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

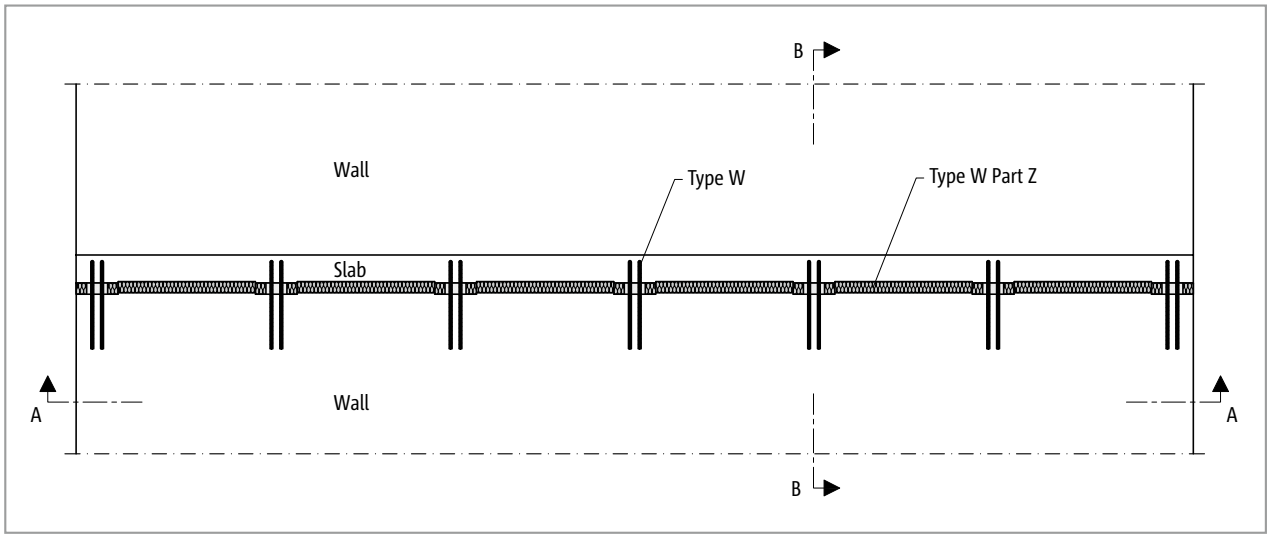


Fig. 59: Schöck Sconnex® type W: Connection between wall and slab above – installation at the top of the wall

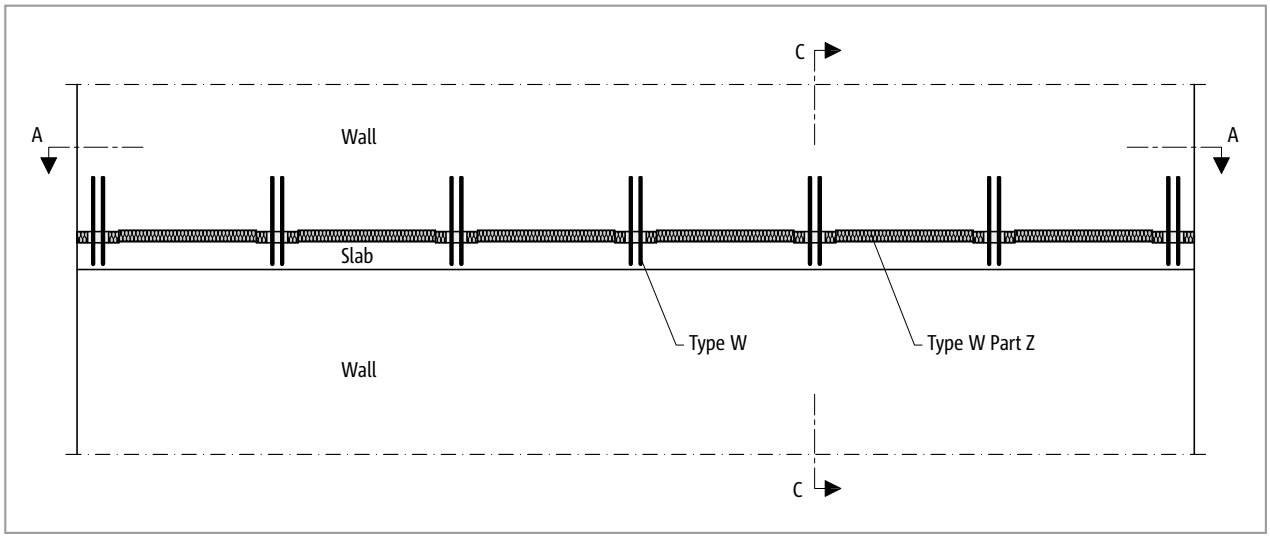


Fig. 60: Schöck Sconnex® type W: Connection between floor and rising wall – installation at the foot of the wall

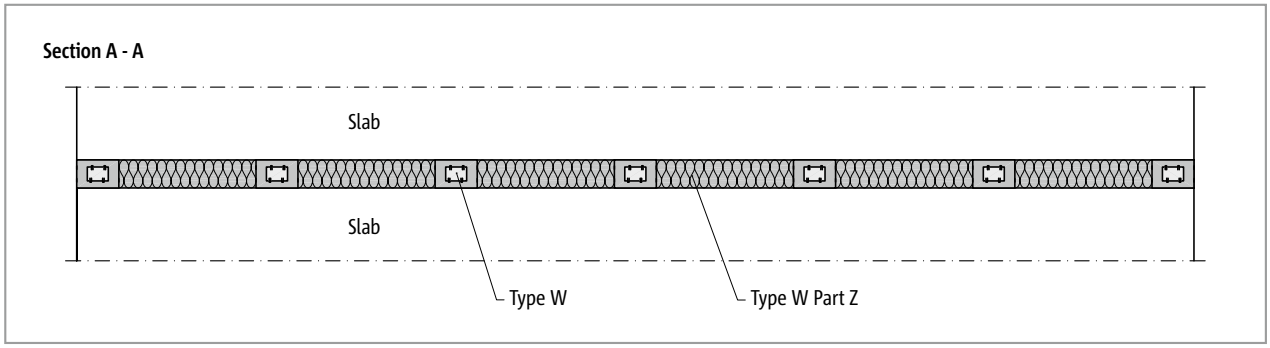


Fig. 61: Schöck Sconnex® type W: Section A-A

Installation cross sections

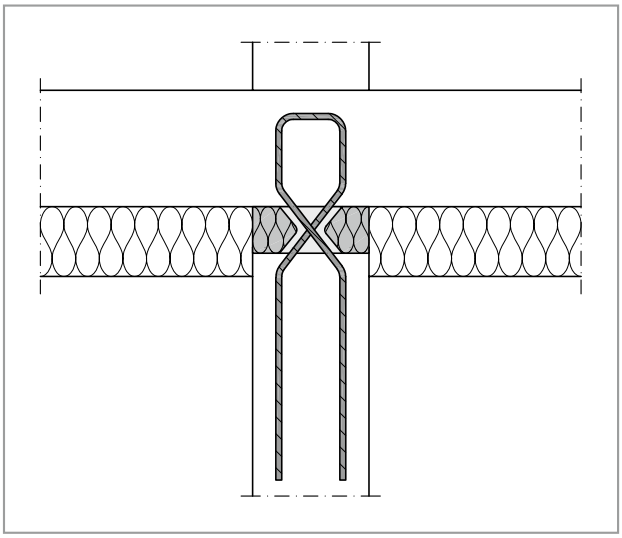


Fig. 62: Schöck Sconnex® type W-N-VH: Section B-B, internal wall; below-slab insulation

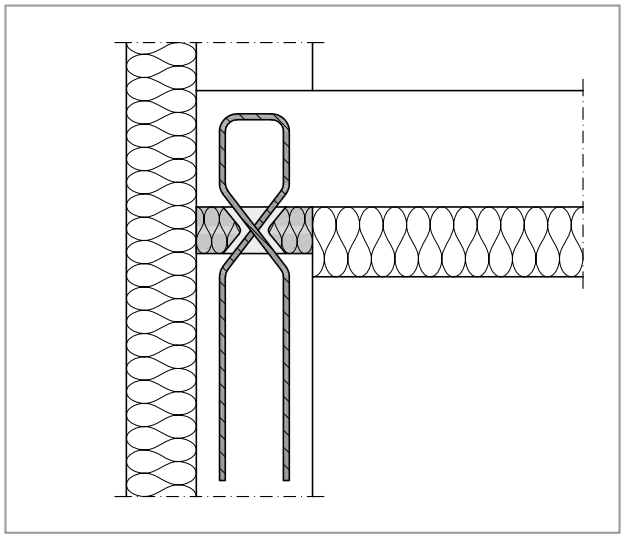


Fig. 63: Schöck Sconnex® type W-N-VH: External wall; below-slab insulation corresponding to Section B-B

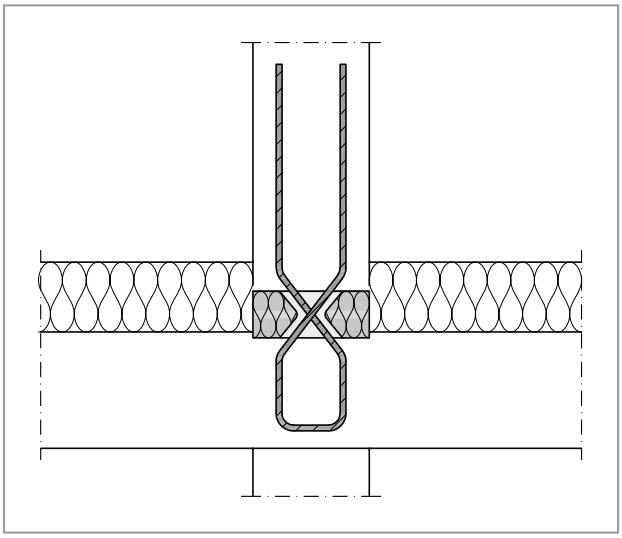


Fig. 64: Schöck Sconnex® type W-N-VH: Section C-C, internal wall; above-slab insulation

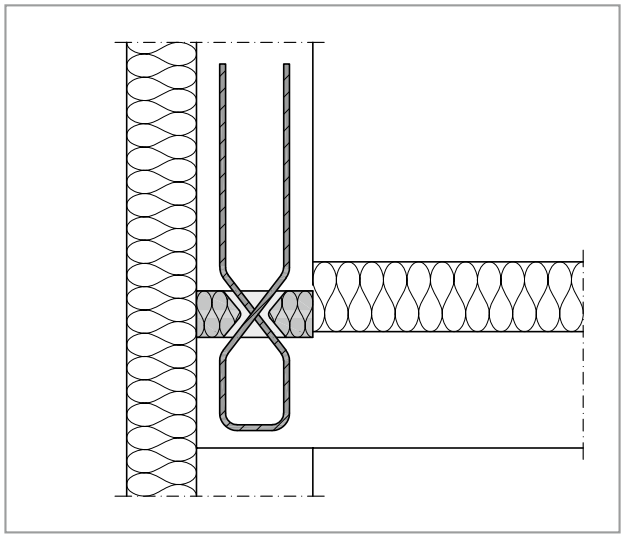


Fig. 65: Schöck Sconnex® type W-N-VH: External wall; above-slab insulation corresponding to Section C-C

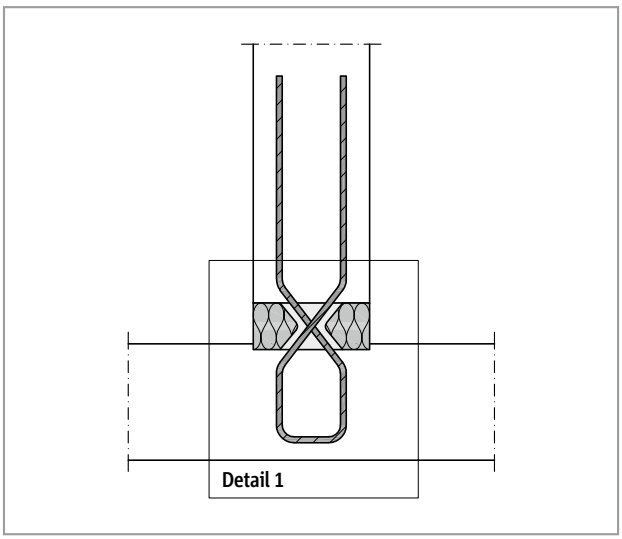


Fig. 66: Schöck Sconnex® type W: Tight fit between the upper edge of the floor and the lower edge of the pressure bearing is ensured

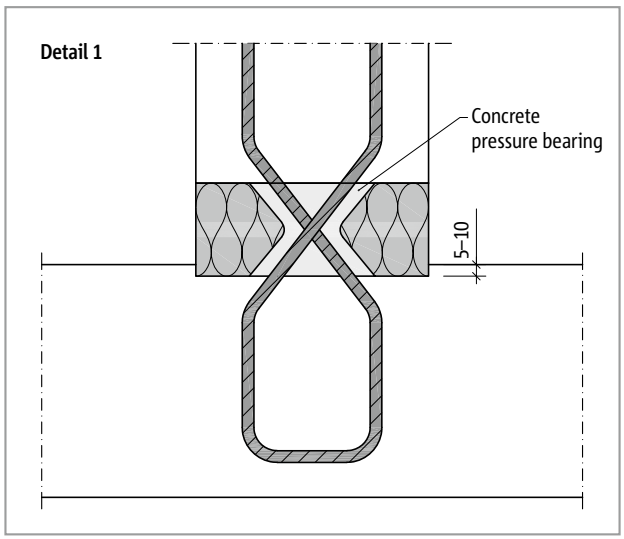


Fig. 67: Schöck Sconnex® type W: Tight fit through 5-10 mm deep counter-sinking of the insulating element in the floor

Element arrangement – for special applications

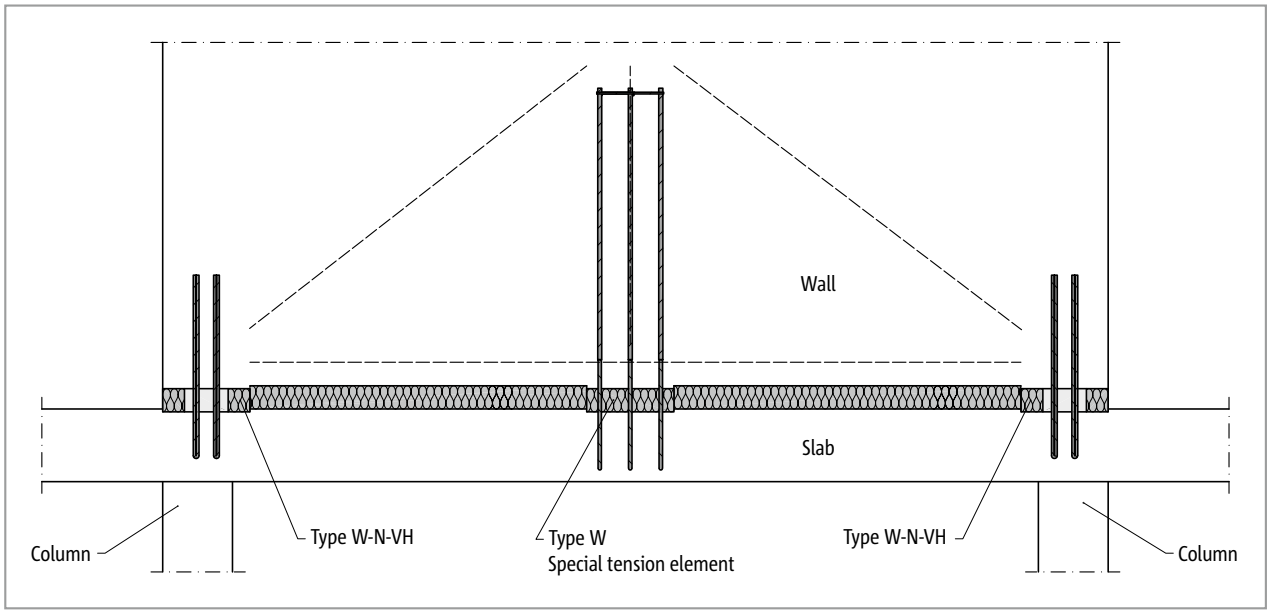


Fig. 68: Schöck Sconnex® type W: Combined product variants for the connection of a wall type beam with ceiling suspension

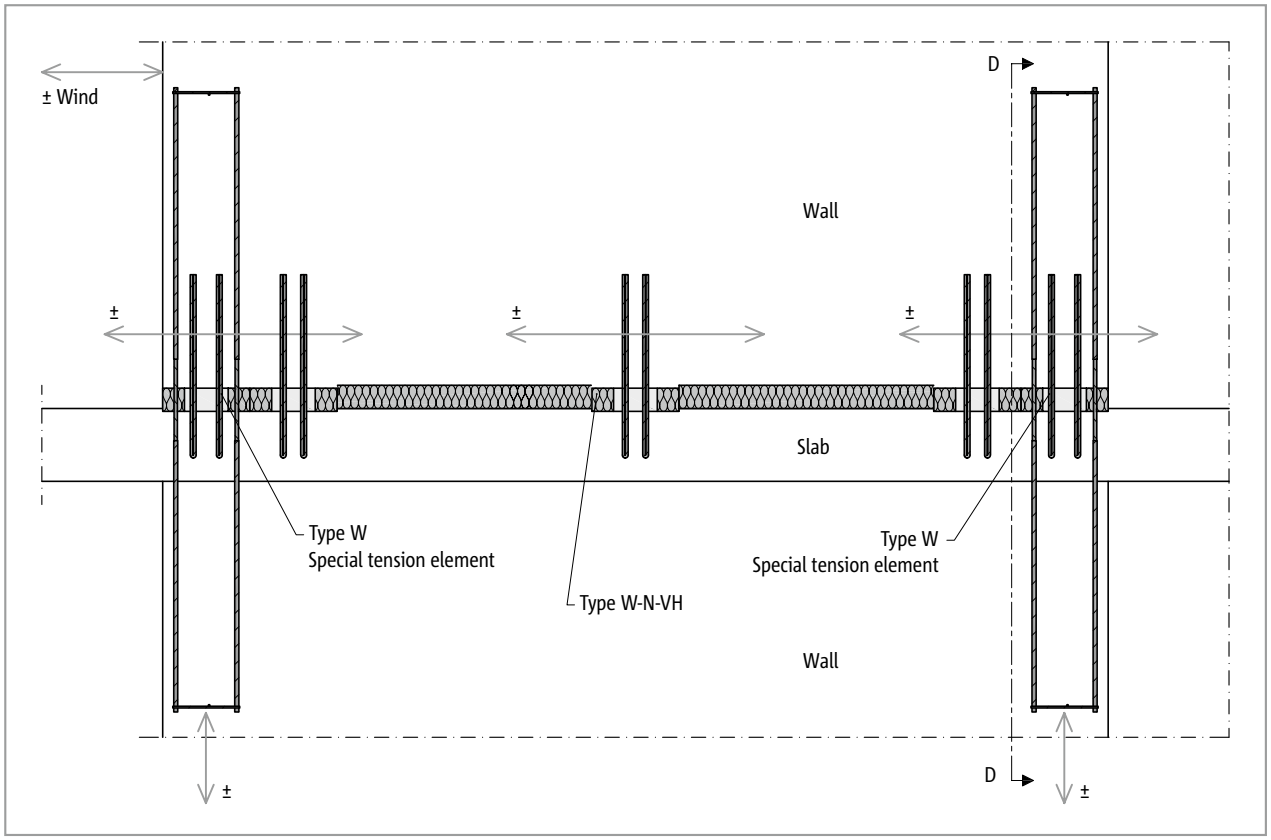


Fig. 69: Schöck Sconnex® type W: Combined product variants for the connection of a horizontal, loaded, stabilized wall

Element arrangement – for special applications

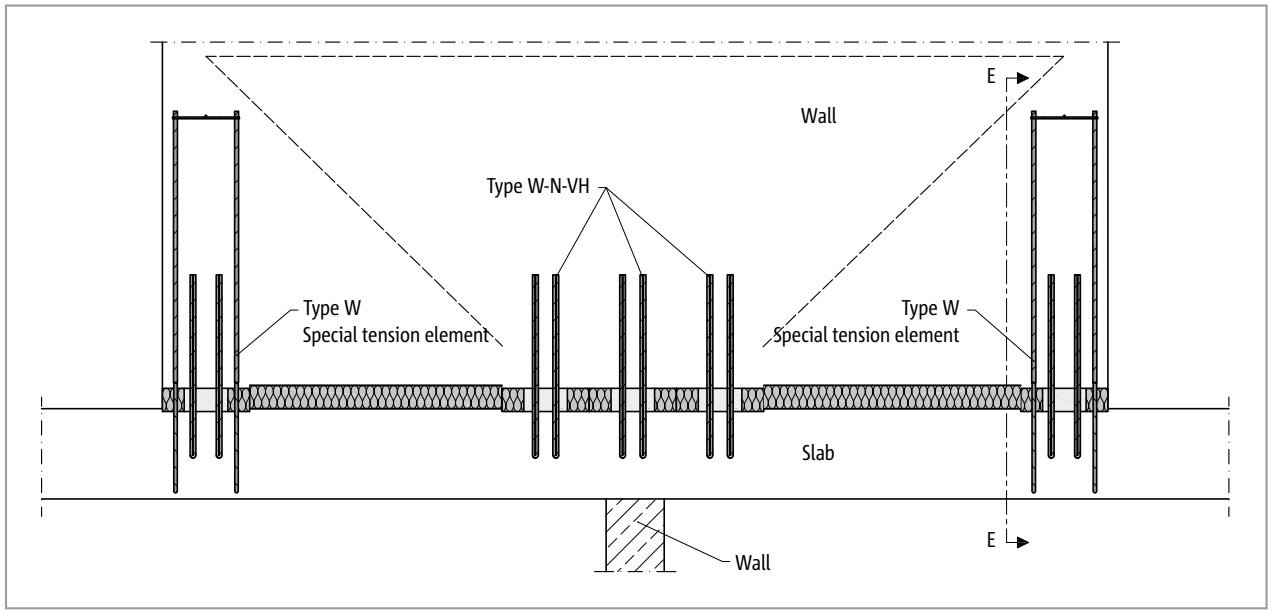


Fig. 70: Schöck Sconnex® type W: Combined product variants in the application case of intersecting walls

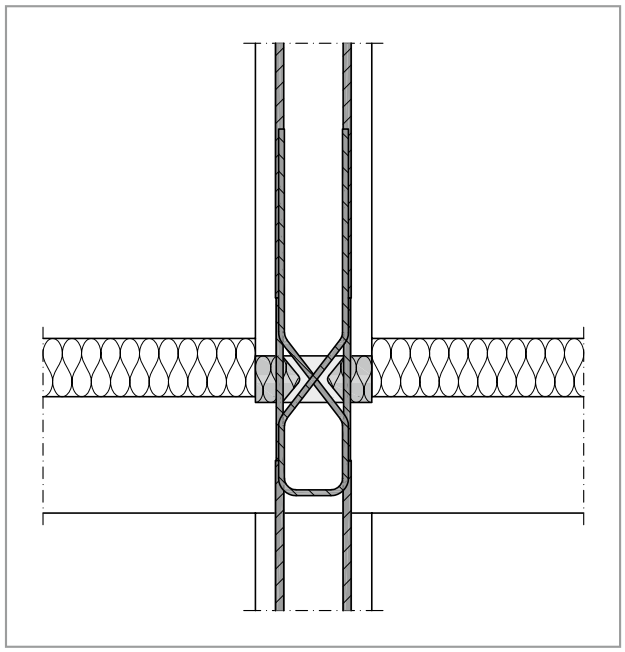


Fig. 71: Schöck Sconnex® type W special tension element: Section D-D; Tensile force connection of the walls straight through the floor

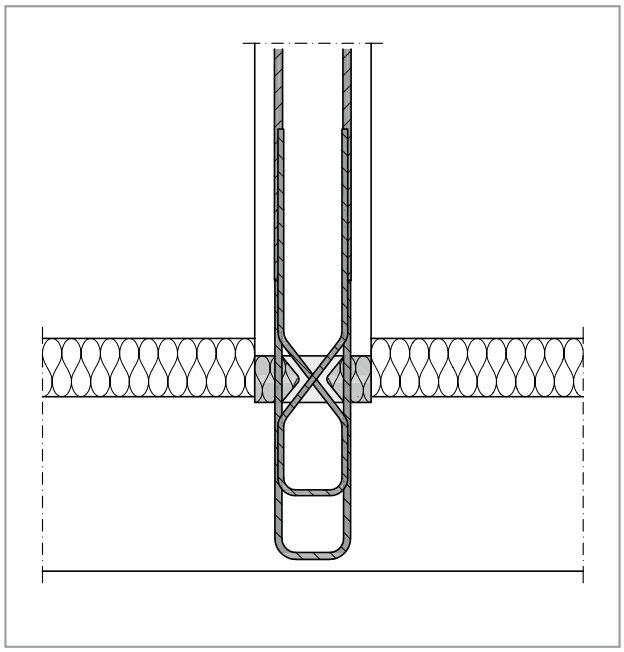


Fig. 72: Schöck Sconnex® type W special tension element: Section E-E; suspension of a floor on a wall

Product selection | Type designations

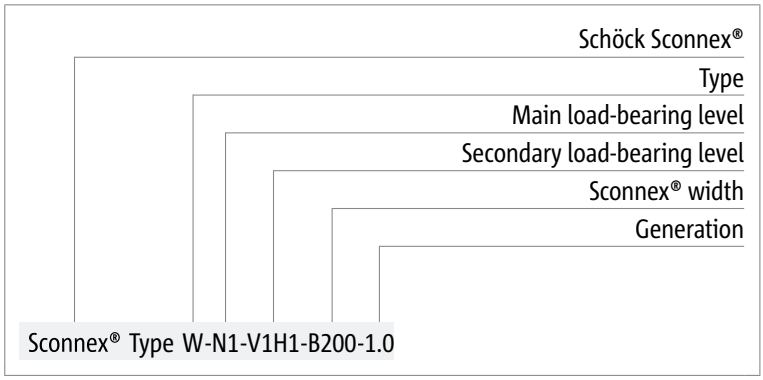
Fig. 73: Schöck Sconnex® type W

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 70).

Type designation in planning documents



Product selection | Type designations

Fig. 74: Schöck Sconnex® type W Part Z

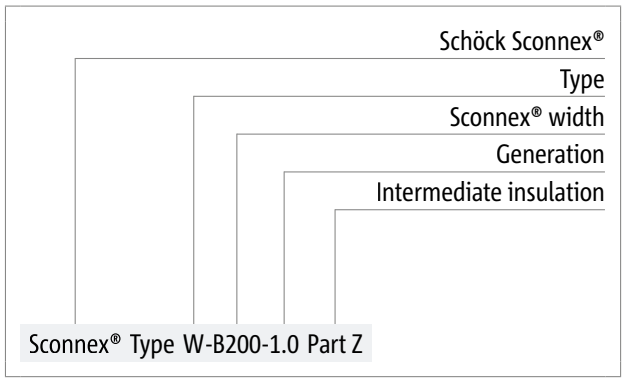
Schöck Sconnex® type W Part Z variants

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 70).

Type designation in planning documents



Product selection | Type designations

Fig. 75: Schöck Sconnex® type W Part M

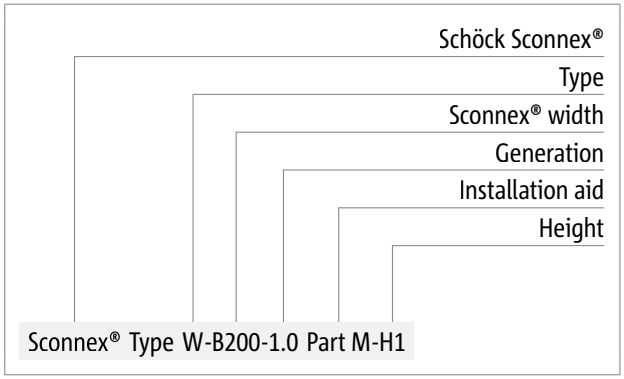
Schöck Sconnex® type W Part M variants

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
- Schöck Sconnex® width:
  B = 180, 200, 250, 300 mm = wall thickness
- Variant:
  H1: for 200 mm < H < 355 mm; Height H see product description page 69
  H2: for 350 mm < H < 600 mm

Type designation in planning documents



Product selection | Type designations

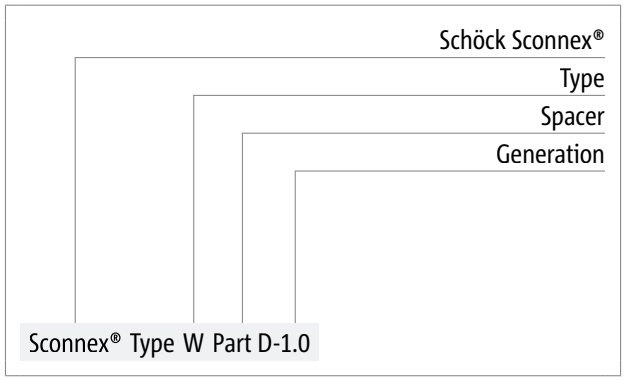
Fig. 76: Schöck Sconnex® type W Part D

Schöck Sconnex® type W Part D

Schöck Sconnex® type W Part D is a 15 mm high concrete spacer as accessory for exposed concrete applications.
4 pieces Part D are required for the spacing between the slab formwork and an installation aid Part M.

- Generation:
  1.0

Type designation in planning documents



Application Schöck Sconnex® type W

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

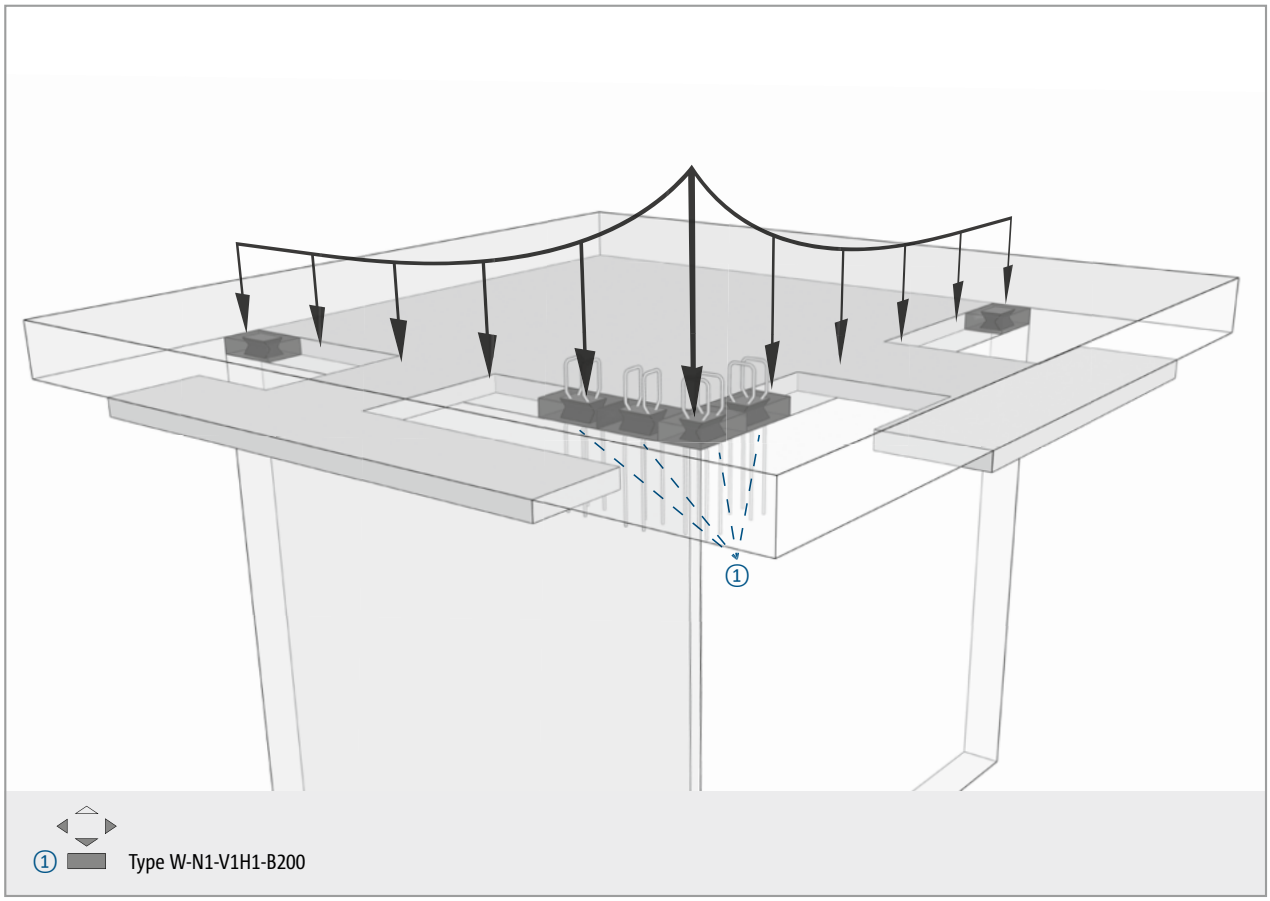


Fig. 77: Wall corner separated under floor

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

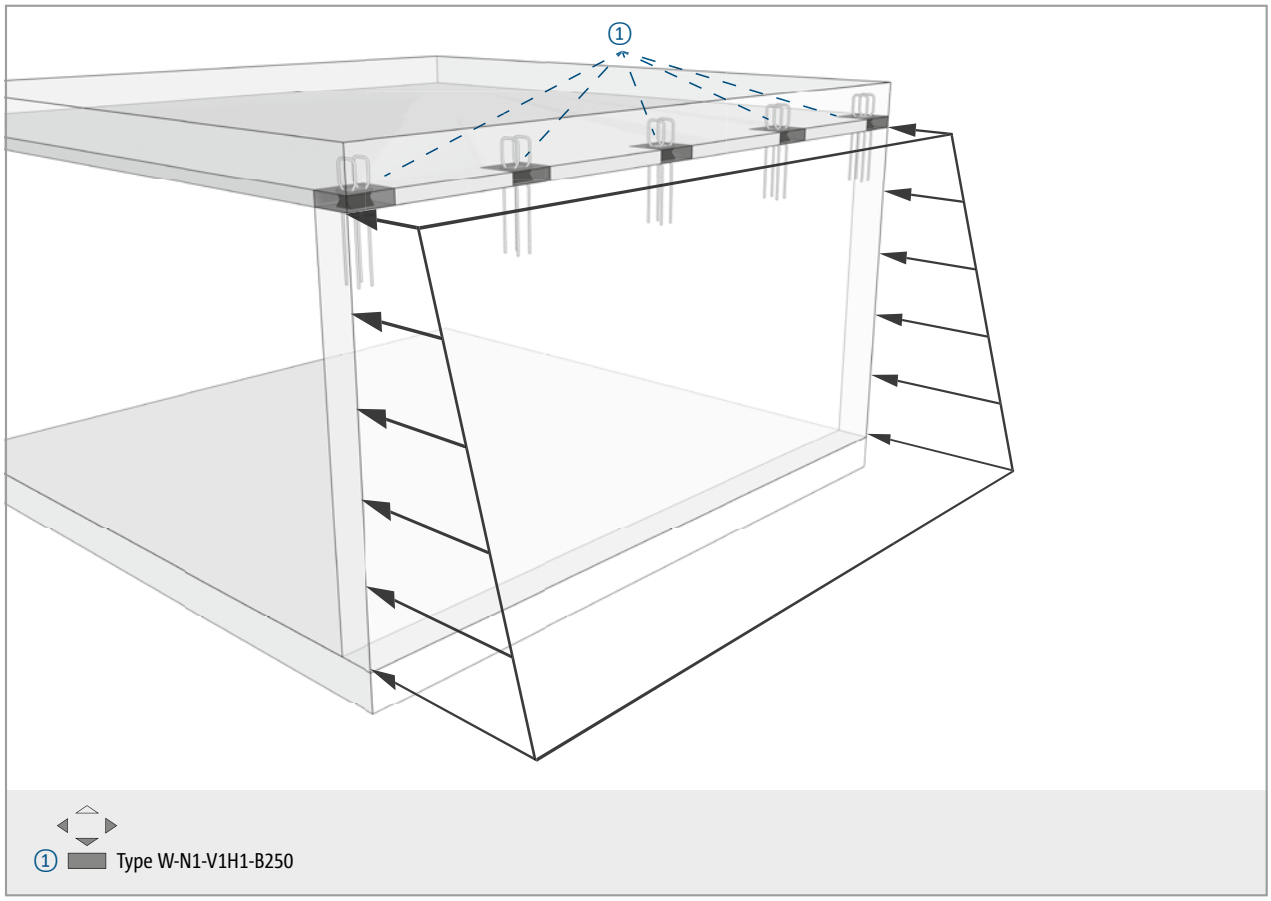


Fig. 78: Earth pressure loaded wall separated below floor

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

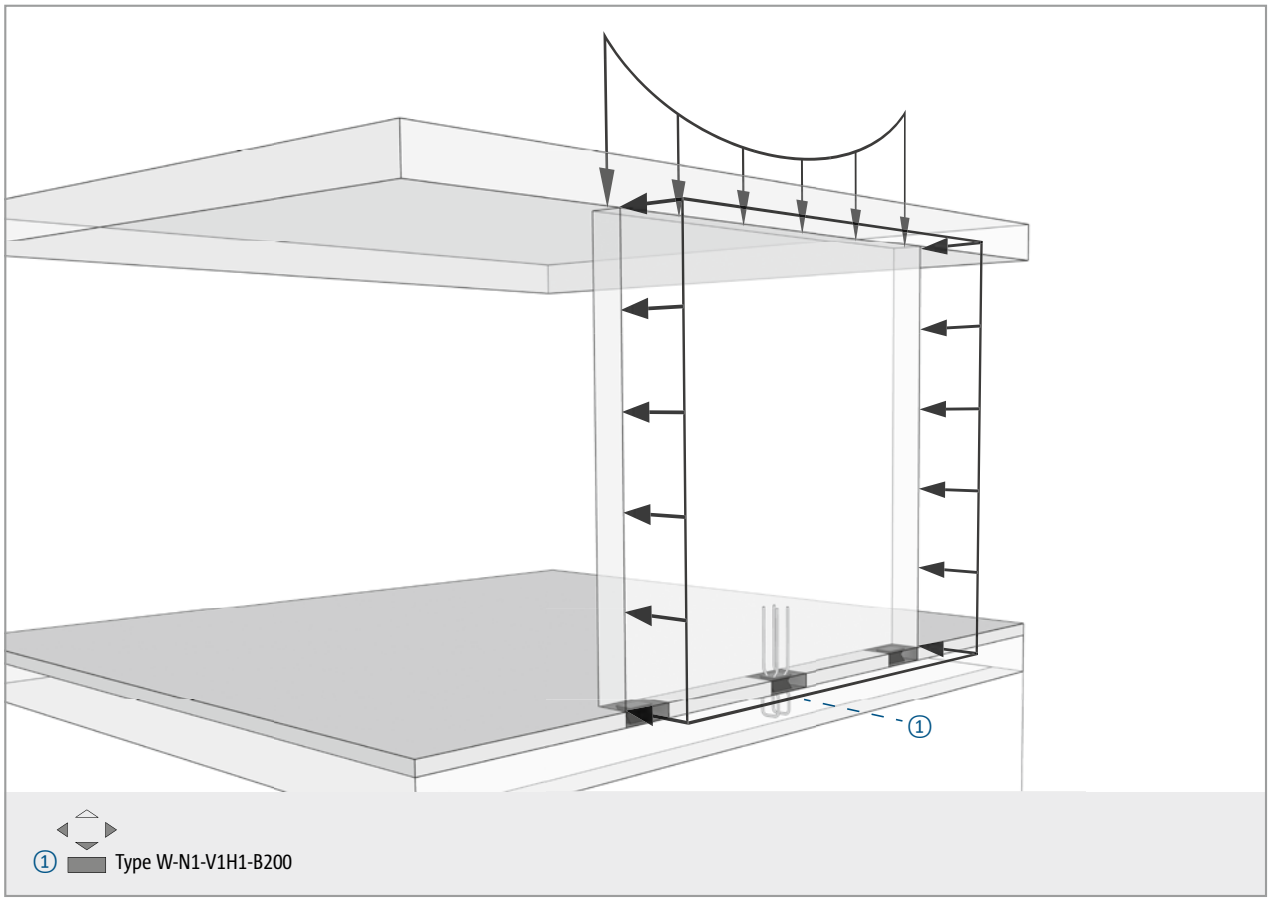


Fig. 79: Wind loaded facade wall separated on the floor

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

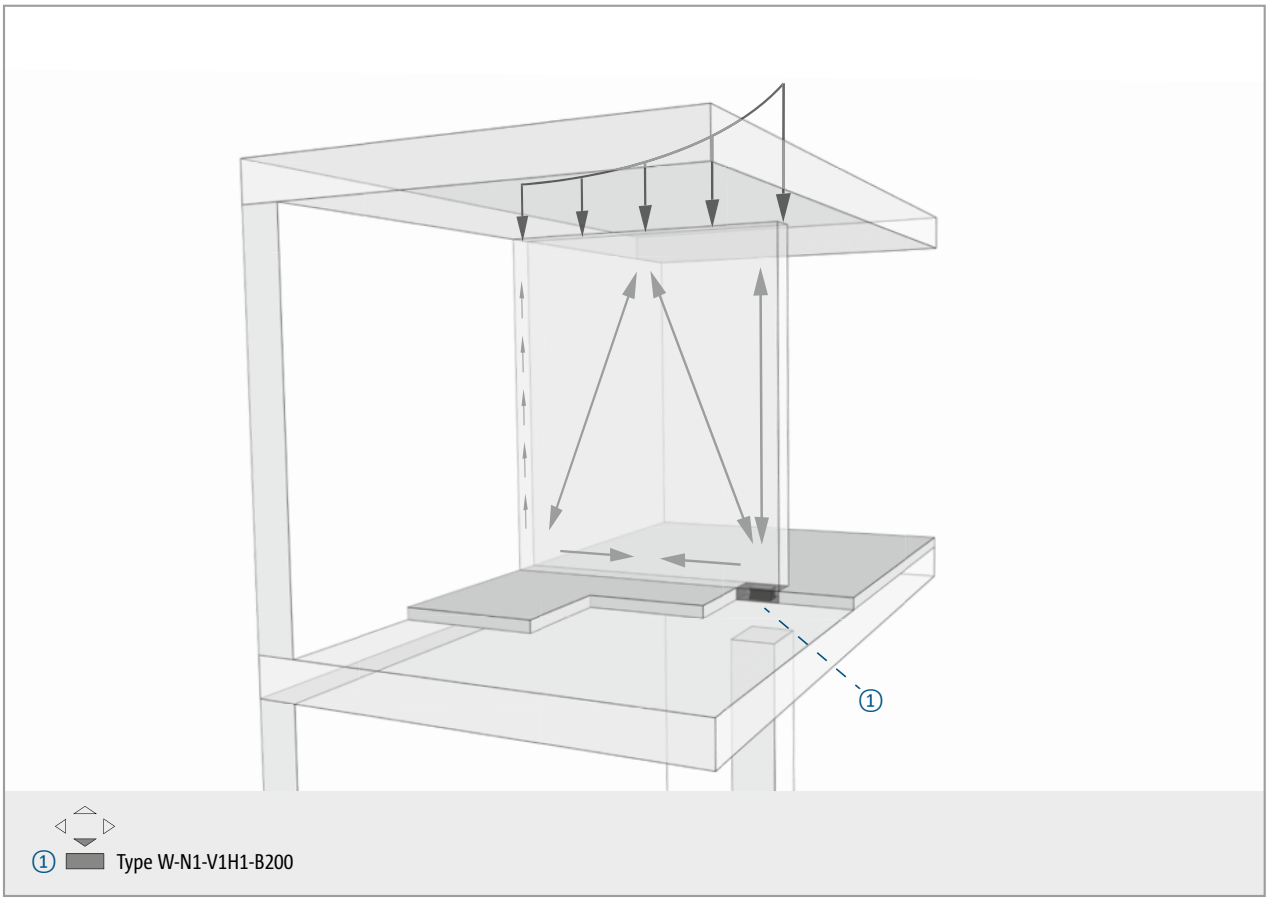


Fig. 80: Wall at stairwell, separated at the floor, point support

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

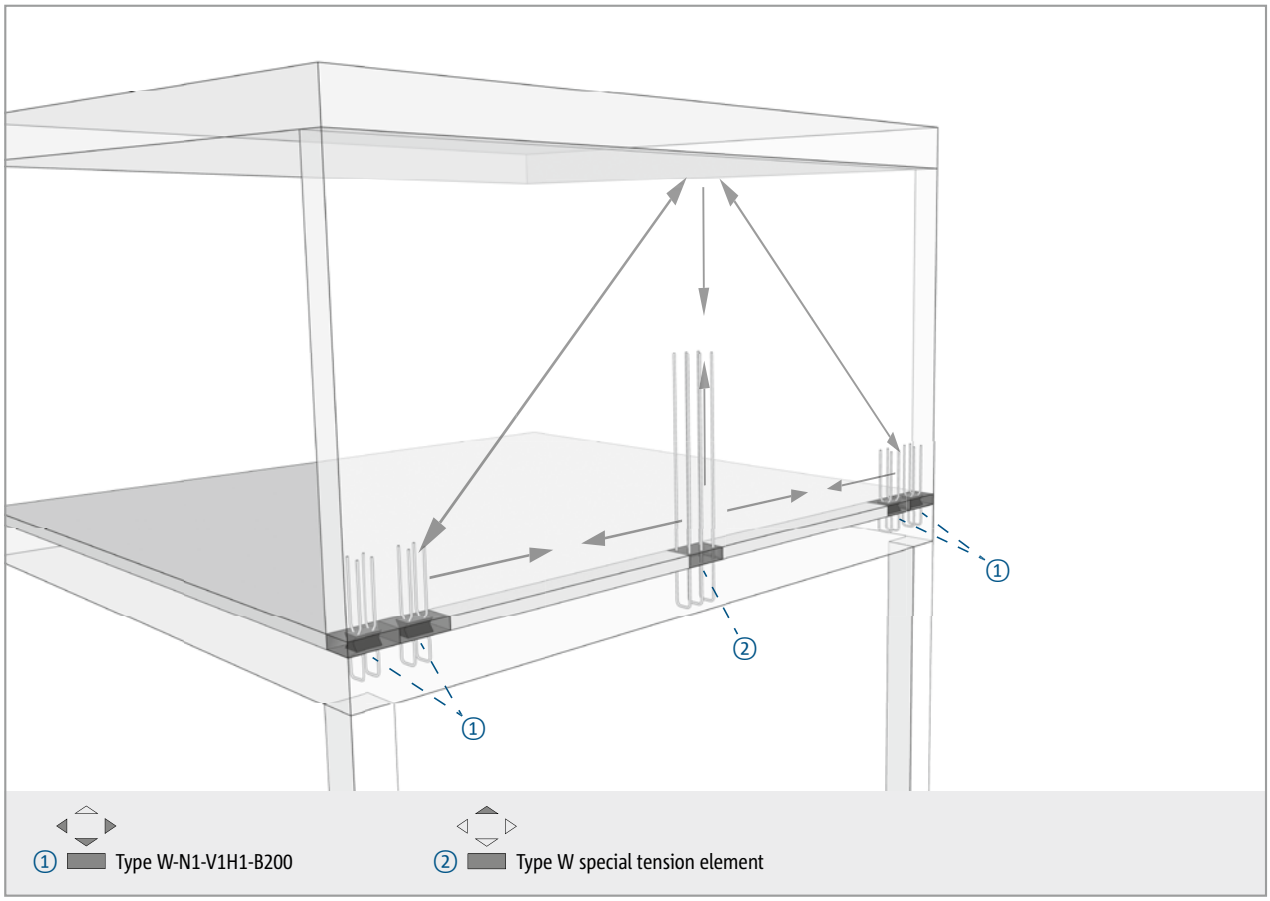


Fig. 81: Wall-type beam separated at the floor

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

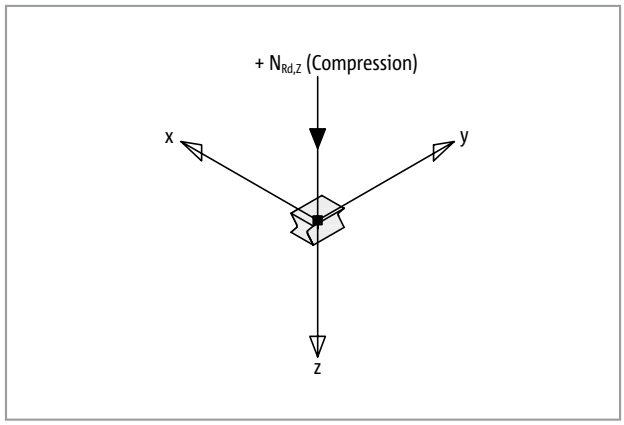


Fig. 82: Schöck Sconnex® type W-N: The design force $+N_{Rd,z}$ (compression) in the coordinate system

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 | Design

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	$V_{Ed,y}/V_{Rd,y} + V_{Ed,x}/V_{Rd,x} \leq 1$

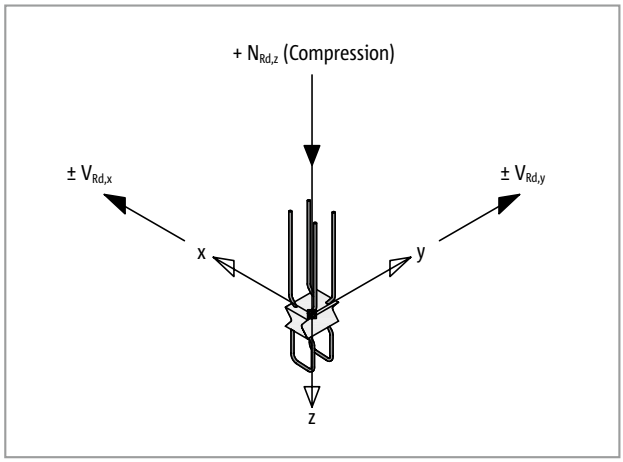


Fig. 83: Schöck Sconnex® type W-N-VH: The design forces $+N_{Rd,z}$ (compression), $+V_{Rd,x}$ and $-V_{Rd,y}$ in the coordinate system

Variants A

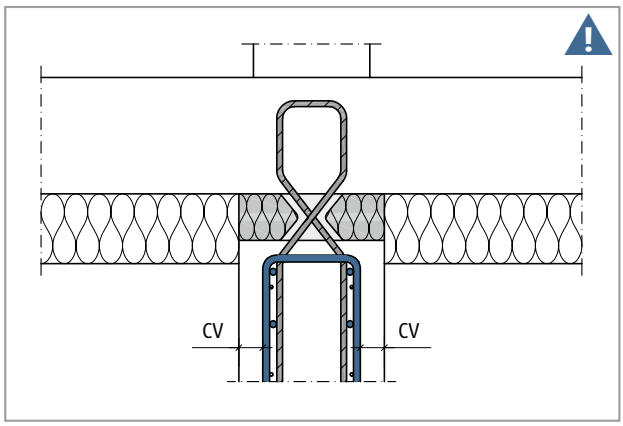


Fig. 84: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement; the outer longitudinal reinforcement supports the shear force bars of the Schöck Sconnex® against the structural element surface

Variants B

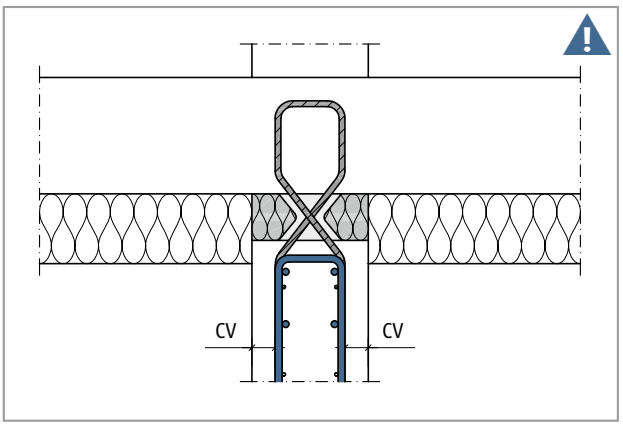


Fig. 85: Schöck Sconnex® type W-N-VH: Variant B (for small wall thicknesses) – on-site reinforcement; the longitudinal reinforcement supports the shear force bars of the Schöck Sconnex® against the inside of the reinforced concrete structural element

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 67 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 66.

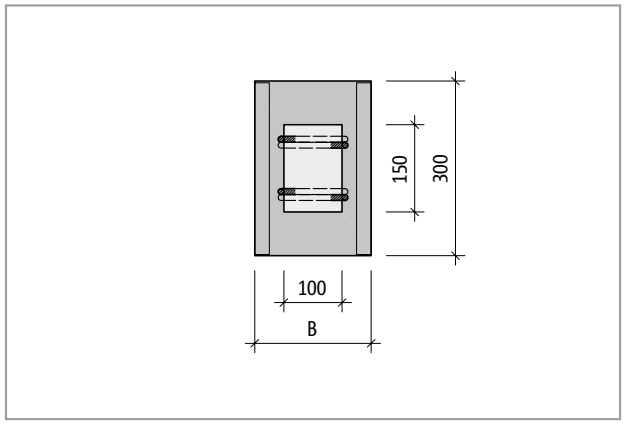


Fig. 86: Schöck Sconnex® type W-N-VH: Product plan view; pressure bearing area 150 mm × 100 mm

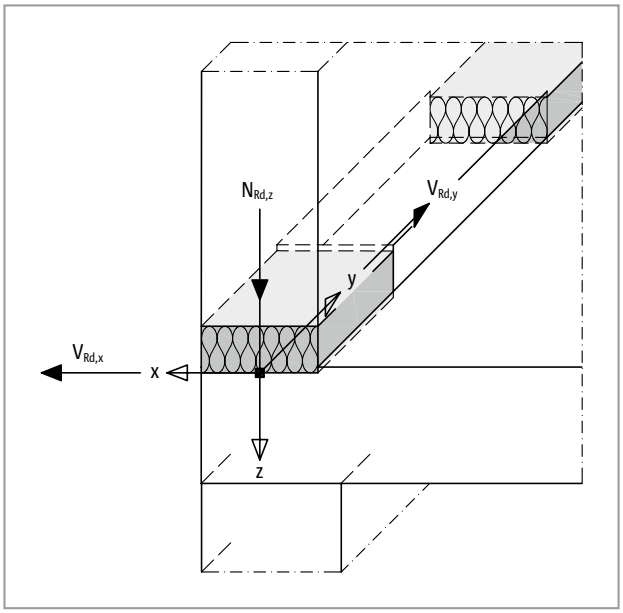


Fig. 87: Schöck Sconnex® type W: Sign convention for the design

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:

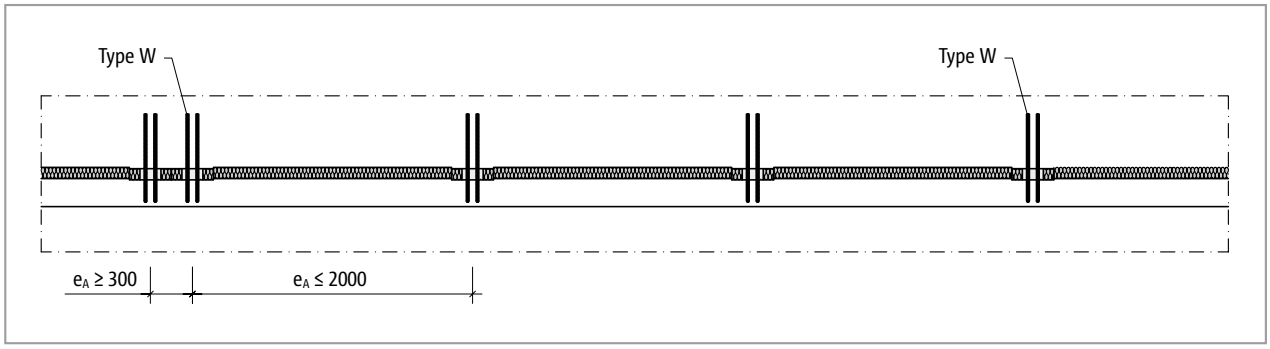


Fig. 88: Schöck Sconnex® type W: Minimum and maximum centre distance e_A

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.

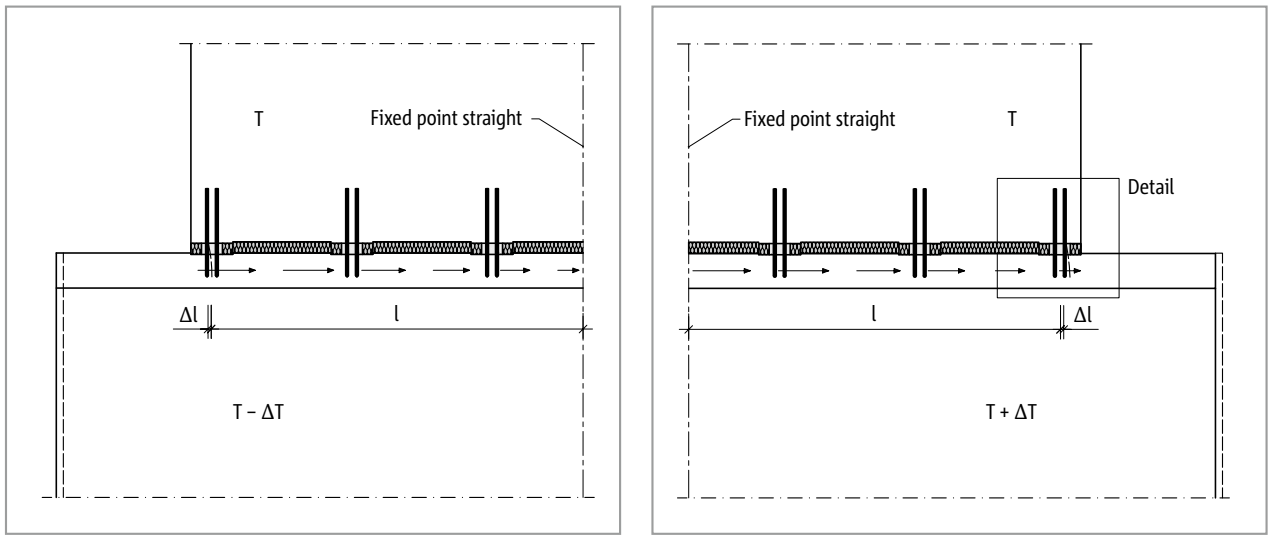


Fig. 89: Schöck Sconnex® type W: Displacement of the outer bars of a wall by Δl as a result of temperature deformation

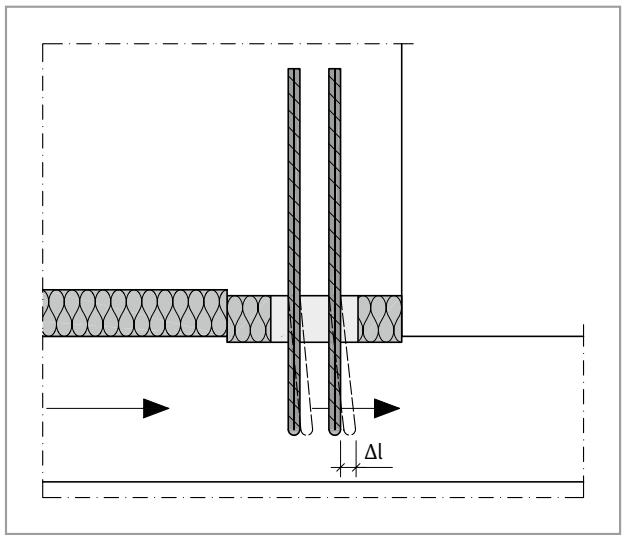


Fig. 90: Schöck Sconnex® type W: Δl as a result of temperature deformation in detail

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

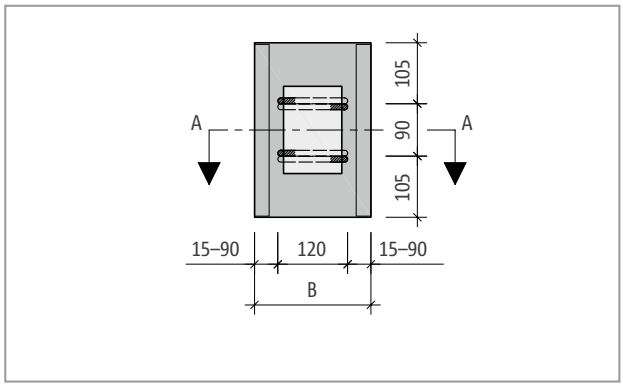


Fig. 91: Schöck Sconnex® type W-N-VH: Product plan view; positioning of shear force bars

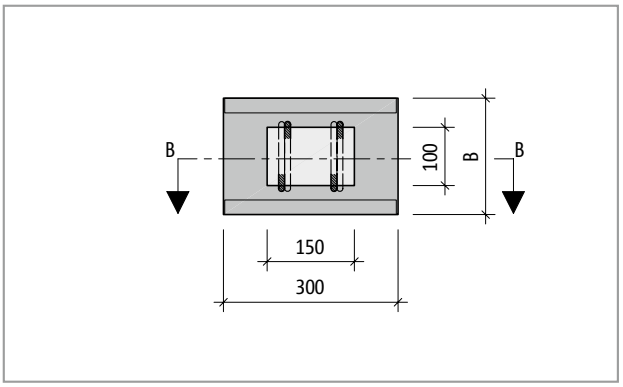


Fig. 92: Schöck Sconnex® type W-N-VH: Product plan view, pressure bearing area 150 × 100 mm

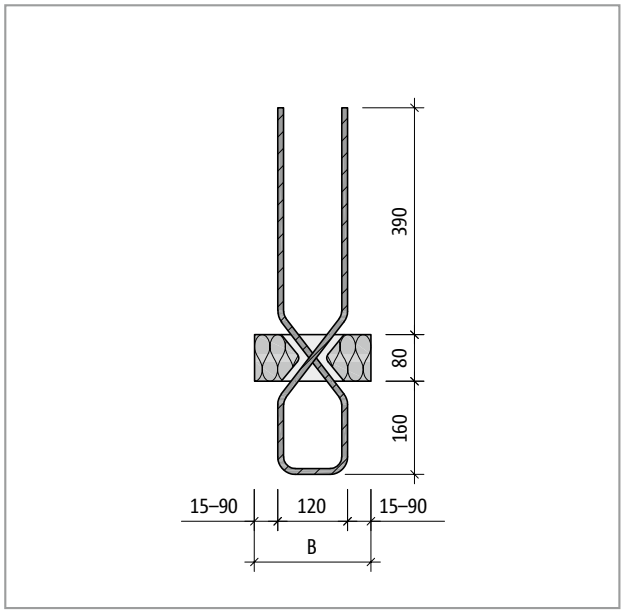


Fig. 93: Schöck Sconnex® type W-N-VH: Product section A-A

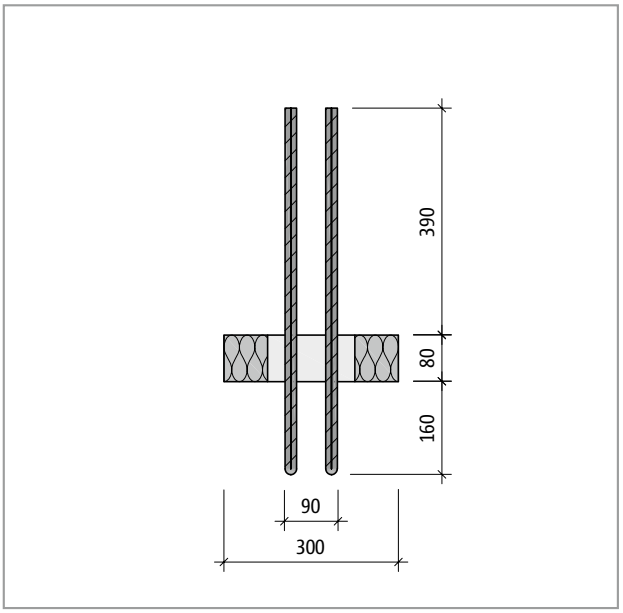


Fig. 94: Schöck Sconnex® type W-N-VH: Product section B-B

Product information

- Download further product plan views and cross-sections at www.schoeck.com/en-gb/download

Product description

Installation aid Part M

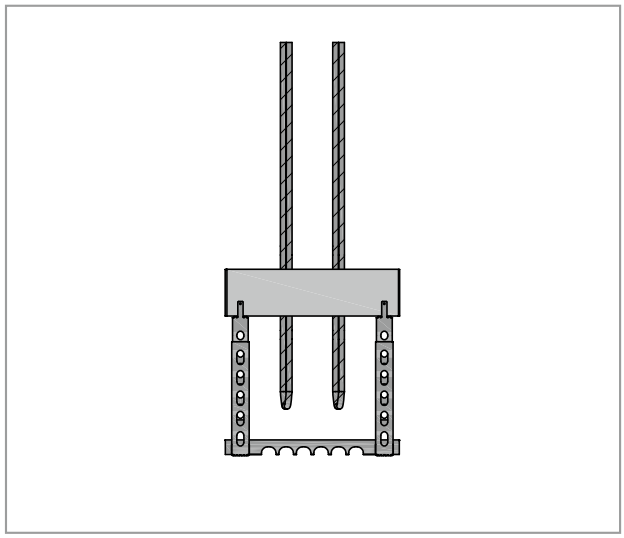


Fig. 95: Schöck Sconnex® type W: Product view with installation aid

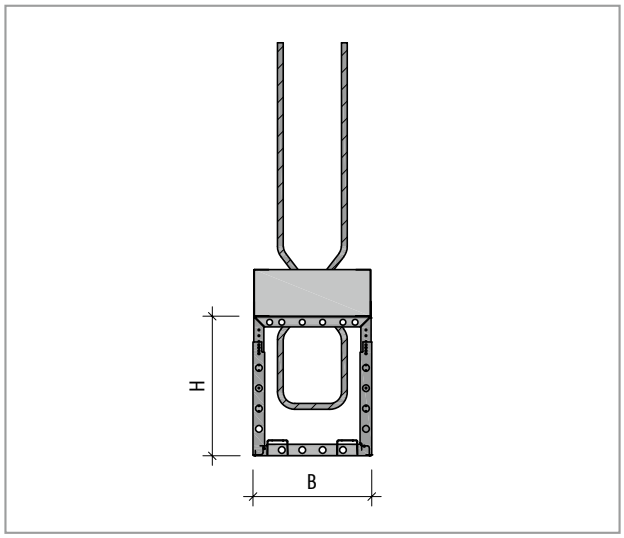


Fig. 96: Schöck Sconnex® type W: Product section with installation aid

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).
- For exposed concrete applications, the Part M installation aid must be used to prevent rust stains on spacers. See Schöck Sconnex® type W Part D page 57.
- By placing spacers under the installation aid to maintain corrosion protection for exposed concrete ceilings, the position of the reinforcement can be higher than planned. This can reduce the lever arm This smaller lever arm must be taken into account in the structural calculations.

Fire protection

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 determination of the fire protection measures, expert opinions are available in the download area: www.schoeck.com/en-gb/download

Fire resistance classes R 30 to REI 120

R 120 / EI 30

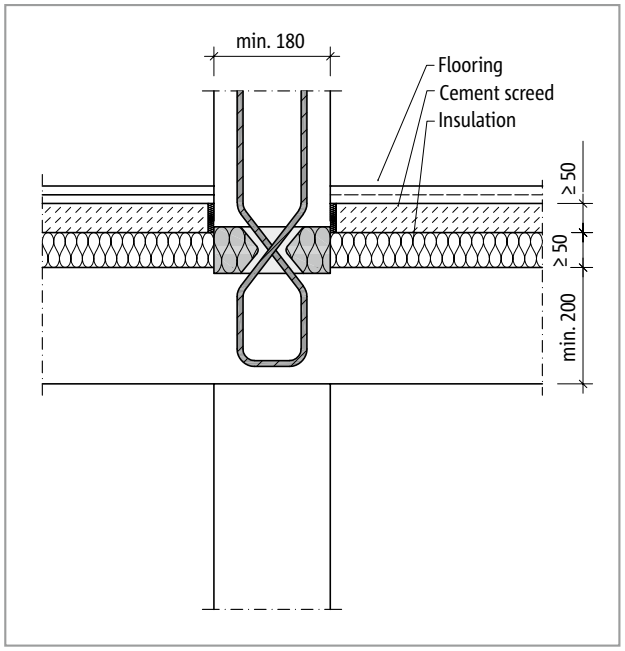


Fig. 97: Schöck Sconnex® type W: R 120 / EI 30 with internal wall and above-slab insulation

R 120 / EI 60

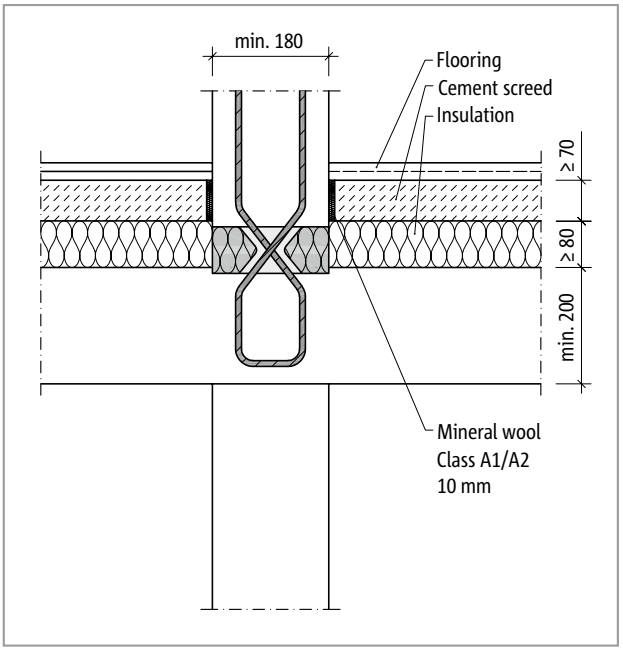


Fig. 98: Schöck Sconnex® type W: R 120 / EI 60 with internal wall and above-slab insulation

R 120 / EI 120

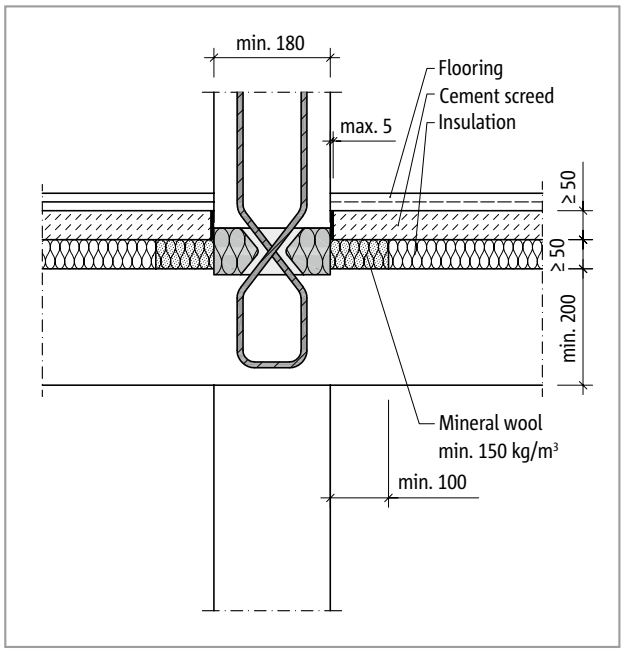


Fig. 99: Schöck Sconnex® type W: R 120 / EI 120 with internal wall and above-slab insulation

R 30 / EI 0

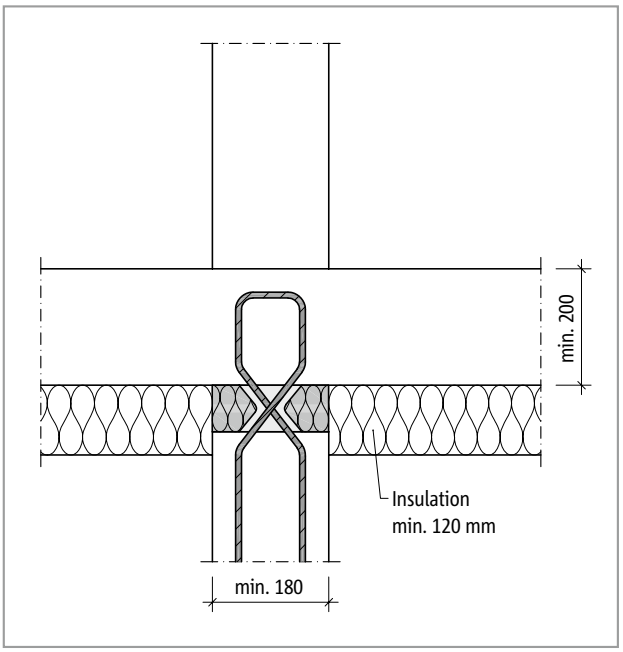


Fig. 100: Schöck Sconnex® type W: R 30 / EI 0 with internal wall and under-slab insulation without fire protection measures

Fire protection

R 120 / EI 120

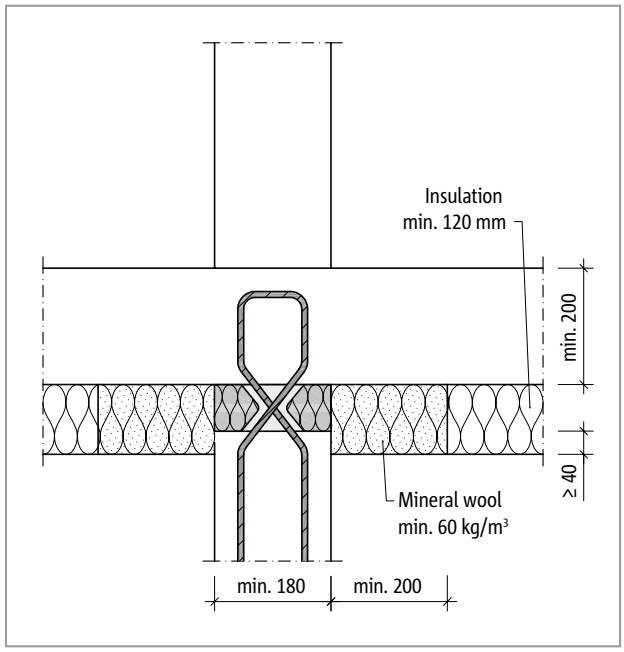


Fig. 101: Schöck Sconnex® type W: R 120 / EI 120 with internal wall and under-slab insulation

R 120 / EI 120

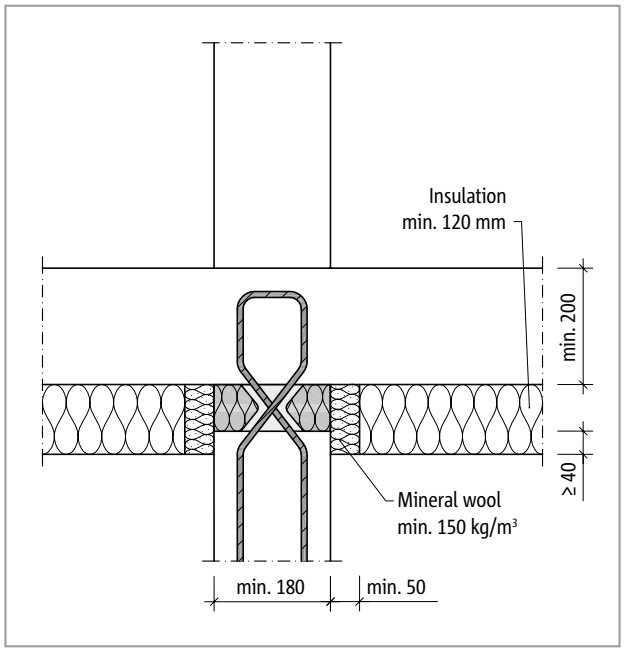


Fig. 102: Schöck Sconnex® type W: R 120 / EI 120 with internal wall and under-slab insulation

R 30 / EI 0

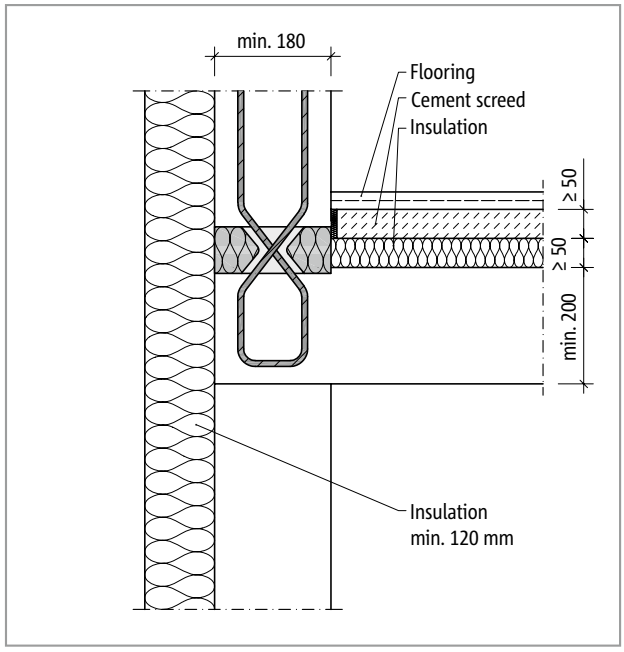


Fig. 103: Schöck Sconnex® type W: R 30 / EI 0 with external wall and above-slab insulation without fire protection measures

R 120 / EI 120

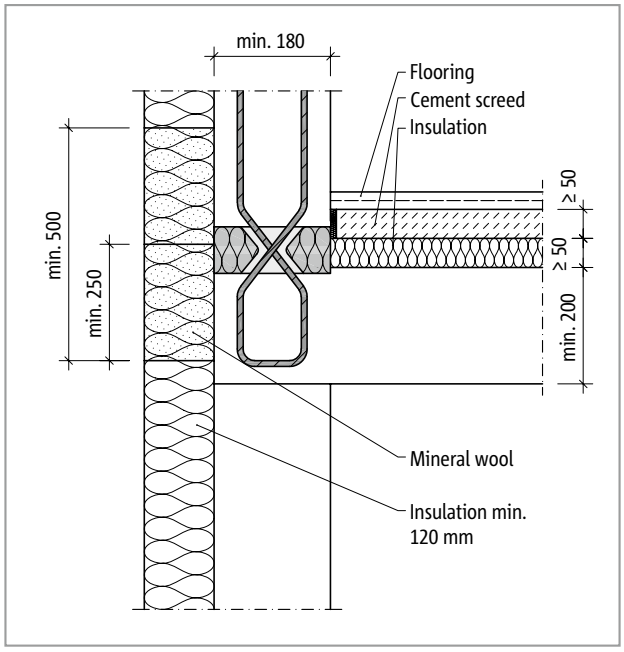


Fig. 104: Schöck Sconnex® type W: R 120 / EI 120 with external wall and above-slab insulation

Fire protection

R 30 / EI 0

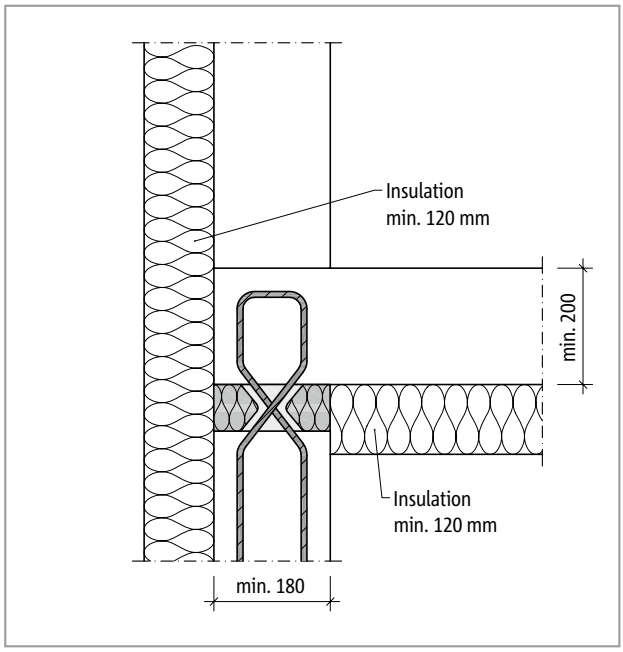


Fig. 105: Schöck Sconnex® type W: R 30 / EI 0 with external wall and under-slab insulation, fire load from outside without fire protection measures

R 120 / EI 120

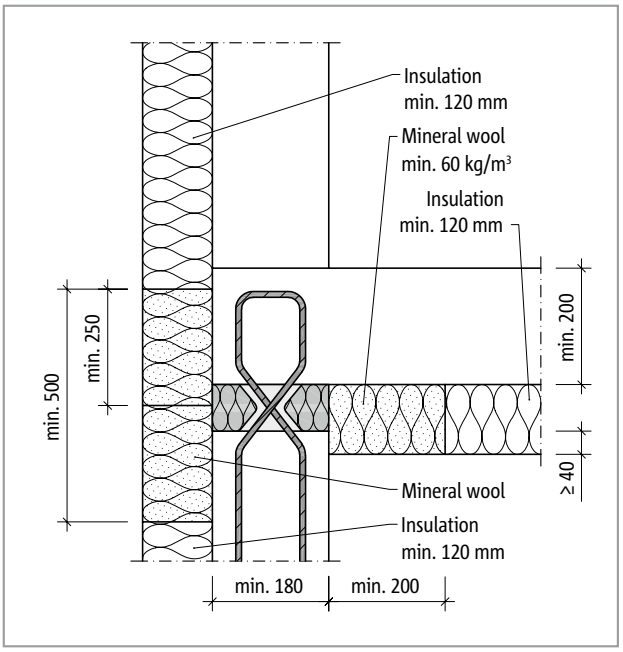


Fig. 106: Schöck Sconnex® type W: R 120 / EI 120 with external wall and under-slab insulation

R 120 / EI 120

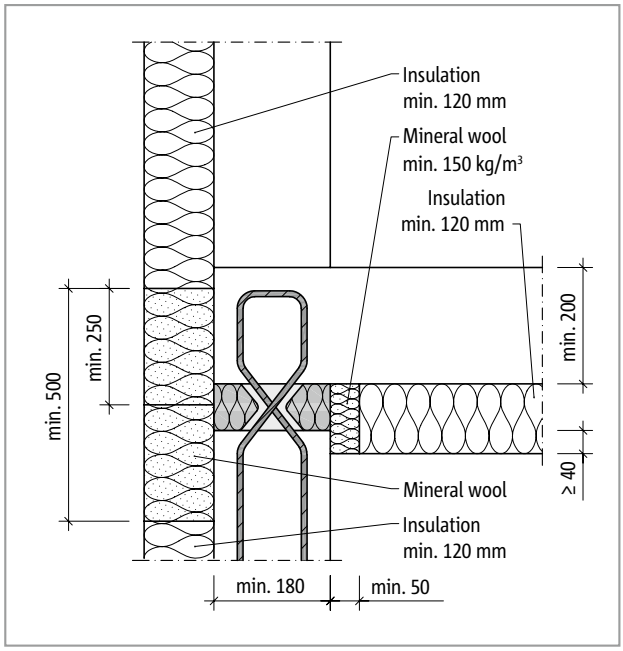


Fig. 107: Schöck Sconnex® type W: R 120 / EI 120 with external wall and under-slab insulation

R 30 / EI 0

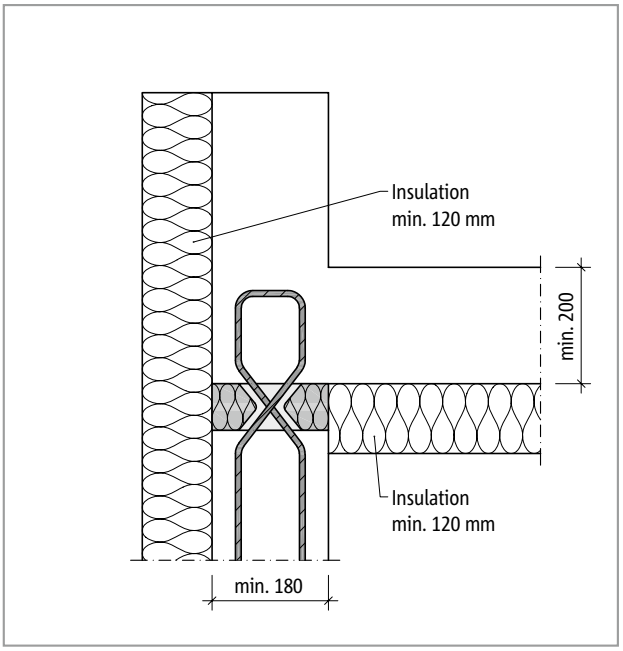


Fig. 108: Schöck Sconnex® type W: R 30 / EI 0 with external wall and under-slab insulation without fire protection measures

Fire protection

R 120 / EI 120

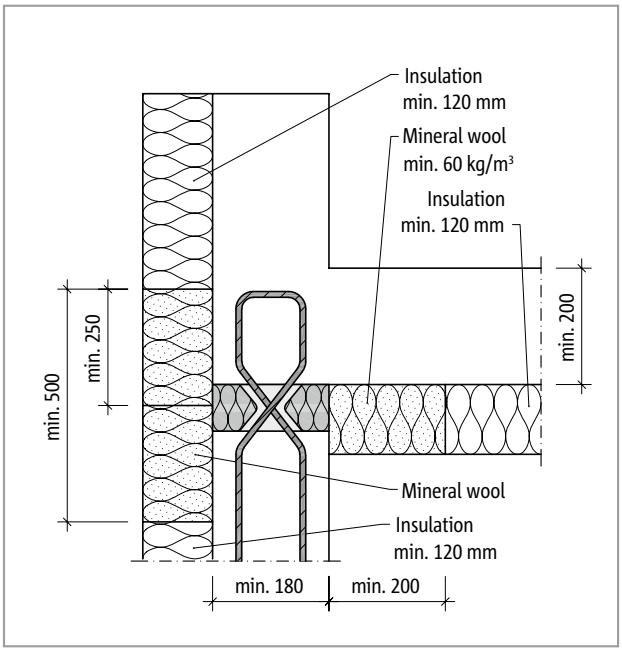


Fig. 109: Schöck Sconnex® type W: R 120 / EI 120 with external wall and under-slab insulation

R 120 / EI 120

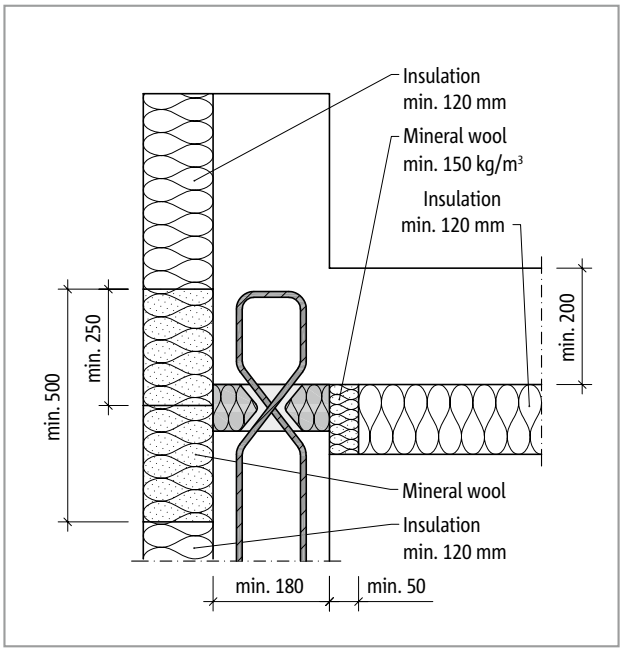


Fig. 110: Schöck Sconnex® type W: R 120 / EI 120 with external wall and under-slab insulation

On-site reinforcement

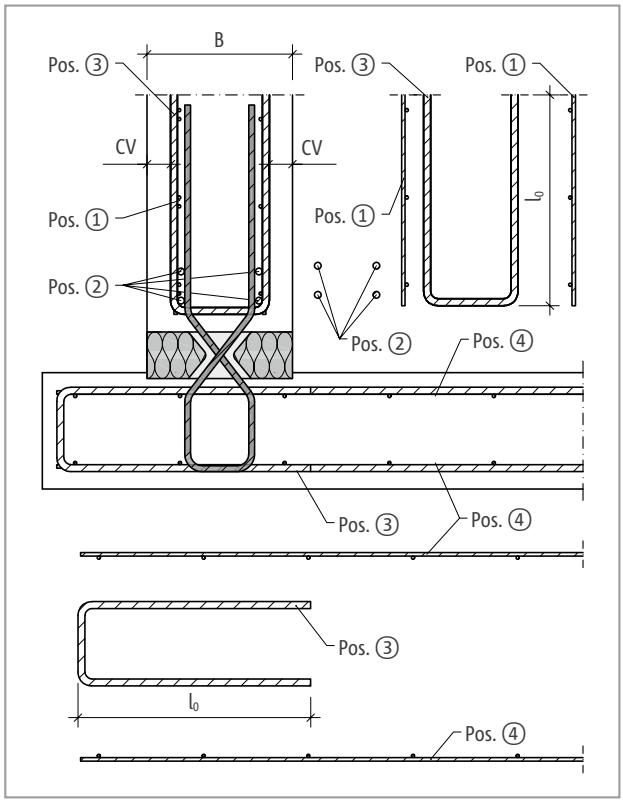


Fig. 111: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement for connection at base of wall

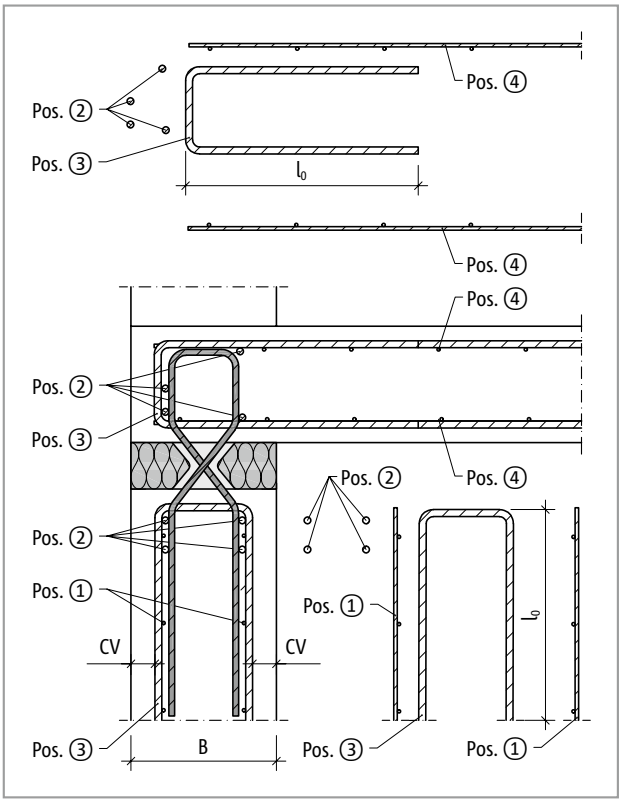


Fig. 112: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement for connection at top of wall

On-site reinforcement

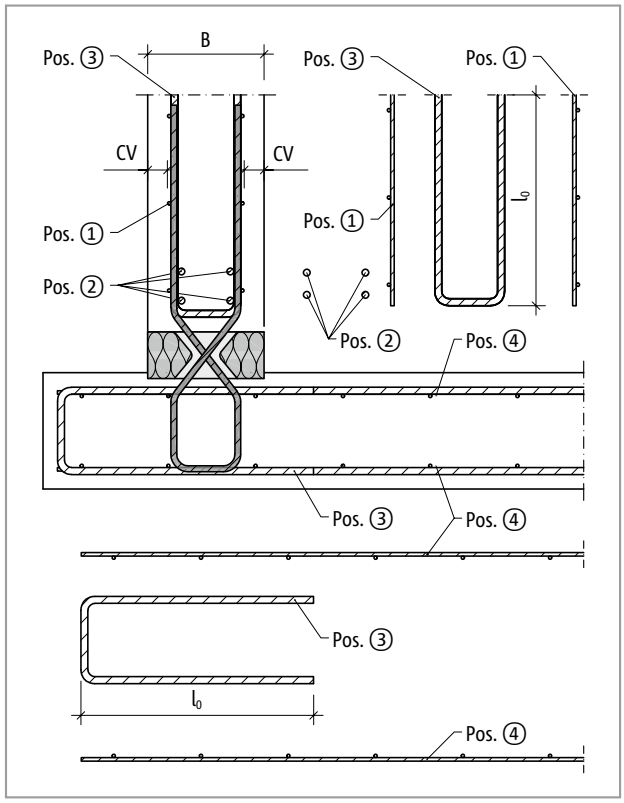


Fig. 113: Schöck Sconnex® type W-N-VH: Variant B – on-site reinforcement for connection to the foot of wall

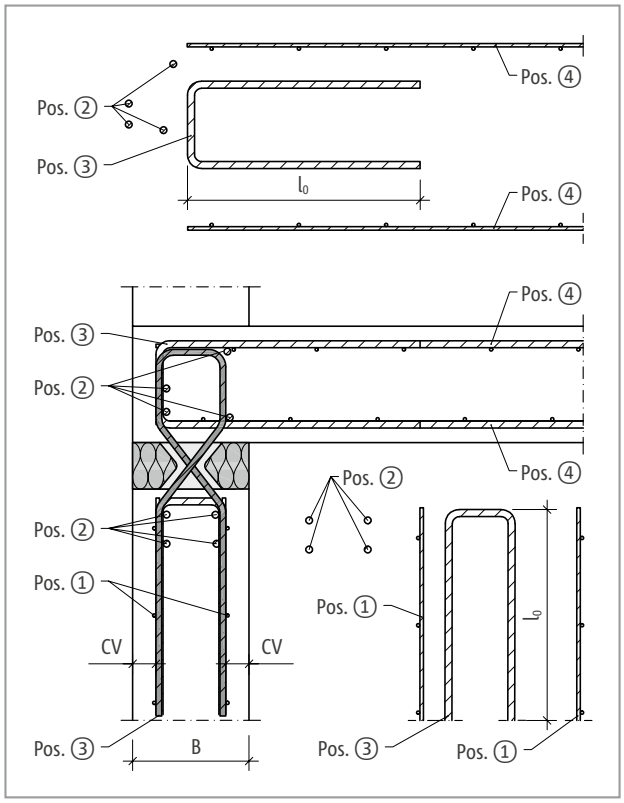


Fig. 114: Schöck Sconnex® type W-N-VH: Variant B – on-site reinforcement for connection to top of wall

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

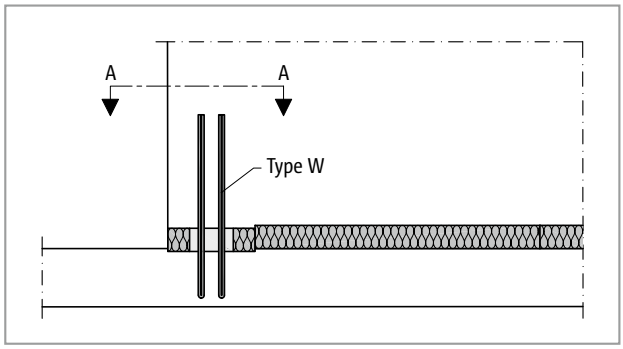


Fig. 115: Schöck Sconnex® type W-N-VH: On-site reinforcement for connection to end of wall

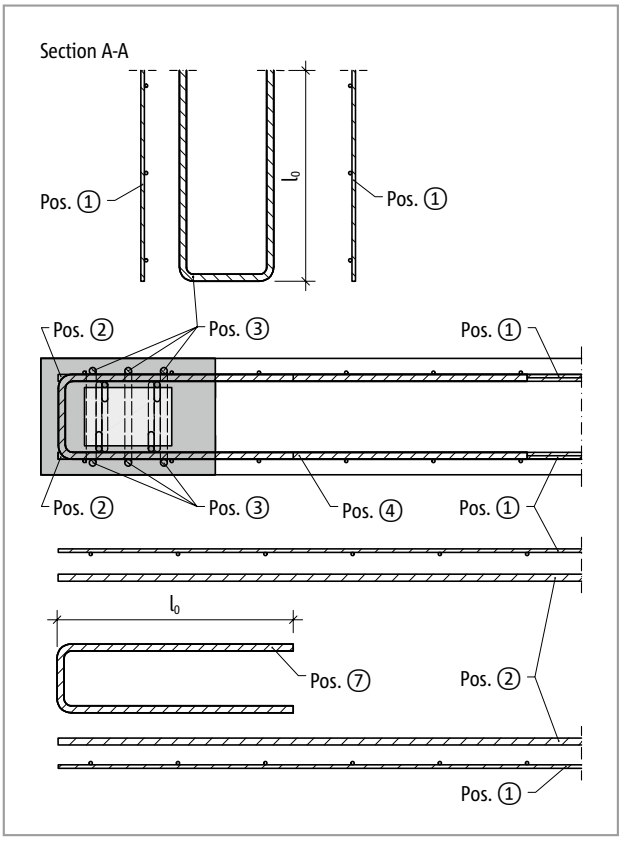


Fig. 116: Schöck Sconnex® type W-N-VH: Variant A – on-site reinforcement with Pos. 4 for connection to end of wall

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

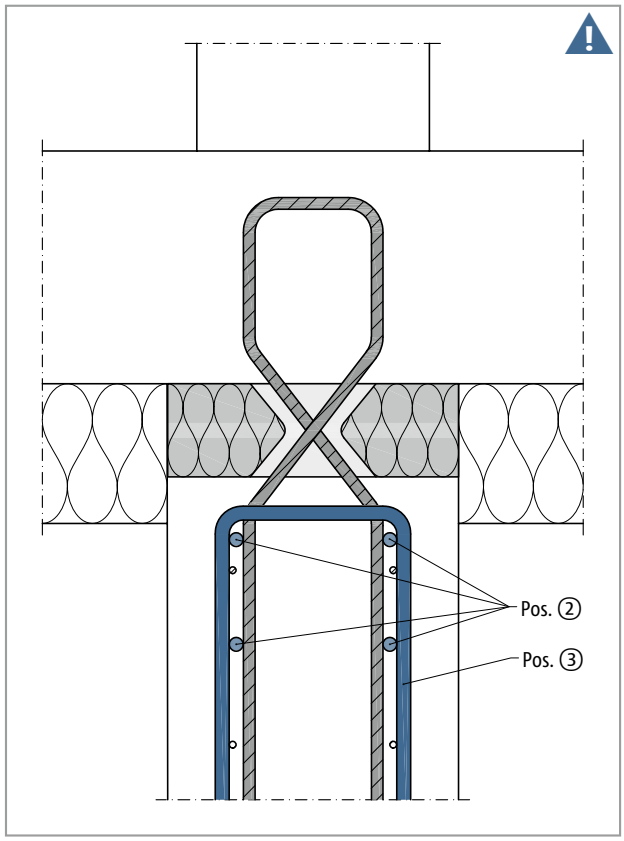


Fig. 117: Schöck Sconnex® type W-N-VH: On-site reinforcement variant A; the external steel bar Pos. 2 supports the shear force bars of the Schöck Sconnex® against the component surface

Variant B on-site reinforcement

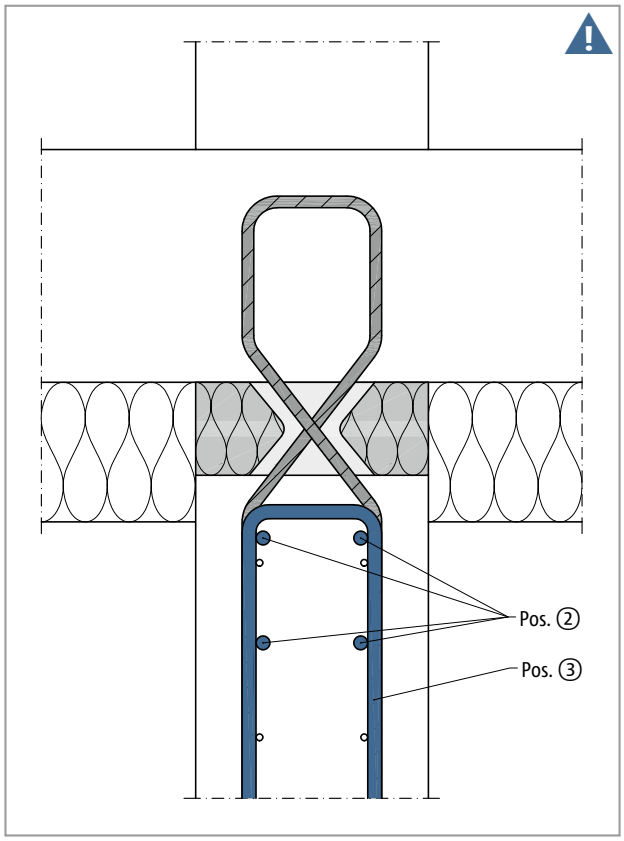


Fig. 118: Schöck Sconnex® type W-N-VH: On-site reinforcement variant B; steel bar Pos. 2 supports the shear force bars of the Schöck Sconnex® against the inside of the reinforced concrete component

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

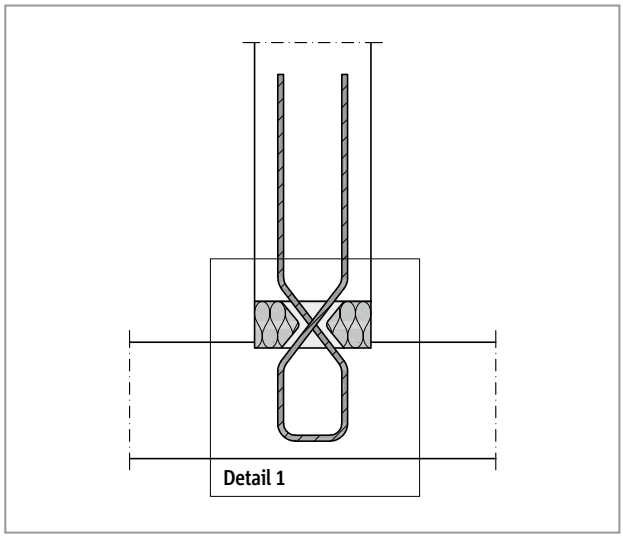


Fig. 119: Schöck Sconnex® type W: Tight fit between the upper edge of the floor and the lower edge of the pressure bearing is ensured

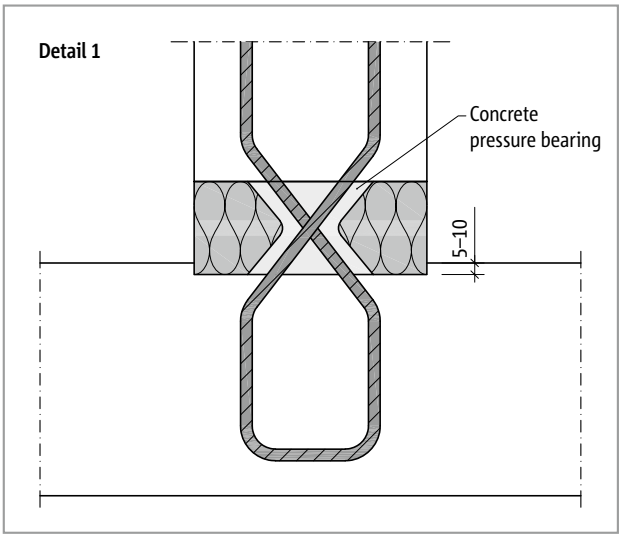


Fig. 120: Schöck Sconnex® type W: Tight fit through 5-10 mm deep countersinking of the insulating element in the floor

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

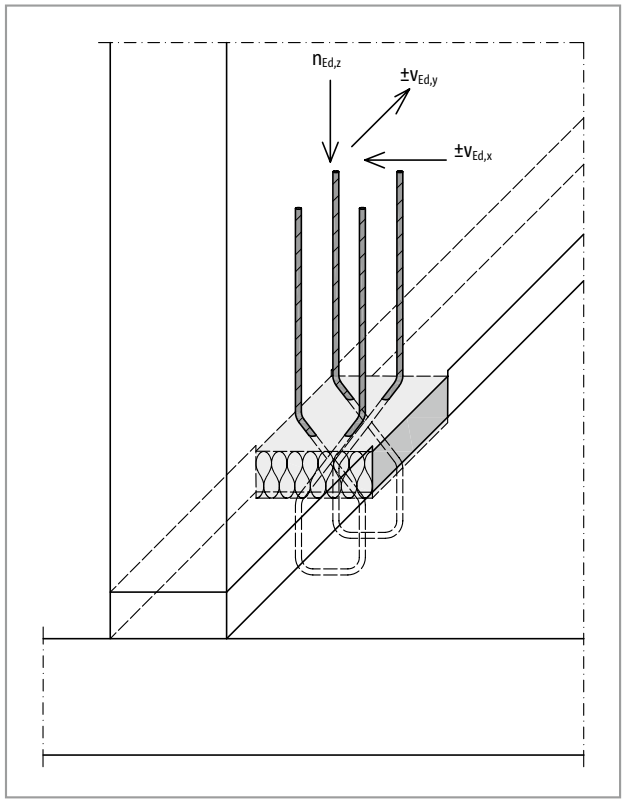


Fig. 121: Schöck Sconnex® type W-N-VH: Static system

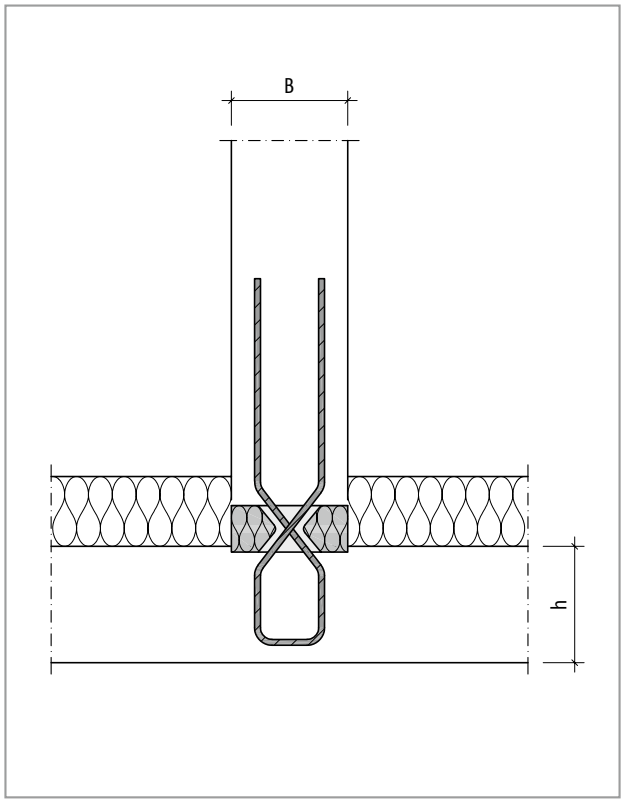


Fig. 122: Schöck Sconnex® type W-N-VH: Geometry

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 68)

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:	internal XC 1, external 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

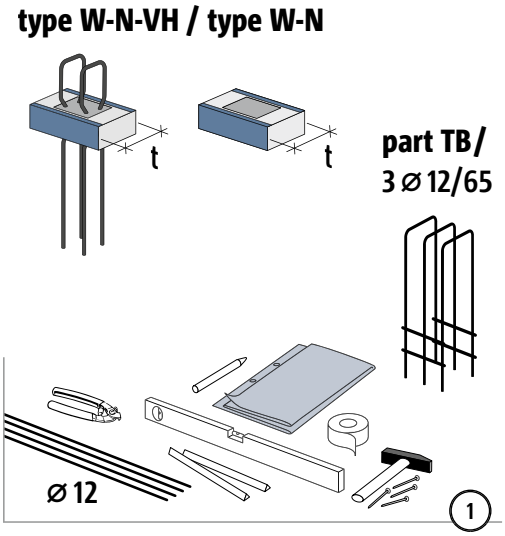
Schöck Sconnex® type W	Feature N
Design values with	Secondary load-bearing level V1H1
	Concrete strength class ≥ C25/30
Shear force	$V_{Rd,x}$ [kN/Element]
Variant A – on-site reinforcement on the outside	±88.0
Variant B – on-sitel reinforcement on the inside →	±46.3
Shear force	$V_{Rd,y}$ [kN/element]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

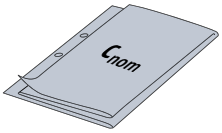
Shear force: $V_{Rd,x}$ = 46.3 kN/element
$v_{Rd,x}$ = 46.3 kN / 1 m = 46.3 kN/m
$V_{Rd,y}$ = 59 kN/element
$v_{Rd,y}$ = 59 kN / 1 m = 59 kN/m
Shear force - interaction: $v_{Ed,x} / v_{Rd,x} + v_{Ed,y} / v_{Rd,y}$ = 5 / 46.3 + 50 / 59 = 0.96 < 1.0

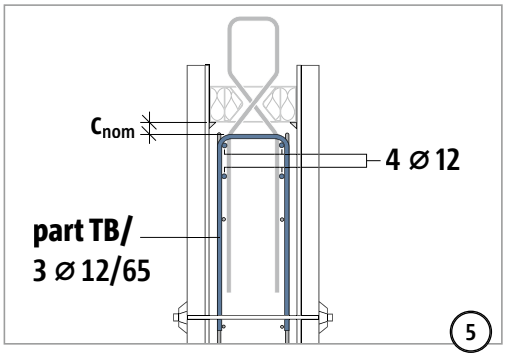
Design

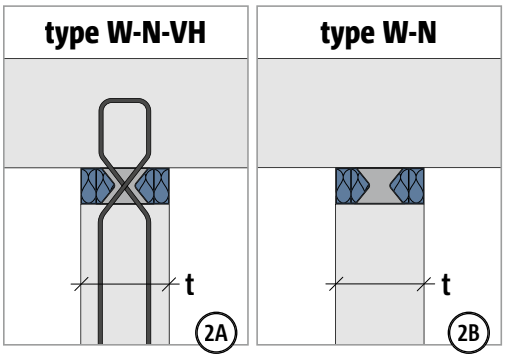
- Any required punching shear or shear force verification of the slab can be carried out using the software for Schöck Bole®. A ground pressure area of 150 × 100 mm is to be assumed.
  For further information see Schöck Bole® Technical Information under:
  www.schoeck.com/de/downloads

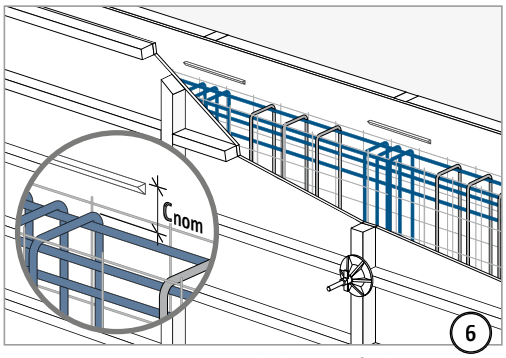
Installation instruction top of wall



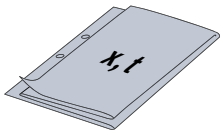


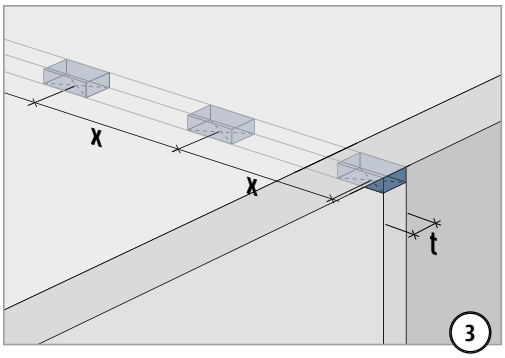


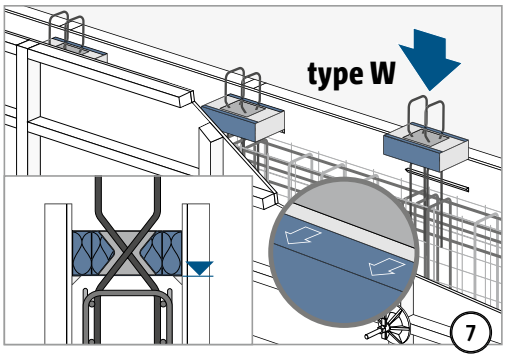


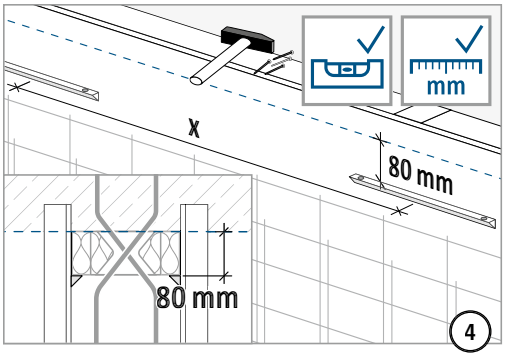


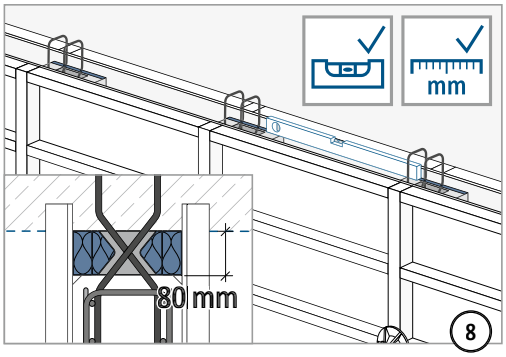
Structural element failure through impaired pressure zone!
Lay absolutely no objects such as spacers, cables, pipes etc. over the pressure bearing. Compact the concrete well.



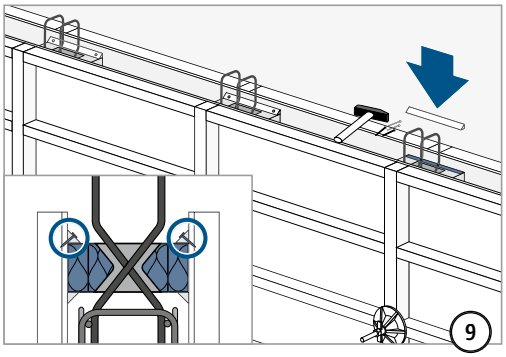


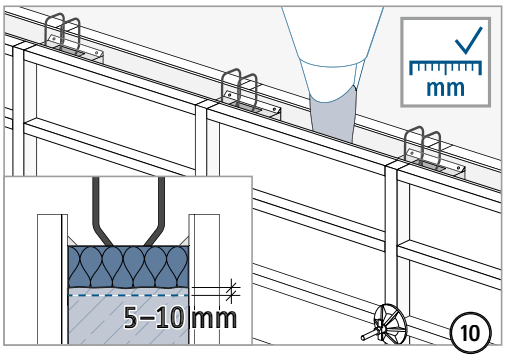


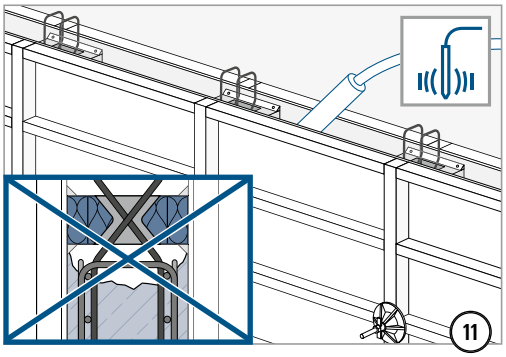


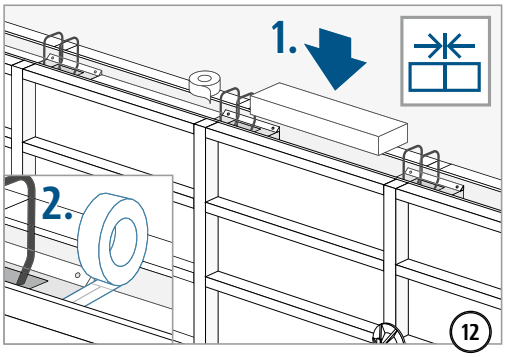


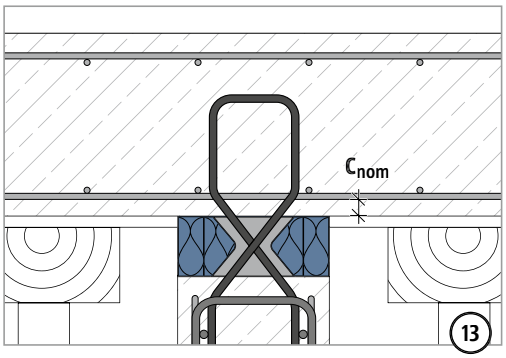
Installation instruction top of wall



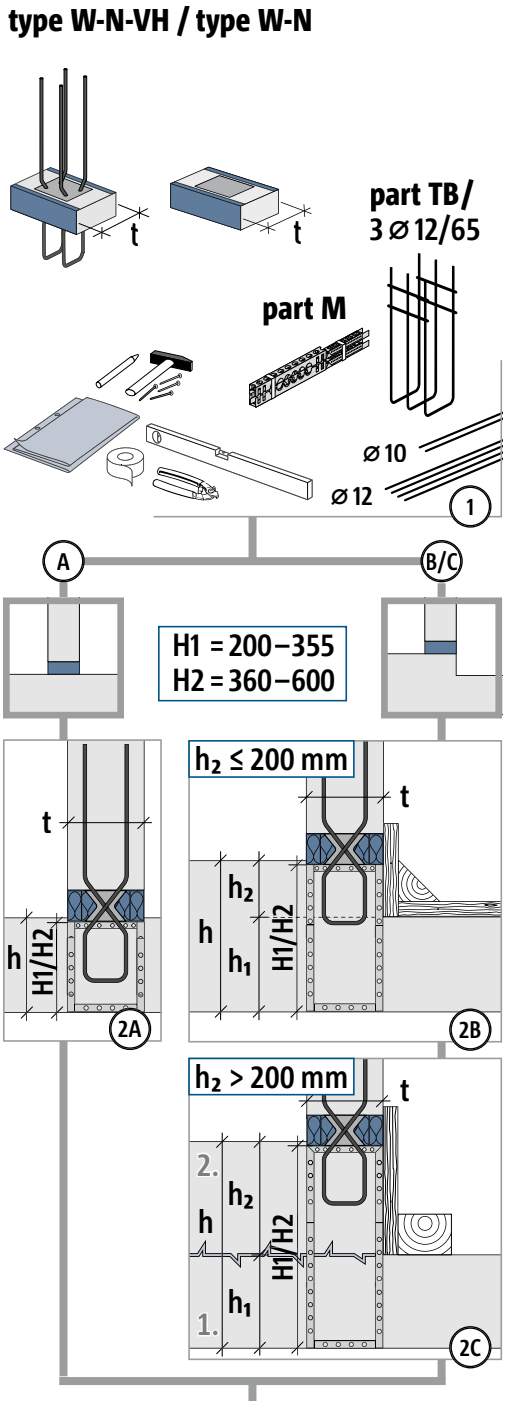


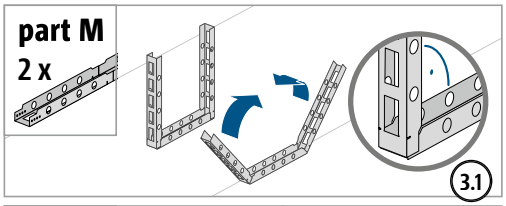


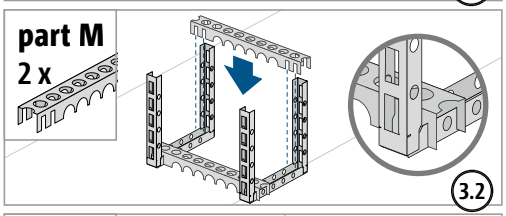


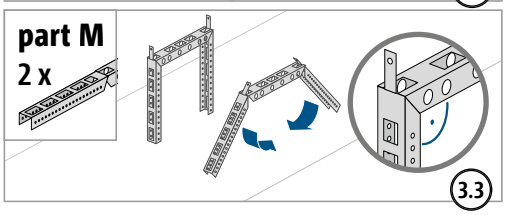


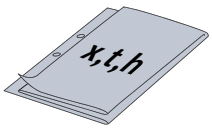
Installation instruction foot of wall

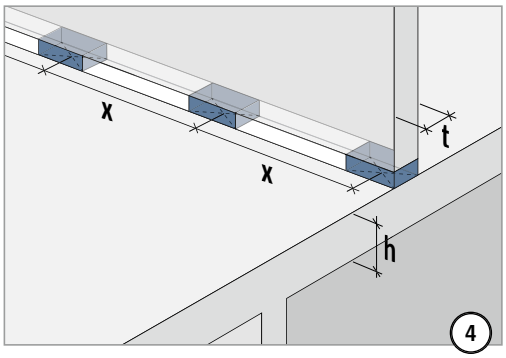


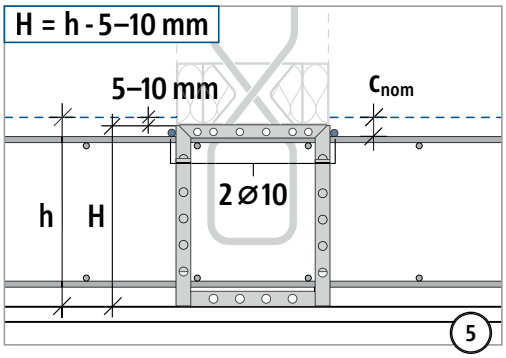


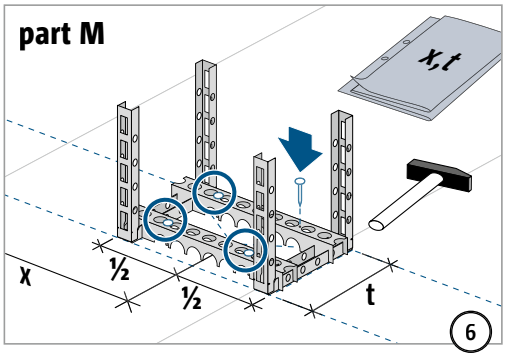




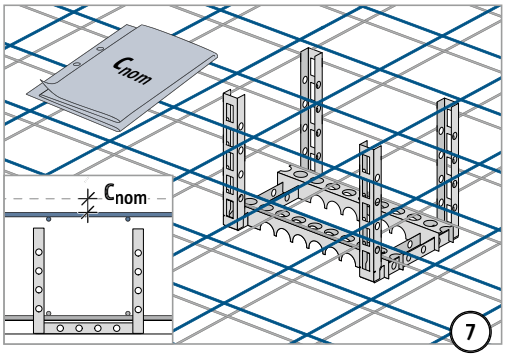


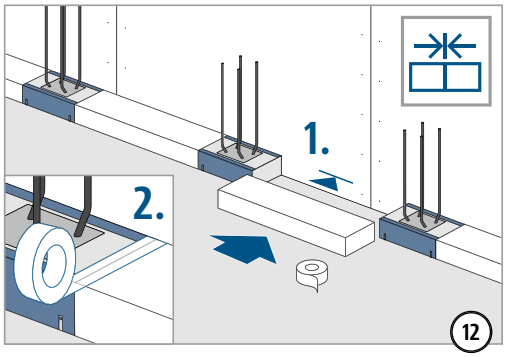


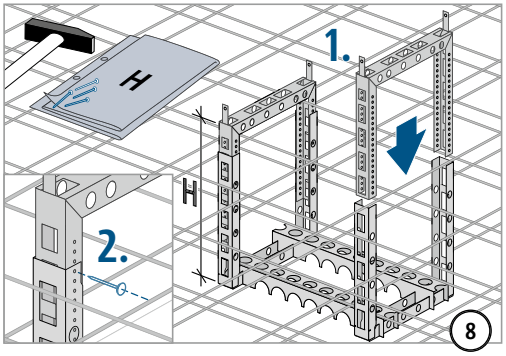


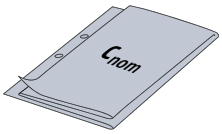


Installation instruction foot of wall

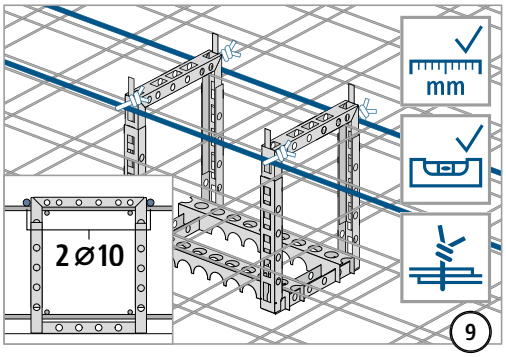


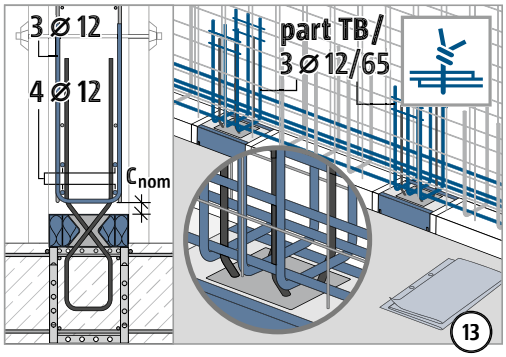


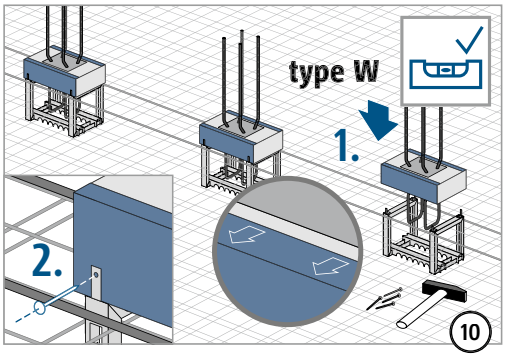


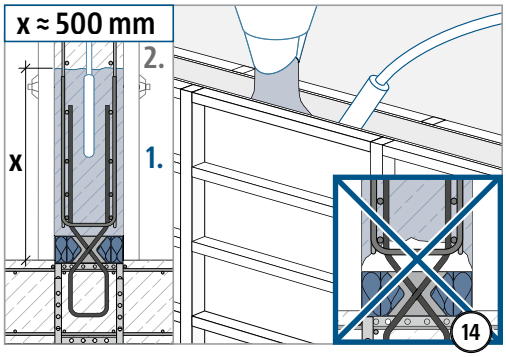


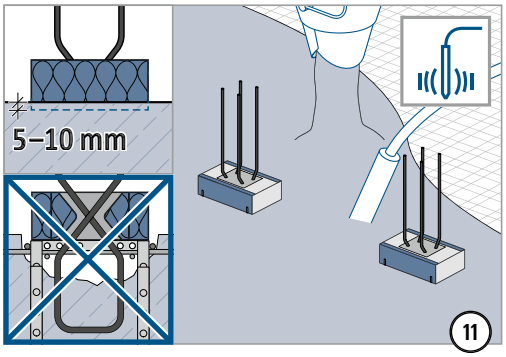
Structural element failure through impaired pressure zone!
Lay absolutely no objects such as spacers, cables, pipes etc. over the pressure bearing. Compact the concrete well.





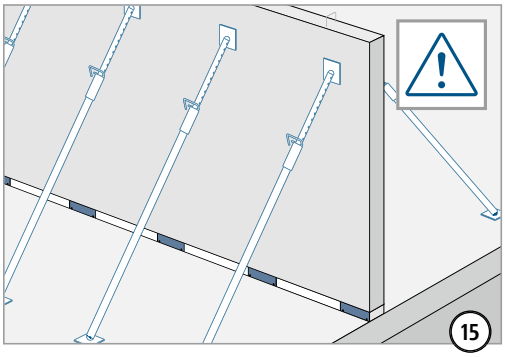






Installation instruction foot of wall

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!



☑ 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?
- ☐ Are the requirements with regard to fire protection clarified?
- ☐ 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

â€€ 0,75

Schöck Sconnex® type P
Thermally separating thermal insulation elements for square reinforced concrete columns with the dimensions 250 × 250 mm. The element transfers primarily compressive forces.

Element arrangement

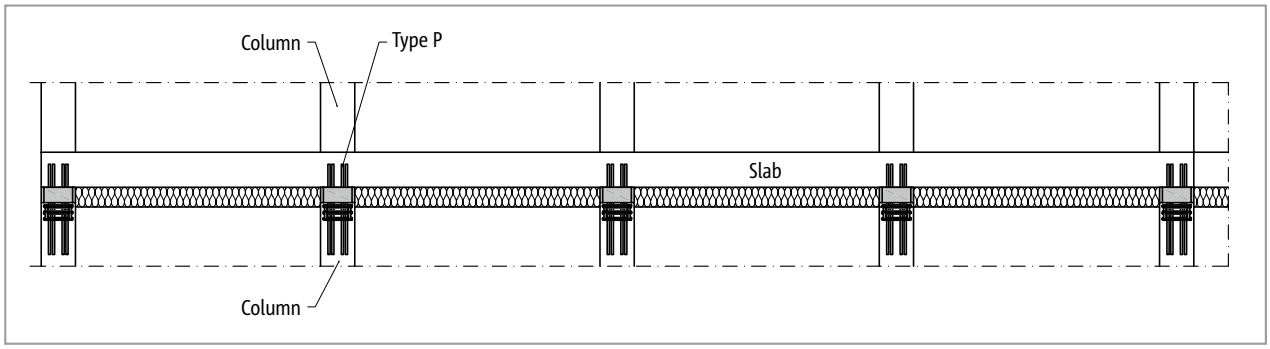


Fig. 123: Schöck Sconnex® type P: Column connection to the floor above

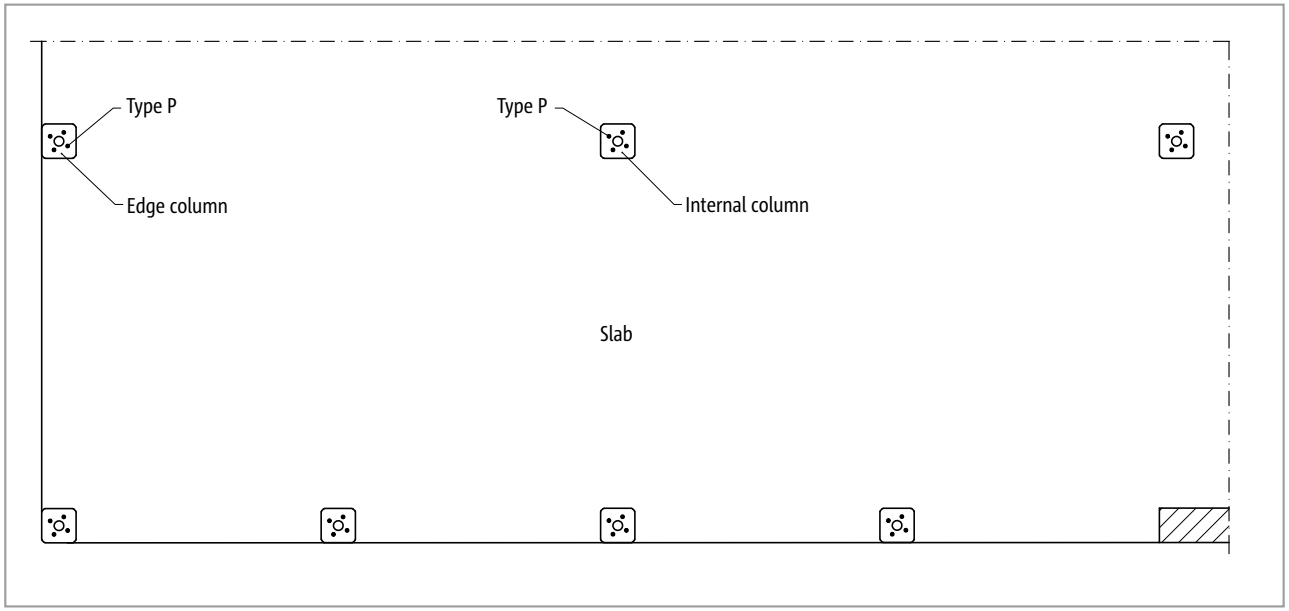


Fig. 124: Schöck Sconnex® type P: Element arrangement in the floor plan

Installation cross sections | Application at column head

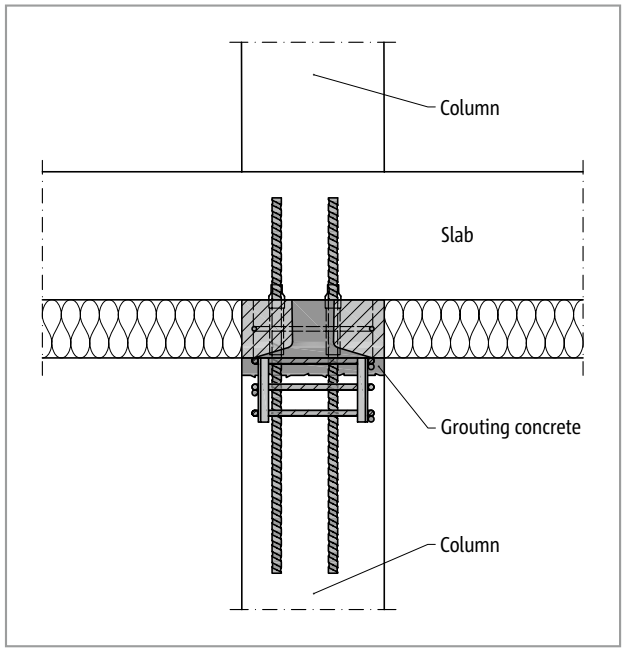


Fig. 125: Schöck Sconnex® type P: Connection of an internal column to the above lying floor

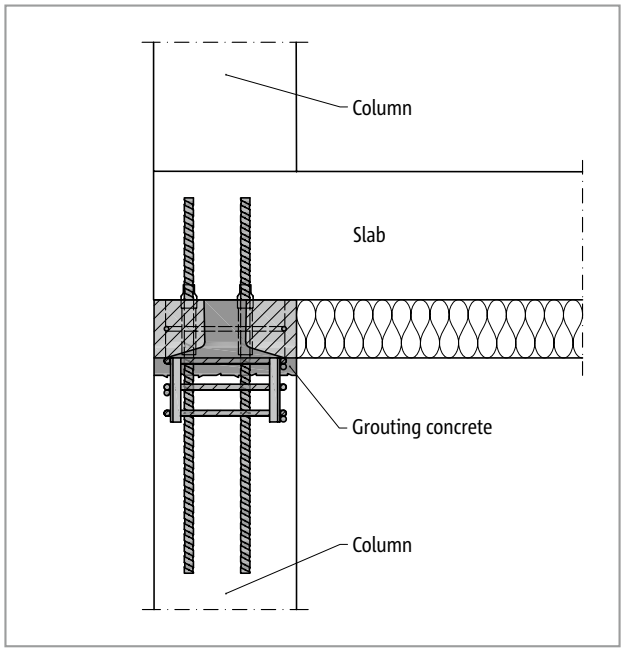


Fig. 126: Schöck Sconnex® type P: Connection of an edge column to the above lying floor

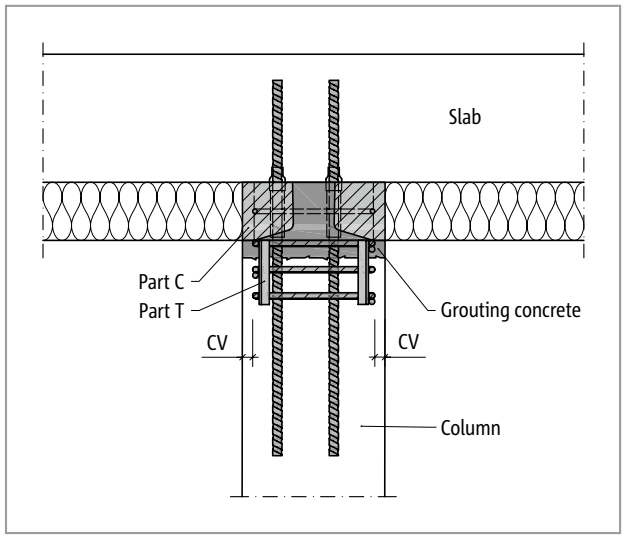


Fig. 127: Schöck Sconnex® type P: Installation section; connection column – floor with Part C and Part T

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.

Product selection | Type designations | Grouting concrete

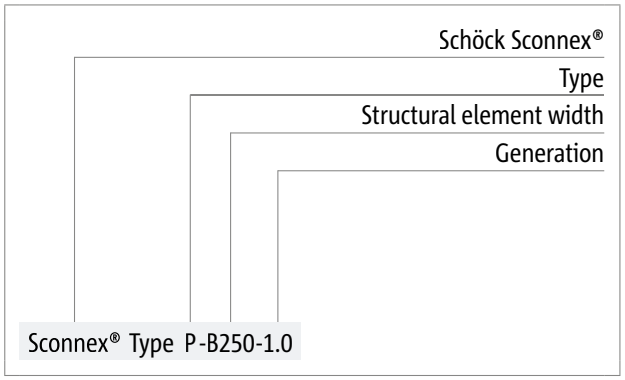
Schöck Sconnex® type P

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:

- Square column cross-section
- Width of the column cross-section:
  B250 = 250 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 employed in columns without requirement on the fire resistance as well as in columns of fire resistance classes R 30, R 60 and R 90.

Poured concrete: PAGEL® grouting V1/50

- Schöck Sconnex® type P is supplied together with a dry mortar for the production of PAGEL® grouting V1/50 poured concrete. The delivered quantity is dimensioned for the production of tight fits on column-floor connections.

Application Schöck Sconnex® type P

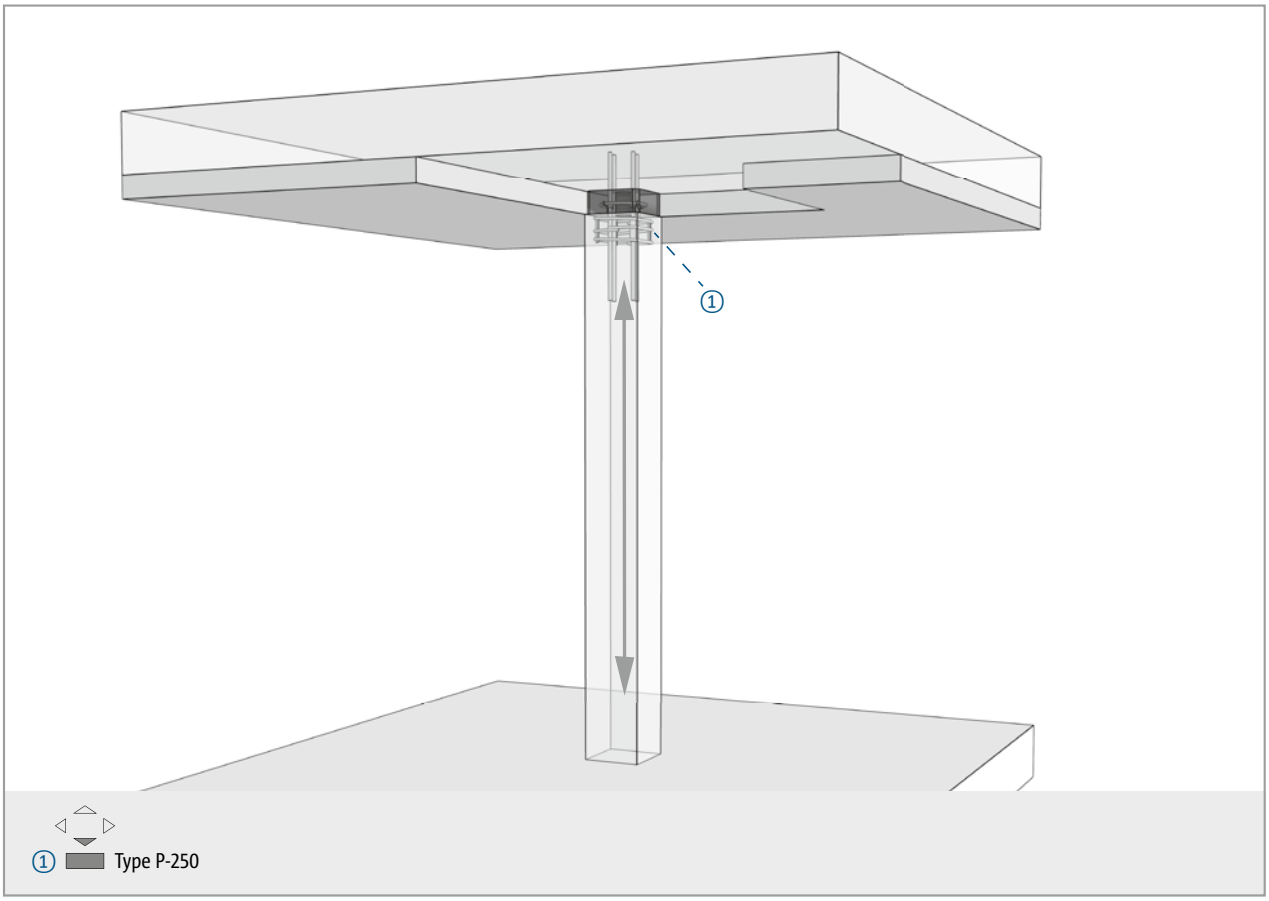


Fig. 128: Column connection with under-slab insulation

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 93) 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 | Design

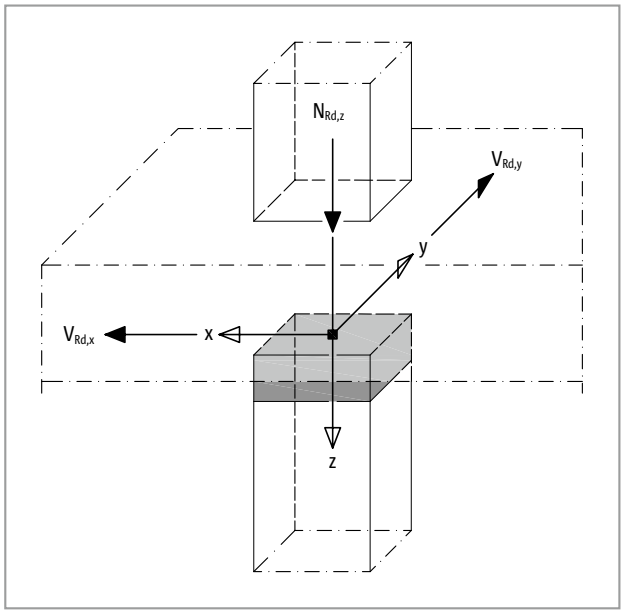


Fig. 129: Schöck Sconnex® type P: Sign convention for the design

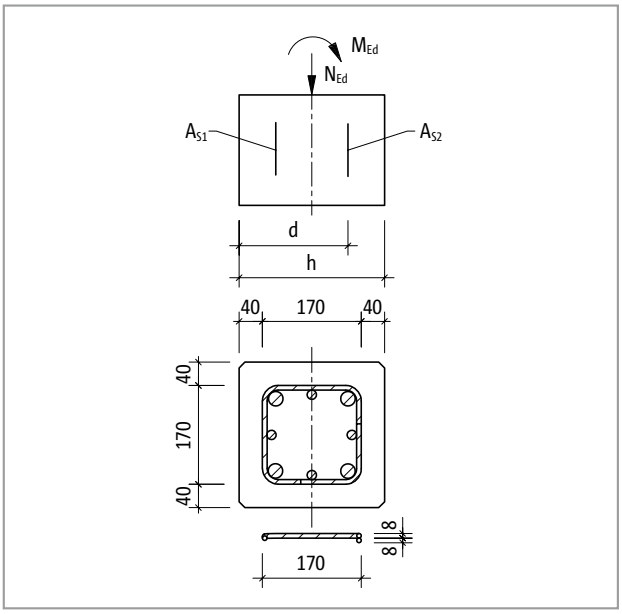


Fig. 130: Schöck Sconnex® type P: Limitation of the external dimension of the stirrups; see warning note

Application conditions

- Static or quasi-static effects
- Application in horizontal stiffened systems
- For the thermally insulated connection of columns with square cross-section and 250 mm side length
- Column headroom ≥ 2.50 m with application of the simplified dimensioning procedure
- Column headroom ≤ 2.85 m with requirements on fire resistance

Notes on design

- Installation in hinged column heads
- For the transmission of compressive forces in the core area of the column cross-section. Maximum permitted eccentricity of the resultant compressive force is b/6 and, with the application of the general dimensioning procedure, is to be verified.
- Column dimensioning without planned horizontal forces (e.g. as a result of cantilevers).
  Exception: Vehicle impact must be considered according to page 96.
- 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

- Due to the stirrup external measurement of 170 mm the static effective height for the buckling dimensioning results. This must be considered by the structural engineer for the buckling verification of the column.

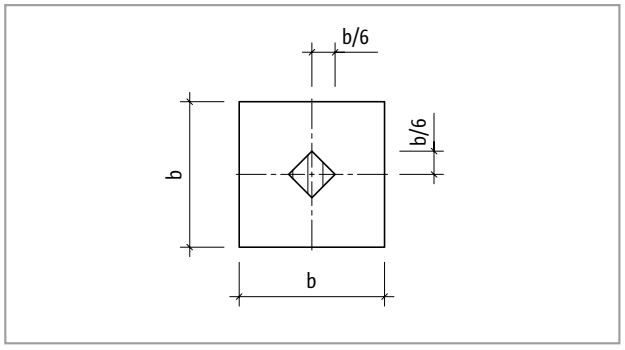


Fig. 131: Schöck Sconnex® type P: Limitation of the eccentricity on the core area of the column cross-section with $e_x + e_y \leq b / 6$, gaping joint not permitted

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
Centre distance of longitudinal bars of the column [mm]	Normal force (compression with e = 20 mm) $N_{Rd,z}$ [kN/element]					
≤ 150	904	1016	1119	1207	1207	1207
≤ 75	954	1069	1171	1207	1207	1207
≤ 50	974	1090	1191	1207	1207	1207

Cold dimensioning: General design procedure using the accurate load eccentricity

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

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

with:

e_x:	Eccentricity in x-direction ($e_x \leq 250 / 6$)
e_y:	Eccentricity in y-direction ($e_y \leq 250 / 6$)
$N_{Rd,z,0}$:	Max. load-bearing capacity with centric pressure as per table [kN]
$N_{Rd,z}$:	Load-bearing capacity of the column connection [kN]

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
Centre distance of longitudinal bars of the column [mm]	Normal force (compression with e = 0 mm) $N_{Rd,z,0}$ [kN/element]					
≤ 150	1076	1210	1332	1443	1443	1443
≤ 75	1136	1273	1394	1443	1443	1443
≤ 50	1160	1298	1418	1443	1443	1443

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)
- Verification of an over-pressured joint between the two above-named cross-sections through observation of the core values: $e_{d,fi} = M_{Ed,fi} / N_{Ed,fi} \leq b/6$ (drawn-through straight line of the diagrams)

Calculation example, see page 101

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.

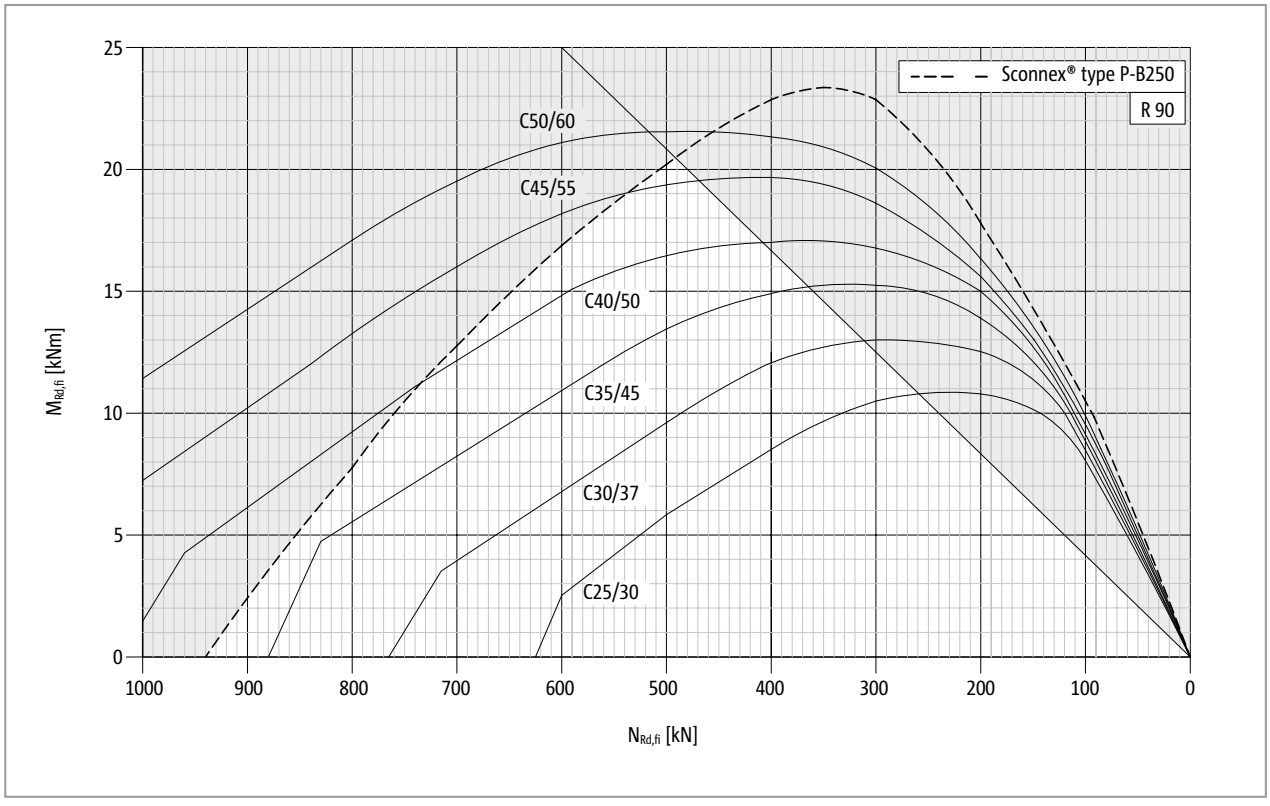


Fig. 132: Schöck Sconnex® type P: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

Design

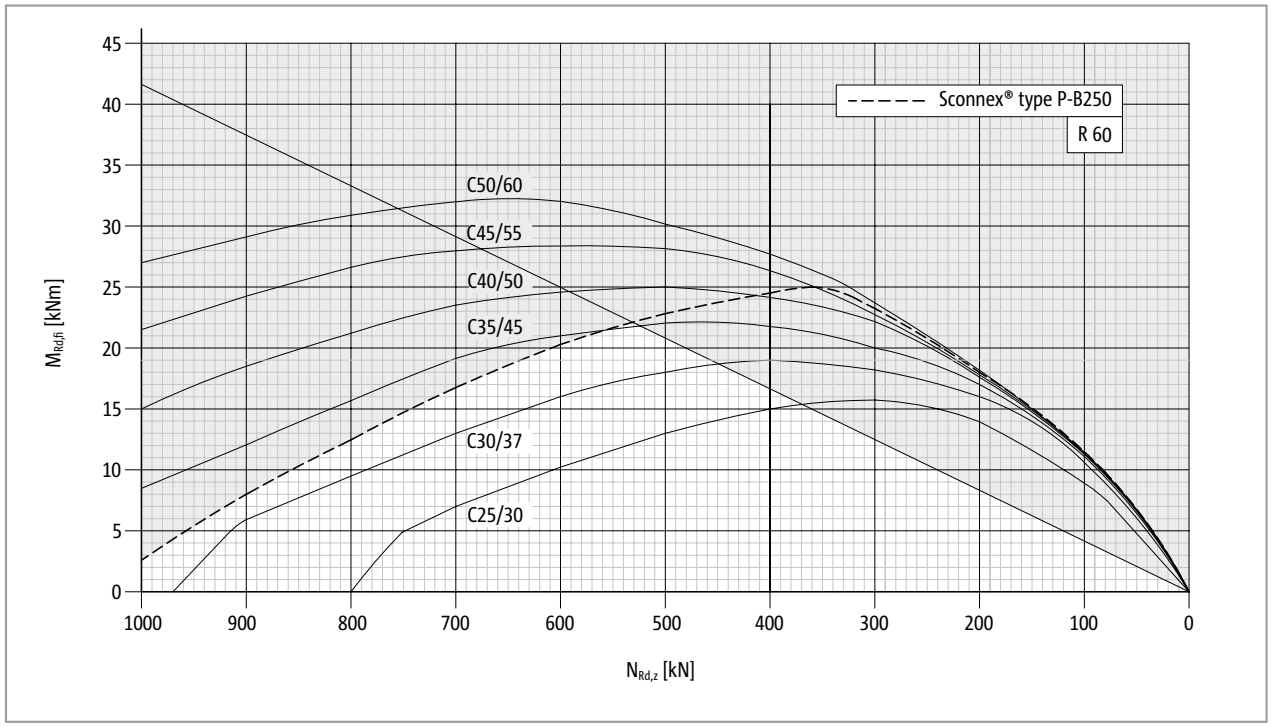


Fig. 133: Schöck Sconnex® type P: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 60

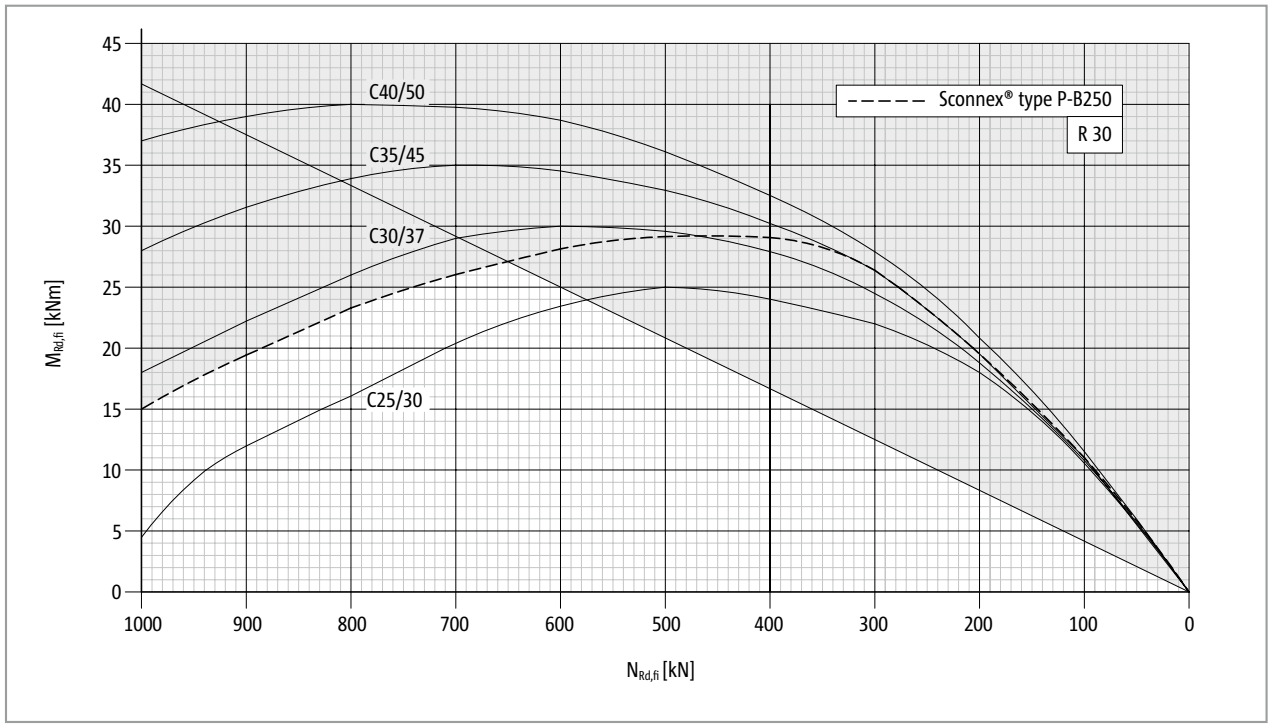


Fig. 134: Schöck Sconnex® type P: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 30

Fire protection

- Schöck Sconnex® type P may be employed in columns without requirement on the fire resistance as well as in columns of fire resistance classes R 30, R 60 and R 90.

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 as per BS EN 1991-1-7 in building construction with multi-storey car parks and structures with permitted traffic, the columns may be dimensioned as hinged columns (articulated mounting).
- The joint between Schöck Sconnex® type P and adjoining floor or column must not be verified separately.

Product description

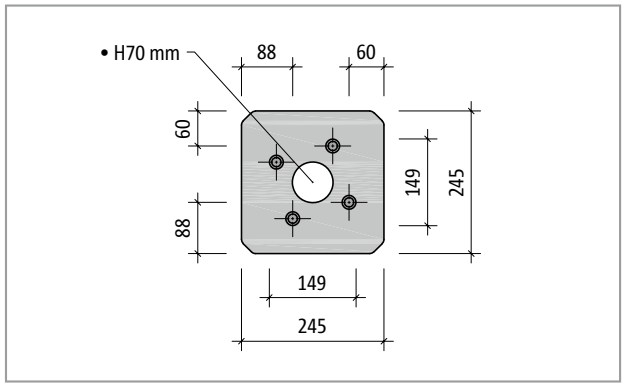


Fig. 135: Schöck Sconnex® type P: Top view

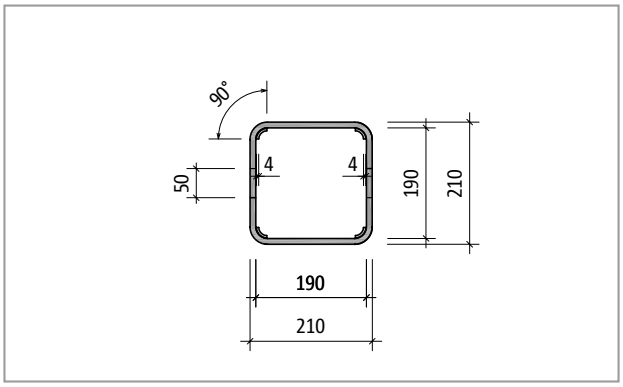


Fig. 136: Schöck Sconnex® type P: Part T; welded stirrup and bending mould segment made of stainless steel

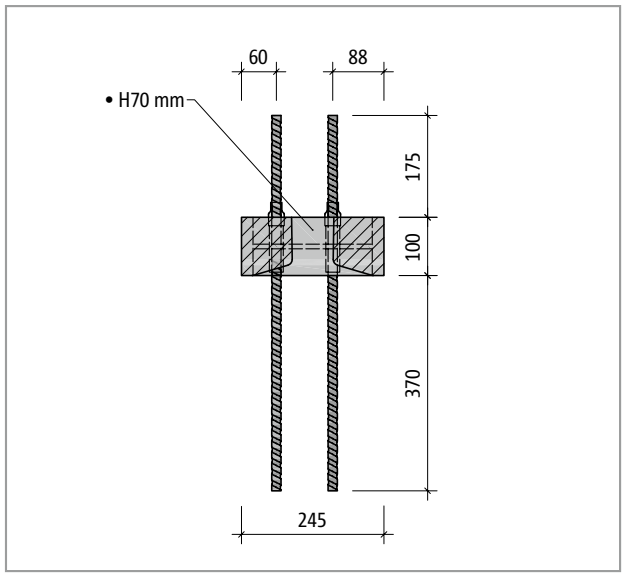


Fig. 137: Schöck Sconnex® type P: Product section Part C

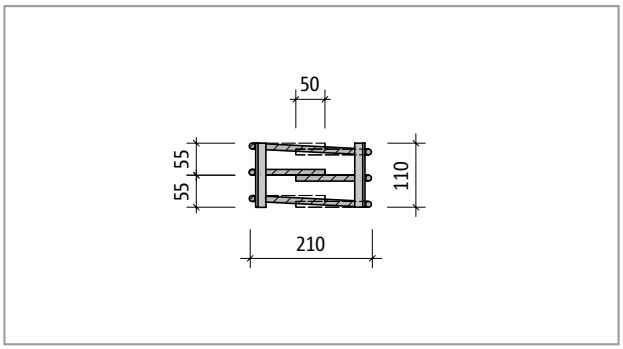


Fig. 138: Schöck Sconnex® type P: Side view Part T; welded stirrup and bending form segments made of stainless steel

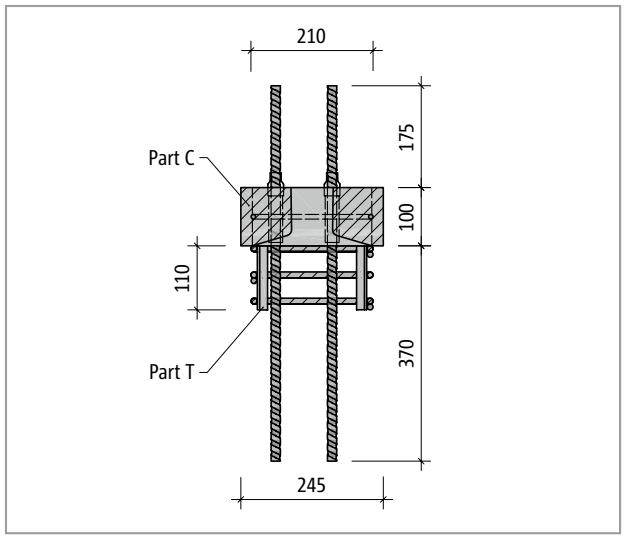


Fig. 139: Schöck Sconnex® type P: Product section Part C and part T

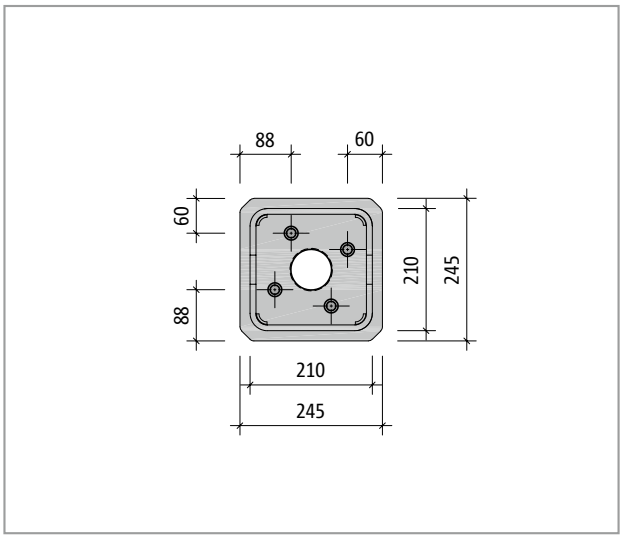


Fig. 140: Schöck Sconnex® type P: Bottom view

Product information

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

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.

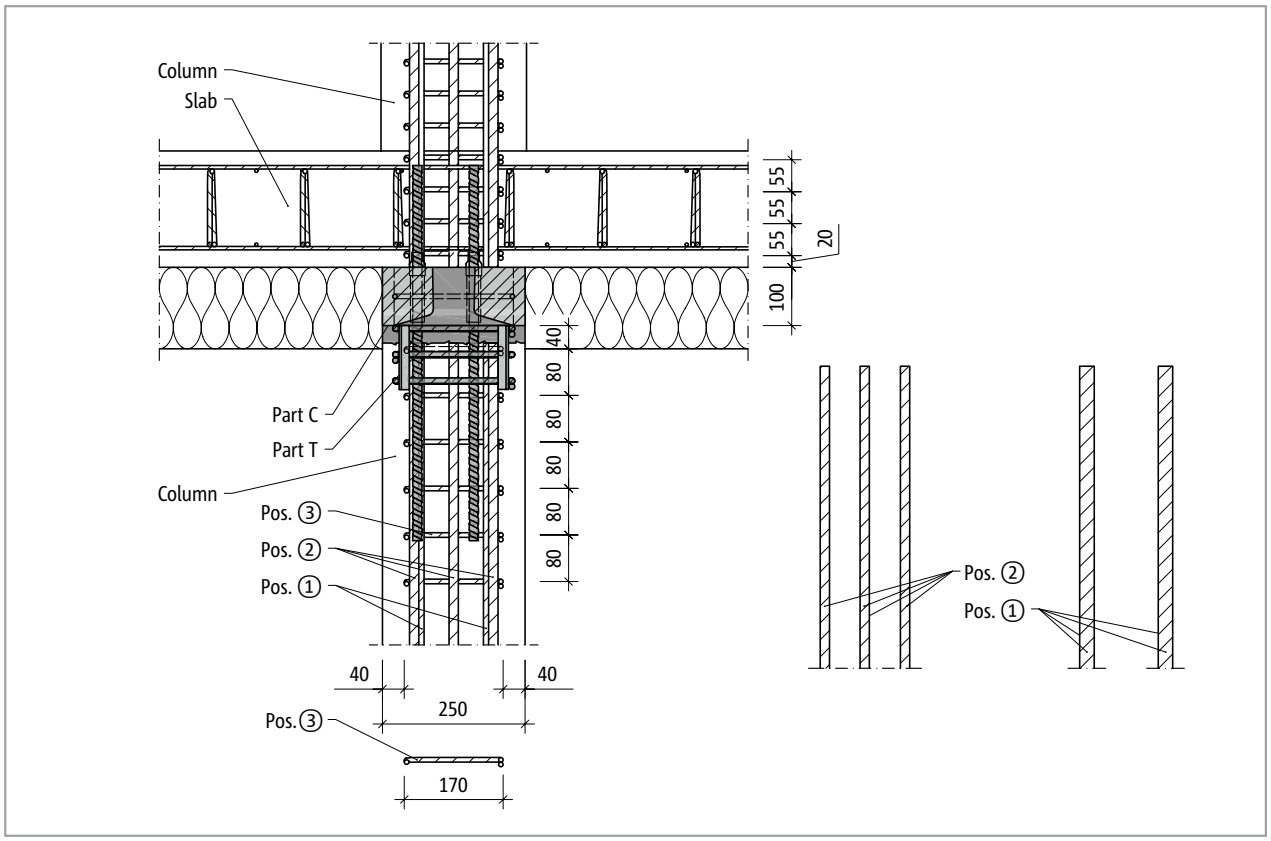


Fig. 141: Schöck Sconnex® type P: On-site reinforcement in column cross-section A-A

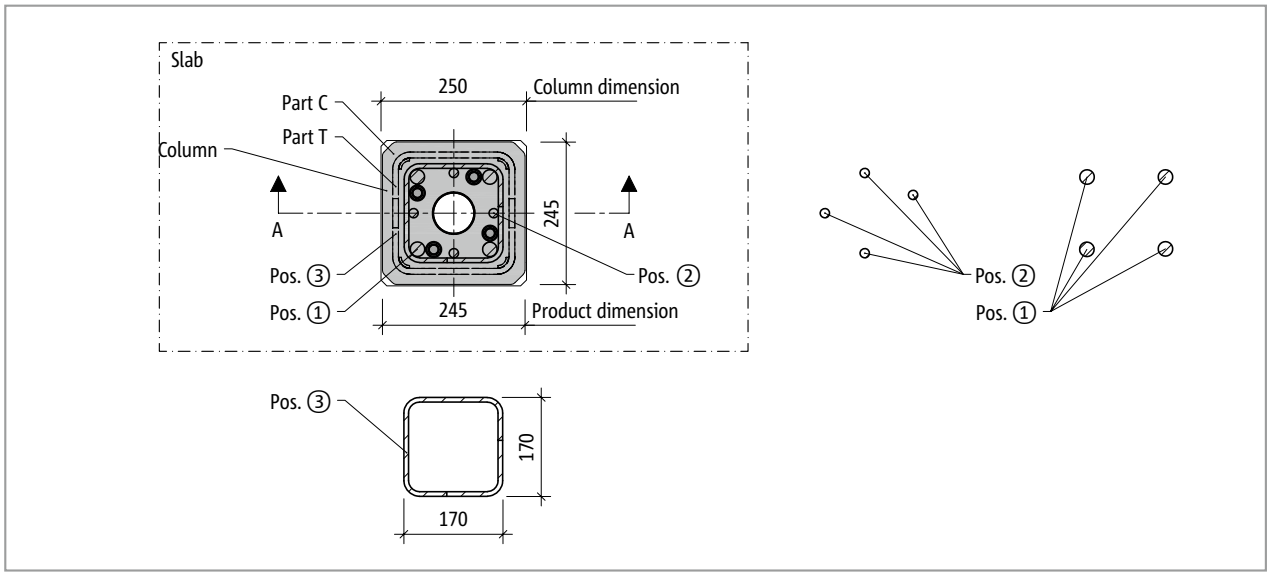


Fig. 142: Schöck Sconnex® type P: On-site reinforcement in column cross-section

On-site reinforcement

Schöck Sconnex® type		P
On-site reinforcement	Location	Concrete strength class ≥ C25/30
Longitudinal reinforcement		
Pos. 1	Column	4 • Hx; x in accordance with column design specified by the structural engineer
Longitudinal reinforcement (optional)		
Pos. 2	Column	4 • Hx; x in accordance with column design specified by the structural engineer
Transverse reinforcement as stirrup		
Pos. 3	Column	6 • Hx / 80; x in accordance with column dimensioning specified by the structural engineer

On-site reinforcement

- Pos. 2, in accordance with the column dimensioning by the structural engineer, can be dispensed with.
- Pos. 3: The lateral lengths of the stirrup are as external dimension to be limited to a maximum of 170 mm. 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 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.

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. D-locks with 135° hooks in accordance with Figure 8.5.a lead to collisions with the Combar® of Part C.

Tight fit | Grouting concrete | Strapping | Installation

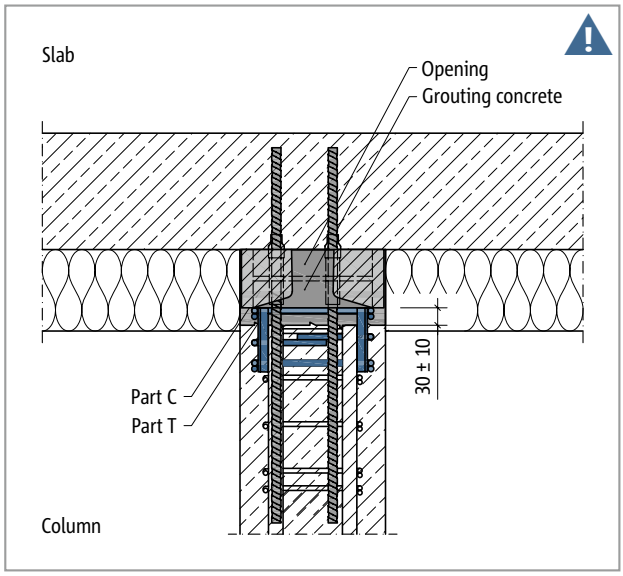


Fig. 143: Schöck Sconnex® type P: Installation section; connection column – floor using integrated Part T for the load-bearing safety in combination with Part C

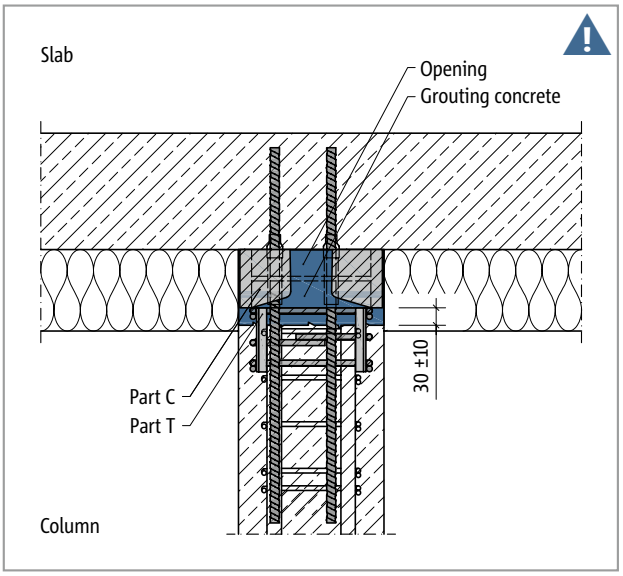


Fig. 144: Schöck Sconnex® type P: Installation section; connection column – floor using form fit to the column concrete using PAGEL® grouting V1/50

Poured concrete: PAGEL® grouting V1/50

- Schöck Sconnex® type P is supplied together with a dry mortar for the production of PAGEL® grouting V1/50 poured concrete. The delivered quantity is dimensioned for the production of tight fits on column-floor connections.

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/de-at/e-learning-sconnex.
- In case of questions, please contact our master installer.

Design example

Simplified design procedure

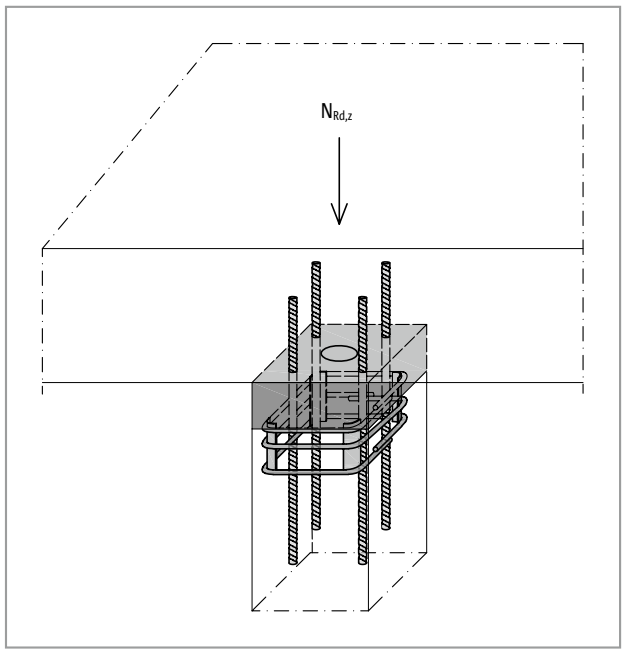


Fig. 145: Schöck Sconnex® type P: Sign convention for the design

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/m²
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

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
Centre distance of longitudinal bars of the column [mm]	Normal force (compression with e = 20 mm) $N_{Rd,z}$ [kN/element]					
→ ≤ 150	904	1016	1119	1207	1207	1207
≤ 75	954	1069	1171	1207	1207	1207
≤ 50	974	1090	1191	1207	1207	1207

$N_{Rd,z}$ = 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

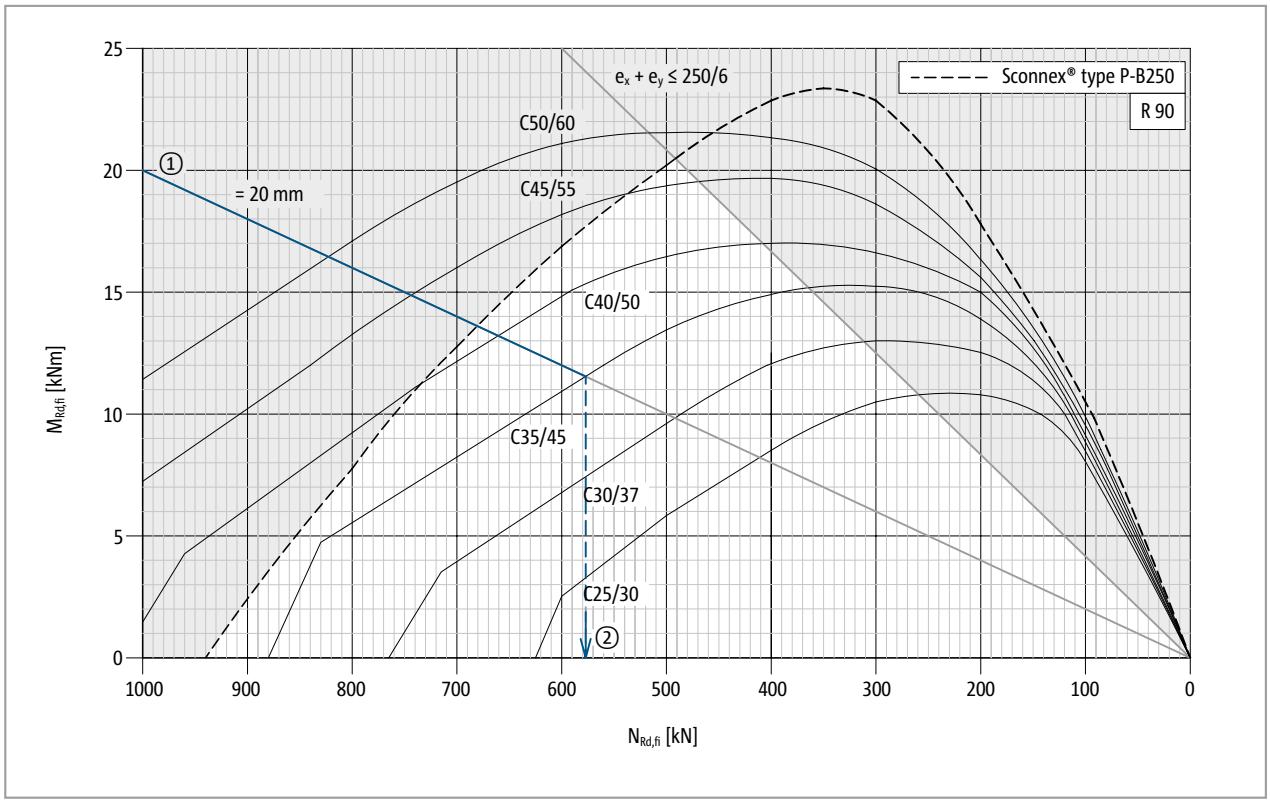


Fig. 146: Schöck Sconnex® type P: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

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

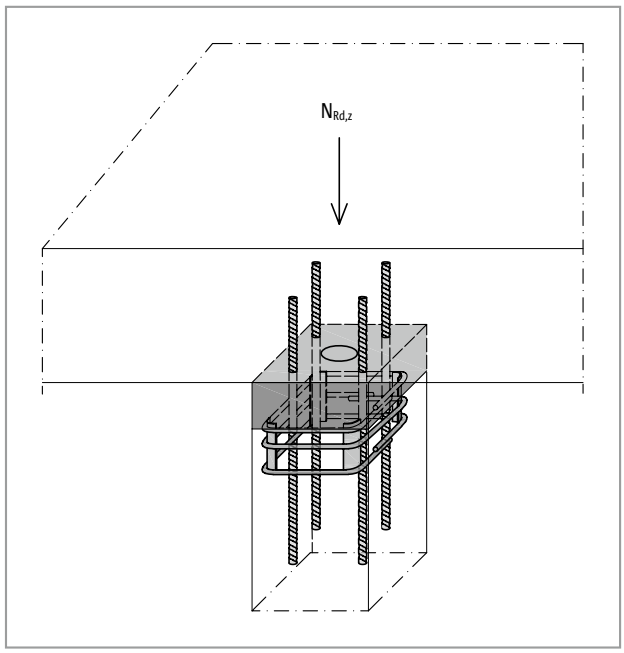


Fig. 147: Schöck Sconnex® type P: Sign convention for the design

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 98)
	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
Centre distance of longitudinal bars of the column [mm]	Normal force (compression with e = 0 mm) $N_{Rd,z,0}$ [kN/element]					
→ ≤ 150	1076	1210	1332	1443	1443	1443
≤ 75	1136	1273	1394	1443	1443	1443
≤ 50	1160	1298	1418	1443	1443	1443

$N_{Rd,z}$ = $N_{Rd,z,0} \cdot (1 - 2 \cdot e_x / 250\ mm) \cdot (1 - 2 \cdot e_y / 250\ mm)$
= $1332 \cdot (1 - 2 \cdot 9 / 250) \cdot (1 - 2 \cdot 14 / 250) = 1097.6$ kN
$N_{Ed,z}/N_{Rd,z}$ = 900 kN / 1097.6 kN = 0.82 < 1.0

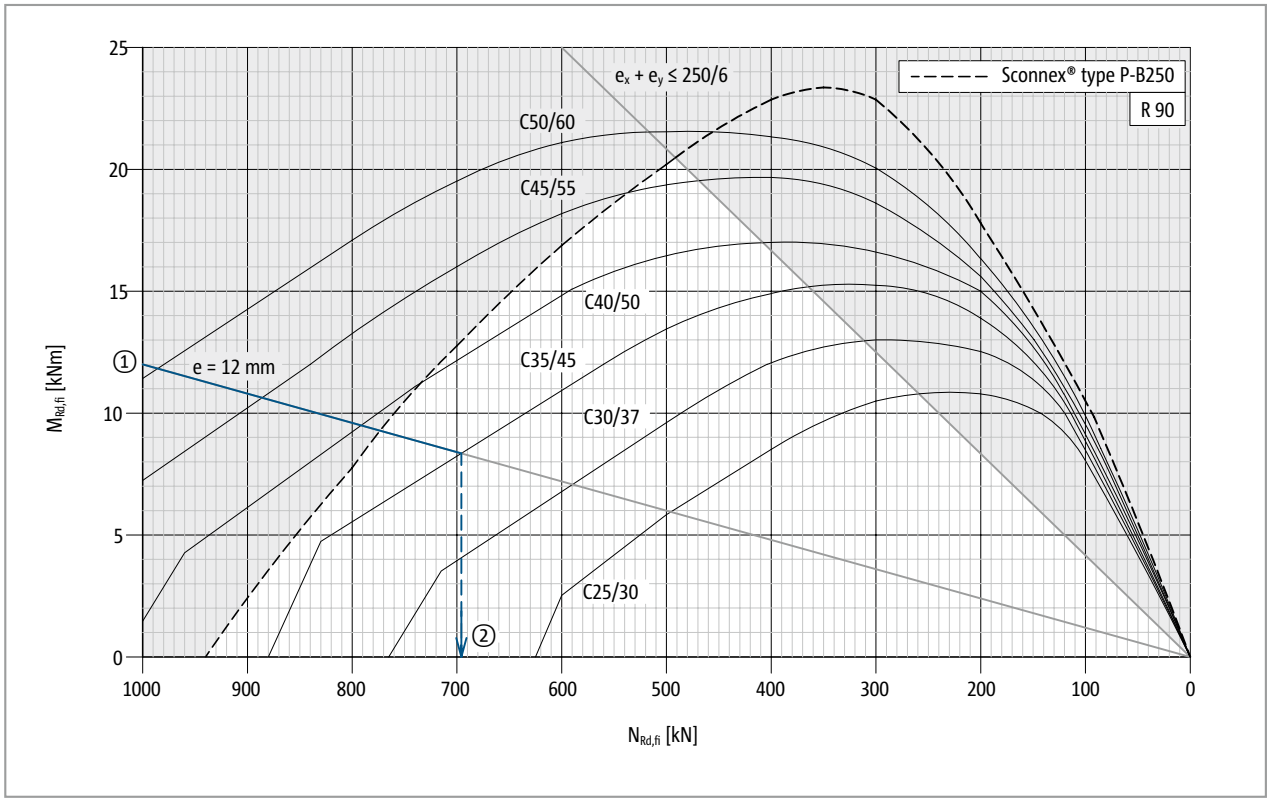
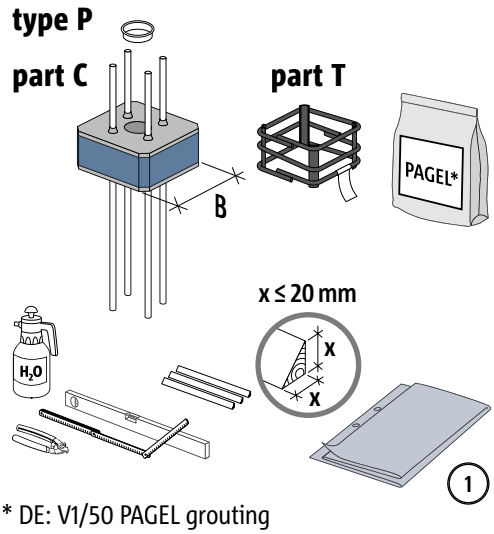


Fig. 148: Schöck Sconnex® type P: Interaction diagram for the dimensioning for the case of fire, fire resistance class R 90

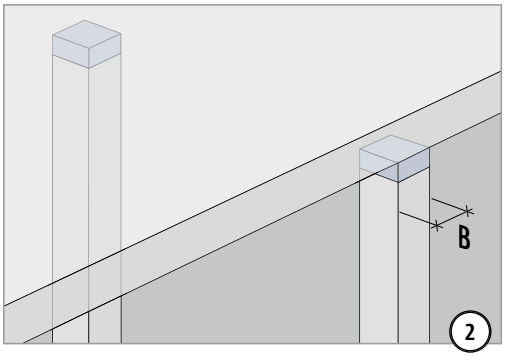
② $N_{Rd,z,fi}$ = 695 kN
$N_{Ed,z,fi}/N_{Rd,z,fi}$ = 650 kN/695 kN = 0.94 < 1.0

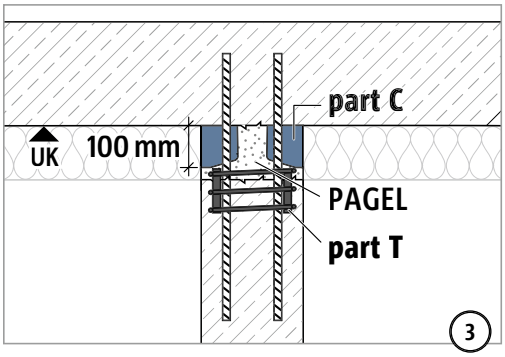
Installation instructions for building site in-situ concrete

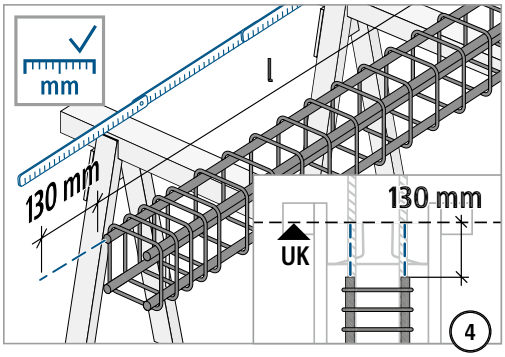


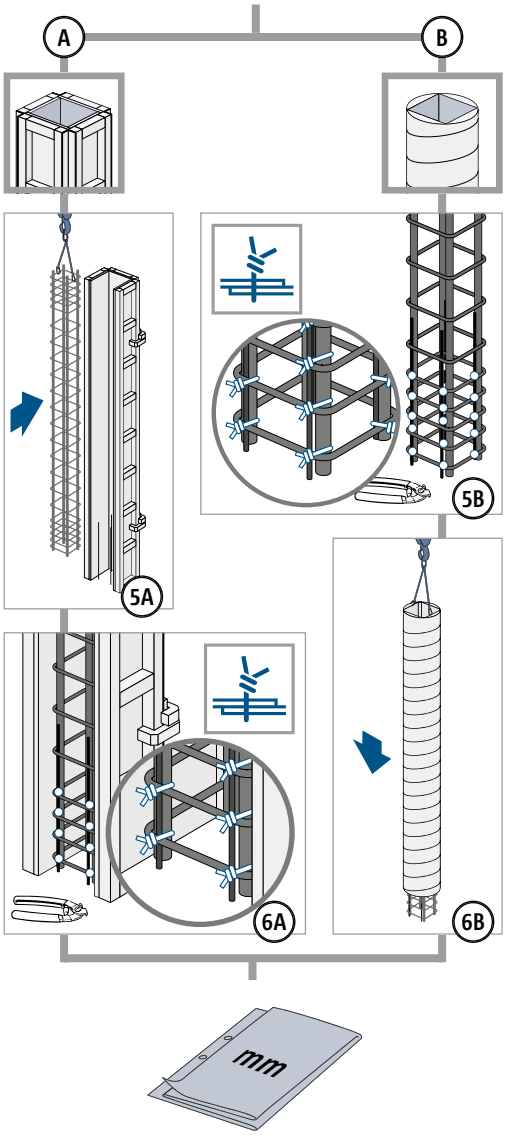
* DE: V1/50 PAGEL grouting

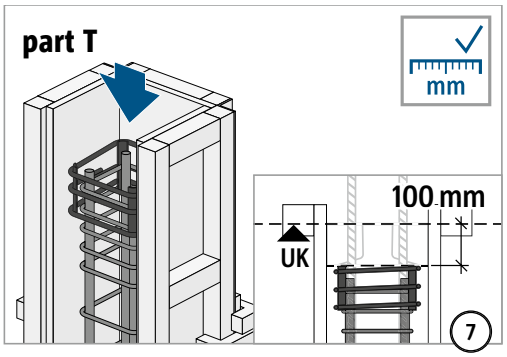
Use assembly report.



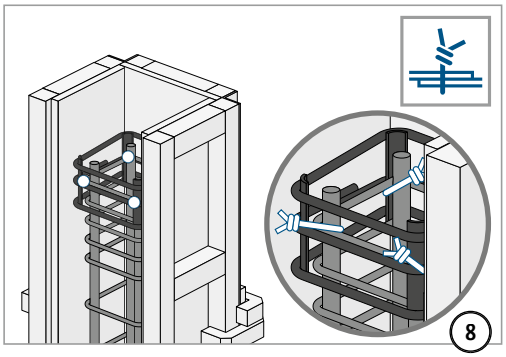


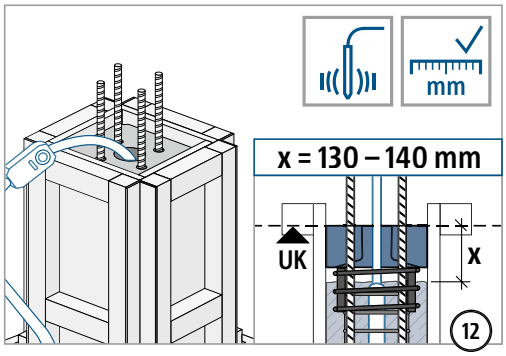


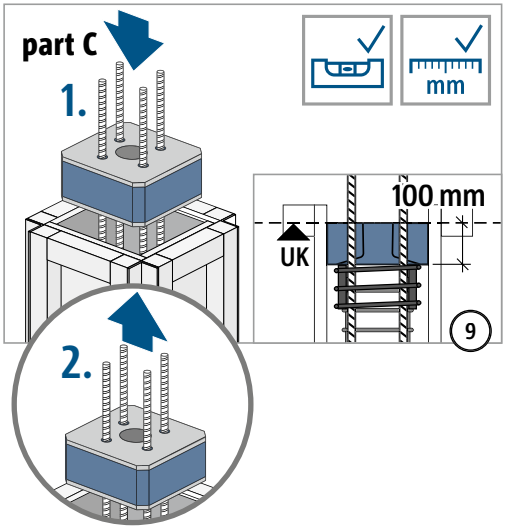


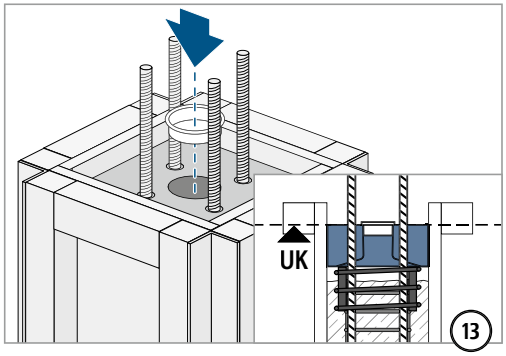


Installation instructions for building site in-situ concrete



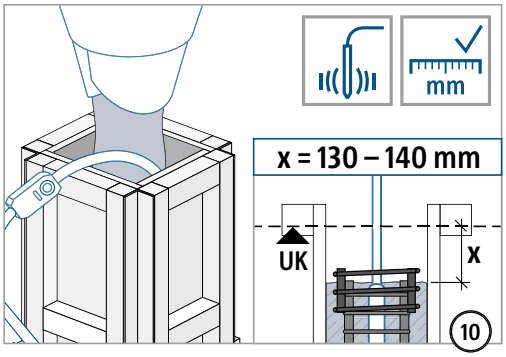




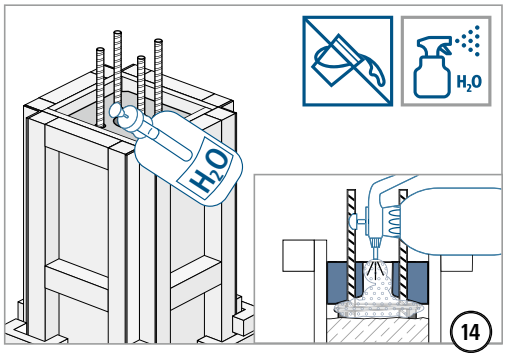


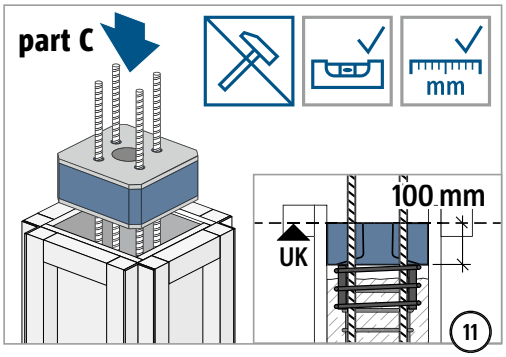
with 20 °C
min. 24 h

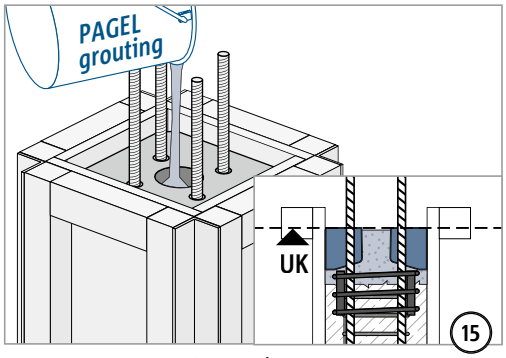
Temperature (C°)	Waiting time (h)
≥ 20	24
15	30
10	40
5	50



max. 5 Min.

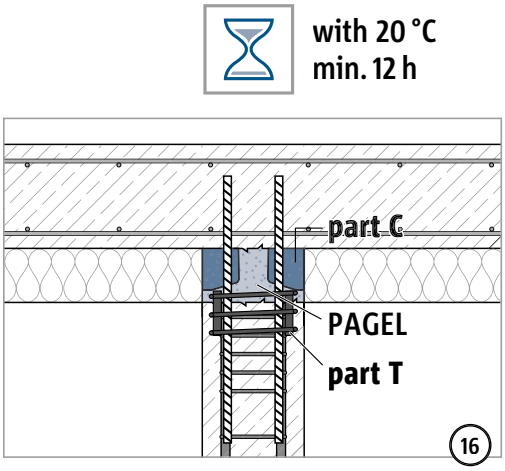




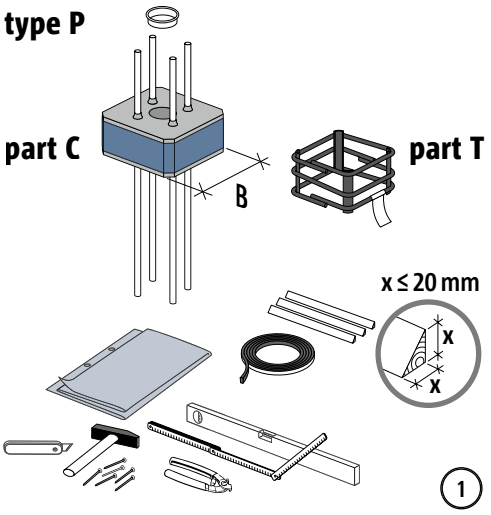


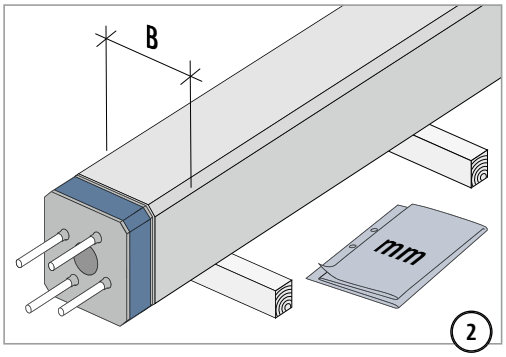
Grouting approx. 3 litre V1/50 PAGEL

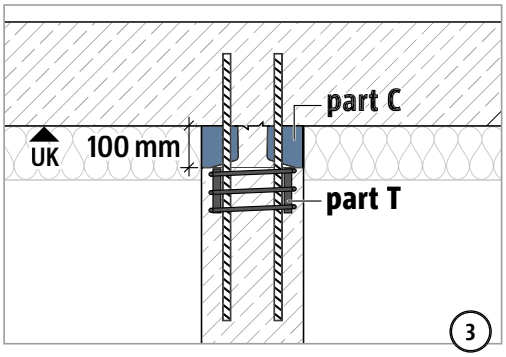
Installation instructions for building site in-situ concrete

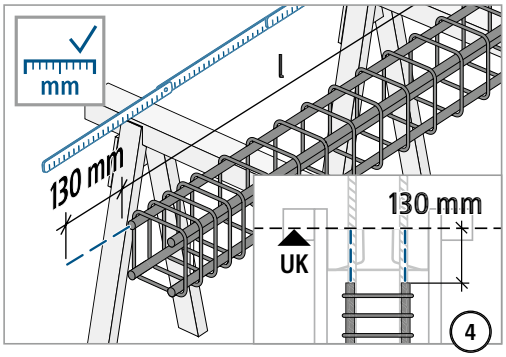


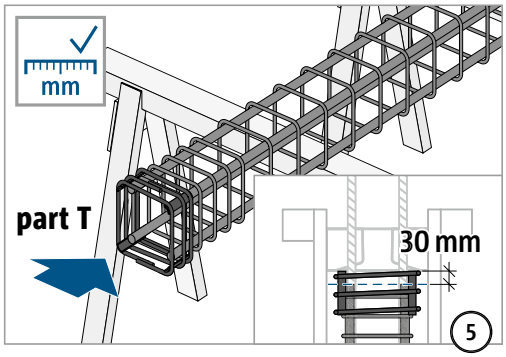
Installation instruction – Precast factory

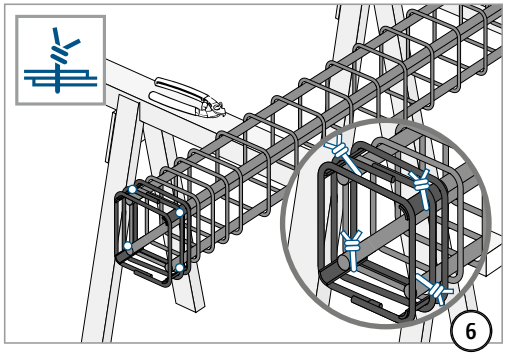


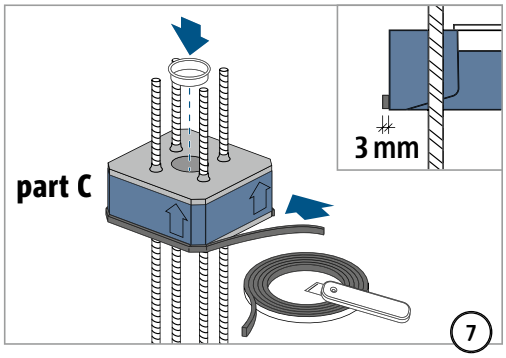


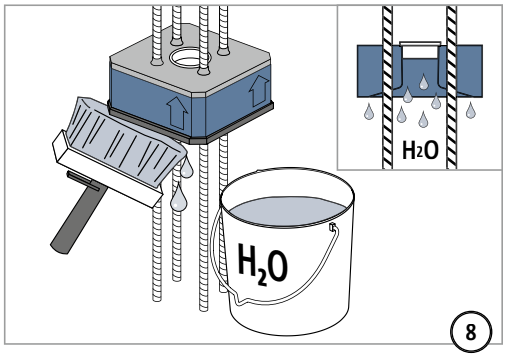


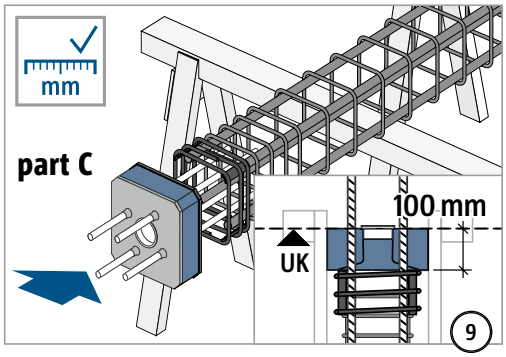




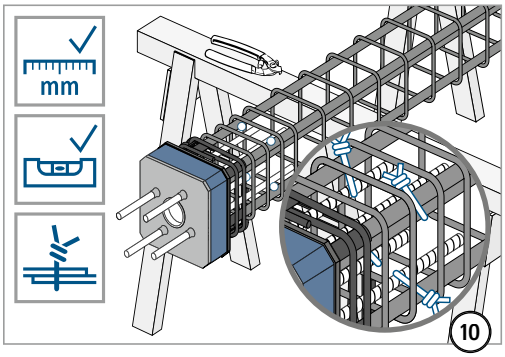


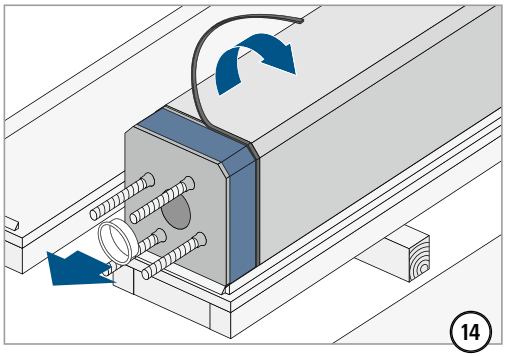


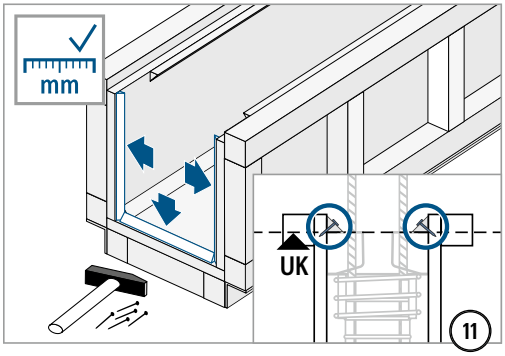


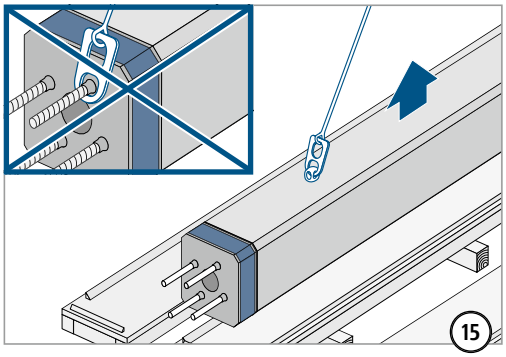


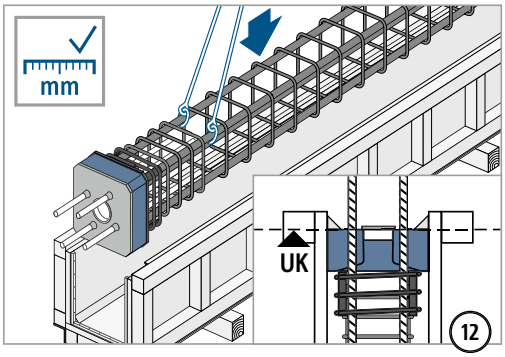
Installation instruction – Precast factory

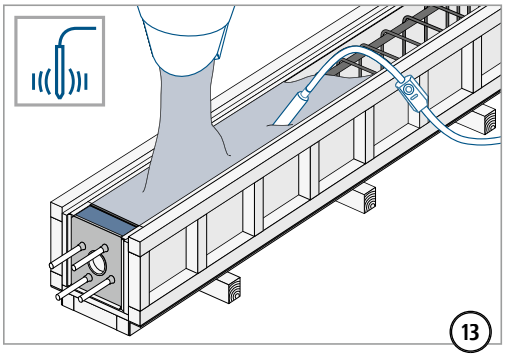












with 20 °C
min. 24 h

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

☑ Check list

- ☐ Are Schöck Sconnex® type P Part C and Part T taken into account in the planning documents for the column cross-section 250 mm × 250 mm?
- ☐ 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?
- ☐ Are the requirements with regard to fire protection clarified?
- ☐ Is dimensioning necessary for the case of fire?
- ☐ With fire protection dimensioning is the clear column length l ≤ 2.85 m 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?
- ☐ Was the construction site advised of the mandatory certification?