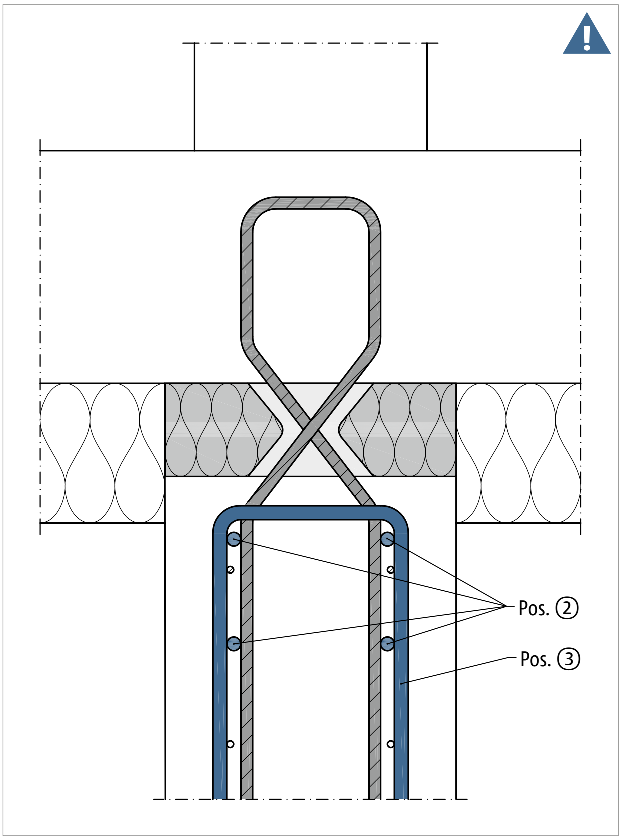


Fig. 111: Schöck Sconnex® type W-N-VH: On-site reinforcement variant A; the external steel bar Pos. 2 supports the shear force bars of the Schöck Sconnex® against the component surface

Variant B on-site reinforcement

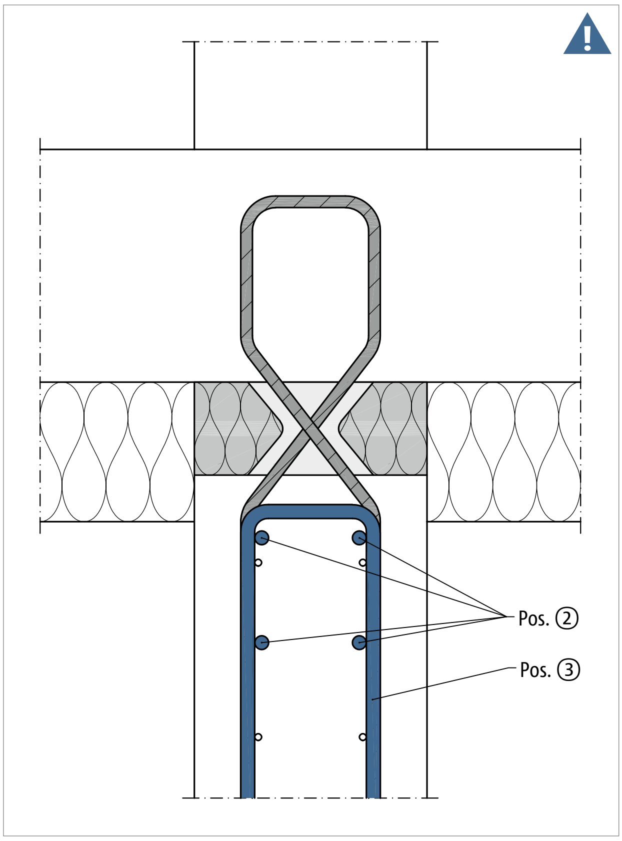


Fig. 112: Schöck Sconnex® type W-N-VH: On-site reinforcement variant B; steel bar Pos. 2 supports the shear force bars of the Schöck Sconnex® against the inside of the reinforced concrete component

Bar steel Pos. 2

- The position of the on-site bar steel along the insulation joint, Pos. 2 influences the design values $V_{Rd,x}$ of the Schöck Sconnex® type W significantly. Maximum design values $V_{Rd,x}$ are possible due to the optimum support of the shear force bars of the Schöck Sconnex® type W.
- An optimum effect is achieved if the bar steel Pos. 2 and the stirrup Pos. 3 support the shear force bars of the Schöck Sconnex® type W against the surface of the reinforced concrete component.

Hazard notice – bracing of the shear force bars of the Schöck Sconnex® type W through on-site reinforcement

- The bracing of the product’s own shear force bars by the on-site reinforcement variant A is necessary for the maximum shear force load-bearing capacity of the Schöck Sconnex® type W.
- With interior bar steel Pos. 2 in accordance with variant B, the reduction of the shear force load-bearing capacity of the Schöck Sconnex® type W is to be taken into account according to the design table.

Hazard notice – fault-free force application with Schöck Sconnex® type W

- Openings and built-in units in the force application area of the Schöck Sconnex® type W pressure bearing pose a danger to the load-bearing safety.
- For a failure-free force application in the Schöck Sconnex® type W pressure bearing, the pressure zone in the wall and the floor is to be kept free of openings and built-in units such as, for example lines/cable, pipes and spacers.

Tight fit

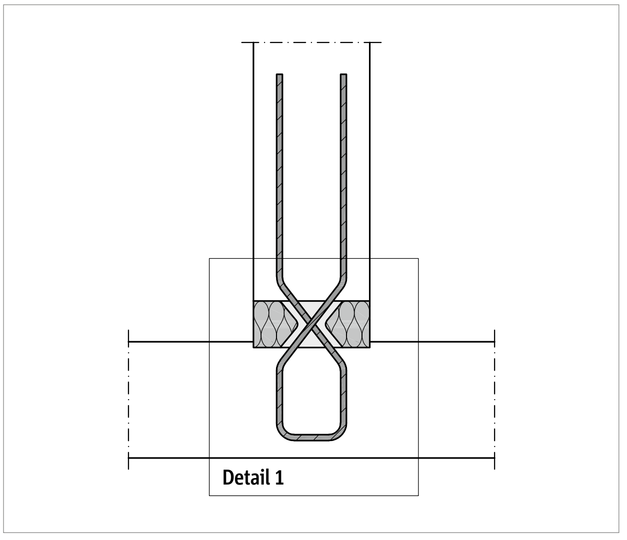


Fig. 113: Schöck Sconnex® type W: Tight fit between the upper edge of the floor and the lower edge of the pressure bearing is ensured

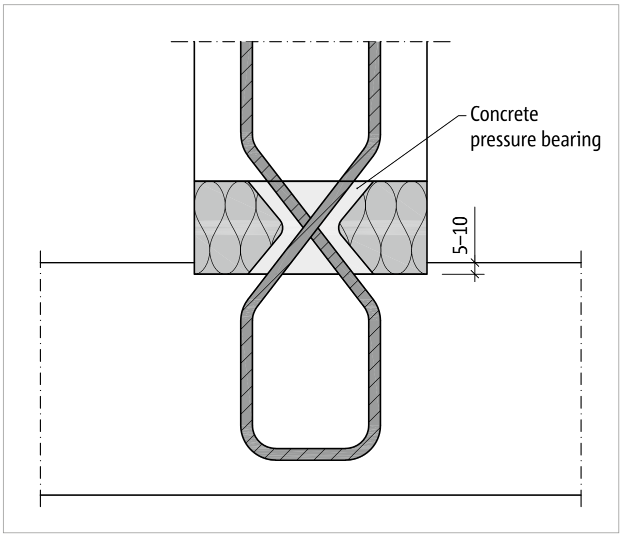


Fig. 114: Schöck Sconnex® type W: Tight fit through 5-10 mm deep countersinking of the insulating element in the floor

⚠ Tight fit

- A tight fit is absolutely necessary between the fresh concrete and the product's own concrete pressure bearing of the Schöck Sconnex® type W!
- The concrete pressure bearing of the Schöck Sconnex® type W must be countersunk 5–10 mm into the floor. The minimum insert depth is to be indicated on the insulation element.
- Compact the concrete carefully. Cavities are to be avoided at all costs.

Design example

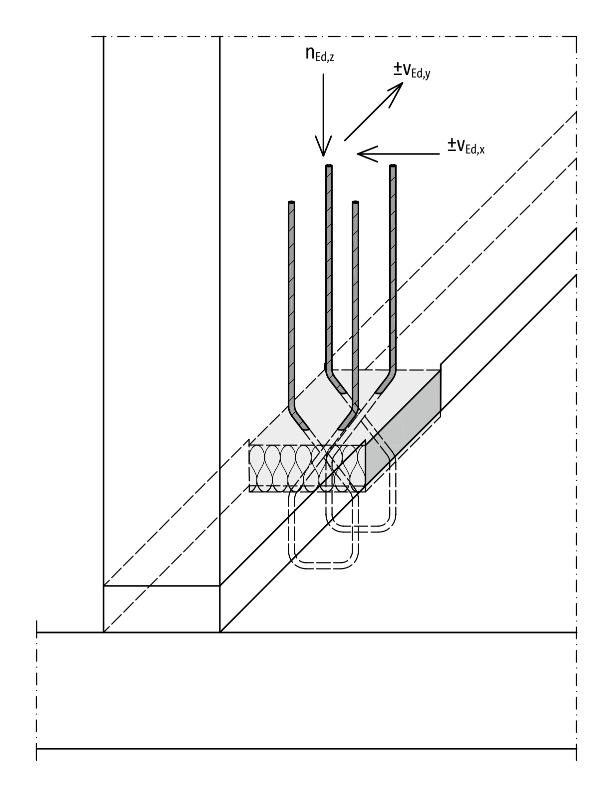


Fig. 115: Schöck Sconnex® type W-N-VH: Static system

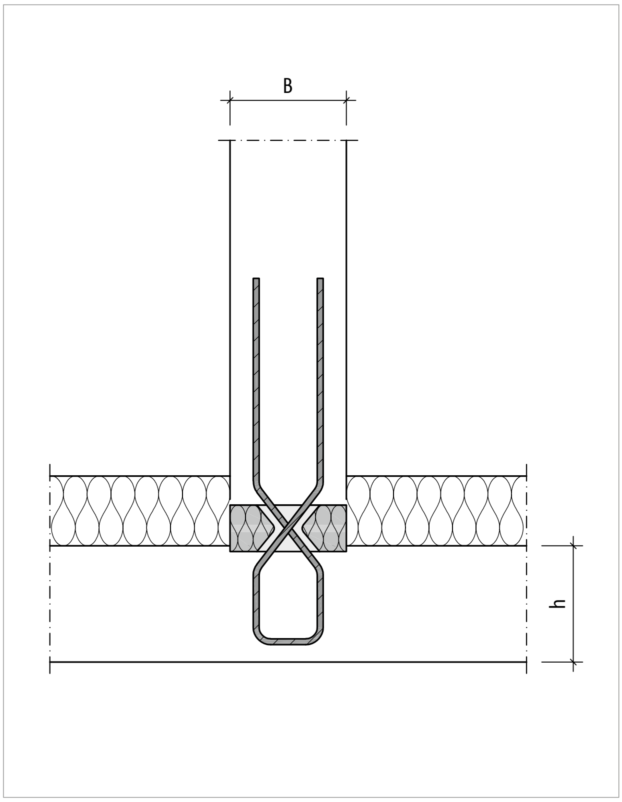


Fig. 116: Schöck Sconnex® type W-N-VH: Geometry

Geometries:

Wall thickness:	B = 180 mm
Floor height:	h = 250 mm
Separation:	e_A = 1000 mm
Pressure bearing surface:	d_1 = 150 mm, b_1 = 100 mm (Schöck Sconnex® type W see page 67)

Internal forces from static calculation:

Compressive force: $n_{Ed,z}$ = 370 kN/m

Shear force perpendicular to the wall from earth pressure:

$v_{Ed,x}$ = ±5 kN/m

Shear force along wall from building stabilization:

$v_{Ed,y}$ = ±50 kN/m

Exposure classes:

Wall/floor:	inside XC 1, outside XC 4
selected:	Concrete strength class C25/30 for wall and floor
	Concrete cover c_{nom} = CV = 35 mm for the splitting tension reinforcement Pos. 3
On-site reinforcement:	Variants B

Design example

Verification in the ultimate limit state for normal force

Selected: **Schöck Sconnex® type W-N1-V1H1-B180-1.0**

Schöck Sconnex® type W		N1	
Design values with		Concrete strength class ≥ C25/30	Concrete strength class ≥ C30/37
		Floor thickness ≥ 200 mm	
		Normal force (compression) $N_{Rd,z,wall}$ [kN/element]	
Wall thickness [mm]	150	250.0	300.0
	180	450.0	540.0
	≥ 200	500.0	600.0

Normal force (compression): $N_{Rd,z,wall}$ = 450.0 kN/element

$n_{Rd,z}$ = 450.0 kN / 1 m = 450.0 kN/m

$n_{Ed,z} / n_{Rd,z}$ = 370 / 450.0 = 0.82 < 1.0

Verification in the ultimate limit state for shear force

Schöck Sconnex® type W	Feature N
Design values with	Secondary load-bearing level V1H1
	Concrete strength class ≥ C25/30
Shear force	$V_{Rd,x}$ [kN/Element]
Variant A – on-site reinforcement on the outside	±88.0
Variant B – on-sitel reinforcement on the inside	±46.3
Shear force	$V_{Rd,y}$ [kN/element]
	±59.0
Interaction	$V_{Ed,y}/V_{Rd,y} + V_{Ed,x}/V_{Rd,x} \leq 1$

Shear force: $V_{Rd,x}$ = 46.3 kN/element

$v_{Rd,x}$ = 46.3 kN / 1 m = 46.3 kN/m

$V_{Rd,y}$ = 59 kN/element

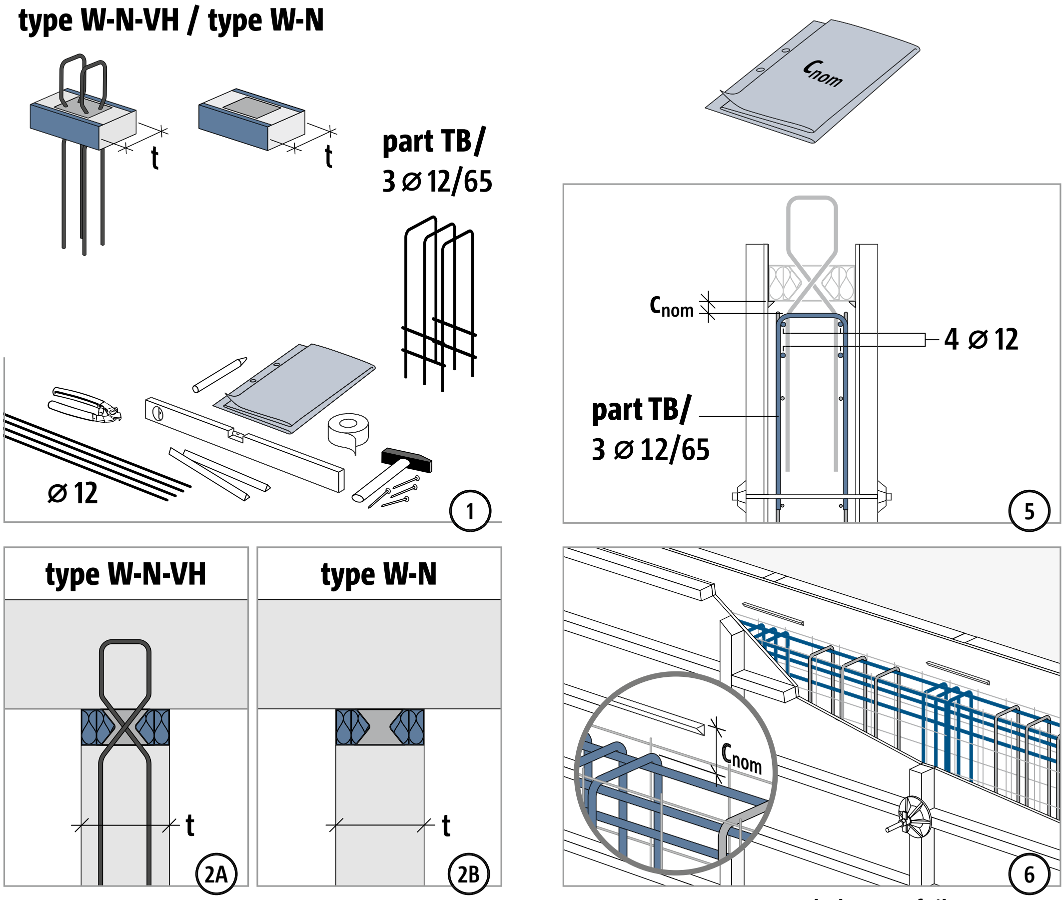
$v_{Rd,y}$ = 59 kN / 1 m = 59 kN/m

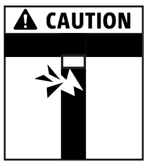
Shear force - interaction: $v_{Ed,x} / v_{Rd,x} + v_{Ed,y} / v_{Rd,y}$ = 5 / 46.3 + 50 / 59 = 0.96 < 1.0

i Design

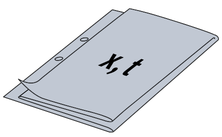
- Any required punching shear or shear force verification of the slab can be carried out using the software for Schöck Bole®. A ground pressure area of 150 × 100 mm is to be assumed.
  For further information see Schöck Bole® Technical Information under:
  www.schoeck.com/download/de

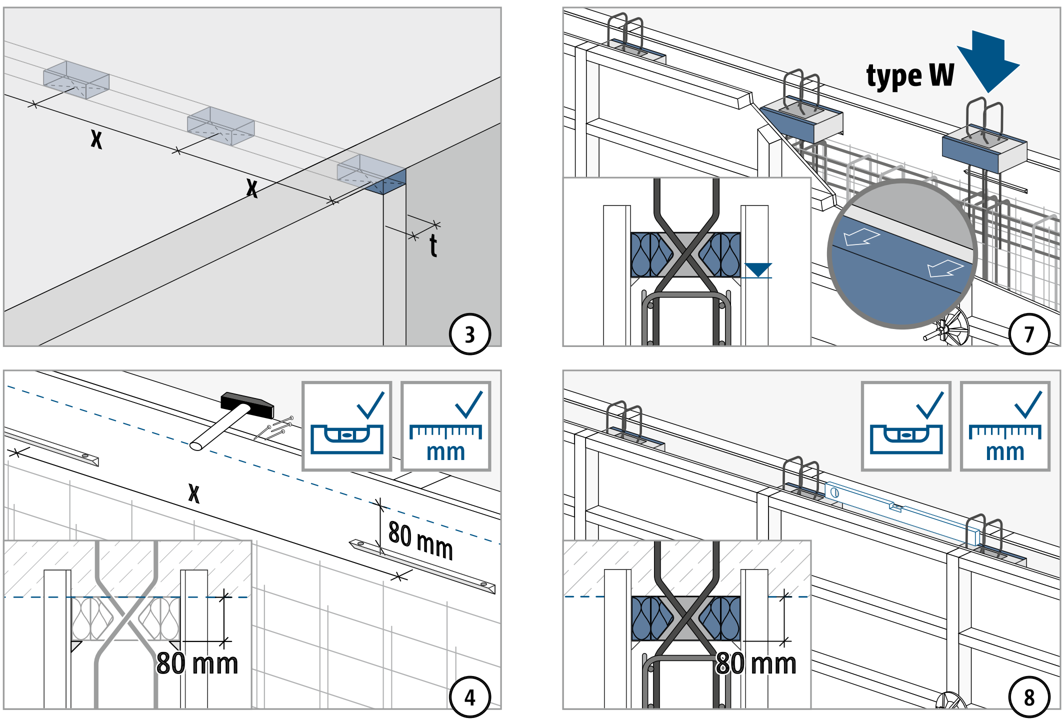
Installation instruction top of wall





Structural element failure through impaired pressure zone!
Lay absolutely no objects such as spacers, cables, pipes etc. over the pressure bearing. Compact the concrete well.

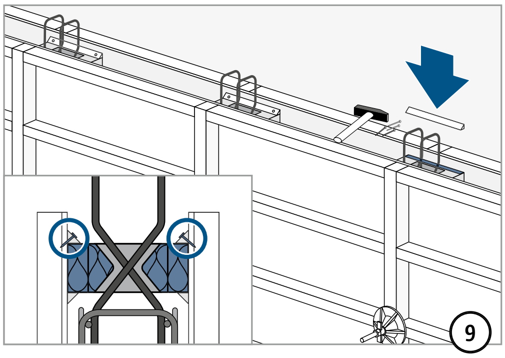


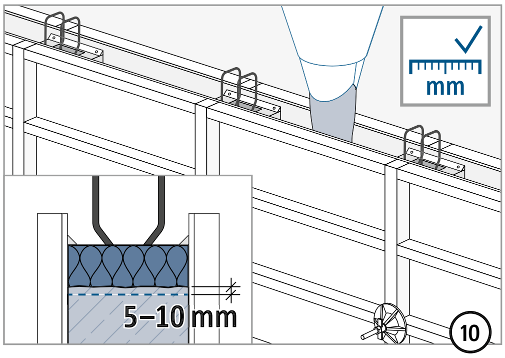


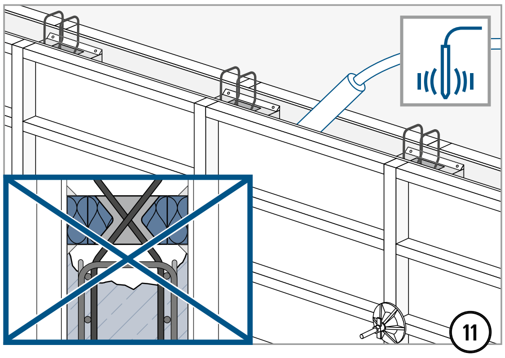
Type W

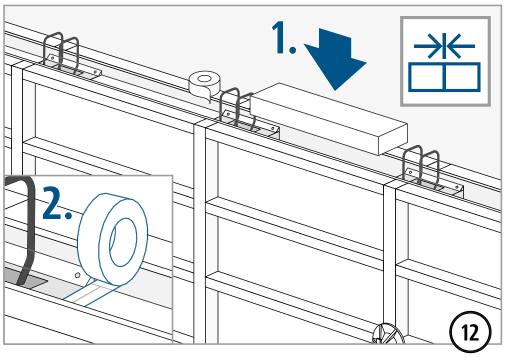
Reinforced concrete – reinforced concrete

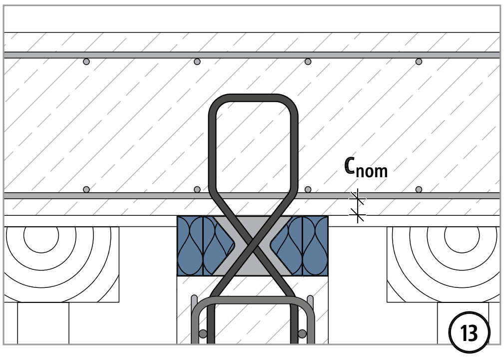
Installation instruction top of wall



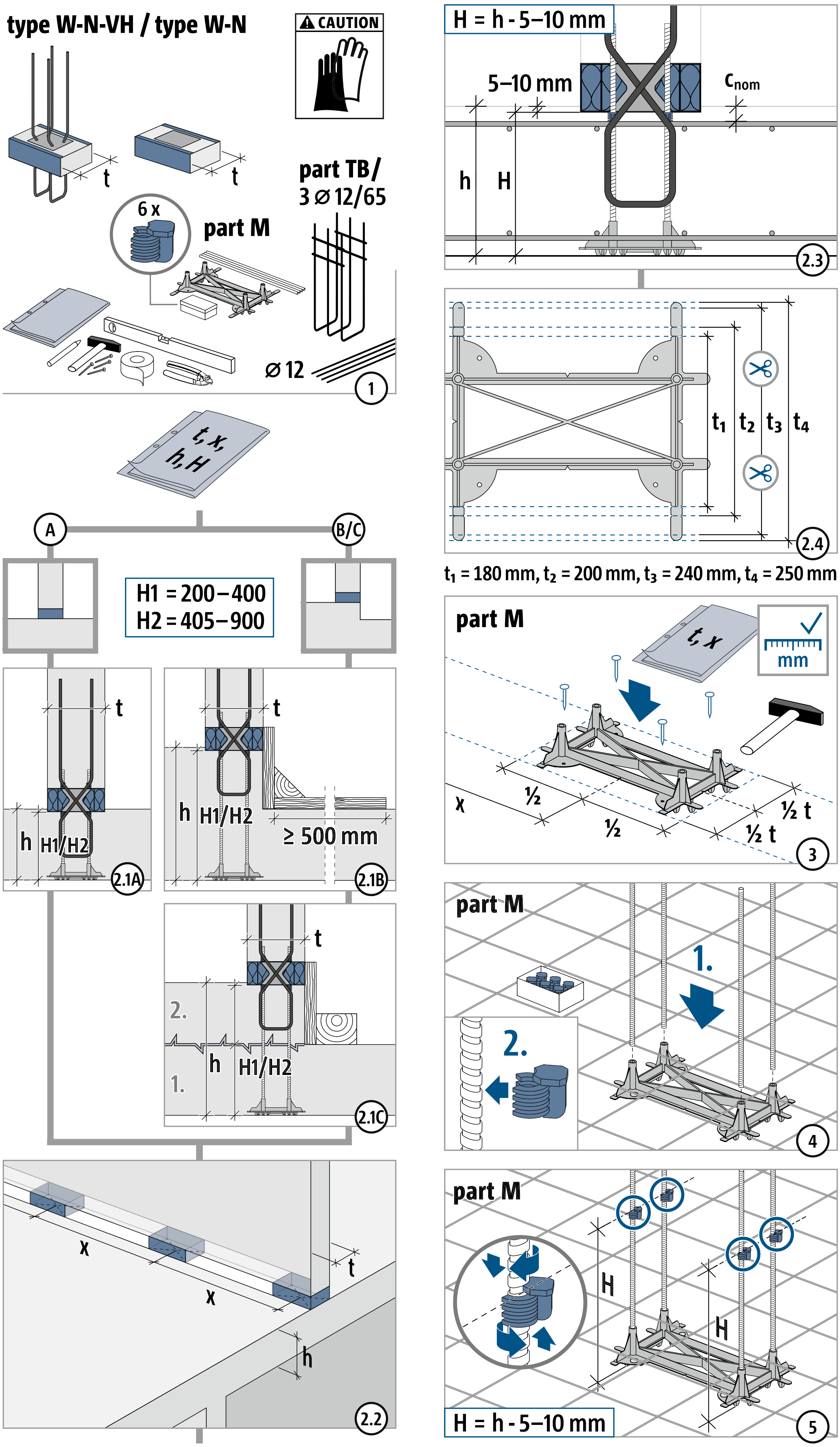








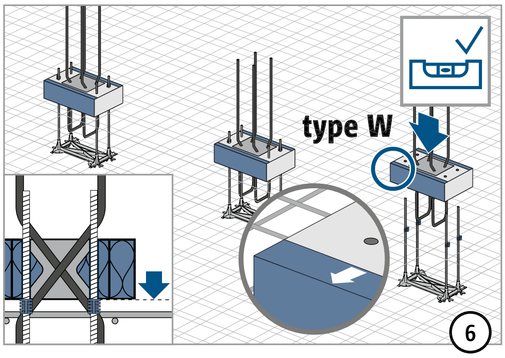
Installation instruction foot of wall

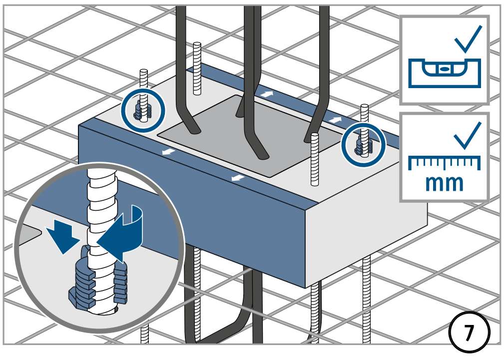


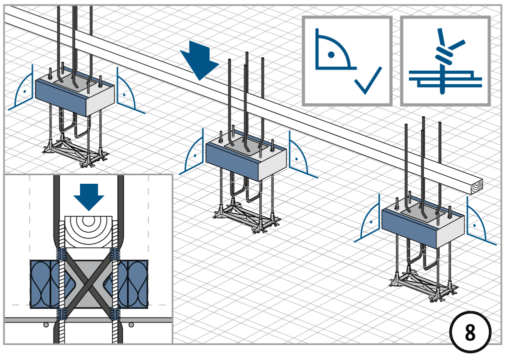
Type W

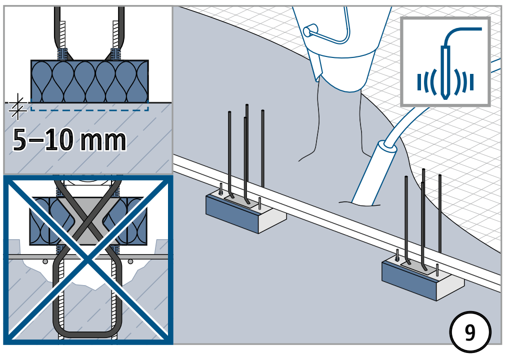
Reinforced concrete – reinforced concrete

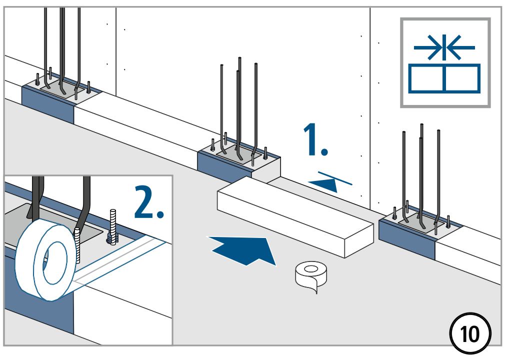
Installation instruction foot of wall

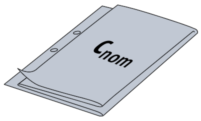


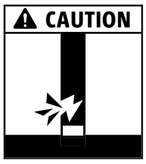




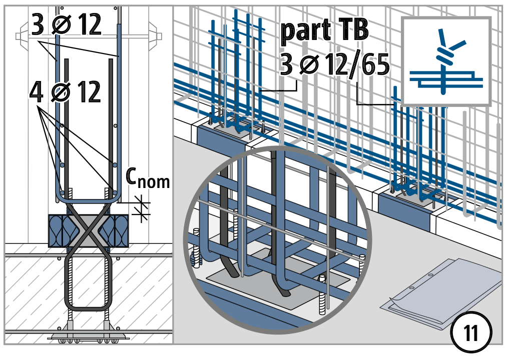


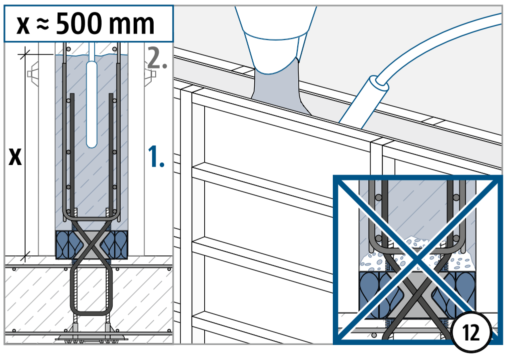




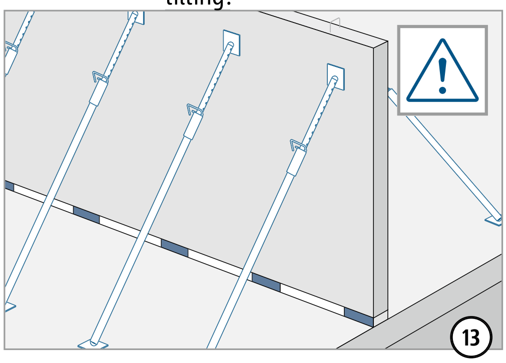


Structural element failure through impaired pressure zone! Lay absolutely no objects such as spacers, cables, pipes etc. over the pressure bearing. Compact the concrete well.





Danger of tilting due to articulated connection at the bottom of the wall! In all construction conditions secure walls on Sconnex® type W against tilting!



Type W

Reinforced concrete – reinforced concrete

☑ Check list

- ☐ Are the influences on the Schöck Sconnex® connection determined at the dimensioning stage?
- ☐ When connecting with Schöck Sconnex® type W, was a freely rotatable bearing assumed as the static system, taking into account the spring stiffnesses?
- ☐ Is the relevant concrete strength class taken into account when selecting the design and calculation table?
- ☐ Is the relevant on-site reinforcement variant A or B taken into account when selecting the design table?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ Are the maximum permitted centre distances taken into account and plotted in the formwork plan?
- ☐ Have the fire protection requirements been clarified and planned for?
- ☐ Is there a situation in which, during the construction phase, the construction had to be dimensioned for an emergency or a special load?
- ☐ Is the deformation as result of temperature < 1 mm?
- ☐ Is a shear force verification of the adjoining structural elements required? If yes, was this carried out?
- ☐ Was the load application zone unimpeded and without inserts (e.g. cables or pipes)?
- ☐ Was securing the walls against tilting during construction pointed out to the building site?

Schöck Sconnex® type P

Schöck Sconnex® type P
Load-bearing thermal insulation element for reinforced concrete columns. The element transfers primarily compressive forces.

Area of application in accordance with DiBt approval Z-15.7-351
- The approval is only valid in the single application at the column head of reinforced concrete columns.

Element arrangement | Installation cross sections

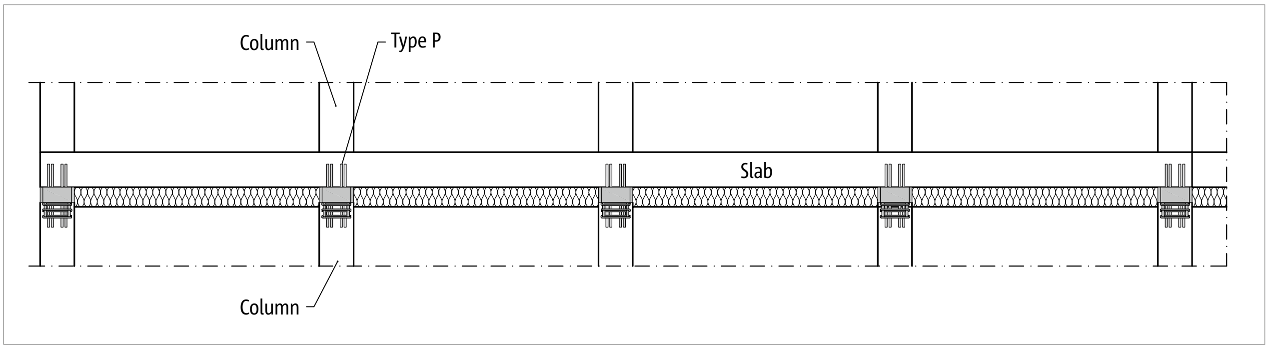


Fig. 117: Schöck Sconnex® type P: Column connection to the floor above

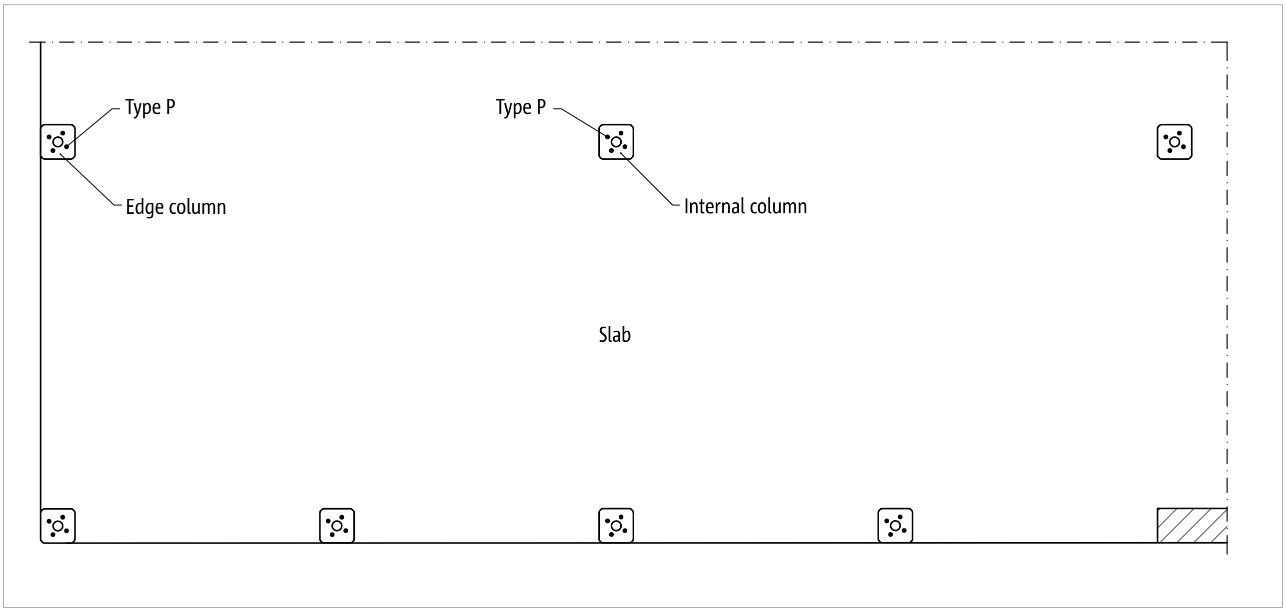


Fig. 118: Schöck Sconnex® type P: Element arrangement in the floor plan

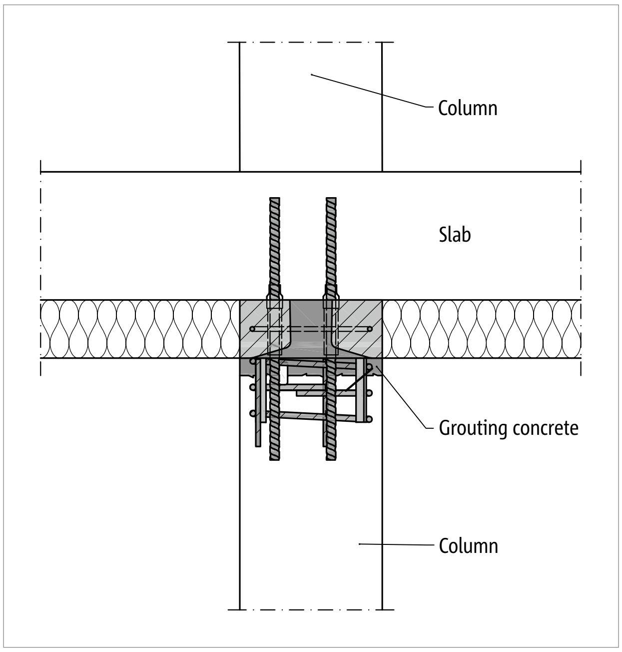


Fig. 119: Schöck Sconnex® type P: Connection of an internal column to the above lying floor

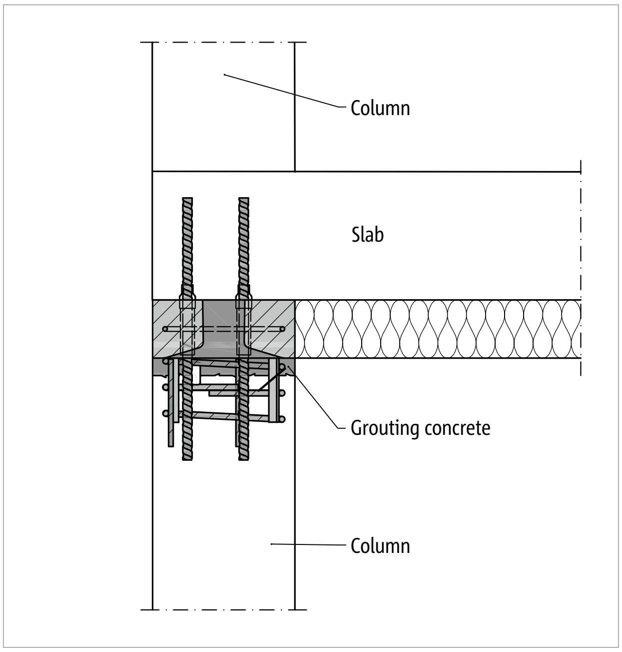


Fig. 120: Schöck Sconnex® type P: Connection of an edge column to the above lying floor

Installation cross sections | Application at column head

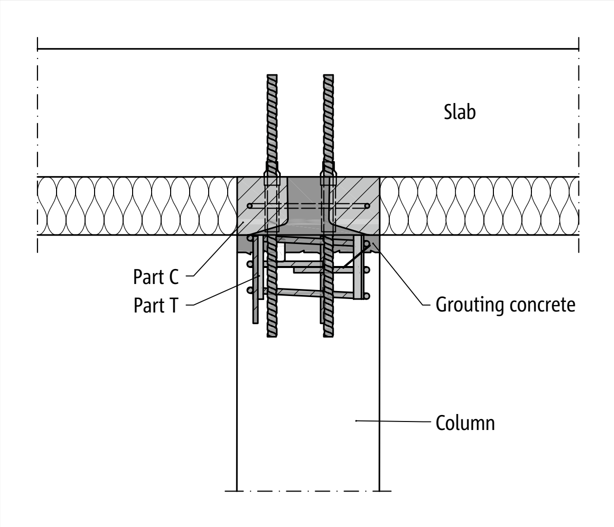


Fig. 121: Schöck Sconnex® type P: Installation section; connection for square column - floor with Part C and Part T

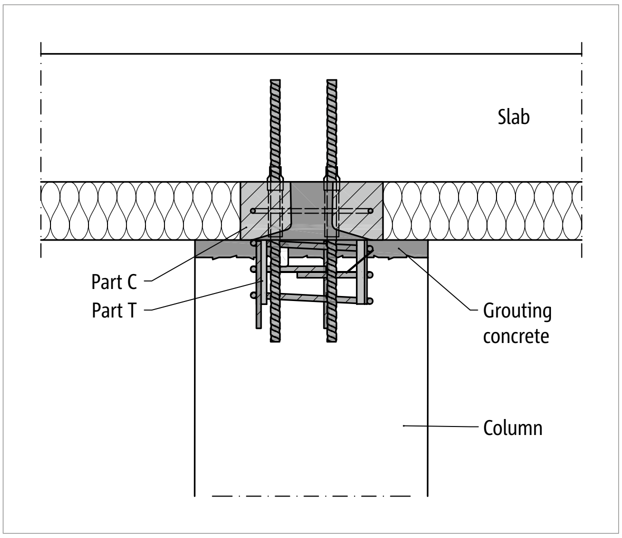


Fig. 122: Schöck Sconnex® type P: Installation section; connection for rectangular column - floor with Part C and Part T

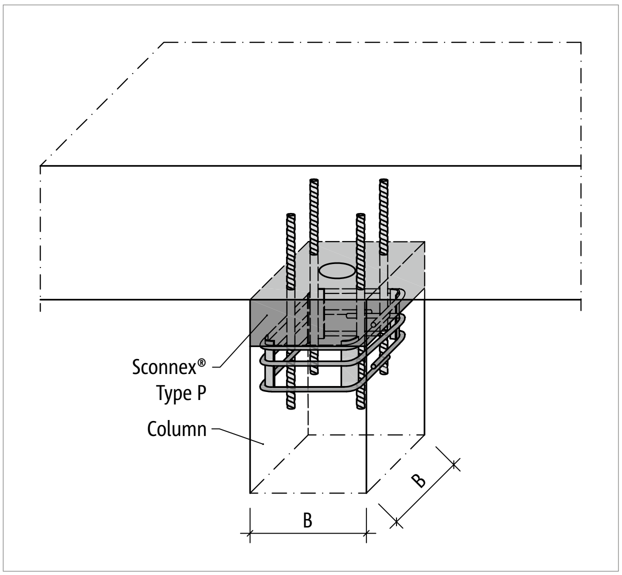


Fig. 123: Schöck Sconnex® type P: Connection for square column

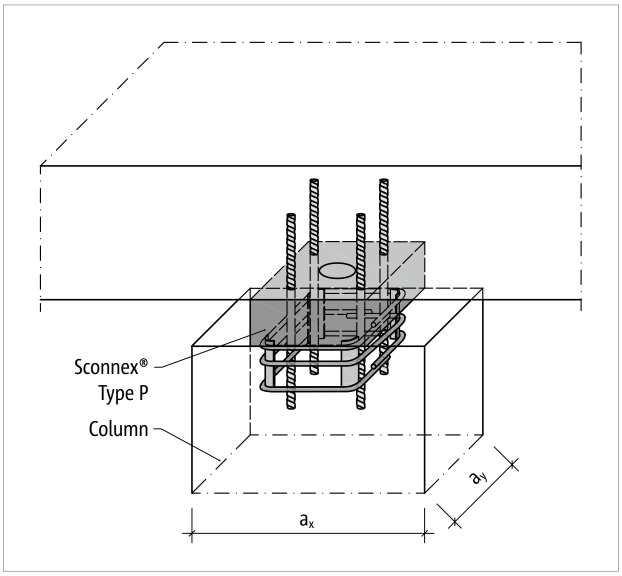


Fig. 124: Schöck Sconnex® type P: Connection for rectangular column; central installation - column dimensions a_x and a_y see page 92

i Application at the top of the column only

In accordance with the Approval only application at the top of the column is permitted. An application at the foot of the column is not part of the Approval.

Type P

Reinforced concrete – reinforced concrete

Product selection | Type designations | Grouting concrete

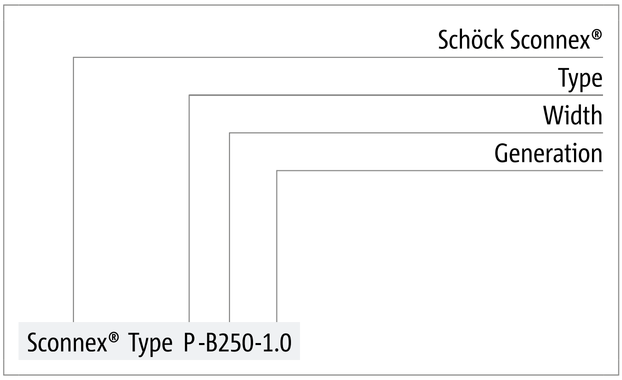
Schöck Sconnex® type P

The version of the Schöck Sconnex® type P consists of Part C (lightweight concrete element) and Part T (reinforcement element). For the column-floor connection type P the following features and notations apply:

- Width (nominal dimension of the edge length):
  B250 (250 mm), B300 (300 mm), B350 (350 mm), B400 (400 mm)
- Lightweight concrete element:
  Schöck Sconnex® type P Part C
- Reinforcement element:
  Schöck Sconnex® type P Part T
- Grouting concrete:
  PAGEL® grouting V1/50
- Generation:
  1.0
- Fire resistance class:
  R 30 to R 90
  Depending on the fire resistance class there are various load-bearing resistances for which a verification with the aid of the dimensioning diagrams must be carried out.

The lightweight concrete element Part C is to be combined with the reinforcement element Part T for the application.

Type designations in planning documents



Fire protection

- Schöck Sconnex® type P may be used in columns without fire resistance requirements as well as in columns of fire resistance classes R 30, R 60 and R 90. The minimum and maximum clear column height is to be observed (see page 92)

Poured concrete: PAGEL® grouting V1/50

- Schöck Sconnex® type P is supplied together with a premixed dry mortar for the production of PAGEL®-Verguss V1/50 cast concrete. The quantity supplied is designed for the establishment of a positive fit at a column–slab connection with a square column.
- For the extended application using a rectangular column cross-section it is to be checked whether the quantity supplied is still sufficient due to the increased backfill volume. If not, a further container of dry mortar must be planned in order to guarantee the form fit.

Application Schöck Sconnex® type P

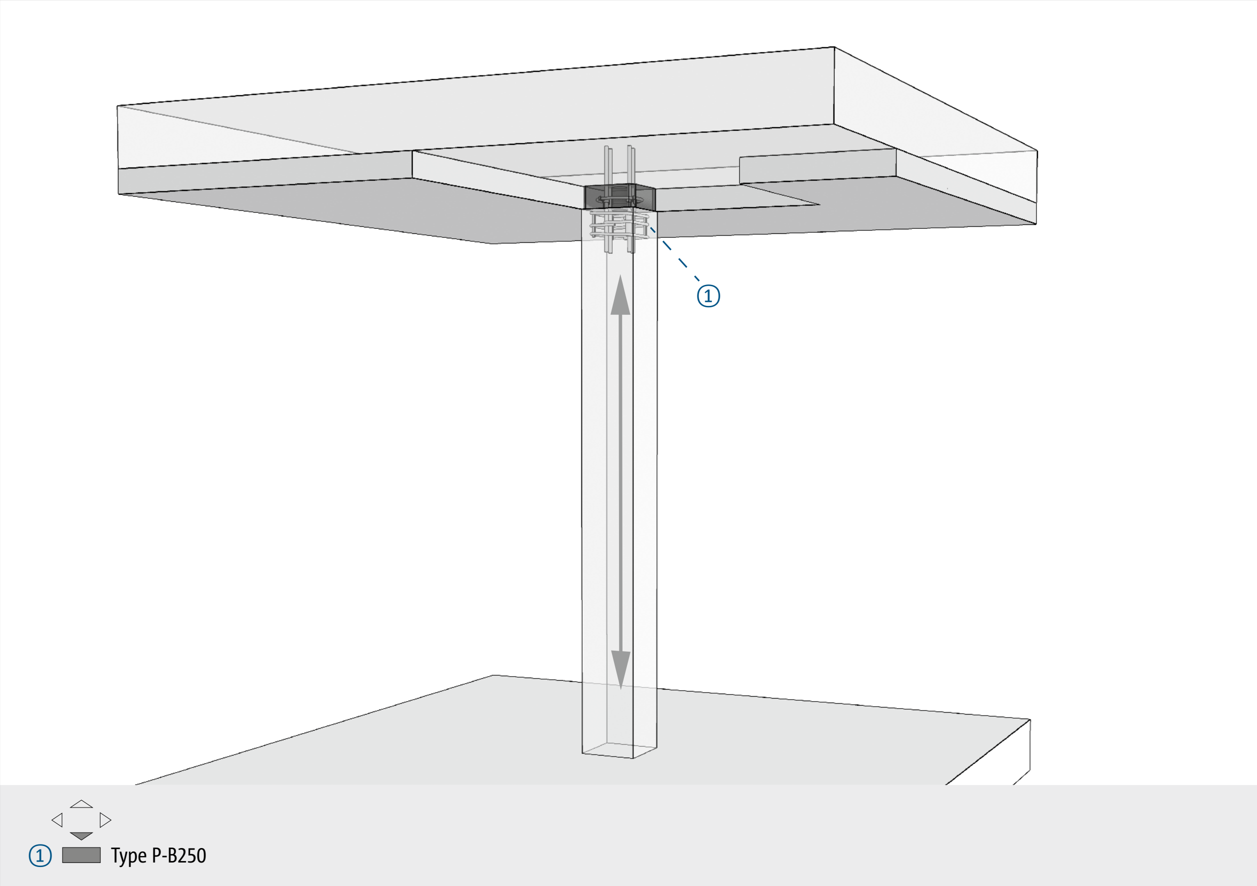


Fig. 125: Column connection with under-slab insulation

Columns are highly loaded compression elements. Typically, columns are treated as hinged supports (without restraint moments). For this case Schöck Sconnex® type P is placed in the insulation layer below the floor. Any horizontal forces that appear (e.g. normative impact loads in garage doors), despite the articulated effect of the column, can be safely transferred into the above-lying floor. Depending on the constraints two verification variants are available, the simplified and the accurate. With observance of the constraints (see page 94) a standard eccentricity of 20 mm may be reckoned with. On the other hand, with the accurate procedure, this is to be determined by the engineer. For a possible verification of the fire protection, a separate load-bearing capacity verification in the case of fire must be carried out.

Sign convention | Application conditions

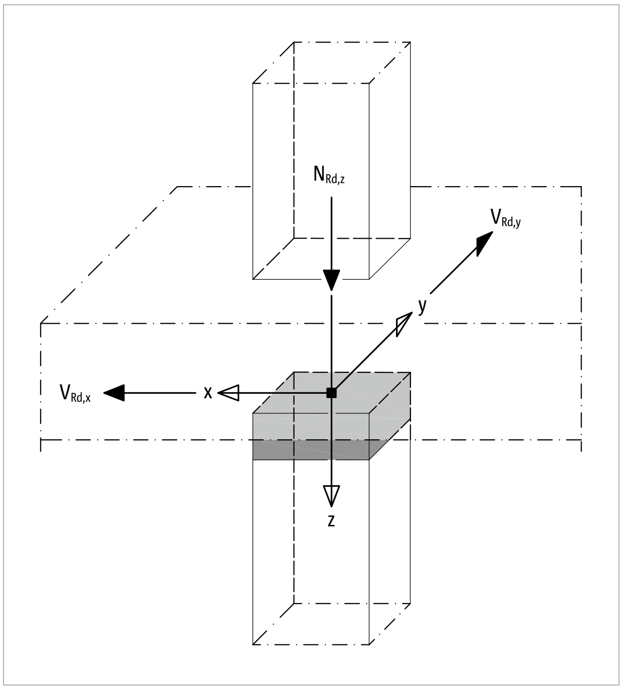


Fig. 126: Schöck Sconnex® type P: Sign convention for the design

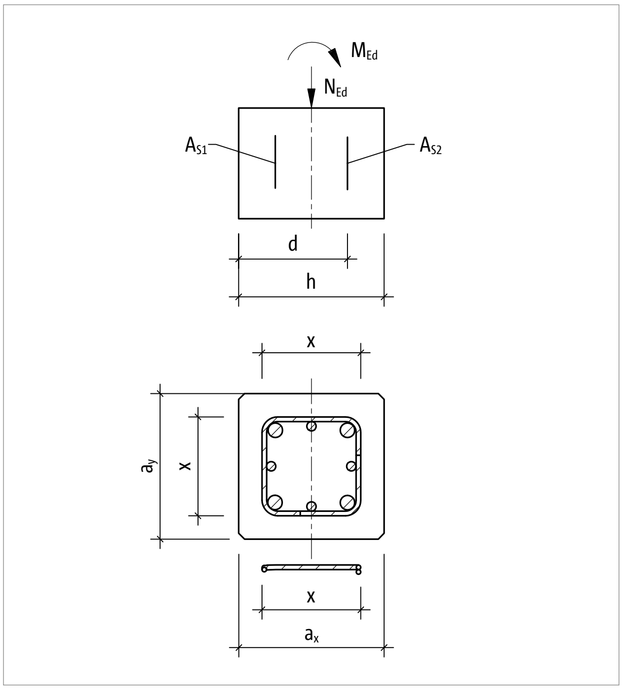


Fig. 127: Schöck Sconnex® type P: Limitation of the external dimension of the stirrups; see warning note (x - see page 110)

Application conditions

- Static or quasi-static effects
- Application in horizontal stiffened systems
- Column dimensions a_x / a_y ≤ 2:1

Schöck Sconnex® type P		
Width	Maximum column dimensions	
	a_x [mm]	a_y [mm]
B250	≤ 500	250
B300	≤ 600	300
B350	≤ 700	350
B400	≤ 800	400

- In relation to the column dimensions the largest possible Sconnex® type P is always to be installed
- Column headroom (shell dimension) ≥ 2.50 m when using the simplified dimensioning procedure

Schöck Sconnex® type P	
Width	Maximum clear column heights for fire resistance requirements
	[m]
B250	≤ 2.85
B300	≤ 3.42
B350	≤ 3.99
B400	≤ 4.56

Design

Notes on design

- Installation centrally in hinged column heads
- For the transmission of compressive forces in the core area of the column cross-section. The maximum permissible eccentricity of the resultant compressive force is b/6 and must be verified with use of the general design method.
- Column dimensioning without planned horizontal forces (e.g. as a result of cantilevers).
  Exception: Vehicle collision, must be considered 103 in accordance with page .
- The static verification for the redirection of the forces in the column and floor is to be carried out (e.g. buckling and punching shear). The immediately adjacent column areas are excluded from this.

Warning note

- The static effective height for the buckling dimensioning is based on the maximum stirrup external dimensions (see page 92). This must be considered by the structural engineer for the buckling verification of the column.

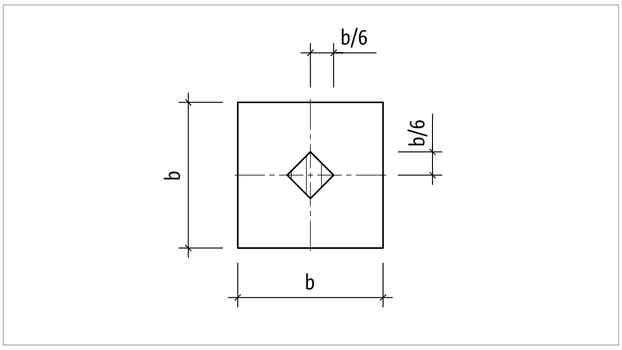


Fig. 128: Schöck Sconnex® type P: Limitation of the eccentricity on the core area of the column cross-section with $e_x + e_y \leq b / 6$, gaping joint not permitted

Design

Cold dimensioning: Simplified design procedure

With the basic application conditions the permitted compressive force $N_{Rd,z}$ [kN] may be calculated without further verification of floor displacement with a planned eccentricity (single axis eccentricity) of e = 20 mm. The verification of gaping joints may be omitted if all following boundary limitations are complied with:

- Interior columns within the limits of the normal high rise as per BS EN 1992-1-1 and BS EN 1992-1-1/NA
- Evenly distributed live loads ≤ 5 kN/m²
- Span length ratio of the edge span of the 1st interior span 0.5 ≤ L1/L2 ≤ 2
- Floor span width ≤ 7.5 m
- Floor height ≥ 25 cm, whereby for each 0.5 m smaller floor span width the floor height may be reduced by 1 cm

Schöck Sconnex® type P							
Design values with		Concrete strength class of the column					
		C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Width	Number of longitudinal bars of the column	Normal force (compression with e = 20 mm) $N_{Rd,z}$ [kN/element]					
B250	≥ 4	904	1016	1119	1207	1207	1207
	≥ 8	954	1069	1171	1207	1207	1207
B300	≥ 4	1343	1505	1651	1784	1808	1808
	≥ 8	1418	1584	1728	1808	1808	1808
B350	≥ 4	1868	2087	2282	2457	2529	2529
	≥ 8	1973	2196	2389	2529	2529	2529
B400	≥ 4	2479	2761	3009	3229	3371	3371
	≥ 8	2618	2905	3150	3358	3371	3371

Notes on design

- In-situ concrete is standard for blank boxes.
- The lightweight concrete element is standard for values with grey shading.
- The degree of reinforcement has no appreciable influence on the load-bearing capacity of the column connection.

Design

Cold dimensioning: General design procedure using the accurate load eccentricity

For an exact calculation of the eccentric load application, the eccentricity determined by the user can be taken into account using the following equation as well as the maximum compressive force with centric compression in accordance with the following table . Accordingly, the design value of the load-bearing capacity $N_{Rd,z}$ is calculated as:

$$N_{Rd,z} = N_{Rd,z,0} \cdot (1 - 2 \cdot e_x / B) \cdot (1 - 2 \cdot e_y / B)$$

with:

e_x:	Eccentricity in x-direction ($e_x \leq B / 6$) [mm]
e_y:	Eccentricity in y-direction ($e_y \leq B / 6$) [mm]
$N_{Rd,z,0}$:	Max. load-bearing capacity with centric compressive force as per table [kN]
$N_{Rd,z}$:	Load-bearing capacity of the column connection [kN]
B:	Width (nominal dimension of the edge length Schöck Sconnex® type P - see page 90) [mm]

Schöck Sconnex® type P							
Design values with		Concrete strength class of the column					
		C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Width	Number of longitudinal bars of the column	Normal force (compression with e = 0 mm) $N_{Rd,z,0}$ [kN/element]					
B250	≥ 4	1076	1210	1332	1443	1443	1443
	≥ 8	1136	1273	1394	1443	1443	1443
B300	≥ 4	1549	1737	1905	2058	2092	2092
	≥ 8	1636	1827	1994	2092	2092	2092
B350	≥ 4	2109	2356	2577	2774	2861	2861
	≥ 8	2227	2479	2697	2861	2861	2861
B400	≥ 4	2754	3068	3344	3588	3750	3750
	≥ 8	2909	3227	3500	3731	3750	3750

Notes on design

- In-situ concrete is standard for blank boxes.
- The lightweight concrete element is standard for values with grey shading.
- The degree of reinforcement has no appreciable influence on the load-bearing capacity of the column connection.

Design

Hot dimensioning: Load-bearing capacity in case of fire

The verification of the load-bearing capacity in the case of fire in the first instance takes place through the conventional verification of an unimpaired column as per BS EN 1992-1-2 and on the other hand through additional cross-section verification in the area of the column head, whereby for the cross-section verification, the dimensioning diagrams for the fire resistance classes R 30, R 60 and R 90 can be used.

- The internal forces $M_{Ed,fi}$ and $N_{Ed,fi}$ of the exceptional dimensioning situation of exposure to fire, in accordance with the standard time-temperature curve may be determined as for an unimpaired column.
- The assumption of an unimpaired column can be applied for the replacement length of the column in the case of a fire. The connection moments as a result of compatibility and Theory II. Regulations are to be taken into account in the dimensioning and may be approximated over a minimum eccentricity of the normal force of 20 mm.

In addition, the following three cross-section verifications are to be carried out in the area of the pressure connection:

- Cross-section verification of the Schöck Sconnex® type P pressure connection at the transition to the reinforced concrete column for $M_{Ed,fi}$ and $N_{Ed,fi}$ (dashed curve of the diagrams)
- Verification of the column cross-section considered as unreinforced at the transition to the Schöck Sconnex® type P for $M_{Ed,fi}$ and $N_{Ed,fi}$ (drawn-through curves of the diagrams, arranged according to concrete strength class)
- Nachweis einer überdrückten Fuge zwischen den beiden o. g. Querschnitten durch Einhalten der Kernweite: $e_{d,fi} = M_{Ed,fi} / N_{Ed,fi} \leq b/6$ (durchgezogene Gerade der Diagramme)
- For non-square columns within the application conditions on page 108 the supplementary cross-section verifications are to be carried out in each case with the design diagram of the Sconnex element used.

Calculation example, see page 116

Diagrams for fire protection dimensioning

The design values $N_{Rd,concrete}$ and $N_{Rd,\,type\,P}$ can be presented as diagram curves depending on the load eccentricity. This results in individual diagram curves for the concrete strength classes considered and for the Schöck Sconnex® type P. For the load eccentricity the relationship e = M / N applies. If the moment $M_{Rd} = N_{Ed} \cdot e$ is determined as input parameter for the diagram, then from the associated curve values $N_{Rd,concrete}$ and $N_{Rd,\,type\,P}$ the minimum for the design value $N_{Rd,SDA}$ is relevant.

i Fire protection

- Schöck Sconnex® type P may be used in columns without fire resistance requirements as well as in columns of fire resistance classes R 30, R 60 and R 90. The minimum and maximum clear column height is to be observed (see page 92)

Design

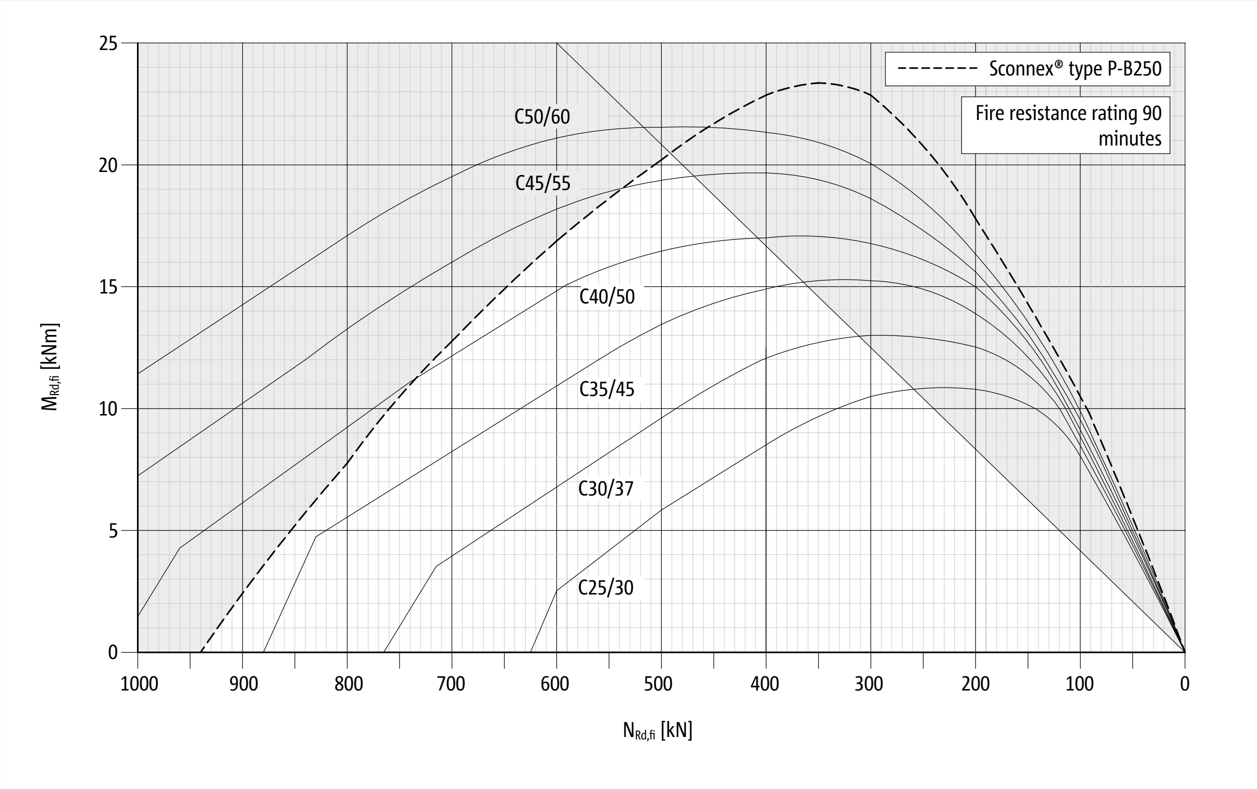


Fig. 129: Schöck Sconnex® type P-B250: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

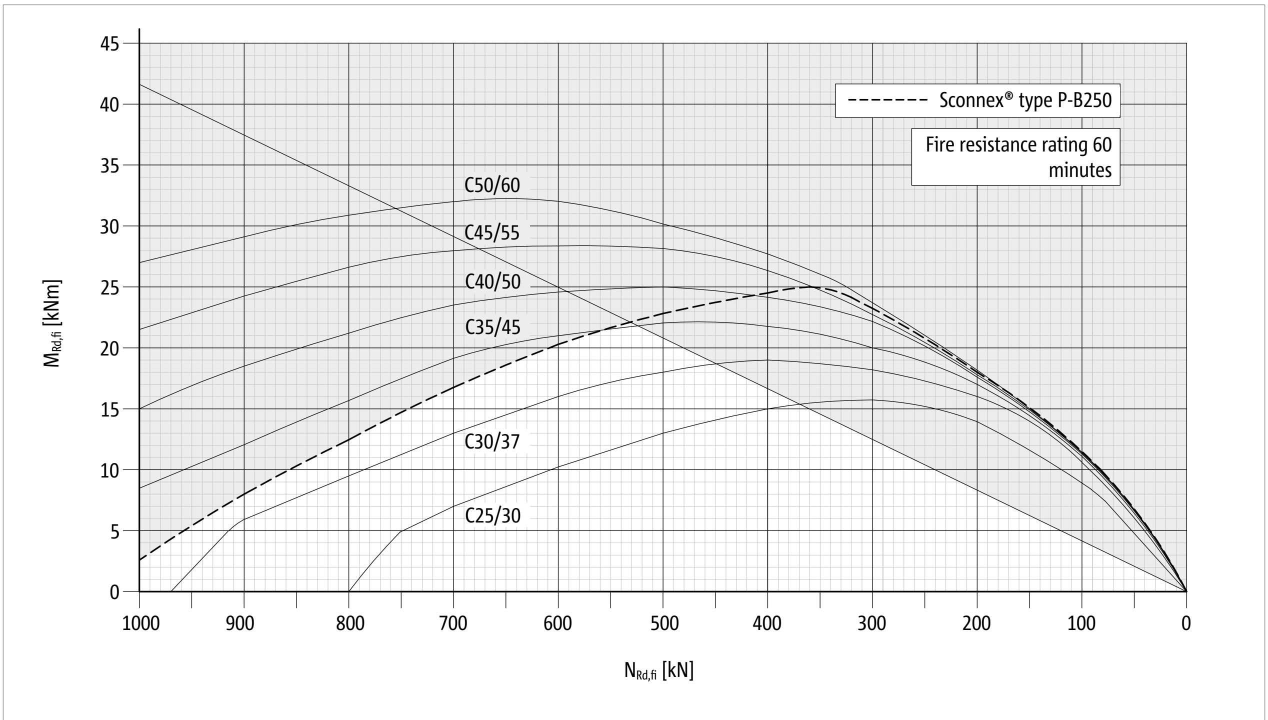


Fig. 130: Schöck Sconnex® type P-B250: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 60

Type P

Reinforced concrete – reinforced concrete

Design

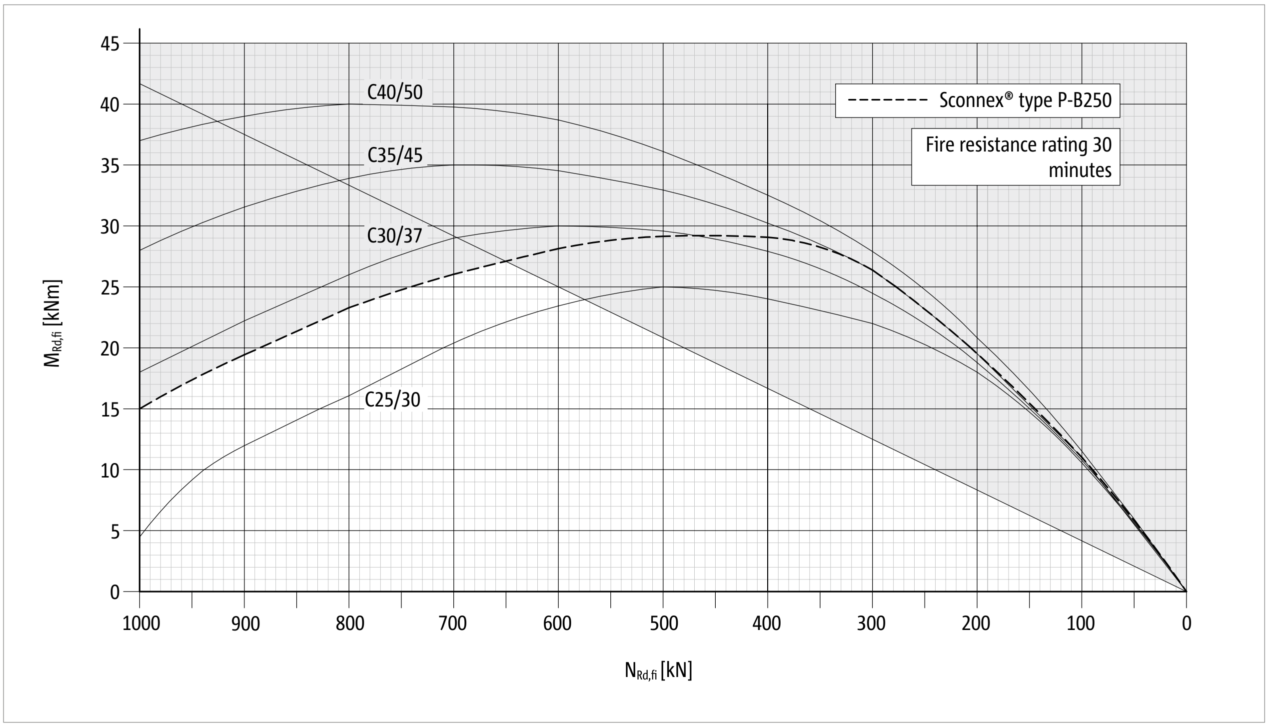


Fig. 131: Schöck Sconnex® type P-B250: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 30

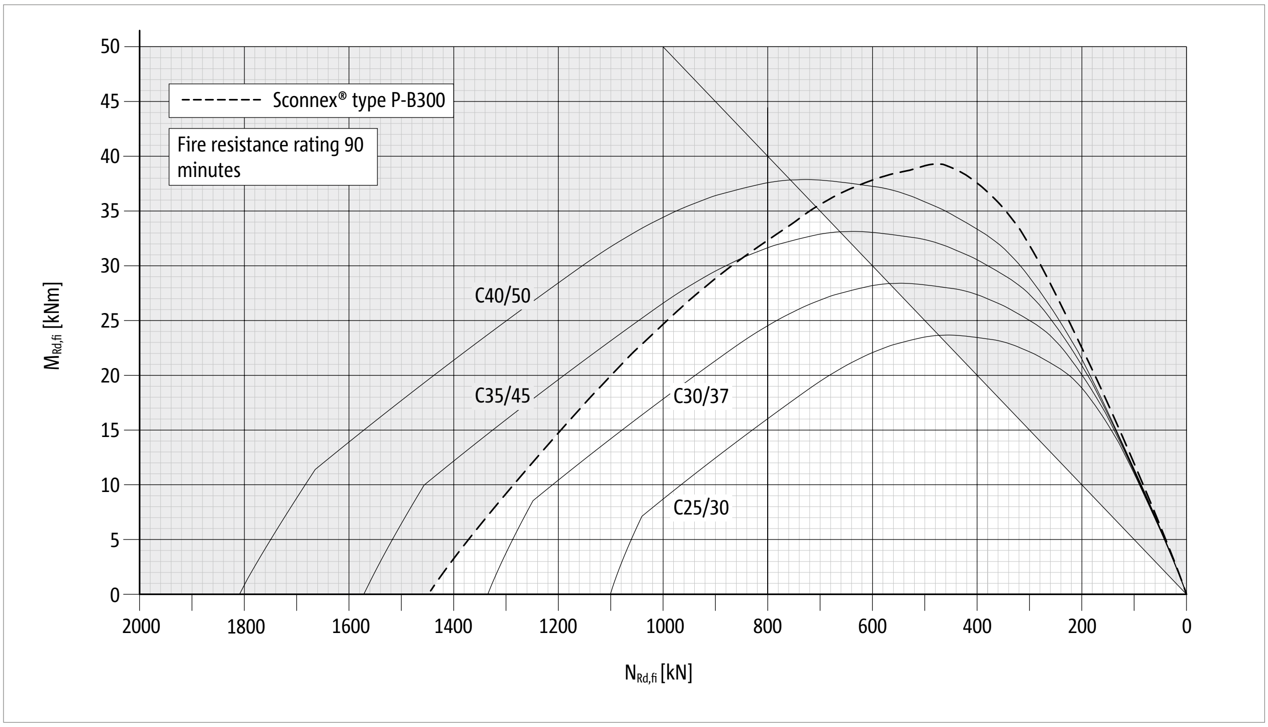


Fig. 132: Schöck Sconnex® type P-B300: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

Design

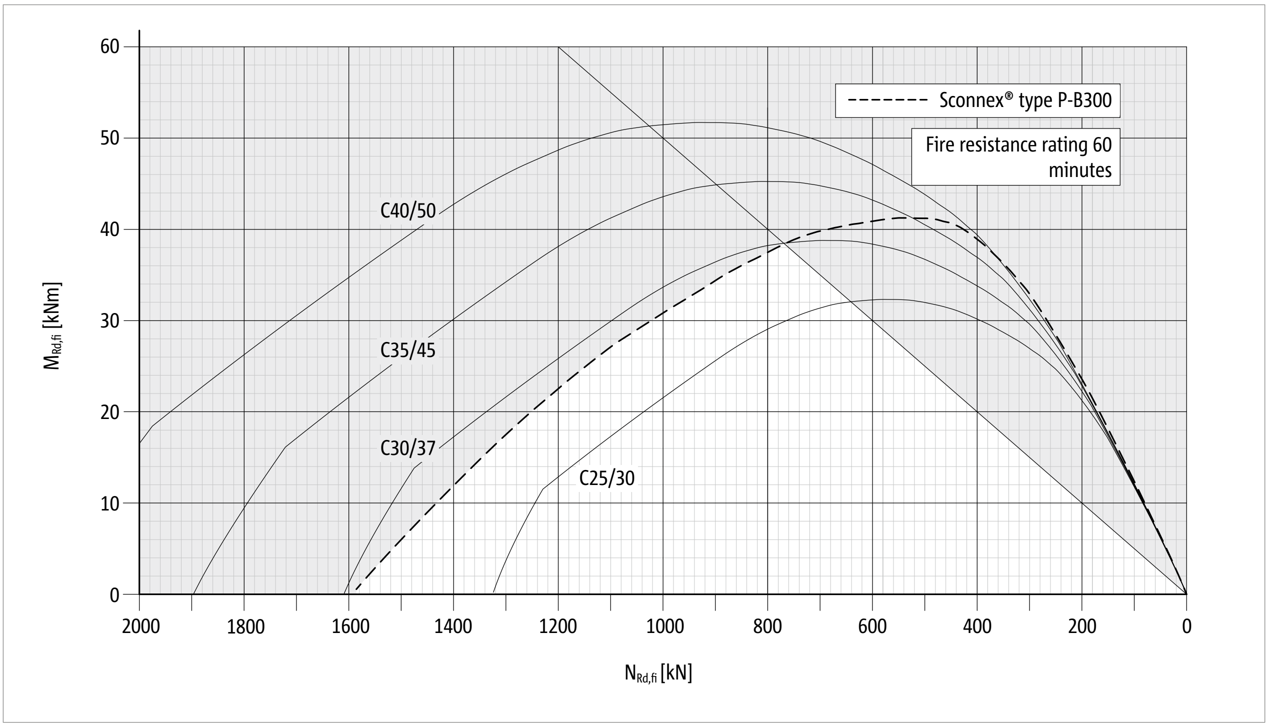


Fig. 133: Schöck Sconnex® type P-B300: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 60

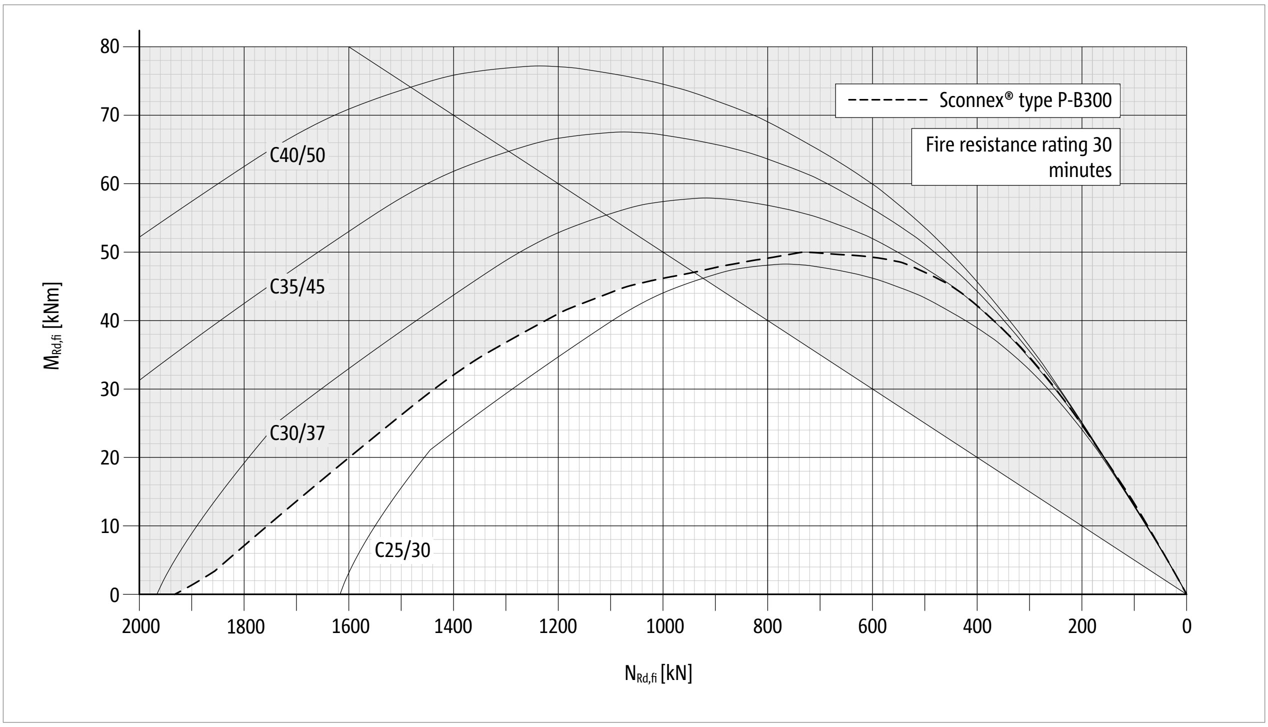


Fig. 134: Schöck Sconnex® type P-B300: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 30

Design

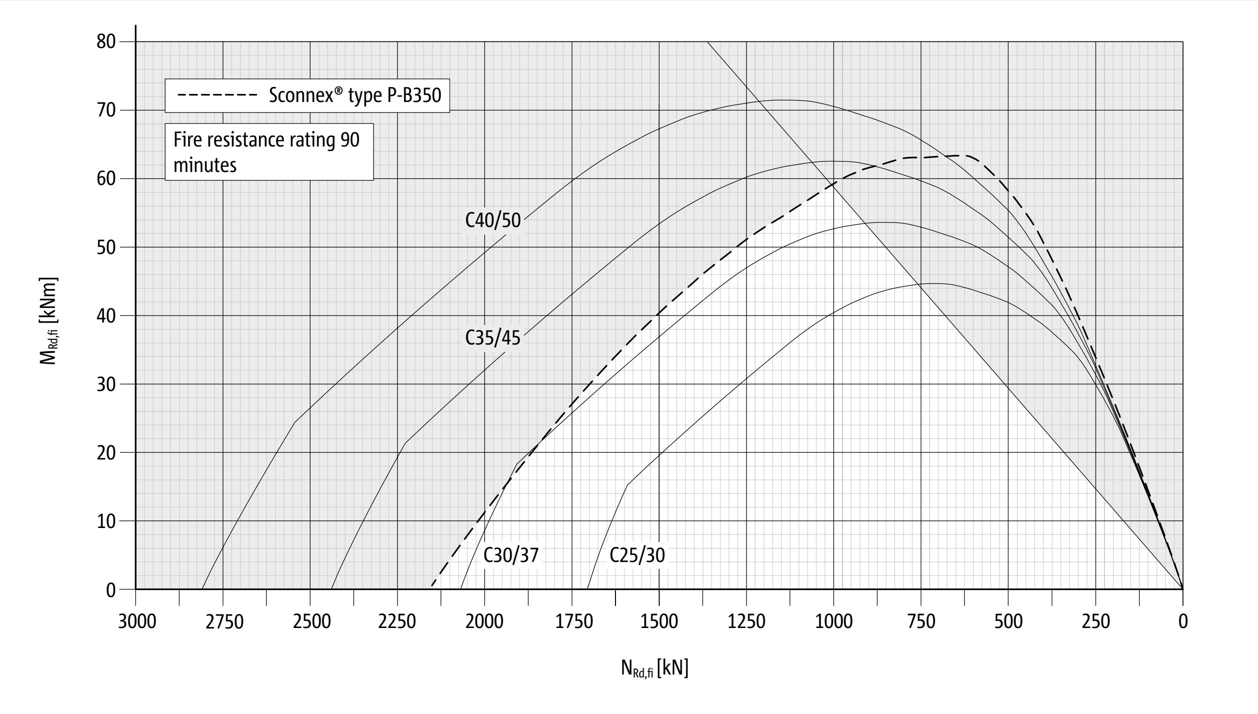


Fig. 135: Schöck Sconnex® type P-B350: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

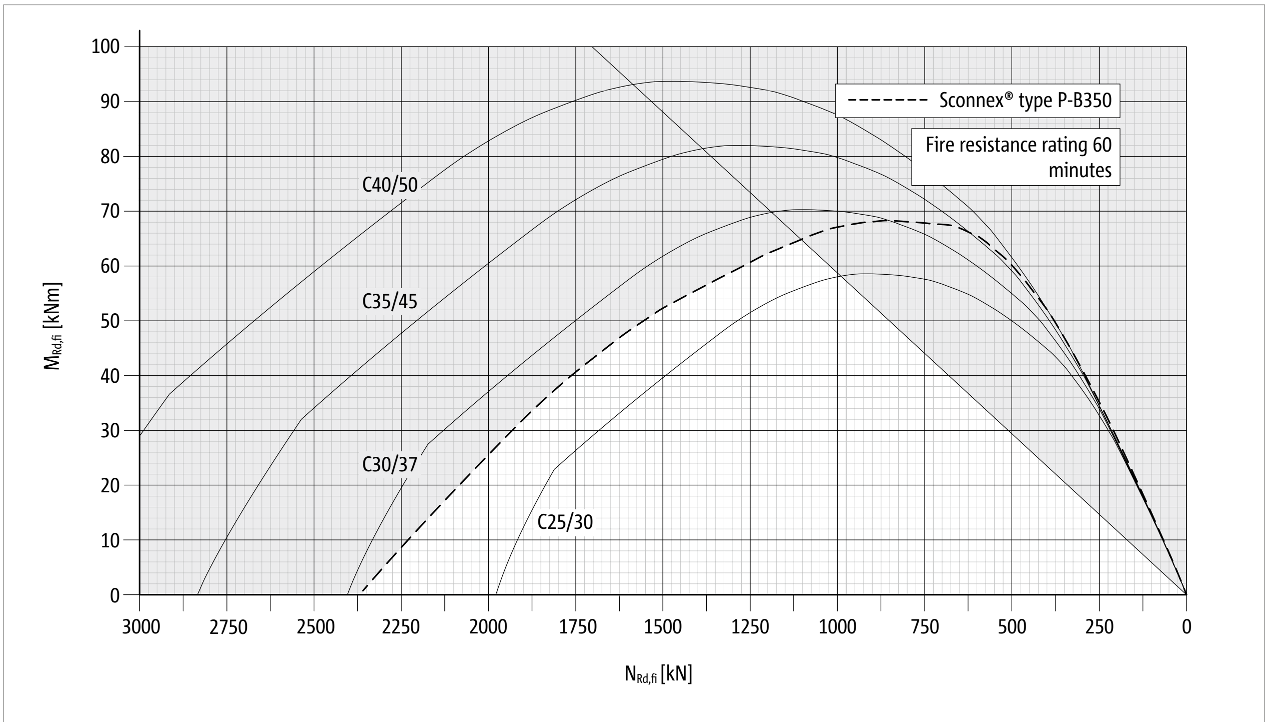


Fig. 136: Schöck Sconnex® type P-B350: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 60

Type P

Reinforced concrete – reinforced concrete

Design

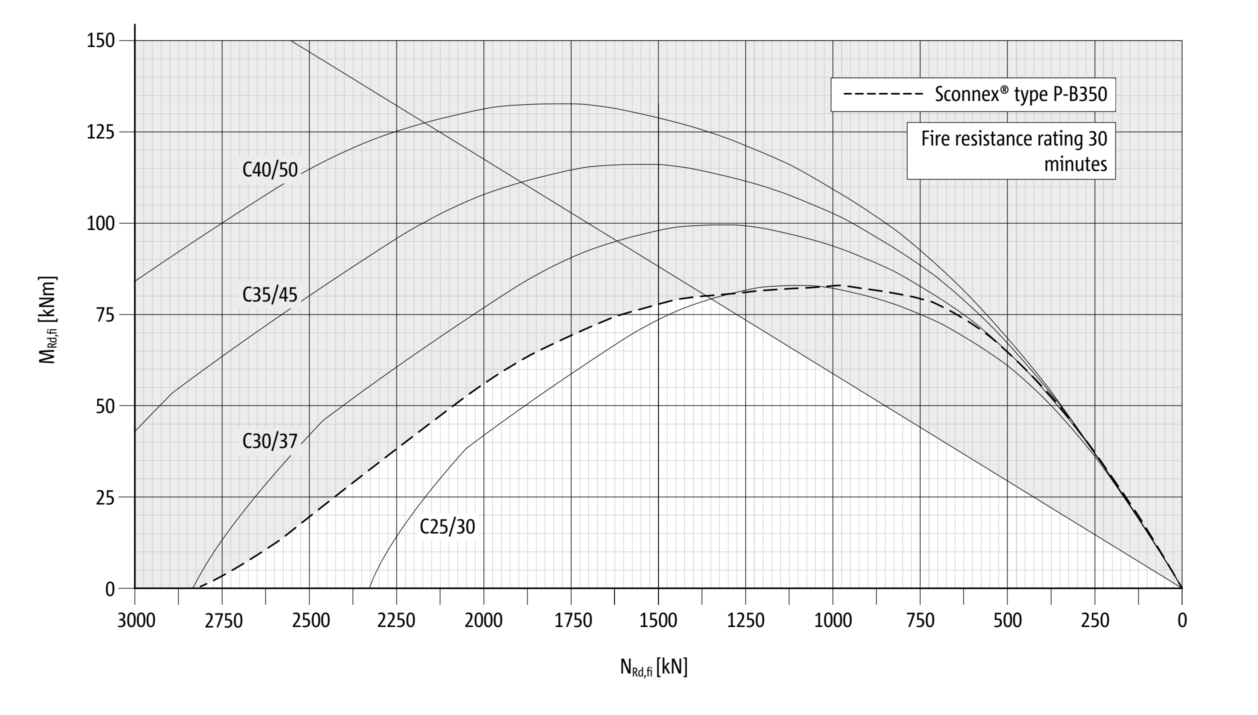


Fig. 137: Schöck Sconnex® type P-B350: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 30

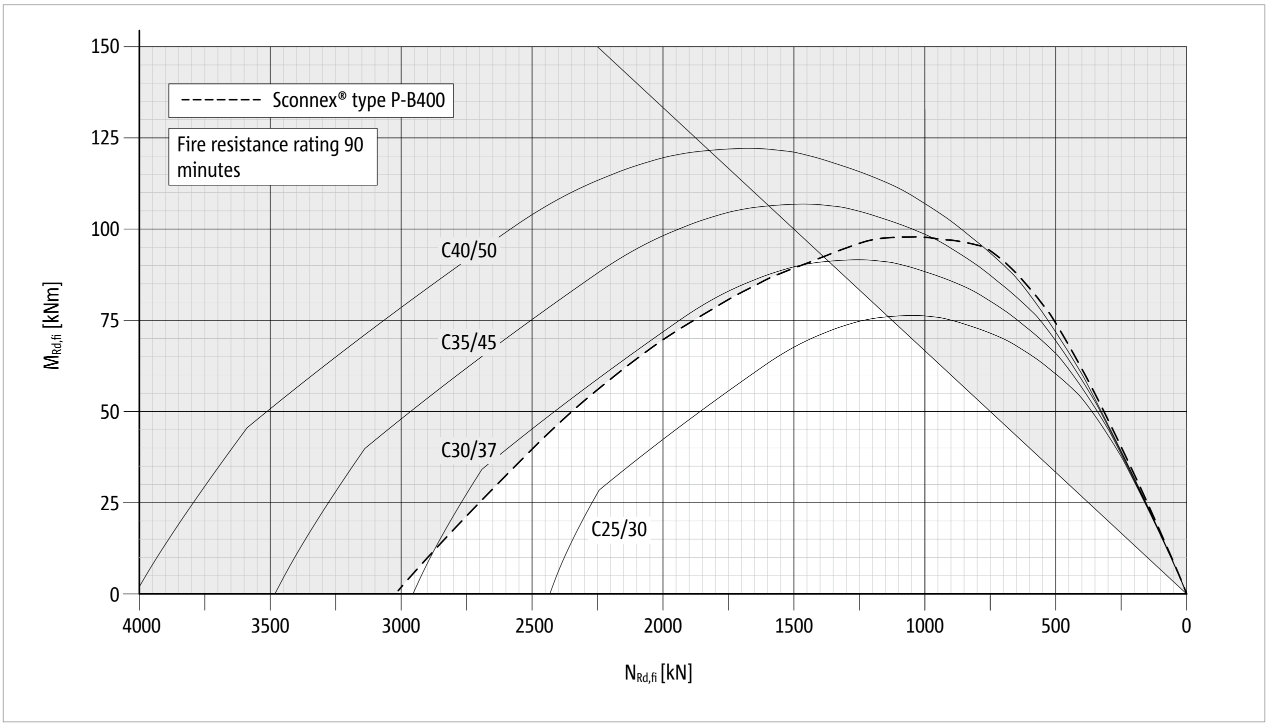


Fig. 138: Schöck Sconnex® type P-B400: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

Design

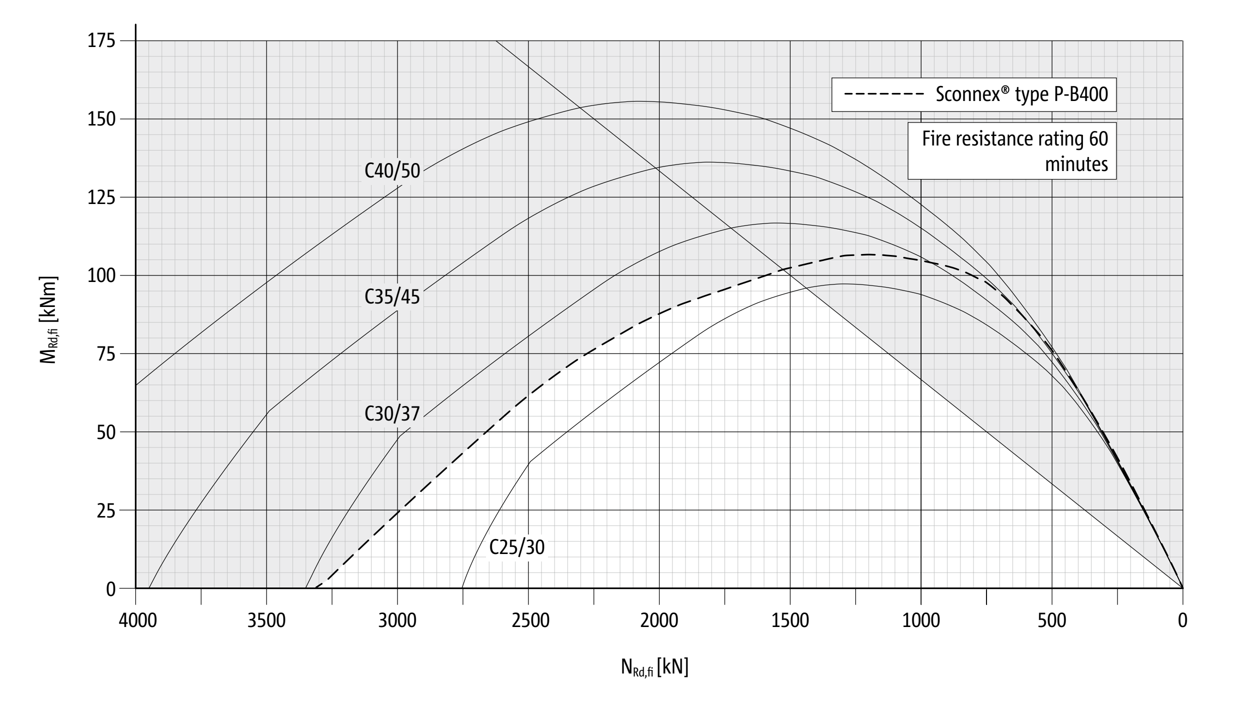


Fig. 139: Schöck Sconnex® type P-B400: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 60

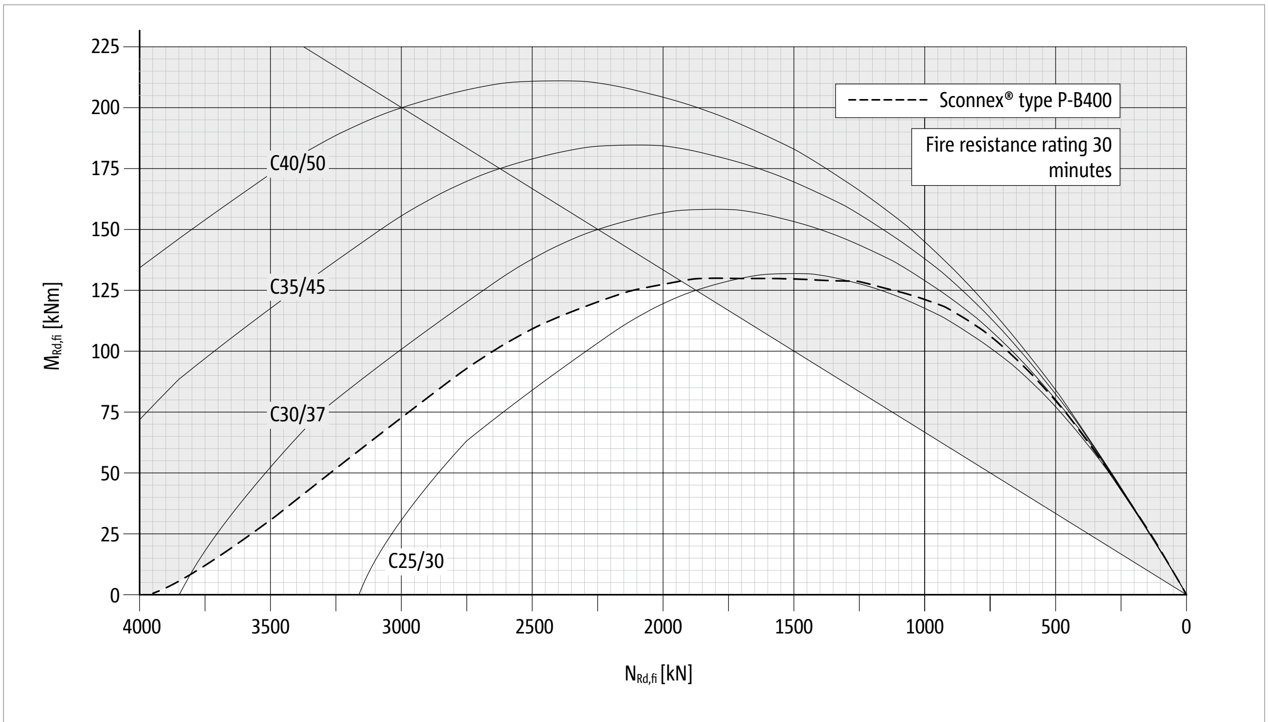


Fig. 140: Schöck Sconnex® type P-B400: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 30

Impact damage

Horizontal load transfer via the joint with impact

Due to the specification of a stiffened system no scheduled horizontal forces are to be removed for the Schöck Sconnex® type P:
- For the determination of internal forces for horizontal effects such as vehicle impact the columns may be dimensioned as hinged columns (articulated mounting).
- With car impacts as per BS EN 1991-1-7, 4.3.1 the verification of the joints between Schöck Sconnex® type P and connecting floor or column may be dispensed with.
- In other cases the determination of the horizontal shear resistance v_{Rd} can be determined in accordance with BS EN 1992-1-1, 6.2.5:

$$v_{Rd} = \mu \cdot \sigma_n \leq 0.1 \cdot f_{cd}$$

with:

$\mu = 0.5$
$\mu = 0.6$, if it is ensured that the concrete consistency class is F4.
σ_n = tension as a result of the minimum normal force perpendicular to the joint, that can act simultaneously with the shear force (positive for compression with $\sigma_n < 0.6 \cdot f_{cd}$ and negative for tension).

Product description

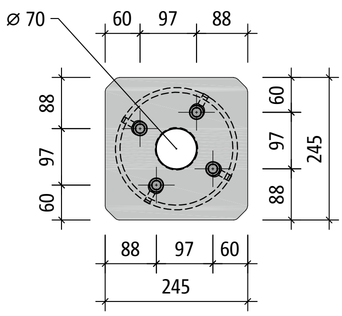


Fig. 141: Schöck Sconnex® type P-B250: Top view

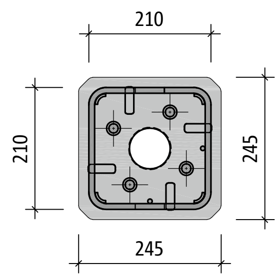


Fig. 142: Schöck Sconnex® type P-B250: Bottom view

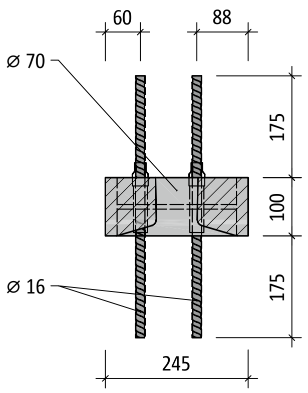


Fig. 143: Schöck Sconnex® type P-B250: Product section Part C

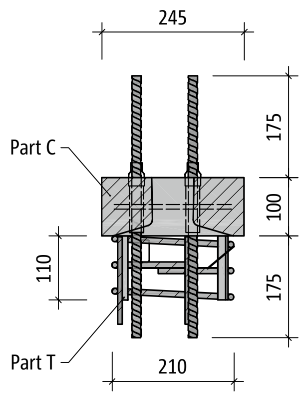


Fig. 144: Schöck Sconnex® type P-B250: Product section Part C and part T

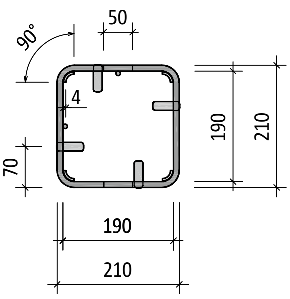


Fig. 145: Schöck Sconnex® type P-B250: Part T; welded stirrup and bending mould segment made of stainless steel

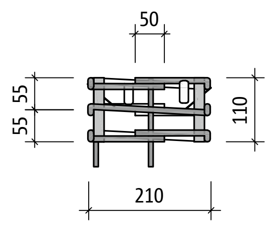


Fig. 146: Schöck Sconnex® type P-B250: Side view Part T; welded stirrup and bending form segments made of stainless steel

Product information

- It is imperative, that in every application, Part C is combined with Part T.

Product description

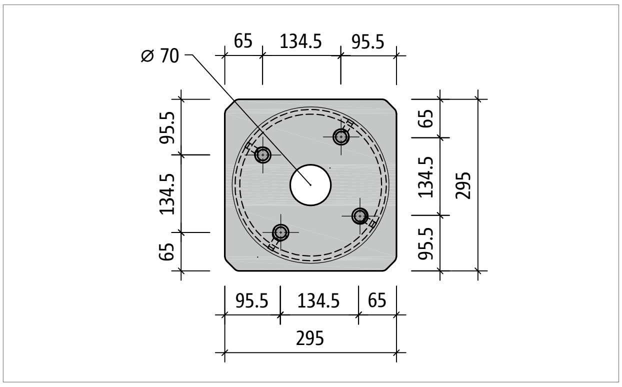


Fig. 147: Schöck Sconnex® type P-B300: Top view

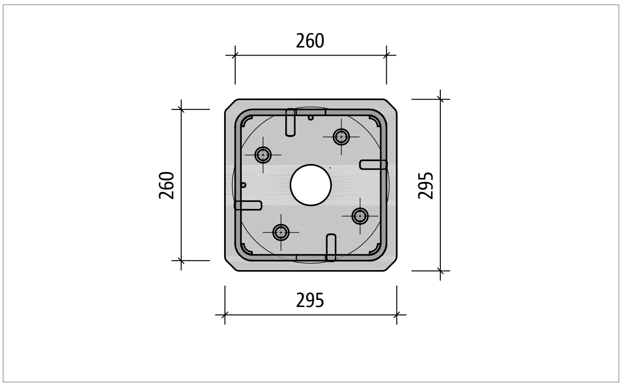


Fig. 148: Schöck Sconnex® type P-B300: Bottom view

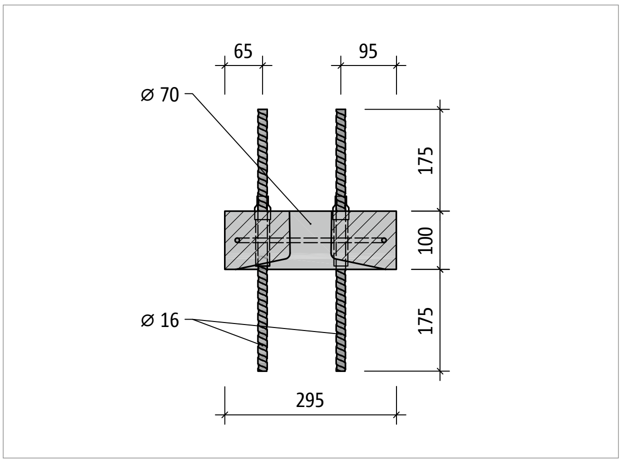


Fig. 149: Schöck Sconnex® type P-B300: Product section Part C

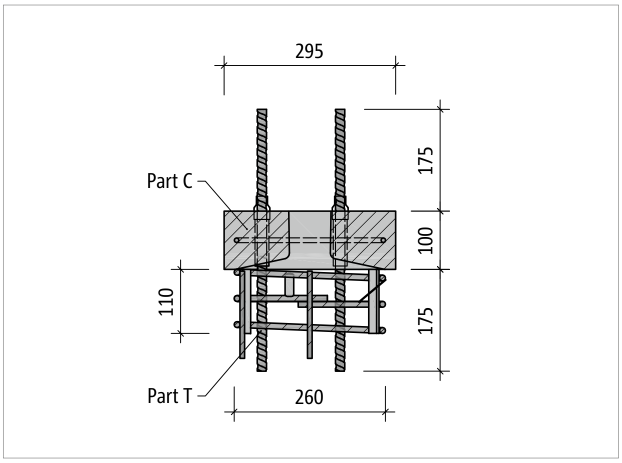


Fig. 150: Schöck Sconnex® type P-B300: Product section Part C and part T

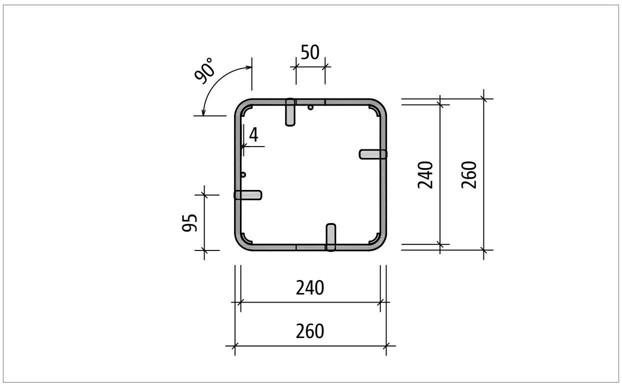


Fig. 151: Schöck Sconnex® type P-B300: Part T; welded stirrup and bending mould segment made of stainless steel

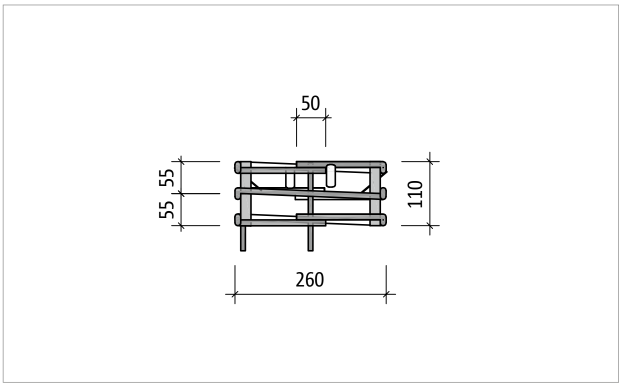


Fig. 152: Schöck Sconnex® type P-B300: Side view Part T; welded stirrup and bending form segments made of stainless steel

Product information

- It is imperative, that in every application, Part C is combined with Part T.

Product description

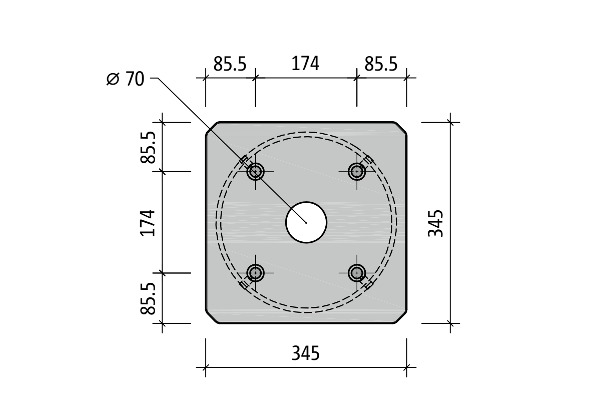


Fig. 153: Schöck Sconnex® type P-B350: Top view

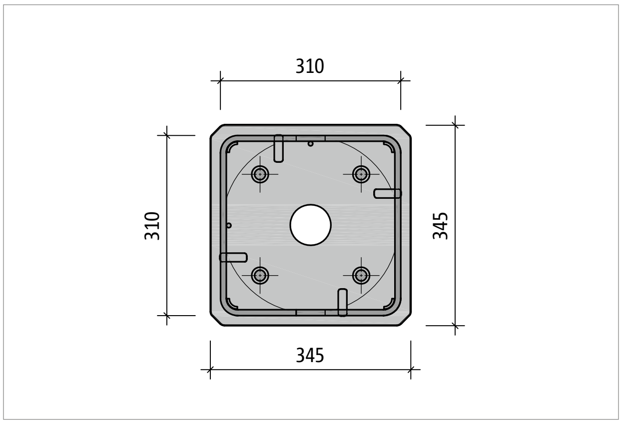


Fig. 154: Schöck Sconnex® type P-B350: Bottom view

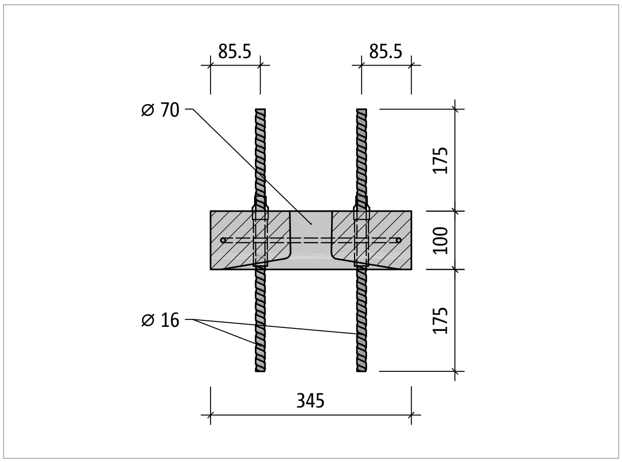


Fig. 155: Schöck Sconnex® type P-B350: Product section Part C

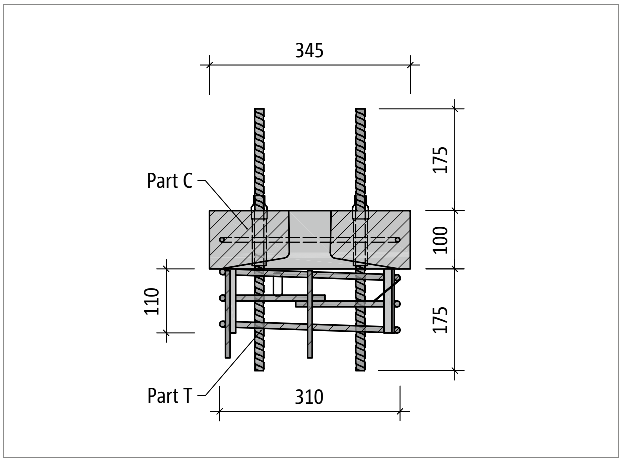


Fig. 156: Schöck Sconnex® type P-B350: Product section Part C and part T

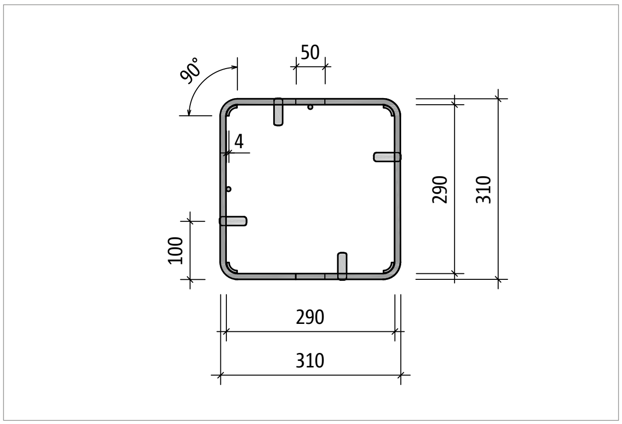


Fig. 157: Schöck Sconnex® type P-B350: Part T; welded stirrup and bending mould segment made of stainless steel

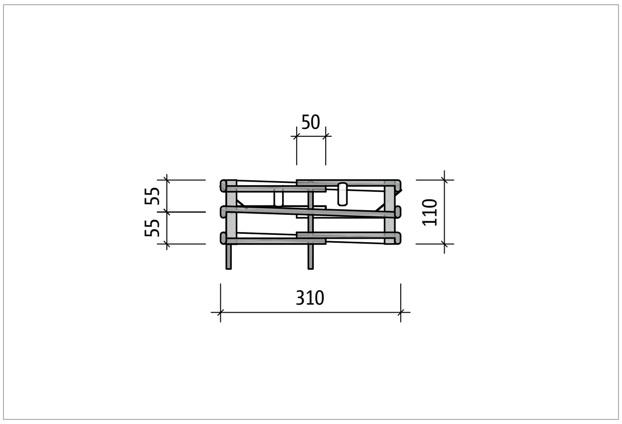


Fig. 158: Schöck Sconnex® type P-B350: Side view Part T; welded stirrup and bending form segments made of stainless steel

Product information

- It is imperative, that in every application, Part C is combined with Part T.

Type P

Reinforced concrete – reinforced concrete

Product description

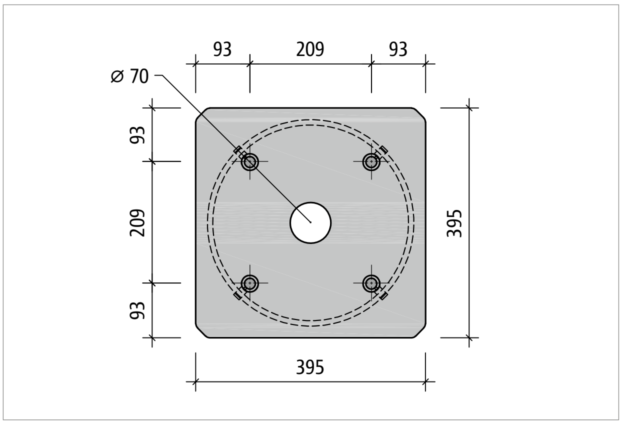


Fig. 159: Schöck Sconnex® type P-B400: Top view

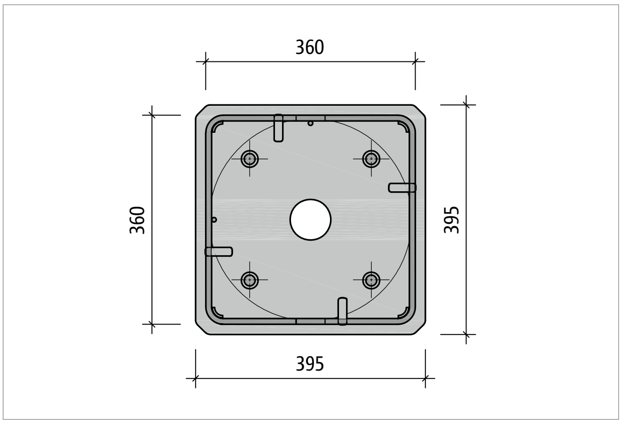


Fig. 160: Schöck Sconnex® type P-B400: Bottom view

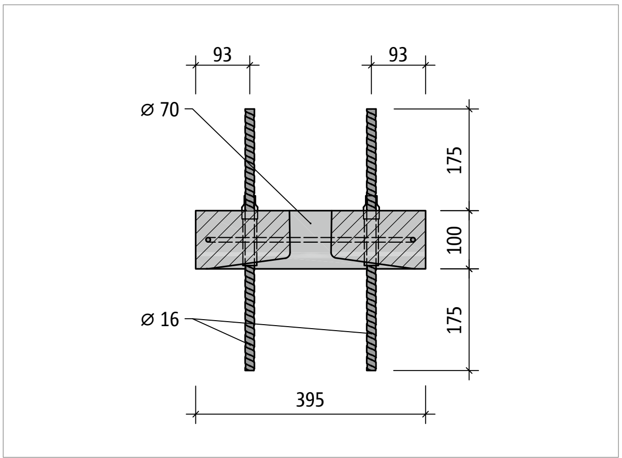


Fig. 161: Schöck Sconnex® type P-B400: Product section Part C

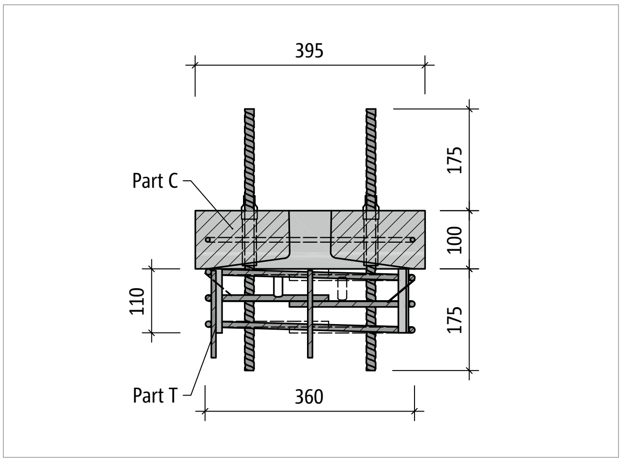


Fig. 162: Schöck Sconnex® type P-B400: Product section Part C and part T

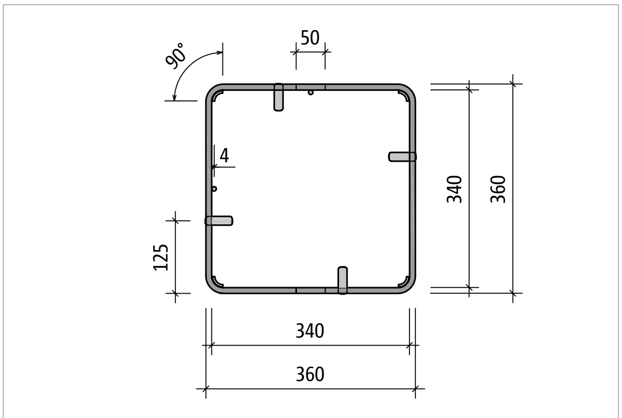


Fig. 163: Schöck Sconnex® type P-B400: Part T; welded stirrup and bending mould segment made of stainless steel

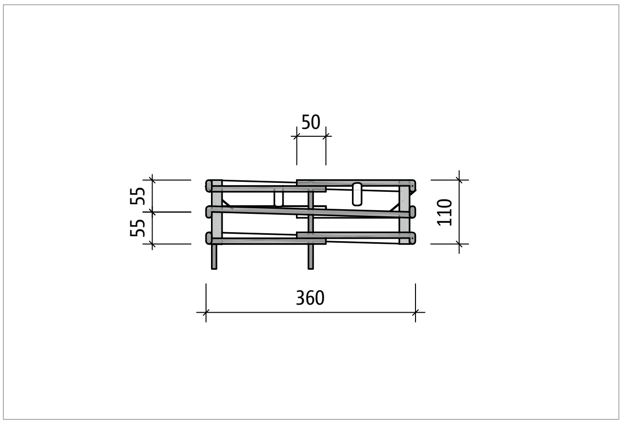


Fig. 164: Schöck Sconnex® type P-B400: Side view Part T; welded stirrup and bending form segments made of stainless steel

Product information

- It is imperative, that in every application, Part C is combined with Part T.

On-site reinforcement

Area limits for reinforcement layout

With increasing aspect ratio of column a_x / a_y three different variants of the reinforcement layout are required:

Reinforcement management in Area 1

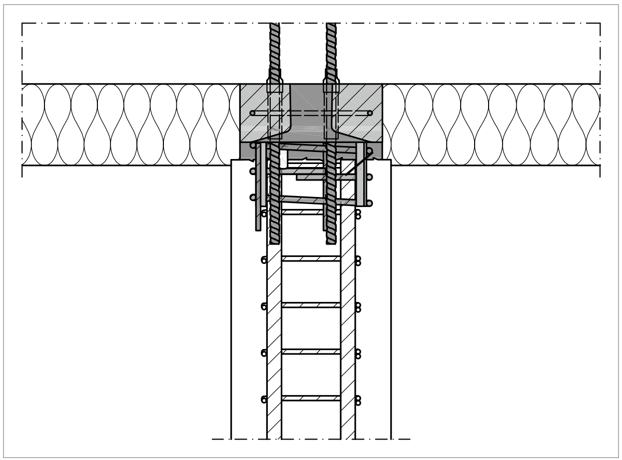


Fig. 165: Schöck Sconnex® type P: Reinforcement layout in Area 1 - longitudinal column section

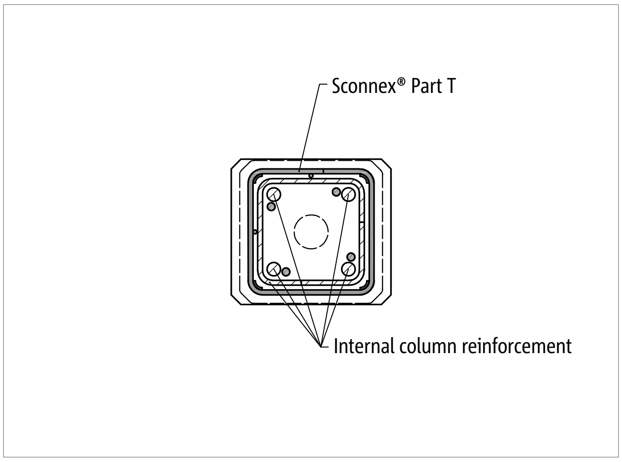


Fig. 166: Schöck Sconnex® type P: Reinforcement layout in Area 1 - column cross-section

Reinforcement layout in Area 2

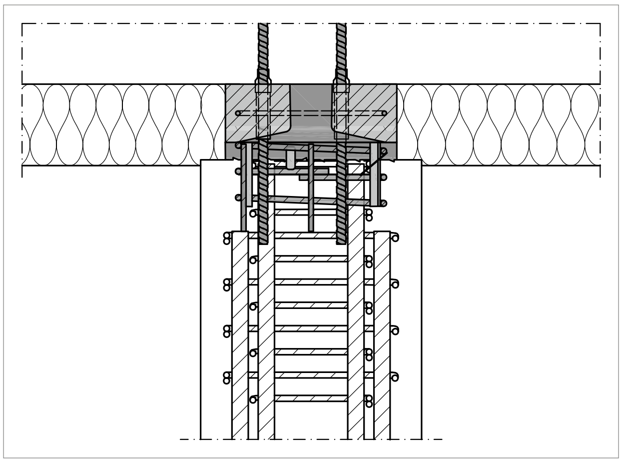


Fig. 167: Schöck Sconnex® type P: Reinforcement layout in Area 2 - longitudinal column section

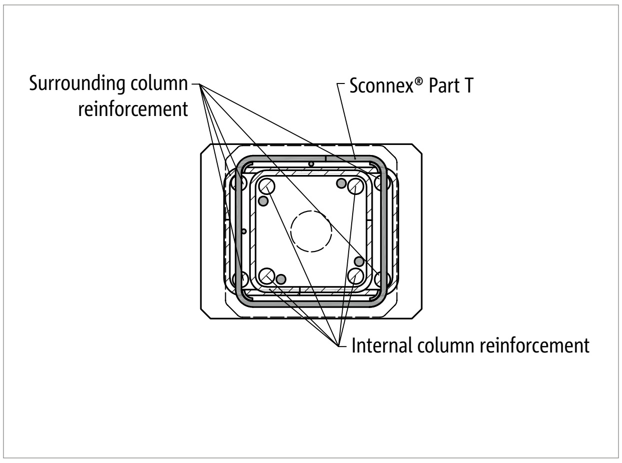


Fig. 168: Schöck Sconnex® type P: Reinforcement layout in Area 2 - column cross-section

Reinforcement layout in Area 3

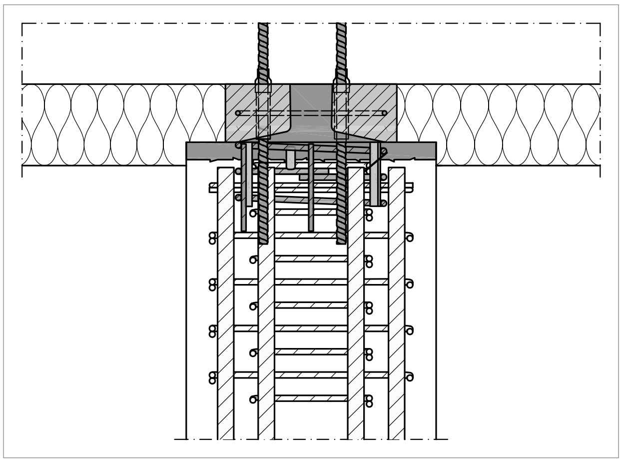


Fig. 169: Schöck Sconnex® type P: Reinforcement layout in Area 3 - longitudinal column section

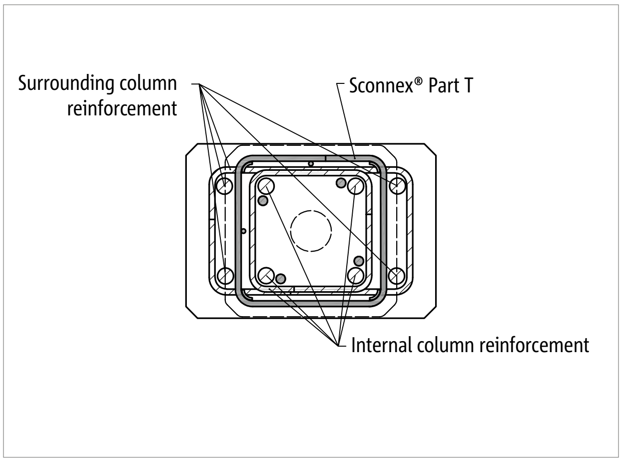


Fig. 170: Schöck Sconnex® type P: Reinforcement layout in Area 3 - column cross-section

On-site reinforcement

Area limits for reinforcement layout

Reinforcement layout in Area 1:
Similar to square column reinforcement with adjustment of the number of stirrups - increased concrete cover is to be noted.

Minimum dimension a_x: $a_x > B$

Reinforcement layout in Area 2:
With surrounding reinforcement, which ends below the Sconnex® Part T.

Minimum dimension a_x: $a_x \geq B + 2 \cdot (d_{Bü,um} + d_{s,um} + 5\ mm)$

Reinforcement layout in Area 3:
With surrounding reinforcement, the c_{nom} ends below the upper edge of the column. Additional stirrups are to be installed.

Minimum dimension a_x: $a_x \geq B + 2 \cdot (c_{nom} - 20\ mm + d_{Bü,um} + d_{s,um} + 5\ mm)$

with:

a_x: Dimensions of the column [mm]
B: Width (nominal dimension of the edge length Schöck Sconnex® type P - see page 90) [mm]
$d_{Bü,\ um}$: Stirrup diameter of the surrounding column reinforcement (Pos. 6 / 7) [mm]
$d_{s,\ um}$: Diameter of the longitudinal bars of the surrounding reinforcement (Pos. 1 / 2) [mm]
c_{nom}: Required concrete cover [mm]

Schöck Sconnex® type P					
On-site reinforcement for rectangular columns with $a_x / a_y \leq 2:1$		Edge length a_x [mm]			
		Area 1	Area 2	Area 3	
$d_{Bü,um}$ [mm]	$d_{s,um}$ [mm]	Start	Start	Start	End
8	12	> B	B + 40	B + 90	2 • B
8	14	> B	B + 45	B + 95	2 • B
8	16	> B	B + 50	B + 100	2 • B
8	20	> B	B + 60	B + 110	2 • B
8	25	> B	B + 70	B + 120	2 • B
8	28	> B	B + 75	B + 125	2 • B
10	12	> B	B + 45	B + 95	2 • B
10	14	> B	B + 50	B + 100	2 • B
10	16	> B	B + 55	B + 105	2 • B
10	20	> B	B + 60	B + 110	2 • B
10	25	> B	B + 70	B + 120	2 • B
10	28	> B	B + 80	B + 130	2 • B
12	32	> B	B + 90	B + 140	2 • B

i On-site reinforcement

- The table values apply for c_{nom} = 40 mm.

On-site reinforcement

Column reinforcement

The column reinforcement and the number of the longitudinal reinforcement bars in the column are to be determined by the structural engineer according to the valid building codes. In this respect the degree of reinforcement and the number of longitudinal reinforcement bars can be determined independent of Schöck Sconnex® type P. The load-bearing capacities depending on the number of bars as per table (see page 94) are to be observed.

On-site reinforcement for square column

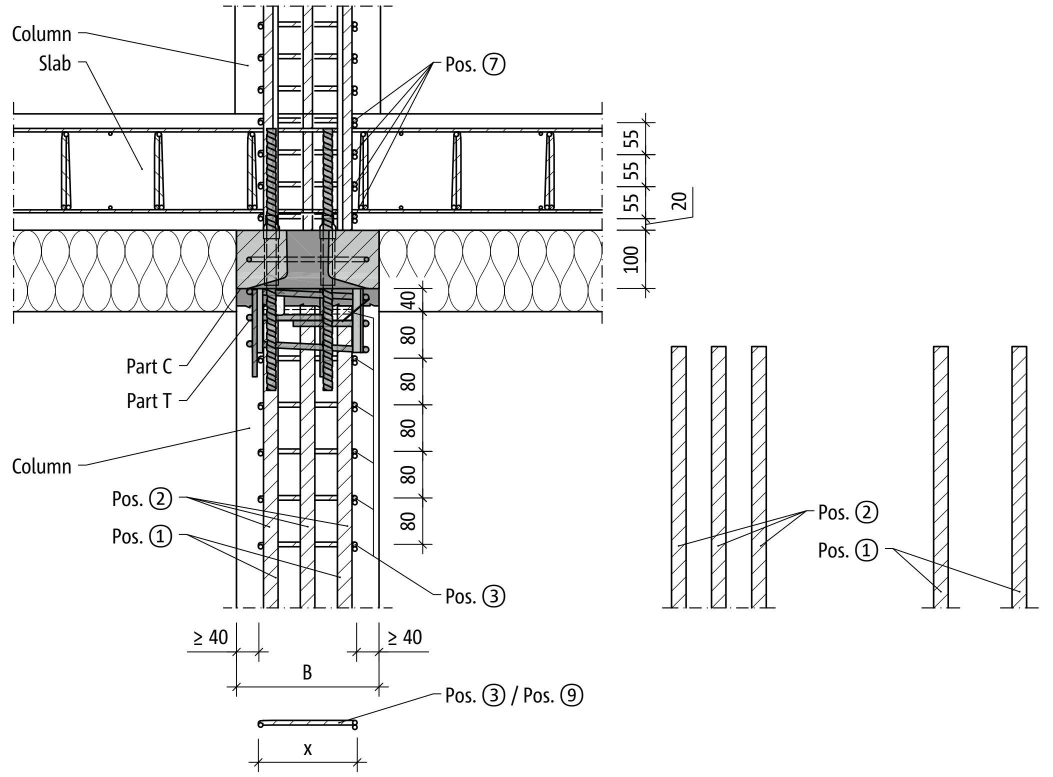
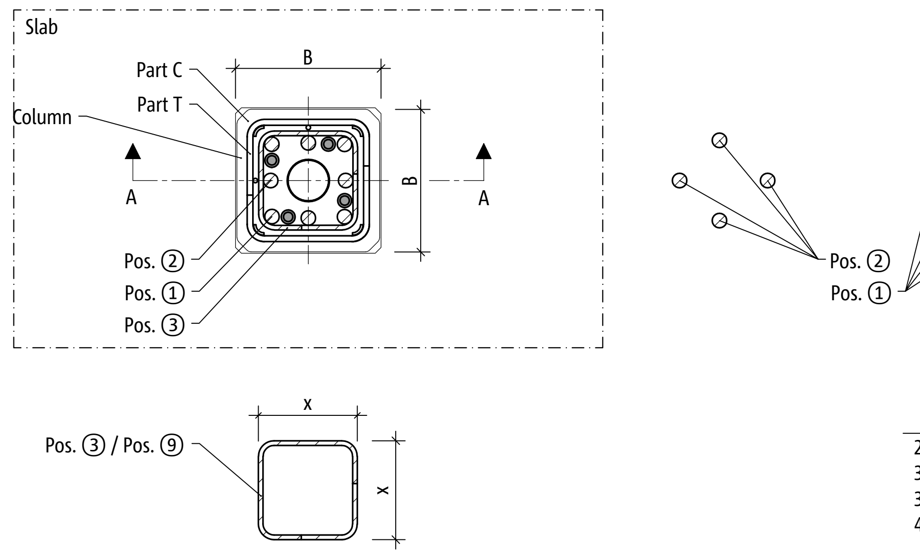


Fig. 171: Schöck Sconnex® type P: On-site reinforcement in column cross-section A-A



B	x
250	170
300	220
350	270
400	320

Fig. 172: Schöck Sconnex® type P: On-site reinforcement in column cross-section

Type P

Reinforced concrete – reinforced concrete

On-site reinforcement

On-site reinforcement for square column in Area 1

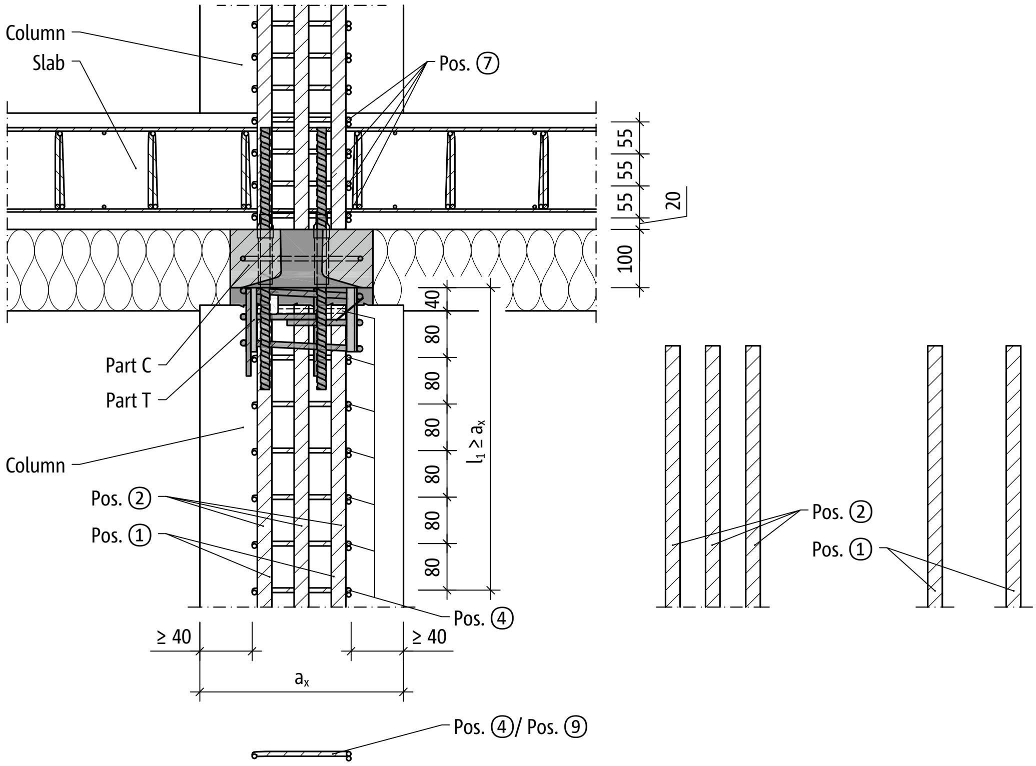
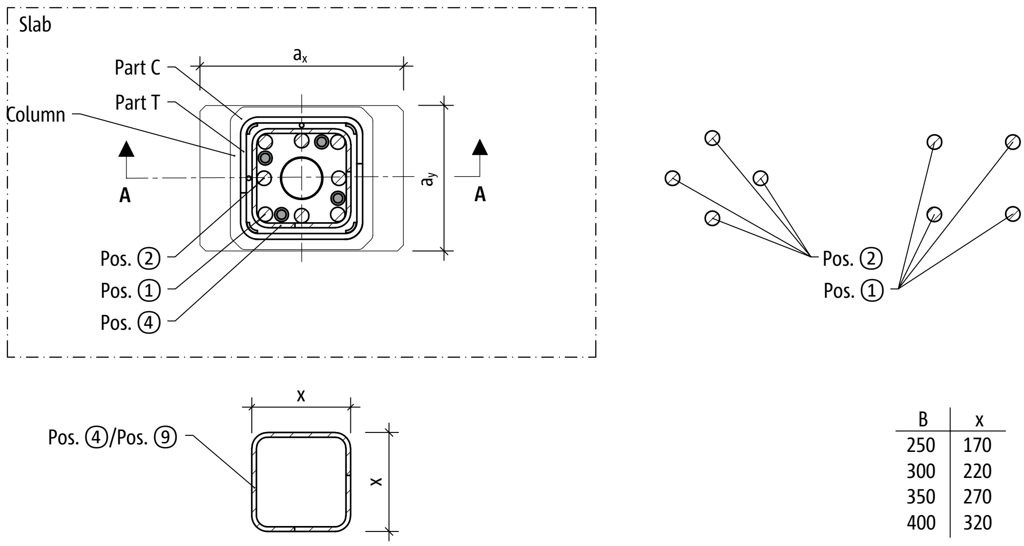


Fig. 173: Schöck Sconnex® type P: On-site reinforcement in column cross-section A-A



B	x
250	170
300	220
350	270
400	320

Fig. 174: Schöck Sconnex® type P: On-site reinforcement in column cross-section

Type P

Reinforced concrete – reinforced concrete

On-site reinforcement

On-site reinforcement for square column in Area 2

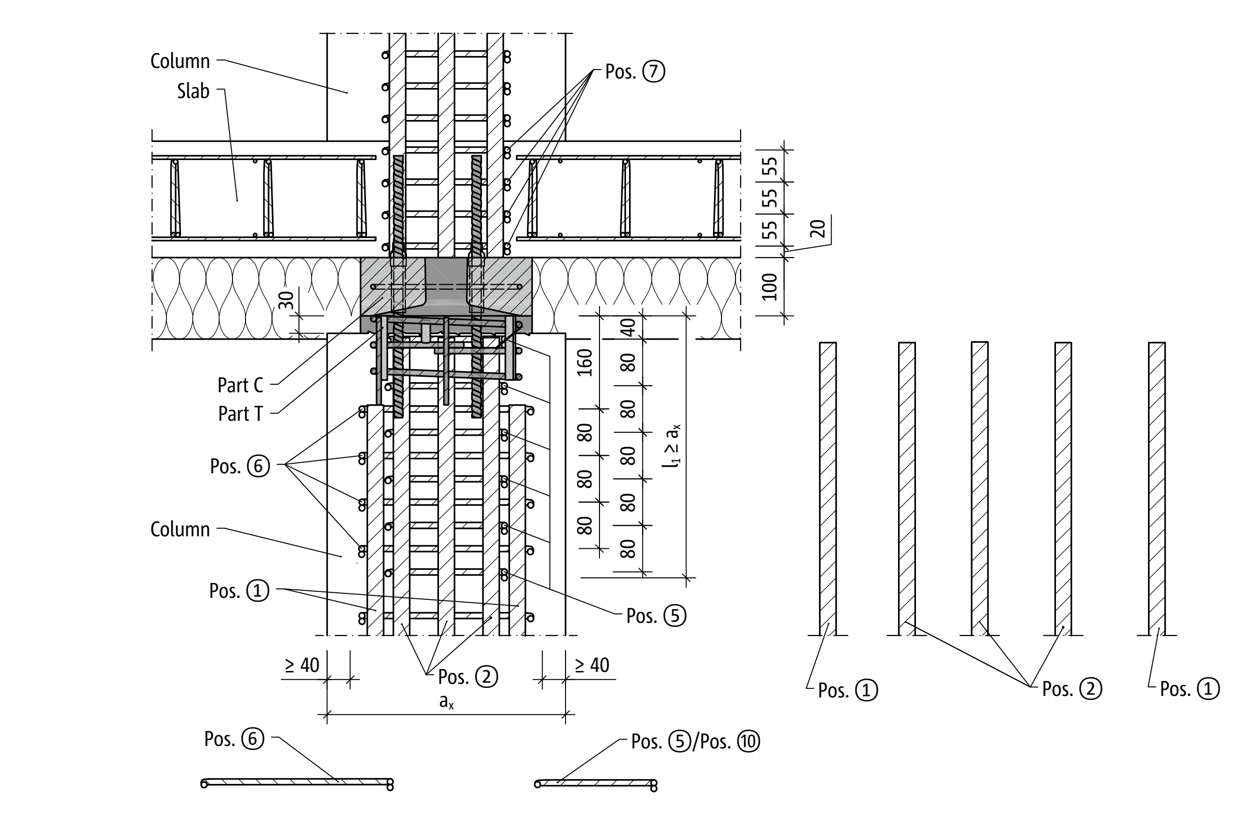
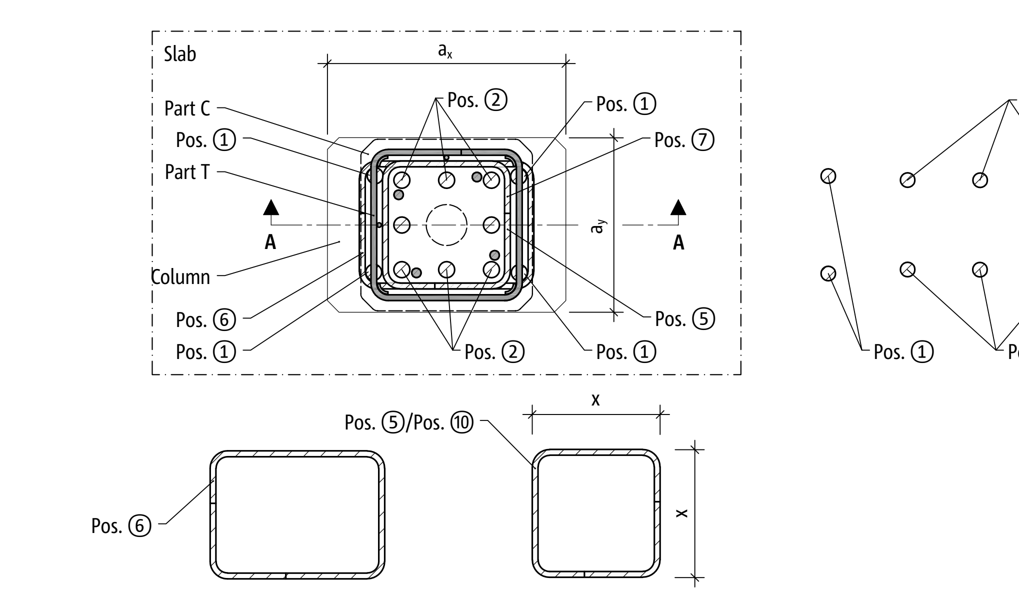


Fig. 175: Schöck Sconnex® type P: On-site reinforcement in column cross-section A-A



B	x
250	160
300	210
350	260
400	310

Fig. 176: Schöck Sconnex® type P: On-site reinforcement in column cross-section

Type P

Reinforced concrete – reinforced concrete

On-site reinforcement

On-site reinforcement for square column in Area 3

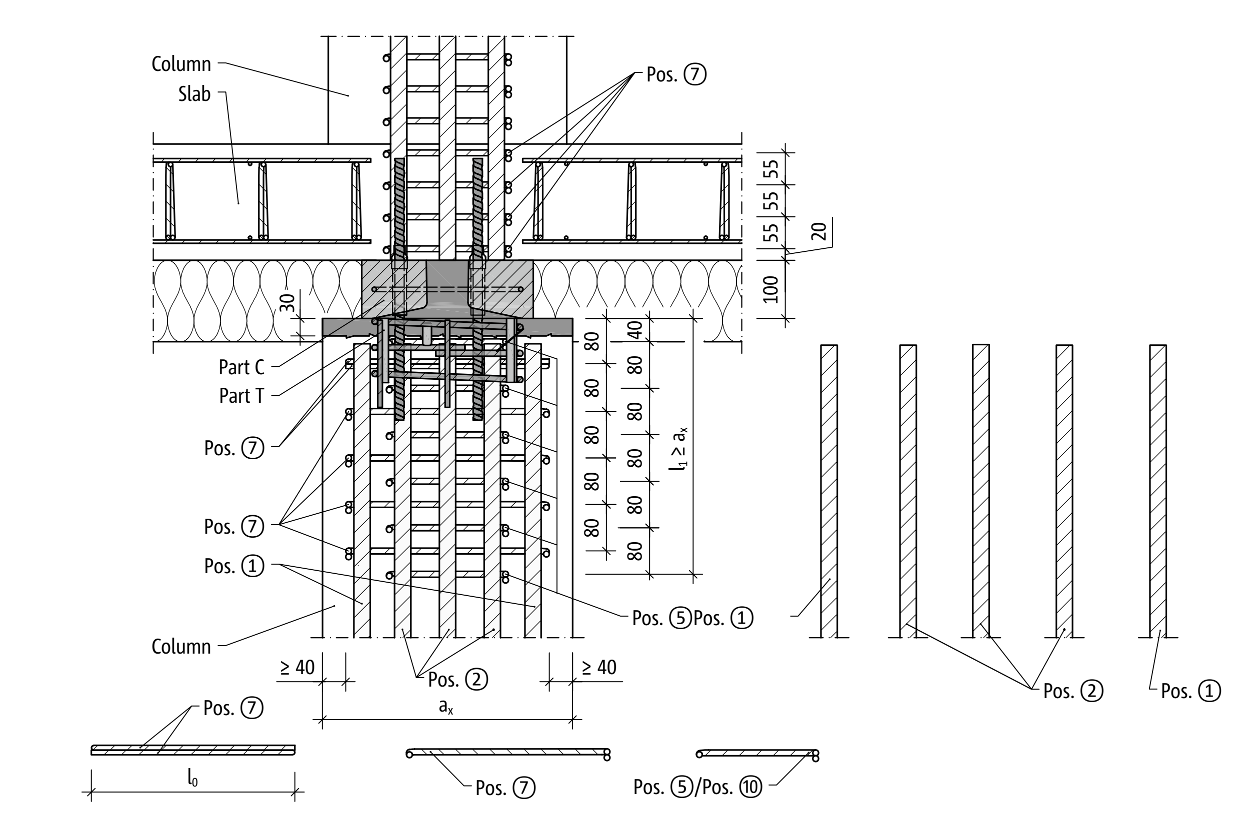


Fig. 177: Schöck Sconnex® type P: On-site reinforcement in column cross-section A-A

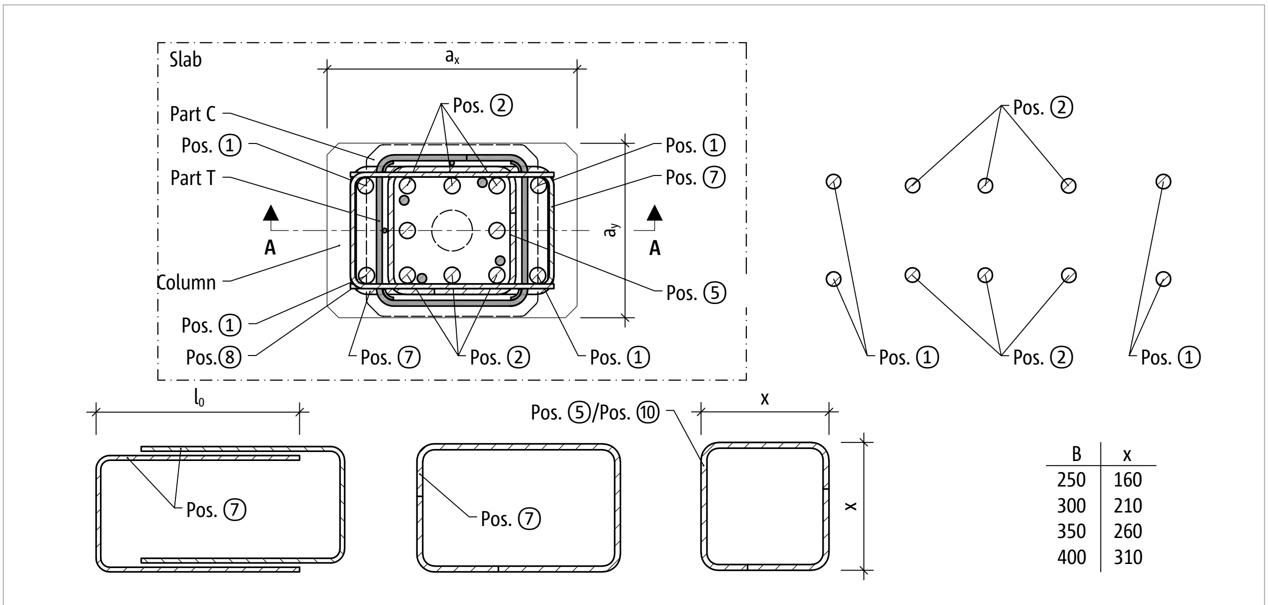


Fig. 178: Schöck Sconnex® type P: On-site reinforcement in column cross-section

Type P

Reinforced concrete – reinforced concrete

On-site reinforcement

Schöck Sconnex® type P			B250	B300	B350	B400
On-site reinforcement			Concrete strength class ≥ C25/30			
Longitudinal reinforcement						
Pos. 1			4 • Hx; x in accordance with column design specified by the structural engineer			
Longitudinal reinforcement (optional)						
Pos. 2			4 • Hx; x in accordance with column design specified by the structural engineer			
Transverse reinforcement as stirrup below Sconnex® Part C						
Pos. 3			6 ⌀ 8 / 80 mm	6 ⌀ 10 / 80 mm		
Transverse reinforcement as stirrup below Sconnex® Part C (via $l_1 \geq a_x$ to be arranged with separation of 80 mm)						
Edge length a_x [mm]	≤ 440	Pos. 4 / 5	6 ⌀ 8 / 80 mm	6 ⌀ 10 / 80 mm		
		Pos. 6 / 7	4 ⌀ 8 / 80 mm	4 ⌀ 10 / 80 mm		
	≤ 520	Pos. 4 / 5	7 ⌀ 8 / 80 mm	7 ⌀ 10 / 80 mm		
		Pos. 6 / 7	5 ⌀ 8 / 80 mm	5 ⌀ 10 / 80 mm		
	≤ 600	Pos. 4 / 5	8 ⌀ 8 / 80 mm	8 ⌀ 10 / 80 mm		
		Pos. 6 / 7	6 ⌀ 8 / 80 mm	6 ⌀ 10 / 80 mm		
	≤ 680	Pos. 4 / 5	9 ⌀ 8 / 80 mm	9 ⌀ 10 / 80 mm		
		Pos. 6 / 7	7 ⌀ 8 / 80 mm	7 ⌀ 10 / 80 mm		
	≤ 760	Pos. 4 / 5	10 ⌀ 8 / 80 mm	10 ⌀ 10 / 80 mm		
		Pos. 6 / 7	8 ⌀ 8 / 80 mm	8 ⌀ 10 / 80 mm		
	≤ 800	Pos. 4 / 5	11 ⌀ 8 / 80 mm	11 ⌀ 10 / 80 mm		
		Pos. 6 / 7	9 ⌀ 8 / 80 mm	9 ⌀ 10 / 80 mm		
Slip in bracket						
Pos. 8			2 ⌀ 10			
Transverse reinforcement as stirrup above Sconnex® Part C						
Pos. 9			4 • H8	4 • H10		
Pos. 10			4 • H8	4 • H10		

On-site reinforcement

- Pos. 2 (optional): The longitudinal reinforcement in accordance with the column dimensioning by the structural engineer, can be omitted.
- Pos. 3: The lateral lengths of the stirrup are to be defined as external dimensions (see page 92). This specification enables the correct installation of Schöck Sconnex® type P Part T and the dimensioning for the case of fire. This can have an impact on the static effective height used for the calculation.
- Smaller stirrup spacings than those given are permitted.
- The distance of Pos. 3, Pos. 4 and Pos. 5 to the lower edge of Part C is 40 mm, see specifications in the column longitudinal sections for the on-site reinforcement.
- As the column longitudinal reinforcement cannot be carried out through the Schöck Sconnex® type P Part C, an unreinforced area appears under Part C and the poured concrete layer. The load-bearing capacity of this connection area is regulated in the German Approval and is taken into account in the load-bearing values.
- With rising columns the spacing of vertical column longitudinal reinforcement is between 0 and 25 mm from the lower edge of Part C.
- For concrete covers of 70 mm or more, surface reinforcement in accordance with BS EN 1992-1-2/NA, 4.5.2 (2) is to be installed: Mesh size of maximum 100 mm, diameter of at least 4 mm.

Warning note

- In the area 20 cm above Part C to 35 cm below Part C only angled hooks in accordance with BS EN 1992-1-1, Figure 8.5.b may be used. Stirrup-locks with 135° hooks in accordance BS EN 1992-1-1, Fig. 8.5.a lead to collisions with the Combar® of Part C.

Tight fit | Grouting concrete | Strapping | Installation

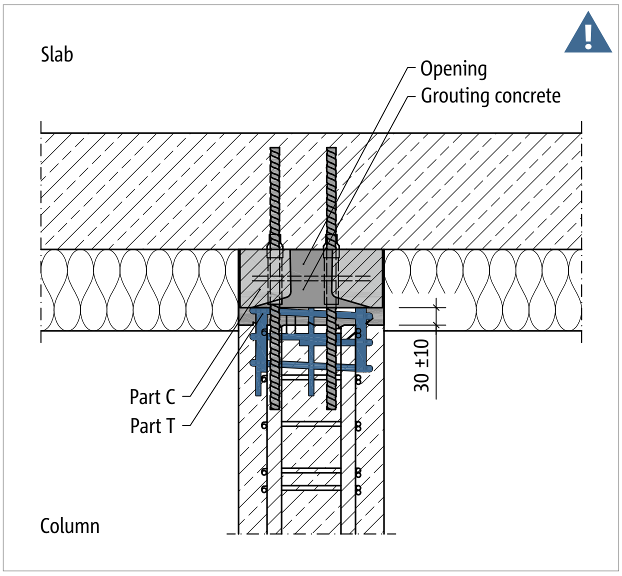


Fig. 179: Schöck Sconnex® type P: Installation section; connection column – floor using integrated Part T for the load-bearing safety in combination with Part C

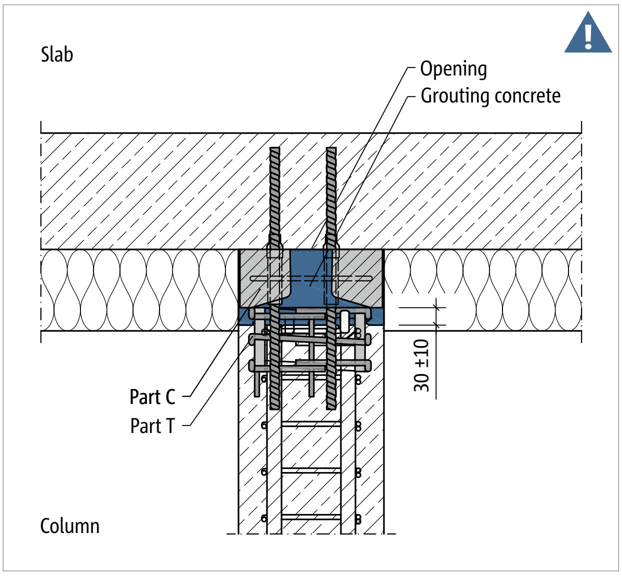


Fig. 180: Schöck Sconnex® type P: Installation section; connection column – floor using form fit to the column concrete using PAGEL® grouting V1/50

Poured concrete: PAGEL® grouting V1/50

- Schöck Sconnex® type P is supplied together with a premixed dry mortar for the production of PAGEL®-Verguss V1/50 cast concrete. The quantity supplied is designed for the establishment of a positive fit at a column–slab connection with a square column.
- For the extended application using a rectangular column cross-section it is to be checked whether the quantity supplied is still sufficient due to the increased backfill volume. If not, a further container of dry mortar must be planned in order to guarantee the form fit.

Hazard note, form fit with poured concrete

- The tight fit of the Schöck Sconnex® type P Part C to the column concrete is to be achieved using PAGEL® grouting V1/50 poured concrete. The opening in Part C must be filled up to the top edge.
- The grouting (depending on the temperature, see installation instructions) may, at the earliest, take place 24 hours after concreting of the column.
- The installation instructions for Schöck Sconnex® type P is to be taken into account for the correct installation of the components Part C and Part T.

Hazard note, strapping of the column concrete

- In the application the combination Schöck Sconnex® type P Part C with Part T is absolutely necessary in order to achieve a three-dimensional compressive stress status.
- Part T acts as additional stirrup under Part C at the top of the column for the acceptance of the hoop tension force from the end-anchorage of the column longitudinal reinforcement and for the strapping of the column concrete.

Installation

- The installation and the processing of Schöck Sconnex® type P require particular knowledge and special care. If an installation or processing does not take place professionally this has an influence on the statics of the complete building and can impair its stability. Therefore, we strongly recommend the successful completion of the E-learning provided by us. Also have your operating personnel successfully complete the E-learning. You can find he E-learning under: www.schoeck.com/e-learning-sconnex/at.
- In case of questions, please contact our master installer.

Design example

Simplified design procedure

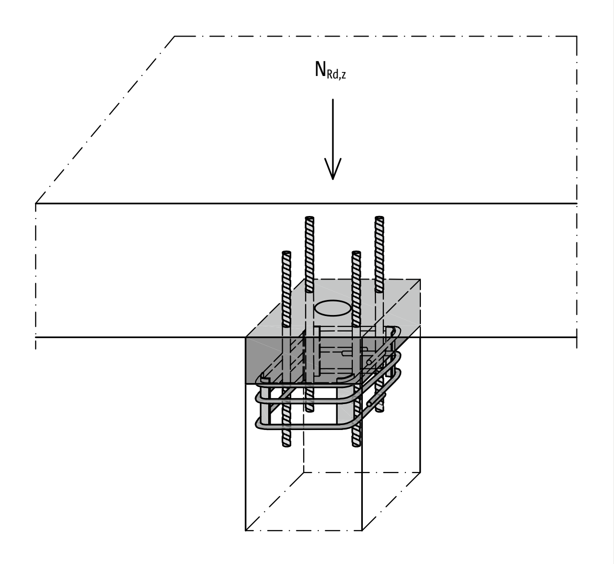


Fig. 181: Schöck Sconnex® type P: Sign convention for the design

Static system:

Bearing:	Installation in hinged column head without planned horizontal forces
Installation situation:	Internal column
Live load:	Office areas Category B q ≤ 5 kN/m^2
Ceiling spans:	≤ 7.5 m
Span length ratio:	Span length ratio of the edge span of the 1st internal section 0.5 ≤ L1/L2 ≤ 2
Design procedure:	Simplified design procedure

geometries:

Clear support height:	l = 2.6 m ≥ 2.50 m; use of the simplified design procedure permitted
	l = 2.6 m ≤ 2.85 m; requirements on the fire resistance according to Approval met
Column dimensions:	b = 250 mm
	d = 250 mm

Minimum eccentricity specified by structural engineer 1:
e = 20 mm

Exposure classes:

Column/Floor:	internal XC1, external XD3
Selected:	Concrete strength class of the column C35/45
	Spacing of longitudinal bars of the column: 134 mm ≤ 150 mm
Fire protection requirements:	R 90

Internal forces from static calculation:

Compressive force:	$N_{Ed,z}$ = 900 kN
	$N_{Ed,z,fi}$ = 500 kN in the case of fire load combination according to BS EN 1992-1-2

Type P

Reinforced concrete – reinforced concrete

Design example

Verifications in the ultimate limit state for cold dimensioning

Schöck Sconnex® type P							
Design values with		Concrete strength class of the column					
		C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Width	Number of longitudinal bars of the column	Normal force (compression with e = 20 mm) $N_{Rd,z}$ [kN/element]					
B250	≥ 4	904	1016	1119	1207	1207	1207
	≥ 8	954	1069	1171	1207	1207	1207
B300	≥ 4	1343	1505	1651	1784	1808	1808
	≥ 8	1418	1584	1728	1808	1808	1808
B350	≥ 4	1868	2087	2282	2457	2529	2529
	≥ 8	1973	2196	2389	2529	2529	2529
B400	≥ 4	2479	2761	3009	3229	3371	3371
	≥ 8	2618	2905	3150	3358	3371	3371

$N_{Rd,z}$ = 1119 kN
$N_{Ed,z}/N_{Rd,z}$ = 900 kN / 1119 kN = 0.81 < 1.0

Verifications in the ultimate limit state for hot dimensioning

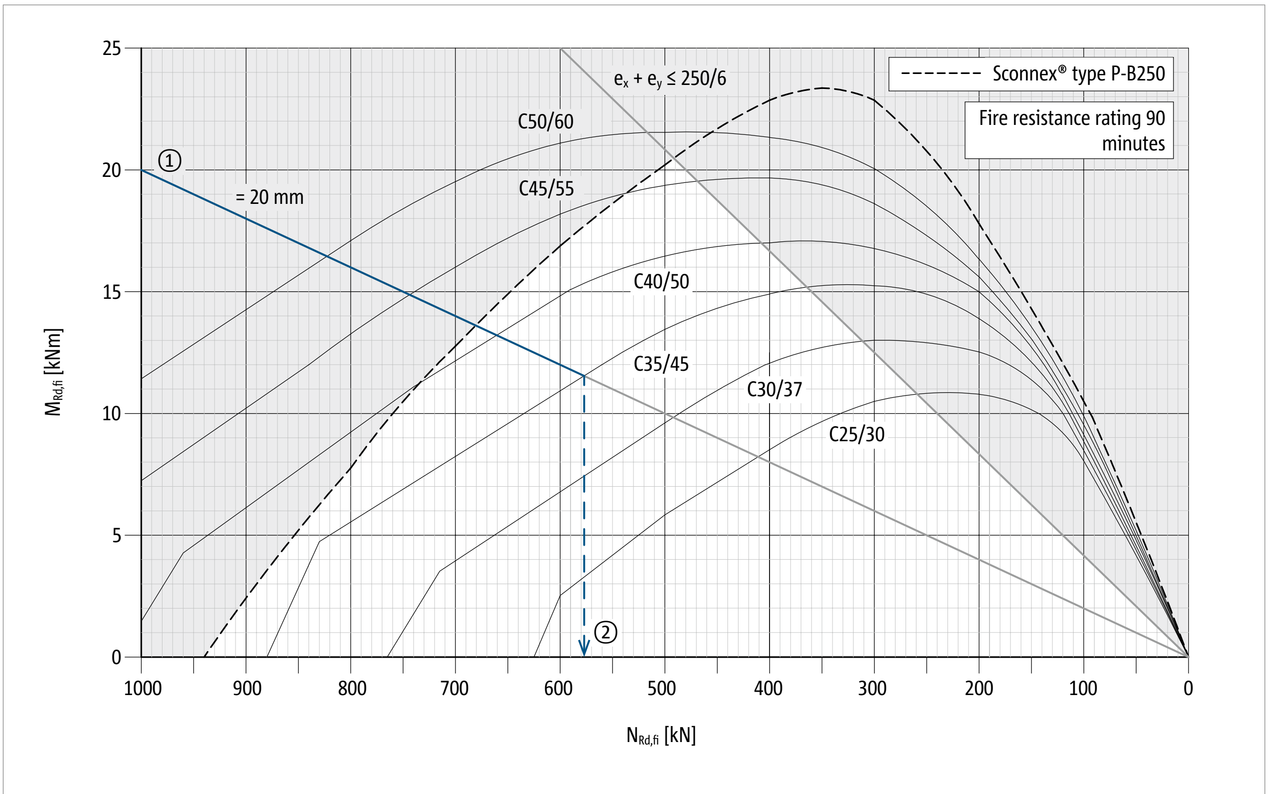


Fig. 182: Schöck Sconnex® type P-B250: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

② $N_{Rd,z,fi}$ = 575 kN
$N_{Ed,z,fi}/N_{Rd,z,fi}$ = 500 kN/ 575 kN = 0.87 < 1.0

Design example

General design procedure using the accurate load eccentricity

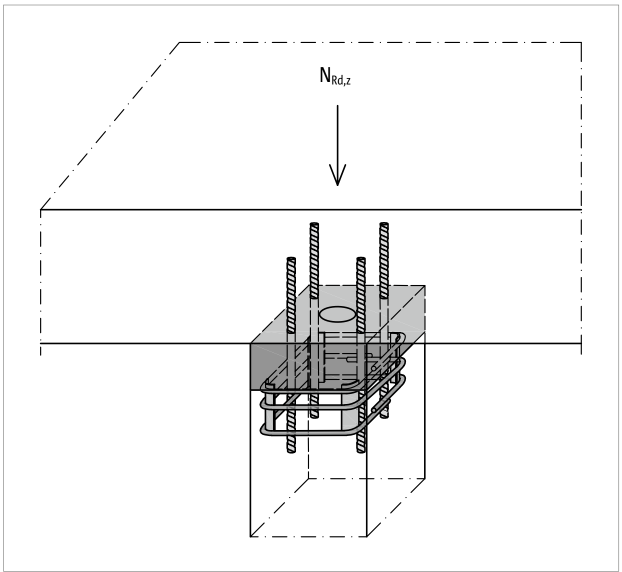


Fig. 183: Schöck Sconnex® type P: Sign convention for the design

Static system:

Bearing:	Installation in hinged column head without scheduled horizontal forces
Installation situation:	Edge column – non-admissible for simplified design procedure
Live load:	Plant rooms Category E q = 7,5 kN/m² – non-admissible for simplified design procedure
Ceiling span:	≤ 7.5 m
Span length ratio:	Span length ratio of the edge span of the 1st internal section 0.5 ≤ L1/L2 ≤ 2
Design procedure:	General design procedure using the accurate load eccentricity

Geometries:

Column headroom:	l = 2.6 m ≤ 2.85 m; requirements on the fire resistance following approval of possible
column dimensions:	b = 250 mm
	d = 250 mm

Exposure classes:

Column/floor:	internal XC1, external XD3
Selected:	Concrete strength class of the column C35/45
	Concrete cover c_{nom} = CV = 40 mm for Pos. 3 (see page 110)
	Spacing of longitudinal bars of the column: 134 mm ≤ 150 mm
Fire protection requirements:	R 90

Internal forces from static calculation:

Compressive force:	$N_{Ed,z}$ = 900 kN
Moments:	$M_{Ed,x}$ = 8 kNm, $M_{Ed,y}$ = 13 kNm
Eccentricity:	$e_x = M_{Ed,x} / N_{Ed,z}$ = 9 mm, $e_y = M_{Ed,y} / N_{Ed,z}$ = 14 mm
Compressive force (case of fire):	$N_{Ed,z,fi}$ = 650 kN in the case of fire load combination as per BS EN 1992-1-2
Moments (case of fire):	$M_{Ed,fi,x}$ = 4.6 kNm; $M_{Ed,fi,y}$ = 6.5 kNm load combination in the case of fire as per BS EN 1992-1-2
Eccentricity (case of fire):	$e_{fi,x} = M_{Ed,fi,x} / N_{Ed,fi,z}$ 7 mm ≤ 250/6
	$e_{fi,y} = M_{Ed,fi,y} / N_{Ed,fi,z}$ = 10 mm ≤ 250/6
	1 $e_{fi} = \sqrt{(e_{fi,x}^2 + e_{fi,y}^2)}$ = 12 mm ≤ 250/6

Design example

Verifications in the ultimate limit state for cold dimensioning

Schöck Sconnex® type P							
Design values with		Concrete strength class of the column					
		C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Width	Number of longitudinal bars of the column	Normal force (compression with e = 0 mm) $N_{Rd,z,0}$ [kN/element]					
B250	≥ 4	1076	1210	1332	1443	1443	1443
	≥ 8	1136	1273	1394	1443	1443	1443
B300	≥ 4	1549	1737	1905	2058	2092	2092
	≥ 8	1636	1827	1994	2092	2092	2092
B350	≥ 4	2109	2356	2577	2774	2861	2861
	≥ 8	2227	2479	2697	2861	2861	2861
B400	≥ 4	2754	3068	3344	3588	3750	3750
	≥ 8	2909	3227	3500	3731	3750	3750

$N_{Rd,z}$ $= N_{Rd,z,0} \cdot (1 - 2 \cdot e_x / 250\text{ mm}) \cdot (1 - 2 \cdot e_y / 250\text{ mm})$

$= 1332 \cdot (1 - 2 \cdot 9 / 250) \cdot (1 - 2 \cdot 14 / 250) = 1097.6\text{ kN}$

$N_{Ed,z}/N_{Rd,z}$ $= 900\text{ kN} / 1097.6\text{ kN} = 0.82 < 1.0$

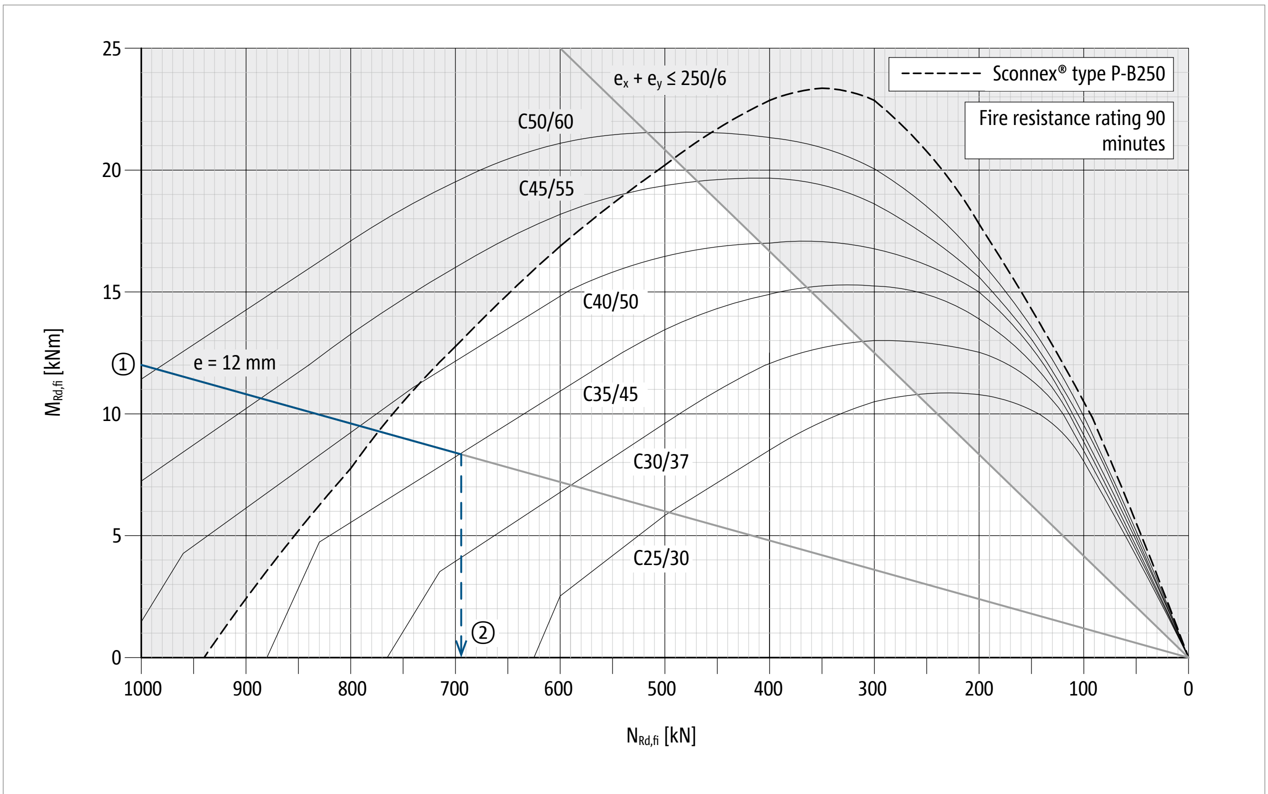
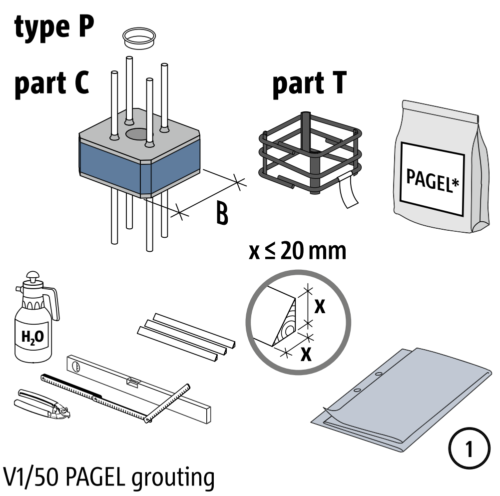


Fig. 184: Schöck Sconnex® type P-B250: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

② $N_{Rd,z,fi}$ $= 695\text{ kN}$

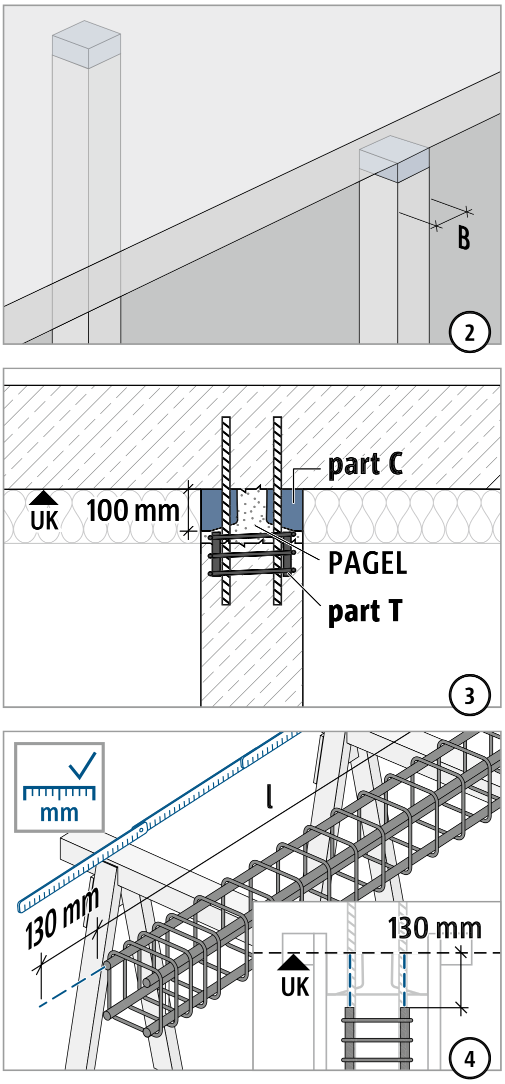
$N_{Ed,z,fi}/N_{Rd,z,fi} = 650\text{ kN}/695\text{ kN} = 0.94 < 1.0$

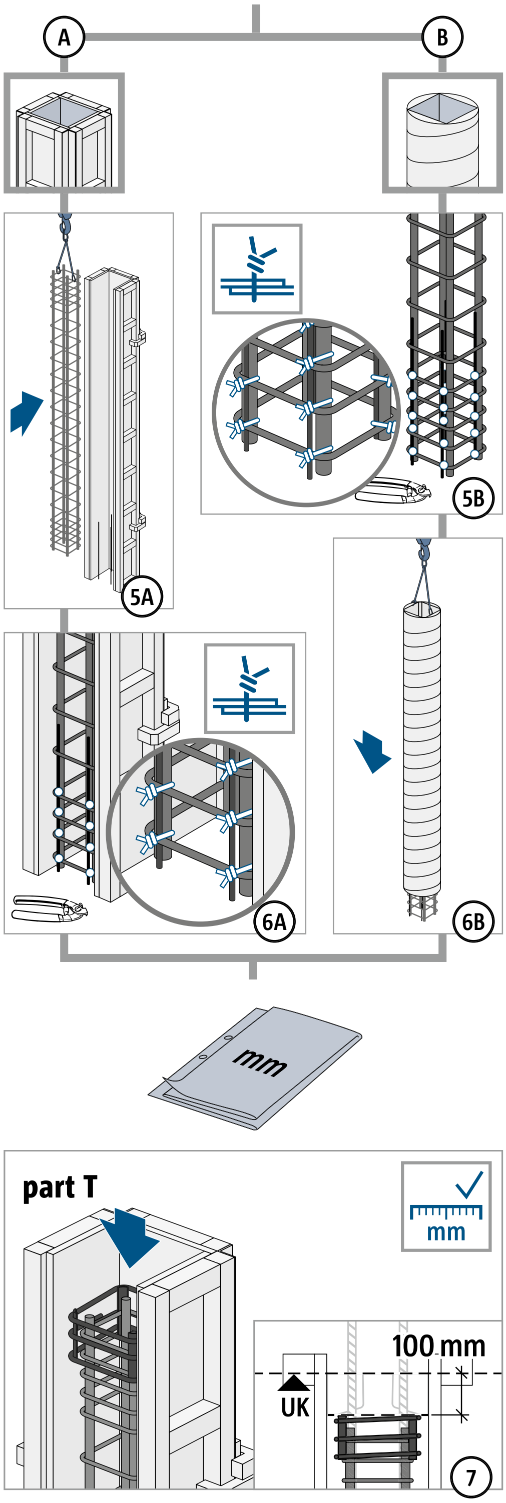
Installation instructions - site cast-in-place concrete



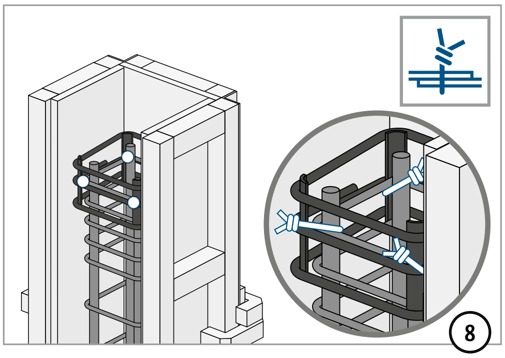
V1/50 PAGEL grouting

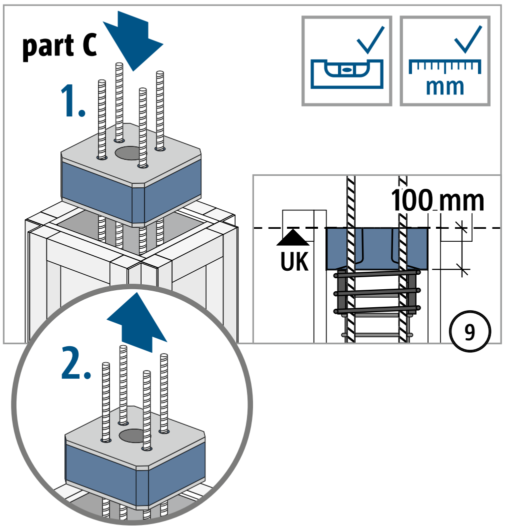
Use assembly report.

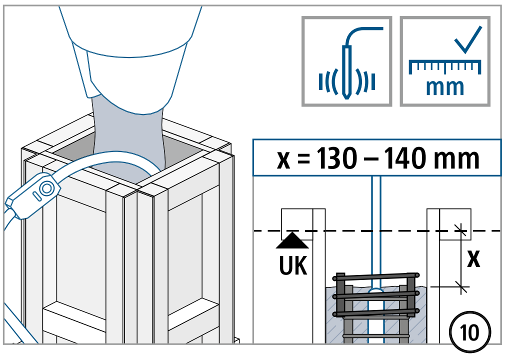




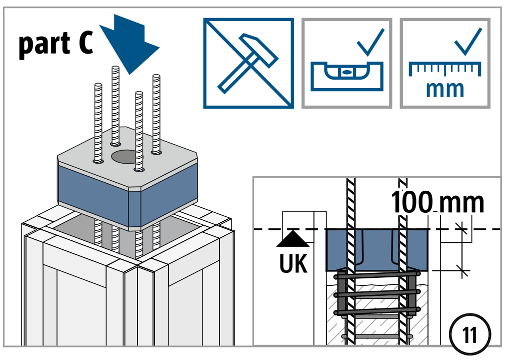
Installation instructions - site cast-in-place concrete

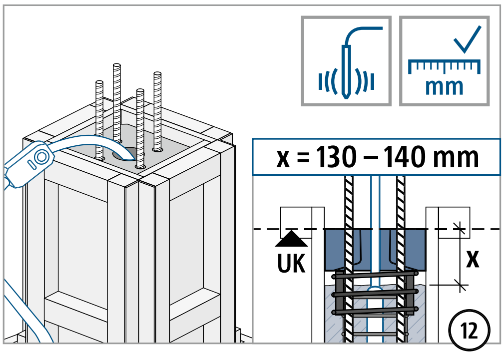


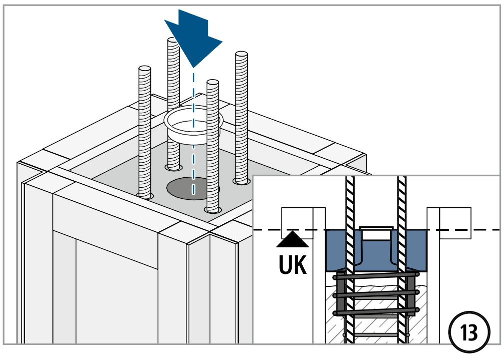




max. 5 min.

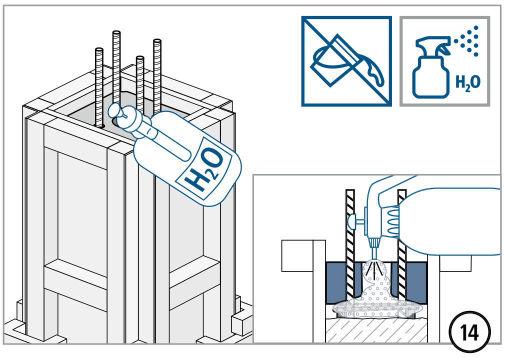




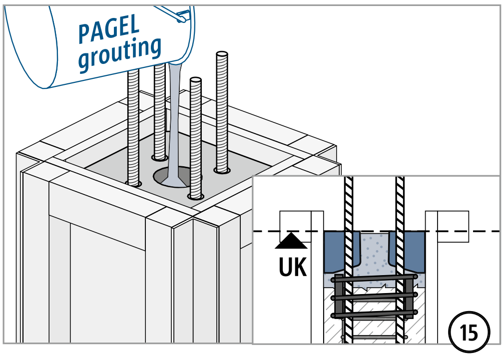


with 20 °C
min. 24 h

Temperature (°C)	Waiting time (h)
≥ 20	24
15	30
10	40
5	50

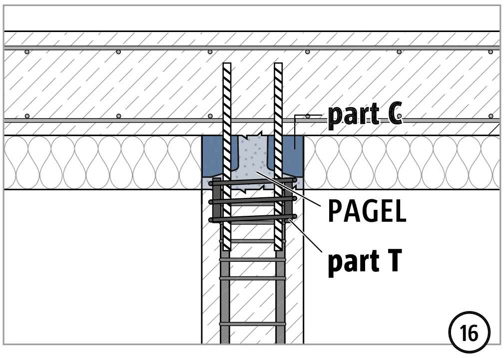


Installation instructions - site cast-in-place concrete



B250: Grouting using ca. 3 litre PAGEL V1/50
B300: Grouting using ca. 4 litre PAGEL V1/50
B350: Grouting using ca. 5.5 litre PAGEL V1/50
B400: Grouting using ca. 7 litre PAGEL V1/50

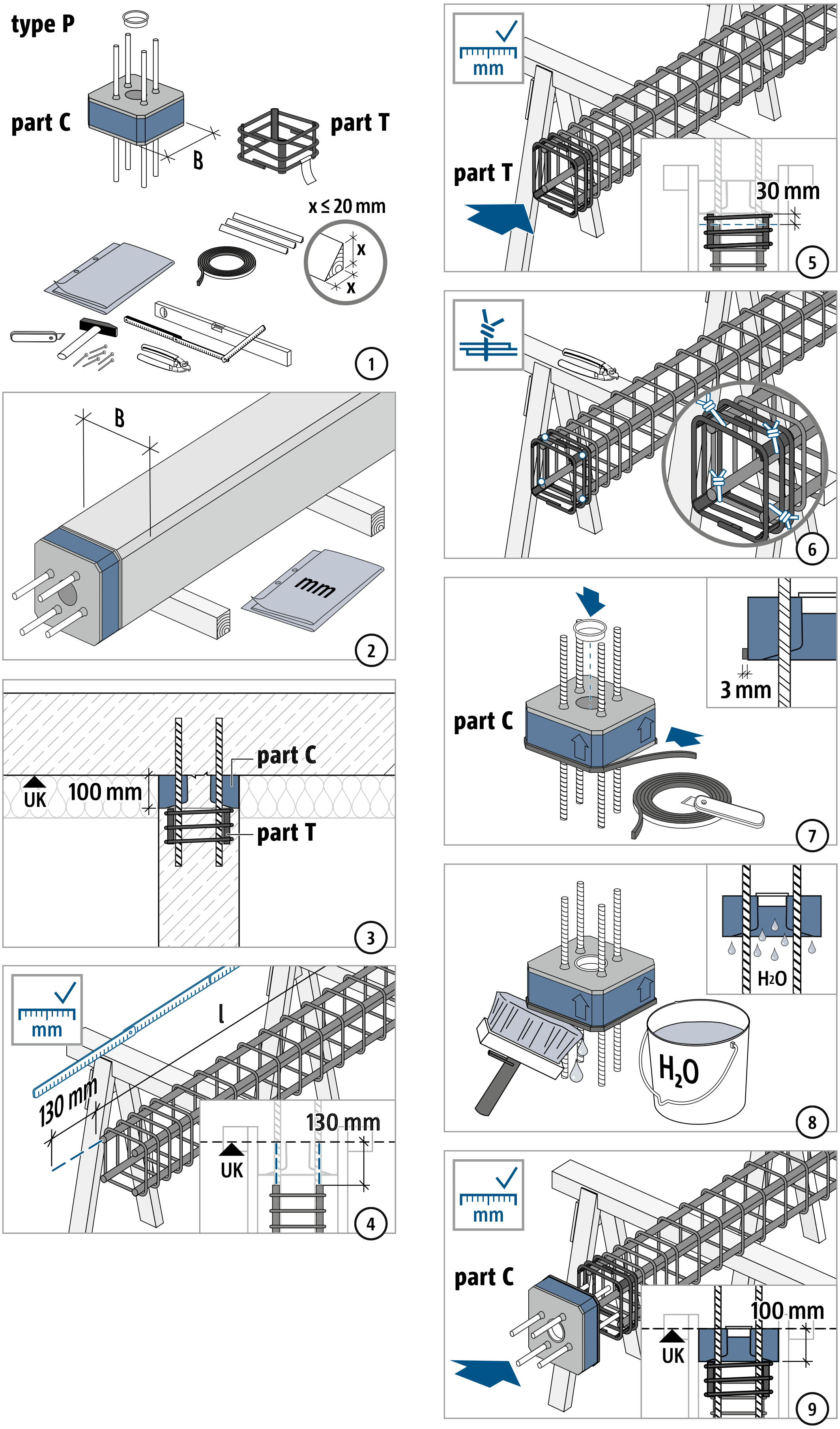
with 20 °C
min. 12 h



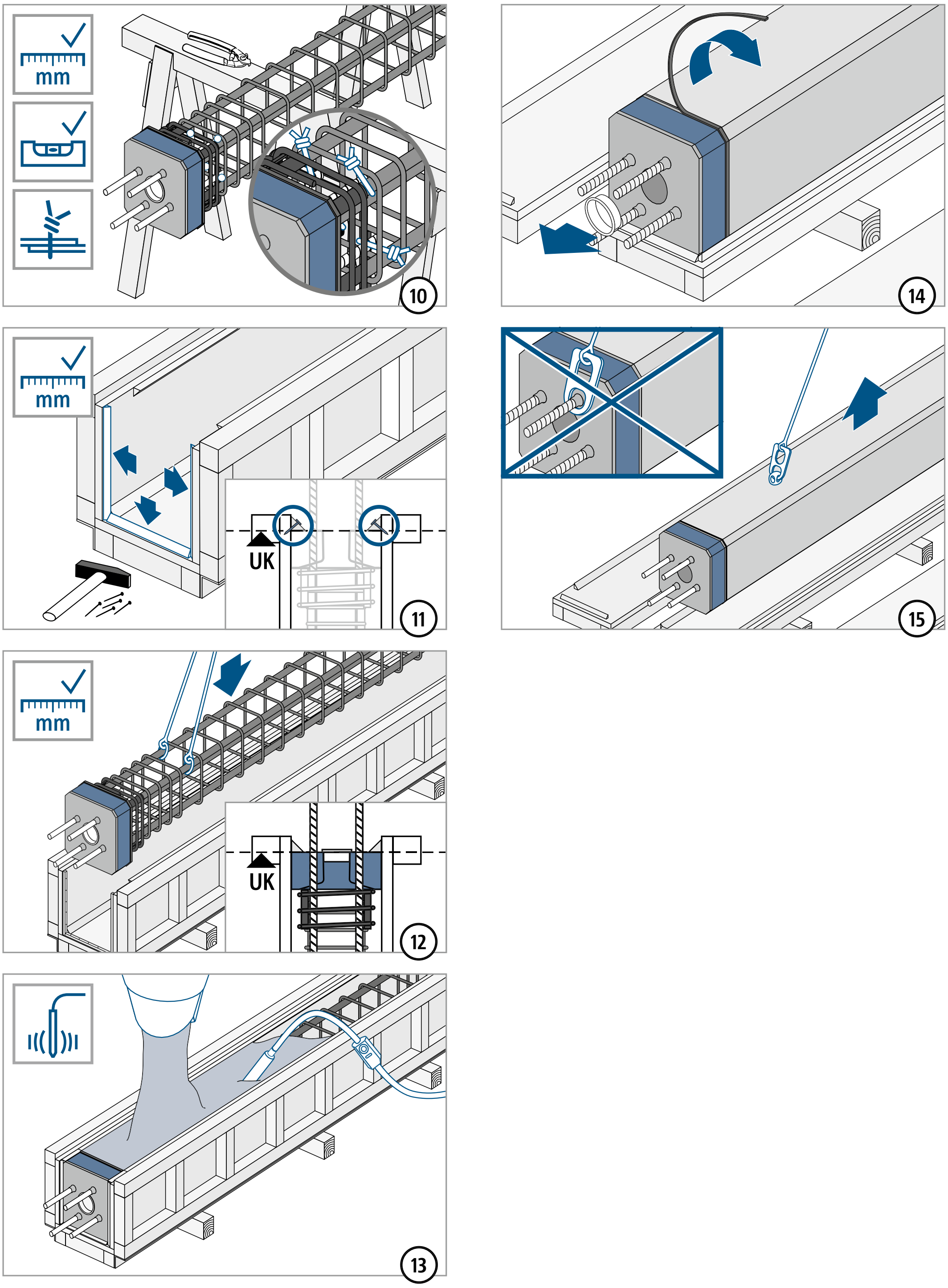
Type P

Reinforced concrete – reinforced concrete

Installation instruction – Precast plant



Installation instruction – Precast plant



with 20 °C
min. 24 h

Temperature (°C)	Waiting time (h)
≥ 20	24
15	30
10	40
5	50

Type P

Reinforced concrete – reinforced concrete

☑ Check list

- ☐ Is Schöck Sconnex® to be used in the column head?
- ☐ Are the influences on the Schöck Sconnex® connection determined at the dimensioning stage?
- ☐ Are the columns planned as compression elements in a horizontal non-displacable supporting structure?
- ☐ Is the relevant concrete strength class taken into account in the design?
- ☐ Are the boundary conditions complied with for the employment of simplified design procedures?
- ☐ For edge columns are the maximum permitted eccentricities complied with and is the load-bearing capacity dimensioned accordingly?
- ☐ Is the respective required column reinforcement defined?
- ☐ Is there a situation in which, during the construction phase, the construction had to be dimensioned for an emergency or a special load?
- ☐ Have the fire protection requirements been clarified and planned for?
- ☐ Is dimensioning necessary for the case of fire?
- ☐ With fire protection dimensioning is the clear column length taken into account?
- ☐ With the determination of the column reinforcement (e.g. buckling verification) has the correct static height been used?
- ☐ Are the on-site stirrups in the area of at least 20 cm above Part C to 35 cm below Part C planned as 90° angled hooks?
- ☐ Is the tight fit using PAGEL® grouting V1/50 poured concrete taken into account in the planning documents?
- ☐ Is there a sufficient quantity of premixed dry mortar planned for the production of PAGEL®-Verguss V1/50 cast concrete for the extended application with a rectangular column cross-section?
- ☐ Was the construction site advised of the mandatory certification?

Masonry – reinforced concrete

Construction materials

Building material Schöck Sconnex® type M

Approval	Approval Z-17.1-709 and Z-17.1-749
Lightweight concrete	The compressive strength of the lightweight concrete, tested based on BS EN 12390-3 on cubes with an edge length of approx. 40 mm must bear 30 N/mm² and in the centre at least 35 N/mm²
Insulating material	Polystyrene hard foam (WLG 035, building material class B1)

Schöck Sconnex® type M: Connecting structural elements

The thermal insulation element may be used in masonry made from the following materials:

- Solid sand-lime bricks and sand-lime blocks (hole content ≤ 15 %) according to DIN EN 771-2 in conjunction with DIN 20000-402 of compressive strength class ≥ 12 or
- Solid brick according to DIN EN 771-1 in connection with DIN 20000-401 of compressive strength class ≥ 12
- normal masonry mortar of mortar class M 5 or M 10 or thin-bed mortar according to DIN EN 998-2 in conjunction with DIN 20000-412 or DIN V 18580

Or:

- Lime-sand facing bricks or lime-sand facing elements (hole content ≤ 15 %) in accordance with DIN EN 771-2 in conjunction with DIN 20000-402 of compressive strength class ≥ 12 and
- Thin-bed mortar according to DIN EN 988-2 in conjunction with DIN 20000-412 or DIN V 18580; requirements for the thin-bed mortar can be found in the approvals.

Schöck Sconnex® type M

Schöck Sconnex® type M
Load-bearing, water-repellent thermal insulation element for the avoidance of thermal bridges in masonry walls. The element transfers primarily compressive forces.

Installation cross sections

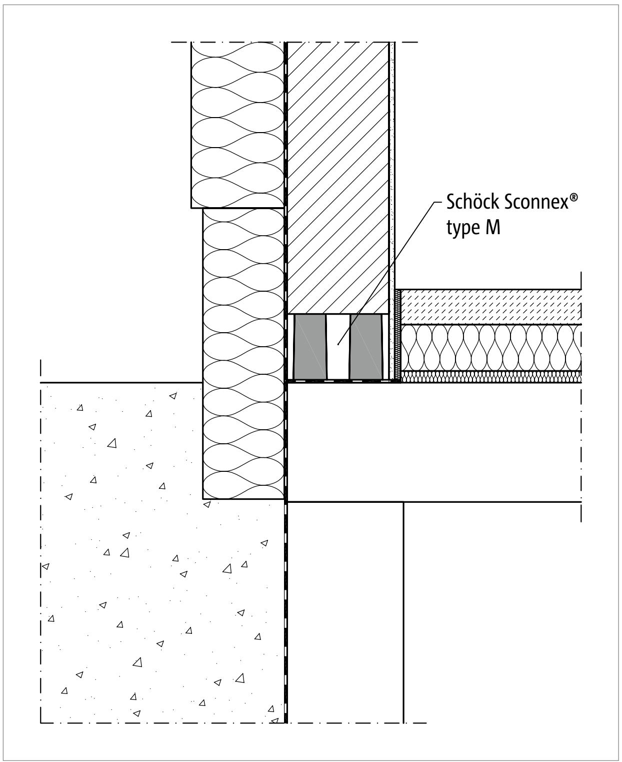


Fig. 185: Schöck Sconnex® type M: Installation condition for external thermal insulation composite system

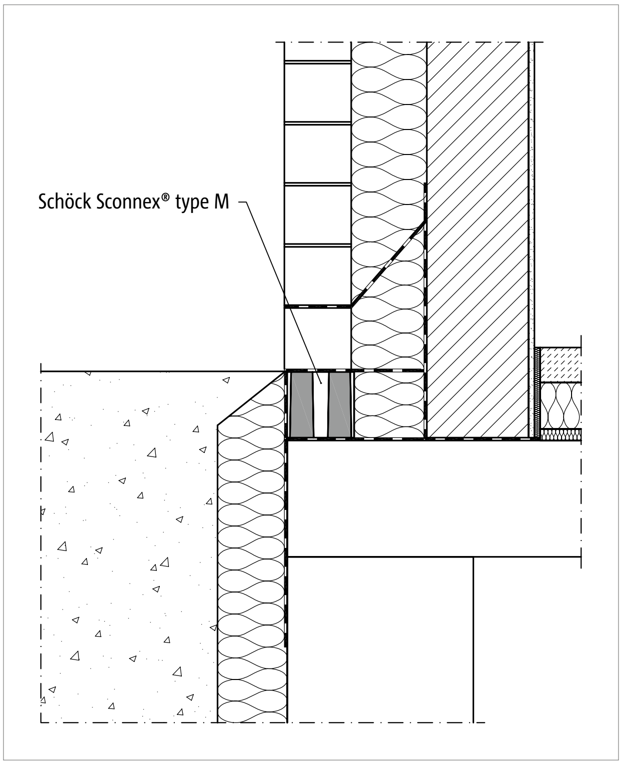


Fig. 186: Schöck Sconnex® type M: Connection with double-leaf masonry

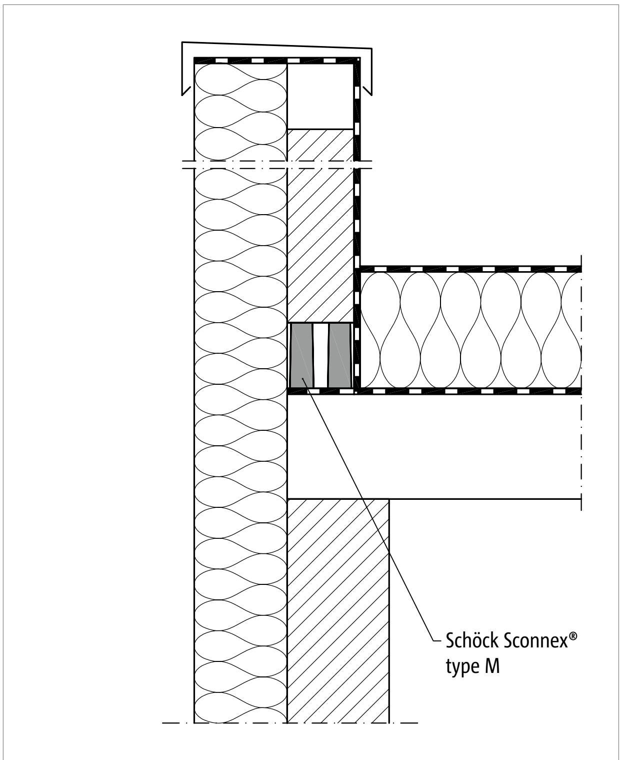


Fig. 187: Schöck Sconnex® type M: Installation condition in a parapet

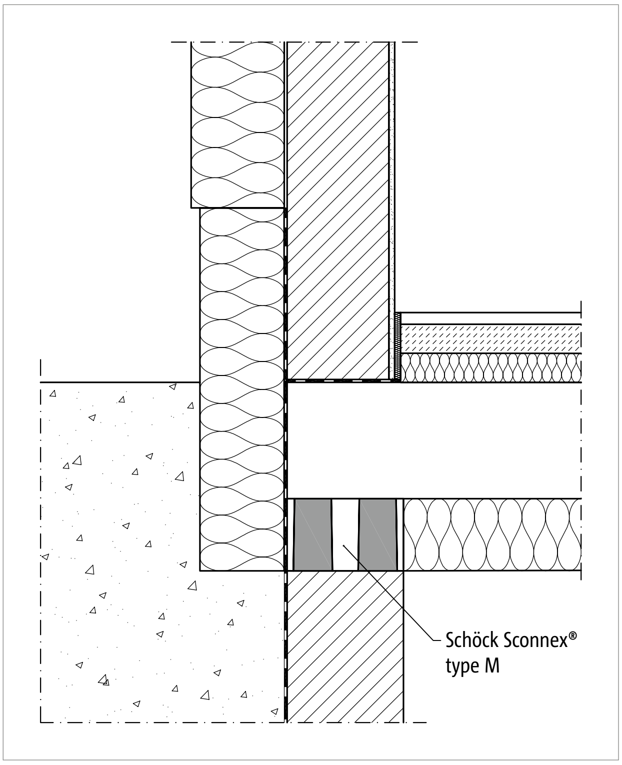


Fig. 188: Schöck Sconnex® type M: Installation condition below the basement floor

Installation cross sections

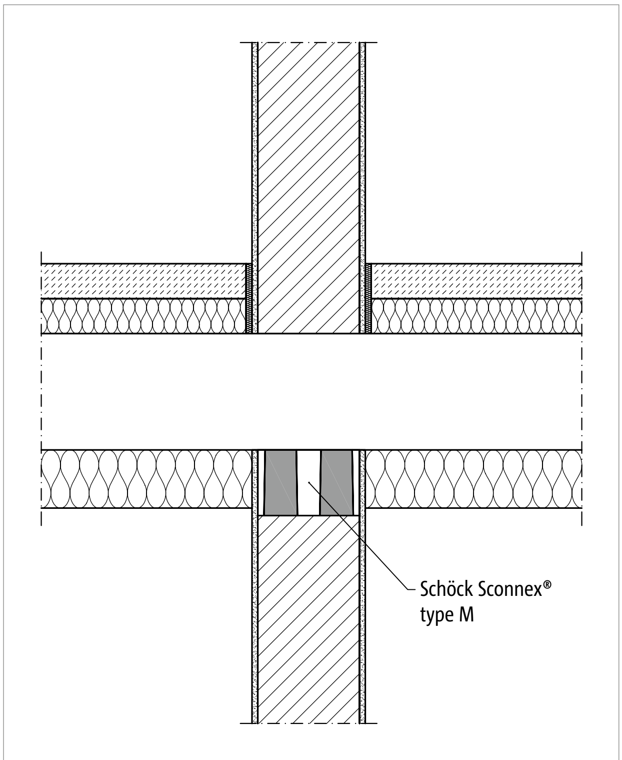


Fig. 189: Schöck Sconnex® type M: Installation condition with interior wall and under-slab installation

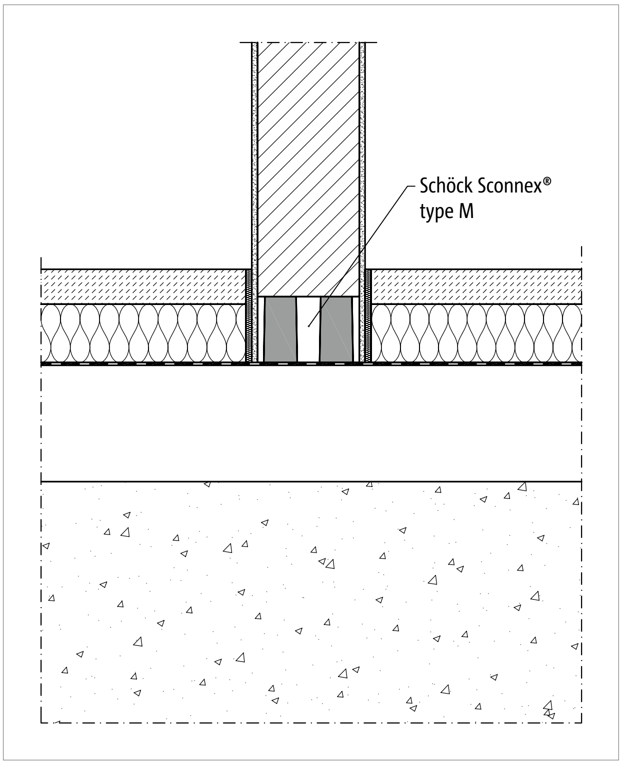


Fig. 190: Schöck Sconnex® type M: Installation condition with internal wall and foundation slab

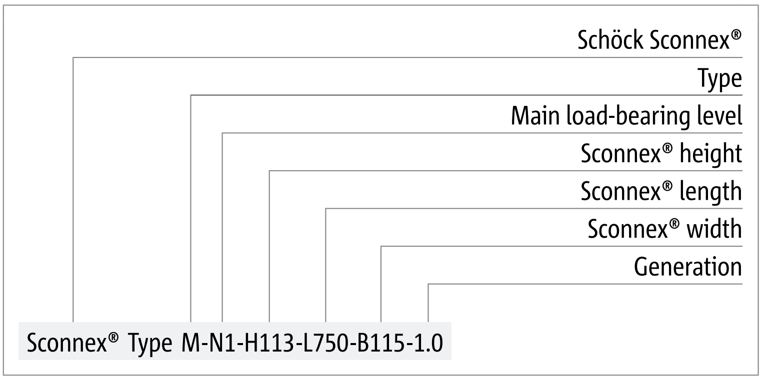
Product selection | Type designations | Product description

Schöck Sconnex® type M variants

The configuration of the Schöck Sconnex® type M can vary as follows:

- Main load-bearing level:
  N1 (previously Novomur® light), N2 (previously Novomur®)
- Schöck Sconnex® height:
  H = 113 mm
- Schöck Sconnex® length:
  L = 750 mm; the fitting elements at least 250 mm – further information see Approval
- Schöck Sconnex® width:
  B = 115, 150, 175, 200, 240 mm
- Generation: 1.0

Type designation in planning documents



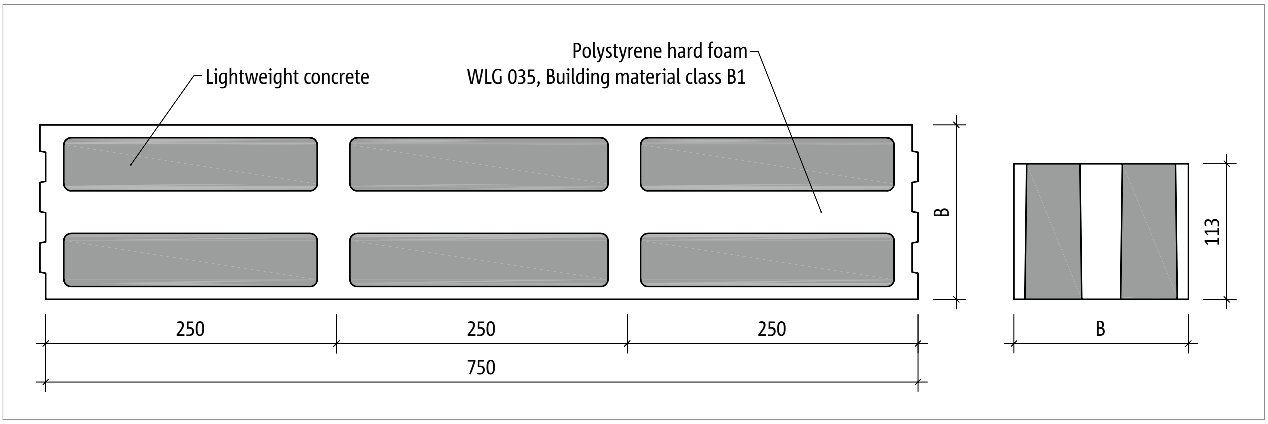


Fig. 191: Schöck Sconnex® type M: Dimensions

Schöck Sconnex® type M	N1	N2
Width B [mm]	Weight [kg]	
115	7.1	10.0
150	8.8	12.7
175	10.7	14.9
200	12.6	17.6
240	15.8	20.8

Design

Normal force for masonry in combination with Schöck Sconnex® type M

$n_{Rd,z}$ [kN/m] = T (table value) · f_k [N/mm²]

Schöck Sconnex® type M	N1, N2
compressive strength for	Compressive strength class
	≥ 12
Masonry with	f_k [N/mm²]
Normal mortar of mortar group ≥ 5	2.6
Thin-bed mortar	3.1

Schöck Sconnex® type M				N1, N2					
Table value for				End bearing (fully supported floor a/t = 1.0)					Intermediate bearing
				Floor				Roofing	
				Floor span width l_f [m]					
				≤ 4.5	5.0	5.5	6.0	≤ 6.0	≤ 6.0
				T					
Wall height h [m]	2.50	Wall thickness t [cm]	11.5	36	36	36	36	21	36
			15.0	57	57	57	51	28	57
			17.5	71	71	67	59	33	71
			20.0	80	80	77	68	37	80
			24.0	102	102	92	81	45	102
	2.75		11.5	32	32	32	32	21	32
			15	54	54	54	51	28	54
			17.5	69	69	67	59	33	69
			20.0	77	77	77	68	37	77
			24.0	99	99	92	81	45	99
	3.0		24.0	–	–	–	–	45	96

Notes on design

- Intermediate values may not be interpolated.
- Schöck Sconnex® type M is to be designed according to the simplified verification procedure as per BS EN 1996-3/NA.
- Schöck Sconnex® type M may be employed only in the lowest or highest course of the masonry.
- In accordance with the simplified calculation methods as per BS EN 1996-3/NA, NDP to 4.1 (1)P, a mathematical verification of the spatial stiffness may be dispensed with if, with buildings, the floors are implemented as stiff slabs or verified as sufficiently stiff ring beams and in the longitudinal and transverse directions of the building enough stiffened walls are present. Otherwise, the following described smaller shear load-bearing capacity is to be considered mathematically.
- If a shear verification of the walls is carried out as per BS EN 1996-1-1, A. 6.2, together with DIN EN 1996-1-/NA, NCI to 6.2, then for V_{Rdlt} only 50% of the resultant values of the equation NA.19 or NA.24, at the most the resultant values with f_{vk} or f_{vlt} with 0.2 N/mm², are taken into account. The smaller value is relevant.
- With buildings in the earthquake Zones 2 and 3 as per DIN 4149-1:2005-04 walls with Schöck Sconnex® type M may not be considered for the reinforcing of buildings.
- For the determination of buckling length only one double-sided fixture of the walls may be taken into account.
- For masonry, which is loaded at right angles to its plane, tensile bending stresses must not be taken into account. If a mathematical verification of the acceptance of these loads is required, then a load-bearing action only perpendicular to the horizontal joints, free from tensile bending stresses, may be accepted.

Fire protection

The technical fire protection requirements on walls are regulated in the §§ 26-30 MBO (Model Building Regulation (MBO)) together with MVV TB (Model Administrative Instructions Technical Building Regulations). These have been transferred into the (German) Federal state building regulations and can vary from each other.

The demand for sufficiently long stability and duration of fire resistance depending on building class applies as general requirements. (§ 27 MBO)

"External walls are to be so configured that the spreading of a fire is limited for a sufficiently long time". (§ 28.1 MBO)

Partition walls between utilization units and between utilization units and other rooms must have the fire resistance of the load-bearing and stiffening structural elements of the floor, however, at least fire retardant (F30). (§ 29.3 MBO)

Application of Schöck Sconnex® type M with fire resistance classes REI 30 to REI 90
Schöck Sconnex® type M can also be installed in walls with fire protection requirements. However, additional measures are then required in accordance with approval Z-17.1-709/-749. Installation in fire walls is not permitted.

The classification in fire resistance classes REI 30 and REI 90 of room-enclosing walls according to DIN EN 13501-2 or DIN EN 1996-1-2 remains valid when using Schöck Sconnex® type M if the installation is carried out as follows:

- Install elements within the floor structure so that the upper edge of the load-bearing thermal insulation elements is below the upper edge of the screed.
- Alternatively, rendering of both sides of the element with at least 15 mm thick plaster in accordance with BS EN 1996-1-2, Section 4.2 (1) or
- arrangement on both sides of at least 12.5 mm thick plasterboard firecheck strips as per DIN 18180 minimum element height.
- Alternatively, the rendering or the plasterboard firecheck strips can be replaced on one side by facing masonry.

The classification R 30 to R 90 of non-space enclosing walls according to DIN EN 13501-2 or DIN EN 1996-1-2 in conjunction with DIN EN 1996-1-2/NA is not lost when installing Schöck Sconnex® Type M. Additional technical fire protection measures are not required.

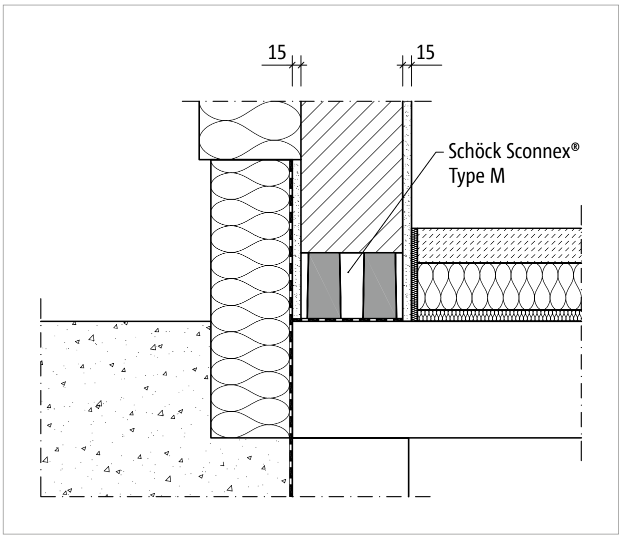


Fig. 192: Schöck Sconnex® type M: REI 30 or REI 90 configuration for technical fire protection integrity

Type M

Masonry – reinforced concrete

Design example | Installation information

Geometry:

Wall thickness:	t = 17.5 cm
Clear height:	h = 2.75 m
Floor span:	l_f = 5.5 m
Masonry:	Sand-lime block compressive strength class 20, thin-bed mortar, external wall

Verification in the ultimate limit state

Characteristic value of the compressive strength:

	f_k = 6.3 N/mm², see table page 134
Selected:	**Schöck Sconnex® type M-N2-H113-L750-B175-1.0**
Table value:	T = 67, see table page 134
Load-bearing capacity:	$n_{Rd,z} = T \cdot f_k = 67 \cdot 6.3$ N/mm² = 422 kN/m

Notes

- Masonry is always to be implemented as single brick masonry.
- Schöck Sconnex® type M, according to its designation, is to be arranged with its top always upwards.
- Slots and recesses, which weaken the load-bearing cross-section are not permitted.
- Schöck Sconnex® type M may not be used one above the other to build a wall.
- According to DIN 18195-4 a sealing measure (foil) is required.
- The installation of Schöck Sconnex® type M in the outer leaf of double-leaf masonry may only take place protected against moisture.

Installation above the basement ceiling

- Schöck Sconnex® type M is to be set together and aligned non-bonded in a mortar bed of normal mortar of mortar class M 5 or M 10.
- After the placing of the elements a sufficient time is to be waited until the mortar is sufficiently set for further work without hazarding the structural stability of the elements.
- The thin-bed mortar is to be applied over the entire surface of the Schöck Sconnex® type M, which has been cleaned of dust.
- The rising limestone-sandstone masonry is to be fully jointed with thin-bed mortar.

Installation below the basement ceiling

- A full surface bedding of the floor on Schöck Sconnex® type M is to be ensured.
- Attention to DIN 18195 construction waterproofing.

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