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.

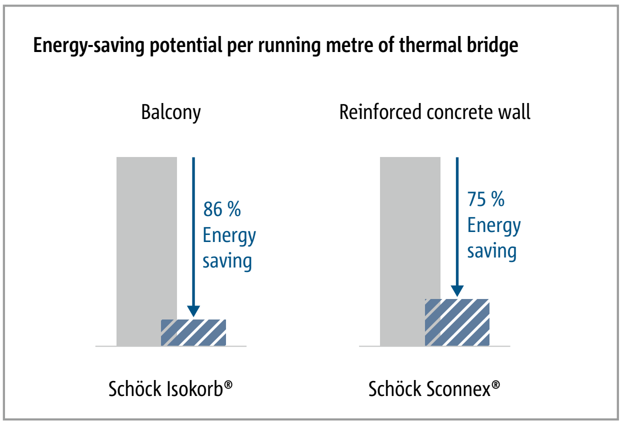


Fig. 3: Energy-saving in balconies and reinforced concrete walls through the use of Schöck products

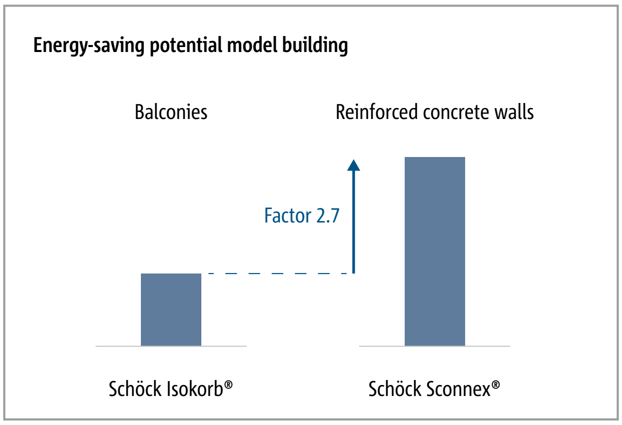


Fig. 4: Energy-saving potential of reinforced concrete walls in comparison with balconies on a model building

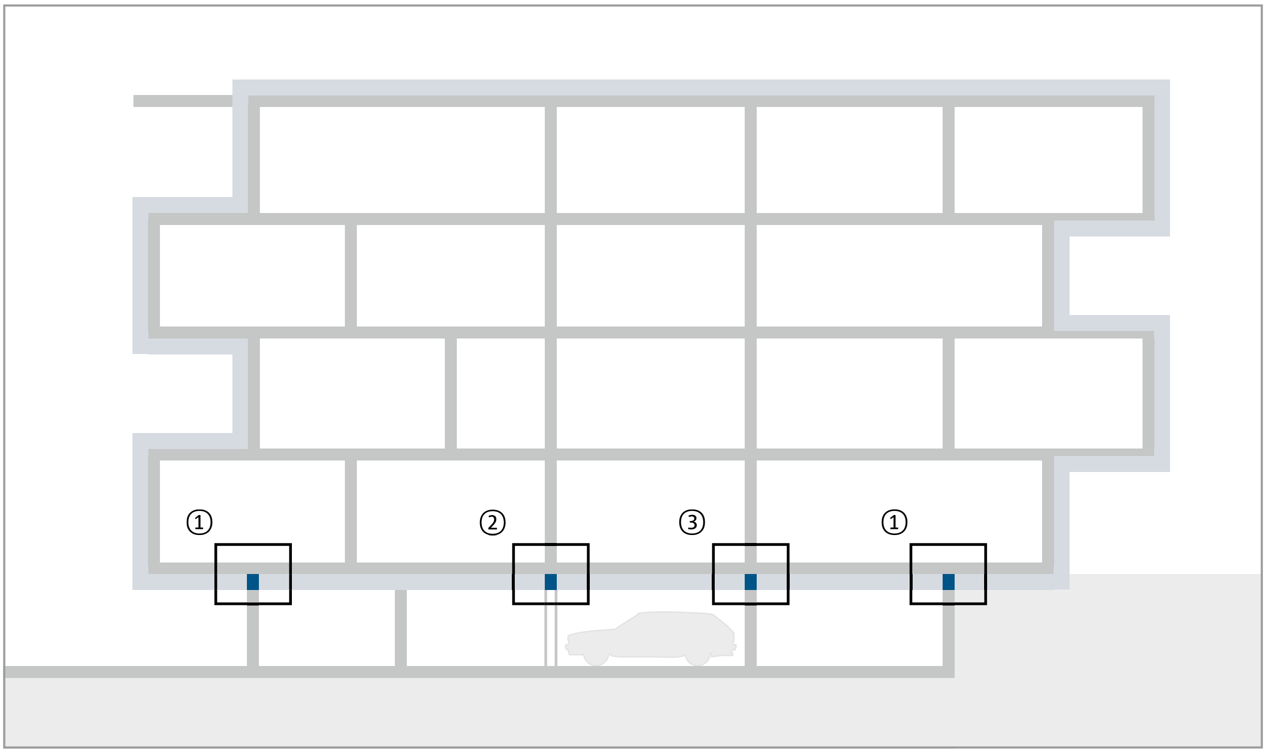
Model building block of flats
- Wall thermal insulation compound system: U = 0.28 W/(m²•K)
- Insulation thickness d = 120 mm
- 4 full storeys, 11 flats, on average 150 m^2 living area per flat
- 115 m reinforced concrete wall
- 6 balconies each 4 m in length
- Complete underground level with garage

Schöck Sconnex®
principles

Schöck Sconnex® applications

The requirement for a solution for the reduction of thermal bridges in walls and columns is constantly increasing. With the new Schöck Sconnex® product family, walls and columns can now be insulated directly in the connection detail to foundation slabs and floors and a visually appealing and energy efficient solution can be planned.

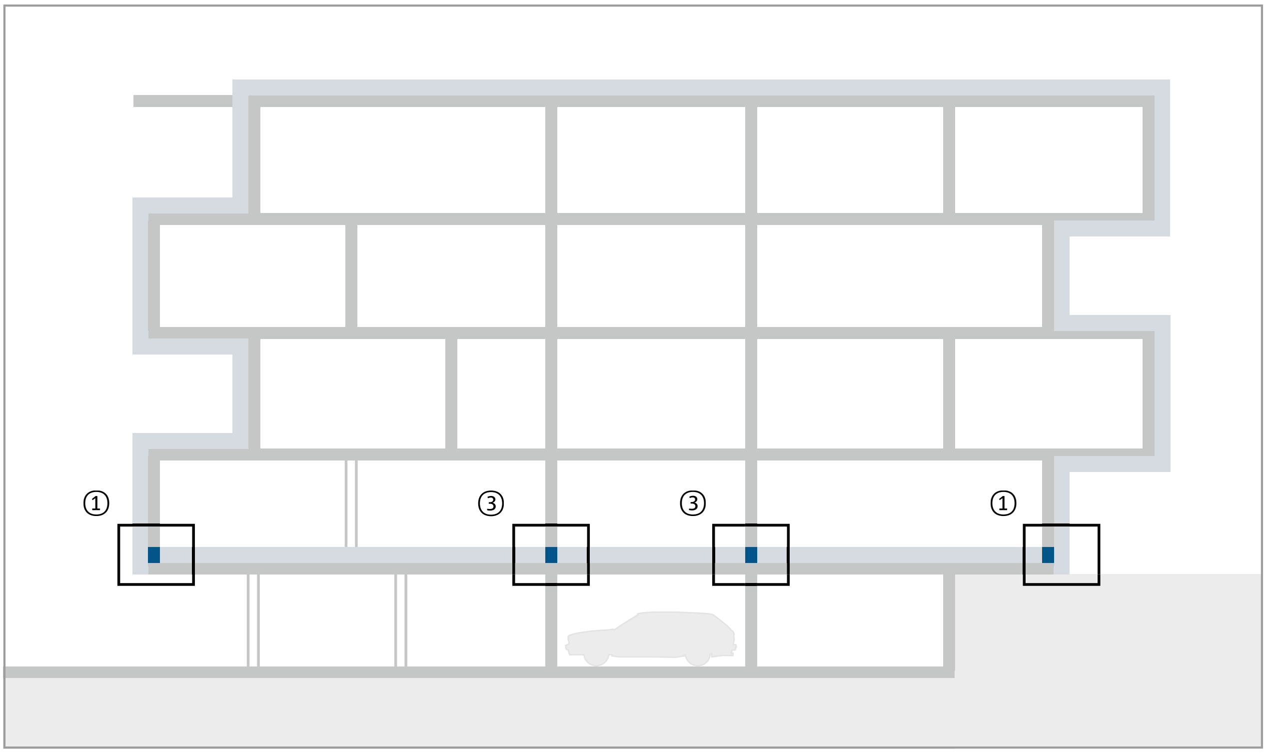
Schöck Sconnex® application examples with under-slab insulation



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.

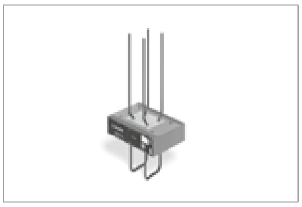
Schöck Sconnex® applications

Schöck Sconnex® application examples with above-slab insulation



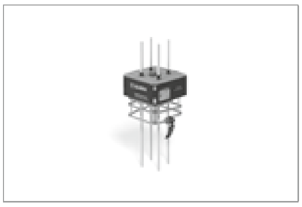
With the employment of Schöck Sconnex® at the foot of the wall or column the floor or footing can be insulated using a more economic above-slab insulation. The direct insulation of the thermal bridge at the foot of the wall or column through the use of Schöck Sconnex® eliminates the risk of building 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



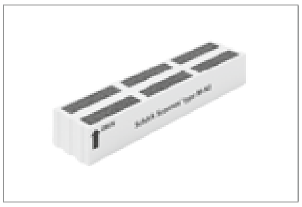
Load-bearing thermal insulation element for reinforced concrete walls. The element transfers, depending on load-bearing level, normal forces (compression) and shear forces in the longitudinal and transverse directions of the wall.

② Schöck Sconnex® type P



Thermally separating insulation element for square reinforced concrete columns with the dimensions 250 x 250 mm. 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 and footings. The element transfers primarily compressive forces.

Schöck Sconnex®
principles

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

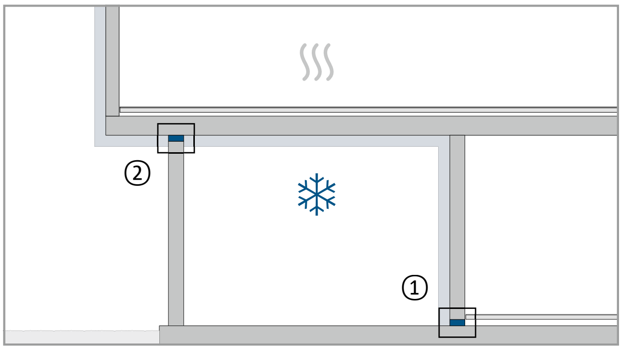


Fig. 5: External underground garage walls and columns using Schöck Sconnex®

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

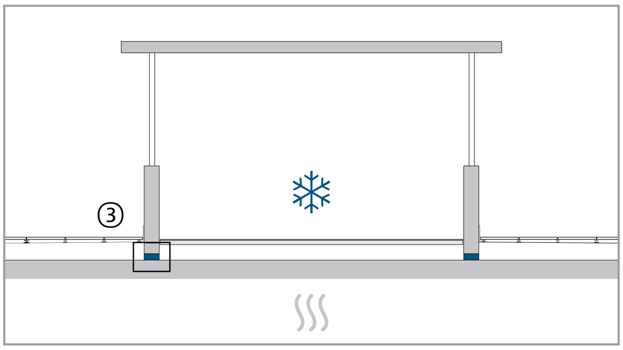


Fig. 6: Roof structure using Schöck Sconnex®

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

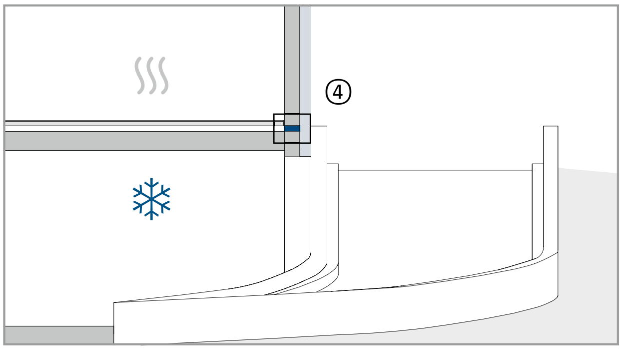


Fig. 7: Underground garage entrance using Schöck Sconnex®

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

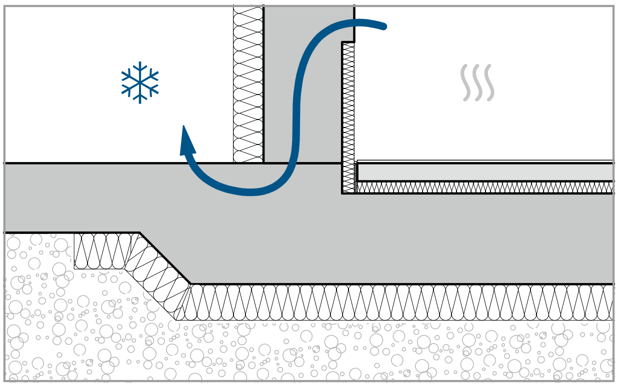


Fig. 8: Pos. ①: Heat flow in underground garage wall with flank insulation

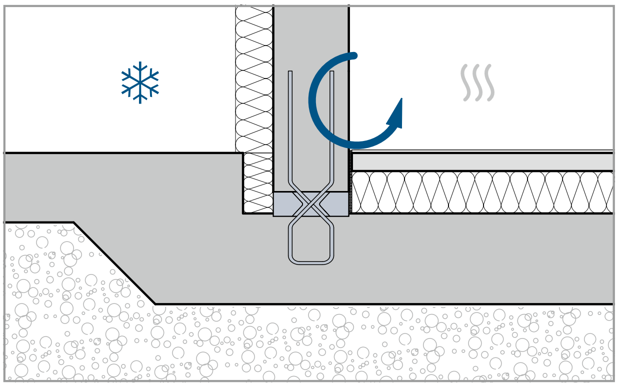


Fig. 9: Pos. ①: Heat flow in underground garage wall with Schöck Sconnex® type W

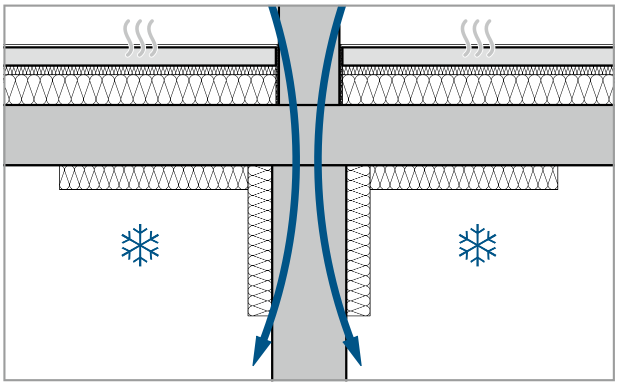


Fig. 10: Pos. ②: Heat flow with external column with flank insulation

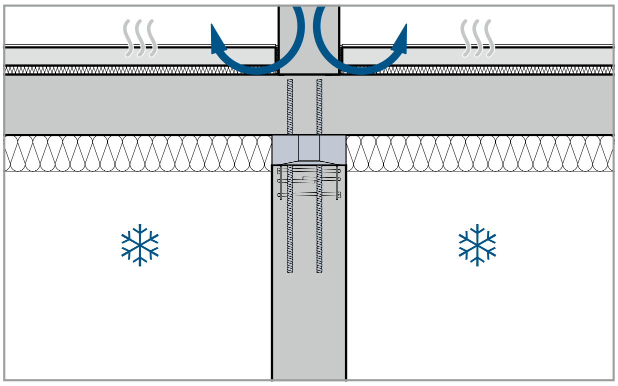


Fig. 11: Pos. ②: Heat flow with external column using Schöck Sconnex® type P

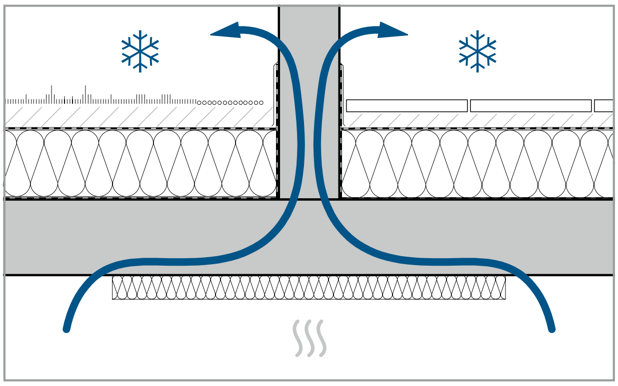


Fig. 12: Pos. ③: Heat flow in roof construction with flank insulation

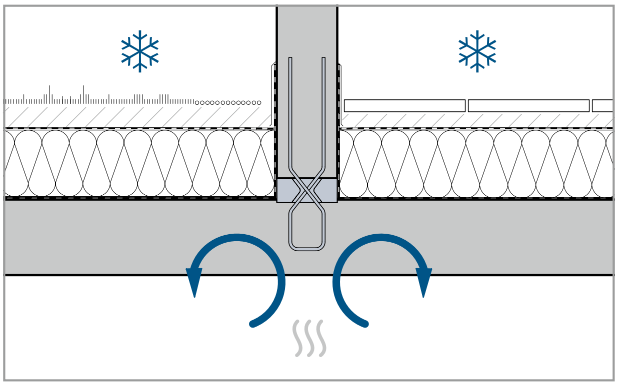


Fig. 13: Pos. ③: Heat flow in roof construction with Schöck Sconnex® type W

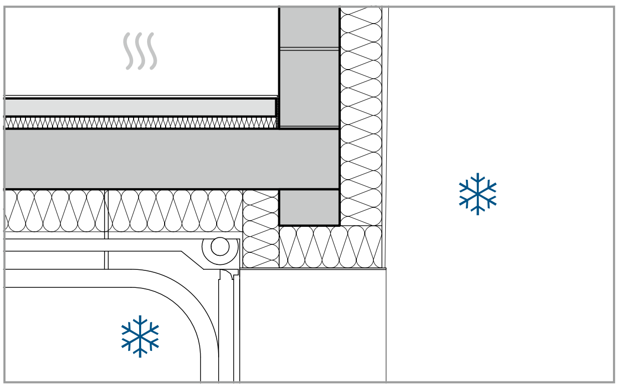


Fig. 14: Pos. ①: Insulated overhead door

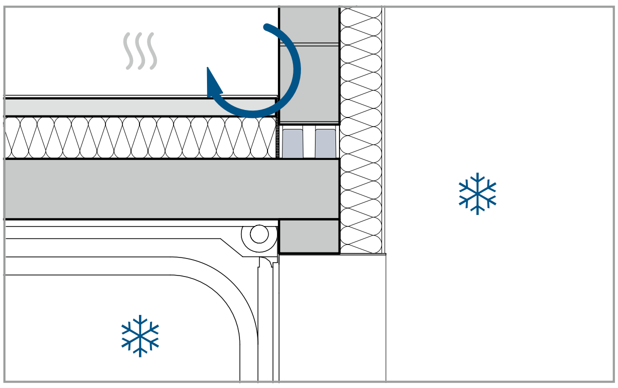


Fig. 15: Pos. ①: Heat flow with underground garage wall with Schöck Sconnex® type M

Schöck Sconnex®
principles

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 (previously Schöck Alphadock®)

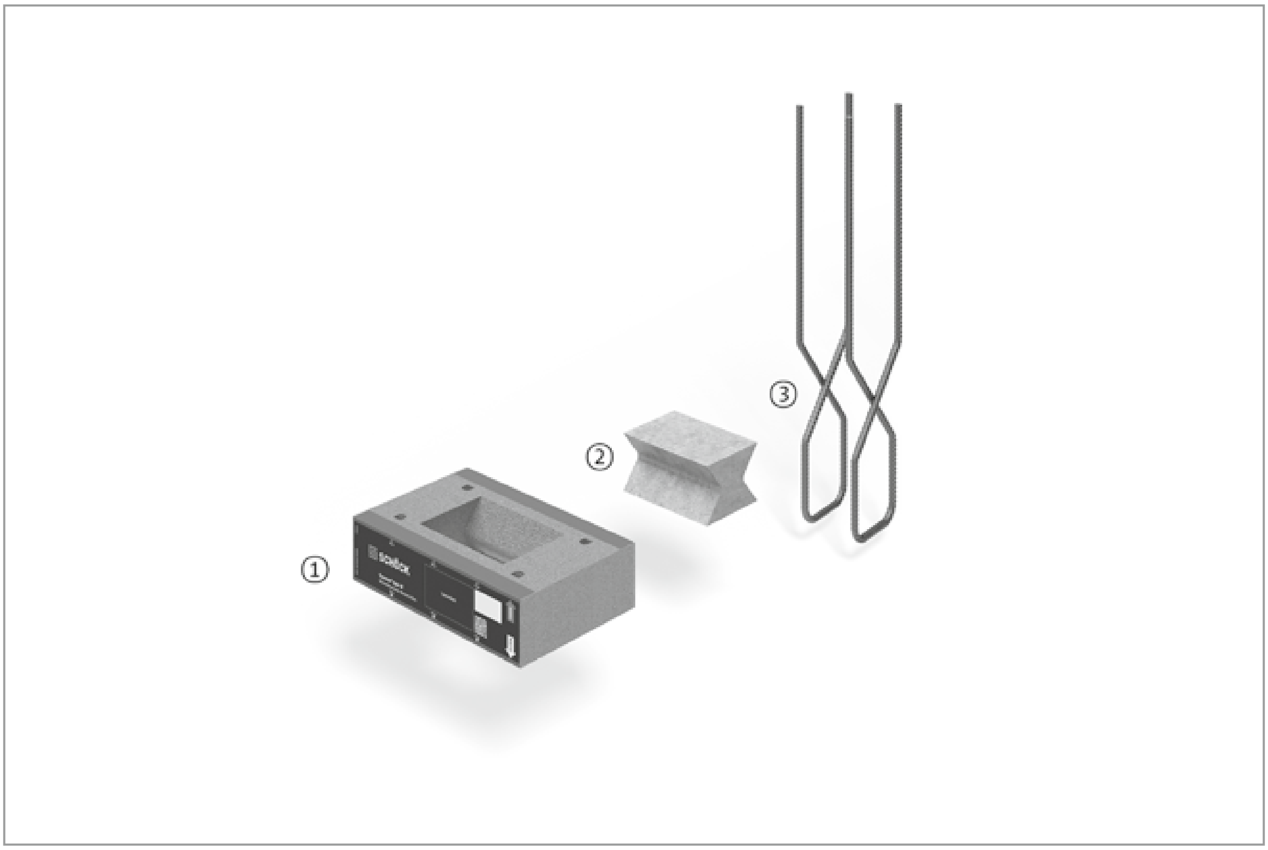


Fig. 16: Schöck Sconnex® type W-N-VH

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

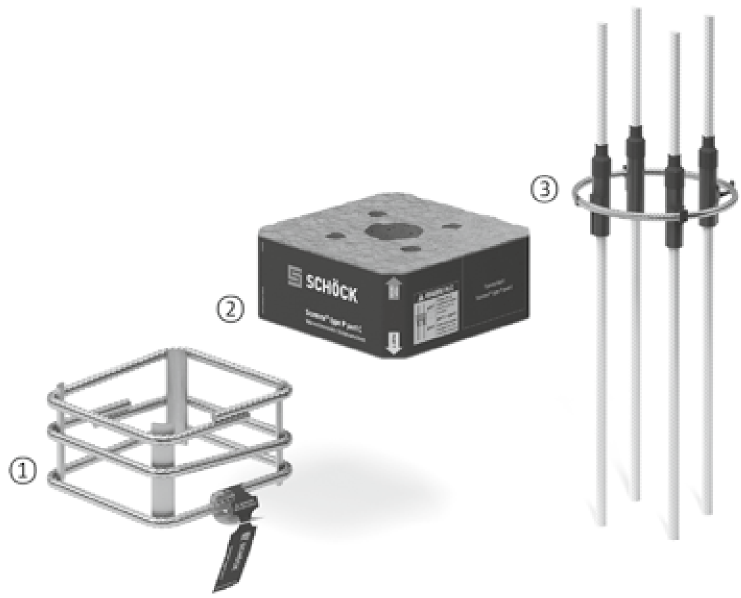


Fig. 17: Schöck Sconnex® type P-B250

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.

Configuration and geometry

Schöck Sconnex® type P is one of two components of the existing system solution for the reduction of the heat flow from quadratic reinforced concrete columns with an edge length of 250 × 250 mm. It consists of Part C and Part T. Both parts are absolutely necessary for the achievement of the specified bearing loads.

Product features and components

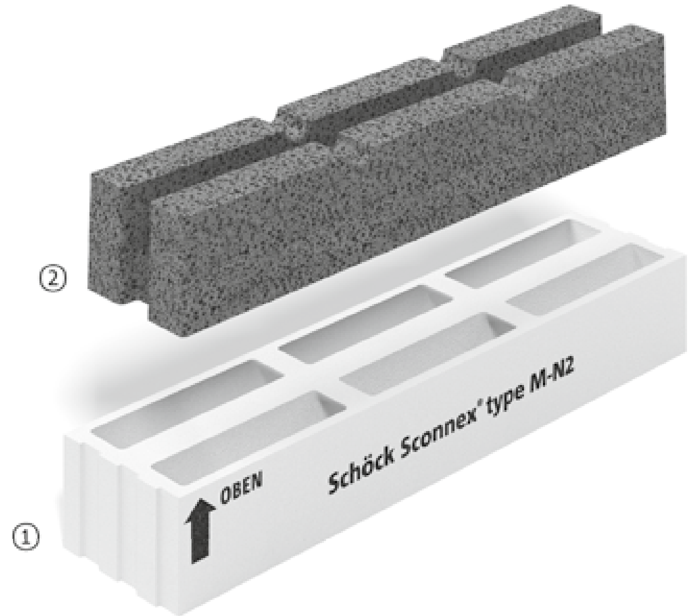


Fig. 18: Schöck Sconnex® type M-N2

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, sand lime building blocks, lime-sand precision blocks (percentage perforation ≤ 15%) and plan elements as per DIN V 106 or BS EN 771-2 in combination with DIN 20000-402 of crushing strength class ≥ 12 or solid bricks as per DIN 105-100 or BS EN 771-1 in combination with DIN 20000-401 of crushing strength class ≥ 12
- Standard masonry mortar of Mortar Group IIa or III or thin-bed mortar as per BS EN 998-2 in combination with DIN 20000-412 or DIN V 18580

Application cases with under-slab insulation

Connection of an external wall using Schöck Sconnex® type W

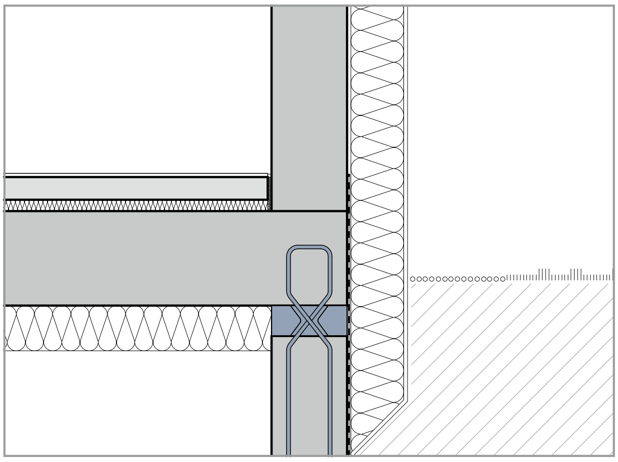


Fig. 19: Schöck Sconnex® type W with external wall and under-slab insulation

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

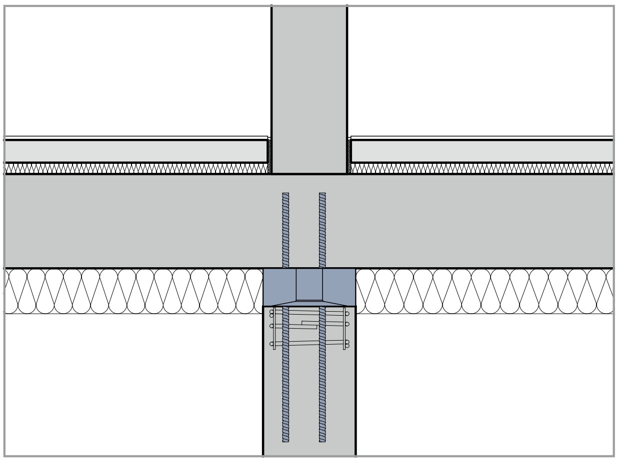


Fig. 20: Schöck Sconnex® type P with internal columns and under-slab insulation

Schöck Sconnex® type P Part C has an insulation 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

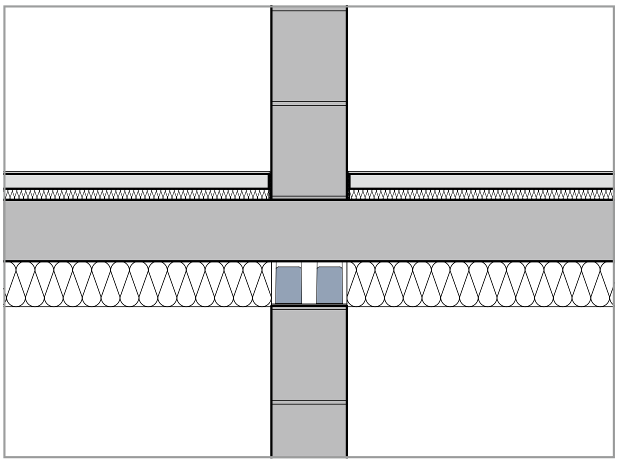


Fig. 21: Schöck Sconnex® type M in masonry with internal walls and under-slab insulation

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 119).

Schöck Sconnex® principles

Application cases with above slab insulation

Connection of an external wall using Schöck Sconnex® type W

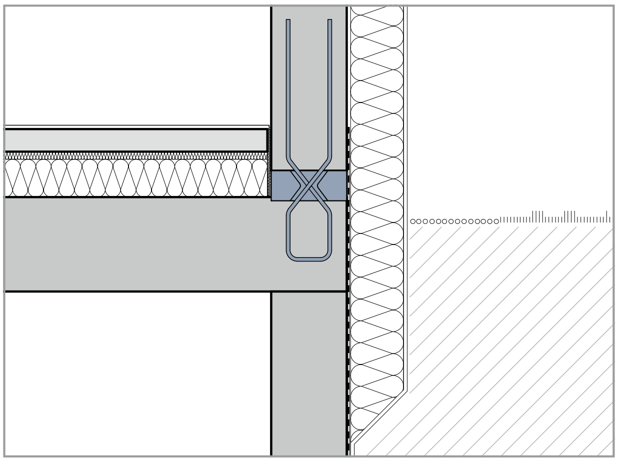


Fig. 22: Schöck Sconnex® type W with external wall and under-slab insulation

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

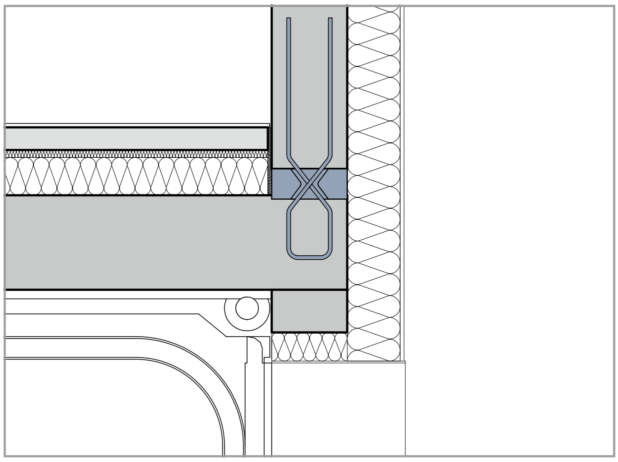


Fig. 23: Sconnex® type W with external wall and under-slab insulation over underground garage entry

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

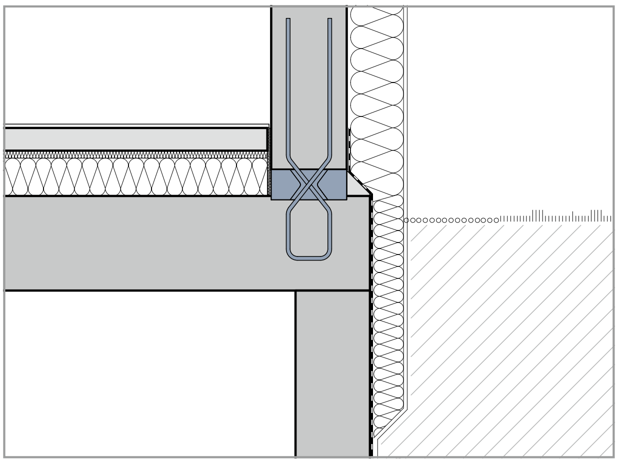


Fig. 24: Possible reduction of the insulation perimeter in the soil

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

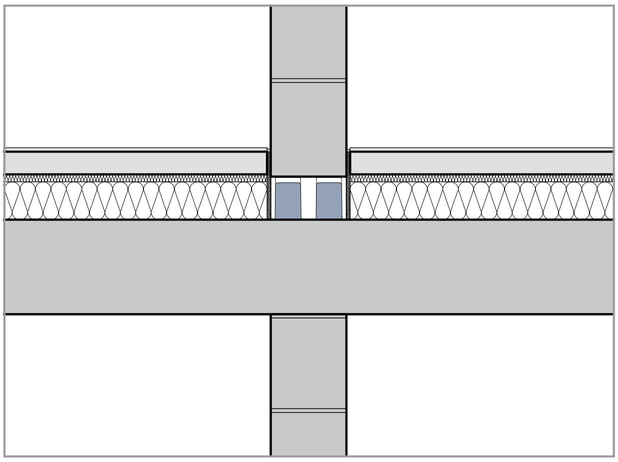


Fig. 25: Schöck Sconnex® type M in masonry with internal walls and under-slab insulation

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

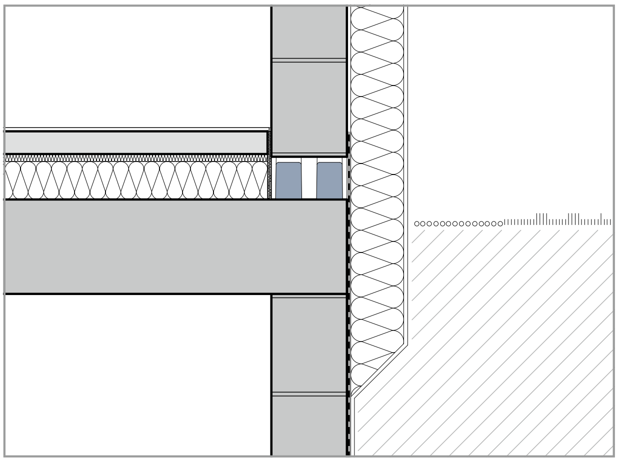


Fig. 26: Schöck Sconnex® type M in masonry with internal wall and under-slab insulation

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

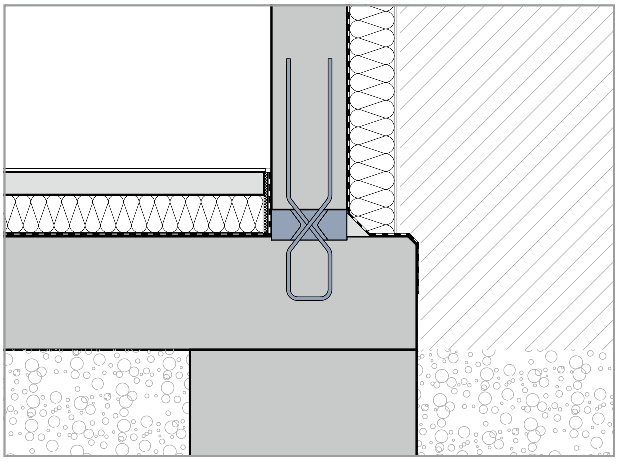


Fig. 27: Schöck Sconnex® type W external wall on strip footing/frost-proof course

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

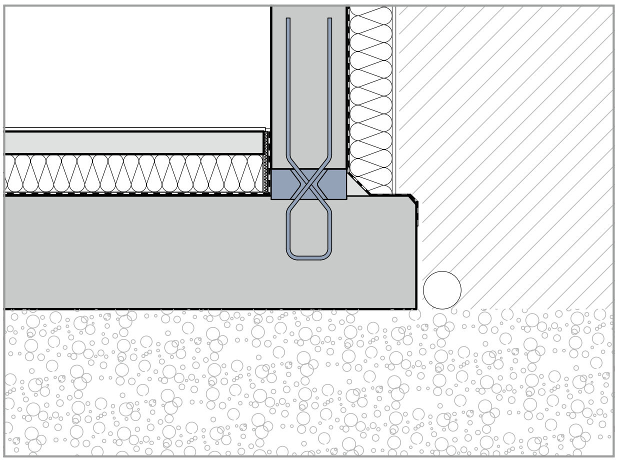


Fig. 28: Schöck Sconnex® type W external wall on foundation slab

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

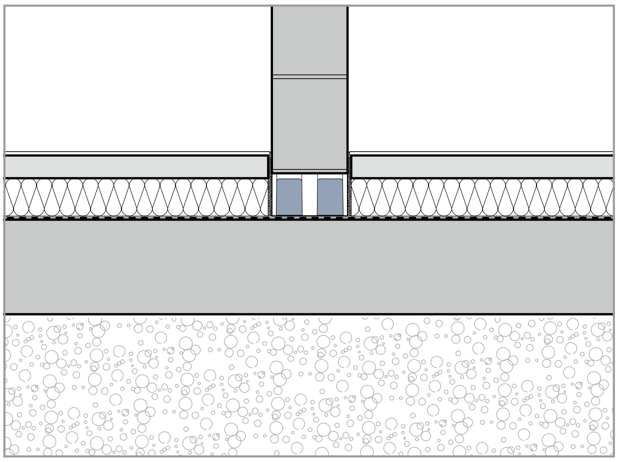


Fig. 29: Schöck Sconnex® type M internal wall on foundation component

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

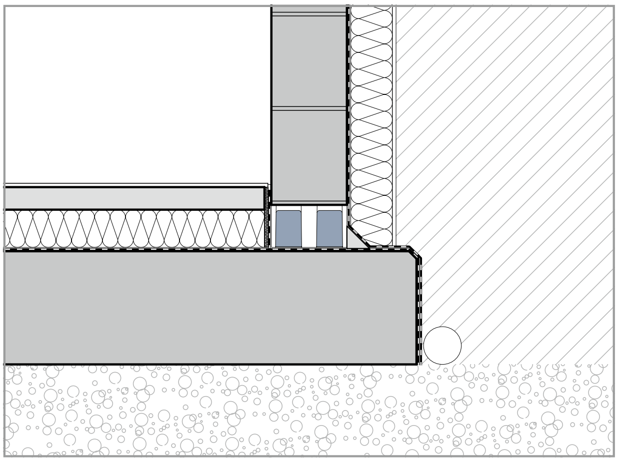


Fig. 30: Schöck Sconnex® type M external wall on foundation component

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

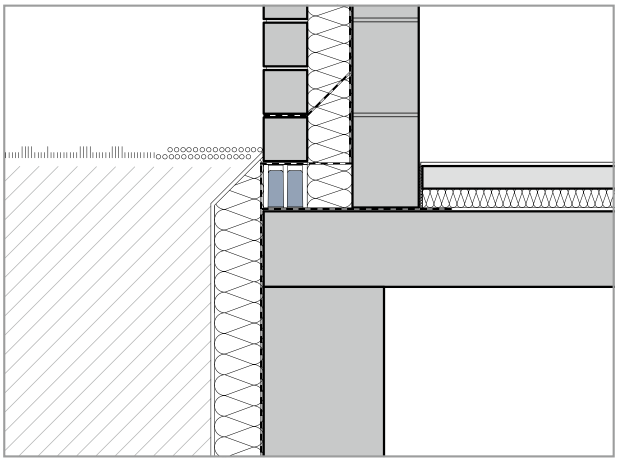


Fig. 31: Schöck Sconnex® type M with double-leaf masonry

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

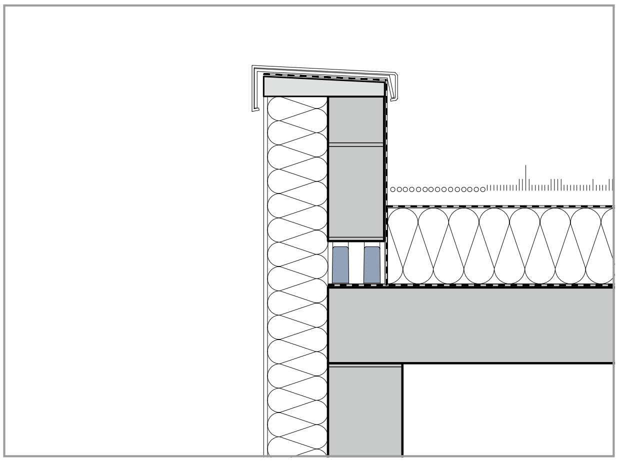


Fig. 32: Schöck Sconnex® type M in the attic

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

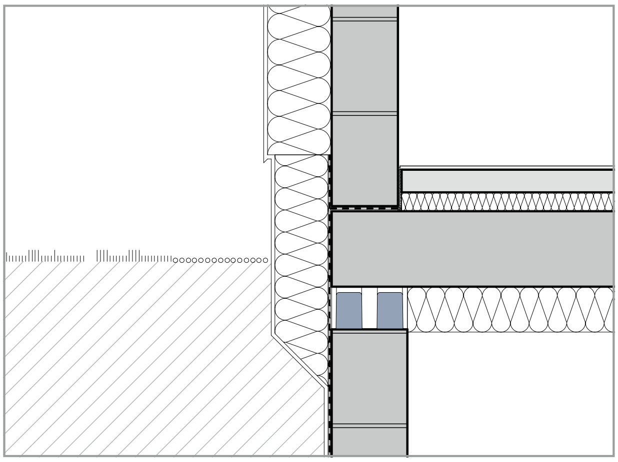


Fig. 33: Schöck Sconnex® type M underneath the basement floor

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

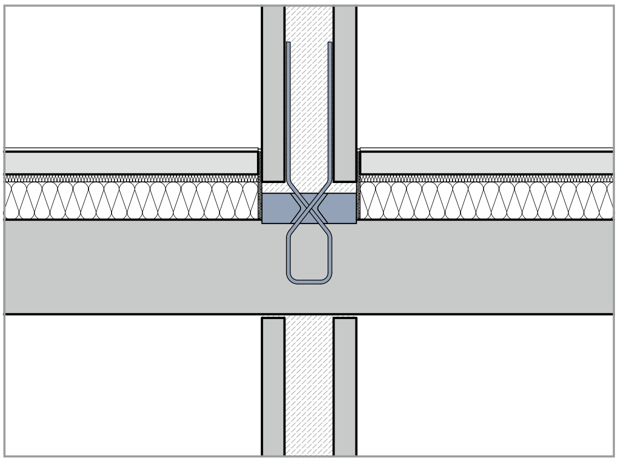


Fig. 34: Schematic diagram Schöck Sconnex® type W with twin walls and above-slab insulation

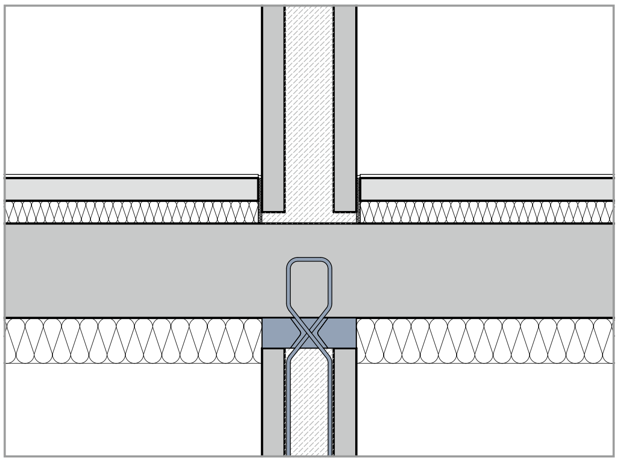


Fig. 35: Schematic diagram Schöck Sconnex® type W with twin walls and under-slab insulation

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

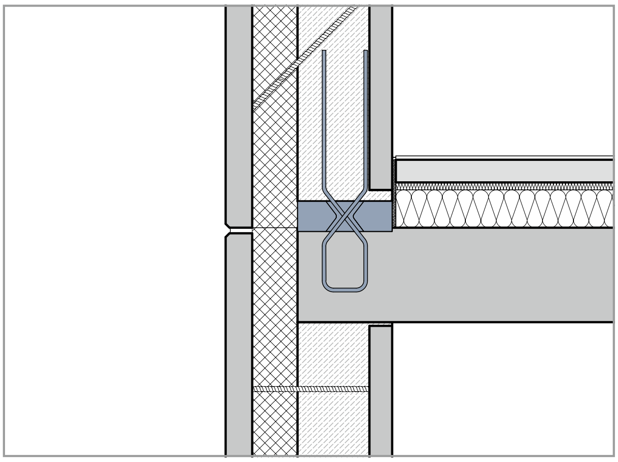


Fig. 36: Schematic diagram Schöck Sconnex® type W with sandwich walls and above-slab insulation

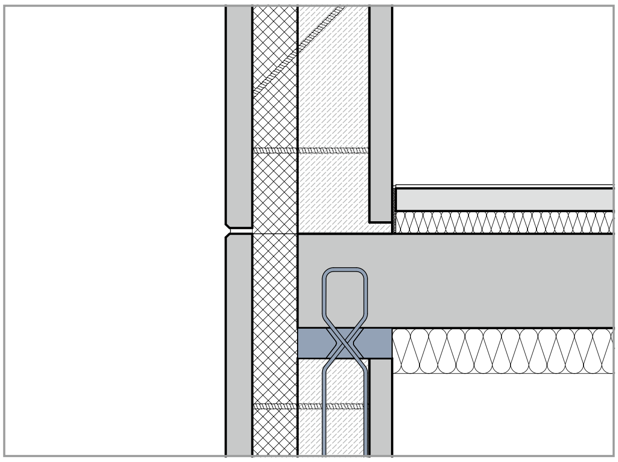


Fig. 37: Schematic diagram Schöck Sconnex® type W with sandwich walls and under-slab insulation

Schöck Sconnex®
principles

Application cases with superimposed timber house structures

Connection of a concrete base with Schöck Sconnex® type W

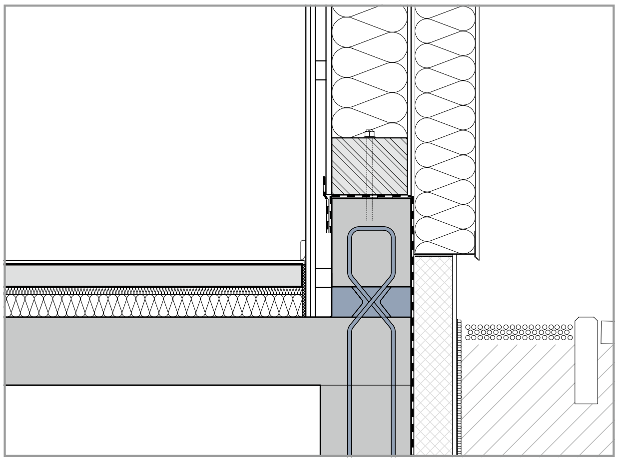


Fig. 38: Concrete base with Schöck Sconnex® type W

In the area of the external wall of timber houses particular attention is ito be paid that the timber construction is protected, using suitable measures, in the area of splash water. For this reason the respective required minimum height is implemented using a concrete base. Care must be taken to ensure that the outer membrane extends beyond the concrete base.

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

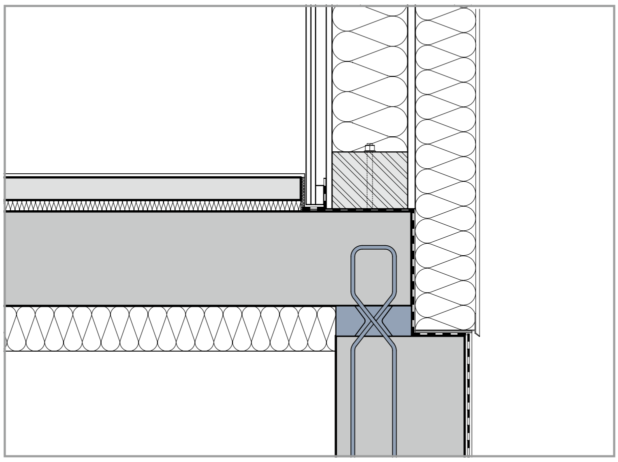


Fig. 39: External wall with Schöck Sconnex® type W above an underground garage

In the area off underground garages the selection of material and the thickness of the insulation layer in the interior area can be specified due to fire protection requirements. Due to moisture protection (for example due to splash and backwater), it is also recommended to place a sealing membrane here.