Deutsches Institut für Bautechnik
DIBt

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

European Technical Assessment ETA-17/0261 of 2 January 2025

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	72 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 2 June 2023

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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 A18 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}; $N_{Rd,c}$ see Annex C1 – C5, C7 V_{Rd} ($Z_{v,Rd}$) see Annex C6 D_{Rd} ($N_{ki,d}$) see Annex C7 – C9 H_{td} ($H_{II,d}$; $H_{\perp,d}$; $H_{IIpl,d}$) see Annex C6, C10 and C11

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire of materials	See Annex A18
Resistance to fire	See Annex C12 – C14
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 C18 – C23
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 C16 – C17

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 + AC:2010 + A1:2014	Eurocode 2 - Design of concrete structures - Part 1-1: General rules and rules for buildings, bridges and civil engineering structures
EN 1992-1-2:2004 + AC:2008 + A1:2019	Eurocode 2: Design of concrete structures – Part 1-2: General rules – Structural fire design
EN 1993-1-1:2005+ AC:2009 +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 + AC:2009 + 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 10088-1:2023	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)

Issued in Berlin on 2 January 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing Beatrix Wittstock
Head of Section

b*eglaubigt:*
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

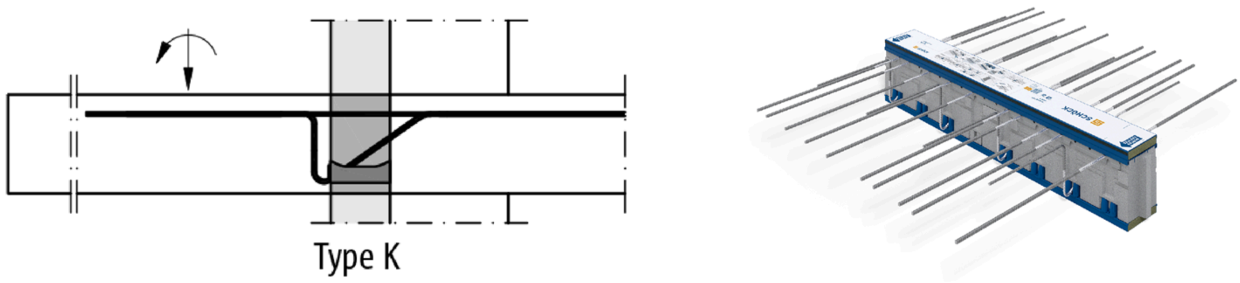


Fig. A.1: Schöck Isokorb® Type K for freely cantilevered balconies

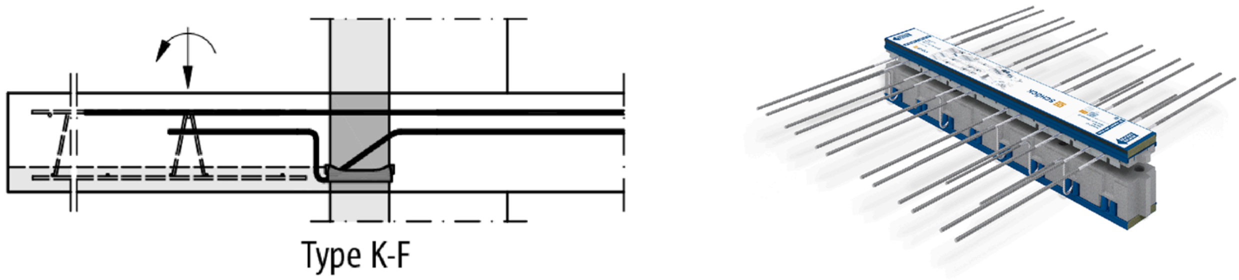


Fig. A.2: Schöck Isokorb® Type K-F for freely cantilevered balconies in element construction (variation in several parts)

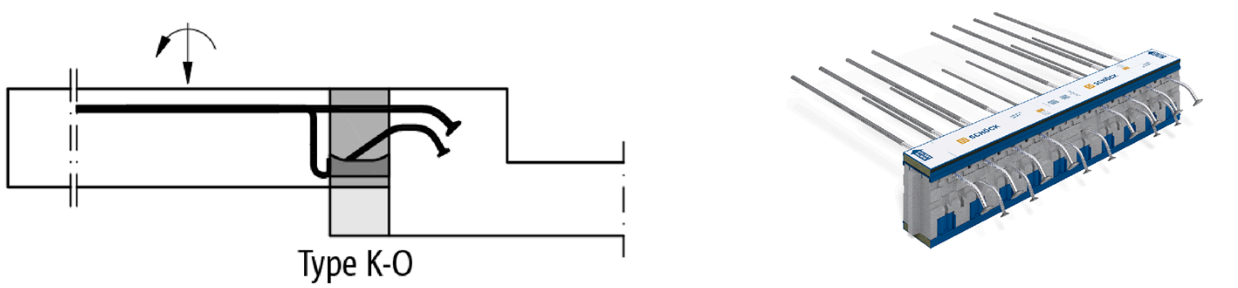
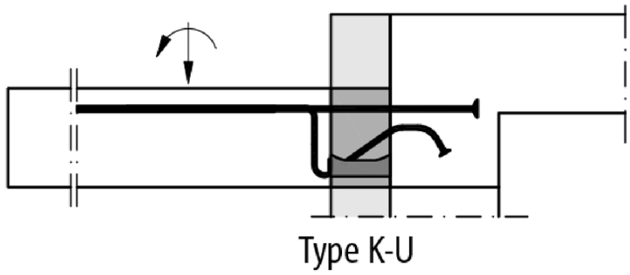


Fig. A.3: Schöck Isokorb® Type K-O, K-O-F for freely cantilevered balconies with or without height offset upwards or wall connection

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



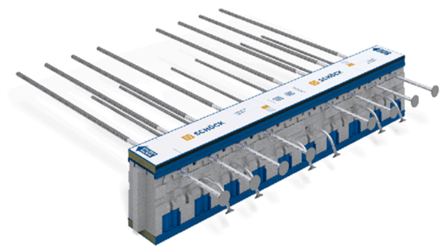
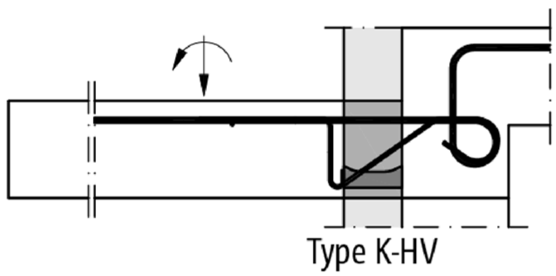


Fig. A.4: Schöck Isokorb® Type K-U, K-U-F for freely cantilevered balconies with height offset downwards or wall connection



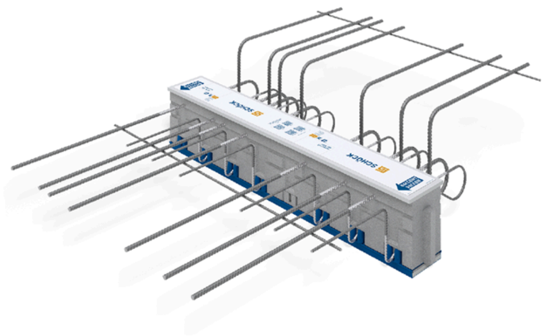
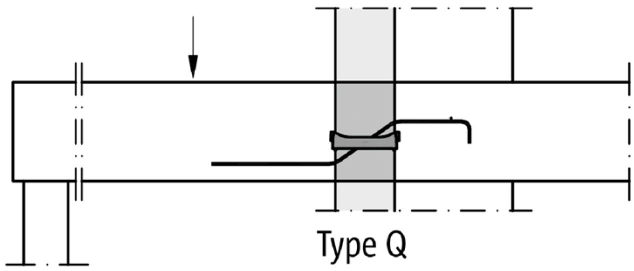


Fig. A.5: Schöck Isokorb® Type K-HV for freely cantilevered balconies with height offset downwards or wall connection



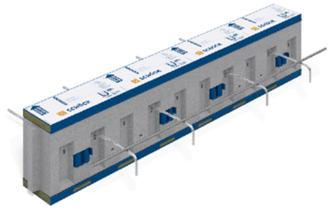


Fig. A.6: Schöck Isokorb® Type Q for supported balconies, for example shear force bar with bent bar end on the ceiling side (alternatively with straight bar end on the ceiling side);
Schöck Isokorb® Type Q-Z (without compression element) for constraint-free applications, for example loggias with opposite slab connections, see Fig. B.3

Schöck Isokorb® with compression elements made of concrete or steel	Annex A2
Product description Type overview Schöck Isokorb® with concrete compression elements (CCE)	

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

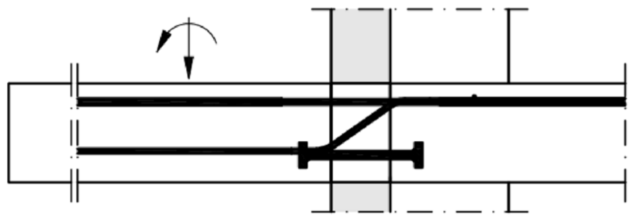


Fig. A.7: Schöck Isokorb® Type K, K-F (variation in several parts) for freely cantilevered balconies with steel compression elements with welded-on compression plates

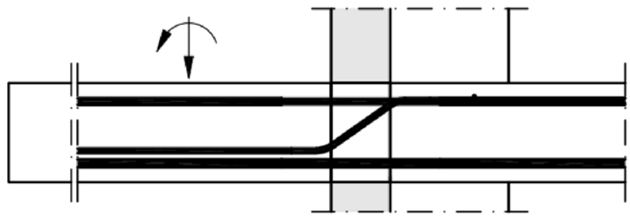
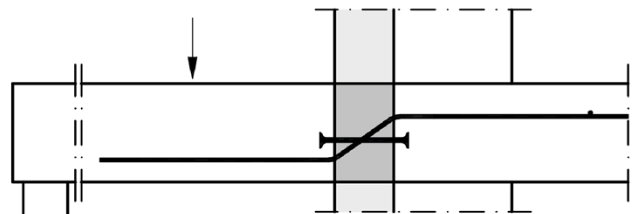


Fig. A.8: Schöck Isokorb® Type K, K-F (variation in several parts) for freely cantilevered balconies with steel compression bars



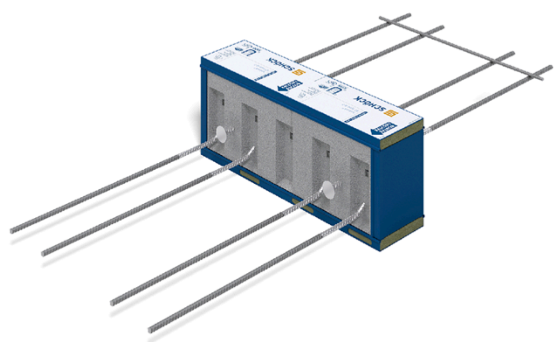
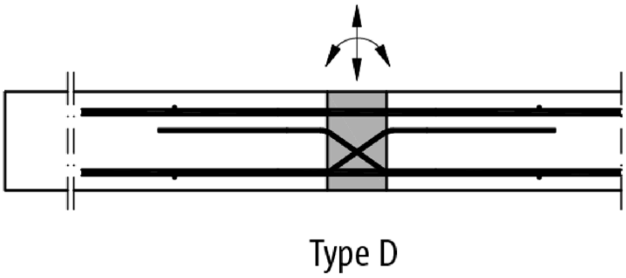


Fig. A.9: Schöck Isokorb® Type Q, Q-P for supported balconies (alternatively with bent bar end on the ceiling side); Schöck Isokorb® Type Q-Z , Q-PZ (without compression element) for constraint-free applications, for example loggias with opposite slab connections, see Fig. B.3

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



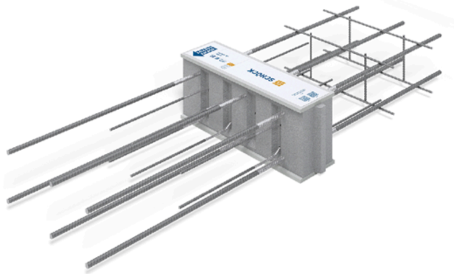
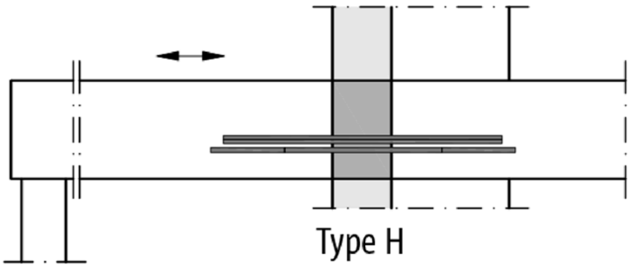


Fig. A.10: Schöck Isokorb® Type D for continuous slabs



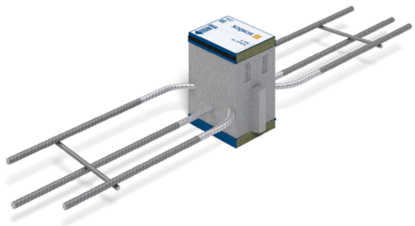
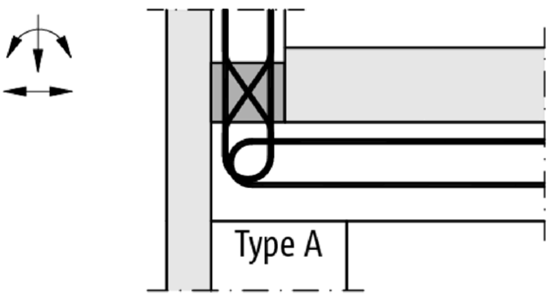


Fig. A.11: Schöck Isokorb® Type H, supplement for horizontal loads perpendicular and parallel to the insulation joint



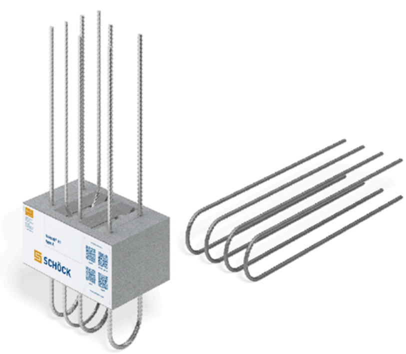
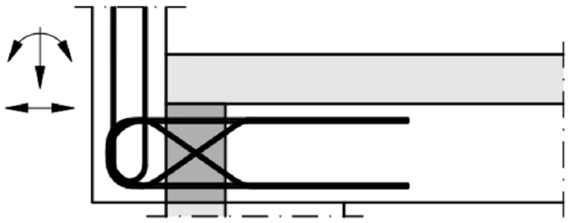


Fig. A.12: Schöck Isokorb® Type A for parapets and attics

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



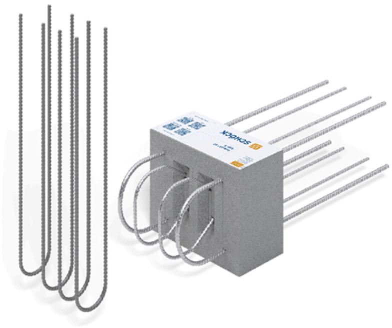
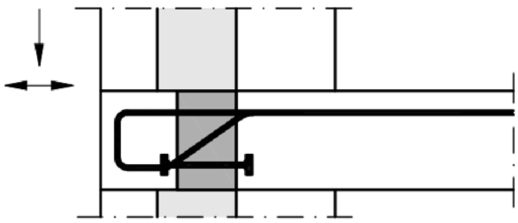


Fig. A.13: Schöck Isokorb® Type F for facing parapets



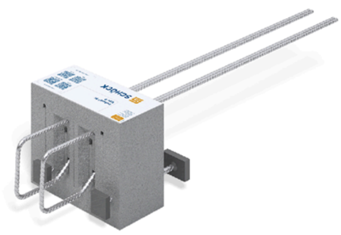


Fig. A.14: Schöck Isokorb® Type O for consoles

Schöck Isokorb® with compression elements made of concrete or steel	Annex A5
Product description Type overview Schöck Isokorb® with steel compression elements (SCE)	

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) with integrated reinforcement stirrups (see Fig. A.21, Fig. A.22 and Fig. A.25) Ø ≤ 14 mm for all other types graded nominal diameter are permitted, section D.1.2.8 shall be observed
▪ 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:	α = 45° for 60 mm or 80 mm insulation thickness, α = 35° at 120 mm insulation thickness for simplified calculation or 30° ≤ α ≤ 70° for detailed calculation in accordance with section C.1.1.2
▪ 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 for simplified calculation or $Ø_{BR}$ ≥ 4 × Ø for detailed calculation in accordance with section C.1.1.2
▪ Bending roll diameter in the area of the concrete compression element (CCE):	in accordance with section A.2.2 and Fig. A.48 and in compliance with the simplified calculation (section C.1.1.2)

Schöck Isokorb® with compression elements made of concrete or steel	Annex A6
Product description Dimensions	

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 / meter; n ≥ 1 / connection element;
  n = 0 for constraint-free applications (Type Q-Z, Q-PZ)
- Axial distance within the connection element:
  ≤ 300 mm, on average ≤ 250 mm
- Three 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
     - 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
  3) Forwarding via a compressed head
     - $Ø_2$ = 10 mm, 12 mm, 14 mm or 16 mm; $Ø_K$ ≥ 3 × $Ø_2$ (see Fig. A.43)

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

- Number per meter: n ≥ 4 / meter; n ≥ 4 / connection element
  n = 0 for constraint-free applications (Type Q-Z)
- Clear spacing within the connection element:
  ≤ 250 mm

A.2.1 Tension bar variants

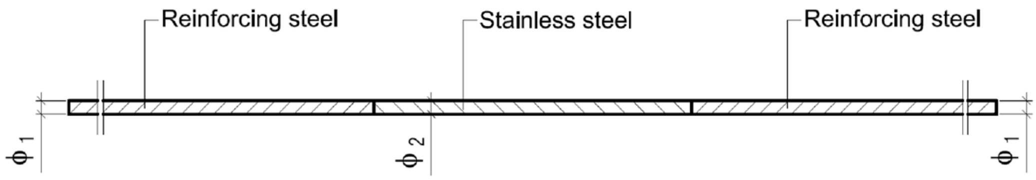


Fig. A.15: Tension bar without diameter combination

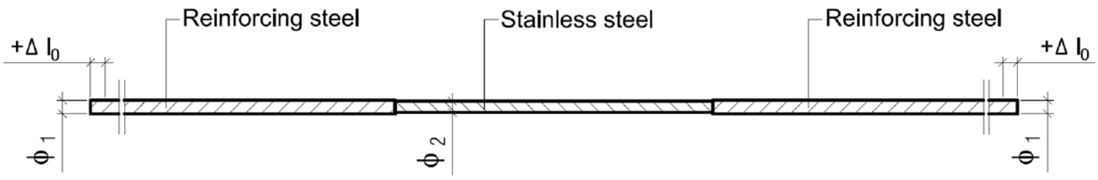


Fig. A.16: Tension bar with diameter combination

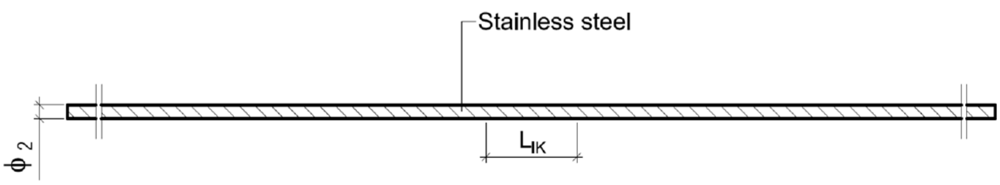


Fig. A.17: Tension bar made of stainless steel

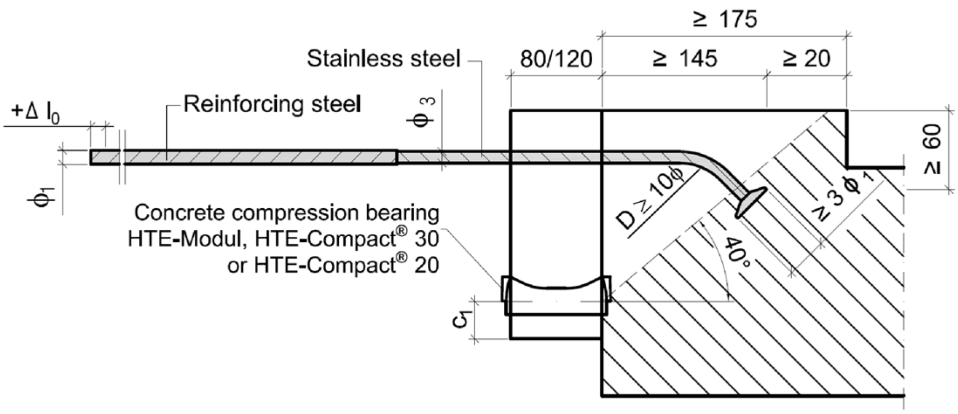


Fig. A.18: Tension bar for Schöck Isokorb® Type K-O and Type K-O-F with diameter combination and position of the anchor head

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

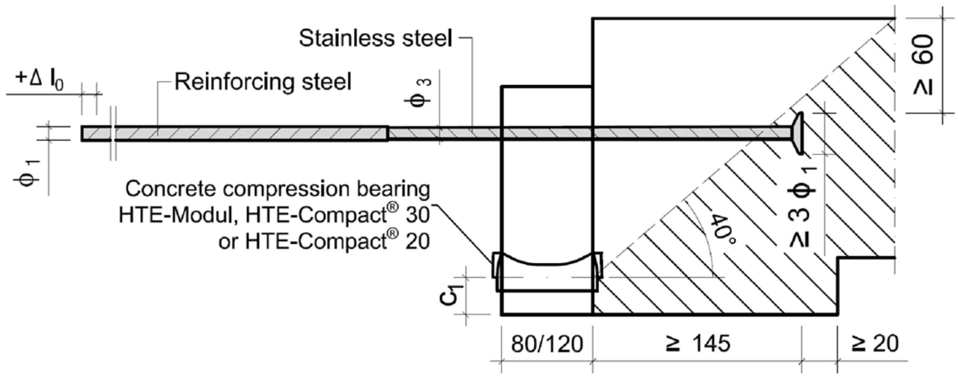


Fig. A.19: Tension bar for Schöck Isokorb® Type K-U and Type K-U-F with diameter combination and position of the anchor head

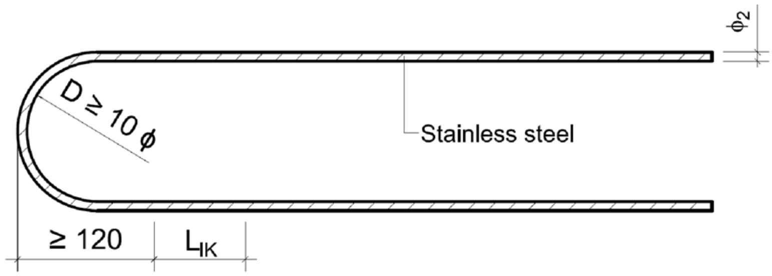


Fig. A.20: Tension bar for Schöck Isokorb® Type A and Type F

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

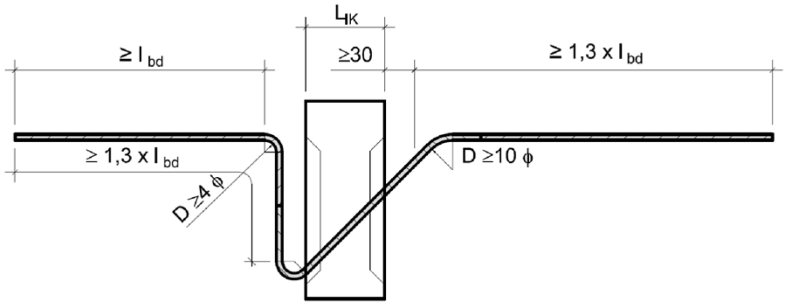


Fig. A.21: Shear force bar for Schöck Isokorb® Type K, K-F with bent up bar end on the balcony side

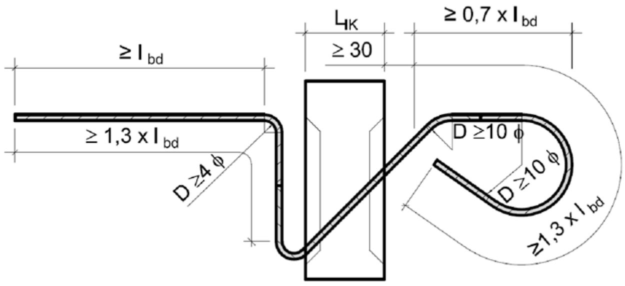


Fig. A.22: Shear force bar for Schöck Isokorb® Type K, K-F with bent up bar end on the balcony side and bent bar end on the ceiling side

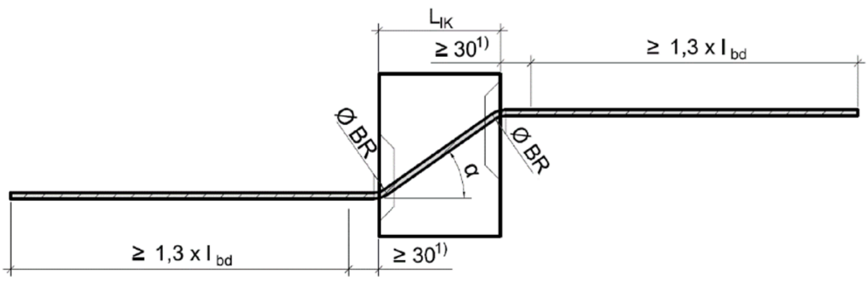


Fig. A.23: Shear force bar with straight bar ends

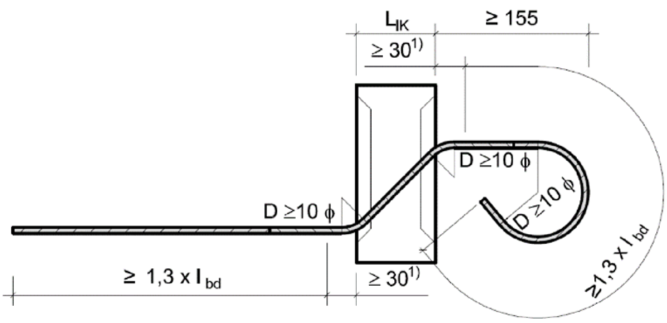


Fig. A.24: Shear force bar for Schöck Isokorb® Type Q with bent bar end on the ceiling side

where $l_{bd} \geq l_{b,min}$ as per EN 1992-1-1
[1)] for bars to be anchored value ≥ 0; otherwise ≥ 30

Schöck Isokorb® with compression elements made of concrete or steel	Annex A10
Product description Shear force bar variants	

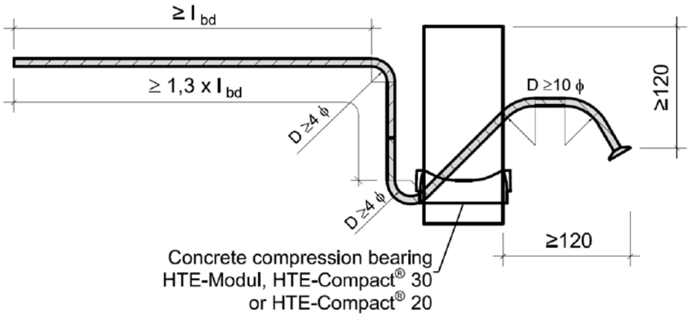


Fig. A.25: Shear force bar for Schöck Isokorb® Type K-U, K-U-F, K-O and K-O-F

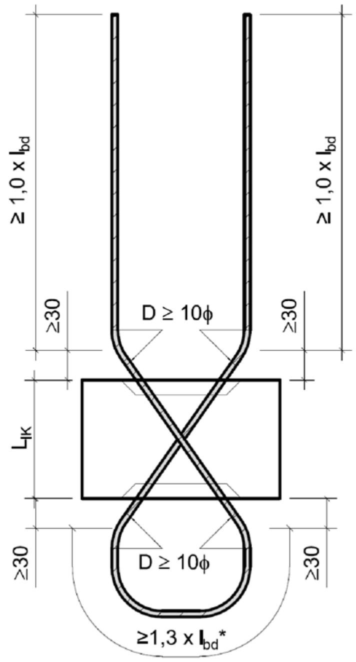


Fig. A.26: Shear force bar for Schöck Isokorb® Type A

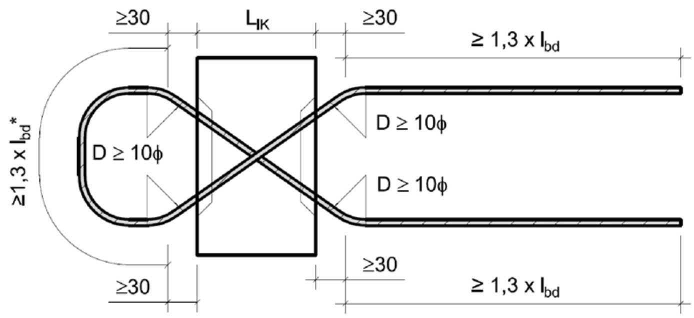


Fig. A.27: Shear force bar for Schöck Isokorb® Type F

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	

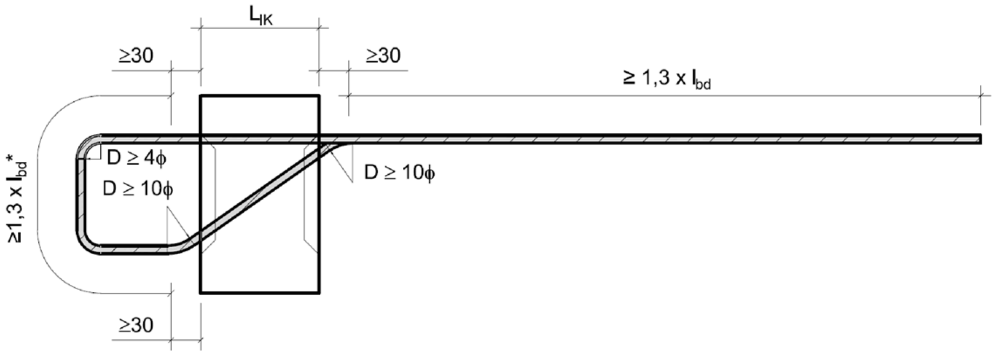


Fig. A.28: Shear force bar for Schöck Isokorb® Type O

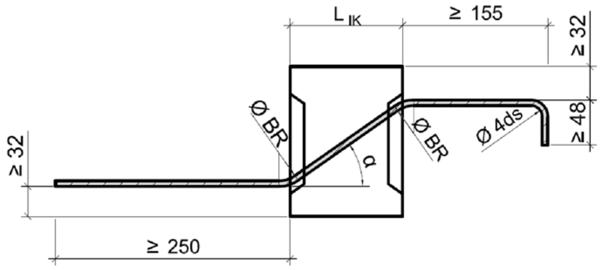


Fig. A.29: Shear force bar for Schöck Isokorb® Type Q, Q-P; Ø 6 mm with shortened bar ends; balcony and slab sides arbitrarily combinable in straight and/or bent form

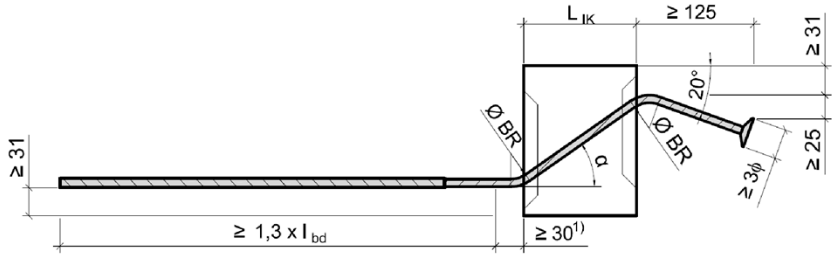


Fig. A.30: Shear force bar for Schöck Isokorb® Type Q, Q-P; Ø 8 mm with anchor head, one-sided; balcony and slab sides arbitrarily combinable in straight and/or bent form with compressed head

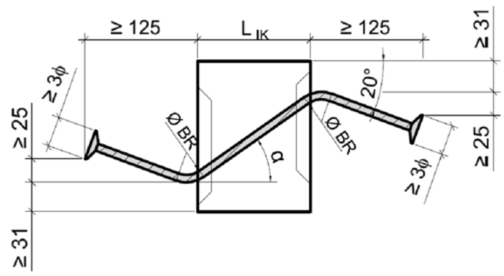


Fig. A.31: Shear force bar for Schöck Isokorb® Type Q, Q-P; Ø 8 mm with anchor heads, on both sides

where $l_{bd} \geq l_{b,min}$ as per EN 1992-1-1
* with α_1 = 0,7
1) for bars to be anchored value ≥ 0; otherwise ≥ 30

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

A.2.3 Horizontal bar variants

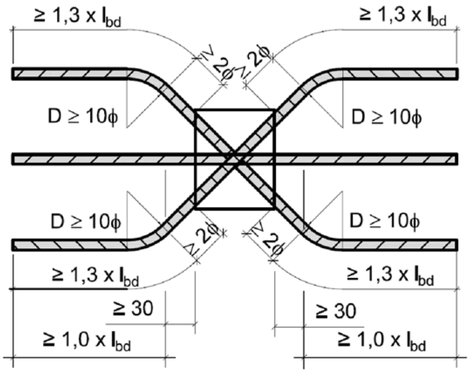


Fig. A.32: Horizontal inclined bars and straight bar for Schöck Isokorb® Type H-VV-NN, top view

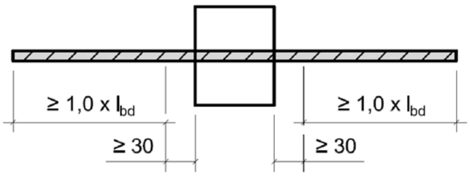


Fig. A.33: Horizontal straight bar for Schöck Isokorb® Type H-NN, top view

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

Product description
Horizontal bar variants

Annex A13

A.2.4 Steel compression element variants (SCE)

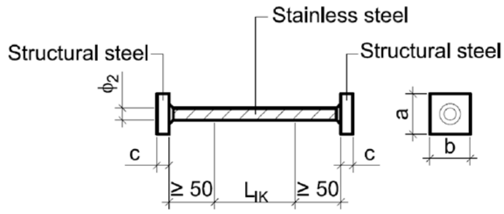


Fig. A.34: Steel compression element with welded-on compression plates, embedding at least 50 mm on both sides

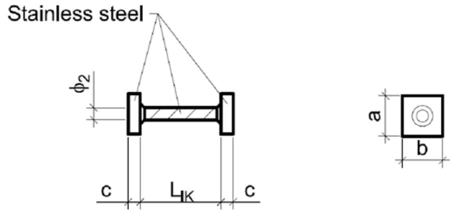


Fig. A.35: Steel compression element with welded-on compression plates, flush on both sides

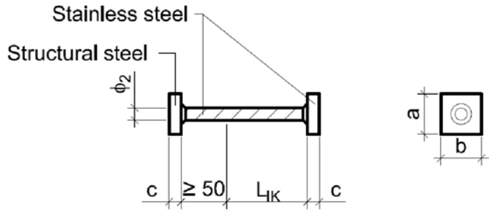


Fig. A.36: Steel compression element with welded-on compression plates, flush on one side, embedding at least 50 mm on one side (e.g. for Schöck Isokorb® Type K-ID, Schöck Isokorb® RT Type K)

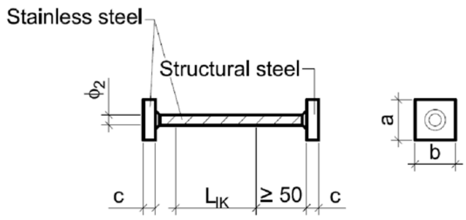


Fig. A.37: Steel compression element with welded-on compression plates, embedding at least 50 mm on one side, less than 50 mm on the other side (e.g. for Schöck Isokorb® Typ O)

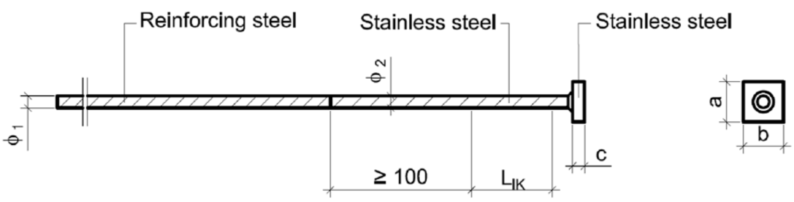


Fig. A.38: Steel compression element with welded-on compression plate and welded reinforcing steel

Schöck Isokorb® with compression elements made of concrete or steel	Annex A14
Product description Steel compression element variants (SCE)	

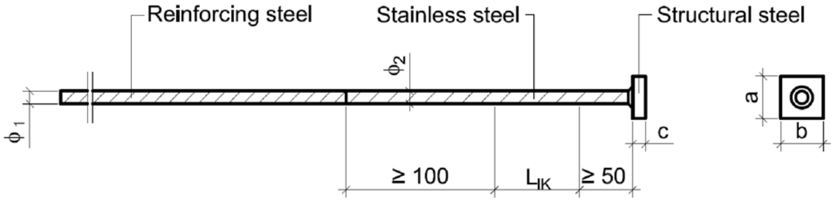


Fig. A.39: Steel compression element with welded-on compression plate and welded reinforcing steel

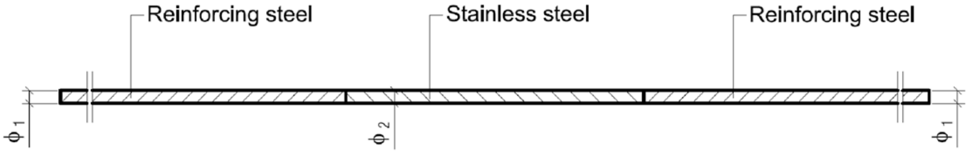


Fig. A.40: Steel compression element with reinforcing steel welded on both sides

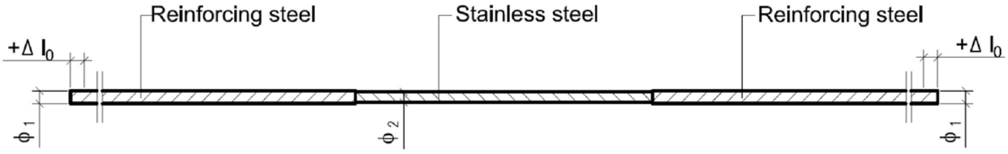


Fig. A.41: Steel compression element with reinforcing steel welded on both sides, with diameter combination, Table A.1 also applies this steel compression element

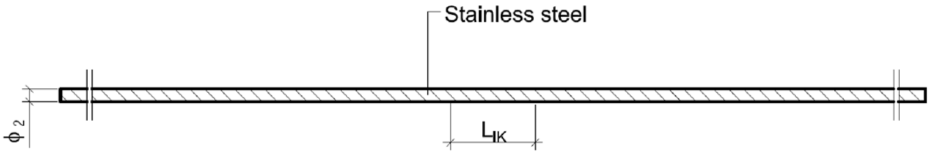


Fig. A.42: Steel compression element made of stainless reinforcing steel

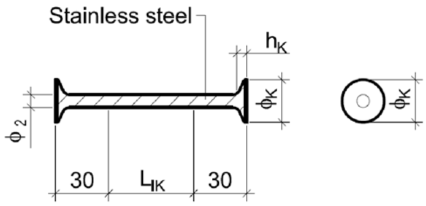


Fig. A.43: Steel compression element made of steel with compressed heads

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

A.2.5 Concrete compression element variants (CCE)

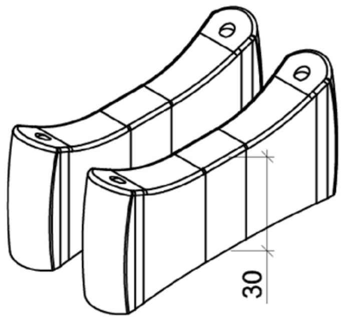


Fig. A.44: Concrete compression element HTE-Modul and HTE-Compact® 30, insulation thickness 80 mm

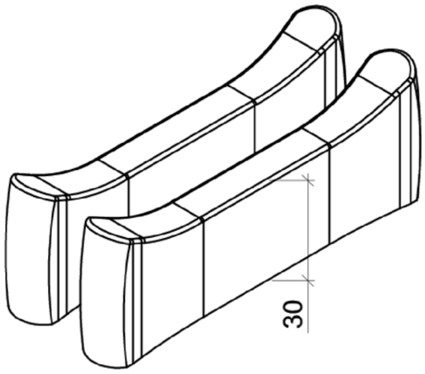


Fig. A.45: Concrete compression element HTE-Modul and HTE-Compact® 30, insulation thickness 120 mm

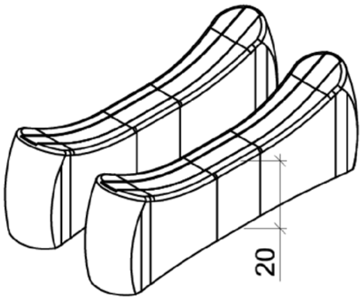


Fig. A.46: Concrete compression element HTE-Compact® 20, insulation thickness 80 mm

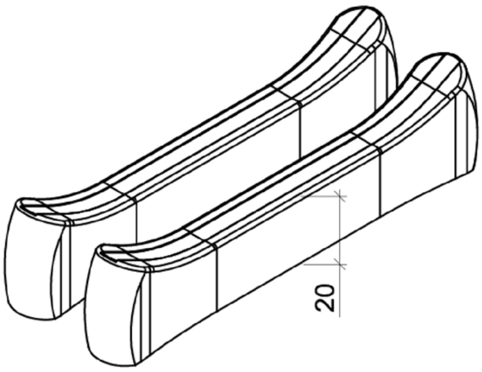


Fig. A.47: Concrete compression element HTE-Compact® 20, insulation thickness 120 mm

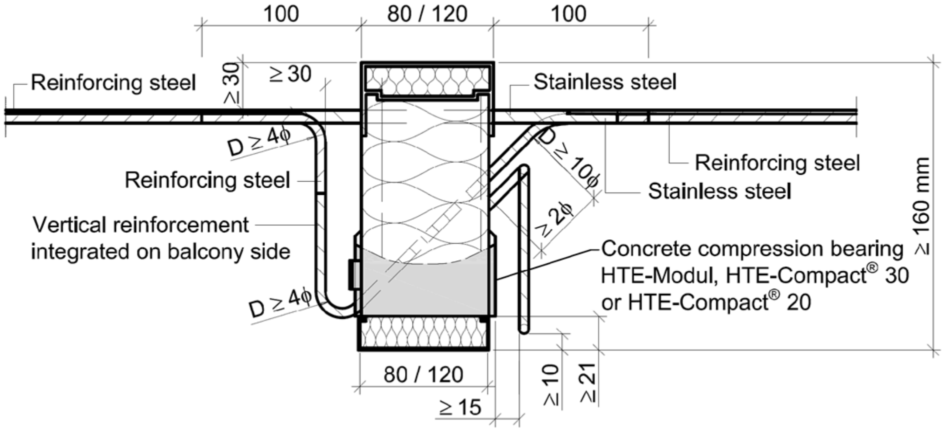
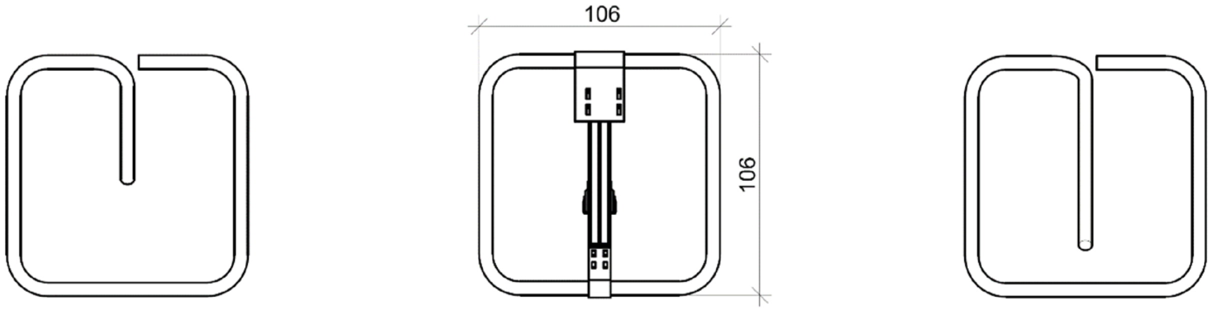
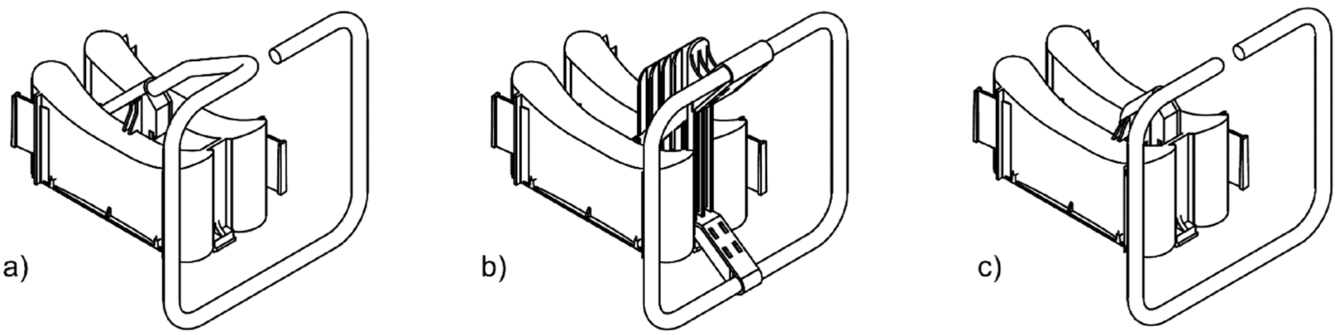


Fig. A.48: Schöck Isokorb® Type K with CCE with integrated reinforcement stirrups as per section D.1.1 and special stirrup



a) b) c)

Fig. A.49: Stainless steel special stirrup



a) b) c)

Fig. A.50: Concrete compression elements with special stirrup

Schöck Isokorb® with compression elements made of concrete or steel

Product description
Concrete compression element variants (CCE)

Annex A17

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
Plastic rail:	PVC-U in accordance with EN 13245-1 and EN 13245-2, class E in accordance with EN 13501-1

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
- for connection for 150 mm to 500 mm thick vertical components 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.7 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 (additional provisions in accordance with section C.1.1.2 and 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.32, 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.

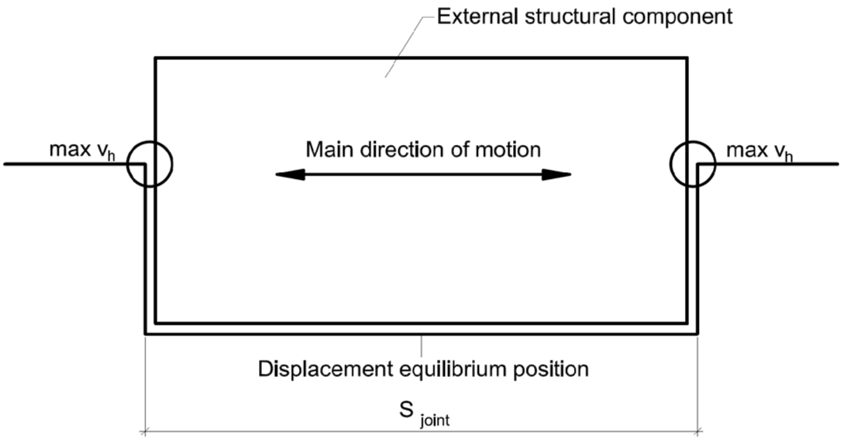


Fig. B.1: Installation situation with support on opposite edges

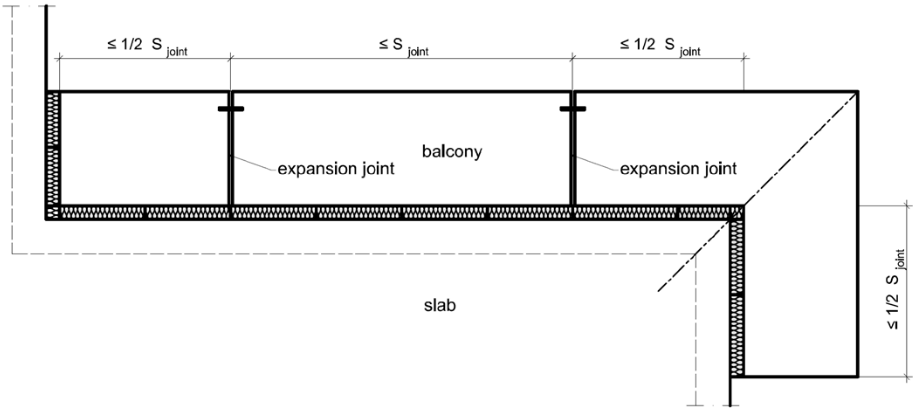


Fig. B.2: Installation situation with expansion joints

B.2.2 Installation situation: Exclusion of constrained normal forces in the compression elements of the slab connections

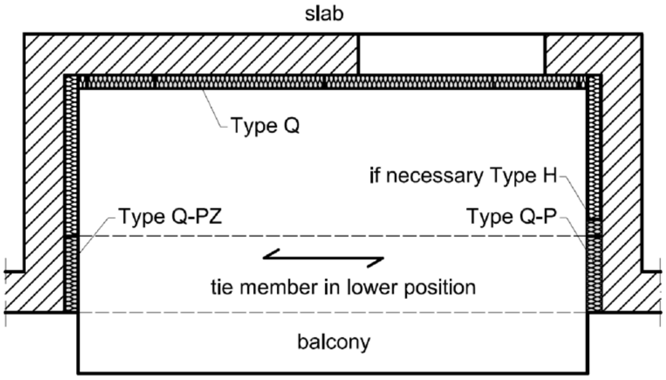


Fig. B.3: Constraint-free application: Example Schöck Isokorb® Type Q-Z, Q-PZ (without compression elements) with opposing slab connections Schöck Isokorb® Type Q, Q-P (if necessary with Type H)

Schöck Isokorb® with compression elements made of concrete or steel	Annex B3
Intended use Installation requirements	

B.2.3 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:

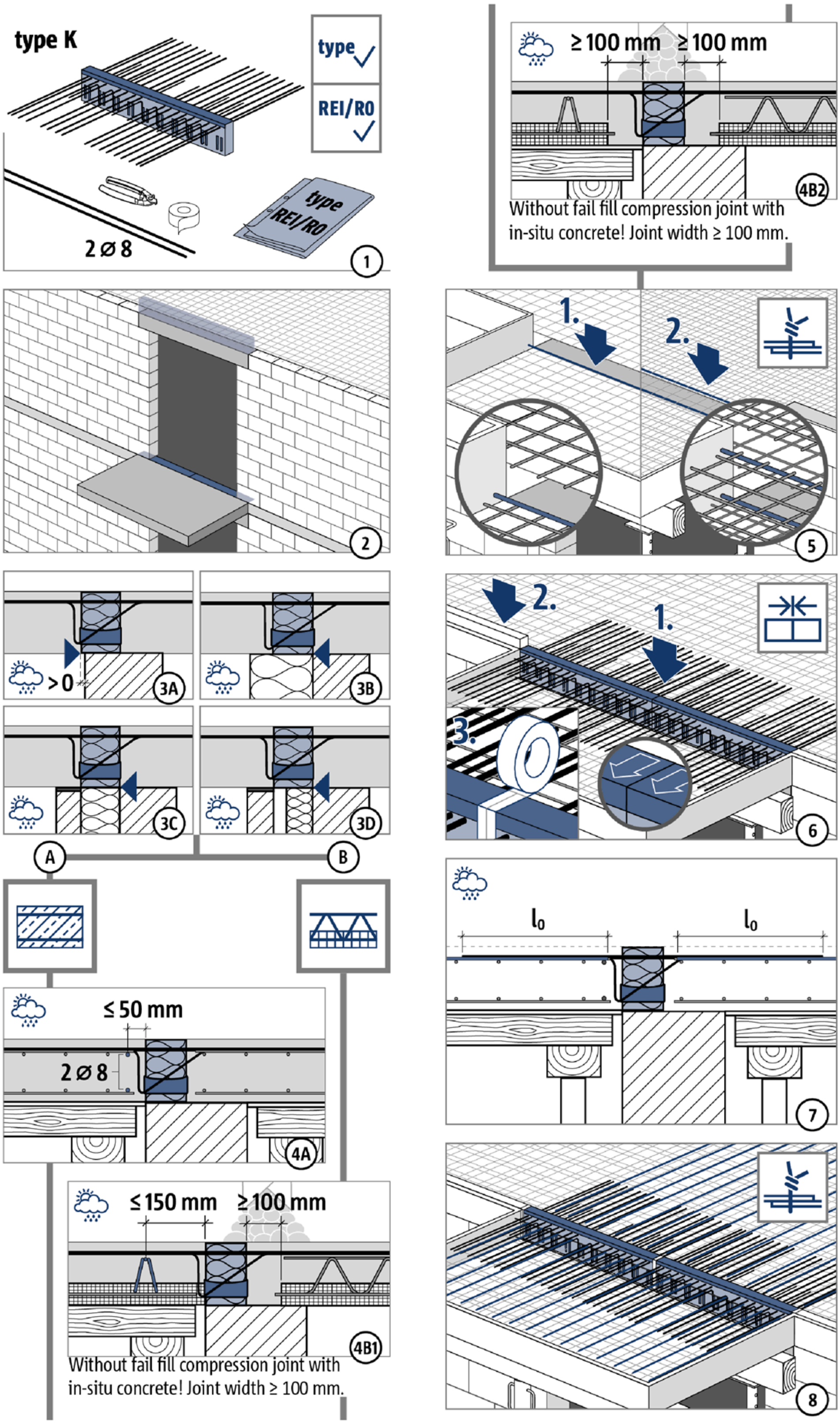
- The installation of the shear force bars directly underneath the longitudinal bars of the slab connection is possible.
- The installation is monitored, e.g. by construction engineer.
- The necessary installation steps shall be described in the installation instructions (see Annex B5).

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.7 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:
  1. Shall overlap the tensile bars.
- Uplift shear forces or uplifting moments are transferred:
  1. Shall overlap the tensile bars and compression bars.
- Exclusively shear forces are transferred:
  1. The required tensile reinforcement shall not be graded around the load bearing thermal insulation element.
  2. The tensile reinforcement shall be anchored in the compression zone on the frontal side with hooks.
  3. 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

Intended use
Installation instructions Schöck Isokorb® Type K

Annex B5

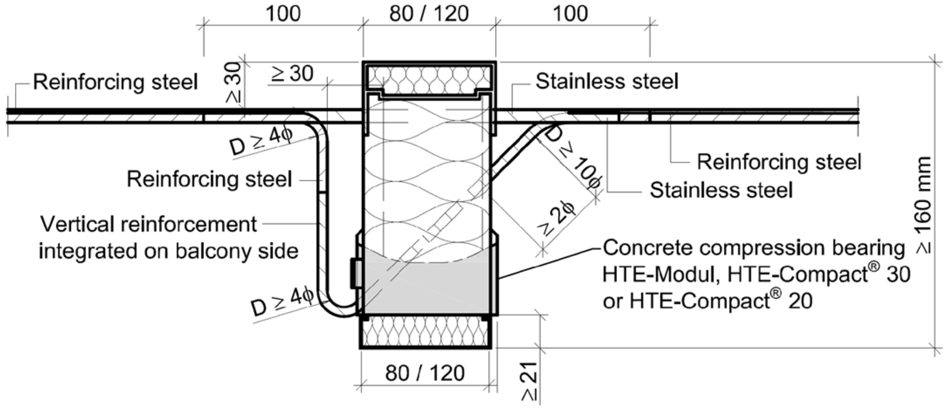


Fig. B.4: Example of Schöck Isokorb® Type K with CCE

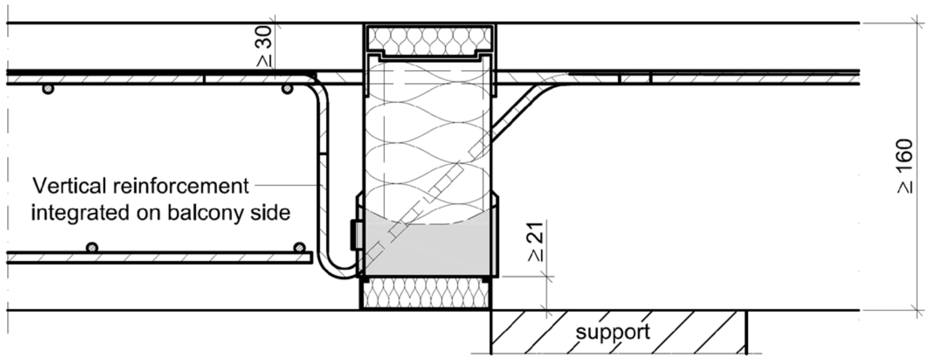


Fig. B.5: Example of Schöck Isokorb® Type K with CCE in installed condition

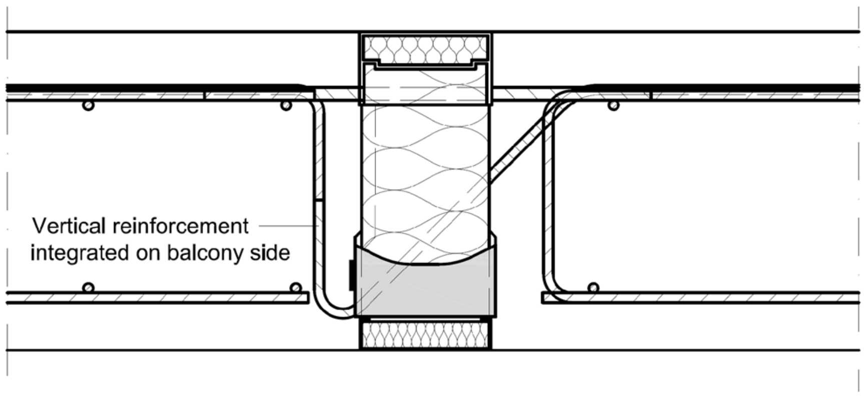


Fig. B.6: Example of Schöck Isokorb® Type K according to Fig. B.4 with CCE with indirect support

Schöck Isokorb® with compression elements made of concrete or steel

Intended use
Installation requirements

Annex B6

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.7 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

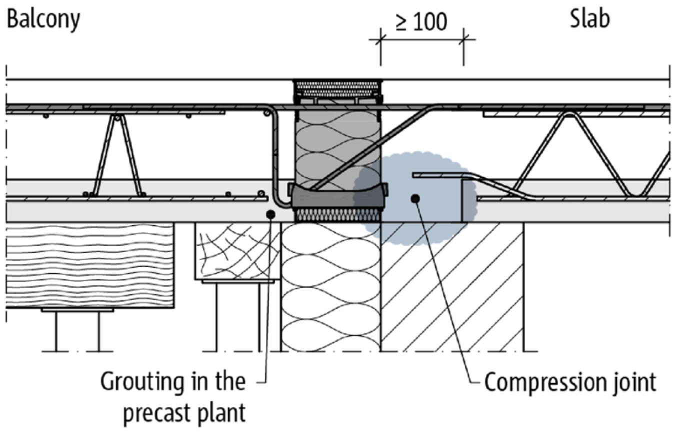


Fig. B.7: Schöck Isokorb® Type K with CCE or SCE and prefabricated concrete slab, compression joint

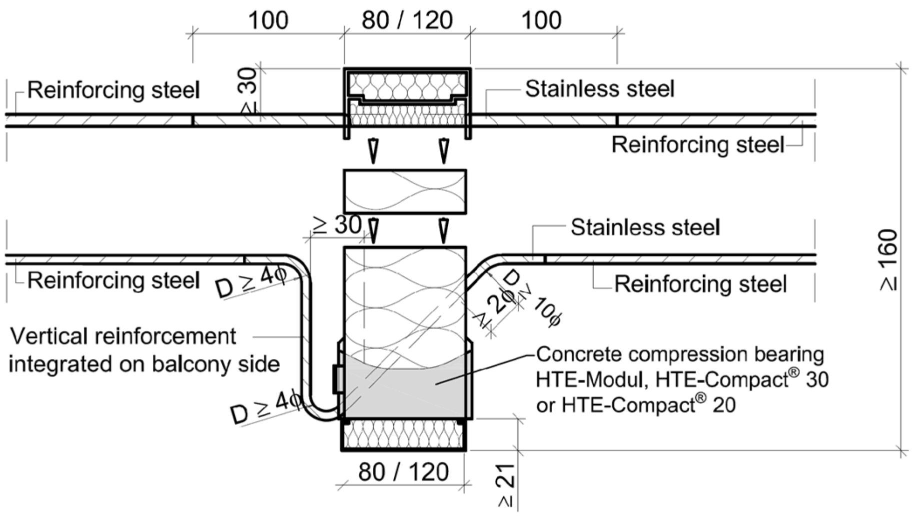


Fig. B.8: Example of Schöck Isokorb® Type K-F (variation in several parts) with CCE

Schöck Isokorb® with compression elements made of concrete or steel	Annex B7
Intended use Installation requirements	

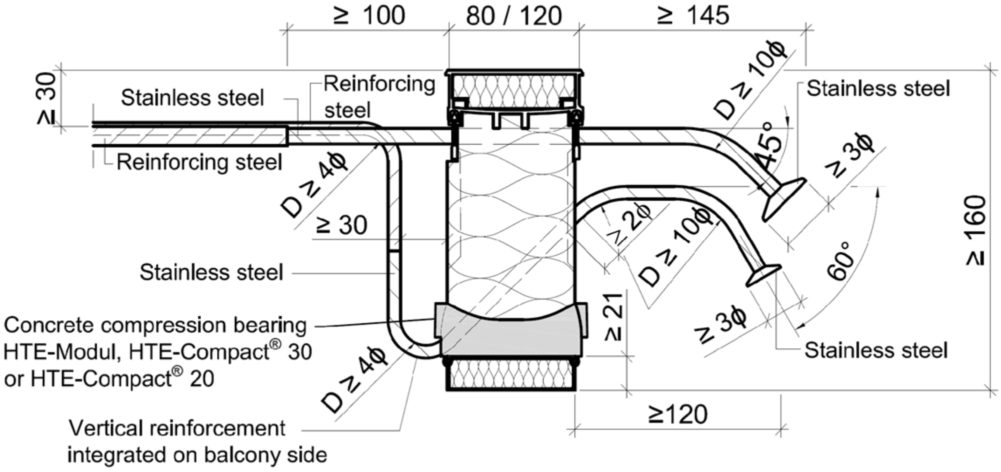


Fig. B.9: Example of Schöck Isokorb® Type K-O with CCE

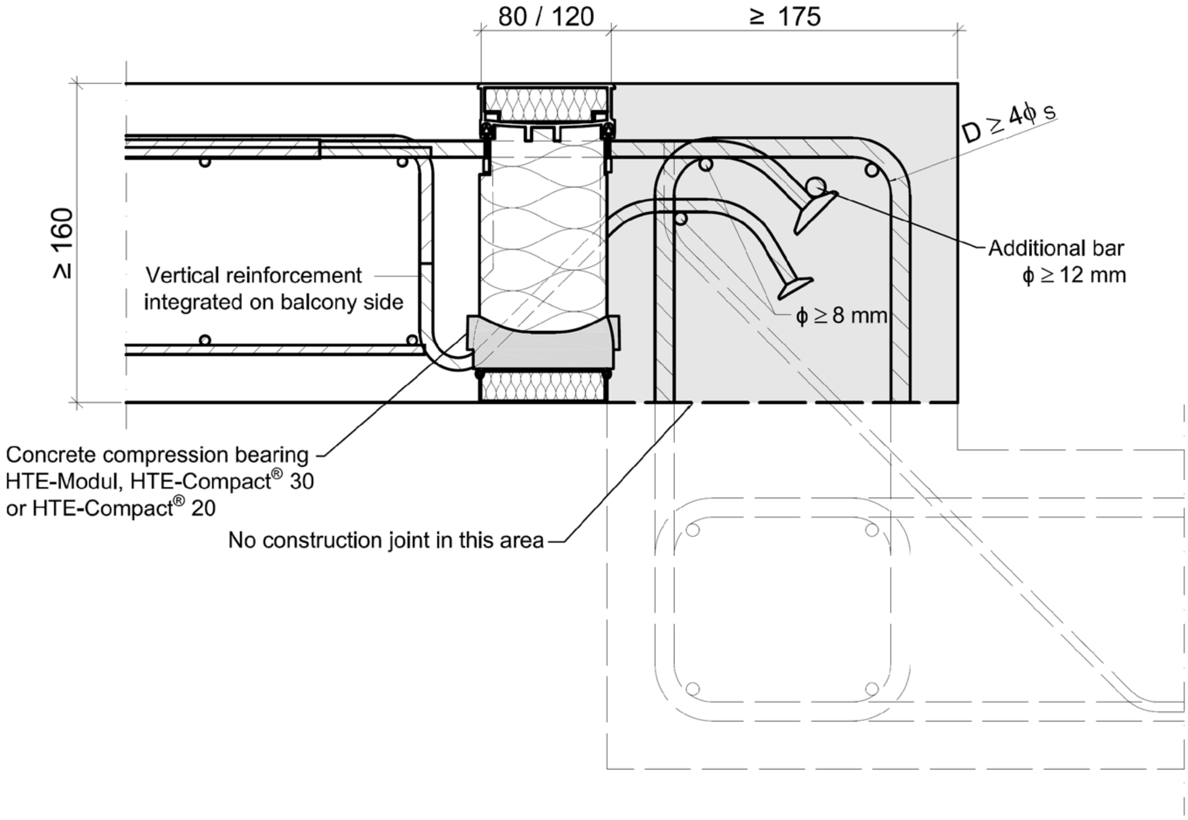


Fig. B.10: Example of Schöck Isokorb® Type K-O with CCE in installed condition with connection to wall or height offset

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

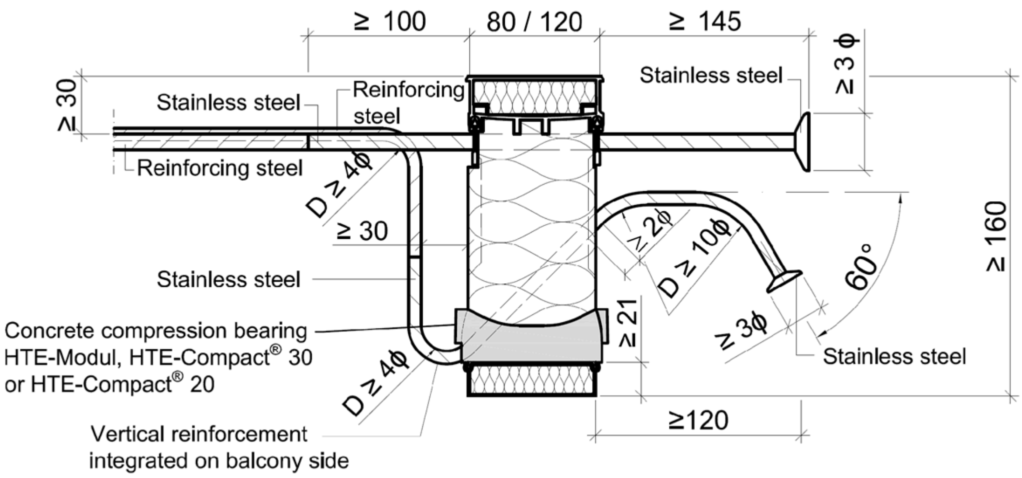


Fig. B.11: Example of Schöck Isokorb® Type K-U with CCE

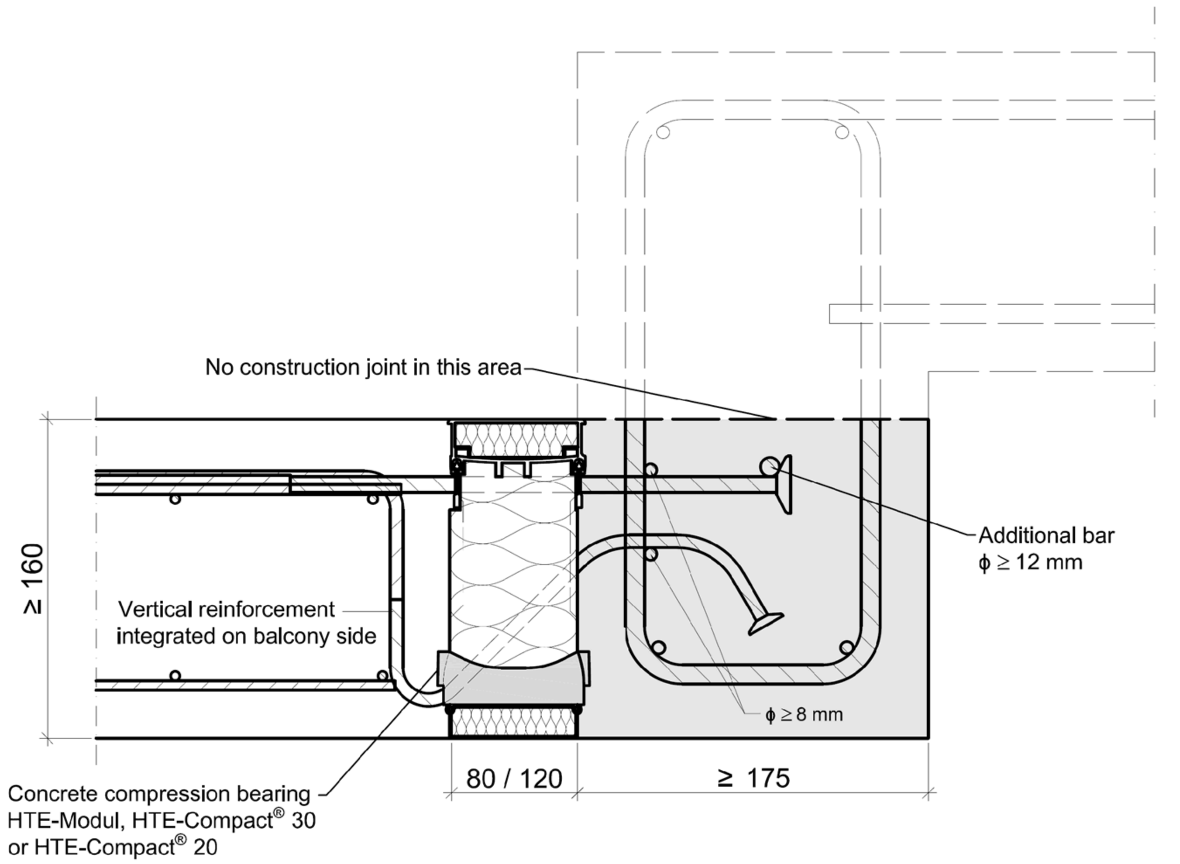


Fig. B.12: Example of Schöck Isokorb® Type K-U with CCE in installed condition with connection to wall or height offset

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

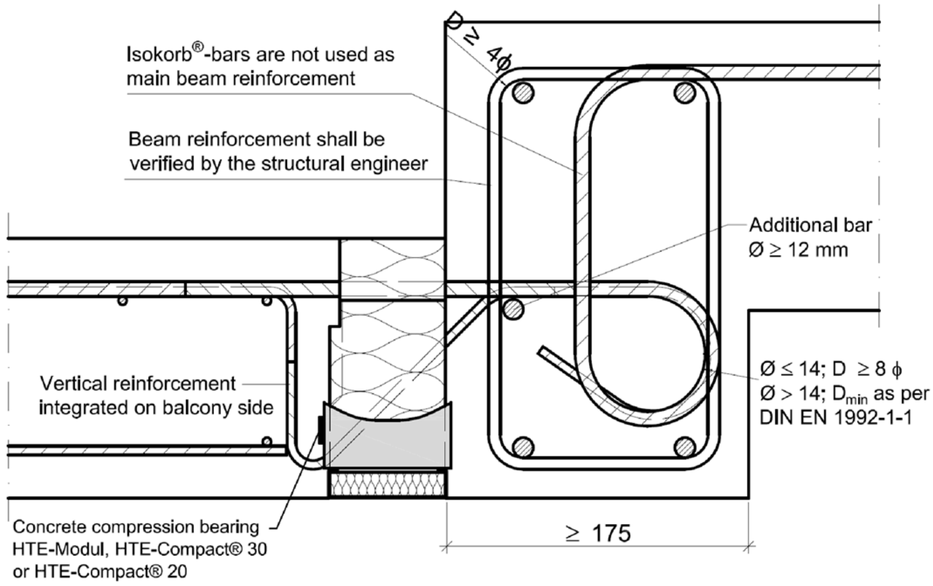


Fig. B.13: Example of Schöck Isokorb® Type K-HV with CCE

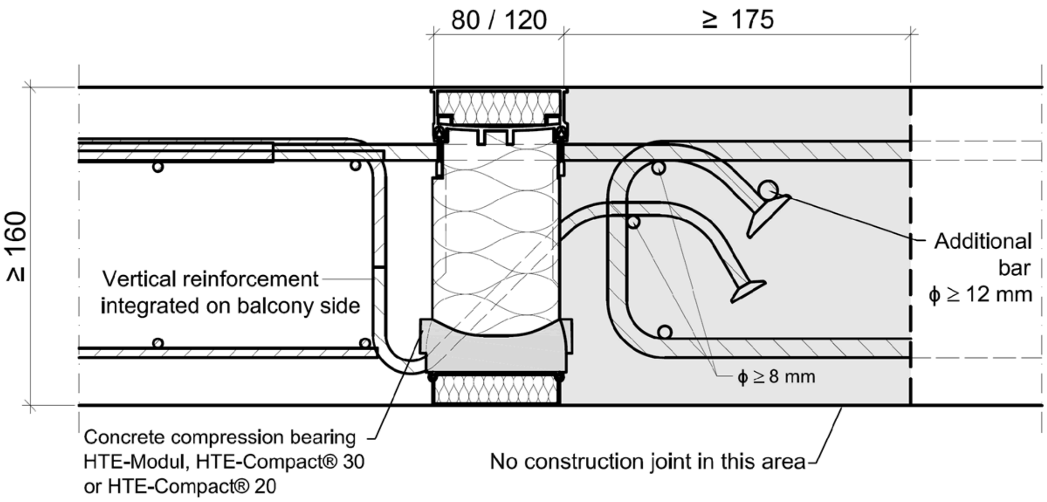


Fig. B.14: Example of Schöck Isokorb® Type K-O with CCE in ceiling connection without offset

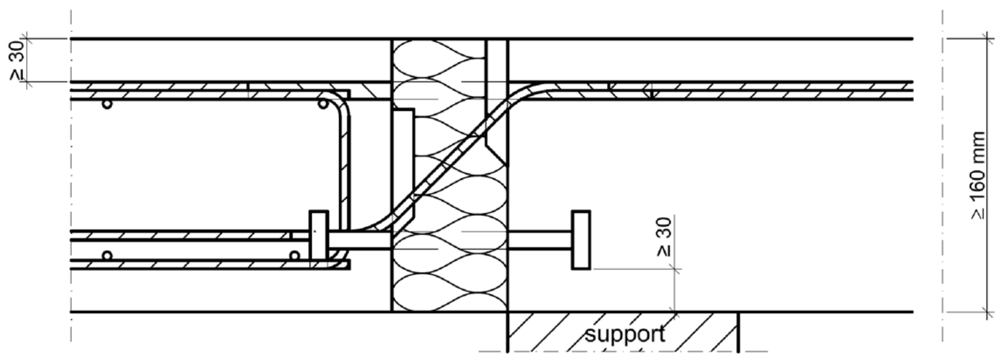


Fig. B.15: Example of Schöck Isokorb® Type K with SCE with vertical reinforcement according to section D.1.1

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

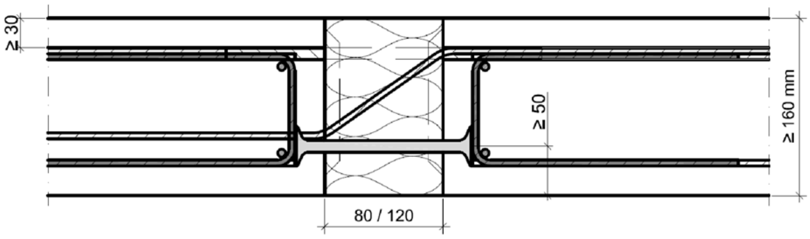


Fig. B.16: Example of Schöck Isokorb® Type K with SCE with vertical reinforcement according to section D.1.1

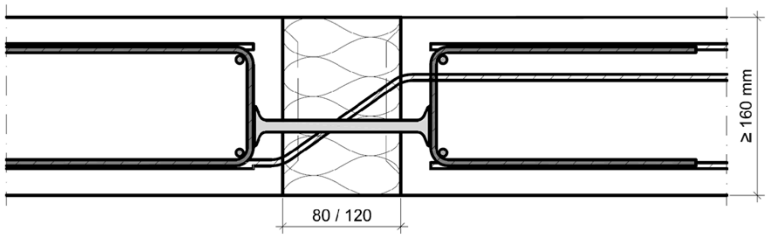


Fig. B.17: Example of Schöck Isokorb® Type Q with SCE (or CCE) with shear force bar with straight bar ends

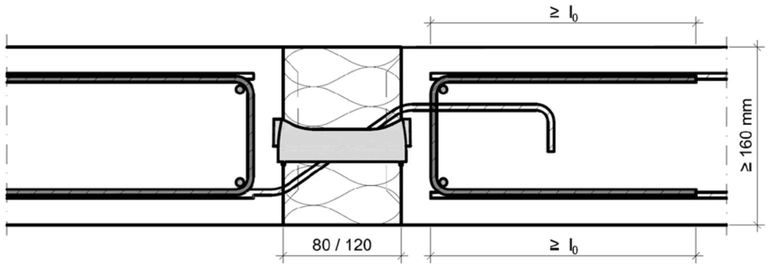


Fig. B.18: Example of Schöck Isokorb® Type Q with CCE (or SCE) and shear force bar Ø 6 mm with shortened bar ends and with stirrups ≥ 8 mm according to section D.1.2.8

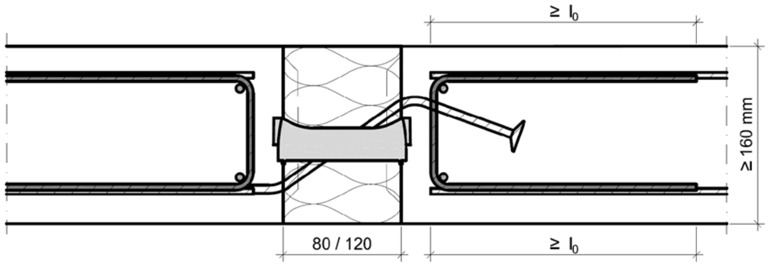


Fig. B.19: Example of Schöck Isokorb® Type Q with CCE (or SCE) and shear force bar Ø 8 mm with anchor head (one-sided) and with stirrups ≥ 8 mm according to section D.1.2.8

Schöck Isokorb® with compression elements made of concrete or steel

Intended use
Installation requirements

Annex B11

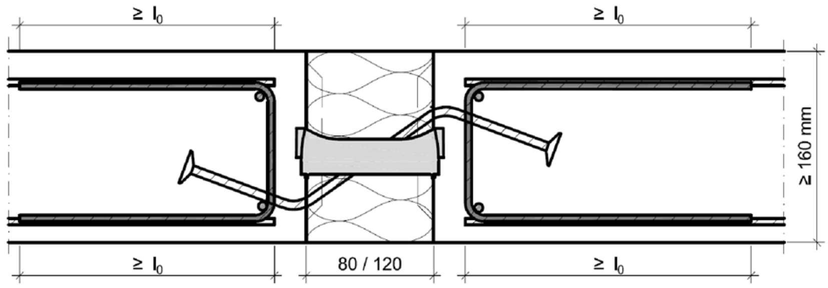


Fig. B.20: Example of Schöck Isokorb® Type Q with CCE (or SCE) and shear force bar Ø 8 mm with anchor head (on both sides) and with stirrups ≥ 8 mm according to section D.1.2.8

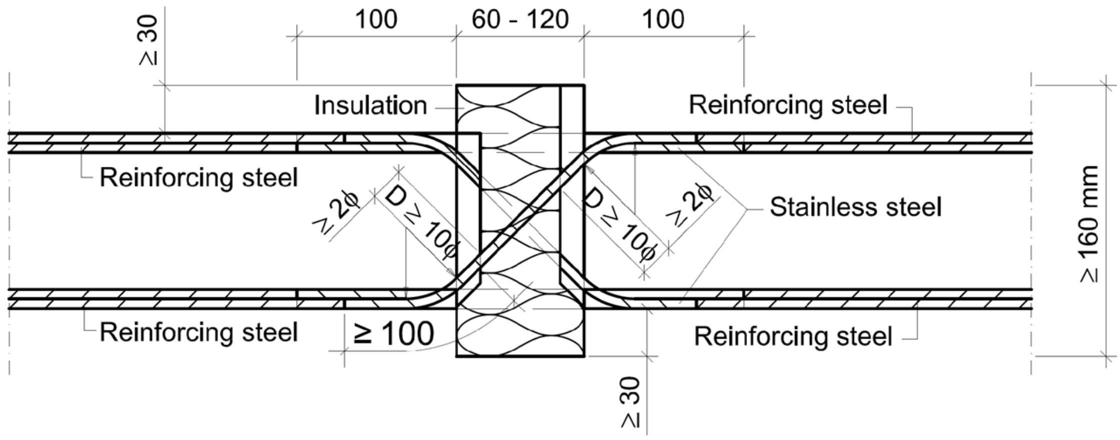


Fig. B.21: Example of Schöck Isokorb® Type D with SCE

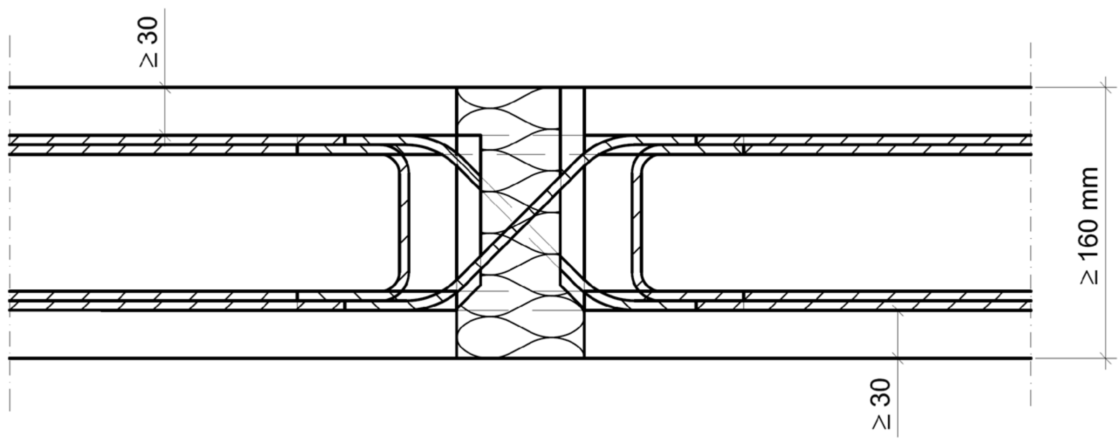


Fig. B.22: Example of Schöck Isokorb® Type D with SCE with on-site reinforcement

Schöck Isokorb® with compression elements made of concrete or steel	
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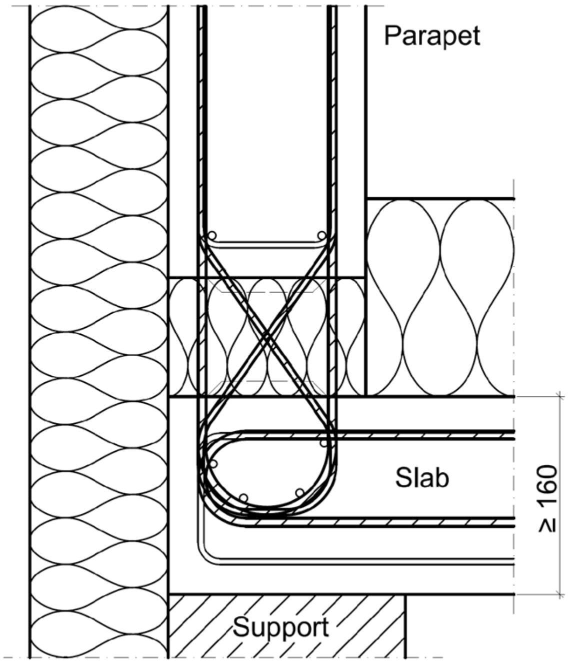

Fig. B.23: Example of Schöck Isokorb® Type A with SCE with on-site reinforcement

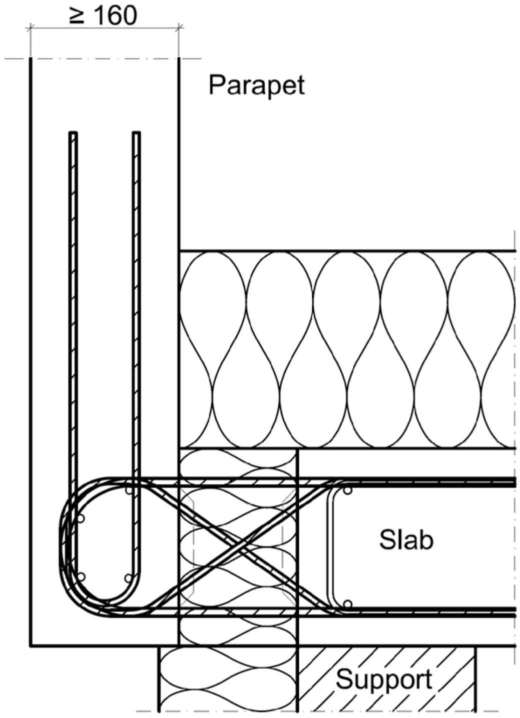

Fig. B.24: Example of Schöck Isokorb® Type F with SCE with on-site reinforcement

Schöck Isokorb® with compression elements made of concrete or steel	Annex B13
Intended use Installation requirements	

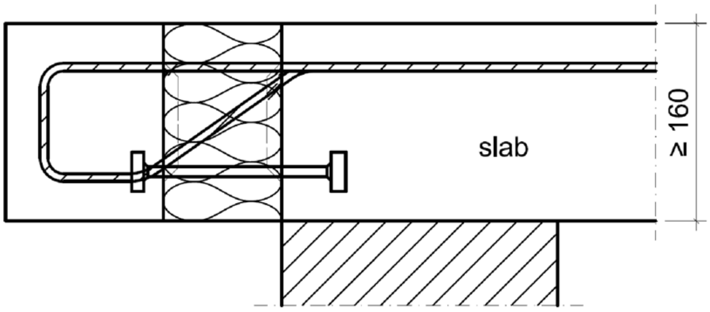

Fig. B.25: Example of Schöck Isokorb® Type O with SCE

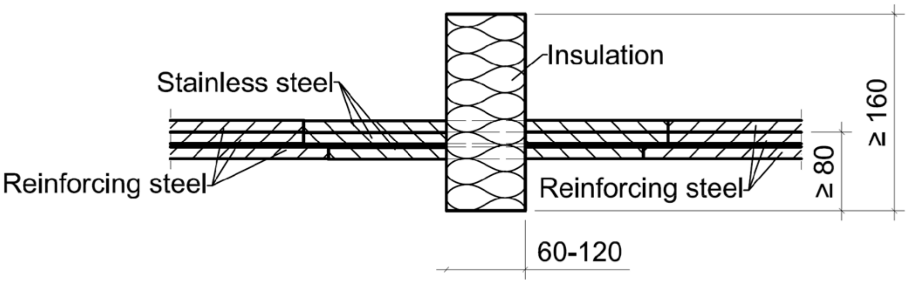

Fig. B.26: Example of Schöck Isokorb® Type H with SCE

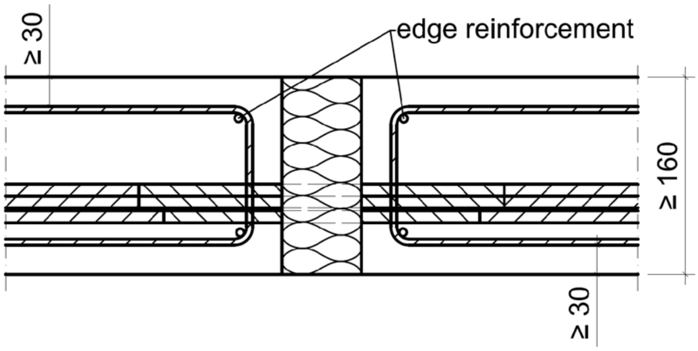

Fig. B.27: Example of Schöck Isokorb® Type H with SCE and on-site reinforcement

B.2.4 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.

C.1 Load bearing capacity

C.1.1 Load bearing capacity of bars

C.1.1.1 Tension bars according to section A.2.1

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
Stainless reinforcing steel ($R_{p0.2}$ = 800 N/mm²)	661
Stainless reinforcing steel ($R_{p0.2}$ = 820 N/mm²)	678
Stainless steel round bars S355	323
Stainless steel round bars S460	418
Stainless steel round bars S690	627

C.1.1.2 Shear force bars according to section A.2.2

Table C.2: Design values of the yield strengths for tension loads

Calculation method	**f_{yd} [N/mm²]**
Simplified calculation	435 for stainless reinforcing steel ($R_{p0,2}$ ≥ 500 N/mm²) and shear force bar variants according to Fig. A.21 to Fig. A.28
Detailed calculation	$\sigma_B \cdot AF \cdot \alpha_{Head} \cdot \left(\frac{f_{ck}}{25}\right)^{0,5} \leq 609$ for stainless reinforcing steel ($R_{p0,2}$ ≥ 700 N/mm²) and shear force bar variants acc. to Fig. A.23, Fig. A.29 to Fig. A.31

with:

σ_B Base tension stress in N/mm² according to Table C.4 to Table C.9, depending on Ø, α and $Ø_{BR}$
Linear interpolation may be used for intermediate values.

AF Distance factor see Fig. C.1, as a function of c_d

$$c_d = \min \begin{Bmatrix} \text{clear edge distance } c_x \\ \text{half clear centre distance } \frac{c_s}{2} \end{Bmatrix}$$

Table C.3: Minimum values for c_d depending on the shear force bar diameter

Shear force bar diameter [mm]	**6**	**8**	**10**	**12**	**14**
c_d [mm]	15	20	25	30	35

$$\alpha_{Head} \begin{Bmatrix} \text{1,0 for straight bar ends} \\ \text{1,0 for bent bar ends Ø 6 mm} \\ \text{0,7 for bent bars ends Ø > 6 mm and anchor heads} \end{Bmatrix}$$

f_{ck} Characteristic compressive strength of concrete in N/mm²; 20 N/mm² ≤ f_{ck} ≤ 50 N/mm²

Bar variants acc. to Fig. A.29: c_d ≥ 25 mm, min. C20/25, f_{yd} ≤ 600 N/mm²

Bar variants acc. to Fig. A.30 and Fig. A.31: c_d ≥ 46 mm, min. C20/25

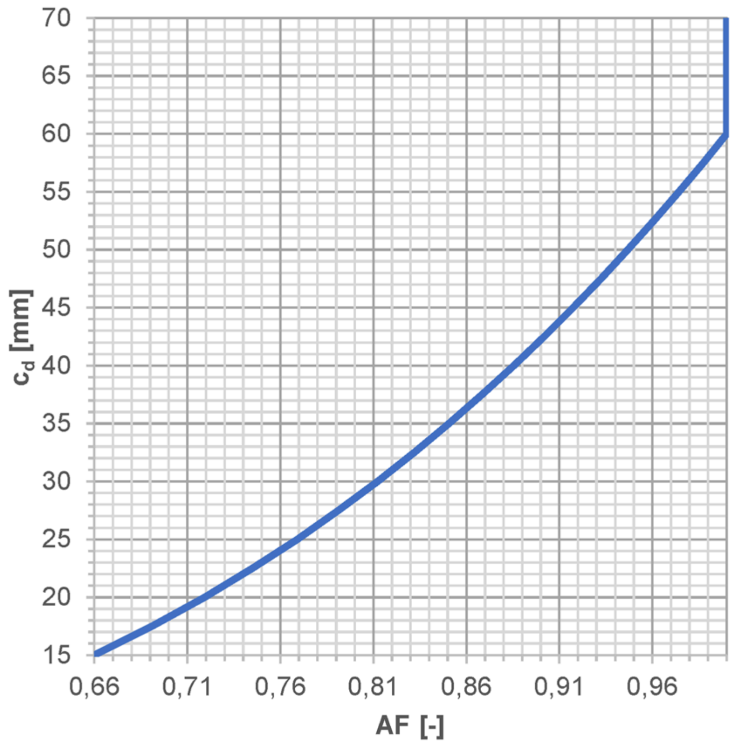

Fig. C.1: Distance factor AF as a function of c_d

Table C.4: Base tension stress σ_B [N/mm²] for shear force bars Ø 6 mm depending on α und $Ø_{BR}$

σ_B [N/mm²]		$Ø_{BR}$ [mm]																						
		30	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**220**	**240**	**260**	**280**	**300**
α [°]	**30**	505	528	546	561	574	586	596	605	614	622	630	637	643	650	656	661	667	672	682	690	699	707	714
	32	510	533	551	566	580	591	602	611	620	628	636	643	650	656	662	668	673	678	688	697	706	713	721
	34	515	538	556	571	585	597	607	617	626	634	642	649	656	662	668	674	679	685	694	704	712	720	727
	35	517	540	558	574	587	599	610	620	629	637	645	652	659	665	671	677	682	688	697	707	715	723	731
	36	519	542	561	576	590	602	613	622	631	640	647	654	661	668	674	680	685	690	700	710	718	726	734
	38	524	547	565	581	595	607	618	627	636	645	653	660	667	673	679	685	691	696	706	715	724	732	740
	40	528	551	570	586	599	611	622	632	641	650	658	665	672	678	685	690	696	701	712	721	730	738	745
	42	532	555	574	590	604	616	627	637	646	654	662	670	677	683	690	696	701	707	717	726	735	743	751
	44	535	559	578	594	608	620	631	641	651	659	667	674	682	688	694	700	706	712	722	731	740	748	756
	45	537	561	580	596	610	622	633	643	653	661	669	677	684	690	697	703	708	714	724	734	743	751	759
	46	539	563	582	598	612	624	635	646	655	663	671	679	686	693	699	705	711	716	727	736	745	753	761
	48	542	566	586	602	616	628	640	650	659	668	676	683	690	697	704	710	715	721	731	741	750	758	766
	50	546	570	589	605	620	632	643	654	663	672	680	688	695	701	708	714	720	725	736	745	754	763	771
	55	554	578	598	614	629	641	653	663	673	682	690	697	705	712	718	724	730	736	746	756	765	774	782
	60	561	586	605	622	637	650	661	672	682	690	699	707	714	721	727	734	740	745	756	766	775	784	792
	65	568	593	613	630	645	658	669	680	690	699	707	715	723	730	736	743	749	754	765	775	785	793	802
	70	574	599	620	637	652	665	677	688	697	707	715	723	731	738	745	751	757	763	774	784	793	802	811

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Load bearing capacity

Annex C2

Table C.5: Base tension stress σ_B [N/mm²] for shear force bars Ø 6,5 mm depending on α und $Ø_{BR}$

σ_B [N/mm²]		$Ø_{BR}$ [mm]																				
		30	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**220**	**240**	**260**	**280**	**300**
α [°]	**30**	491	513	531	545	558	569	580	589	597	605	612	619	626	632	638	643	648	653	663	671	679	687	694
	32	496	518	536	551	564	575	585	594	603	611	618	625	632	638	644	649	655	660	669	678	686	694	701
	34	501	523	541	556	569	580	591	600	609	617	624	631	638	644	650	655	661	666	675	684	692	700	707
	35	503	525	543	558	571	583	593	603	611	619	627	634	640	647	652	658	663	669	678	687	695	703	710
	36	505	527	545	560	574	585	596	605	614	622	629	636	643	649	655	661	666	671	681	690	698	706	713
	38	509	532	550	565	578	590	600	610	619	627	634	642	648	655	661	666	672	677	687	696	704	712	719
	40	513	536	554	569	583	594	605	615	624	632	639	647	653	660	666	671	677	682	692	701	709	717	725
	42	517	540	558	574	587	599	610	619	628	636	644	651	658	664	671	676	682	687	697	706	715	723	730
	44	521	543	562	578	591	603	614	624	633	641	649	656	663	669	675	681	687	692	702	711	720	728	735
	45	522	545	564	580	593	605	616	626	635	643	651	658	665	671	678	683	689	694	704	713	722	730	738
	46	524	547	566	581	595	607	618	628	637	645	653	660	667	674	680	686	691	697	707	716	724	733	740
	48	527	551	569	585	599	611	622	632	641	649	657	664	671	678	684	690	696	701	711	720	729	737	745
	50	531	554	573	589	603	615	626	636	645	653	661	669	676	682	688	694	700	705	715	725	734	742	750
	55	538	562	581	597	611	624	635	645	654	663	671	678	685	692	698	704	710	715	726	735	744	752	760
	60	545	569	589	605	619	632	643	653	663	671	679	687	694	701	707	713	719	725	735	745	754	762	770
	65	552	576	596	612	627	639	651	661	671	679	688	695	703	709	716	722	728	734	744	754	763	772	780
	70	558	583	603	619	634	647	658	669	678	687	695	703	710	717	724	730	736	742	752	762	772	780	788

Table C.6: Base tension stress σ_B [N/mm²] for shear force bars Ø 8 mm depending on α und $Ø_{BR}$

σ_B [N/mm²]		$Ø_{BR}$ [mm]																				
		32	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**220**	**240**	**260**	**280**	**300**
α [°]	**30**	461	477	493	507	519	529	539	547	555	563	569	576	582	587	593	598	603	607	616	624	632	639	646
	32	466	482	498	512	524	535	544	553	561	568	575	581	587	593	599	604	609	613	622	630	638	645	652
	34	470	486	503	517	529	540	549	558	566	573	580	587	593	599	604	609	614	619	628	636	644	651	658
	35	472	488	505	519	531	542	552	560	568	576	583	589	595	601	607	612	617	622	631	639	647	654	661
	36	474	490	507	521	533	544	554	563	571	578	585	592	598	604	609	615	620	624	633	642	649	657	663
	38	478	494	511	525	538	549	558	567	575	583	590	597	603	609	614	620	625	629	638	647	655	662	669
	40	482	498	515	529	542	553	563	572	580	587	595	601	607	613	619	624	629	634	643	652	660	667	674
	42	485	502	519	533	546	557	567	576	584	592	599	606	612	618	624	629	634	639	648	657	665	672	679
	44	489	505	523	537	550	561	571	580	588	596	603	610	616	622	628	633	638	643	653	661	669	677	684
	45	490	507	524	539	552	563	573	582	590	598	605	612	618	624	630	635	641	646	655	663	671	679	686
	46	492	509	526	541	553	565	575	584	592	600	607	614	620	626	632	638	643	648	657	666	674	681	688
	48	495	512	529	544	557	568	578	587	596	604	611	618	624	630	636	642	647	652	661	670	678	686	693
	50	498	515	533	547	560	572	582	591	600	607	615	622	628	634	640	646	651	656	665	674	682	690	697
	55	505	523	540	555	568	580	590	600	608	616	624	631	637	643	649	655	660	665	675	684	692	700	707
	60	512	529	547	563	576	587	598	607	616	624	632	639	646	652	658	663	669	674	684	693	701	709	716
	65	518	536	554	569	583	595	605	615	624	632	639	647	653	660	666	671	677	682	692	701	710	717	725
	70	524	542	560	576	589	601	612	622	631	639	647	654	661	667	673	679	685	690	700	709	717	726	733

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Load bearing capacity

Annex C3

Table C.7: Base tension stress σ_B [N/mm²] for shear force bars Ø 10 mm depending on α und $Ø_{BR}$

σ_B [N/mm²]		$Ø_{BR}$ [mm]																					
		40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300
α [°]	30	441	456	469	480	490	498	506	514	520	527	533	538	543	548	553	558	562	570	577	584	591	597
	32	446	461	474	485	494	503	511	519	525	532	538	543	549	554	558	563	567	575	583	590	597	603
	34	450	465	478	489	499	508	516	523	530	537	543	548	554	559	564	568	572	581	588	595	602	608
	35	452	467	480	491	501	510	518	526	533	539	545	551	556	561	566	571	575	583	591	598	605	611
	36	454	469	482	493	503	512	520	528	535	541	547	553	558	564	568	573	577	586	593	601	607	614
	38	457	473	486	497	507	516	525	532	539	546	552	558	563	568	573	578	582	590	598	605	612	619
	40	461	476	490	501	511	520	529	536	543	550	556	562	567	572	577	582	587	595	603	610	617	623
	42	464	480	493	505	515	524	533	540	547	554	560	566	571	577	582	586	591	599	607	615	622	628
	44	467	483	497	508	519	528	536	544	551	558	564	570	575	581	586	590	595	604	612	619	626	632
	45	469	485	498	510	520	530	538	546	553	560	566	572	577	583	588	592	597	606	614	621	628	635
	46	471	487	500	512	522	531	540	548	555	562	568	574	579	585	590	594	599	608	616	623	630	637
	48	474	490	503	515	525	535	543	551	558	565	571	577	583	588	593	598	603	612	620	627	634	641
	50	476	493	506	518	529	538	547	555	562	569	575	581	587	592	597	602	607	615	623	631	638	645
	55	483	500	514	526	536	546	555	563	570	577	583	589	595	600	606	611	615	624	632	640	647	654
	60	490	506	520	533	543	553	562	570	577	584	591	597	603	608	614	619	623	632	641	648	656	662
	65	496	512	527	539	550	560	569	577	584	591	598	604	610	616	621	626	631	640	648	656	664	670
	70	501	518	533	545	556	566	575	583	591	598	605	611	617	623	628	633	638	647	656	664	671	678

Table C.8: Base tension stress σ_B [N/mm²] for shear force bars Ø 12 mm depending on α und $Ø_{BR}$

σ_B [N/mm²]		$Ø_{BR}$ [mm]																					
		48	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300
α [°]	30	426	428	440	450	459	468	475	482	488	494	500	505	510	514	519	523	527	535	542	548	554	560
	32	430	432	444	455	464	472	480	487	493	499	505	510	515	519	524	528	532	540	547	554	560	566
	34	434	436	448	459	468	476	484	491	497	503	509	514	519	524	529	533	537	545	552	559	565	571
	35	435	438	450	461	470	479	486	493	500	506	511	517	522	526	531	535	539	547	554	561	567	573
	36	437	440	452	463	472	481	488	495	502	508	513	519	524	529	533	538	542	550	557	563	570	576
	38	441	444	456	467	476	484	492	499	506	512	518	523	528	533	538	542	546	554	561	568	574	580
	40	444	447	459	470	480	488	496	503	510	516	522	527	532	537	542	546	550	558	566	572	579	585
	42	448	450	463	474	483	492	500	507	513	520	526	531	536	541	546	550	554	562	570	577	583	589
	44	451	453	466	477	487	495	503	510	517	523	529	535	540	545	550	554	558	566	574	581	587	593
	45	452	455	468	479	488	497	505	512	519	525	531	537	542	547	551	556	560	568	576	583	589	595
	46	454	456	469	480	490	499	507	514	521	527	533	538	544	548	553	558	562	570	578	585	591	597
	48	457	459	472	483	493	502	510	517	524	530	536	542	547	552	557	561	566	574	581	588	595	601
	50	459	462	475	486	496	505	513	520	527	533	539	545	550	555	560	565	569	577	585	592	599	605
	55	466	469	482	493	503	512	520	528	535	541	547	553	558	563	568	573	577	586	593	600	607	613
	60	472	475	488	500	510	519	527	535	542	548	554	560	566	571	576	580	585	593	601	608	615	622
	65	478	481	494	506	516	525	533	541	548	555	561	567	572	578	583	587	592	600	608	616	623	629
	70	483	486	500	511	522	531	539	547	554	561	567	573	579	584	589	594	599	607	615	623	630	636

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Load bearing capacity

Annex C4

Table C.9: Base tension stress σ_B [N/mm²] for shear force bars Ø 14 mm depending on α und $Ø_{BR}$

σ_B [N/mm²]		$Ø_{BR}$ [mm]																				
		56	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**220**	**240**	**260**	**280**	**300**
α [°]	**30**	413	417	427	435	443	450	457	463	468	473	478	483	487	492	496	499	507	513	519	525	531
	32	417	421	431	440	447	454	461	467	473	478	483	488	492	496	500	504	512	518	525	530	536
	34	420	425	435	444	451	459	465	471	477	482	487	492	497	501	505	509	516	523	529	535	541
	35	422	427	437	445	453	461	467	473	479	484	490	494	499	503	507	511	518	525	532	538	543
	36	424	428	438	447	455	463	469	475	481	487	492	496	501	505	509	513	521	527	534	540	545
	38	428	432	442	451	459	466	473	479	485	490	496	500	505	509	513	517	525	532	538	544	550
	40	431	435	445	454	463	470	477	483	489	494	499	504	509	513	517	521	529	536	542	548	554
	42	434	438	449	458	466	473	480	487	492	498	503	508	513	517	521	525	533	540	546	552	558
	44	437	442	452	461	469	477	484	490	496	501	507	512	516	521	525	529	537	544	550	556	562
	45	438	443	453	463	471	478	485	492	498	503	508	513	518	522	527	531	538	545	552	558	564
	46	440	445	455	464	472	480	487	493	499	505	510	515	520	524	528	532	540	547	554	560	566
	48	443	447	458	467	475	483	490	496	502	508	513	518	523	527	532	536	544	551	557	564	570
	50	445	450	461	470	478	486	493	499	505	511	516	521	526	531	535	539	547	554	561	567	573
	55	452	457	467	477	485	493	500	507	513	518	524	529	534	538	543	547	555	562	569	575	581
	60	458	463	473	483	492	499	507	513	519	525	531	536	541	545	550	554	562	570	576	583	589
	65	463	468	479	489	498	505	513	519	526	532	537	542	547	552	557	561	569	576	583	590	596
	70	469	473	484	494	503	511	518	525	532	538	543	548	553	558	563	567	575	583	590	596	603

C.1.1.3 Tension bars with anchor head according to Fig. A.18 and Fig. A.19 (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.10. A maximum of ten tension bars with anchor head shall be placed per meter.

Table C.10: 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.1.1.4 Shear force bars with anchor head according to Fig. A.25 (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.11.

Table C.11: Design values per shear force bar

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

C.1.1.5 Horizontal bars according to section A.2.3

Table C.12: 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.26	1.3 · l_{bd} according to Fig. A.32	$H_{II,d}$ 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.13: Design values of horizontal force perpendicular to joint $H_{\perp,d}$ for horizontal straight bars

Diameter	Insulation thickness	1.0 · l_{bd} according to Fig. A.33	$H_{\perp,d}$ 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.1.1.6 Steel compression elements (SCE) according to section A.2.4

Table C.14: Design values $N_{ki,d}$ of compression force for stainless steels

Ø	Insulation thickness	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]	[kN]	[kN]	[kN]	[kN]
6	60	-	11,0	-	-
	80	-	10,7	-	-
	120	-	8,2	-	-
8	60	-	21,3	-	-
	80	-	21,7	-	-
	120	-	17,8	-	-
10	60	-	35,0	27,4	-
	80	-	36,3	26,0	-
	120	-	31,5	23,3	-
12	60	-	52,1	40,5	-
	80	-	53,6	38,8	-
	120	-	49,5	35,4	-
14	80	53,4	71,5	54,1	70,7
	120	49,2	67,3	50,1	64,4
16	80	-	-	72,1	100,7
	120	-	-	67,4	95,4
20	80	-	-	115,7	152,4
	120	-	-	110,0	143,0

Table C.15: Design values $N_{Rd,c}$ of tensile force of steel compression elements acc. to Fig. A.34 and Fig. A.39

		Embedded length h_{ef}	Edge distance c_o, c_u top, bottom	Tensile force $N_{Rd,c}$
		[mm]	[mm]	[kN/SCE]
Concrete strength class	C20/25	≥ 50	≥ 75	0,071 · c
	C25/30			0,079 · c

with:

c	min(c_1; c_2; S_n/2; 75) in mm
c_1, c_2	Lateral edge distance of steel compression elements SCE, left or right in mm
S_n	Minimal centre distance of steel compression elements SCE in mm

C.1.2 Load bearing capacity of Concrete Compression Elements (CCE) according to section A.2.5

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.16: Design values for the HTE-Modul (alternatively HTE-Compact® 30)

Minimum centre 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.12 and Fig. B.13 the design values according to Table C.16 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.17
$a_{c,z}$ ... see Table C.18

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.49 and Fig. A.50 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.19
c_1	edge distance of the load resultant in mm, according to Annexes D3 and D4
a	centre 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.17
$a_{c,z}$	see Table C.18

Table C.17: Factor $a_{c,uz}$ for consideration of the beam width for height offsets

Connection situation	**Beam width [mm]**	**$a_{c,uz}$**
Fig. B.12 and Fig. B.13	175 ≤ b ≤ 240	$0{,}0245 \cdot b^{2/3}$
	b > 240	0,95
others	-	1,0

Table C.18: 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.12 and Fig. B.13	80 ≤ of ≤ 150	1,0
		z > 150	150/z
	others	-	1,0
< 350	general	-	1,0

Table C.19: 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 centre 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 A17

If the number of compression bearings is exceeded or the minimum distance between the compression bearings not reached according to Table C.19, the design values for HTE-Compact® 30 can be taken from Table C.16.

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

Table C.20: 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 according to section A.2.1 and steel compression elements (SCE) according to section A.2.4

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	80	-	-	-	-	3,16	4,74
	120	-	-	-	-	2,23	3,34
20	80	-	-	-	-	5,92	8,88
	120	-	-	-	-	4,23	6,34

Table C.21: 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 according to section A.2.2

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.22: Design values of the plastic horizontal force parallel to the joint $H_{IIpl,d}$ in the earthquake design case for Concrete Compression Elements (CCE) according to section A.2.5

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

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 C9 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.24. 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.2 to Fig. C.7 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 C13 to C14).
- The fire protection boards in the area of planned tensile loads shall be realized with a lateral overhang of 10 mm in relation to the insulation body for the design variants shown in Fig. C.3 and Fig. C.7.
- The lateral overhang of 10 mm in relation to the insulation body on both lateral surfaces is not necessary for the design variants shown in Fig. C.2, Fig. C.4 to Fig. C.6.
- The required thicknesses t of the fire protection boards, the minimum axis spacing v and the minimum concrete cover c_{nom} of the reinforcing steel shall be taken from Table C.23.

Table C.23: Minimum dimensions of c_{nom}, u and v and required thickness of fire protection board t in [mm]

c_{nom} [mm]	according to exposure class EN 1992-1-1
min u [mm]	35
min v_1/v_2 * [mm]	20/21
min t [mm]	according to technical documentation

* see Fig. C.2, Fig. C.4 to Fig. C.6

Table C.24: Fire resistance period (load capacity)

Design variant in accordance with	Fire resistance period (load bearing capacity) in minutes
Fig. C.2	120
Fig. C.3	120
Fig. C.4	120
Fig. C.5	60
Fig. C.6	60
Fig. C.7	120

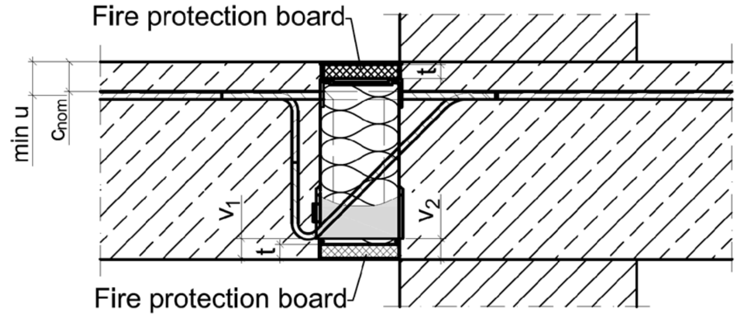

Fig. C.2: Example of Schöck Isokorb® Type K, K-F with CCE

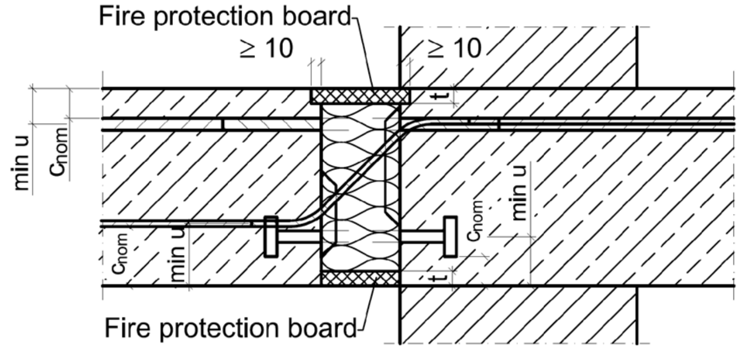

Fig. C.3: Example of Schöck Isokorb® Type K, K-F (analog to Type O) with SCE

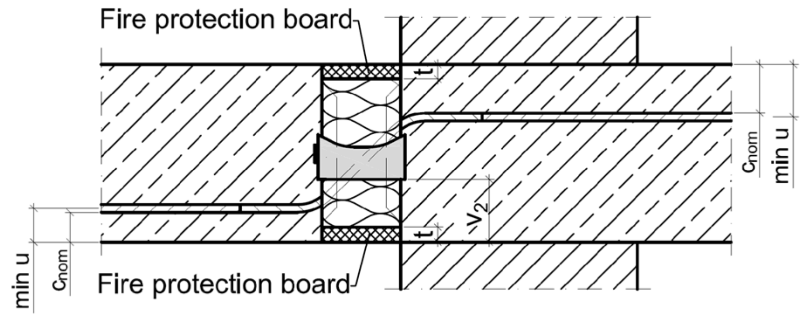

Fig. C.4: Example of Schöck Isokorb® Type Q with CCE (or SCE)

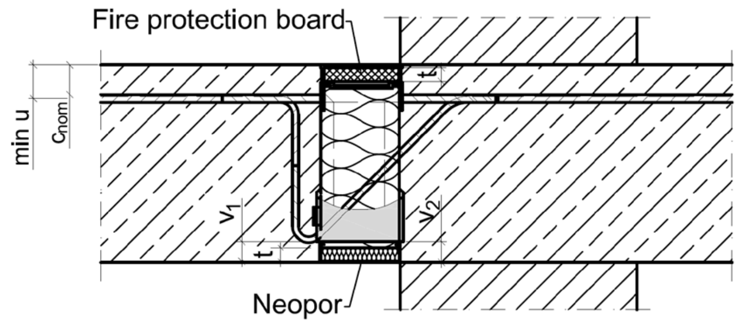

Fig. C.5: Example of Schöck Isokorb® Type K, K-F with CCE (or SCE)

Schöck Isokorb® with compression elements made of concrete or steel	Annex C13
Performance parameters Load bearing capacity in case of fire	

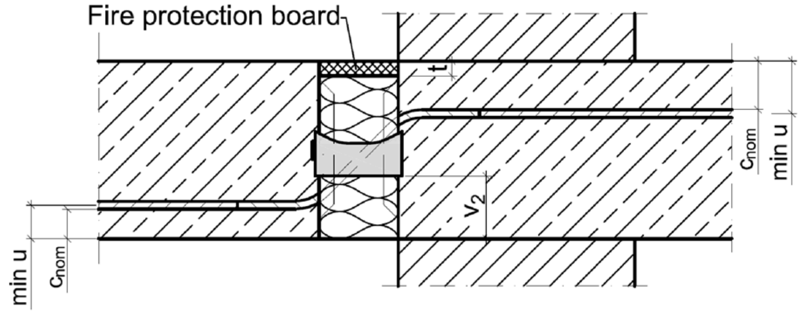

Fig. C.6: Example of Schöck Isokorb® Type Q with CCE

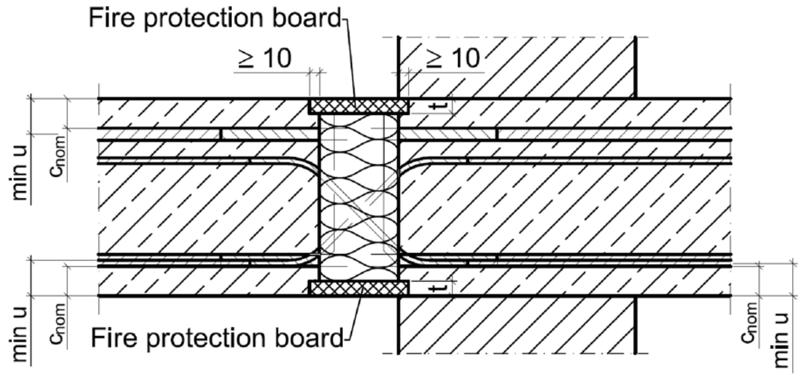

Fig. C.7: Example of Schöck Isokorb® Type D (analog to Type A and Type F) with SCE

Schöck Isokorb® with compression elements made of concrete or steel	
Performance parameters Load bearing capacity in case of fire	Annex C14

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 C13 to C14 – can be classified in terms of fire resistance in accordance with EN 13501-2 as specified in Table C.25. 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.23.
- 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.25: Component classification

Design variant	Floor or roof construction with fire separating function	Balcony and walkway, parapets
Fig. C.2	REI 120	R 120
Fig. C.3	REI 120	R 120
Fig. C.4	REI 120	R 120
Fig. C.5	REI 60	R 60
Fig. C.6	REI 60	R 60
Fig. C.7	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.8 (with concrete compression elements (CCE)) respectively Fig. C.9 (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.8 or Fig. C.9
$R_{eq,TI}$	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

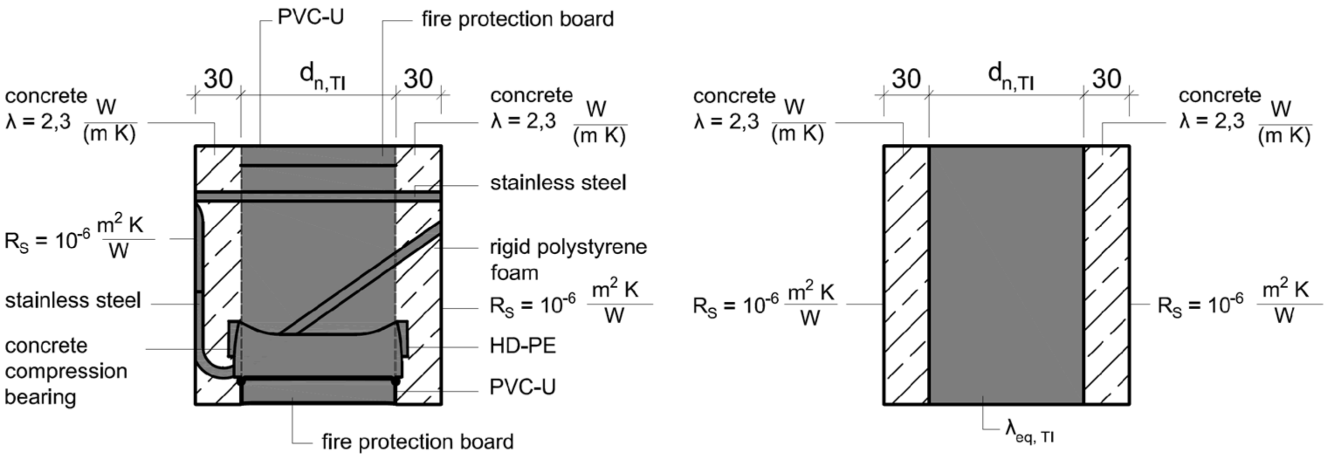

Fig. C.8: Cross section of the configuration with concrete compression elements (CCE) to calculate the equivalent thermal resistance $R_{eq,TI}$ and simplified model with $\lambda_{eq,TI}$

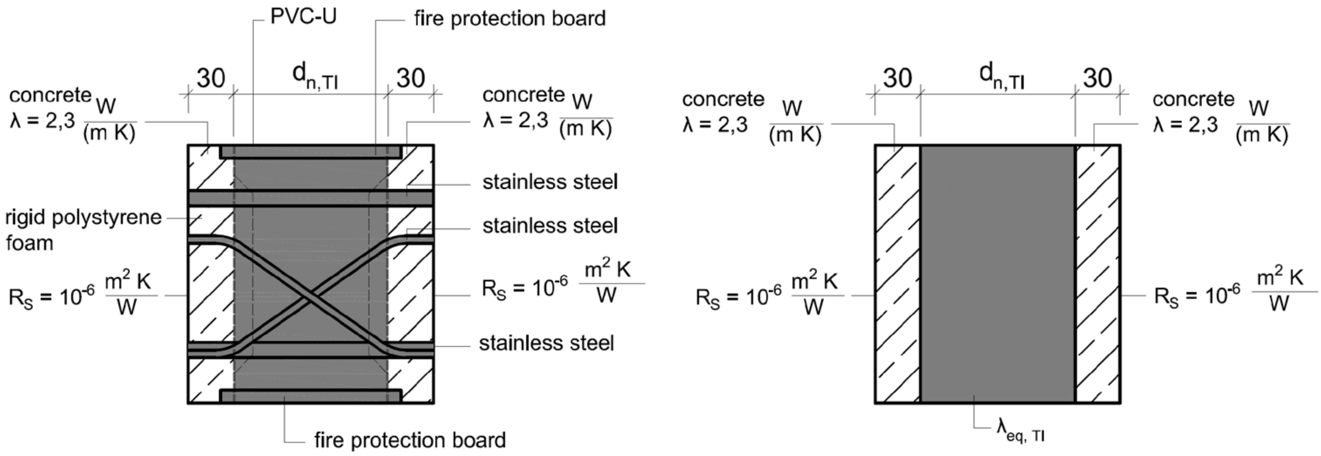

Fig. C.9: Cross section of the configuration with steel compression elements (SCE) to calculate the equivalent thermal resistance $R_{eq,TI}$ and simplified model with $\lambda_{eq,TI}$

The design values of the thermal conductivities of the components are given in Table C.26.

Table C.26: 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

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Thermal resistance

Annex C17

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.27 to Table C.41 apply both to a design with and without fire protection boards.

Table C.27: 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	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [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.28: 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	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [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

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Table C.29: 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	**Ø₂ [mm]**	**n**	**Ø [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.30: 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	**Ø₂ [mm]**	**n**	**Ø [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.31: 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	**Ø₂ [mm]**	**n**	**Ø [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.32: 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	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [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.33: 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	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [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.34: 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	**$\varnothing_2$ [mm]**	**n**	**$\varnothing$ [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						

Table C.35: 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	**Ø₂ [mm]**	**n**	**Ø [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.36: 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	**Ø₂ [mm]**	**n**	**Ø [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.37: 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	**Ø₂ [mm]**	**n**	**Ø [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 C21

Table C.38: 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**	**∅ [mm]**	**n**	**∅ [mm]**	
-		4	10	2	14	12
-		2		1		14

[1] Steel compression elements (SCE) in accordance with section A.2.4

Table C.39: 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**	**∅ [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.40: 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**	**∅ [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.41: 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

Schöck Isokorb® with compression elements made of concrete or steel

Performance parameters
Reduction of impact sound pressure level

Annex C23

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.16
- 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.2.3 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.2.3
  A supporting reinforcement
  S splitting reinforcement

Schöck Isokorb® with compression elements made of concrete or steel	Annex D1
Structural analysis General	

- <u>A – supporting reinforcement</u>

  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

- <u>S – splitting reinforcement</u>

  1. 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 or diameter of the compressed head
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

  2. 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:
  1. Subsidiary structural edge reinforcement in accordance with section B.2.3
  2. Lattice girder with a maximum distance of 100 mm from the insulation joint
  3. Special stirrups (inclusion for splitting tensile reinforcement)
  4. 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

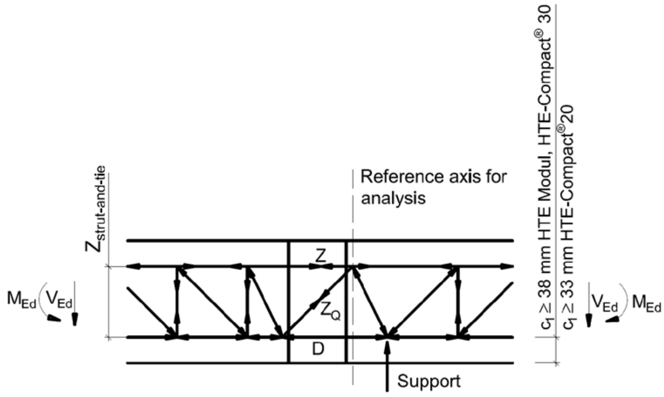

Fig. D.1: Schöck Isokorb® Type K, K-F (variation in several parts) with concrete compression elements

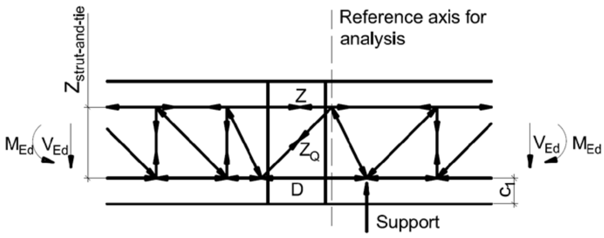

Fig. D.2: Schöck Isokorb® Type K, K-F (variation in several parts) with steel compression elements

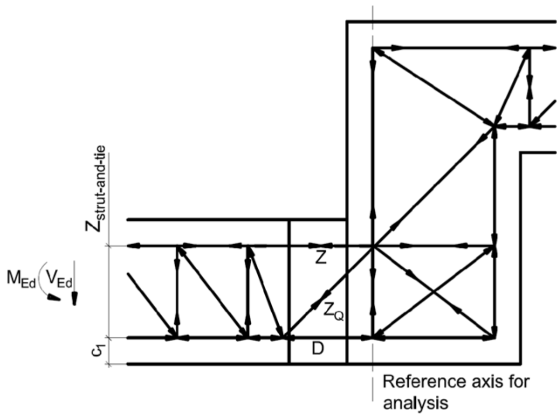

Fig. D.3: Schöck Isokorb® Type K-HV

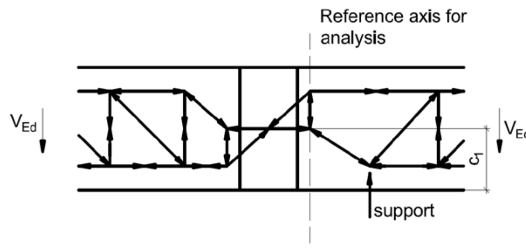

Fig. D.4: Schöck Isokorb® Type Q, Q-P

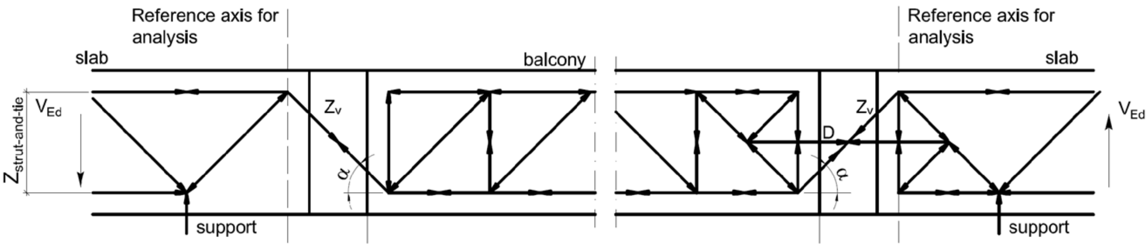

Fig. D.5: Schöck Isokorb® Type Q-Z and Q as well as Type Q-PZ and Q-P used in constraint-free application with opposing slab connections (compare Fig. B.3)

Schöck Isokorb® with compression elements made of concrete or steel

Structural analysis
Truss models

Annex D3

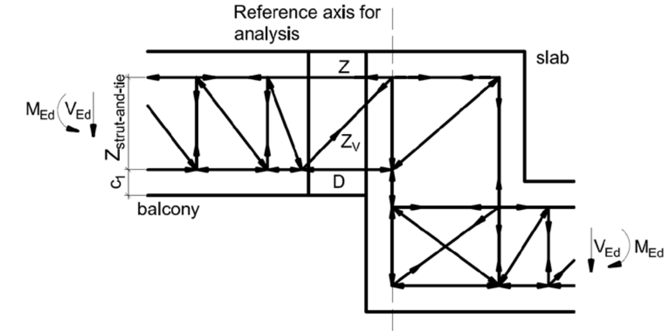

Fig. D.6: Schöck Isokorb® Type K-O and K-O-F with connection to height offset

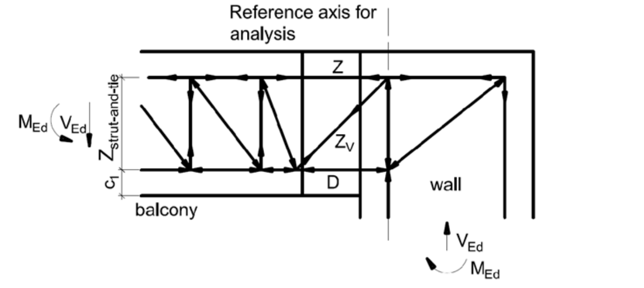

Fig. D.7: Schöck Isokorb® Type K-O and K-O-F with connection to wall

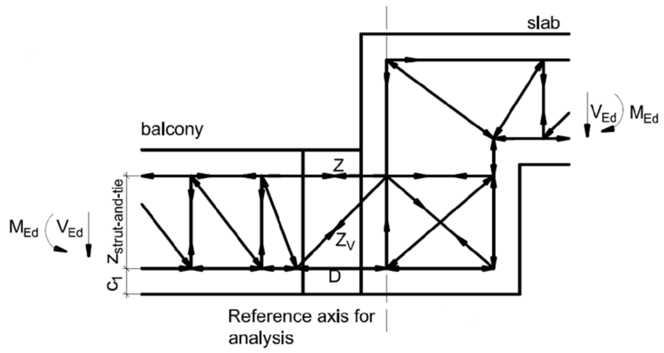

Fig. D.8: Schöck Isokorb® Type K-U and K-U-F with connection to height offset

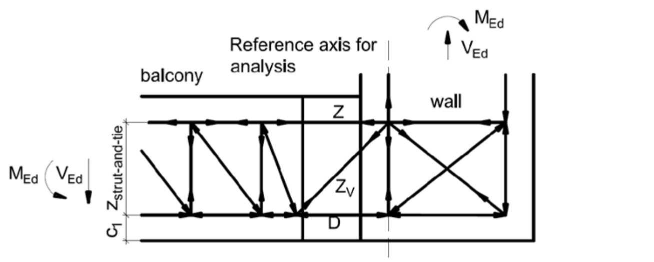

Fig. D.9: Schöck Isokorb® Type K-U and K-U-F with connection to wall

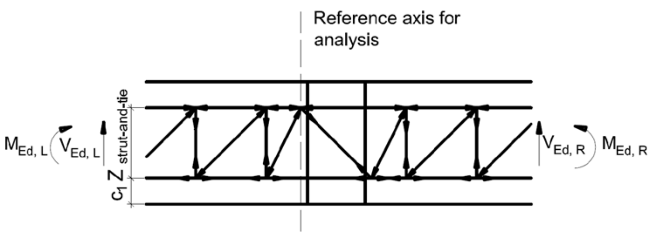

Fig. D.10: Schöck Isokorb® Type D*

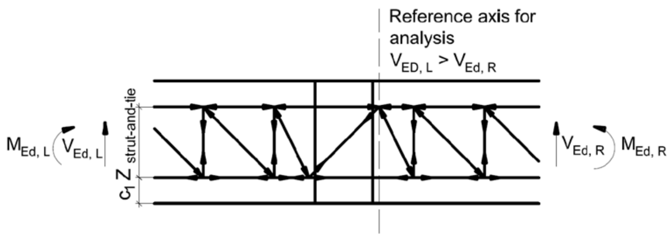

Fig. D.11: Schöck Isokorb® Type D*

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

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

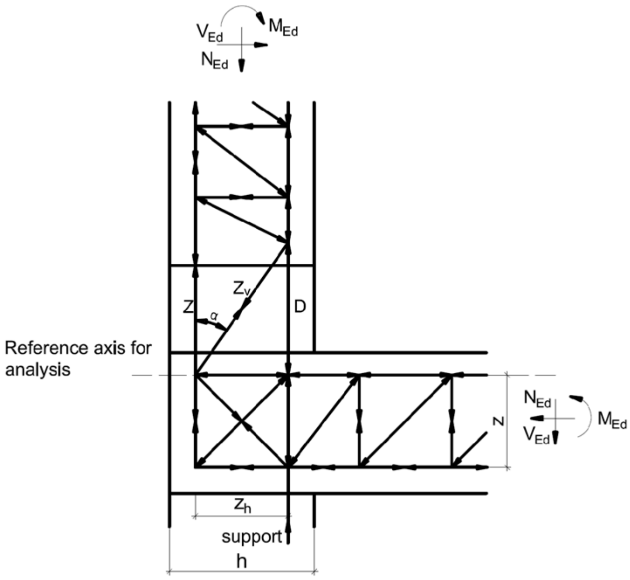

Fig. D.12: Schöck Isokorb® Type A

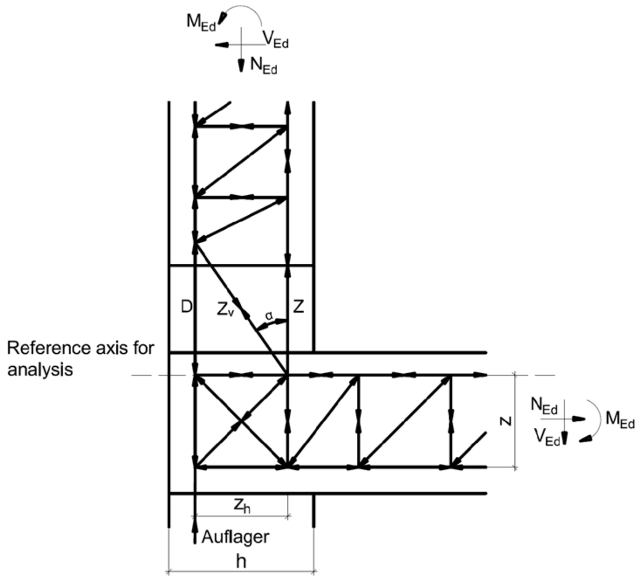

Fig. D.13: Schöck Isokorb® Type A

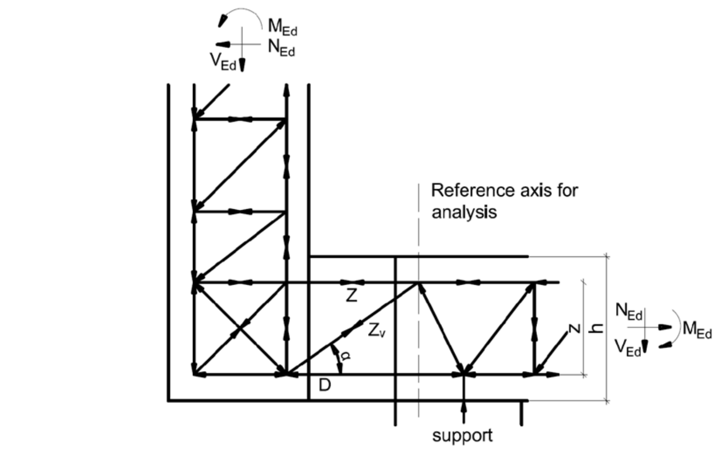

Fig. D.14: Schöck Isokorb® Type F

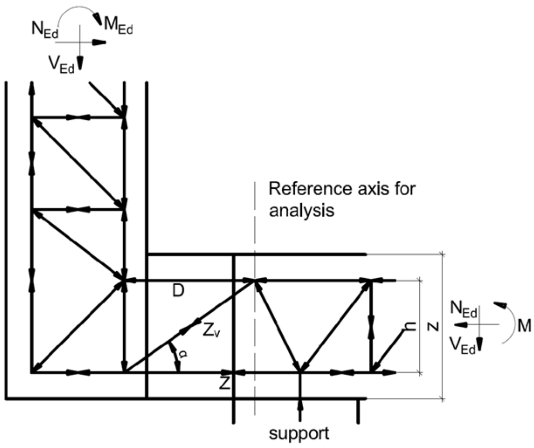

Fig. D.15: Schöck Isokorb® Type F

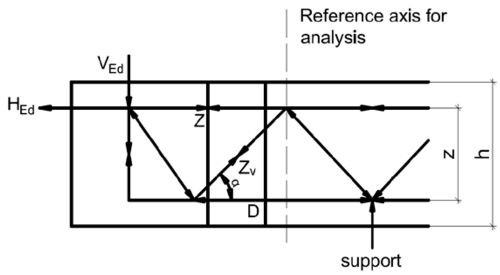

Fig. D.16: Schöck Isokorb® Type O

Schöck Isokorb® with compression elements made of concrete or steel	Annex D5
Structural analysis Truss models	

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.
- 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.1.1.5 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.14
- Compression elements with welded-on compression plates or compressed heads:
  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. For compressed heads: $b_1 = d_1 = Ø_K$
  Vertical reinforcement in accordance with section D.1.1 shall be observed.
- Superimposition of adjacent load distribution surfaces shall be taken into consideration
- It shall be verified that the occurring tensile forces can be transferred
- Tensile force transmission for compression elements with welded-on compression plates according to Fig. A.34 and Fig. A.39: design value $N_{Rd,c}$ of tensile force in accordance with Table C.15

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:
  1. Mandrel diameter specifications given in section A.2.2
  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).
- Centre or edge distance < 100 mm: detailed calculation in accordance with section C.1.1.2 shall be observed.

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 B8 to B10 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).
  For tensile stresses f_{yd} > 435 N/mm² the factor $\frac{f_{yd}}{435}$ shall be observed for the anchorage lengths.
  For welded shear force bars, the position of the weld shall be positioned in such a way that the stress is ≤ 435 N/mm² at this point, assuming a linear stress drop.
  The unrolled length of the centre line of the bar is to be used for the anchoring length. Using shear force bars with diameter combination, the respective surface area of the bars for the anchoring length is to be observed.
- Anchoring of shear force bars shown in Fig. A.29 to Fig. A.31 without any further calculation.
  On the side of the plate with bent bar end or anchor head a stirrup ≥ 8 mm per shear force bar is to be arranged (see Fig. B.18 to Fig. B.20) insofar as higher values are not yielded in accordance with section D.1.1. On-site reinforcement that goes beyond the statically required reinforcement can be included in the calculation.
- 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.2.3).
- 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 D10 to D12
- model for determining the bending deformation in the joint in accordance with Annexes D10 to D12
- calculation of the elastic deformations of the tension bars depending on the yield strengths that can be applied (Table C.)

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 = 200.000 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: $\Delta l_d = \Delta l_{d1} + \Delta l_{d2,GZG}$

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 = 200.000 N/mm² for stainless round steel

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

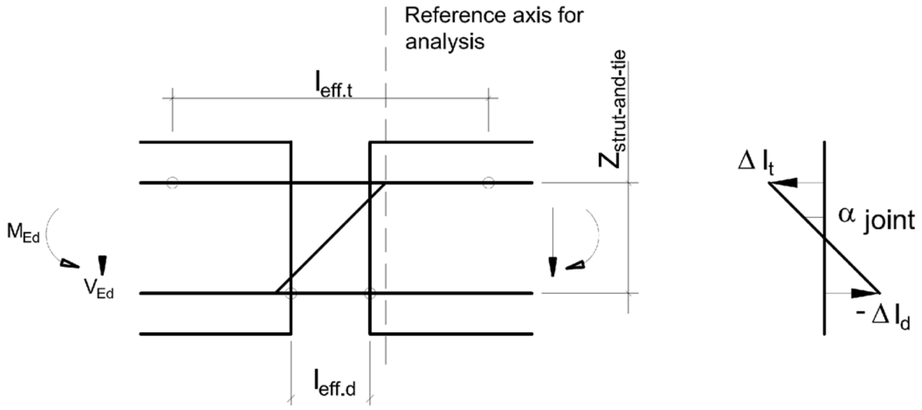

Fig. D.17: Model for determining the bending deformation in the joint

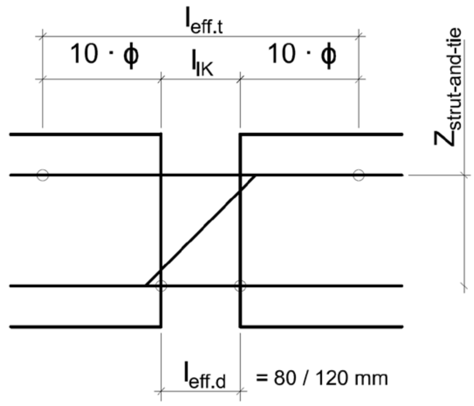

Fig. D.18: l_{eff} for tension bars made of stainless reinforcing steel in the joint and concrete compression elements (CCE)

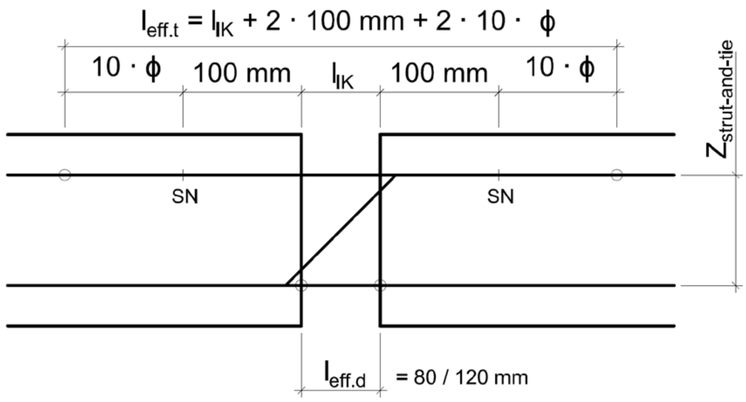

Fig. D.19: l_{eff} for tension bars made of stainless steel round bars in the joint and concrete compression elements (CCE)

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

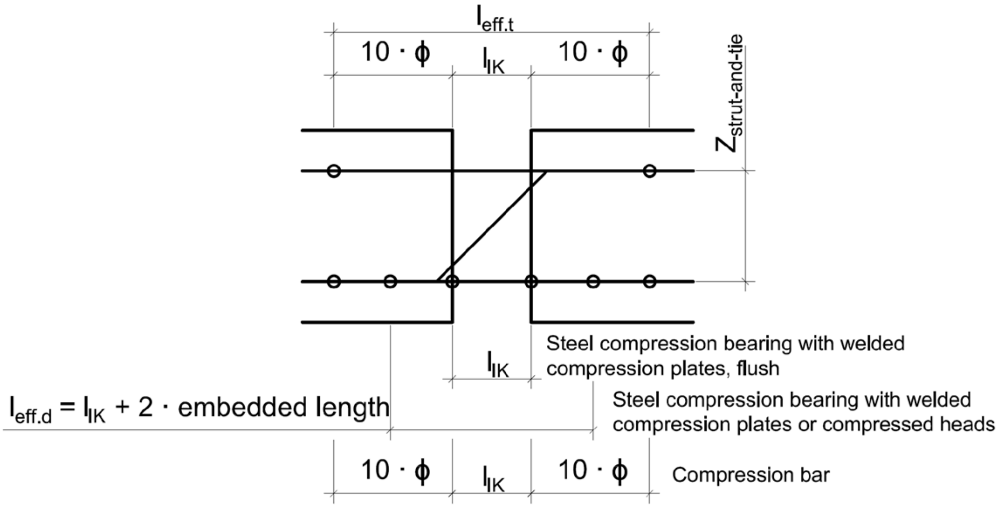

Fig. D.20: l_{eff} for tension bars and steel compression elements (SCE) made of stainless reinforcing steel in the joint

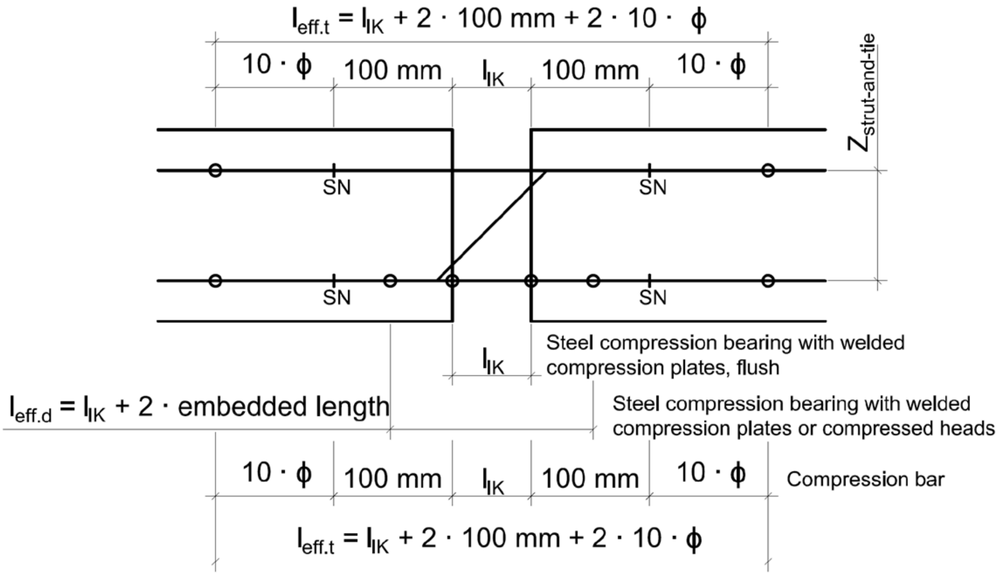

Fig. D.21: l_{eff} for tension bars and steel compression elements (SCE) made of stainless steel round bars in the joint

Tension strap and compression flange can consist of combinations of stainless reinforcing steel and stainless steel round bars.

Schöck Isokorb® with compression elements made of concrete or steel	Annex D12
Structural analysis Model for determining the bending deformation in the joint	