European Technical Assessment

ETA-17/0261 of 7 September 2022

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Schöck Isokorb® with compression elements made of concrete or steel
Product family to which the construction product belongs	Load bearing thermal insulation elements which form a thermal break between balconies and internal floors
Manufacturer	Schöck Bauteile GmbH Schöckstraße 1 76534 Baden-Baden DEUTSCHLAND
Manufacturing plant	Schöck Bauteile GmbH, Schöckstraße 1 76534 Baden-Baden, Germany Schöck Bauteile GmbH, Nordsternstraße 61 45329 Essen, Germany Schöck Bauteile Ges.m.b.H., Handwerkstraße 2 4055 Pucking, Austria Schöck Sp. z o.o., ul. Przejazdowa 99, 43-100 Tychy, Poland
This European Technical Assessment contains	64 pages including 4 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 050001-01-0301
This version replaces	ETA-17/0261 issued on 9 February 2021

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Specific Part

1 Technical description of the product

Schöck Isokorb® with compression elements made of concrete or steel is used as load-bearing thermal insulation element to connect reinforced concrete slabs.

The product description is given in Annex A.

The characteristic material values, dimensions and tolerances of Schöck Isokorb® compression elements made of concrete or steel not indicated in Annexes A1 to A17 shall correspond to the respective values laid down in the technical documentation[1] of this European Technical Assessment.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if Schöck Isokorb® with compression elements made of concrete or steel is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of Schöck Isokorb® with compression elements made of concrete or steel of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Load bearing capacity	f_{yd}; Z_{Rd} see Annex C1 V_{Rd} ($Z_{v,Rd}$) see Annex C1 D_{Rd} ($N_{ki,d}$) see Annex C3 bis C5 H_{td} ($H_{II,d}$; $H_{\perp,d}$; $H_{IIpl,d}$) see Annex C2, C6 und C7

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire of materials	See Annex A17
Resistance to fire	See Annex C8 – C10
Propensity to undergo continuous smouldering	No performance assessed

[1] The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

3.3 Protection against noise (BWR 5)

Essential characteristic	**Performance**
Impact sound insulation	ΔL_w see Annex C14 – C19
Flanking sound transmission	No performance assessed

3.4 Energy economy and heat retention (BWR 6)

Essential characteristic	**Performance**
Thermal resistance	$R_{eq,TI}$ see Annex C12 – C13

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No. 050001-01-0301, the applicable European legal act is: 97/597/EC.
The systems to be applied is: 1+

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

The following standards are referred to in this European Technical Assessment:

- EN 206:2013+A2:2021 — Concrete: Specification, performance, production and conformity
- EN 1992-1-1:2004/A1:2014 — Eurocode 2: Design of concrete structures – Part 1-1: General design rules and rules for buildings
- EN 1992-1-2:2004/A1:2019 — Eurocode 2: Design of concrete structures – Part 1-2: General rules – Structural fire design
- EN 1993-1-1:2005/A1:2014 — Eurocode 3: Design of steel structures – Part 1-1: General design rules and rules for buildings
- EN 1993-1-4:2006/A2:2020 — Eurocode 3: Design of steel structures – Part 1-4: General rules – Supplementary rules for stainless
- EN 1998-1:2004/A1:2013 — Eurocode 8: Design of structures for earthquake resistance – Part 1: General rules, seismic actions and rules for buildings
- EN 10025-2:2019 — Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels
- EN 10088-1:2014 — Stainless steels – Part 1: List of stainless steels
- EN 12664:2001 — Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Dry and moist products of medium and low thermal resistance

– EN 13163:2012+A2:2016	Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products – Specification
– EN 13245-1:2010	Plastics – Unplasticized poly(vinyl chloride) (PVC-U) profiles for building applications – Part 1: Designation of PVC-U profiles
– EN 13245-2:2008 + AC:2009	Plastics – Unplasticized poly(vinyl chloride) (PVC-U) profiles for building applications – Part 2: PVC-U profiles and PVC-UE profiles for internal and external wall and ceiling finishes
– EN 13501-1:2018	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
– EN 13501-2:2016	Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services
– EN ISO 6946:2017	Building components and building elements – Thermal resistance and thermal transmittance – Calculation method (ISO 6946:2017)
– EN ISO 10211:2017	Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations (ISO 10211:2017)
– EN ISO 10456:2007+AC:2009	Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007 + Cor. 1:2009)
– EN ISO 12354-2:2017	Building acoustics – Estimation of acoustic performance of buildings from the performance of elements - Part 2: Impact sound insulation between rooms (ISO 12354-2:2017)
– EN ISO 17855-1:2014	Plastics – Polyethylene (PE) moulding and extrusion materials – Part 1: Designation system and basis for specifications (ISO 17855-1:2014)
– EN ISO 17855-2:2016	Plastics – Polyethylene (PE) moulding and extrusion materials – Part 2: Preparation of test specimens and determination of properties (ISO 17855-2:2016)

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Dipl.-Ing. Beatrix Wittstock	*beglaubigt:*
Referatsleiterin	Kisan

A.1 Type overview

A.1.1 Schöck Isokorb® with concrete compression elements (CCE in accordance with section A.2.5): HTE-Modul, HTE-Compact® 20 or HTE-Compact® 30

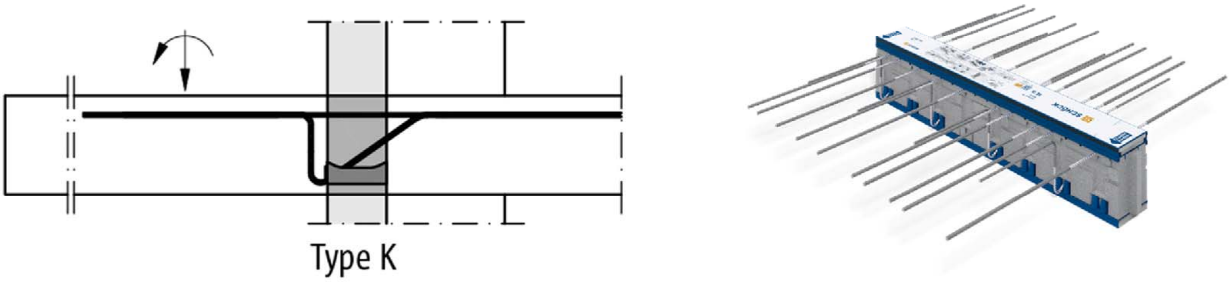


Fig. A.1: Schöck Isokorb® Type K for freely cantilevered balconies

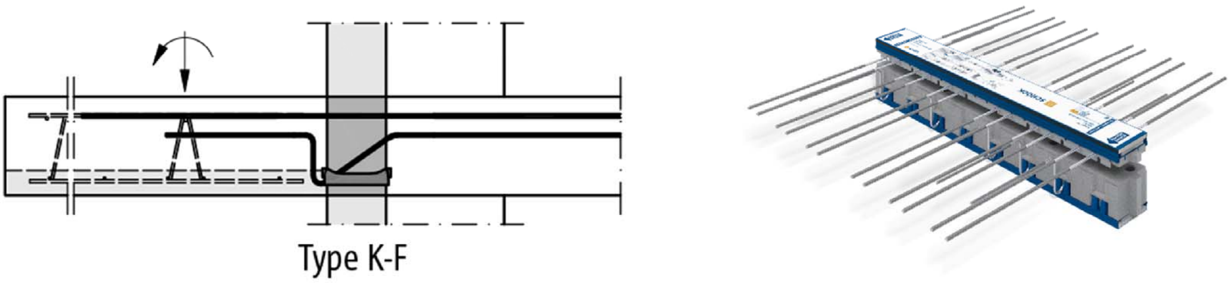


Fig. A.2: Schöck Isokorb® Type K-F for freely cantilevered balconies in element construction (variation in several parts)

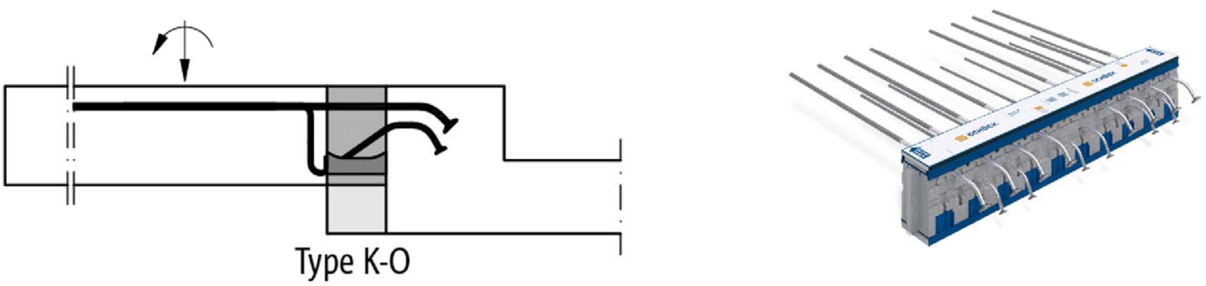


Fig. A.3: Schöck Isokorb® Type K-O, K-O-F for freely cantilevered balconies with or without height offset upwards or wall connection

Schöck Isokorb® with compression elements made of concrete or steel	Annex A1
Product description Type overview Schöck Isokorb® with concrete compression elements (CCE)	

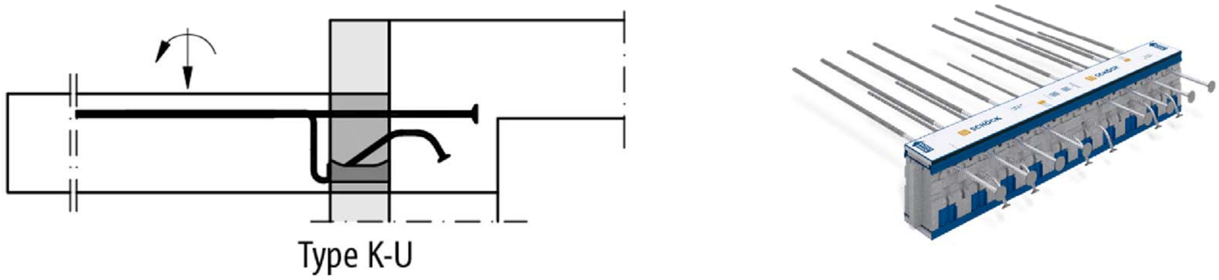


Fig. A.4: Schöck Isokorb® Type K-U, K-U-F for freely cantilevered balconies with height offset downwards or wall connection

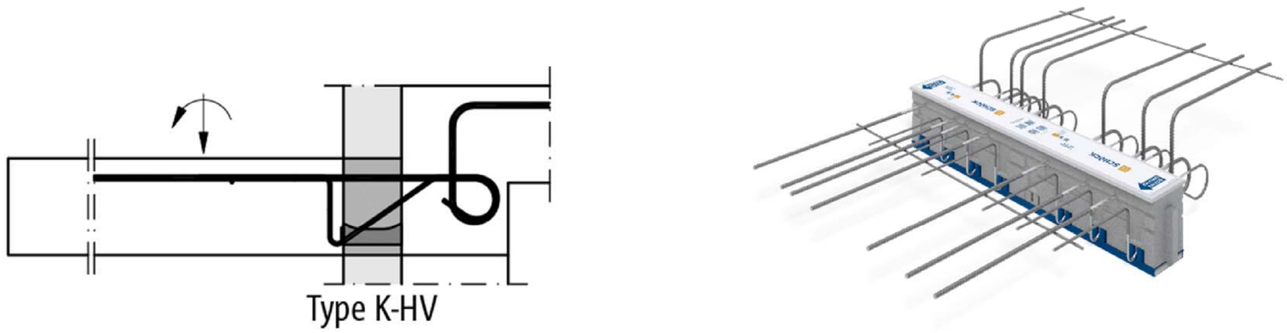


Fig. A.5: Schöck Isokorb® Type K-HV for freely cantilevered balconies with height offset downwards or wall connection

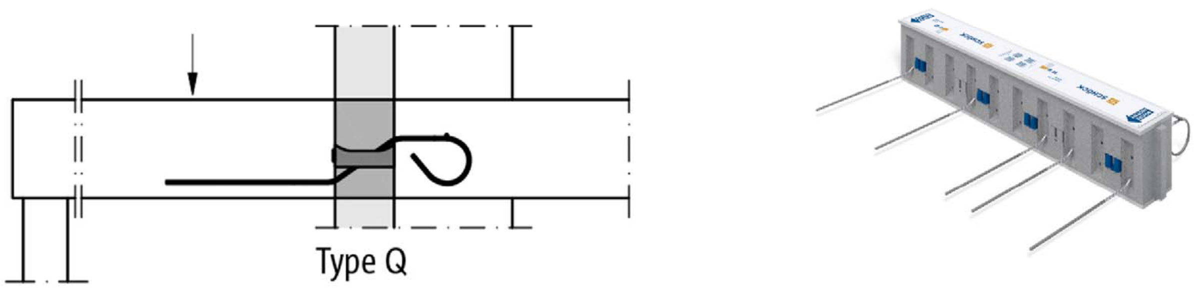


Fig. A.6: Schöck Isokorb® Type Q for supported balconies, for example shear force bar with bent bar end on the ceiling side (alternatively with straight bar end on the ceiling side)

A.1.2 Schöck Isokorb® with steel compression elements (SCE in accordance with section A.2.4): Steel compression elements with welded-on compression plates or compression bars

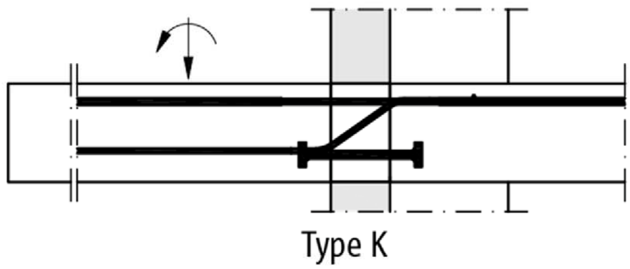


Fig. A.7: Schöck Isokorb® Type K, K-F (variation in several parts) for freely cantilevered balconies with steel compression elements with welded-on compression plates

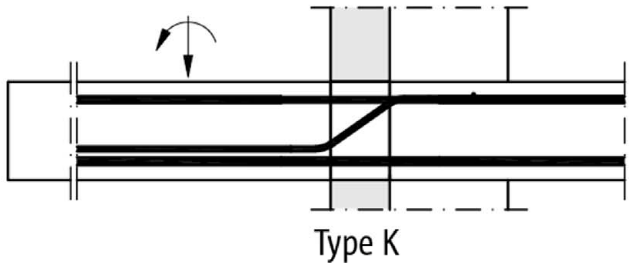


Fig. A.8: Schöck Isokorb® Type K, K-F (variation in several parts) for freely cantilevered balconies with steel compression bars

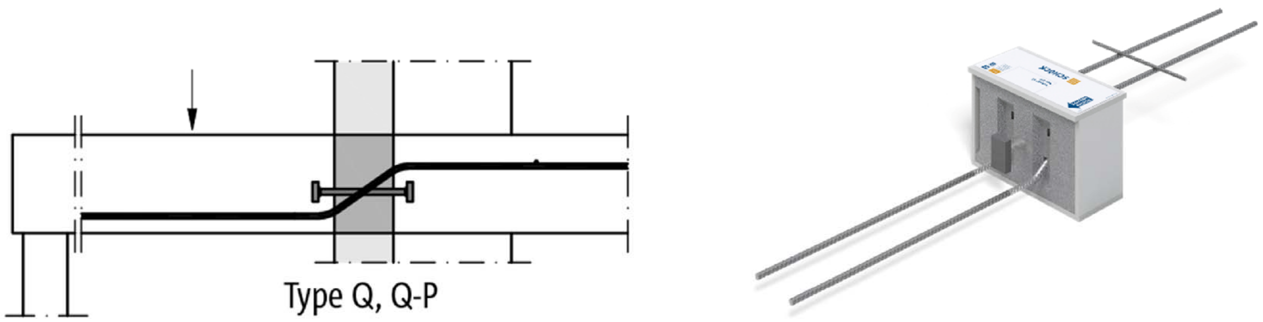


Fig. A.9: Schöck Isokorb® Type Q, Q-P for supported balconies

Schöck Isokorb® with compression elements made of concrete or steel	Annex A3
Product description Type overview Schöck Isokorb® with steel compression elements (SCE)	

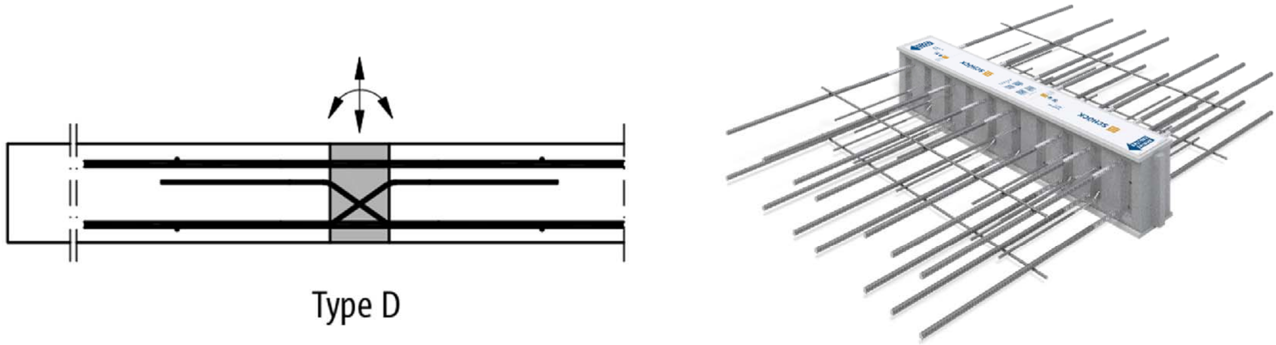


Fig. A.10: Schöck Isokorb® Type D for continuous slabs

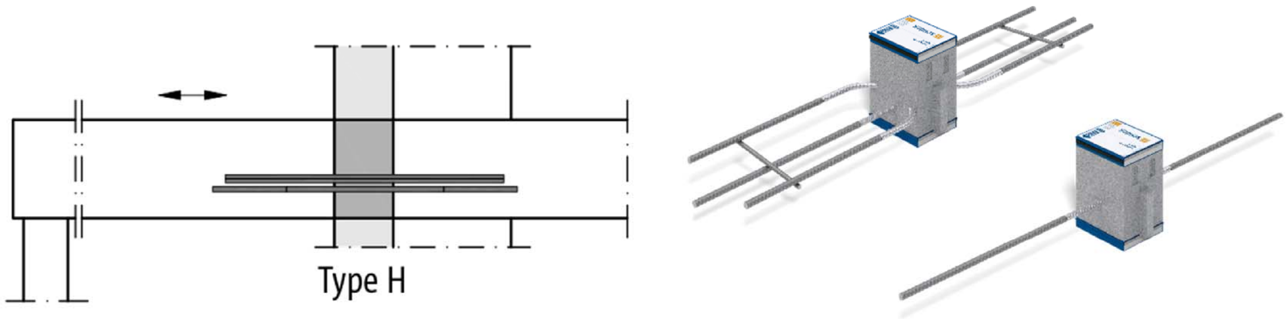


Fig. A.11: Schöck Isokorb® Type H, supplement for horizontal loads perpendicular and parallel to the insulation joint

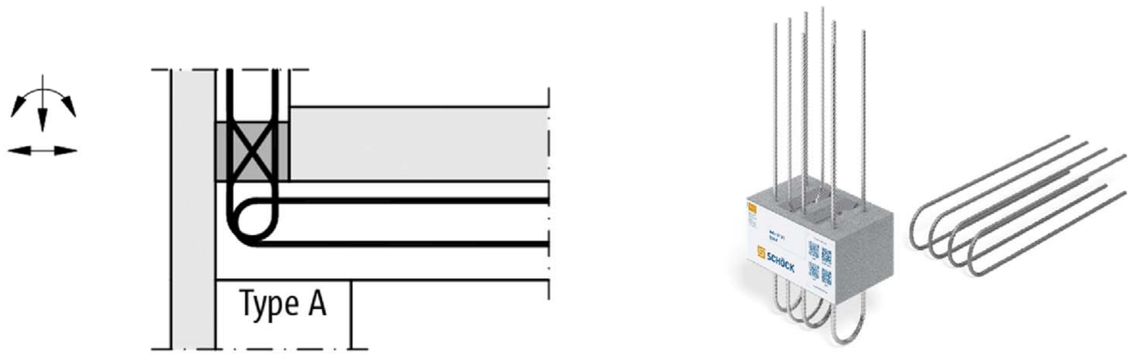
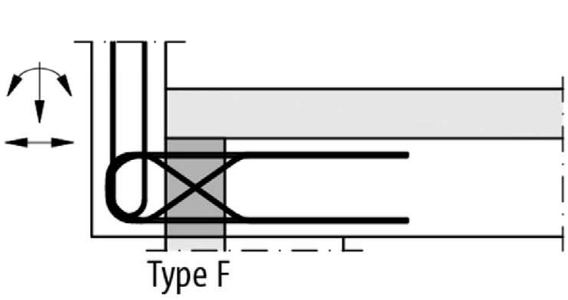


Fig. A.12: Schöck Isokorb® Type A for parapets and attics

Schöck Isokorb® with compression elements made of concrete or steel	Annex A4
Product description Type overview Schöck Isokorb® with steel compression elements (SCE)	



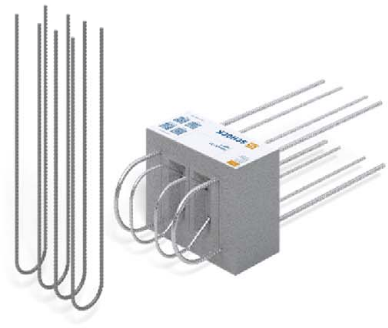


Fig. A.13: Schöck Isokorb® Type F for facing parapets

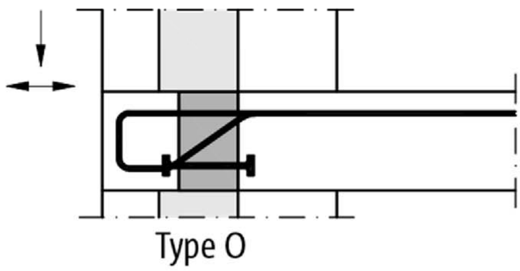


Fig. A.14: Schöck Isokorb® Type O for consoles

A.2 Dimensions and position of the bars and compression elements in the area of the insulation joint

General:

▪ Element height:	160 mm ≤ H ≤ 500 mm
▪ Insulation thickness:	80 mm or 120 mm with concrete compression elements (CCE) 60 mm to 120 mm with steel compression elements (SCE)

Tension bars in accordance with section A.2.1:

▪ Diameter:	Ø ≤ 20 mm graded nominal diameter in accordance with section A.2.1
▪ Number per meter:	n ≥ 4/m
▪ Axial distance:	≤ 300 mm, on average ≤ 250 mm
▪ Embedded length of stainless steel	≥ 100 mm within the adjacent concrete components

Shear force bars in accordance with section A.2.2:

▪ Diameter:	Ø ≤ 8 mm when arranged between individual elements of the compression bearing pairs CCE (Type K, K-F with CCE) Ø ≤ 14 mm for all other types
▪ Number per meter:	n ≥ 4/m when arranged between individual elements of the compression bearing pairs CCE (Type K, K-F with CCE) n ≥ 2/m for Ø < 8 mm n ≥ 4/m for Ø ≥ 8 mm
▪ Axial distance:	≤ 300 mm, on average ≤ 250 mm when arranged between individual elements of the compression bearing pairs CCE (Type K) ≤ 600 mm, on average ≤ 500 mm for Ø < 8 mm ≤ 300 mm, on average ≤ 250 mm for Ø ≥ 8 mm
▪ Embedded length of stainless steel:	≥ 100 mm within the adjacent concrete components
▪ Inclination in the insulation joint:	usually α = 45° for 60 mm or 80 mm insulation thickness, α = 35° at 120 mm insulation thickness
▪ Concrete-free area:	bars shall not have any bends
▪ Bends start point:	≥ 2 Ø inside the concrete, measured in bar direction
▪ Mandrel diameter:	$Ø_{BR}$ ≥ 10 Ø
▪ Bending roll diameter in the area of the concrete compression element (CCE):	in accordance with section A.2.2 and Fig. A.44 and in compliance with the rules of EN 1992-1-1

Horizontally inclined bars in accordance with section A.2.3:

- Diameter: Ø ≤ 12 mm
- Stainless steel embedded length: ≥ 100 mm within the adjacent concrete components
- Inclination in the insulation joint: α = 45°
- Concrete-free area: Bars shall not have curvature
- Mandrel diameter: $Ø_{BR}$ ≥ 10 Ø
- Starting point of internal curvature: ≥ 2 Ø of free concrete surface, measured in bar direction

Steel compression elements (SCE) in accordance with section A.2.4:

- Diameter: Ø ≤ 20 mm
- Number per meter: n ≥ 4/m
- Axial distance: ≤ 300 mm, on average ≤ 250 mm
- Two variants:
  1) Compressive forces are transmitted via the composite effect of the reinforcing steel
     - embedded length stainless steel ≥ 100 mm within the adjacent concrete components
  2) Forwarding via a compression plate if no tension forces are transmitted with this bar as planned
     - Compression plate is made of structural steel
embedded length stainless steel ≥ 50 mm within the adjacent concrete components
     - Compression plate is made of stainless steel
embedded length Stainless steel can be flush
     - Compression plates are welded to the front sides of the compression bars in a force-locking manner

Concrete compression elements (CCE) in accordance with section A.2.5:

- Number per meter: n ≥ 4/m
- Clear spacing: ≤ 250 mm
- Minimum number per component to be connected: n ≥ 4

A.2.1 Tension bar variants

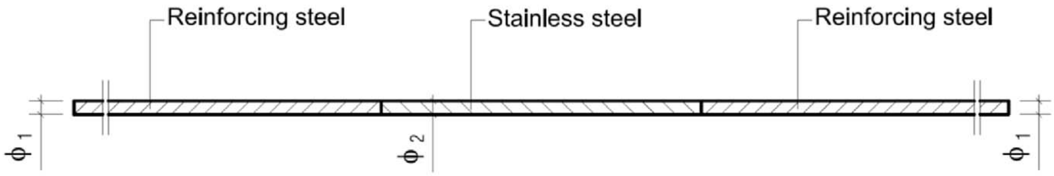


Fig. A.15: Tension bar without diameter combination

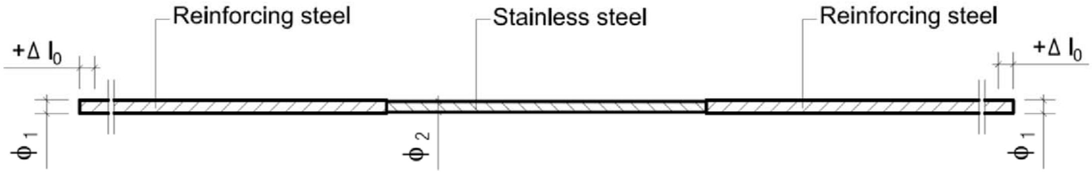


Fig. A.16: Tension bar with diameter combination

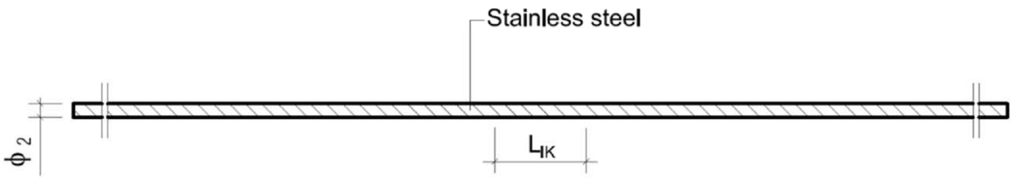


Fig. A.17: Tension bar made of stainless steel

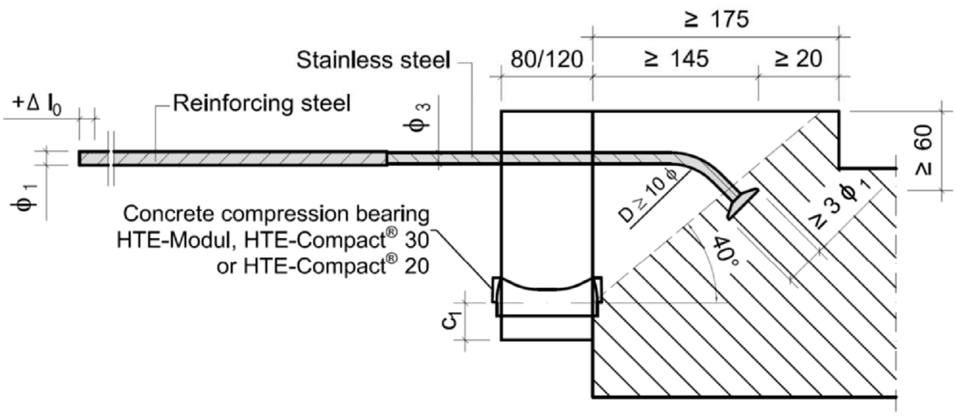


Fig. A.18: Tension bar for Schöck Isokorb® Type K-O and Type K-O-F with diameter combination and position of the anchor head

Schöck Isokorb® with compression elements made of concrete or steel	Annex A8
Product description Tension bar variants	

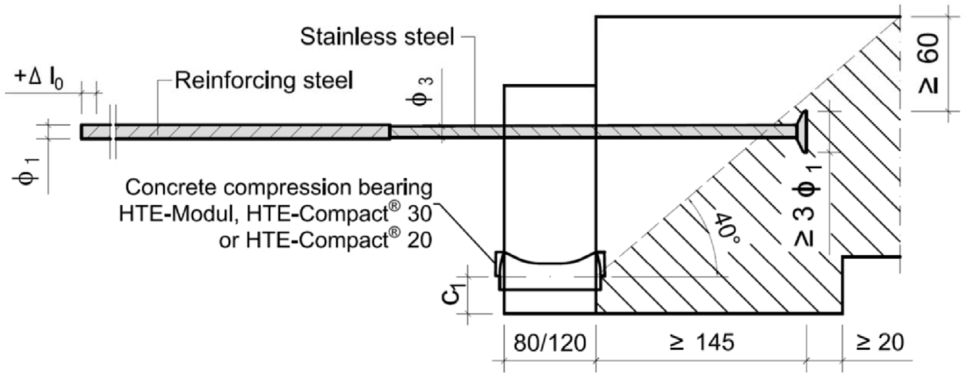


Fig. A.19: Tension bar for Schöck Isokorb® Type K-U and Type K-U-F with diameter combination and position of the anchor head

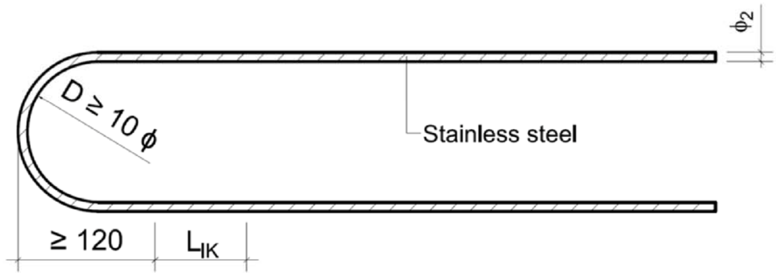


Fig. A.20: Tension bar for Schöck Isokorb® Type A and Type F

Table A.1: Diameter combinations and additions to the overlap length for tension bars according to Fig. A.16

Graded tension bars Ø$_1$ - Ø$_2$ - Ø$_1$	**$R_{p0,2}$ [N/mm²] for reinforcing steel with Ø$_1$ [mm]**	**$R_{p0,2}$ [N/mm²] for stainless steel with Ø$_2$ [mm]**	**Δ l_0 [mm]**
8 - 6,5 - 8	500	800	20
8 - 7 - 8	500	700	13
10 - 8 - 10	500	700 / (820 optional)	20
12 - 9,5 - 12	500	820	20
12 - 10 - 12	500	700	17
12 - 11 - 12	500	700	9
14 - 12 - 14	500	700	14

Table A.2: Diameter combinations and additions to the overlap length for tension bars according to Fig. A.18 and Fig. A.19

Graded tension bars Ø$_1$ - Ø$_3$	**$R_{p0,2}$ [N/mm²] for reinforcing steel with Ø$_1$ [mm]**	**$R_{p0,2}$ [N/mm²] for stainless steel with Ø$_3$ [mm]**	**Δ l_0 [mm]**
12 - 10	500	700	17

Schöck Isokorb® with compression elements made of concrete or steel

Product description
Tension bar variants

Annex A9

A.2.2 Shear force bar variants

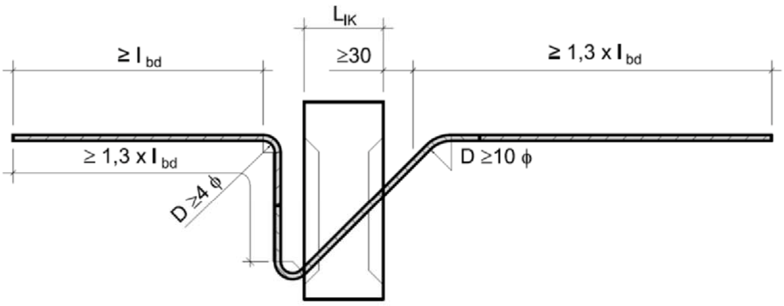


Fig. A.21: Shear force bar for Schöck Isokorb® Type K, K-F with bent up bar end on the balcony side

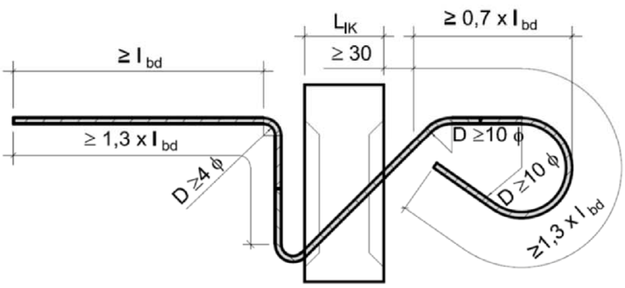


Fig. A.22: Shear force bar for Schöck Isokorb® Type K, K-F with bent up bar end on the balcony side and bent bar end on the ceiling side

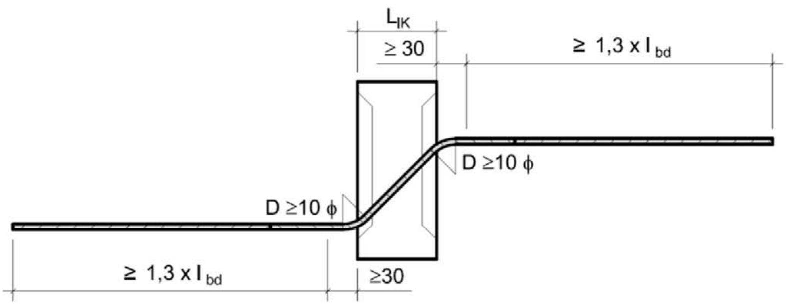


Fig. A.23: Shear force bar with straight bar ends

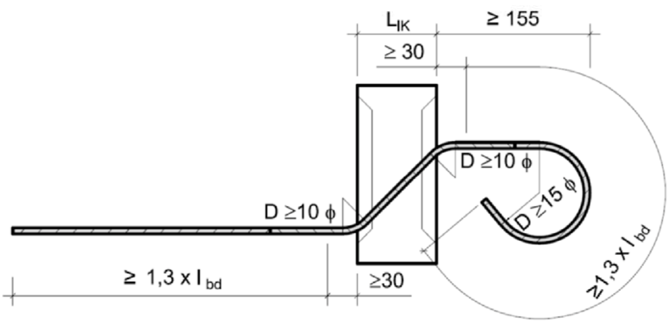


Fig. A.24: Shear force bar with bent bar end on the ceiling side

where $l_{bd} \geq l_{b,min}$ as per EN 1992-1-1

Schöck Isokorb® with compression elements made of concrete or steel

Product description
Shear force bar variants

Annex A10

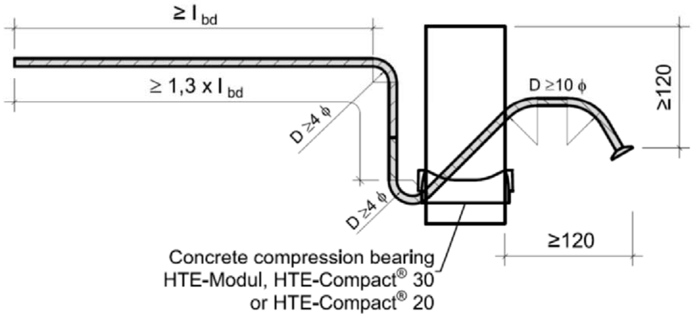


Fig. A.25: Shear force bar for Schöck Isokorb® Type K-U, K-U-F, K-O and K-O-F

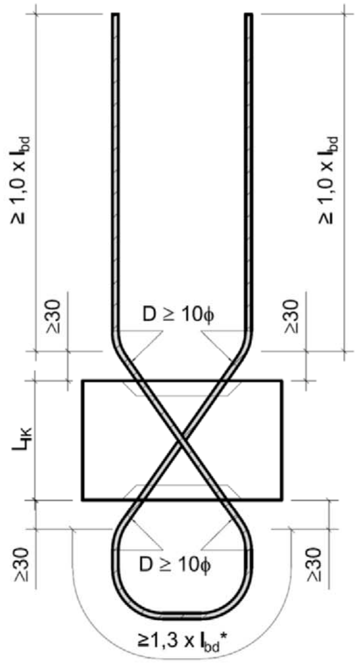


Fig. A.26: Shear force bar for Schöck Isokorb® Type A

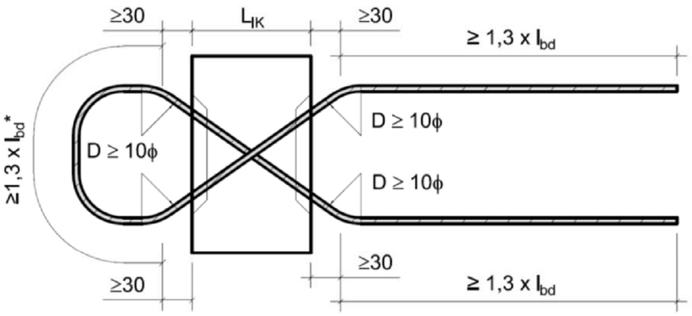


Fig. A.27: Shear force bar for Schöck Isokorb® Type F

where $l_{bd} \geq l_{b,min}$ as per EN 1992-1-1
* with $\alpha_1 = 0,7$

Schöck Isokorb® with compression elements made of concrete or steel	Annex A11
Product description Shear force bar variants	

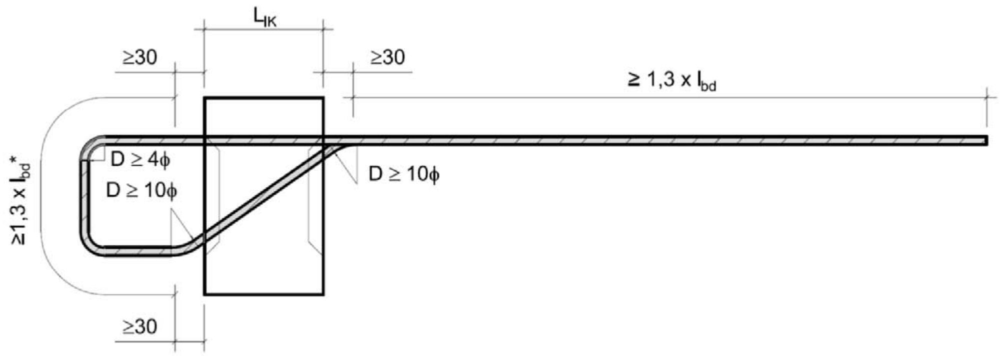


Fig. A.28: Shear force bar for Schöck Isokorb® Type O

A.2.3 Horizontal bar variants

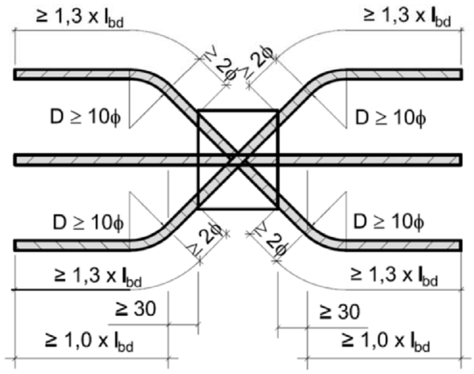


Fig. A.29: Horizontal inclined bars and straight bar for Schöck Isokorb® Type H-VV-NN, top view

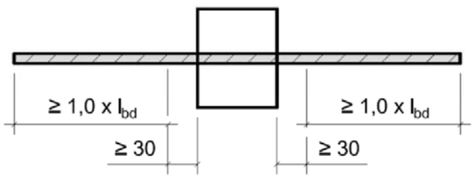


Fig. A.30: Horizontal straight bar for Schöck Isokorb® Type H-NN, top view

where $l_{bd} \geq l_{b,min}$ as per EN 1992-1-1
* with $\alpha_1 = 0,7$

Schöck Isokorb® with compression elements made of concrete or steel	Annex A12
Product description Shear force bar variants / Horizontal bar variants	

A.2.4 Steel compression element variants (SCE)

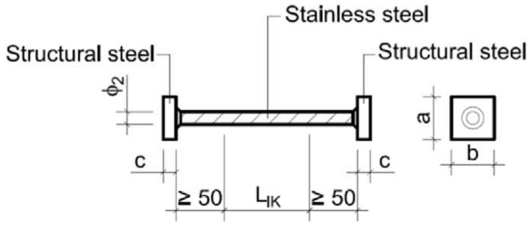


Fig. A.31: Steel compression element with welded-on compression plates, embedding at least 50 mm on both sides

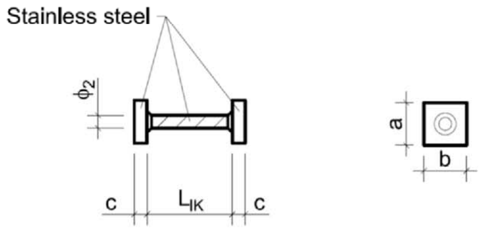


Fig. A.32: Steel compression element with welded-on compression plates, flush on both sides

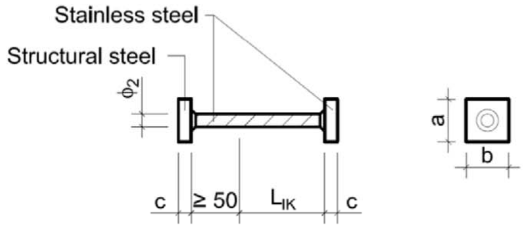


Fig. A.33: Steel compression element with welded-on compression plates, flush on one side, embedding at least 50 mm on one side (e.g. for Schöck Isokorb® Type K-ID, Schöck Isokorb® RT Type K)

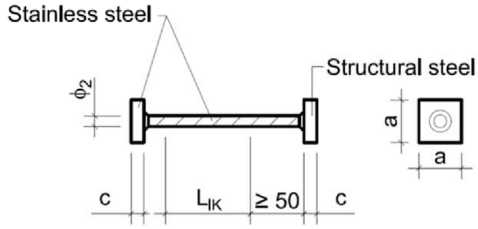


Fig. A.34: Steel compression element with welded-on compression plates, embedding at least 50 mm on one side, less than 50 mm on the other side (e.g. for Schöck Isokorb® Typ O)

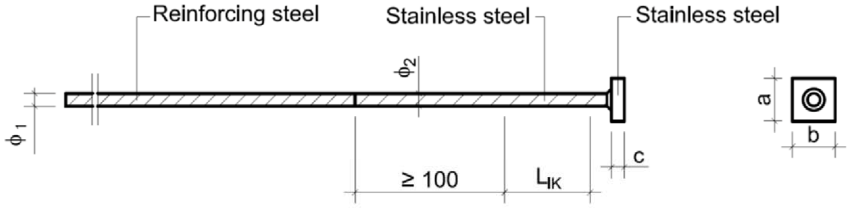


Fig. A.35: Steel compression element with welded-on compression plate and welded reinforcing steel

Schöck Isokorb® with compression elements made of concrete or steel	Annex A13
Product description Steel compression element variants (SCE)	

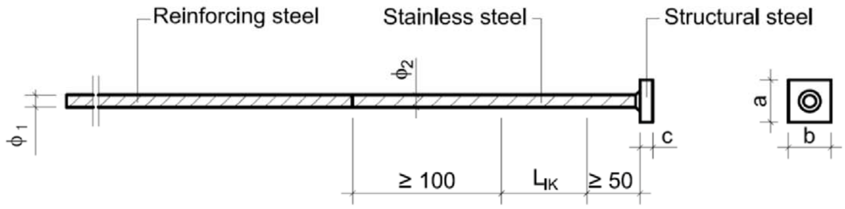


Fig. A.36: Steel compression element with welded-on compression plate and welded reinforcing steel

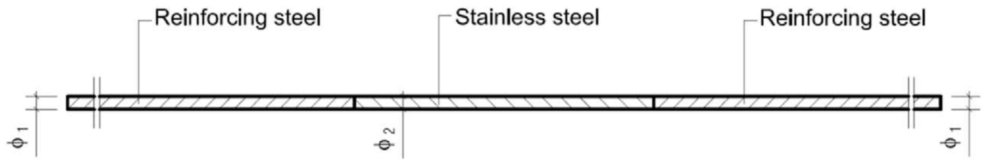


Fig. A.37: Steel compression element with reinforcing steel welded on both sides

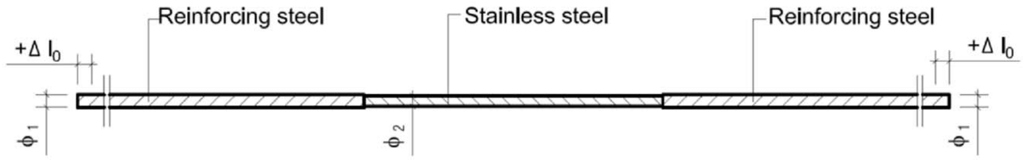


Fig. A.38: Steel compression element with reinforcing steel welded on both sides, with diameter combination, Table A.1 also applies this steel compression element

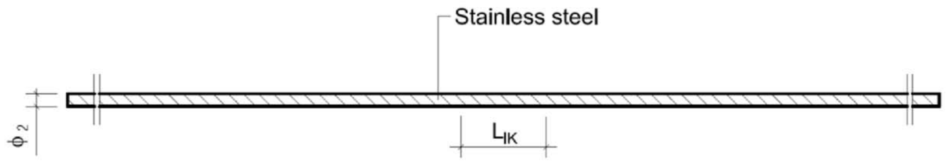


Fig. A.39: Steel compression element made of stainless reinforcing steel

Schöck Isokorb® with compression elements made of concrete or steel

Product description
Steel compression element variants (SCE)

Annex A14

A.2.5 Concrete compression element variants (CCE)

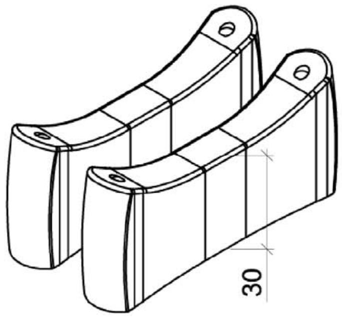


Fig. A.40: Concrete compression element HTE-Modul and HTE-Compact® 30, insulation thickness 80 mm

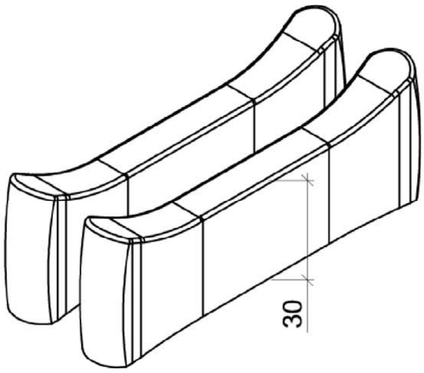


Fig. A.41: Concrete compression element HTE-Modul and HTE-Compact® 30, insulation thickness 120 mm

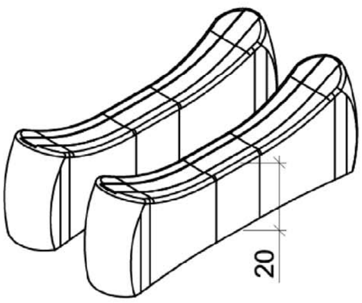


Fig. A.42: Concrete compression element HTE-Compact® 20, insulation thickness 80 mm

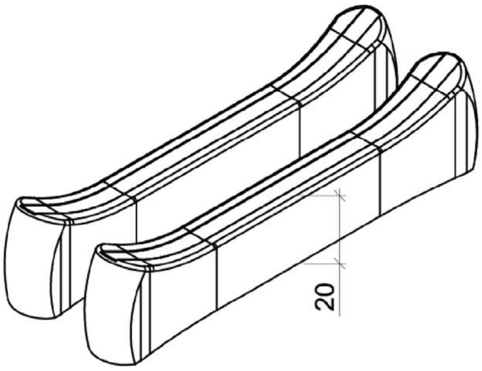


Fig. A.43: Concrete compression element HTE-Compact® 20, insulation thickness 120 mm

Schöck Isokorb® with compression elements made of concrete or steel	Annex A15
Product description Concrete compression element variants (CCE)	

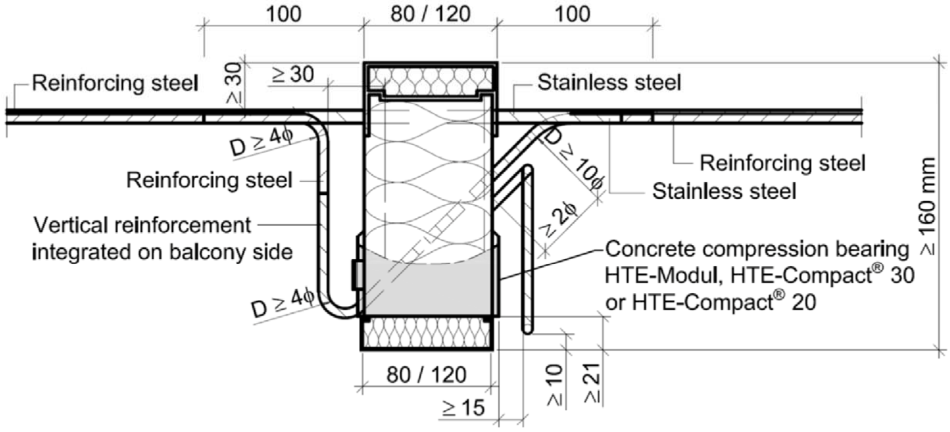


Fig. A.44: Schöck Isokorb® Type K with CCE with integrated reinforcement stirrups as per section D.1.1 and special stirrup

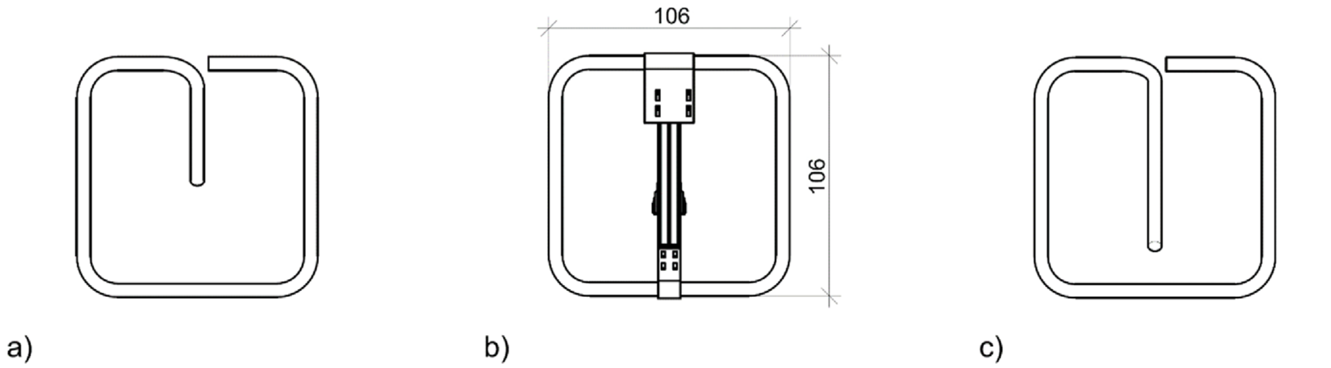


Fig. A.45: Stainless steel special stirrup

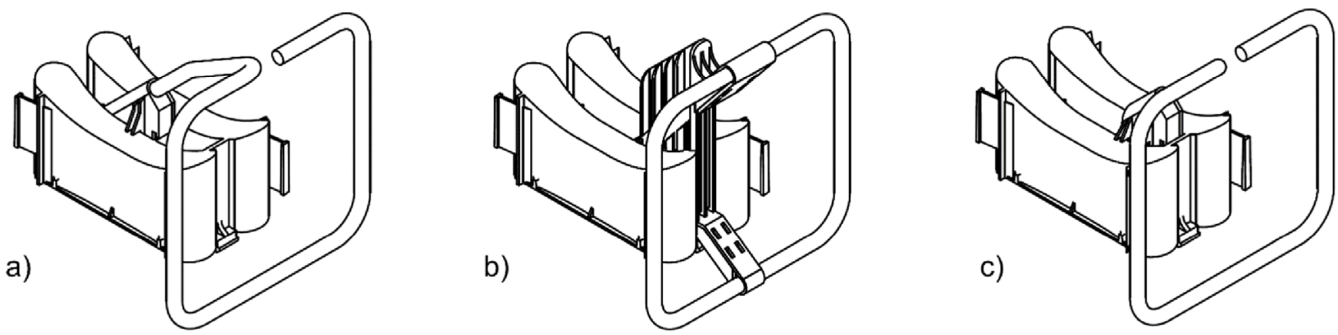


Fig. A.46: Concrete compression elements with special stirrup

Schöck Isokorb® with compression elements made of concrete or steel	Annex A16
Product description Concrete compression element variants (CCE)	

A.3 Materials

Reinforcing steel:	B500B, class A1 in accordance with EN 13501-1
Stainless steel:	Stainless reinforcing steel, stainless steel round bars (S355, S460, S690), stainless flat steel for compression plates (S235, S275, S460) with corrosion resistance class III in accordance with EN 1993-1-4, class A1 in accordance with EN 13501-1
Structural steel:	S235JR, S235J0, S235J2, S355JR, S355J2 or S355J0 in accordance with EN 10025-2 for compression plates, class A1 in accordance with EN 13501-1
Concrete for compression element CCE:	High-performance fine-grained concrete, class A1 in accordance with EN 13501-1
Insulation joint:	Polystyrene rigid foam (EPS) in accordance with EN 13163, class E in accordance with EN 13501-1
Fire protection material:	Moisture repellent, weather-resistant and UV-resistant panels, class A1 in accordance with EN 13501-1
Plastic formwork CCE:	PE-HD plastic in accordance with EN ISO 17855-1 and EN ISO 17855-2, class E in accordance with EN 13501-1
Material that foams up in case of fire:	Halogen-free, three-dimensional foaming building material on graphite basis with foaming factor min. 14; class E in accordance with EN 13501-1
Plastic rail:	PVC-U in accordance with EN 13245-1 and EN 13245-2, class E in accordance with EN 13501-1

Schöck Isokorb® with compression elements made of concrete or steel	Annex A17
Product description Materials	

B.1 Intended use

This product can be used to connect exterior slabs as well as vertical components such as consoles, walls, parapets or attics. The forces are transferred to the adjacent components by bonding or surface pressure. Mainly the product is to be used:

- for minimizing thermal bridges in structures,
- for the transmission of static or quasi-static action loads,
- for the transmission of seismic loads,
- for structural members with fire resistance requirements,
- for structural members with sound insulation requirements,
- for reinforced concrete components to be connected made of normal strength concrete of the minimum concrete strength class in accordance with EN 206: C20/25, for exterior components C25/30,
- for connection for 160 mm to 500 mm thick slabs made of reinforced concrete

B.1.1 Design

The provisions of EN 1992-1-1 in connection with EN 1993-1-1 and in accordance with Annex D shall apply.

- The connected slab shall be divided by joints to reduce thermal loads, see section B.2.1.
- The structural verification of the further transmission of the transferred forces shall be provided. The verification of the transfer of forces between Schöck Isokorb® elements and the connected reinforced concrete shall be carried out in accordance with Annex D.
- The deviations from the strain of a structurally identical slab without an insulation joint are limited to the joint area and the connecting edges through compliance with the provisions of this European Technical Assessment.
- The undistributed strain may then be assumed to exist at a distance h from the joint edge.
- Variable moments and shear forces along a connected edge shall be considered in the structural analysis.
- Strain on the slab connections due to local twisting moments (torques) shall be excluded.
- Small normal forces due to imposed deformation in the girder bars (at the end of the line supports, e.g. beside free edges or expansion joints) shall be neglected in the calculation, normal constraining forces in the direction of the bars of the slab connections shall be excluded (see section B.2.1 for example).
- If the slabs to be connected to the load bearing thermal insulating elements are implemented as prefabricated concrete slabs, Fig. B.5 shall be observed.
- The ratio of height / width of the adjacent structural members should not exceed the ratio 1/3, if no special verification is provided for the transfer of the transverse tensile stresses.
- Cutting of the elements is allowed. The conditions according to section A.2 shall be met after cutting.

B.2 Installation requirements

B.2.1 Centre and joint spacing

- Tensile and compression members, shear force bars (the provisions in accordance with section D.1.2.5):

  $50\text{ mm} \leq s_1 \leq \frac{1}{2} s_{2,max}$

  with:

  s_1 center distance from the free edge or the expansion joint

  $s_{2,max}$ permissible maximum distance between the bars
- External reinforced concrete components: expansion joints shall be placed in a right angle to the insulation joint (see Fig. B.2)
- Joint spacing: Table B.1
- Schöck Isokorb® Types H-VV-NN, in accordance with Fig. A.11 and Fig. A.29, are to be arranged in the area of the displacement rest point (compare Fig. B.1)

Table B.1: Permitted joint spacing in [m]*

Thickness of the insulation joint [mm]	Bar diameter in the joint [mm]						
	≤ 9,5	10	11	12	14	16	20
60	8,1	7,8	7,3	6,9	6,3	5,6	5,1
80	13,5	13,0	12,2	11,7	10,1	9,2	8,0
120	23,0	21,7	20,6	19,8	17,0	15,5	13,5

*Linear interpolation is allowed for intermediate values.

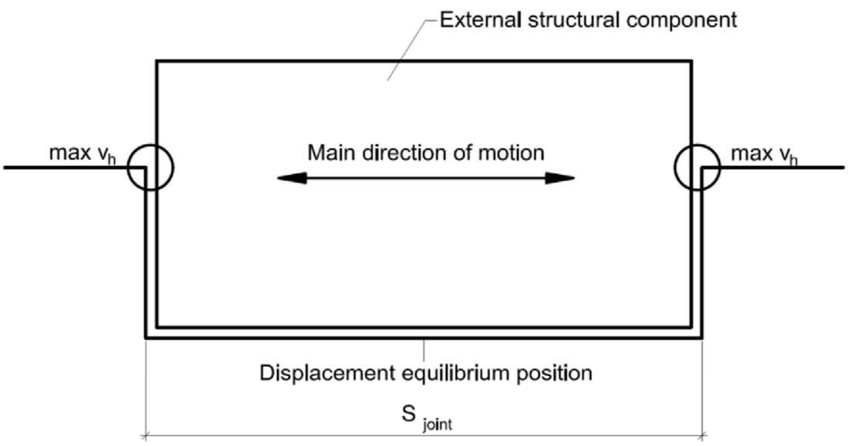


Fig. B.1: Installation situation with support on opposite edges

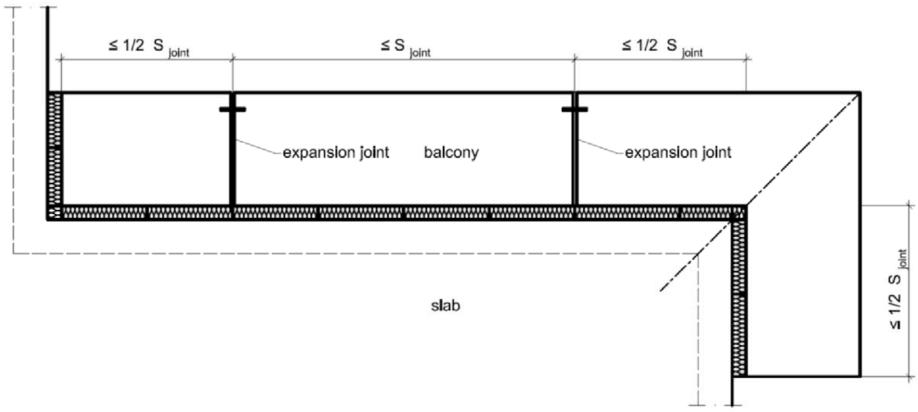


Fig. B.2: Installation situation with expansion joints

B.2.2 Structural design

The minimum concrete cover in accordance with EN 1992-1-1 shall be observed. This applies to tensile bars, shear reinforcement or existing installation reinforcement. The reinforcement of the concrete structures connected to the load bearing thermal insulation elements shall be extended to the insulation joint in consideration of the required concrete cover in accordance with EN 1992-1-1.

The transverse bars of the upper connection reinforcement shall generally lie on the outside on the longitudinal bars of the slab connections. In the case of bars with a nominal diameter Ø < 16 mm an exception may be made if the following conditions are respected:

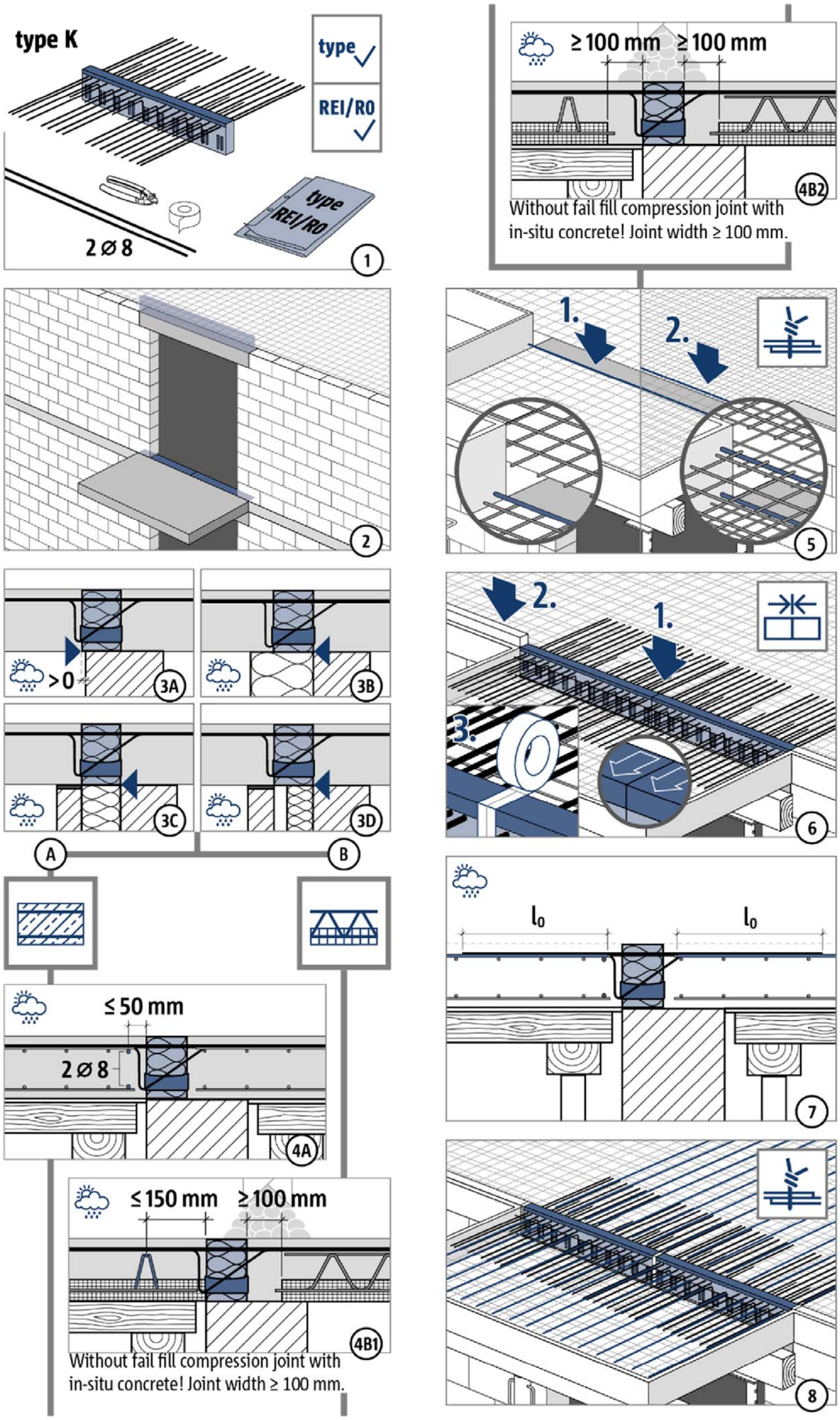
- The installation of the shear force bars directly underneath the longitudinal bars of the slab connection is possible.
- The installation is monitored, e.g. by construction engineer.
- The necessary installation steps shall be described in the installation instructions (see Annex B4).

The front surface of the components to be connected shall receive edge reinforcement in accordance with EN 1992-1-1, section 9.3.1.4, e.g. in the form of stirrups with at least Ø ≥ 6 mm, s ≤ 250 mm and 2 longitudinal bars each with Ø ≥ 8 mm. The vertical legs of the shear force bars for Schöck Isokorb® Types K, K-F, K-O, K-U and HV (see Fig. A.21, Fig. A.22 and Fig. A.25) as well as lattice girders with a maximum distance of 100 mm from the insulation joint in accordance with Fig. B.5 shall be permitted.

Edge reinforcement on the component sides running parallel to the load bearing thermal insulation elements shall be installed as follows:

- Moments and shear forces are transferred:
  - Shall overlap the tensile bars.
- Uplift shear forces or uplifting moments are transferred:
  - Shall overlap the tensile bars and compression bars.
- Exclusively shear forces are transferred:
  - The required tensile reinforcement shall not be graded around the load bearing thermal insulation element.
  - The tensile reinforcement shall be anchored in the compression zone on the frontal side with hooks.
  - Alternatively: stirrups at every shear force bar.

Subsequent bending of the bars of the load bearing thermal insulation element is not permissible.



Schöck Isokorb® with compression elements made of concrete or steel	Annex B4
Intended use Installation instructions Schöck Isokorb® Type K	

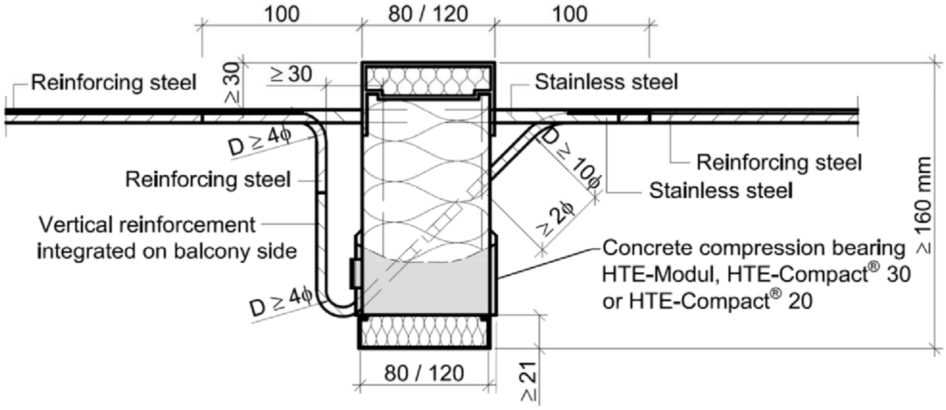


Fig. B.3: Example of Schöck Isokorb® Type K with CCE

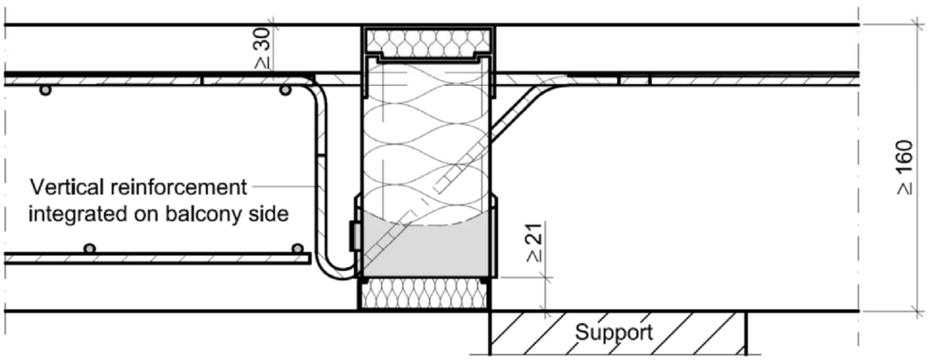


Fig. B.4: Example of Schöck Isokorb® Type K with CCE in installed condition

If the slabs connected to the load bearing thermal insulation elements are implemented as prefabricated concrete slabs, the following conditions should be respected:

- In-situ concrete section in accordance with Fig. B.5 with a width of at least 100 mm shall be carried out between the load bearing thermal insulation element and the prefabricated concrete slab
- The concrete composition of the in-situ concrete area (maximum aggregate size d_g) shall be matched with this distance

Schöck Isokorb® with compression elements made of concrete or steel	Annex B5
Intended use Installation requirements	

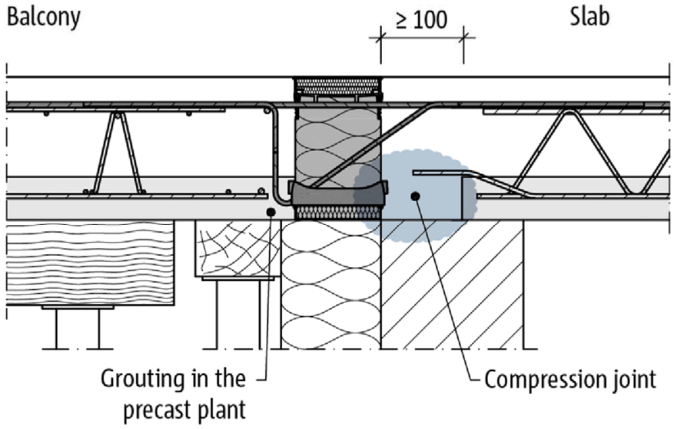


Fig. B.5: Schöck Isokorb® Type K with CCE or SCE and prefabricated concrete slab, compression joint

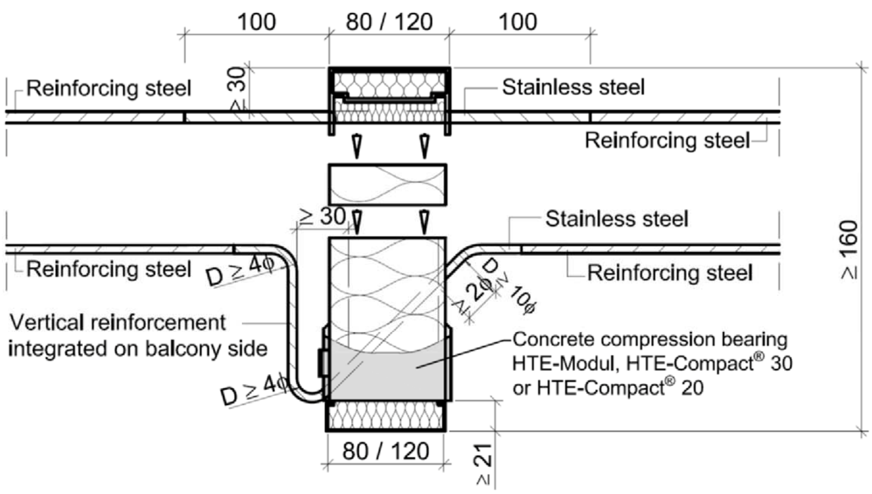


Fig. B.6: Example of Schöck Isokorb® Type K-F (variation in several parts) with CCE

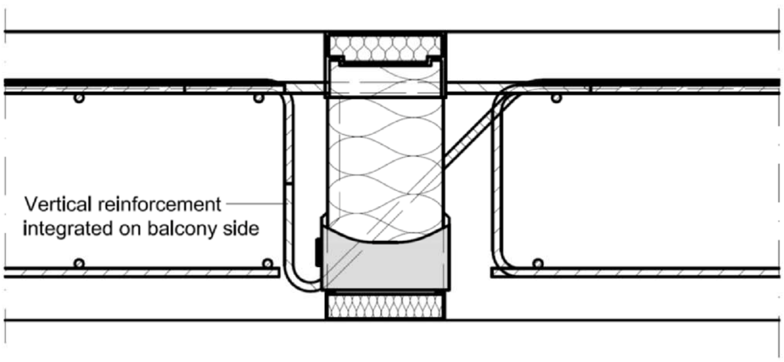


Fig. B.7: Example of Schöck Isokorb® Type K according to Fig. B.3 with CCE with indirect support

Schöck Isokorb® with compression elements made of concrete or steel	Annex B6
Intended use Installation requirements	

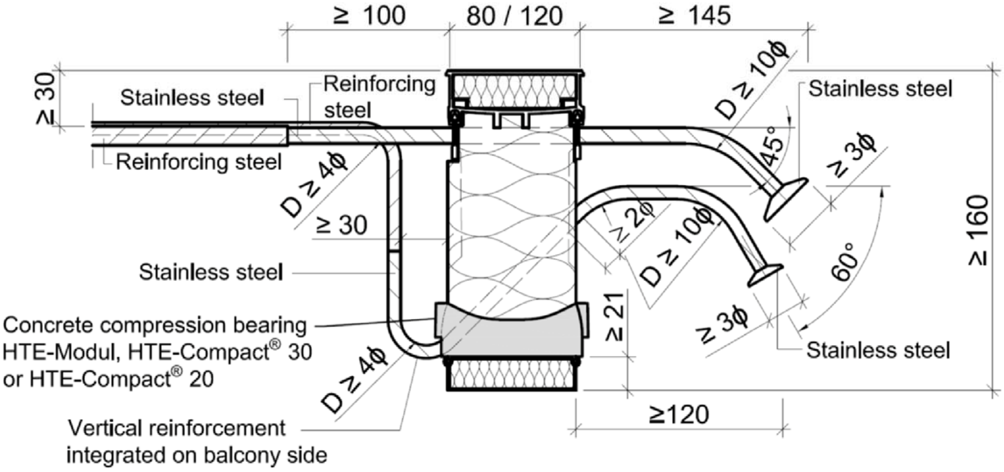


Fig. B.8: Example of Schöck Isokorb® Type K-O with CCE

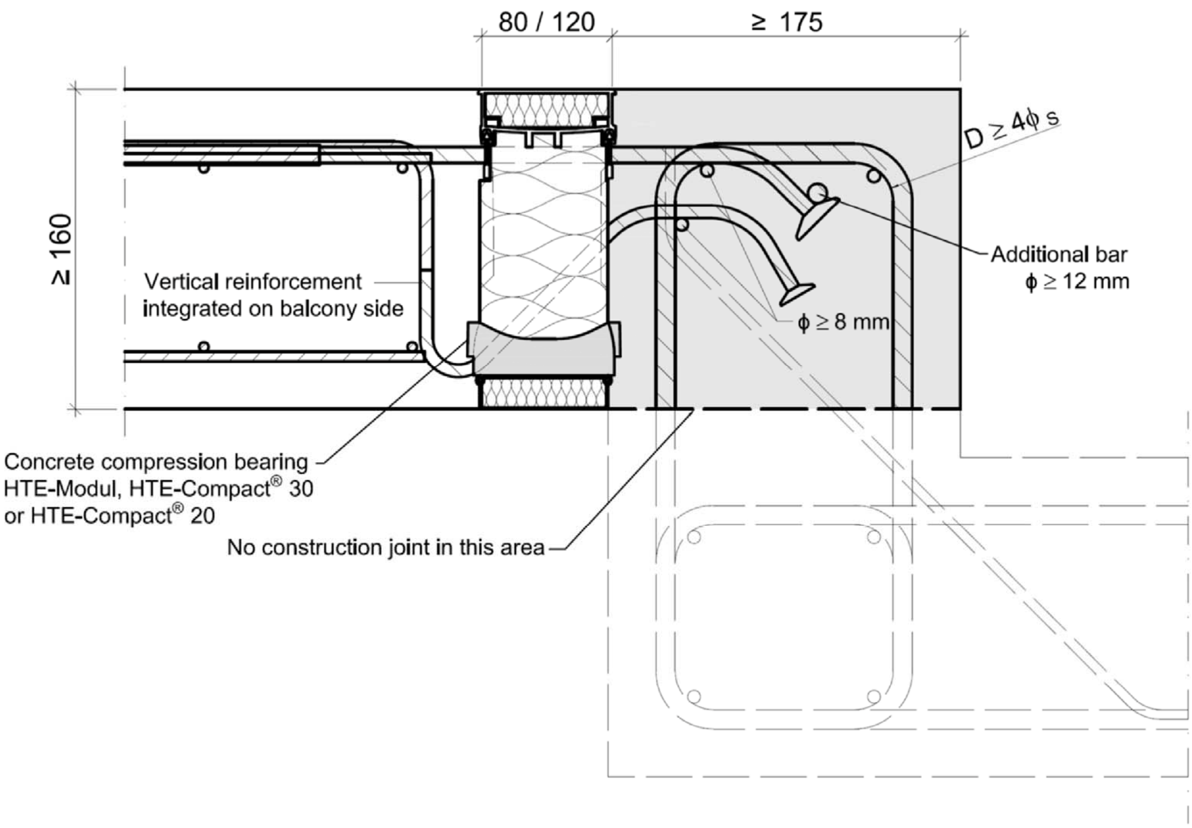


Fig. B.9: Example of Schöck Isokorb® Type K-O with CCE in installed condition with connection to wall or height offset

Schöck Isokorb® with compression elements made of concrete or steel

Intended use
Installation requirements

Annex B7

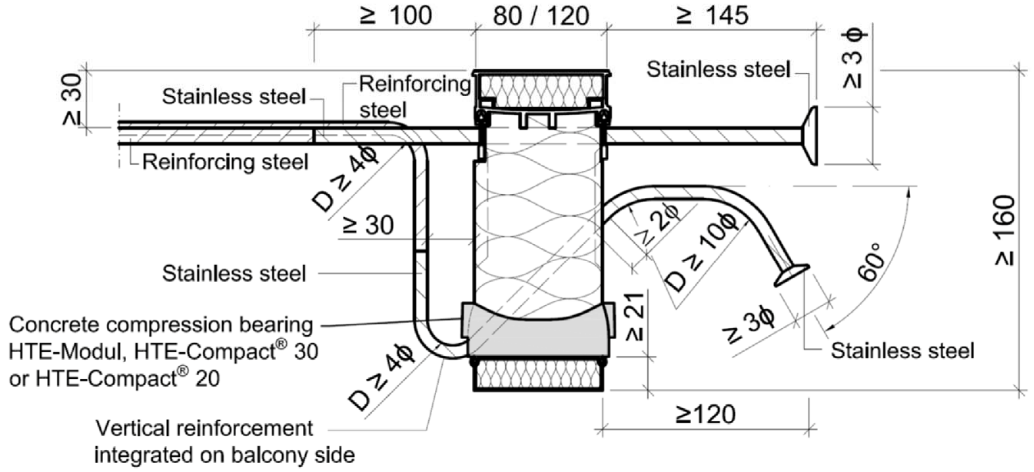


Fig. B.10: Example of Schöck Isokorb® Type K-U with CCE

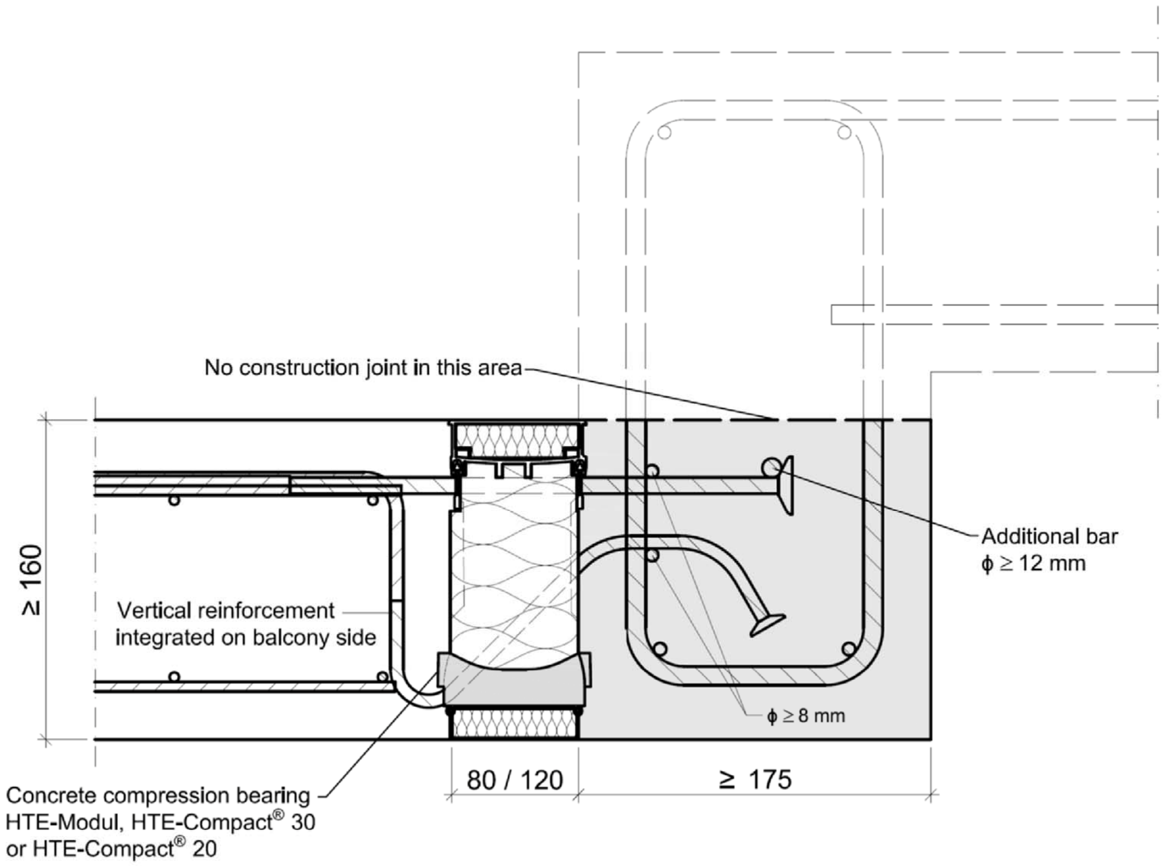


Fig. B.11: Example of Schöck Isokorb® Type K-U with CCE in installed condition with connection to wall or height offset

Schöck Isokorb® with compression elements made of concrete or steel	Annex B8
Intended use Installation requirements	

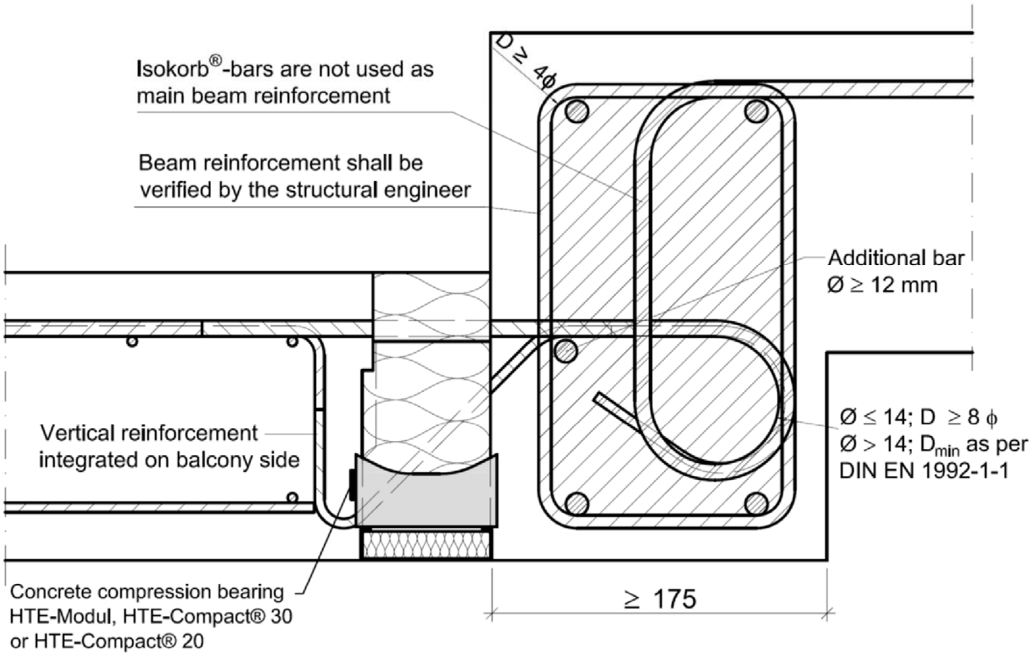


Fig. B.12: Example of Schöck Isokorb® Type K-HV with CCE

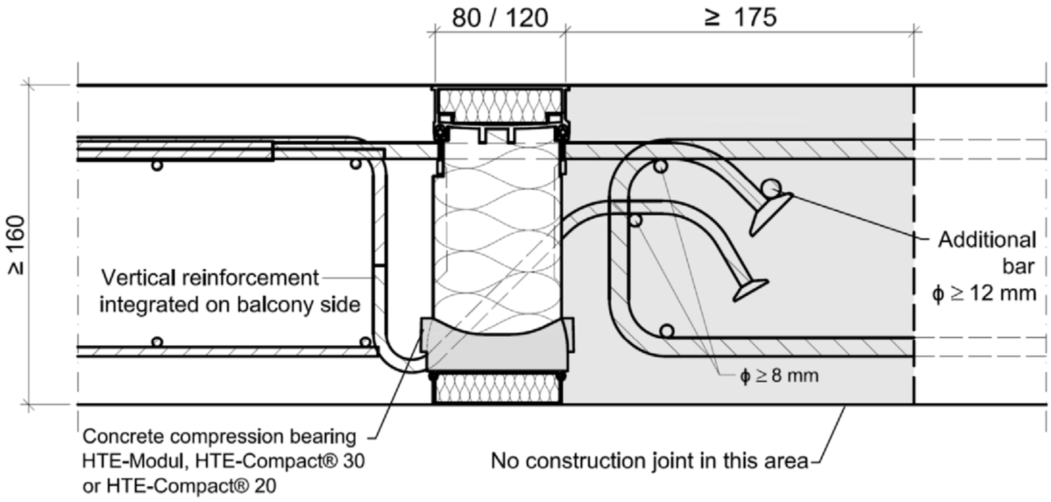


Fig. B.13: Example of Schöck Isokorb® Type K-O with CCE in ceiling connection without offset

Schöck Isokorb® with compression elements made of concrete or steel	Annex B9
Intended use Installation requirements	

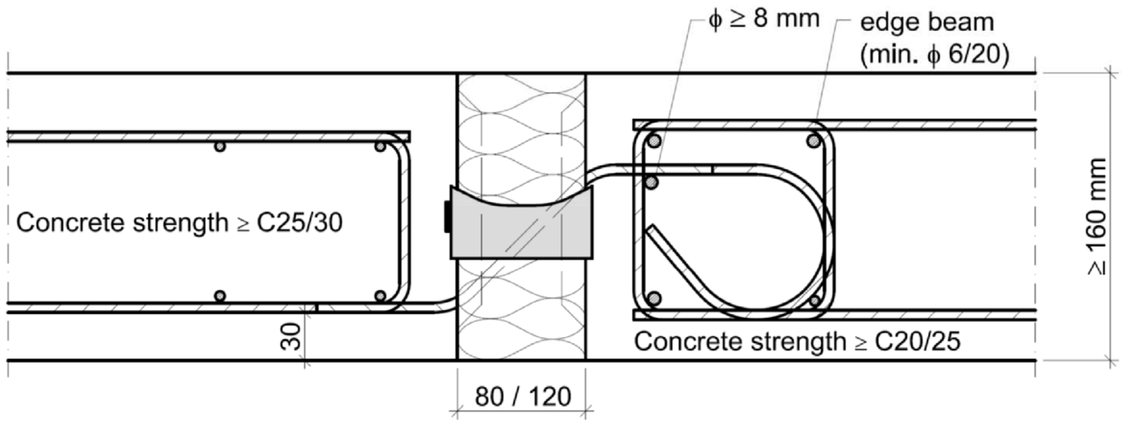


Fig. B.14: Example of Schöck Isokorb® Type Q with CCE and execution as edge beam

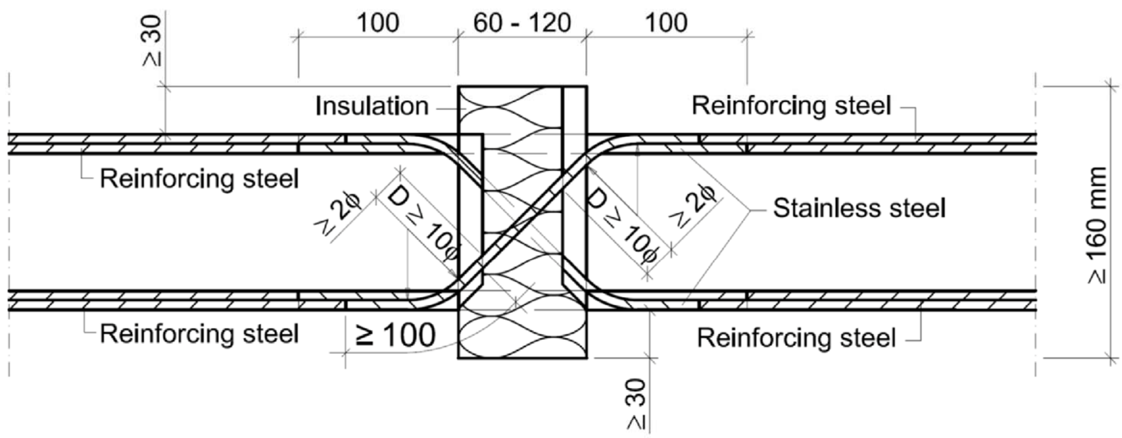


Fig. B.15: Example of Schöck Isokorb® Type D with SCE

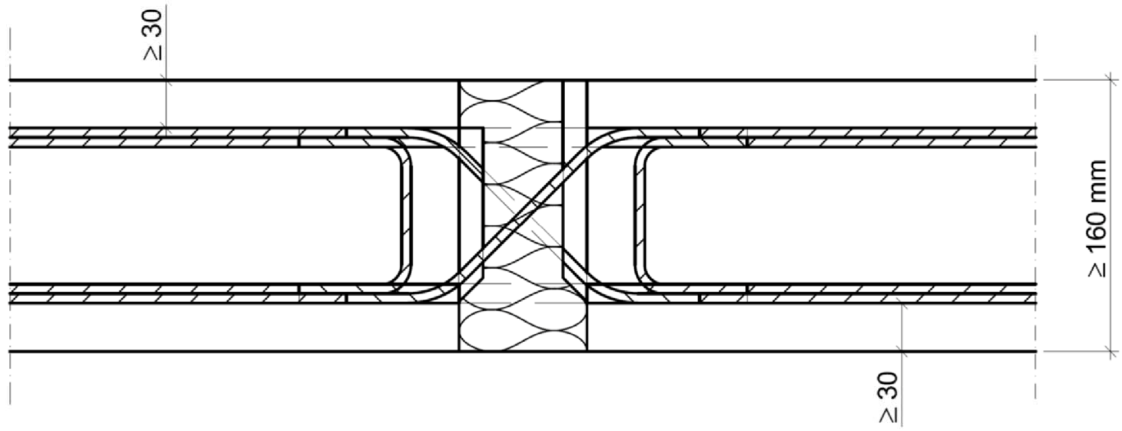


Fig. B.16: Example of Schöck Isokorb® Type D with SCE with on-site reinforcement

Schöck Isokorb® with compression elements made of concrete or steel	Annex B10
Intended use Installation requirements	

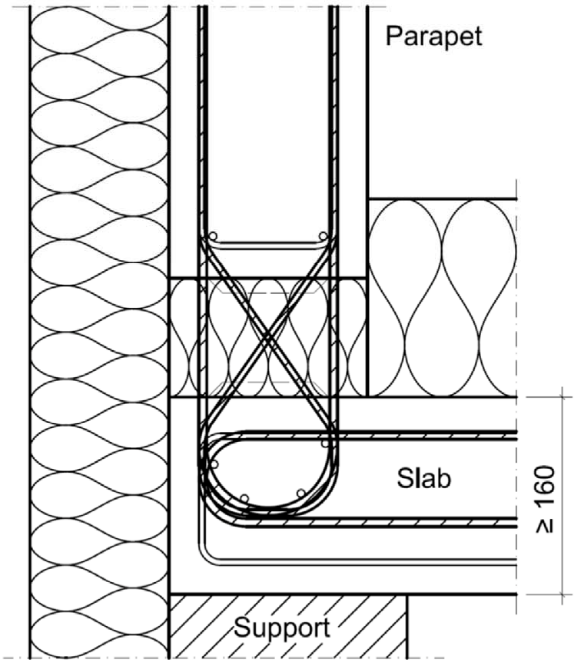


Fig. B.17: Example of Schöck Isokorb® Type A with SCE with on-site reinforcement

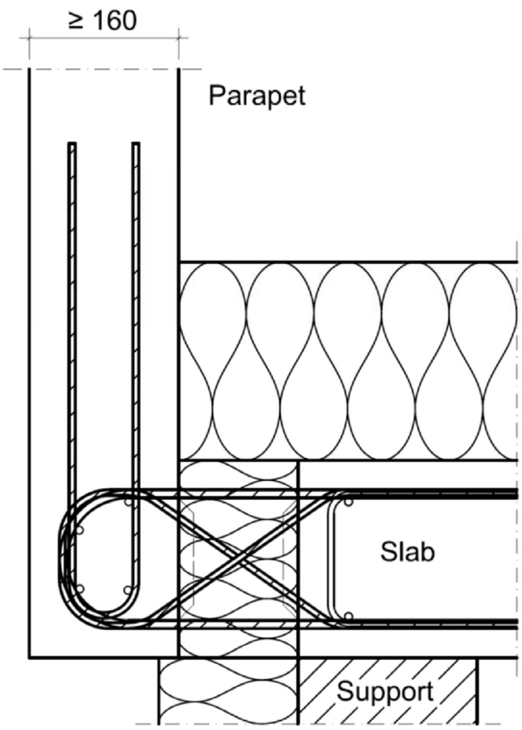


Fig. B.18: Example of Schöck Isokorb® Type F with SCE with on-site reinforcement

Schöck Isokorb® with compression elements made of concrete or steel	Annex B11
Intended use Installation requirements	

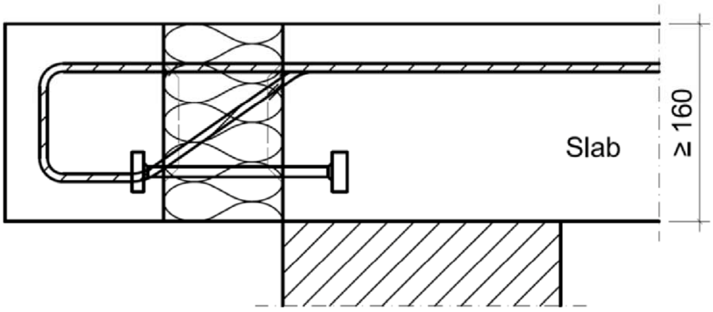


Fig. B.19: Example of Schöck Isokorb® Type O with SCE

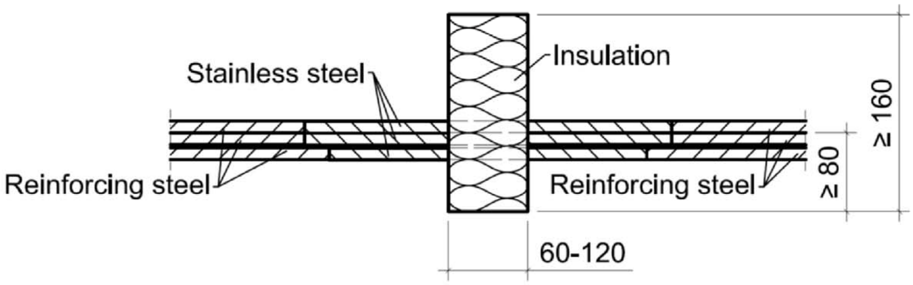


Fig. B.20: Example of Schöck Isokorb® Type H with SCE

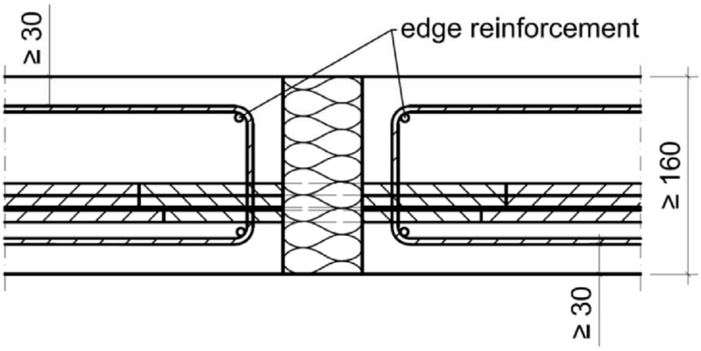


Fig. B.21: Example of Schöck Isokorb® Type H with SCE and on-site reinforcement

B.2.3 Notes on use with fire protection requirements

When using the elements to connect reinforced concrete components (slabs) that are subject to fire protection requirements, the provisions of section C.2 shall be observed.

Schöck Isokorb® with compression elements made of concrete or steel	Annex B12
Intended use Installation requirements	

C.1 Load bearing capacity

C.1.1 Load bearing capacity of bars

C.1.1.1 Tension and shear force bars

Table C.1: Design values of the yield strengths for tension loads

Staff from	f_{yd} [N/mm²]
Stainless reinforcing steel ($R_{p0.2}$ = 500 N/mm²)	435
Stainless reinforcing steel ($R_{p0.2}$ = 700 N/mm²)	609 (for tension bars)
Stainless reinforcing steel ($R_{p0.2}$ = 800 N/mm²)	661 (for tension bars)
Stainless reinforcing steel ($R_{p0.2}$ = 820 N/mm²)	678 (for tension bars)
Stainless steel round bars S355	323
Stainless steel round bars S460	418
Stainless steel round bars S690	627

C.1.1.2 Tension bars with anchor head (Type K-O, K-U)

The design value for the tension force per bar results from the concrete strength class and anchorage of the anchor head according to Table C.2. A maximum of ten tension bars with anchor head shall be placed per meter.

Table C.2: Tension capacity of tension bars with anchor head depending on the anchorage

Concrete strength class	Anchoring of the anchor head	Z_{Rd} [kN]
C25/30	According to Fig. A.18 and Fig. A.19, within the hatched area	47,8
	According to Fig. A.18 and Fig. A.19 outside the hatched area	34,1
C20/25	According to Fig. A.18 and Fig. A.19 within the hatched area	43,0
	According to Fig. A.18 and Fig. A.19 outside the hatched area	30,7

C.1.1.3 Shear force bars with anchor head (Type K-O, K-U)

A maximum of six shear force bars with a nominal diameter of 8 mm with anchor head shall be arranged per meter. The design values per bar are shown in Table C.3.

Table C.3: Design values per shear force bar

Concrete strength class	$Z_{V,Rd}$ [kN]
C25/30	21,8
C20/25	19,6

C.1.1.4 Horizontal bars

Table C.4: Design values of the horizontal force parallel to the joint $H_{II,d}$ for horizontal inclined pairs of bars

Number and diameter	Insulation thickness	Incli-nation of the bars	Vertical edge spacing according to Fig. B.20	$1.3 \cdot l_{bd}$ according to Fig. A.29	$H_{II,d}$ C20/25	$H_{II,d}$ C25/30
[mm]	**[mm]**	**[°]**	**[mm]**	**[mm]**	**[kN]**	**[kN]**
2 Ø 10	80	45	≥ 80	160	±10,3	±12,2
2 Ø 10	120	45	≥ 80	136	±8,8	±10,4
2 Ø 12	80	45	≥ 80	457	±31,4	±39,2
2 Ø 12	120	45	≥ 80	431	±31,4	±39,2

Table C.5: Design values of horizontal force perpendicular to joint $H_{\perp,d}$ for horizontal straight bars

Diameter	Insulation thickness	$1.0 \cdot l_{bd}$ according to Fig. A.30	$H_{\perp,d}$ C20/25	$H_{\perp,d}$ C25/30
[mm]	**[mm]**	**[mm]**	**[kN]**	**[kN]**
10	80	155	±11,2	±13,3
10	120	135	±9,8	±11,6
12	80	500	±43,5	±49,2
12	120	480	±41,8	±49,2

C.1.1.5 Steel compression elements (SCE)

Table C.6: Design values $N_{ki,d}$ of compression force for stainless steels

Ø	Insulation thickness	System-length	Stainless reinforcing steel $R_{p0,2}$ 500	Stainless reinforcing steel $R_{p0,2}$ 700	Stainless steel round bars S460	Stainless steel round bars S690
[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]
6	60	72	-	11,0	-	-
	80	92	-	10,7	-	-
	120	132	-	8,2	-	-
8	60	76	-	21,3	-	-
	80	96	-	21,7	-	-
	120	136	-	17,8	-	-
10	60	80	-	35,0	27,4	-
	80	100	-	36,3	26,0	-
	120	140	-	31,5	23,3	-
12	60	84	-	52,1	40,5	-
	80	104	-	53,6	38,8	-
	120	144	-	49,5	35,4	-
14	80	108	53,4	-	54,1	70,7
	120	148	49,2	-	50,1	64,4
16	80	112	-	-	72,1	-
	120	152	-	-	67,4	-
20	80	120	-	-	115,7	152,4
	120	160	-	-	110,0	143,0

C.1.2 Load bearing capacity of Concrete Compression Elements (CCE)

C.1.2.1 General

The design value of the transmittable compression force D_{Rd} is calculated depending on the compression bearing variant:

$$D_{Rd} = \min \begin{cases} n \cdot D_{Rd,c} \\ n \cdot D_{Rd,CCE} \end{cases}$$

with:

D_{Rd}	Design value of the transmittable compression force in kN/m
n	Existing number of compression bearings per meter
$D_{Rd,c}$	Design value for the concrete edge bearing capacity in kN/bearing pair
$D_{Rd,CCE}$	Design value of the compression bearing capacity in kN/bearing pair

C.1.2.2 HTE Modul

$D_{Rd,CCE}$ = 34,4 kN

Table C.7: Design values for the HTE-Modul (alternatively HTE-Compact® 30)

Minimum center distance CCE, compression bearing number/m	Concrete strength class	$D_{Rd,c}$ [kN/bearing pair]
50 mm 11 - 18	C20/25 C25/30 ≥C30/37	25,5 31,8 34,4
55 mm 11 - 16	C20/25 C25/30 ≥C30/37	26,6 33,3 34,4
60 mm 11 - 14	C20/25 C25/30 ≥C30/37	27,8 34,4 34,4
100 mm 4-10	C20/25 C25/30 ≥C30/37	34,4 34,4 34,4

For connection situations as shown in Fig. B.11 and Fig. B.12 the design values according to Table C.7 shall be determined under consideration of $a_{c,uz}$ and $a_{c,z}$ and a maximum of 16 compression bearings shall be used.
with:

$a_{c,uz}$ …	see Table C.8
$a_{c,z}$ …	see Table C.9

If the design values exeed a compression force of 350 kN/m, four special stirrups per meter shall be installed evenly on the bearing side in accordance with Fig. A.45 and Fig. A.46 along the length of the connection.

C.1.2.3 HTE-Compact® 20 or HTE-Compact® 30

$$D_{Rd,c} = \frac{1}{1000} \cdot a_{cd} \cdot a_{c,uz} \cdot a_{c,z} \cdot c_1 \cdot \min \begin{Bmatrix} a \\ 2 \cdot c_1 + 44\ \text{mm} \end{Bmatrix} \cdot (f_{ck,cube})^{1/2}$$

with:

a_{cd}	see Table C.10
c_1	edge distance of the load resultant in mm, according to Annexes D3 and D4
a	edge distance of the compression bearings in mm
$f_{ck,cube}$	characteristic cube compressive strength in N/mm² ≤ C30/37
$a_{c,uz}$	see Table C.8
$a_{c,z}$	see Table C.9

Table C.8: Factor $a_{c,uz}$ for consideration of the beam width for height offsets

Connection situation	Beam width [mm]	$a_{c,uz}$
Fig. B.11 and Fig. B.12	175 ≤ b ≤ 240	$0{,}0245 \cdot b^{2/3}$
	b > 240	0,95
others	-	1,0

Table C.9: Factor $a_{c,z}$ to take into account the inner lever arm

Compression force D_{Rd} [kN/m]	Connection situation	internal lever arm z [mm]	$a_{c,z}$
≥ 350	Fig. B.11 and Fig. B.12	80 ≤ of ≤ 150	1,0
		z > 150	150/z
	others	-	1,0
< 350	general	-	1,0

Table C.10: Design values for HTE-Compact® 20 and HTE-Compact® 30

	CCE HTE-Compact® 20	**CCE HTE-Compact® 30**	
	without special stirrups	**without special stirrups**	**with special stirrups***
a_{cd}	1,70	1,80	2,23
Minimum center distance, compression element number/m	100 mm 4 - 10	100 mm 4 - 10	80 mm 9 – 12
$D_{Rd,CCE}$ [kN/bearing pair]	38,0	45,0	45,0

* four special stirrups per meter shall be installed evenly on the bearing side in accordance with Annex A16

If the number of compression bearings is exceeded or the minimum distance between the compression bearings not reached according to Table C.10, the design values for HTE-Compact® 30 can be taken from Table C.7.

C.1.3 Design values of the plastic horizontal force parallel to the joint $H_{IIpl,d}$ in the earthquake design case

Table C.11: Design values of the plastic horizontal force parallel to the joint $H_{IIpl,d}$ in the earthquake design case for stainless steel bars; tension bars and steel compression elements (SCE)

Ø	Insul. thick-ness	Stainl. reinf. st. $R_{p0,2}$ 500	Stainl. reinf. st. $R_{p0,2}$ 700	Stainl. reinf. st. $R_{p0,2}$ 800	Stainl. reinf. st. $R_{p0,2}$ 820	Stainl. round st. S460	Stainl. round st. S690
[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
6	80	0,19	0,27	0,29	0,30	0,19	0,28
	120	0,13	0,18	0,20	0,21	0,13	0,19
6,5	80	0,24	0,34	0,37	0,38	0,23	0,35
	120	0,17	0,23	0,25	0,26	0,16	0,24
7	80	0,30	0,42	0,46	0,47	0,29	0,44
	120	0,21	0,29	0,32	0,32	0,20	0,30
8	80	0,45	0,63	0,68	0,70	0,43	0,65
	120	0,31	0,43	0,47	0,48	0,30	0,44
9,5	80	0,74	1,03	1,12	1,15	0,71	1,06
	120	0,51	0,71	0,77	0,79	0,49	0,73
10	80	0,85	1,20	1,30	1,33	0,82	1,23
	120	0,59	0,83	0,90	0,92	0,57	0,85
11	80	1,13	1,58	1,71	1,75	1,08	1,62
	120	0,78	1,09	1,19	1,22	0,75	1,13
12	80	1,44	2,02	2,20	2,25	1,39	2,08
	120	1,01	1,41	1,53	1,57	0,97	1,45
14	80	2,25	3,14	3,41	3,50	2,16	3,24
	120	1,58	2,21	2,40	2,46	1,52	2,27
16	-	-	-	-	-	3,16	4,74
	-	-	-	-	-	2,23	3,34
20	-	-	-	-	-	5,92	8,88
	-		-	-	-	4,23	6,34

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Load bearing capacity in the earthquake design case

Annex C6

Table C.12: Design values of the plastic horizontal force parallel to the joint $H_{IIpl,d}$ in the earthquake design case for stainless steel bars; shear force bars

Ø	**Insulation thickness (inclination)**	**Stainl. reinf. st. $R_{p0,2}$ 500**	**Stainl. reinf. st. $R_{p0,2}$ 700**	**Stainl. reinf. st. $R_{p0,2}$ 800**	**Stainl. reinf. st. $R_{p0,2}$ 820**
[mm]	**[mm]**	**[kN]**	**[kN]**	**[kN]**	**[kN]**
6	80 (a = 45°)	0,14	0,20	0,21	0,22
	120 (a = 35°)	0,11	0,15	0,17	0,17
6,5	80 (a = 45°)	0,18	0,25	0,27	0,28
	120 (a = 35°)	0,14	0,19	0,21	0,22
7	80 (a = 45°)	0,22	0,31	0,33	0,34
	120 (a = 35°)	0,17	0,24	0,26	0,27
8	80 (a = 45°)	0,33	0,46	0,49	0,51
	120 (a = 35°)	0,25	0,36	0,39	0,40
9,5	80 (a = 45°)	0,54	0,75	0,82	0,84
	120 (a = 35°)	0,42	0,59	0,64	0,66
10	80 (a = 45°)	0,62	0,87	0,95	0,97
	120 (a = 35°)	0,49	0,69	0,75	0,77
11	80 (a = 45°)	0,82	1,15	1,25	1,29
	120 (a = 35°)	0,65	0,91	0,99	1,01
12	80 (a = 45°)	1,06	1,49	1,62	1,66
	120 (a = 35°)	0,84	1,17	1,28	1,31
14	80 (a = 45°)	1,66	2,32	2,52	2,59
	120 (a = 35°)	1,32	1,84	2,00	2,05

Table C.13: Design values of the plastic horizontal force parallel to the joint $H_{IIpl,d}$ in the earthquake design case for stainless bars; Concrete Compression Elements (CCE)

Concrete compression element variants (CCE)	**Insulation thickness**	**$H_{IIpl,d}$**
	[mm]	**[kN]**
HTE-Compact® 20, HTE-Compact® 30, THE-Modul	80	$0{,}015 \cdot D_{Rd}$ in accordance with C.1.2
	120	$0{,}010 \cdot D_{Rd}$ in accordance with C.1.2

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Load bearing capacity in the earthquake design case

Annex C7

C.2 Fire resistance

C.2.1 Performance features regarding load bearing capacity in case of fire

If the performance characteristics specified in Annexes C1 to C5 for verification according to the intended use under normal temperatures are met, the load bearing capacity of connections with Schöck Isokorb® is also guaranteed in case of fire for the fire resistance period indicated in Table C.15. This applies to a reduction coefficient η_{fi} according to EN 1992-1-2, section 2.4.2 to η_{fi} = 0.7, for design according to Fig. C.1 to Fig. C.6 and subject to the following boundary conditions.

- The connection joint provided with Schöck Isokorb® is completely covered on the top or top and bottom with fire protection boards in accordance with section A.3 (see Annexes C9 and C10).
- The fire protection boards in the area of planned tensile loads shall be realized either with a lateral overhang on the side of 10 mm opposite the insulation body (Fig. C.2 and Fig. C.5) or with additional intumescent insulation on both lateral surfaces (Fig. C.1, Fig. C.3 and Fig. C.4).
- The lateral overhang on the side of 10 mm opposite the insulation body or additional intumescent insulation on both lateral surfaces are not necessary, if the fire protection boards are not arranged in the area of planned tensile loads.
- The required thicknesses t of the fire protection boards, the minimum axis spacing v and the minimum concrete cover c of the reinforcing steel shall be taken from Table C.14.

Table C.14: Minimum dimensions of c and v and required thickness of fire protection board t in [mm]

min c [mm]	30
min t [mm]	according to technical documentation
v_1/v_2 * [mm]	20/21

* see Fig. C.1 to Fig. C.5

Table C.15: Fire resistance period (load capacity)

Design variant in accordance with	Fire resistance period (load bearing capacity) in minutes
Fig. C.1	120
Fig. C.2	120
Fig. C.3	120
Fig. C.4	60
Fig. C.5	60
Fig. C.6	120

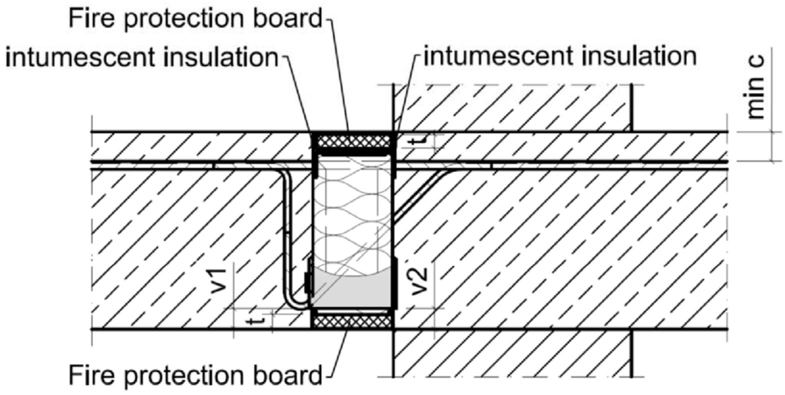


Fig. C.1: Example of Schöck Isokorb® Type K, K-F with CCE (or SCE)

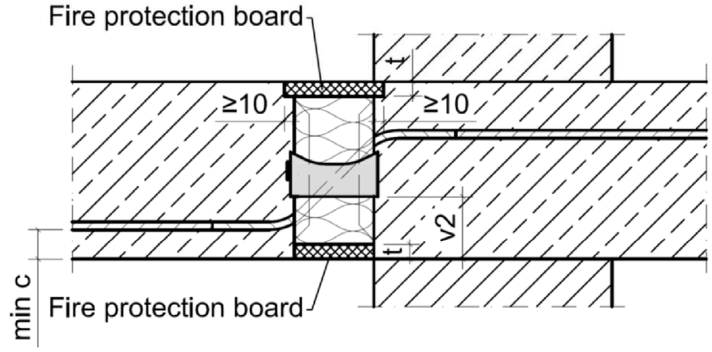


Fig. C.2: Example of Schöck Isokorb® Type Q with CCE (or SCE)

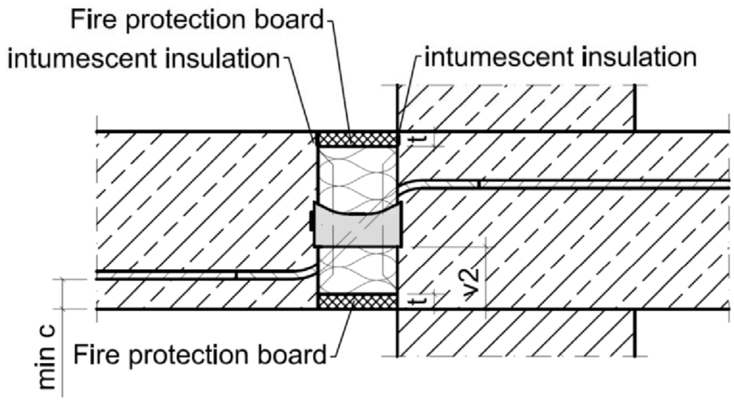


Fig. C.3: Example of Schöck Isokorb® Type Q with CCE (or SCE)

Schöck Isokorb® with compression elements made of concrete or steel	Annex C9
Performance parameters Load bearing capacity in case of fire	

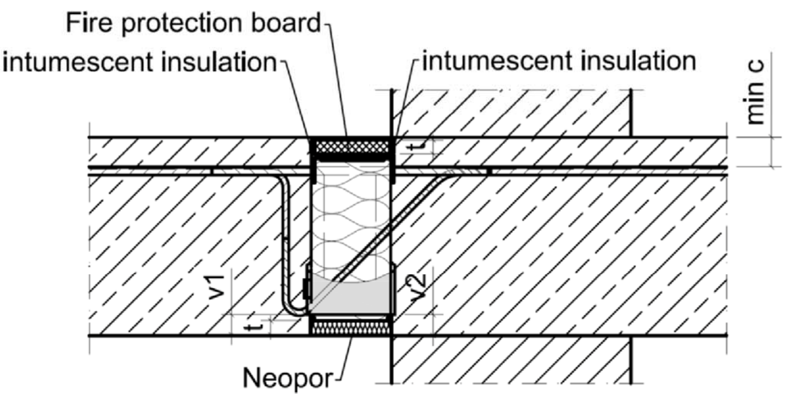


Fig. C.4: Example of Schöck Isokorb® Type K, K-F with CCE (or SCE)

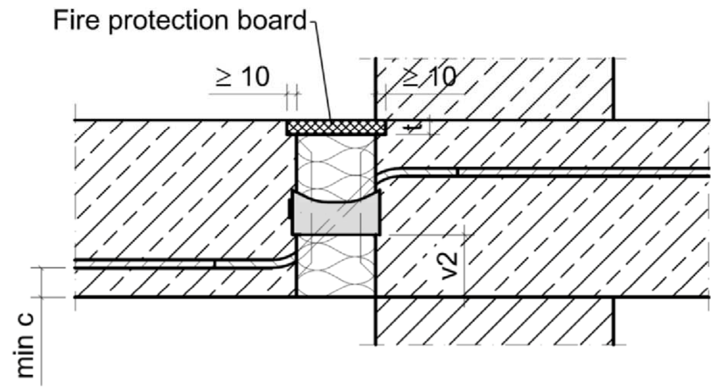


Fig. C.5: Example of Schöck Isokorb® Type Q with CCE

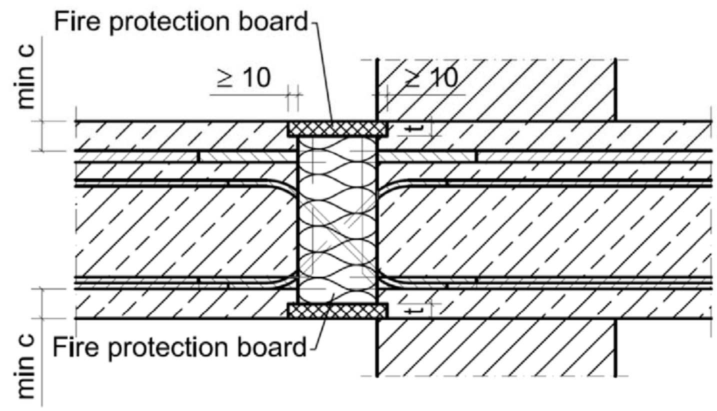


Fig. C.6: Example of Schöck Isokorb® Type D (analog to Type A and Type F) with SCE

Schöck Isokorb® with compression elements made of concrete or steel	Annex C10
Performance parameters Load bearing capacity in case of fire	

C.2.2 Resistance to fire of building elements (informative)

Floor or roof structures as well as balconies and walkways connected to reinforced concrete components with Schöck Isokorb® as per intended use – shown in Annexes C9 and C10 – can be classified in terms of fire resistance in accordance with EN 13501-2 as specified in Table C.16. The following boundary conditions shall be observed:

- The load bearing capacity in case of fire has been declared for Schöck Isokorb®.
- See Section C.2.1, indent 1 to 4 and Table C.14.
- Connections of the remaining edges of floor and roof structures, which are not connected with Schöck Isokorb® to adjacent or supporting components, shall be verified in accordance with the provisions of the Member States for the corresponding fire resistance.

Table C.16: Component classification

Design variant	Floor or roof construction with fire separating function	Balcony and walkway, parapets
Fig. C.1	REI 120	R 120
Fig. C.2	REI 120	R 120
Fig. C.3	REI 120	R 120
Fig. C.4	REI 60	R 60
Fig. C.5	REI 60	R 60
Fig. C.6	REI 120	R 120

C.3 Thermal resistance

The equivalent thermal resistance $R_{eq,TI}$ of the Schöck Isokorb® determined according to EN ISO 6946 and EN ISO 10211 by using finite element method and a detailed 3D model of the thermal insulation element for the configuration shown in Fig. C.7 (with concrete compression elements (CCE)) respectively Fig. C.8 (with steel compression elements (SCE)):

$$R_{cal} = R_{eq,TI} + R_{con}$$

$$R_{eq,TI} = R_{cal} - R_{con} = R_{cal} - \frac{0{,}06\,m}{2{,}3\,W/(m^*K)}$$

$$\lambda_{eq,TI} = \frac{d_{n,TI}}{R_{eq,TI}}$$

with:

R_{cal}	calculated thermal resistance for configuration shown in Fig. C.7 or Fig. C.8
$R_{eq,TI}$	equivalent thermal resistance of thermal insulation element
R_{con}	thermal resistance of concrete block
$d_{n,Ti}$	nominal thickness of thermal insulation element
$\lambda_{eq,TI}$	equivalent thermal conductivity of thermal insulation element

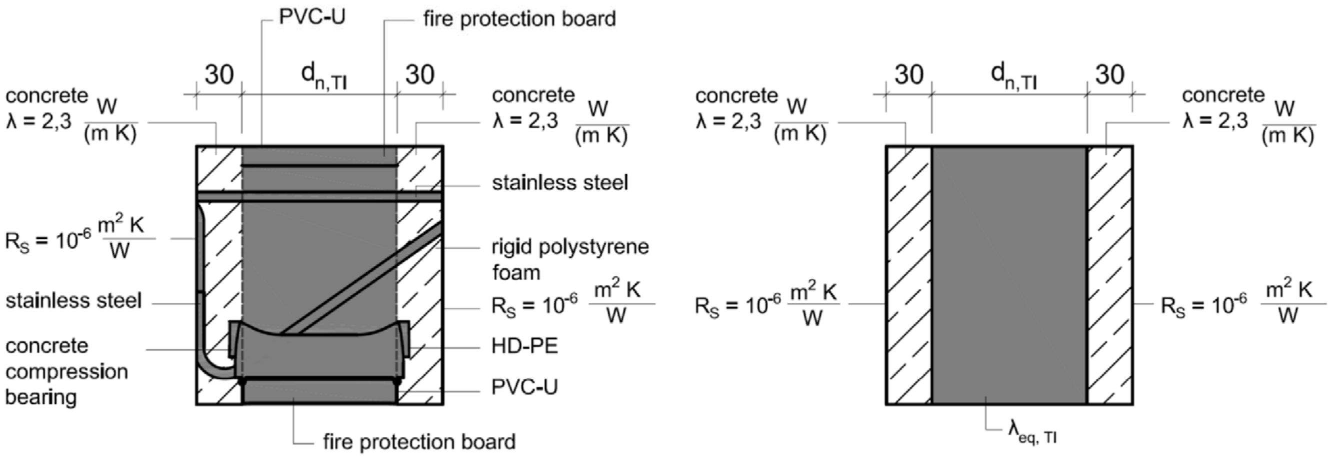


Fig. C.7: Cross section of the configuration with concrete compression elements (CCE) to calculate the equivalent thermal resistance $R_{eq,TI}$ and simplified model with $\lambda_{eq,TI}$

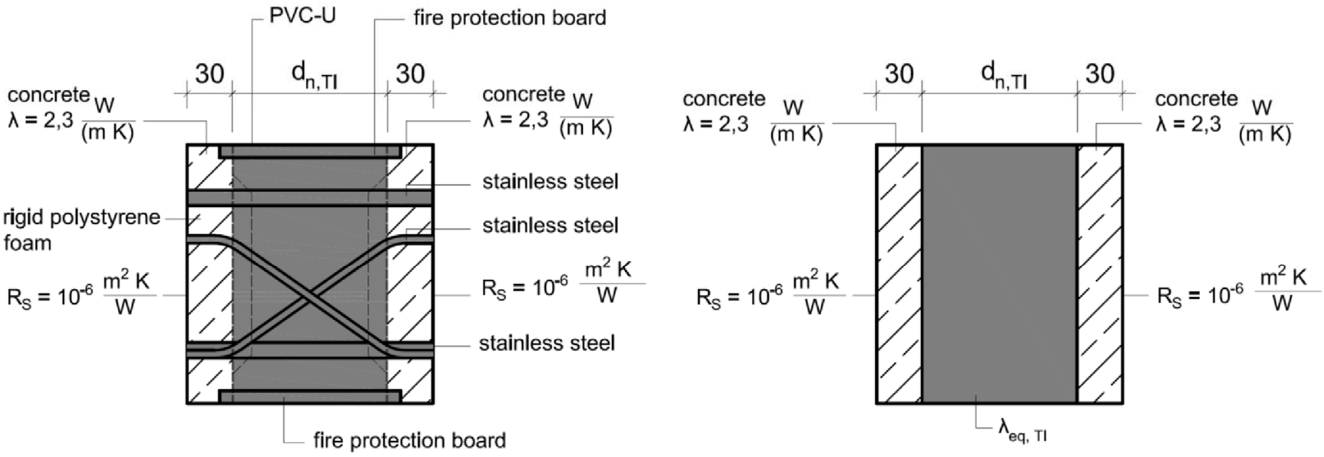


Fig. C.8: Cross section of the configuration with steel compression elements (SCE) to calculate the equivalent thermal resistance $R_{eq,TI}$ and simplified model with $\lambda_{eq,TI}$

The design values of the thermal conductivities of the components are given in Table C.17.

Table C.17: Design values of thermal conductivity

Material	**Design thermal conductivity λ [W/(m*K)]**	**Source of data**
High-performance fine-grained concrete	according to technical documentation	EN 12664 and EN ISO 10456
Rigid polystyrene foam (EPS)	0,031	ISO 13163 and EN ISO 10456
Stainless steel	13-15	EN 10088-1
PE-HD	0,5	EN ISO 10456
PVC-U	0,17	EN ISO 10456
Fire protection board	according to technical documentation	ISO 12664 and EN ISO 10456

C.4 Weighted reduction of impact sound pressure level ΔL_w

The weighted reduction of impact sound pressure level ΔL_w serves as input variable for the computational prediction of the impact sound insulation in the building according to EN ISO 12354-2. The values for ΔL_w according to Table C.18 to Table C.32 apply both to a design with and without fire protection boards.

Table C.18: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 180 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**Ø₂ [mm]**	**n**	**Ø [mm]**	**n**	**name**	
13	10	10	8	18	HTE30	8
8		10		18		8
8		10		11		11
8		8		11		11
4		8		11		11
4		8		5		13
4		4		5		15
2		4		5		15
2		4		2		17
2		2		2		18

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE30 = concrete compression element HTE-Compact® 30 or HTE-Modul

Table C.19: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 180 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**Ø₂ [mm]**	**n**	**Ø [mm]**	**n**	**name**	
7	6,5	4	8	6	HTE20	17
4		4		4		18
4		2		4		20

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE20 = concrete compression element HTE-Compact® 20

Table C.20: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 180 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars (positiv / negativ)**		**Compression elements[1]**		**ΔL_w [dB]**
n	**∅₂ [mm]**	**n**	**∅ [mm]**	**n**	**name**	
11	10	7/4	8	17	HTE30	10
8		4/4		13		12
6		4/4		8		13
4		4/1		5		16
3		4/0		4		16
2		4/0		3		18

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE30 = concrete compression element HTE-Compact® 30 or HTE-Modul

Table C.21: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 180 mm Insulation thickness 80 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**∅₂ [mm]**	**n**	**∅ [mm]**	**n**	**name**	
12	10	9	8	18	HTE30	6
7		8		10		7
5		5		6		11
2		4		3		13

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE30 = concrete compression element HTE-Compact® 30 or HTE-Modul

Table C.22: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 220 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**∅₂ [mm]**	**n**	**∅ [mm]**	**n**	**name**	
12	6,5	5	8	8	HTE20	14
7		4		6		15
4		4		4		16
2		4		2		17
2		2		2		20
2		1		2		24

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE20 = concrete compression element HTE-Compact® 20

Table C.23: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 220 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 50 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**Ø$_2$ [mm]**	**n**	**Ø [mm]**	**n**	**name**	
12	6,5	5	8	8	HTE20	16
7		4		6		17
4		4		4		18
2		4		2		19
2		2		2		21

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE20 = concrete compression element HTE-Compact® 20

Table C.24: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 250 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**Ø$_2$ [mm]**	**n**	**Ø [mm]**	**n**	**name**	
12	6,5	5	8	8	HTE20	16
7		4		6		18
4		4		4		19
2		4		2		20
2		2		2		21

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE20 = concrete compression element HTE-Compact® 20

Table C.25: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 220 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**Ø$_2$ [mm]**	**n**	**Ø [mm]**	**n**	**name**	
13	10	9	8	18	HTE30	10
12		9		18		10
9		7		12		11
8		6		11		12
6		3		8		14
6		3		7		14
5		3		6		15
4		2		5		16
3		2		4		16
2		2		3		17

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE30 = concrete compression element HTE-Compact® 30 or HTE-Modul

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Reduction of impact sound pressure level

Annex C16

Table C.26: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type K

Element height H 220 mm Insulation thickness 80 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars**		**Compression elements**[1]		**ΔL_w [dB]**
n	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [mm]**	**n**	**name**	
13	10	9	8	18	HTE30	6
12		8		18		7
10		7		16		8
9		7		12		9
8		6		11		10
6		3		8		11
6		3		7		12
5		3		6		12
4		3		5		12
3		2		4		14
2		2		3		15

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE30 = concrete compression element HTE-Compact® 30 or HTE-Modul

Table C.27: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type Q

Element height H 180 mm Insulation thickness 120 mm, Element length 1000 mm						
Tension bars		**Shear force bars**		**Compression elements**[1]		**ΔL_w [dB]**
n	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [mm]**	**n**	**name**	
-		8	10	6	HTE20	10
-		5		4		13
-		3		4		14
-		2		4		15
-		2		1		17

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE20 = concrete compression element HTE-Compact® 20

Table C.28: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type Q

Element height H 180 mm Insulation thickness 80 mm, Element length 1000 mm						
Tension bars		**Shear force bars**		**Compression elements**[1]		**ΔL_w [dB]**
n	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [mm]**	**n**	**name**	
-		6	10	4	HTE20	10
-		4				12
-		2				16
-		1				17

[1] Concrete compression elements (CCE) in accordance with section A.2.5,
HTE20 = concrete compression element HTE-Compact® 20

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Reduction of impact sound pressure level

Annex C17

Deutsches Institut für Bautechnik DIBt

Table C.29: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type Q

Element height H 180 mm Insulation thickness 120 mm, Element length 500 mm m						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [mm]**	**n**	**$\varnothing$ [mm]**	
-		4	10	2	14	12
-		2		1		14
[1] Steel compression elements (SCE) in accordance with section A.2.4						

Table C.30: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type Q

Element height H 180 mm Insulation thickness 120 mm, Element length 1000 mm						
Tension bars		**Shear force bars**		**Compression elements[1]**		**ΔL_w [dB]**
n	**$\varnothing_2$ [mm]**	**N**	**$\varnothing$ [mm]**	**n**	**name**	
-		8	6	4	HTE20	14
-		6		4		16
-		5		4		16
-		2		2		20
[1] Concrete compression elements (CCE) in accordance with section A.2.5, HTE20 = concrete compression element HTE-Compact® 20						

Table C.31: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type Q

Element height H 180 mm Insulation thickness 120 mm, Element length 1000 mm						
Tension bars		**Shear force bars (total number of equal number pos. und neg.)**		**Compression elements[1]**		**ΔL_w [dB]**
n	**$\varnothing_2$ [mm]**	**N**	**$\varnothing$ [mm]**	**n**	**name**	
-		16	10	6	HTE20	7
-		10		4		10
-		4		4		13
-		0		4		16
[1] Concrete compression elements (CCE) in accordance with section A.2.5, HTE20 = concrete compression element HTE-Compact® 20						

Table C.32: Weighted reduction of impact sound pressure level ΔL_w, Schöck Isokorb® Type D

Element height H 180 mm Insulation thickness 120 mm, Element length 1000 mm, concrete cover of tension bars 35 mm						
Tension bars		**Shear force bars (total number of equal number pos. und neg.)**		**Compression elements[1]**		**ΔL_w [dB]**
n	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [mm]**	**n**	**$\varnothing$ [mm]**	
12	12	12	10	12	12	8
7		12		7		8
7		4		7		11
4		4		4		11
[1] Steel compression elements (SCE) in accordance with section A.2.4						

D.1 Structural analysis

D.1.1 General

- EN 1992-1-1 and EN 1993-1-1 shall apply to design and structural analysis (in the joint)
- Earthquake design case according to EN 1998-1 with behavior factor:

  $q_a = 1.5$ Connection with one connection line (application example: free cantilever balcony)

  $q_a = 1.0$ Connection with more than one connection line (application example: balcony over corner, loggia)

  $q_a = 1.0$ by transferring the seismic load with Schöck Isokorb® Type H
- Structural verification shall be performed for each individual case
- Type-tested design tables may be used

Determination of internal forces:

- Only with linear-elastic analysis
- Analysis with redistribution, plastic analysis and non-linear analysis may not be used
- The principles for the design of frameworks in accordance with EN 1992-1-1, section 5.6.4 shall be used
- Strut-and-tie models in accordance with Annex D3 to D5 with $z = z_{\text{strut-and-tie}}$
- Internal forces M_{Ed} and V_{Ed} shall be applied on the reference axis, see Fig. D.1 to Fig. D.15
- Shear reinforcement only receive tensile forces
- Variable moments and shear forces along the slab edges shall be taken into account (see section B.1.1)
- The shear force reinforcement required in the insulation joint does not determine the minimum slab thickness in accordance with EN 1992-1-1, section 9.3.2(1)

On-site vertical reinforcement on the adjacent surfaces facing the insulation of the components:

- The required vertical reinforcement results from the supporting and splitting tensile reinforcement, whereby at least a subsidiary structural edge reinforcement in accordance with section B.2.2 shall be provided

  $$V = \max\begin{cases} R \\ A+S \end{cases}$$

  with:

  V on-site vertical reinforcement
  R subsidiary structural edge reinforcement in accordance with section B.2.2
  A supporting reinforcement
  S splitting reinforcement

- A – supporting reinforcement

  A supporting reinforcement is needed on the balcony side, if the number of the compression or tension elements is higher than the number of the shear force bars. The required supporting reinforcement (and subsidiary structural edge reinforcement) covers the entire height up to the tension chord of the connected component.

  positive shear forces (directed downwards):

  $$A = \frac{V_{Ed}}{f_{yd}} \cdot \left(1-\frac{n_{Q\text{-bar}}(+)}{n_{CE}}\right) \text{ with } \frac{n_{Q\text{-bar}}(+)}{n_{CE}} \leq 1$$

  negative shear forces (directed upwards):

  $$A = \frac{V_{Ed}}{f_{yd}} \cdot \left(1-\frac{n_{Q\text{-bar}}(-)}{n_{ZS}}\right) \text{ with } \frac{n_{Q\text{-bar}}(-)}{n_{ZS}} \leq 1$$

  with:

A	required supporting reinforcement
$n_{Q\text{-bar}}$	number of positive (+) or negative (-) shear force bars
n_{CE}	number of compression elements
n_{ZS}	number of tension elements
V_{Ed}	total acting shear force

- S – splitting reinforcement
  - Balcony side:

    $$Z_{Sd} = 0{,}25 \cdot D_{Ed} \left(1-\frac{a}{2 \cdot e'}\right)$$

    $$S_B = \frac{Z_{Sd}}{f_{yd}}$$

    with:

Z_{Sd}	resultant splitting tensile force
D_{Ed}	orthogonal and cantered compression force acting on the subarea in accordance with Annexes D3 to D5
a	height of the subarea on which D_{Ed} is acting CCE: 20 mm for HTE-Compact® 20 30 mm for HTE-Compact® 30 or HTE-Modul SCE: height of the compression plate
e'	distance of the compression element to the nearest edge; $e' = \min\{c_1; h - c_1\}$
h	height of the thermal insulation element
c_1	edge distance of the load resultants (Annexes D3 to D5)
S_B	required splitting reinforcement on the balcony side

  - Floor side:

    $$S_D = \begin{cases} 0 \text{ for direct support} \\ S_B \text{ for indirect support} \end{cases}$$

    with:

S_D	required splitting reinforcement on the slab side

- If the shear force is pointing up (lifting) or the compression chord is above, and the tension chord is underneath, the statements for the on-site vertical reinforcement shall be analogously adapted for the contrary load transfer.
- Inclusion as a vertical reinforcement:
  - Subsidiary structural edge reinforcement in accordance with section B.2.2
  - Lattice girder with a maximum distance of 100 mm from the insulation joint
  - Special stirrups (inclusion for splitting tensile reinforcement)
  - Vertical legs of the shear force bars for Schöck Isokorb® Types K, K-F, K-O, K-U and K-HV, if the axial edge distance between shear force bars and the on-site connection reinforcement ≤ 20 mm

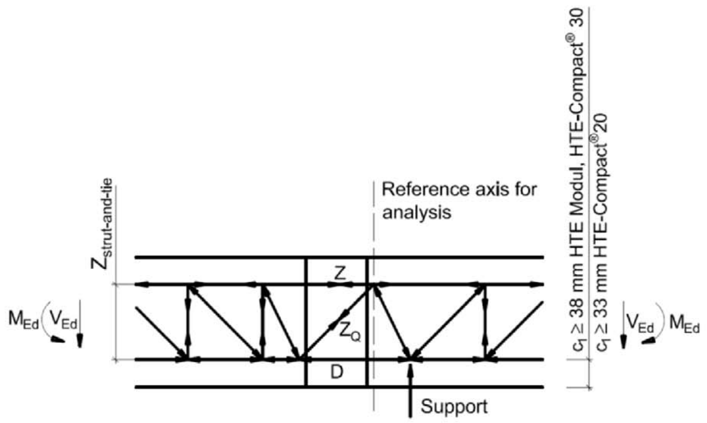


Fig. D.1: Schöck Isokorb® Type K, K-F (variation in several parts) with concrete compression elements

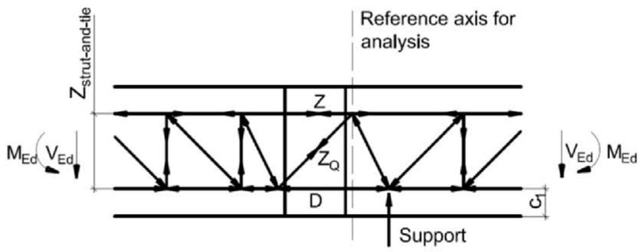


Fig. D.2: Schöck Isokorb® Type K, K-F (variation in several parts) with steel compression elements

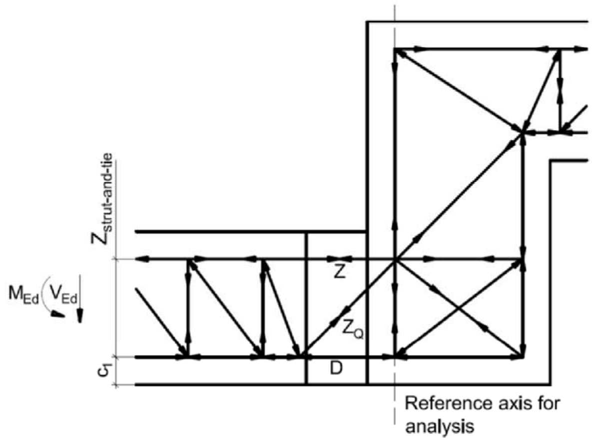


Fig. D.3: Schöck Isokorb® Type K-HV

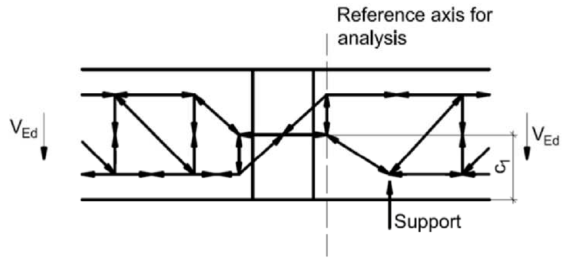


Fig. D.4: Schöck Isokorb® Type Q

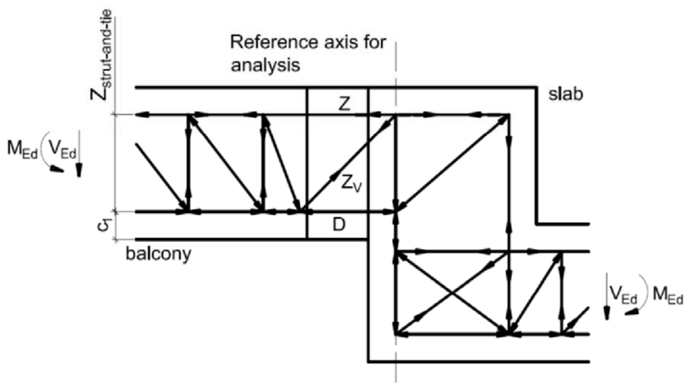


Fig. D.5: Schöck Isokorb® Type K-O and K-O-F with connection to height offset

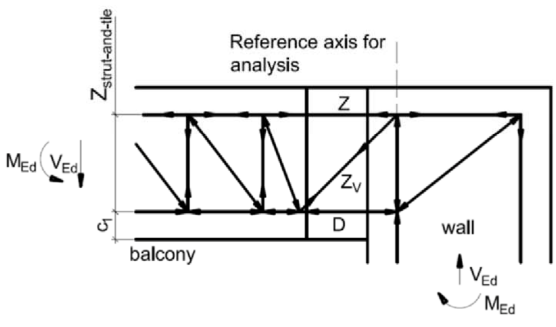


Fig. D.6: Schöck Isokorb® Type K-O and K-O-F with connection to wall

Schöck Isokorb® with compression elements made of concrete or steel	
Structural analysis Truss models	Annex D3

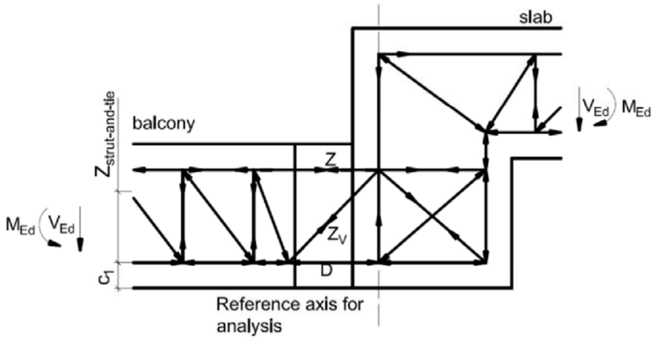


Fig. D.7: Schöck Isokorb® Type K-U and K-U-F with connection to height offset

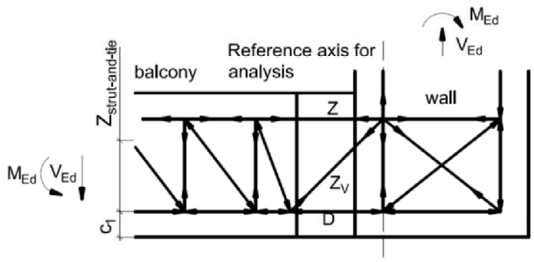


Fig. D.8: Schöck Isokorb® Type K-U and K-U-F with connection to wall

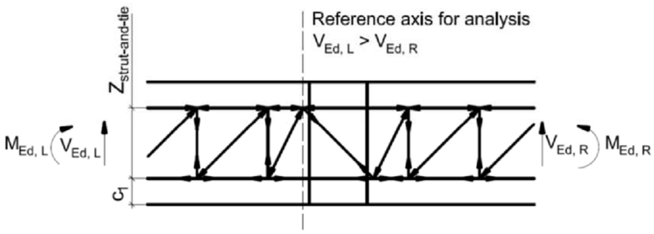


Fig. D.9: Schöck Isokorb® Type D*

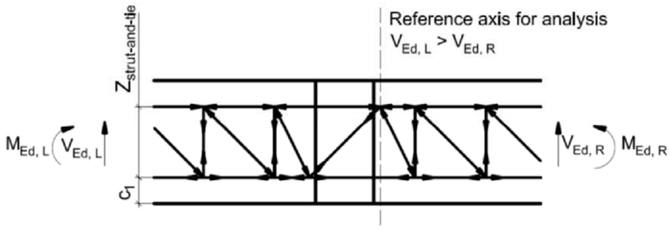


Fig. D.10: Schöck Isokorb® Type D*

* The reference axis can alternatively be taken at the middle of the joint.

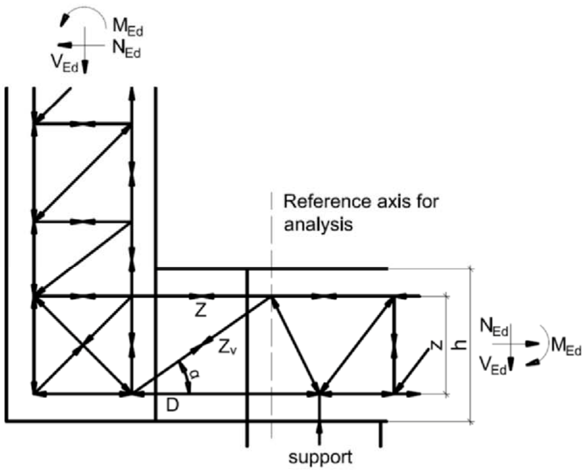


Fig. D.11: Schöck Isokorb® Type A

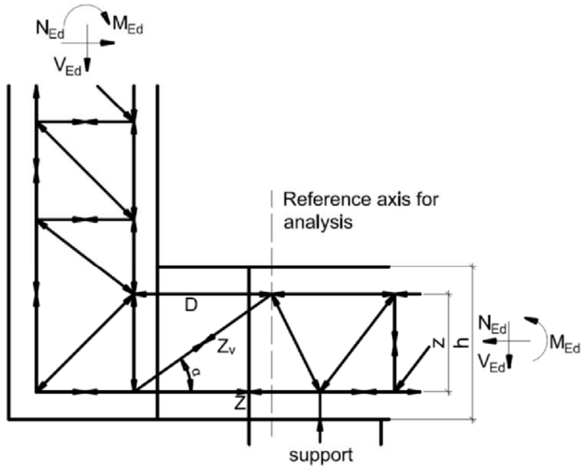


Fig. D.12: Schöck Isokorb® Type A

Schöck Isokorb® with compression elements made of concrete or steel	Annex D4
Structural analysis Truss models	

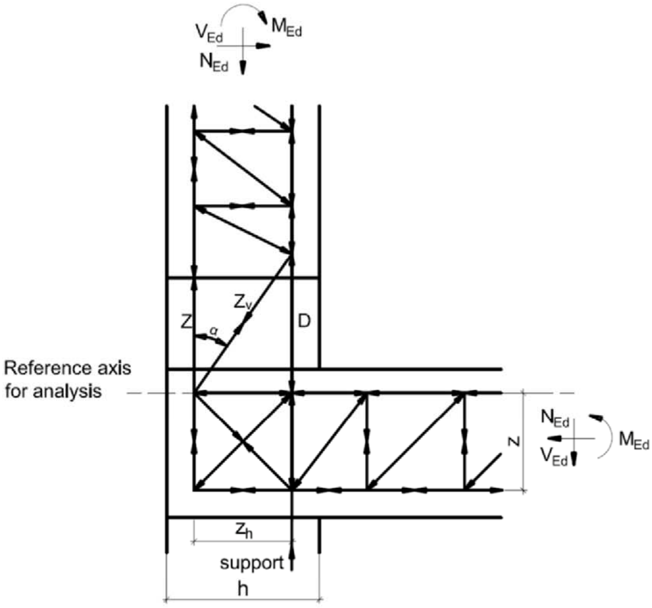


Fig. D.13: Schöck Isokorb® Type F

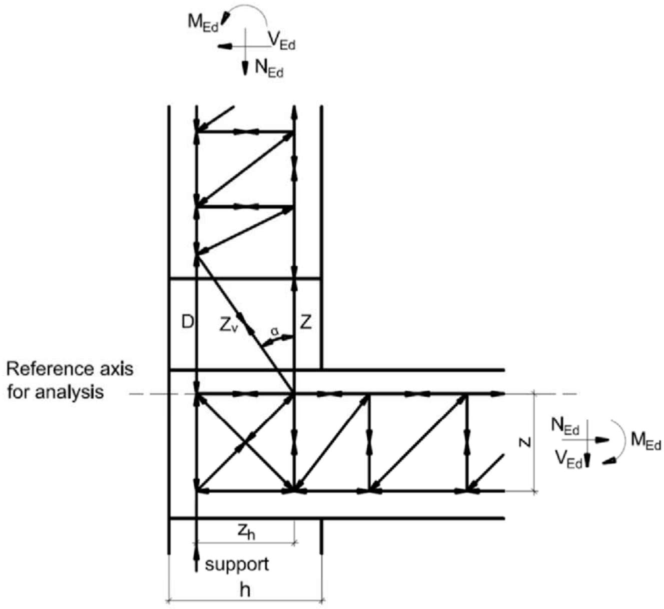


Fig. D.14: Schöck Isokorb® Type F

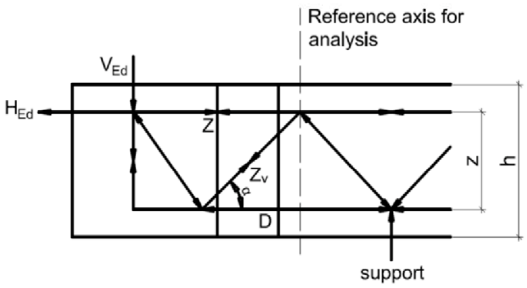


Fig. D.15: Schöck Isokorb® Type O

Schöck Isokorb® with compression elements made of concrete or steel

Structural analysis
Truss models

Annex D5

D.1.2 Ultimate limit state

D.1.2.1 Verification of tension bars and shear force bars

- Verification in accordance with EN 1993-1-4 with design values in accordance with Table C.1
- Load bearing capacity of the welded joint between reinforcing steel and stainless reinforcing steel or round steel does not need to be performed separately

D.1.2.2 Verification of horizontal bars

- The design values for the horizontal bars according to C.1.1.4 shall apply without further proof.

D.1.2.3 Verification of steel compression elements SCE

- The design values that can be applied for verification are given in Table C.6
- Compression elements with welded-on compression plates:
  Introduction of the compressive stresses into the concrete as a partial surface load in accordance with EN 1992-1-1, section 6.7 shall be verified
- Superimposition of adjacent load distribution surfaces shall be taken into consideration
- It shall be verified that the occurring tensile forces can be transferred

D.1.2.4 Verification of concrete compression elements CCE

D.1.2.4.1 Concrete compression elements: HTE module

- Design value D_{Rd} in accordance with section C.1.2 and in consideration of section C.1.2.2
- These design value also applies conservatively to concrete compression elements HTE-Compact® 30

D.1.2.4.2 Concrete compression elements: HTE-Compact® 20 and HTE-Compact® 30

- Design value for the compression element force in accordance with section C.1.2 and in consideration of section C.1.2.3

D.1.2.5 Shear force resistance in the area of the insulation joint

- Shear force resistance of the connecting slabs shall be carried out in consideration of EN 1992-1-1, section 6.2
- The required verification of the mandrel diameter can be omitted if the following conditions are observed:
  - Mandrel diameter specifications given in section A.2.2
  - The shear force bar axis spacing on average and to the free edge or to the expansion joint is ≥ 100 mm (see section A.2).
- Axial distance < 100 mm: verification of the necessary mandrel diameter in accordance with EN 1992-1-1, section 8.3 shall be provided

D.1.2.6 Verification of the fatigue due to temperature difference

- Verification by limitation of the joint spacing in the external structural component in accordance with Table B.1

D.1.2.7 Provisions of the verifications in the load introduction area of the concrete components

- Shear force load capacity of the undisturbed slabs in accordance with EN 1992-1-1, section 6.2
- A shear force distributed evenly across the concrete compression area shall be taken as a basis, especially for the design value of the shear force load bearing capacity of the slabs without shear force reinforcement. Therefore, the elements shall be installed with uniform spacing.
- The on-site stirrup reinforcement in the anchorage area (edge beam) when using tension and shear bars with anchor head according to Annexes B7 to B9 shall be designed as follows.
  A stirrup shall be arranged at least between two and next to the external tension or shear bars. The cross-section of the stirrups shall be designed taking into account the truss models in Annexes D3 to D5 for the total acting longitudinal force of the tension and shear force bars and may be taken into account for the static checks of the edge beam.

D.1.2.8 Anchorage lengths and overlap joints of the bars leading through the thermal insulation joint

- Only ribbed steel can be taken into account for anchorage lengths and overlap joints
- The tension bars shall be lapped to the tensile bars of the adjacent slabs
- With use of tension bars with diameter combination (see section A.2.1) the increase in the overlap length $l\Delta_0$ in accordance with Table A.1 and Table A.2 shall be taken into account
- Anchorage of the shear force bars in the slabs in accordance with section A.2.2, insofar as higher values are not yielded in accordance with EN 1992-1-1, equation (8.10)
- Anchorage of the horizontal bars in accordance with section A.2.3, insofar as higher values are not yielded in accordance with EN 1992-1-1, equation (8.10).
- In cases in which shear force bars and compression members are not placed on a plane, the anchorage length for shear force bars shall also be determined in the compression zone as in the tensile zone
- Compression bars shall be anchored in the slabs with at least l_{bd} in accordance with EN 1992-1-1.

Shear reinforcement in accordance with EN 1992-1-1, section 8.7.4, shall be placed in the overlap area of the bars at an axial distance > 20 mm and anchored to the section edge to resist the arising transverse tensile forces in addition to the shear reinforcement in accordance with EN 1992-1-1, section 8.7.4.1

Grading of the tensile reinforcement in the areas of the Schöck Isokorb® shall not be permitted.

Slab connections exclusively transfer shear forces:

- The tensile reinforcement of the slab to be connected shall be anchored in the compression zone on the frontal side with hooks
- Alternatively, stirrups on every shear force bar or lattice girders, with use of lattice girders, the tensile reinforcement shall lie over the lower chords of the lattice girders (see also B.2.2).
- The version of the shear force bar in bent form shall be possible, if the design details specified in section A.2.2 are implemented

D.1.3 Serviceability limit state

D.1.3.1 Control of cracking

- EN 1992-1-1 section 7.3 applies.
- No additional verification is required on the front faces of the joints or in the load introduction area if the provisions of this European technical assessment are complied with.

D.1.3.2 Deflection control

In the calculation of the vertical deformations, the following influencing factors shall be taken into account:

- elastic deformations of the load bearing thermal insulation element as described below
- elastic deformation of the adjacent slab concrete
- thermal expansions

Verification of the deflections:

- quasi-continuous combination in accordance with Annexes D9 to D11
- model for determining the bending deformation in the joint in accordance with Annexes D9 to D11
- calculation of the elastic deformations of the tension bars depending on the yield strengths that can be applied (Table C.1)

Tension strap: $\Delta l_t = \varepsilon_t \cdot l_{eff.t} = \frac{\sigma_t}{E_t} \cdot l_{eff.t}$

with E_t = 160.000 N/mm² for stainless reinforcing steel
with E_t = 170.000 N/mm² for stainless round steel

Concrete compression bearings (CCE): $\Delta l_{d1} = \varepsilon_d \cdot l_{eff.d} = \frac{\sigma_d}{E_d} \cdot l_{eff.d}$

with E_d = 45.000 N/mm²

Adjacent materials: $\Delta l_{d2,GZG}$ = -0,275 mm

Compression flange: $\Delta l_d = \Delta l_{d1} + \Delta l_{d2,GZT}$

Steel compression bearings (SCE): $\Delta l_d = \varepsilon_d \cdot l_{eff.d} = \frac{\sigma_d}{E_d} \cdot l_{eff.d}$

with E_d = 160.000 N/mm² for stainless reinforcing steel
with E_d = 170.000 N/mm² for stainless round steel

Angle of rotation in the joint: $\tan \alpha_{Fuge} = \frac{\Delta l_t - \Delta l_d}{z}$

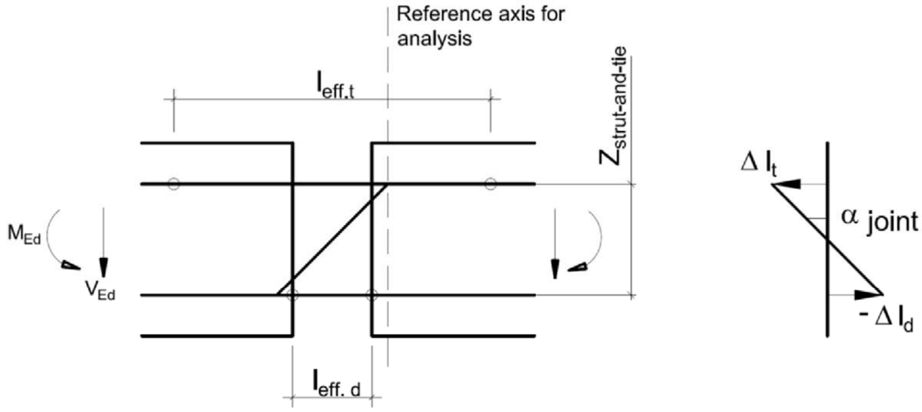


Fig. D.16: Model for determining the bending deformation in the joint

Schöck Isokorb® with compression elements made of concrete or steel	Annex D9
Structural analysis Model for determining the bending deformation in the joint	

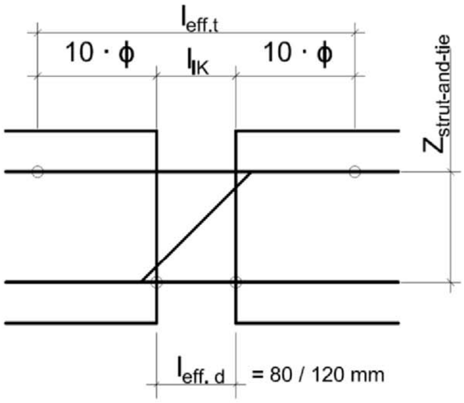


Fig. D.17: l_{eff} for tension bars made of stainless reinforcing steel in the joint and concrete compression elements (CCE)

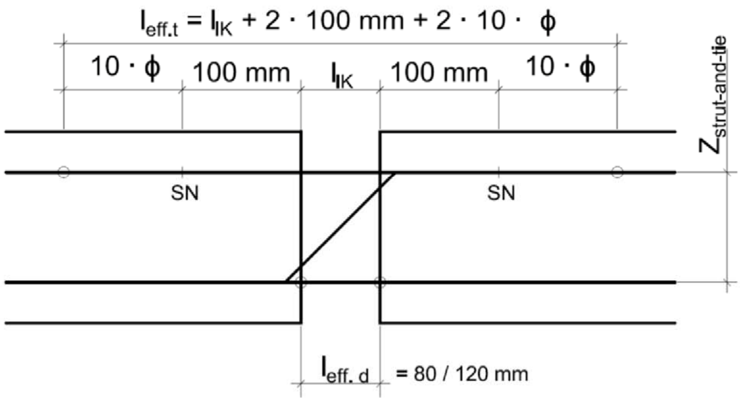


Fig. D.18: l_{eff} for tension bars made of stainless steel round bars in the joint and concrete compression elements (CCE)

Schöck Isokorb® with compression elements made of concrete or steel	Annex D10
Structural analysis Model for determining the bending deformation in the joint	

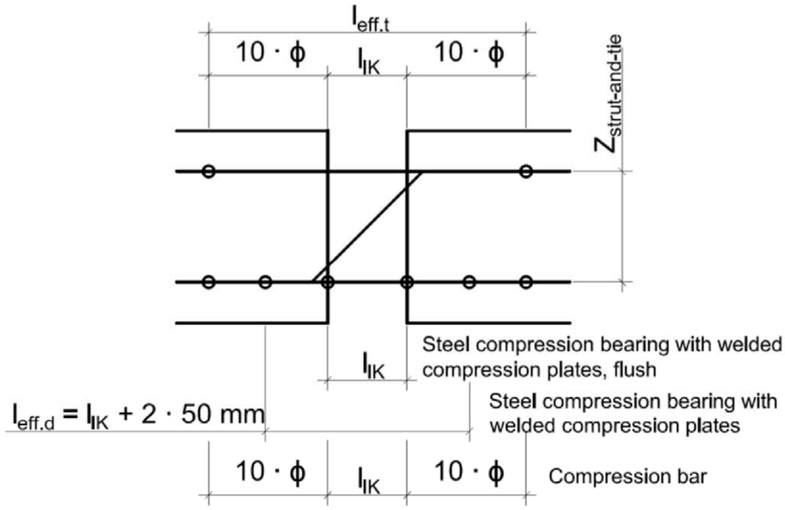


Fig. D.19: l_{eff} for tension bars made of stainless reinforcing steel in the joint and steel compression elements (SCE)

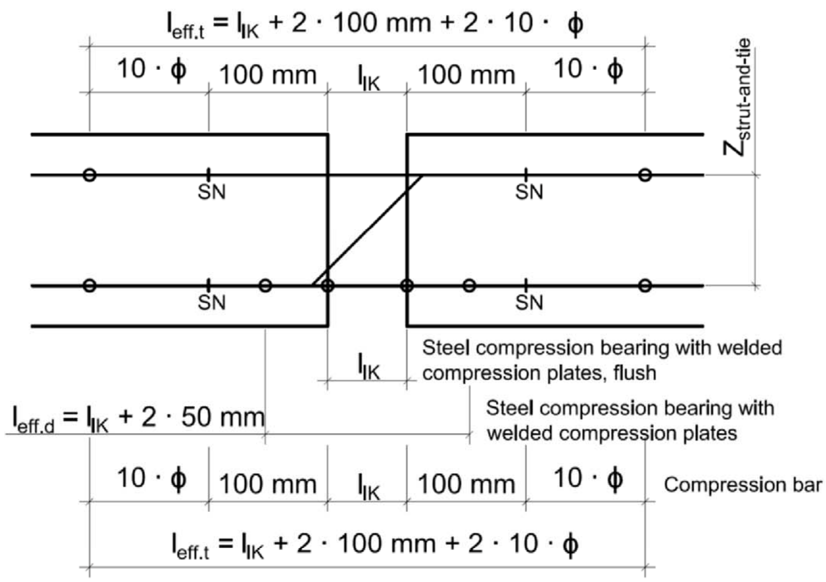


Fig. D.20: l_{eff} for tension bars made of stainless steel round bars in the joint and steel compression elements (SCE)

Schöck Isokorb® with compression elements made of concrete or steel	Annex D11
Structural analysis Model for determining the bending deformation in the joint	