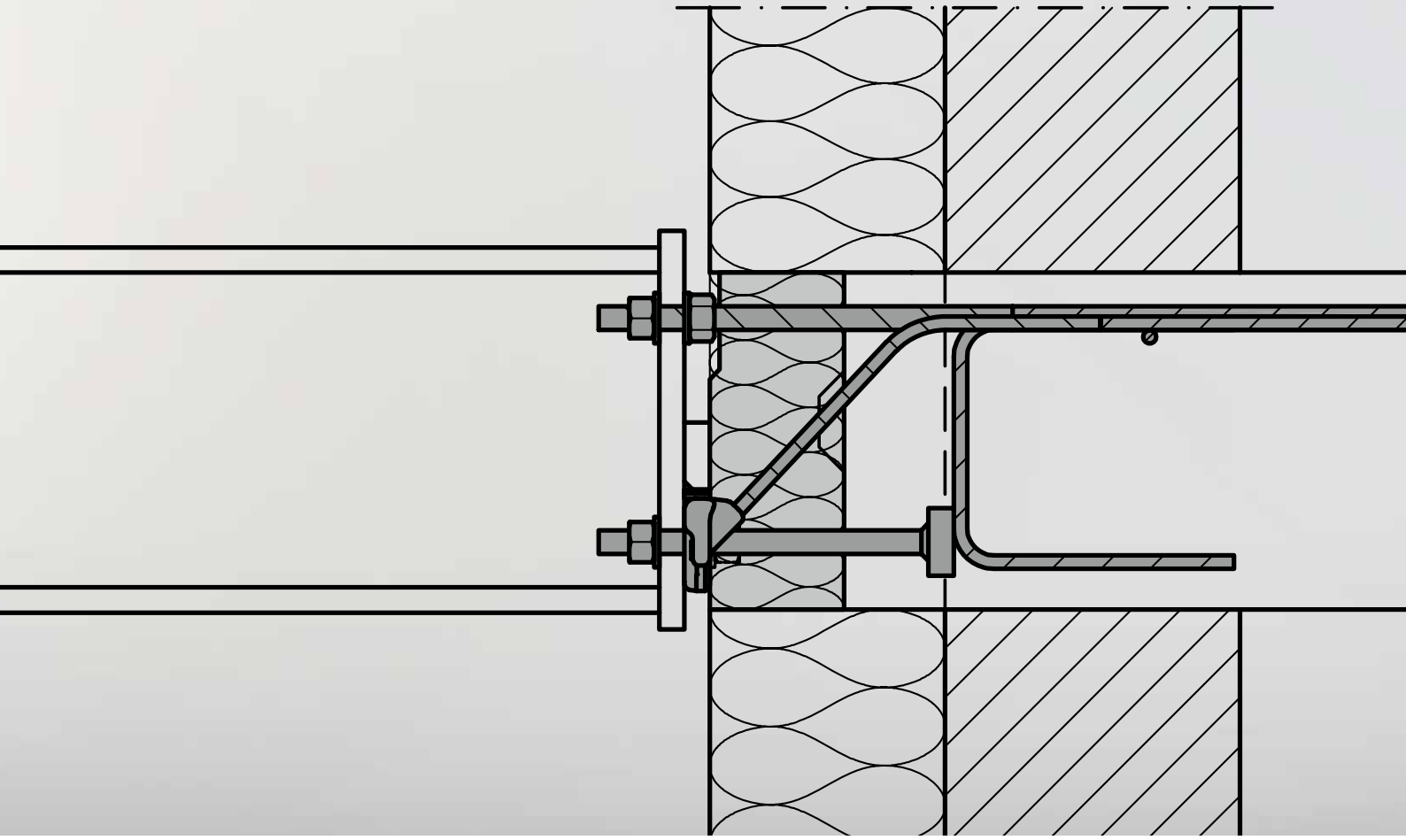
SCHÖCK
Dependable by design



TECHNICAL INFORMATION – MAY 2022

Isokorb®
for steel structures

Load-bearing thermal insulation elements for the effective reduction of thermal bridges in cantilevered steel constructions.

Planning and consulting service

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

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

Telephone hotline for design support services
Tel.: 01865 290 890
Fax: 01865 290 899
E-Mail: design-uk@schoeck.com

Planning tools - downloads and requests
Tel.: 01865 290 890
Fax: 01865 290 899
E-Mail: design-uk@schoeck.com
Web: www.schoeck.com

CPD Seminars and on-site consultation
Tel.: 01865 290 890
Fax: 01865 290 899
Web: www.schoeck.com

Notes | Symbols

Technical Information

- This Technical Information on the respective product application is valid only if complete and therefore may only be reproduced as a whole. With texts and graphics published solely as extracts there is a danger of communicating insufficient or even misleading information. Therefore dissemination is the sole responsibility of the user or the person carrying out the process!
- This Technical Information is valid solely for the United Kingdom and takes into account the country's specific approvals and standards.
- If the installation takes place in another country then the valid Technical Information of the respective country is to be applied.
- The current Technical Information is to be applied. A current version is available at: www.schoeck.com/en-gb/download

Installation instructions

Current installation instructions can be found online at:
www.schoeck.com/en-gb/download

Special constructions

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

Bending of reinforcing steel

With the production of the Schöck Isokorb® in the factory it is ensured through monitoring that the conditions of the general building supervisory approval document and of BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA with regard to bending of reinforcing steel are observed.

Attention: If original Schöck Isokorb® reinforcing steels are bent or bent and bent back on-site, the observation and the monitoring of the respective conditions (European Technical Assessment (ETA), BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA) lie outside the influence of Schöck Bauteile GmbH. Therefore, in such cases, our warranty is invalidated.

Note on shortening threaded rods

The threaded rods may be shortened on site provided at least two threads remain visible after installation, levelling and final tightening of the balcony structure. Nuts must be re-checked after cutting to ensure they have remained fully tightened.

Notes Symbols

Hazard note

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

Info

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

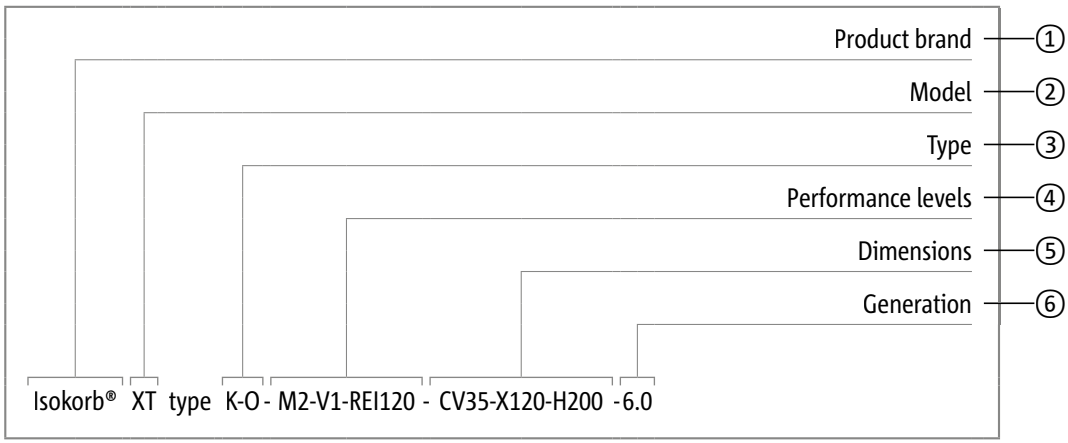
Check list

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

Table of contents

Explanation for the naming of Schöck Isokorb® types

The systematic naming convention for the Schöck Isokorb® product group has changed. This page contains information about the name components for easier conversion.



① Product brand
Schöck Isokorb®

② Model
The model designation is an integral part of the name of each Isokorb®. It stands for a core characteristic of the product. The corresponding abbreviation will always be positioned before the type word.

Model	Core characteristics of the products	Connection	Components
XT	for extra thermal separation	Reinforced concrete – reinforced concrete, Steel – reinforced concrete	Balcony, access walkway, canopy, floor slab, parapet, balustrade, corbel, beam, wall
CXT	with Combar® for extra thermal separation	Reinforced concrete – Reinforced concrete	Balcony, walkway, canopy
T	for thermal separation	Reinforced concrete – reinforced concrete, Steel – reinforced concrete, Steel – steel	Balcony, access walkway, canopy, floor slab, parapet, balustrade, corbel, beam, wall
RT	for renovation with thermal separation	Reinforced concrete – reinforced concrete, Steel – reinforced concrete	Balcony, walkway, canopy, beam

③ Type
The type is a combination of the following name components:
- Basic type
- static or geometric connection variant

Basic type					
K	Balcony, canopy – cantilevered	D	Floor slab – continuous (indirectly mounted)	W	Shear wall
Q	Balcony, canopy – supported (shear force)	A	Parapet, balustrade	SK	Steel balcony – cantilevered
C	Corner balcony	F	Parapet, balustrade – attached	SQ	Steel balcony – supported (shear force)
H	Balcony with horizontal loads	O	Corbel	S	Steel structure
Z	Balcony with intermediate insulation	B	Beam, downstand beam		

Static connection variant	
Z	Restraint-free
P	Punctual
V	Shear force
N	Normal force

Geometric connection variant	
L	Arrangement left of viewpoint
R	Arrangement right of viewpoint
U	Balcony with height offset downwards or wall connection
O	Balcony with height offset upwards or wall connection

④ Performance levels

Performance levels include load-bearing levels and fire protection. The various load-bearing levels of an Isokorb® type are numbered consecutively, beginning with 1 for the lowest load-bearing level. Different Isokorb® types with the same load-bearing level do not have the same load-bearing capacity. The load-bearing level must always be determined via the design and calculation tables or the calculation program.

The load-bearing level has the following name components:

- Main load-bearing level: Combination of internal static force and number
- Secondary load-bearing level: Combination of internal static force and number

Internal static force of the main load capacity	
M	Moment
MM	Moment with positive or negative force
V	Shear force
VV	Shear force with positive or negative force
N	Normal force
NN	Normal force with positive or negative force

Internal static force of the secondary load-bearing level	
V	Shear force
VV	Shear force with positive or negative force
N	Normal force
NN	Normal force with positive or negative force

The name component for the fire protection contains the fire resistance class or R0 if no fire protection is required.

Fire resistance class	
REI	R – load bearing capacity, E – integrity, I – insulation under the effects of a fire
R0	No fire protection

⑤ Dimensions

The following name components are part of the dimensions:

- Concrete cover CV
- Bond length LR, bond height HR
- Insulating element thickness X
- Isokorb® height H, length L, width B (insulating element)
- Diameter of thread D

⑥ Generation

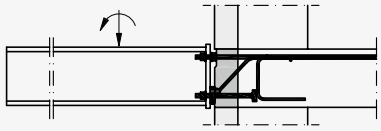
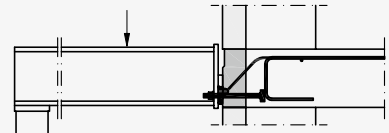
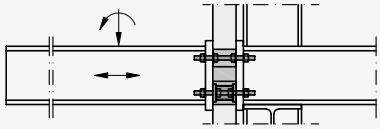
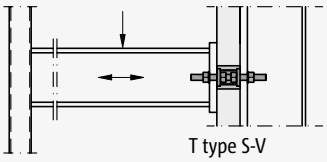
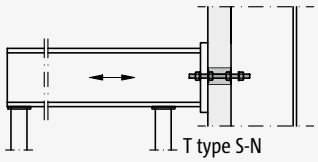
Each type designation ends with a generation number. If Schöck develops a product further and through this the characteristics of the product change, the generation number increases. With large product changes the number in front of the dot increases, with small product changes the number after the dot increases. Examples:

- Large product change: Generation 6.0 becomes 7.0
- Small product change: Generation 7.0 becomes 7.1

i Translation tool

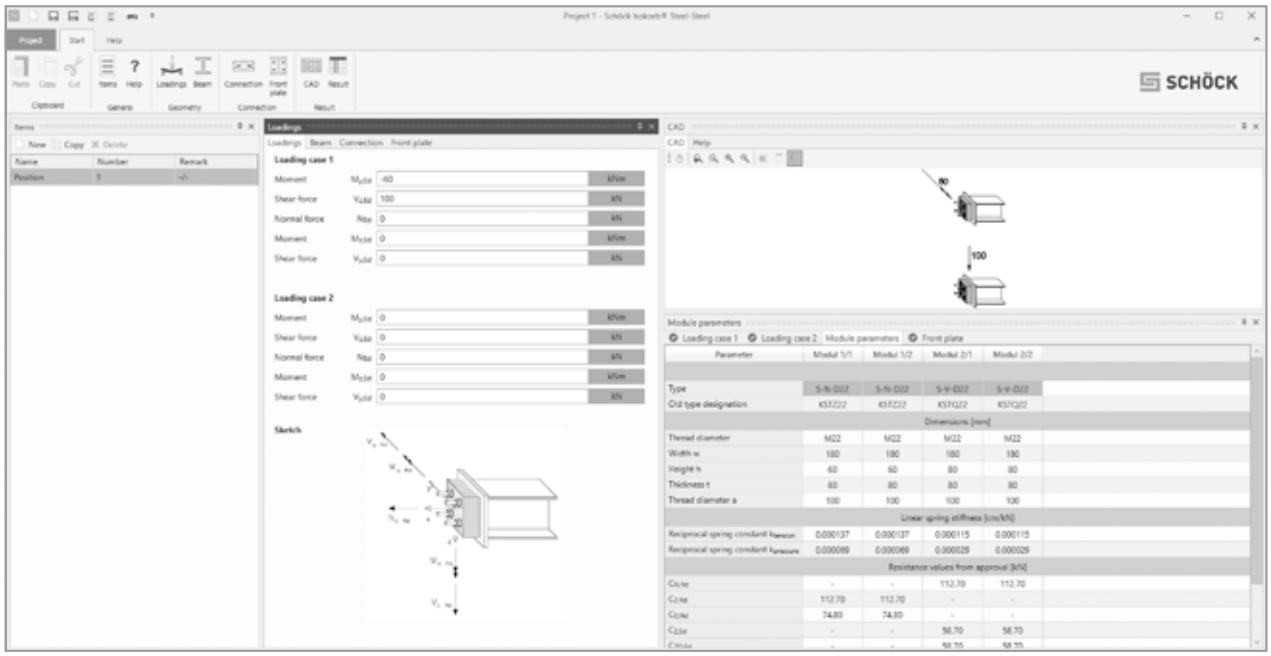
- The online translation tool for the translation from old to new type designation can be found under: www.schoeck.com/en-gb/isokorb-product-name

Type overview steel – reinforced concrete | Type overview steel – steel

Application		Schöck Isokorb® type	
Free cantilevered balconies on reinforced concrete on reinforced concrete structures			
 T type SK		T type SK	Page 19
Supported steel balconies on reinforced concrete structures			
 T type SQ		T type SQ	Page 45
Free cantilevered steel structures			
 T type S		T type S	Page 65
Supported steel structures (two supports)			
 T type S-V		T type S-V	Page 65
Supported steel structures (four supports)			
 T type S-N		T type S-N	Page 65

Design software

The Schöck Isokorb® T type SK design software and the Schöck Isokorb® T type S design software serve for the rapid design of thermally separated structures.
The Schöck Isokorb® design software is available at no cost via download. It runs under MS-Windows with MS-Framework 4.6.1



Software

- Administrator rights are required for installation of the software.
- Upwards from Windows 7, with an update, the software is to be started using administrator rights (right mouse click on Schöck Icon; selection: carry out using administrator rights).

Schöck Isokorb® steel-reinforced concrete software

- With the calculation of the natural frequency of thermally separated steel girders for the verification of the fitness for purpose of balconies

Fire protection

Info
Technical information on the thermal insulation can be found under:
www.schoeck.co.uk/download/building-physics

On-site fire resistance

Schöck Isokorb® fire protection configuration in connection with steel structures

- Fire-resistant cladding of the Schöck Isokorb® must be planned and installed on site. The same on-site fire safety measures apply as for the overall load-bearing structure.

2 design variants are possible for complying with the fire protection requirements for the steel structure:

- The entire structure can be clad on site using fire protection boards. The thickness of the fire protection board is dependent on the required fire resistance class (see table).
  The board cladding is to be fed through the insulation level or the cladding of the steel construction is to overlap the cladding of the Schöck Isokorb® by 30 mm.
- The steel structure including the external threaded bars are painted with a fire protection coating. In addition to this the Schöck Isokorb® is clad on-site using fire protection boards of the appropriate thickness.

To achieve fire resistance class R as per BS EN 1993-2-1 the following panel thicknesses t and anchoring depths t_E are required:

On site fire protection cladding [mm]		
Fire resistance class	Board thickness t [mm]	Anchoring depth t_E [mm]
R 30	15	10
R 60	20	15
R 90	25	20
R 120	30	25

On-site fire resistance

On site fire protection implementation Schöck Isokorb® T type SK, SQ

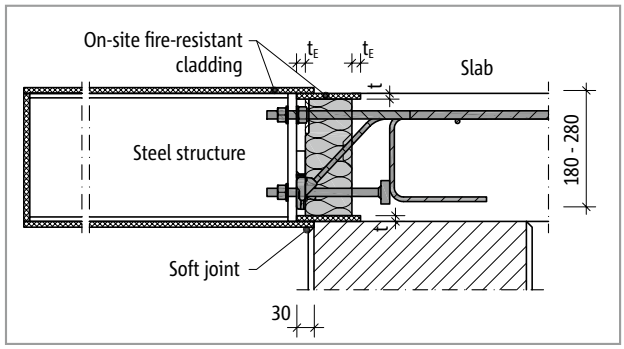


Fig. 1: Schöck Isokorb® T type SK: On-site fire-resistant cladding for Isokorb® and steel structure; cross-section

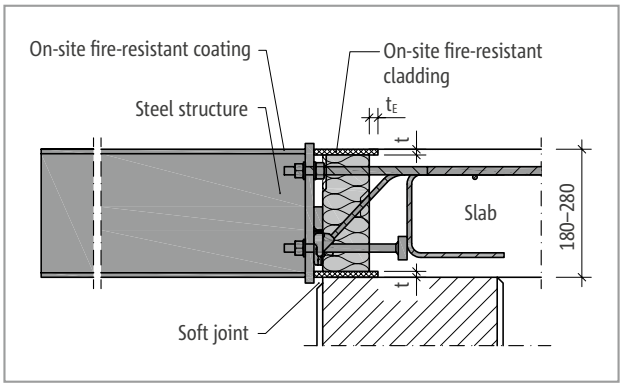


Fig. 2: Schöck Isokorb® T type SK: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant coating: Cross section

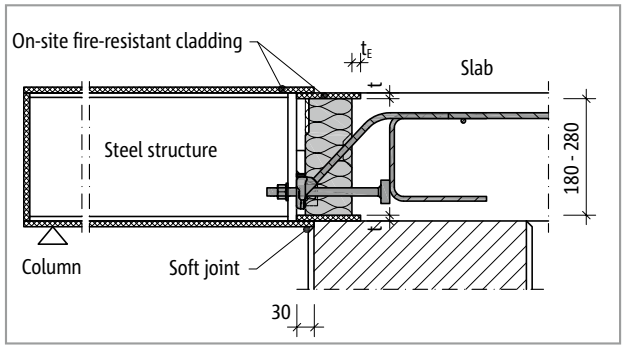


Fig. 3: Schöck Isokorb® T type SQ: On-site fire-resistant cladding for Isokorb® and steel structure; cross-section

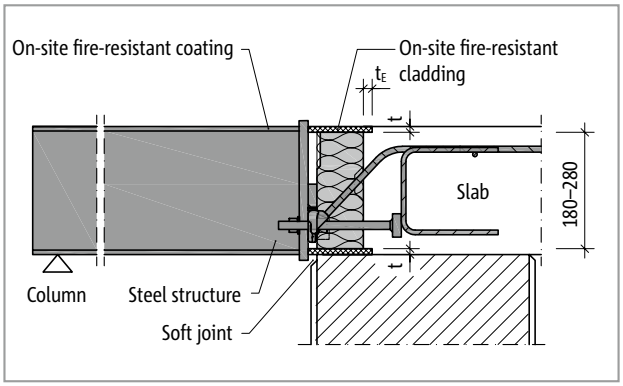


Fig. 4: Schöck Isokorb® T type SQ: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant coating; section

Fire protection

- The selected structure is to be agreed with the project fire expert.

On-site fire resistance

On-site fire protection implementation Schöck Isokorb® T type S

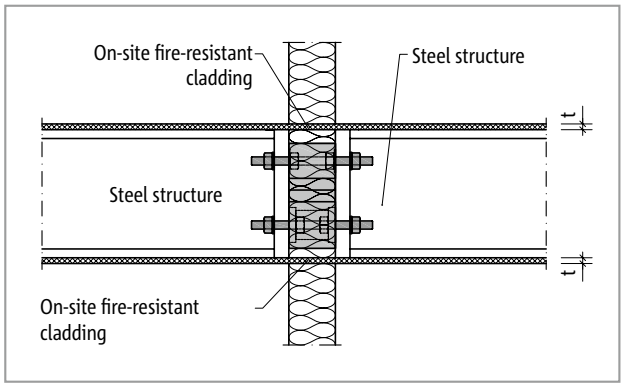


Fig. 5: Fire protection Schöck Isokorb® T type S: On-site fire protection cladding for flush frontplates; section

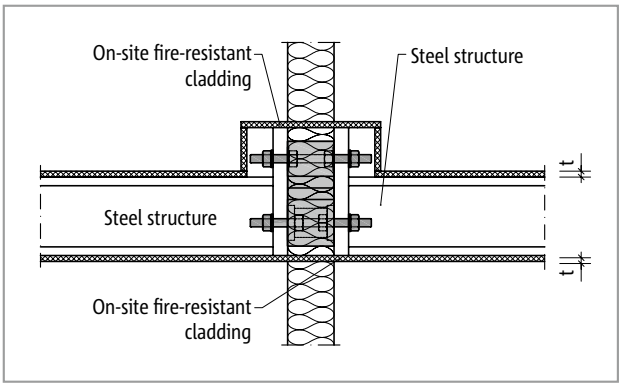


Fig. 6: Fire protection Schöck Isokorb® T type S: On-site fire protection cladding for overlaying face plates; section

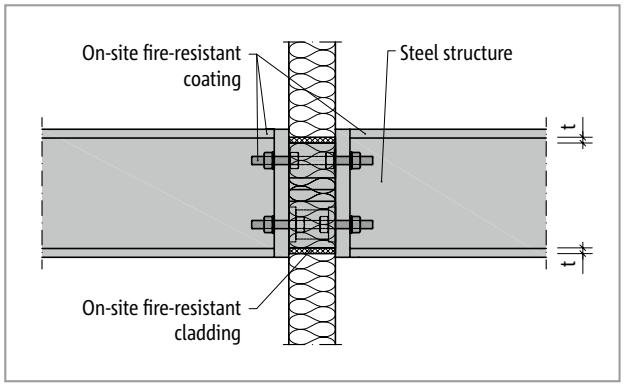


Fig. 7: Fire protection Schöck Isokorb® T type S: On-site fire protection cladding T type S, fire protection coated steel structure; section

Fire protection

- The selected structure is to be agreed with the project fire expert.

Steel - reinforced concrete

Approval | Construction materials | Corrosion protection

Approval Schöck Isokorb® T type SK, SQ

Schöck Isokorb®	DiBt approval Z-15.7-292, BBA Agrement certificate 05/4277

Schöck Isokorb® construction materials

Concrete steel	B500B according to BS 488-1, BSt 500 NR according to the general building supervisory approval
Thrust bearing in the concrete	S 235 JRG2 according to BS EN 10025-2 for the pressure plates
Stainless steel	Material No.: 1.4401, 1.4404, 1.4362, 1.4462 and 1.4571, according to Approval No.: Z-30.3-6 Structural components and securing means made from stainless steel or BSt 500 NR flat slab steel S690 for the tension and compression bars
Load-bearing plate	Grade.: 1.4404, 1.4362 and 1.4571 or higher quality e.g 1.4462
Spacer shims	Grade.: 1.4401 S 235, thickness 2 mm and 3 mm, length 180 mm, width 15 mm
Insulating material	Neopor® – this insulating material is a polystyrole hard foam and a registered trademark of the BASF, λ = 0.031 W/(m·K), building material classification B1 (flame retardant) The version of the insulating material in mineral wool is available on request.

Connected components

Reinforcing steel	B500A or B500B as per BS 4449
Concrete	Minimum concrete on the internal slab side; concrete grade ≥ C 25/30
Structural steel	Minimum S 235 on the balcony side; strength class, structural design and corrosion protection as specified by the structural engineer

Anti-corrosion protection

The stainless steel used in the Schöck Isokorb® T types SK, SQ corresponds to material no.: 1.4362, 1.4401,1.4404 or 1.4571. According to general technical approval Z-30.3-6 Annex 1 “Components and connecting elements made of stainless steel”, these steels are classified as resistance class III/medium.

Connections of Schöck Isokorb® T types SK, SQ in conjunction with a steel end-plate that has been galvanised or coated with anti-corrosion protection are not at risk of bimetallic corrosion (see approval Z-30.3-6, section 2.1.6.5). As far as the connections of Schöck Isokorb® are concerned, the surface area of the lower-grade material (steel end-plate) is much larger than that of the stainless steel (bolts, washers and saddle plate), failure of the connection due to bimetallic corrosion is excluded.

i Note on shortening threaded rods

The threaded rods may be shortened on site provided at least two threads remain visible after installation, levelling and final tightening of the balcony structure. Nuts must be re-checked after cutting to ensure they have remained fully tightened.

Installation accuracy

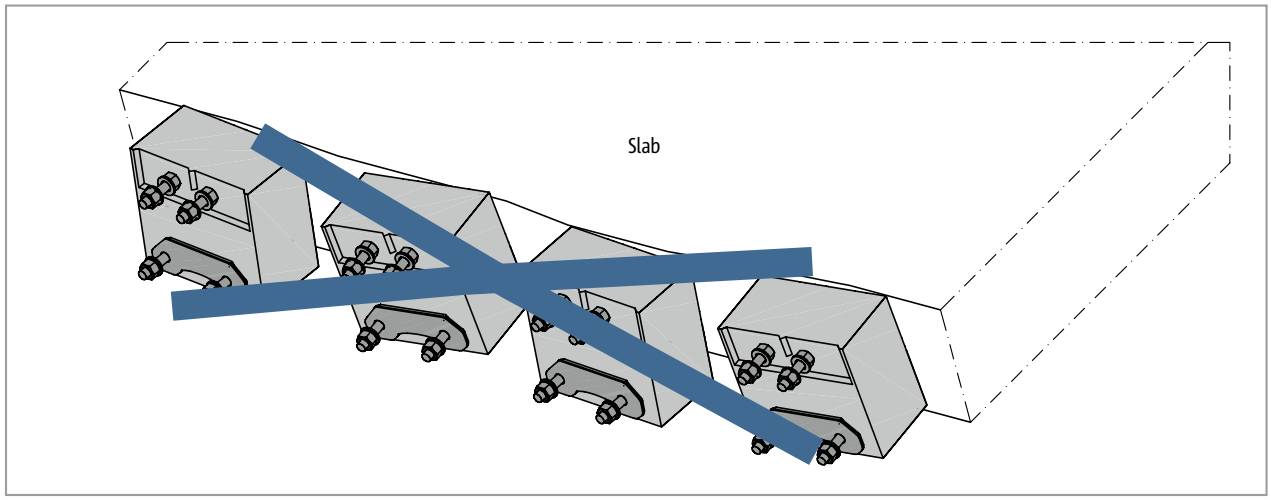


Fig. 8: Schöck Isokorb®: Twisted and displaced elements due to faulty positional security during concreting

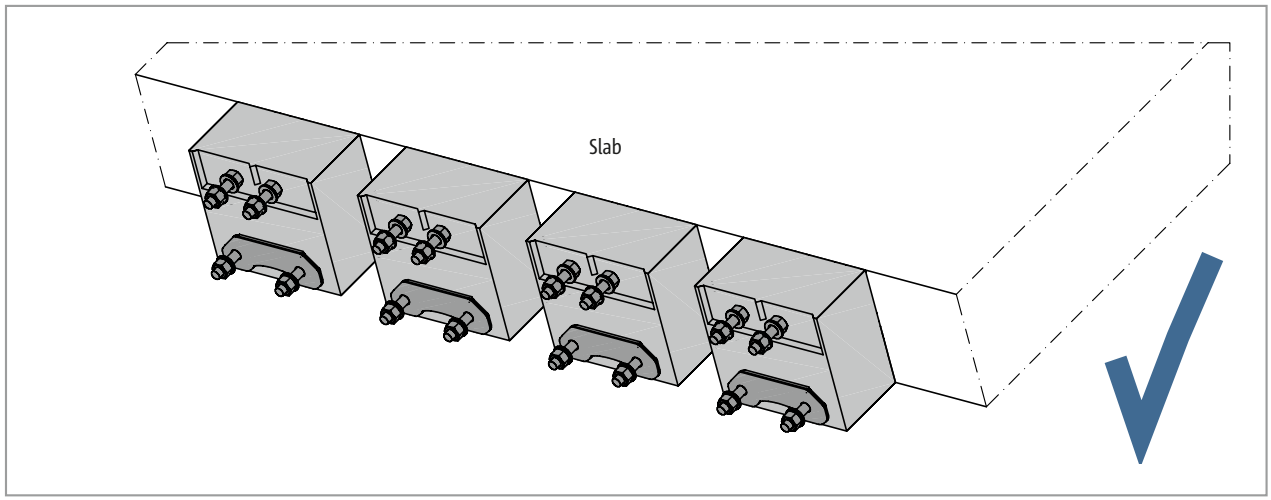


Fig. 9: Schöck Isokorb®: Reliable positional security during concreting enables the achievement of the required installation accuracy

If the Schöck Isokorb® forms the connection between a steel component and a reinforced concrete component, the subject of installation accuracy is particularly important. DIN 18202:2013-04 “Tolerances in building construction - buildings” must be observed in this respect. Derived from this, it is imperative that tolerance limits for the required installation position of the Schöck Isokorb® are included in structural layout plans, which are accepted by both the structural engineer and steel contractor. This is to be agreed in the run up to planning. At the same time, bear in mind that the steel contractor cannot or only with considerable additional expense adjust large deviations in measurement.

Installation accuracy

Adjusting the height of the steel member:

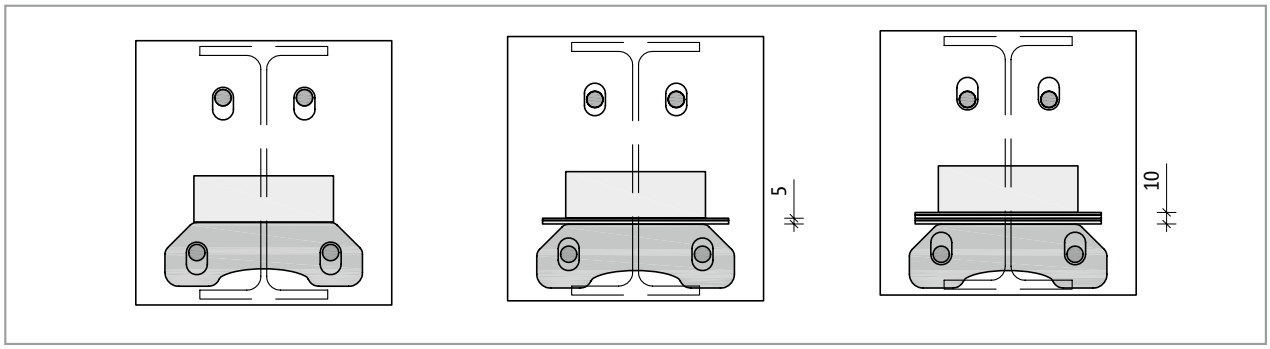


Fig. 10: Schöck Isokorb® T type SK: Adding design shims (5 mm high) on the load plate will raise the fixing plate and bring the centre of the vertical slots in line with the axes of the thread bolts on the T type SK; using this as a starting level will allow vertical tolerance of ±5 mm

Connection with on-site adapter

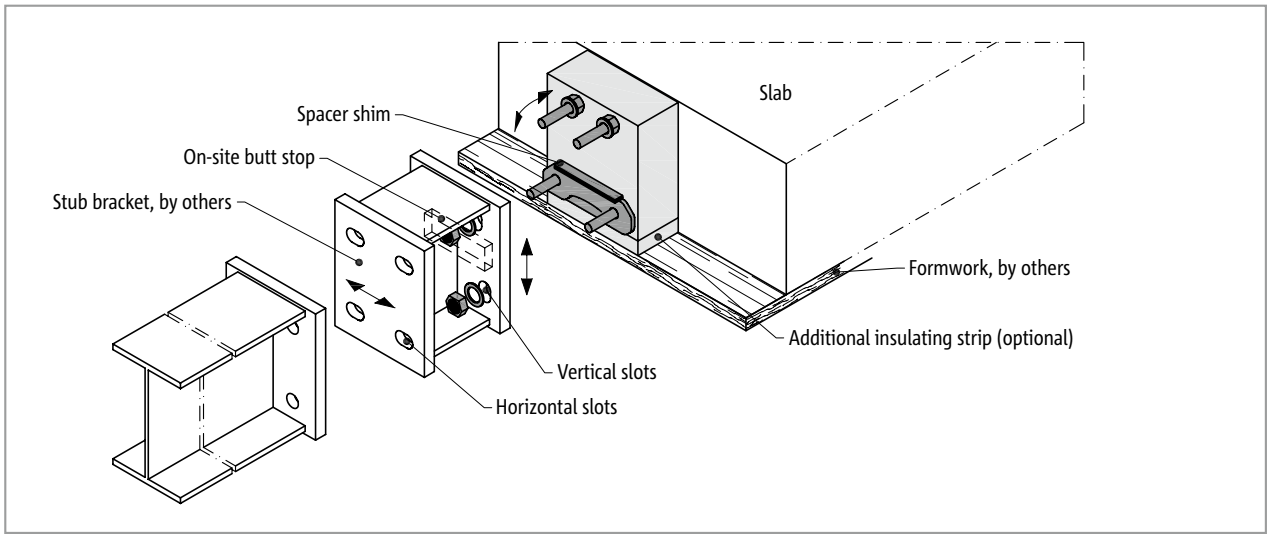
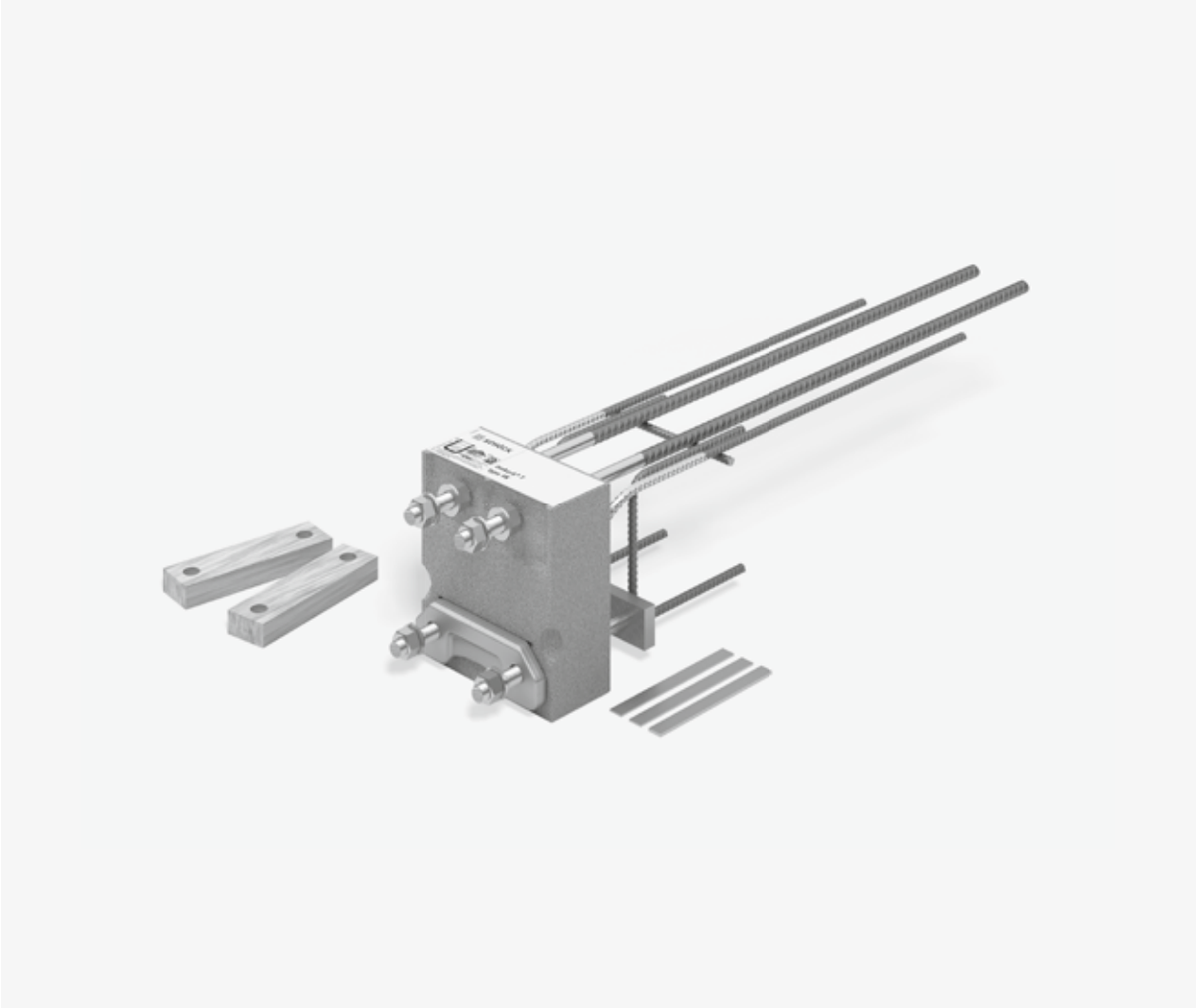


Fig. 11: Schöck Isokorb® T type SK: Cantilever fin connection with stub bracket enables tolerances in vertical and horizontal directions to help overcome dimensional deviations of the reinforced concrete structure; spacer shims are included with the Isokorb®

Information on installation accuracy

- Design constraints allow a vertical tolerance of 10 mm with the Schöck Isokorb® T type SK. The requisite spacer shims are included with the product.
- Horizontal limit deviations for the separation of the type SK axes must be specified, as must the limit deviations from the alignment. Torsional limits must also be specified.
- The use of a template developed on site is highly recommended to ensure dimensionally accurate installation and the correct sitting of the type SK during the concrete pouring process.
- The construction supervisor is responsible for checking the agreed installation accuracy of the SK types in good time!

Schöck Isokorb® T type SK



Schöck Isokorb® T type SK
Load-bearing thermal insulation element for freely cantilevered steel constructions with connection to reinforced concrete floors. The element transfers negative moments and positive shear forces. An element with the load-bearing level MM transfers additionally positive moments and negative shear forces.

Element arrangement | Installation cross sections

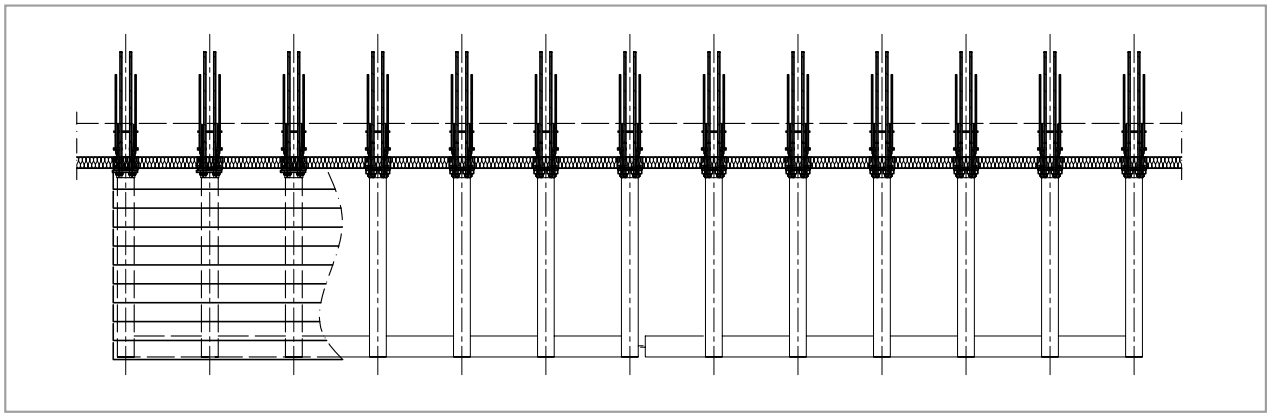


Fig. 12: Schöck Isokorb® T type SK: Balcony freely cantilevered

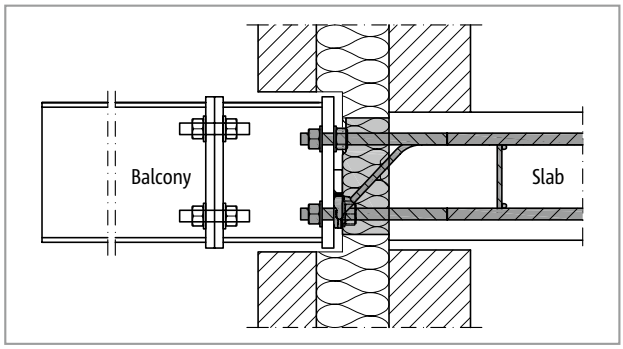


Fig. 13: Schöck Isokorb® T type SK: Insulating element inside the core insulation; stub bracket between the Isokorb® and the balcony to enable flexible installation.

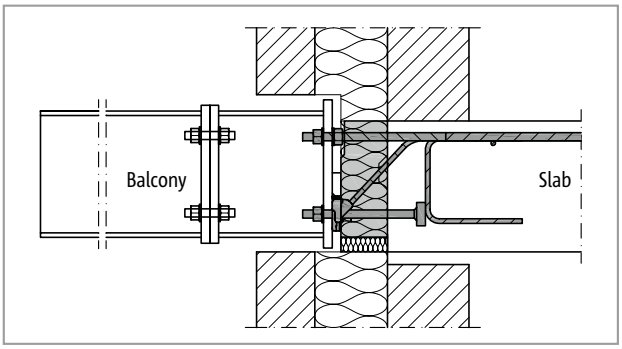


Fig. 14: Schöck Isokorb® T type SK: Connecting the cantilever fin with stub bracket; Isokorb® insulating element with optional additional insulating strip

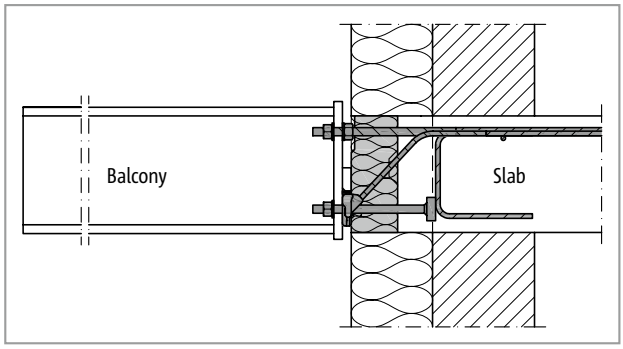


Fig. 15: Schöck Isokorb® T type SK: With the aid of the floor extension, the insulating element ends flush with the wall insulation; the spacing at the edges must be taken into consideration.

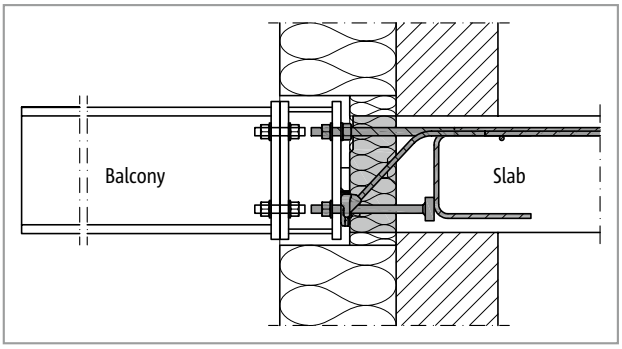


Fig. 16: Schöck Isokorb® T type SK: Connection of the steel member to an adapter that equalises the thickness of the outer insulation

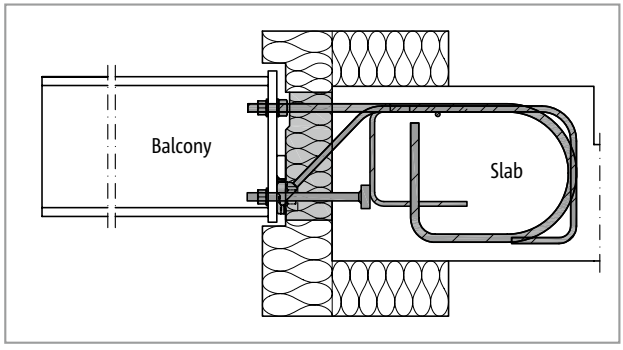


Fig. 17: Schöck Isokorb® T type SK-M1: Special design based on the lateral force load ranges M1

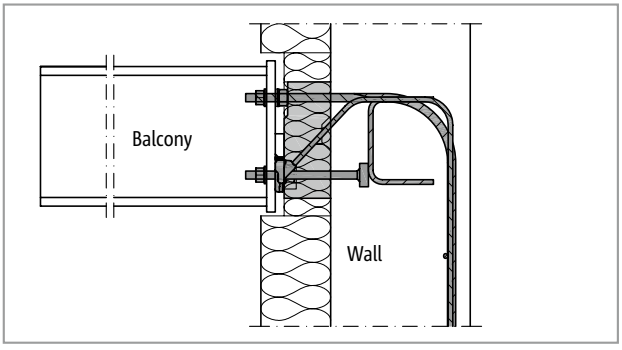


Fig. 18: Schöck Isokorb® T type SK-M1: Special construction for wall connection on the basis of the shear force bearing levels M1 for wall thicknesses from 200 mm

Special designs

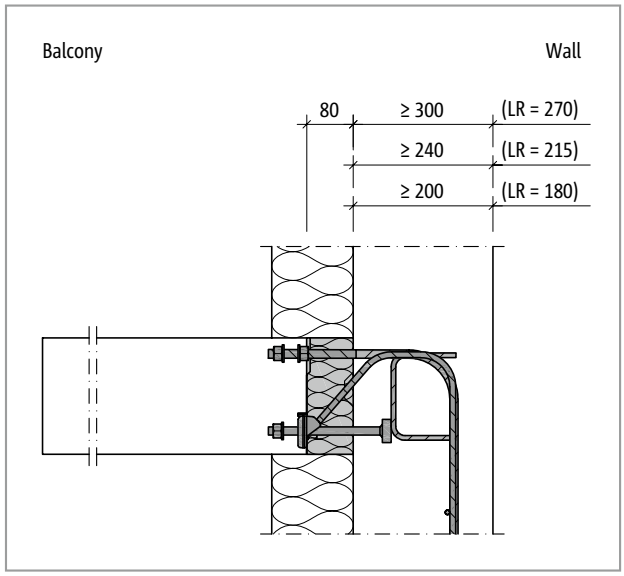


Fig. 19: Schöck Isokorb® T type SK-WU: Special construction for wall connection

Special designs

- The geometric dimensions presented can be implemented using special designs. Contact is the design support department.
- Design values can deviate from the standard products.
- The bond length LR for special constructions is to be carried in the type designation: T type SK-M1-V1-R0-LR270-X80-H200-L180-D16-1.0

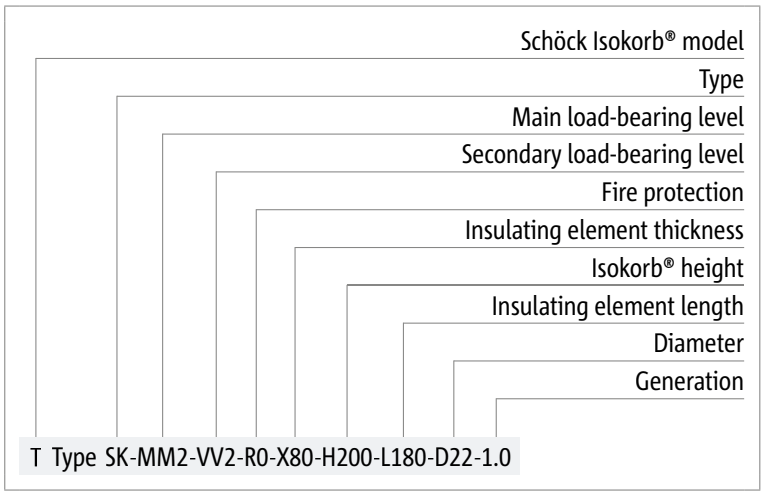
Product selection | Type designations | Special designs

Schöck Isokorb® T type SK variants

The configuration of the Schöck Isokorb® T type SK can be varied as follows:

- Main load-bearing level:
  Moment load-bearing level M1, MM1, MM2
- Secondary load-bearing level:
  for main load-bearing level M1: Shear force load-bearing level V1, V2
  for main load-bearing level MM1: Shear force load-bearing level VV1
  for main load-bearing level MM2: Shear force load-bearing level VV1, VV2
- Fire resistance class:
  R 0
- Insulating element thickness:
  X80 = 80 mm
- Isokorb® Height:
  According to approval H = 180 mm to H = 280 mm, graduated in 10-mm steps
- Isokorb® length:
  L180 = 180 mm
- Thread diameter:
  D16 = M16 for main load-bearing level M1, MM1
  D22 = M22 for main load-bearing level MM2
- Generation:
  1.0

Type designations in planning documents



Special designs

Please contact the design support department if you have connections that are not possible with the standard product variants shown in this information (contact details on page 3).

Sign convention | Design

Sign convention for the design

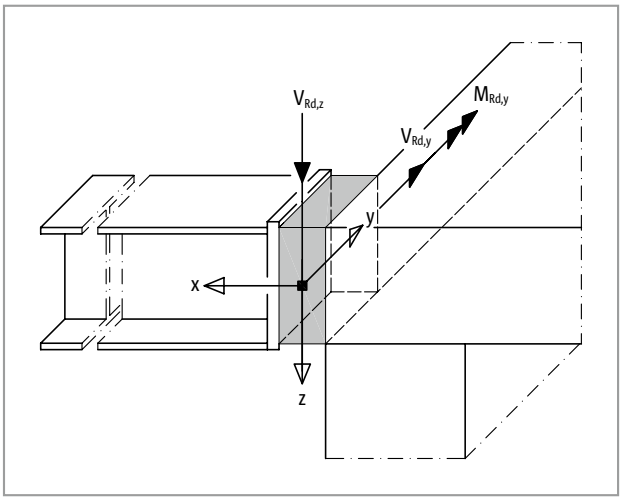


Fig. 20: Schöck Isokorb® T type SK: Direction of internal forces and moments

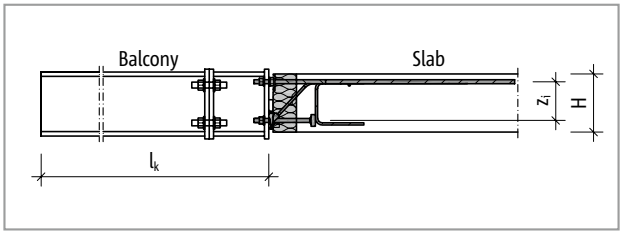


Fig. 21: Schöck Isokorb® T type SK: Structural system

Notes on design

- Potential applications for the Schöck Isokorb® encompass floor and balcony slab structures with predominantly static and evenly distributed live loads as per BS EN 1991-1-1/NA, Table 6.1.
- Static evidence must be furnished for the components connecting to both sides of the Isokorb®.
- A minimum of two Schöck Isokorb® T type SK must be installed per balcony structure. The balcony structure must be designed in such a way to prevent torsion being transferred into an individual Isokorb®. Schöck Isokorb® T type SK are unable to transfer any torsion (i.e. any moment $M_{Ed,x}$).
- When using an indirect bearing solution for the Schöck Isokorb® T type SK, the structural engineer must provide evidence, in particular, of the load transfer in the reinforced concrete component.
- Design values are taken in relation to the rear edge of the fixing plate.
- The nominal dimension c_{nom} of the concrete cover as per BS EN 1992-1-1 (EC2), 4.4.1 and BS EN 1992-1-1/NA is 20 mm for internal areas.
- All Isokorb® T type SK variants can transfer positive shear forces. Types MM1 or MM2 must be selected for negative (uplifting) shear forces.
- When addressing the uplifting forces on steel balconies or canopies, two type SK-MM1-VV1 Isokorbs® T are often sufficient, even if the overall design requires further T type SK.

Inner lever arm

Schöck Isokorb® T type SK		M1, MM1	MM2
Inner cantilever when		z_i [mm]	
Isokorb® height H [mm]	180	113	108
	200	133	128
	220	153	148
	240	173	168
	260	193	188
	280	213	208

Design

Schöck Isokorb® T type SK		M1-V1, MM1-VV1			M1-V2		
Design values with		Concrete strength class ≥ C25/30					
		$V_{Rd,z}$ [kN/element]					
		10	20	30	30	40	45
		$M_{Rd,y}$ [kNm/element]					
Isokorb® height H [mm]	180	-11.0	-9.9	-8.9	-8.9	-7.8	-7.3
	200	-12.9	-11.7	-10.4	-10.4	-9.2	-8.5
	220	-14.9	-13.4	-12,0	-12,0	-10.5	-9.8
	240	-16.8	-15.2	-13,6	-13,6	-11,9	-11.1
	260	-18.7	-16.9	-15,1	-15,1	-13.3	-12.4
	280	-20.7	-18.7	-16.7	-16.7	-14.7	-13,7
		$V_{Rd,y}$ [kN/element]					
	180–280	±2.5			±4.0		

Design with negative shear force and positive moment

Schöck Isokorb® T type SK		MM1-VV1
Design values with		Concrete strength class ≥ C20/25
		$M_{Rd,y}$ [kNm/element]
Isokorb® height H [mm]	180	9.8
	200	11.5
	220	13.2
	240	14.9
	260	16.7
	280	18.4
		$V_{Rd,z}$ [kN/element]
	180–280	-12.0
		$V_{Rd,y}$ [kN/element]
	180–280	±2.5

Schöck Isokorb® T type SK	M1-V1 , MM1-VV1	M1-V2
Placement with	Isokorb® length [mm]	
	180	180
Tension bars	2 ⌀ 14	2 ⌀ 14
Shear force bars	2 ⌀ 8	2 ⌀ 10
Pressure bearing / compression bars	2 ⌀ 14	2 ⌀ 14
Thread	M16	M16

Notes on design

- The applied moment capacity $M_{Rd,y}$ is dictated by the applied shear forces $V_{Rd,Z}$ and $V_{Rd,y}$. Intermediate values can be determined by linear interpolation. Extrapolation in the range of smaller shear force is not permissible.
- The maximum design values of the individual shear force load-bearing levele are to be observed:
  V1, VV1: max. $V_{Rd,z}$ = 30,9 kN
  V2: max. $V_{Rd,z}$ = 48,3 kN
- Edge and centre-to-centre distances are to be observed, see pages 29 and 30.

Design

Schöck Isokorb® T type SK		MM2-VV1			MM2-VV2		
Design values with		Concrete strength class ≥ C25/30					
		$V_{Rd,z}$ [kN/element]					
		25	35	45	45	55	65
		$M_{Rd,y}$ [kNm/element]					
Isokorb® height H [mm]	180	-22,6	-21,6	-20,6	-20,6	-19,6	-18,6
	200	-26,8	-25,6	-24,4	-24,4	-23,2	-22,0
	220	-31,0	-29,6	-28,2	-28,2	-26,8	-25.4
	240	-35,2	-33,6	-32,1	-32,1	-30.4	-28,9
	260	-39,4	-37,6	-35,9	-35,9	-34,1	-32,3
	280	-43,6	-41,6	-39,7	-39,7	-37.3	35.7
		$V_{Rd,y}$ [kN/element]					
	180–280	±4.0			±6.5		

Design with negative shear force and positive moment

Schöck Isokorb® T type SK		MM2-VV1	MM2-VV2
Design values with		Concrete strength class ≥ C20/25	
		$M_{Rd,y}$ [kNm/element]	
Isokorb® height H [mm]	180	11.7	11.0
	200	13.8	13.0
	220	16.0	15.0
	240	18.1	17.0
	260	20.3	19.1
	280	22.5	21.1
		$V_{Rd,z}$ [kN/element]	
	180–280	-12.0	
		$V_{Rd,y}$ [kN/element]	
	180–280	±4.0	±6.5

Schöck Isokorb® T type SK	MM2-VV1	MM2-VV2
Placement with	Isokorb® length [mm]	
	180	180
Tension bars	2 ⌀ 20	2 ⌀ 20
Shear force bars	2 ⌀ 10	2 ⌀ 12
Pressure bearing / compression bars	2 ⌀ 20	2 ⌀ 20
Thread	M22	M22

Notes on design

- The applied moment capacity $M_{Rd,y}$ is dictated by the applied shear forces $V_{Rd,Z}$ and $V_{Rd,y}$. Intermediate values can be determined by linear interpolation. Extrapolation in the range of smaller shear force is not permissible.
- The maximum design values of the individual shear force load-bearing levele are to be observed:
  VV1: max. $V_{Rd,z}$ = 48,3 kN
  VV2: max. $V_{Rd,z}$ = 69,5 kN
- Edge and centre-to-centre distances are to be observed, see pages 29 and 30.

Deflection/Camber

Deflection

The deflection values shown in the calculation tables result solely from the deformation of the Schöck Isokorb® element. The final precamber of the balcony construction results from the calculation according to BS 8500, or according to EC 2, plus the precamber due to the Schöck Isokorb®.

The precamber of the balcony construction to be specified by the engineer in charge.

Deformation (p) caused by the Schöck Isokorb®

$p = \tan \alpha \cdot l_k \cdot (M_{Ed,perm} / M_{Rd}) \cdot 10$ [mm]

Factors to be incorporated:

$\tan \alpha$ = Insert value from table

l_k = Cantilever length [m]

$M_{Ed,perm}$ = Relevant bending moment [kNm] for determining the deformation p [mm] caused by the Schöck Isokorb®.
The structural engineer specifies the load combination to be used when calculating the deformation.
(Recommendation: Load combination for calculating the camber according to EC2: $M_{Ed,perm}$ based on DL + 0.3 LL [kNm]

M_{Rd} = Maximum rated moment [kNm] of the Schöck Isokorb®

Sample calculation, see page 42

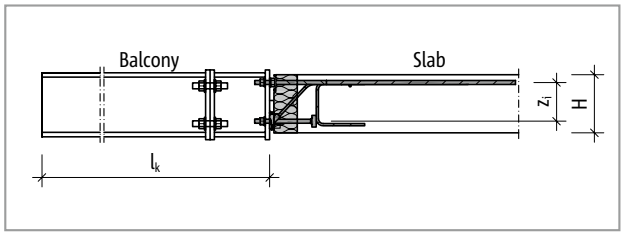


Fig. 22: Schöck Isokorb® T type SK: Structural system

Schöck Isokorb® T type SK		M1-V1	M1-V2	MM1-VV1	MM2-VV1	MM2-VV2
Deflection factors when		tan α [%]				
Isokorb® height H [mm]	180	0.8	0.7	1.2	1.5	1.5
	200	0.7	0.6	1.0	1.3	1.2
	220	0.6	0.5	0.9	1.1	1.1
	240	0.5	0.5	0.8	1.0	0.9
	260	0.5	0.4	0.7	0.9	0.9
	280	0.4	0.4	0.6	0.8	0.8

Torsional spring stiffness

Torsion spring stiffness

The torsion spring stiffness of the Schöck Isokorb® is to be taken into account with the verification of the serviceability limit state. To the extent that an examination of the vibration behaviour of the steel structure to be connected is necessary, the additional deformation resulting from the Schöck Isokorb® must be taken into consideration.

Schöck Isokorb® T type SK		M1-V1	M1-V2	MM1-VV1	MM2-VV1	MM2-VV2
Torsion spring stiffness for		C [kNm/rad]				
Isokorb® height H [mm]	180	1300	1300	800	1500	1500
	200	1700	1700	1200	2000	2000
	220	2300	2300	1500	2800	2800
	240	3100	2700	2000	3400	3600
	260	3500	3800	2500	4300	4000
	280	4800	4200	3200	5300	5000

Expansion joint spacing

Maximum expansion joint spacing

Expansion joints must be provided in the external component. Changes in length due to temperature deformation are determined by the maximum distance (e) from the centre of the outermost Schöck Isokorb® T type SK. The balcony structure may overhang the outermost Schöck Isokorb® element. In the case of fixed points, such as corners, half the maximum distance (e) from the fixed point applies. The calculation of the permissible expansion joint spacing is based on a reinforced concrete balcony slab that is securely connected to the steel members. If design measures have been implemented to ensure there is movement between the balcony slab and the individual steel members, then only the distances of the non-moving connections are relevant, see detail.

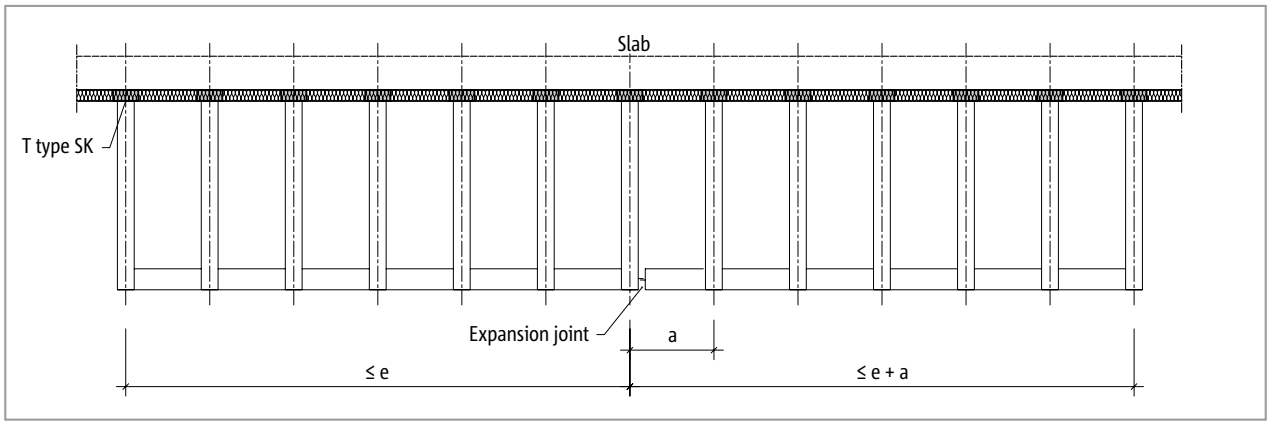


Fig. 23: Schöck Isokorb® T type SK: Maximum expansion joint spacing e

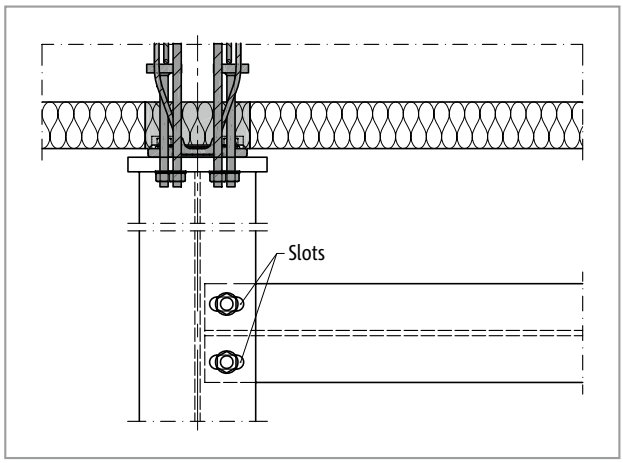


Fig. 24: Schöck Isokorb® T type SK: Expansion joint detail to ensure movement during temperature expansion

Schöck Isokorb® T type SK		M1, MM1	MM2
Maximum expansion joint spacing when		e [m]	
Insulating element thickness [mm]	80	5.7	3.5

Expansion joints

- Provided that the expansion joint detail permanently allows temperature-dependent displacements of the projecting transverse beam, the expansion joint distance may be extended to a maximum of e + a.

Edge spacing

Edge spacing

The Schöck Isokorb® T type SK must be so positioned that minimum edge spacing in relation to the inner reinforced concrete elements are complied with:

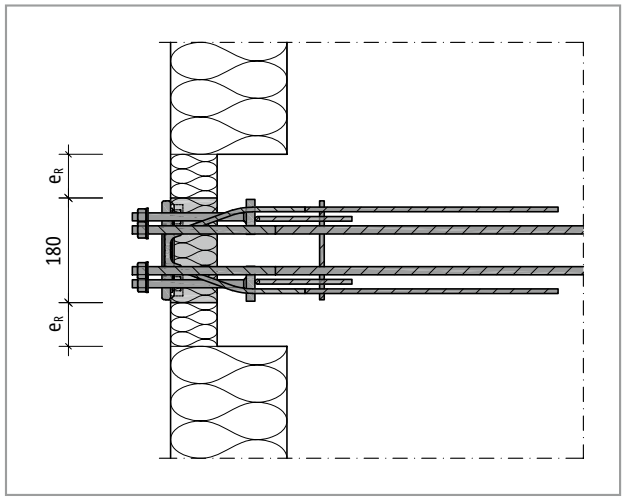


Fig. 25: Schöck Isokorb® T type SK: Edge distances

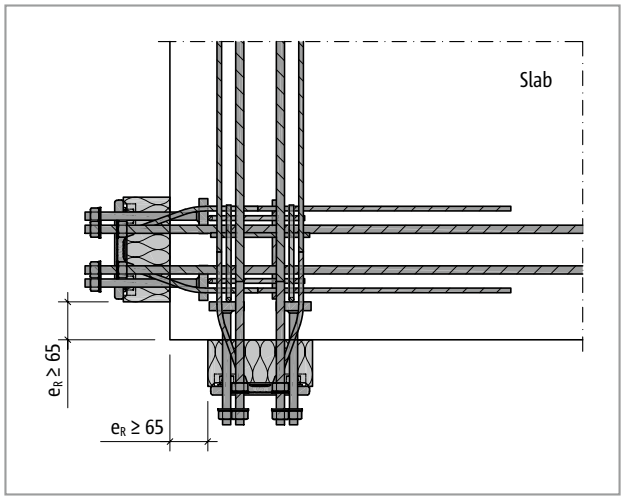


Fig. 26: Schöck Isokorb® T type SK: Edge distances at the outer corner with Isokorbs® arranged vertically to each other

Acceptable shear force $V_{Rd,z}$ depending on the edge distance

Schöck Isokorb® T type SK		M1-V1	M1-V2	MM1-VV1	MM2-VV1	MM2-VV2
Design values with		Concrete strength class ≥ C20/25				
Isokorb® height H [mm]	Edge distance e_R [mm]	$V_{Rd,z}$ [kN/element]				
180–190	30 ≤ e_R < 74	14,2	20,4	14,2	21.3	28,5
200–210	30 ≤ e_R < 81					
220–230	30 ≤ e_R < 88					
240–280	30 ≤ e_R < 95					
180–190	$e_R \geq 74$	No reduction required				
200–210	$e_R \geq 81$					
220–230	$e_R \geq 88$					
240–280	$e_R \geq 95$					

Edge distances

- Edge distances e_R < 30 mm are not permitted!
- If two Isokorb® T type SK are arranged vertically to each other at a corner. edge distances e ≥ 65 mm are required.

Centre-to-centre distances

Centre-to-centre distances

The Schöck Isokorb® T type SK must be so positioned that minimum centre-to-centre distances of Isokorb® to Isokorb® are complied with:

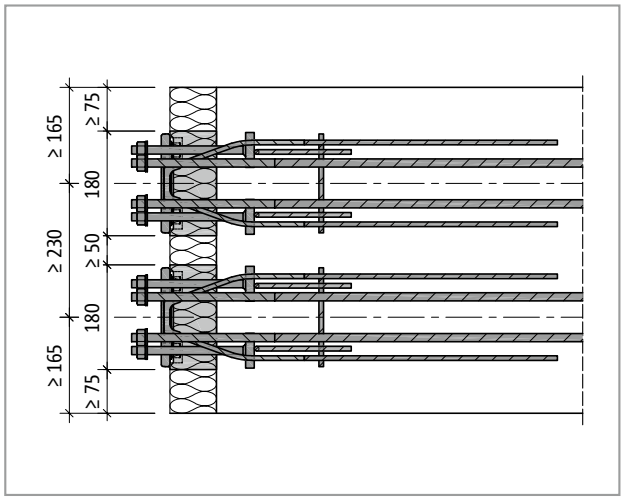


Fig. 27: Schöck Isokorb® T type SK: Centre-to-centre distance

Design internal forces depending on the centre-to-centre distance

Schöck Isokorb® T type SK		M1, MM1, MM2
Design values with		Concrete strength class ≥ C20/25
Isokorb® height H [mm]	Centre-to-centre distance e_A [mm]	$V_{Rd,z}$ [kN/element], $M_{Rd,y}$ [kNm/element]
180–190	$e_A \geq 230$	No reduction required
200–210	$e_A \geq 245$	
220–230	$e_A \geq 260$	
240–280	$e_A \geq 270$	

Outer corner

Height offset on outer corner

On an outer corner, the Schöck Isokorbs® T type SK must be arranged at offset heights. This will allow the tension, compression and shear force rods to overlap, To help achieve this, 20 mm insulation strips can be added directly beneath and directly above the insulating element of the Schöck Isokorb® T type SK on site.

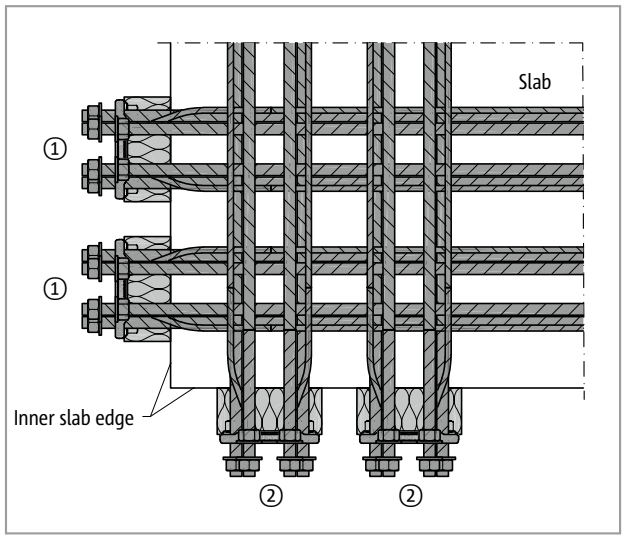


Fig. 28: Schöck Isokorb® T type SK: Outer corner

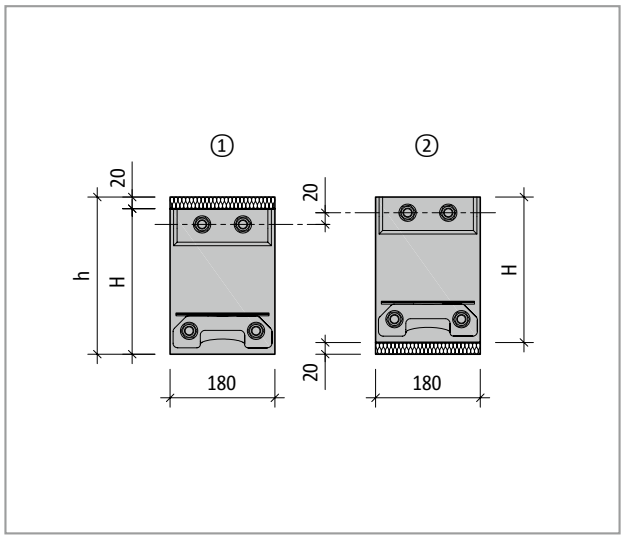


Fig. 29: Schöck Isokorb® T type SK: Layout with offset heights

Outer corner

- The corner solution using T type SK requires a slab thickness of h ≥ 200 mm!
- With the design of a corner balcony it is to be noted that the 20 mm height difference in the area of the corner is also to be taken into account with the on-site front slabs.
- The centre-to-centre, element and edge distances of the Schöck Isokorb® T type SK are to be maintained.

Product description

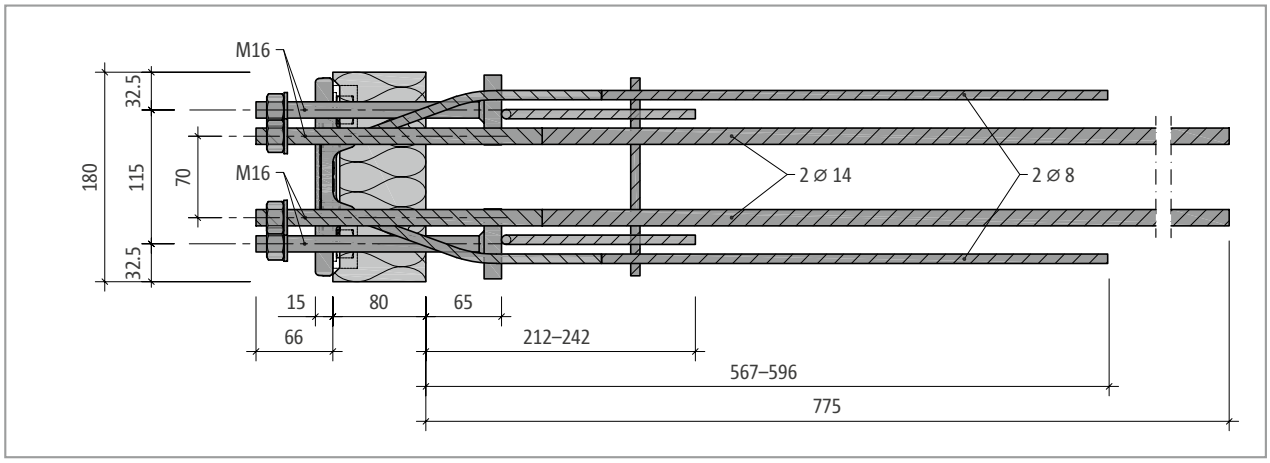


Fig. 30: Schöck Isokorb® T type SK-M1-V1: Plan view

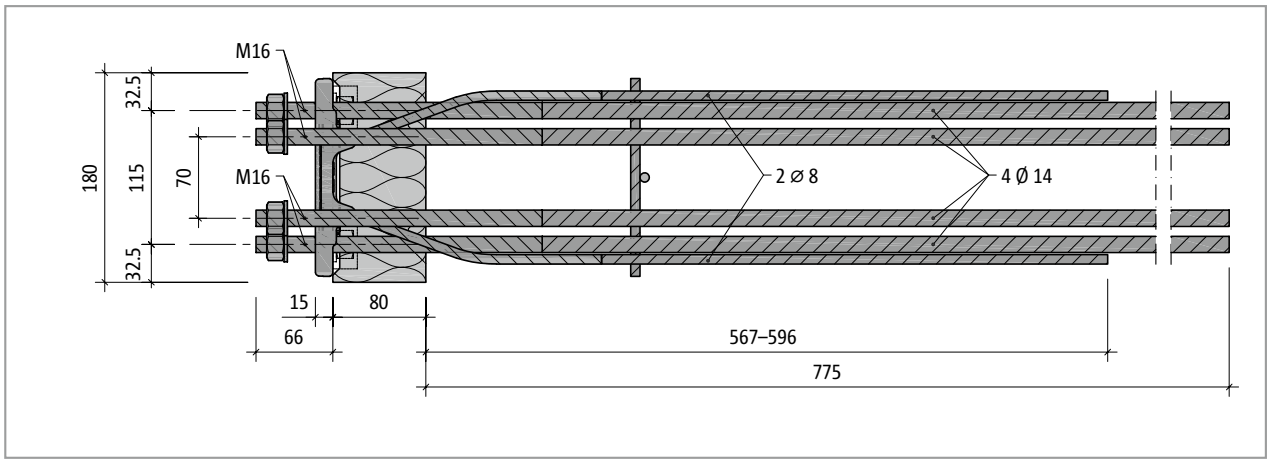


Fig. 31: Schöck Isokorb® T type SK-MM1-VV1: Plan view

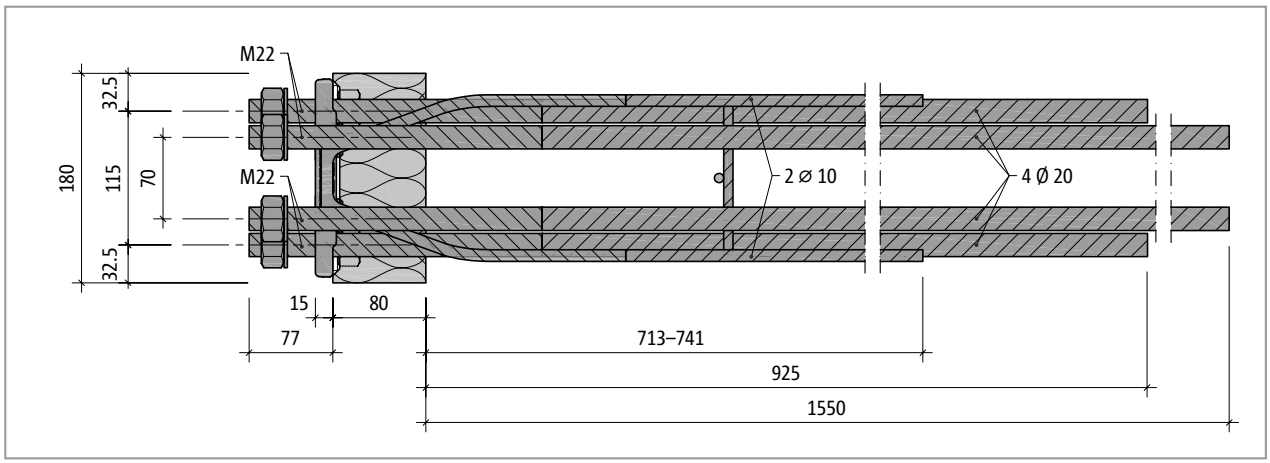


Fig. 32: Schöck Isokorb® T type SK-MM2-VV1: Plan view

Product information

- The clamping distance is 30 mm on T type SK-M1,MM1 and 35 mm on T type SK-MM2.

Product description

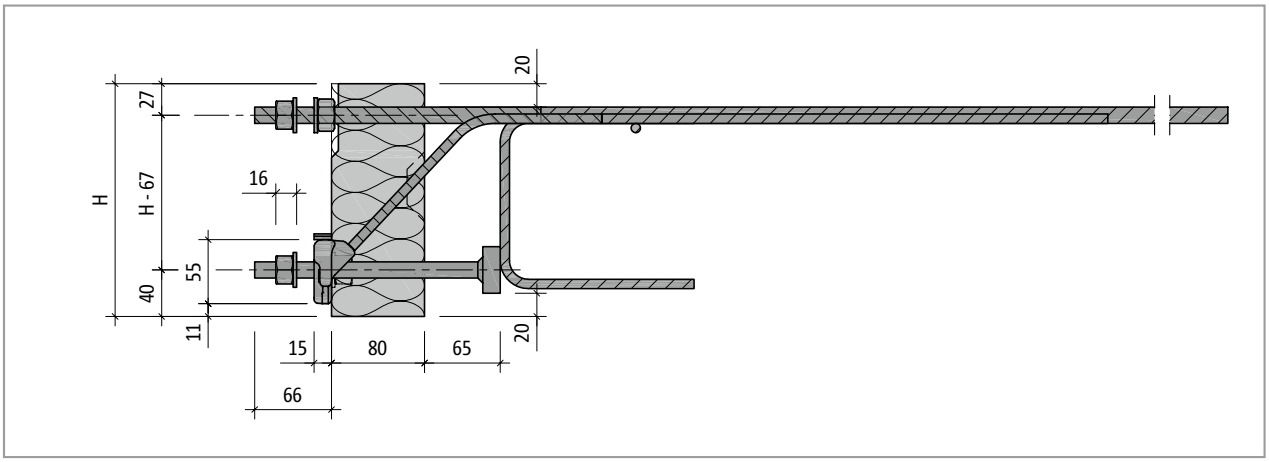


Fig. 33: Schöck Isokorb® T type SK-M1-V1: Cross section of the product

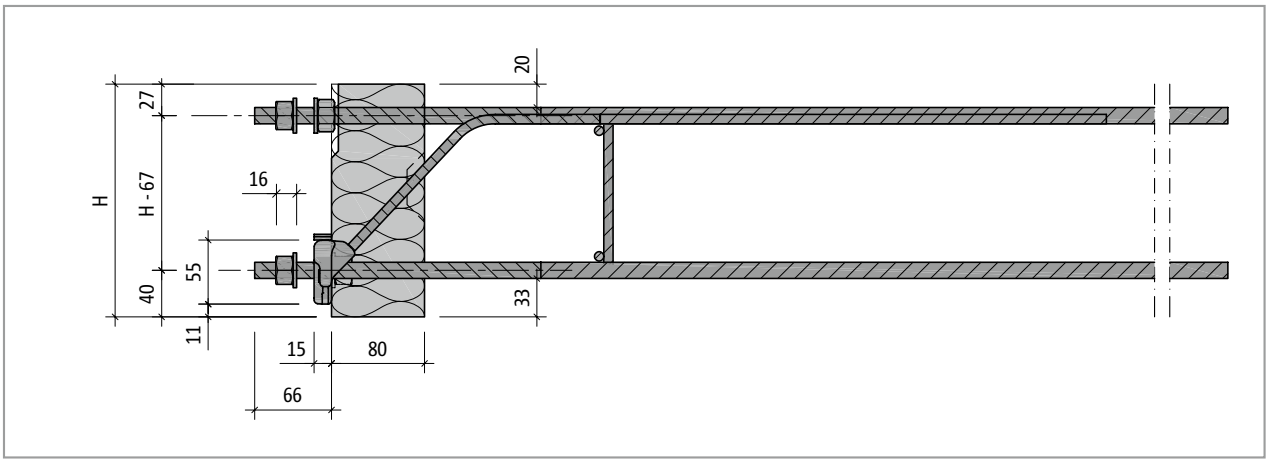


Fig. 34: Schöck Isokorb® T type SK-MM1-VV1: Cross section of the product

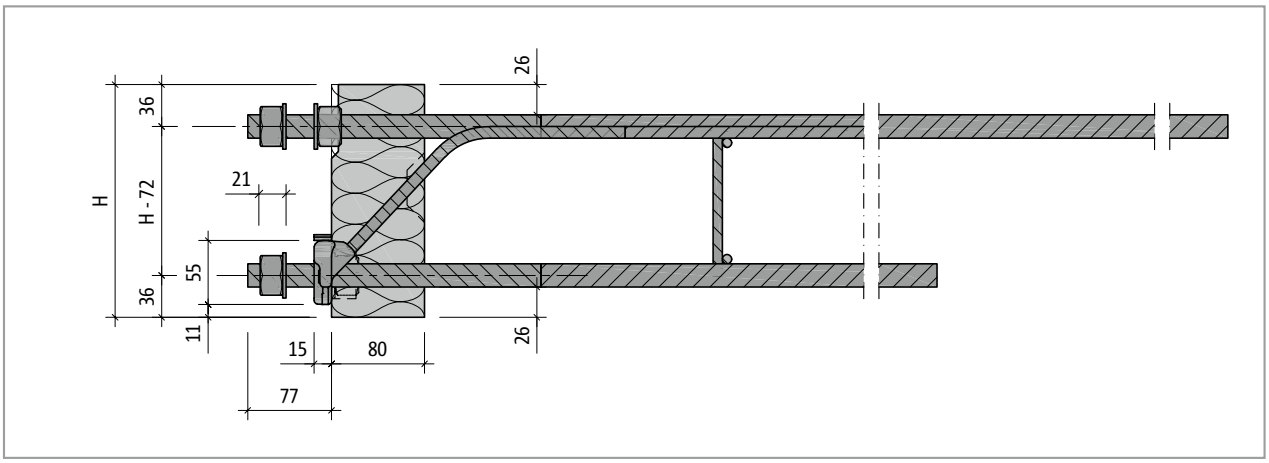


Fig. 35: Schöck Isokorb® T type SK-MM2-VV1: Cross section of the product

Product information

- The clamping distance is 30 mm on T type SK-M1,MM1 and 35 mm on T type SK-MM2.

On-site reinforcement - in-situ concrete construction

Schöck Isokorb® T type SK-M1

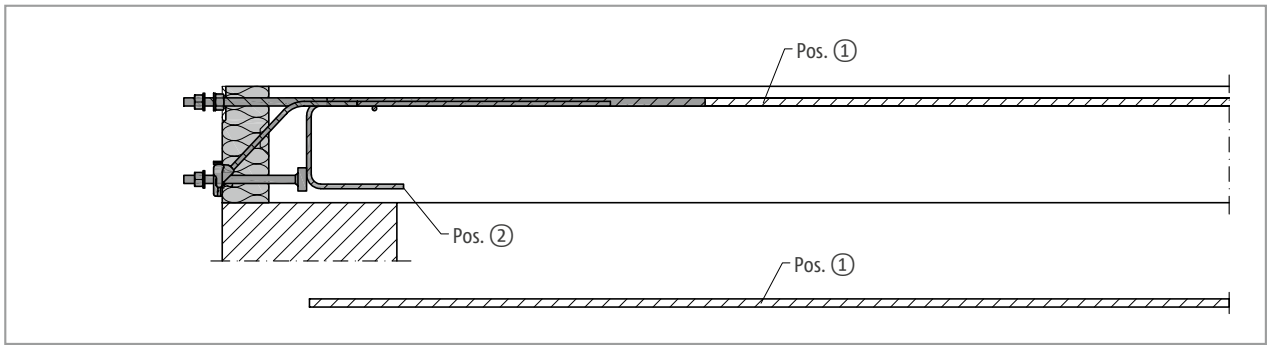


Fig. 36: Schöck Isokorb® T type SK-M1: On-site reinforcement: Cross section

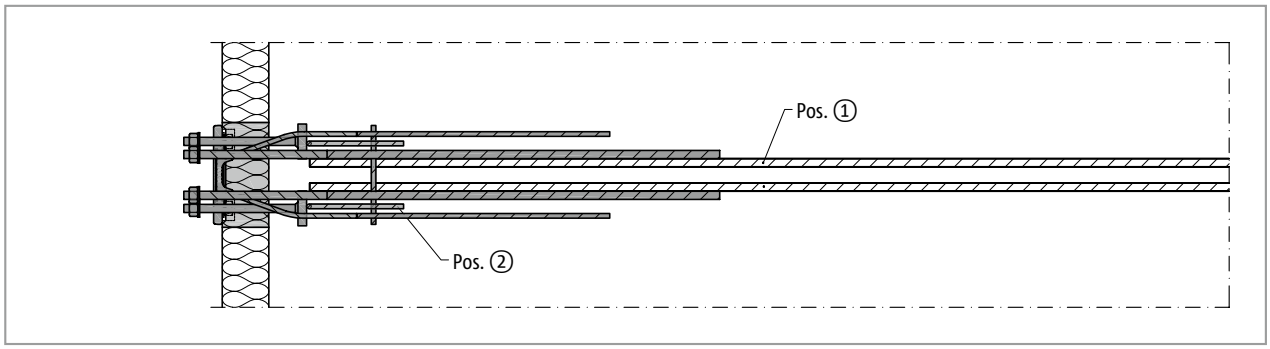


Fig. 37: Schöck Isokorb® T type SK-M1: On-site reinforcement: Plan view

Schöck Isokorb® T type SK			M1
On-site reinforcement	Type of bearing	Height H [mm]	Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure
Overlapping reinforcement			
Pos. 1	direct/indirect	180–280	2 • H16
Edge and splitting tensile reinforcement			
Pos. 2	direct/indirect	180–280	included with the product

Information about on-site reinforcement

- Lapping of the reinforcement in the connecting reinforced concrete components must be applied as close as possible to the insulating element of the Schöck Isokorb®, the required concrete cover must be observed.
- Overlapping joints as per BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA.
- T Type SK-M1 requires installation of transverse reinforcement as per BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA.

On-site reinforcement - in-situ concrete construction

Schöck Isokorb® T type SK-MM1

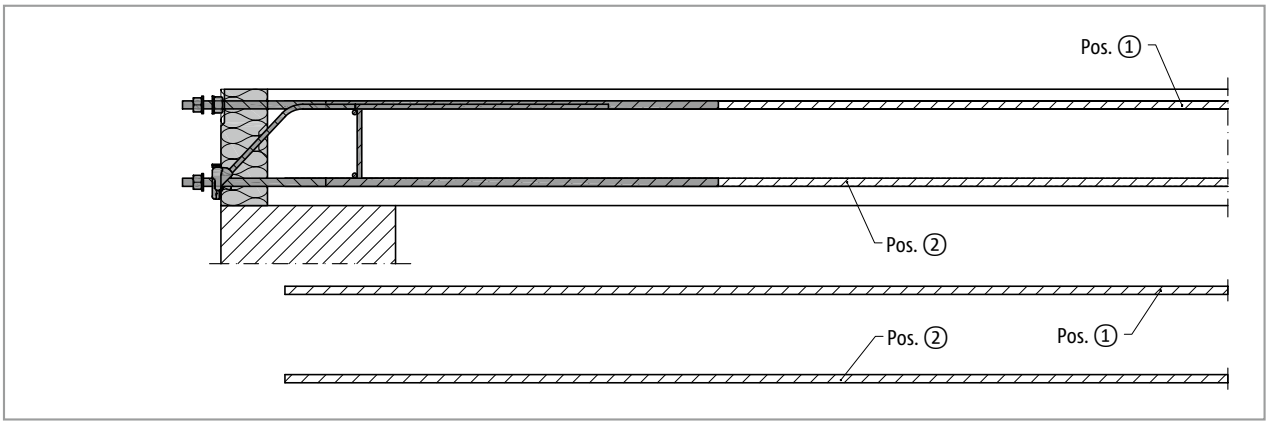


Fig. 38: Schöck Isokorb® T type SK-MM1-VV1: On-site reinforcement: Cross section

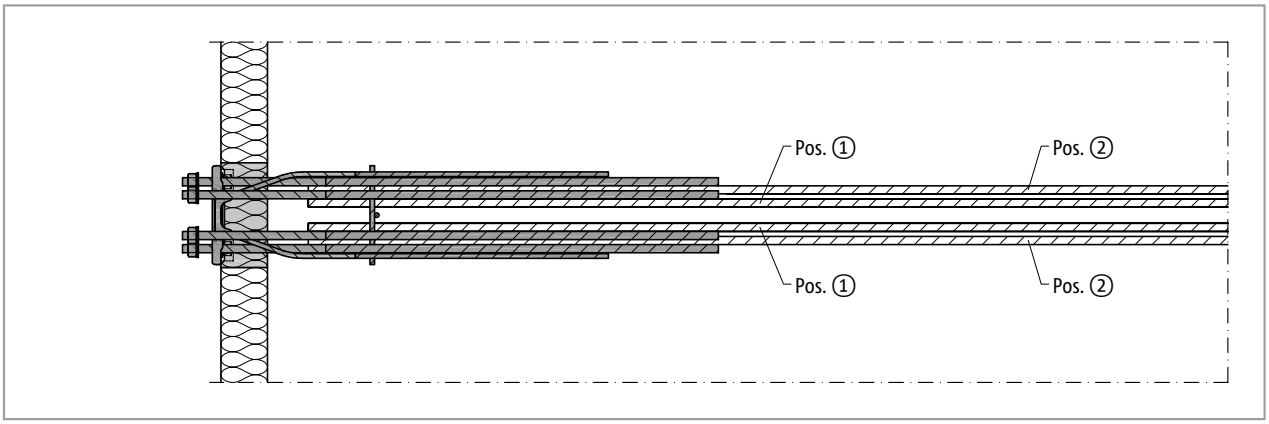


Fig. 39: Schöck Isokorb® T type SK-MM1-VV1: On-site reinforcement: Plan view

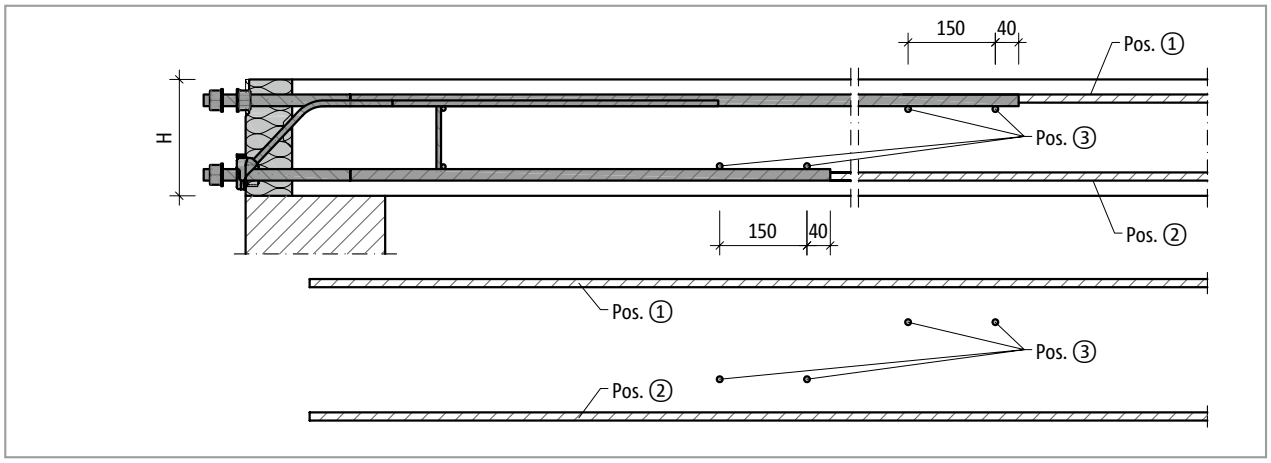
Schöck Isokorb® T type SK			MM1
On-site reinforcement	Type of bearing	Height H [mm]	Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure
Overlapping reinforcement			
Pos. 1	direct/indirect	180–280	acc. to the specifications of the structural engineer
Pos. 2			necessary in the tension zone, as specified by the structural engineer

Information about on-site reinforcement

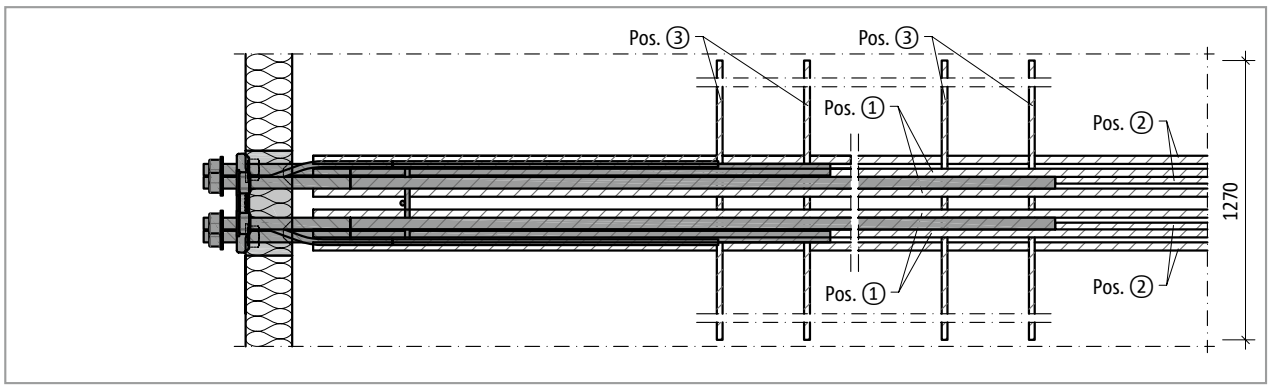
- T Type SK-MM1: In the case of exposure to uplifting loads (+M_{Ed}), as planned, an overlapping joint with the lower Isokorb® reinforcement may be necessary to cover the tensile force curve. The structural engineer must indicate whether this overlapping reinforcement is required.

On-site reinforcement - in-situ concrete construction

Schöck Isokorb® T type SK-MM2



40: Schöck Isokorb® T type SK-MM2: On-site reinforcement; section



41: Schöck Isokorb® T type SK-MM2: On-site reinforcement: Plan view

Schöck Isokorb® T type SK			MM2
On-site reinforcement	Type of bearing	Height H [mm]	Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure
Overlapping reinforcement			
Pos. 1	direct/indirect	180–280	4 • H16
Pos. 2			necessary in the tension zone, as specified by the structural engineer
Lateral reinforcement			
Pos. 3	direct/indirect	180–280	4 • H10

Information about on-site reinforcement

- T Type SK-MM2: In the case of exposure to uplifting loads (+M_{Ed}), as planned, an overlapping joint with the lower Isokorb® reinforcement may be necessary to cover the tensile force curve. The structural engineer must indicate whether this overlapping reinforcement is required.
- Pos. 3: The location and the given centre distance of the reinforcement must be assured. Transverse reinforcement provided for other reasons can be taken into account.

On-site reinforcement - precast construction

Schöck Isokorb® T type SK-M1

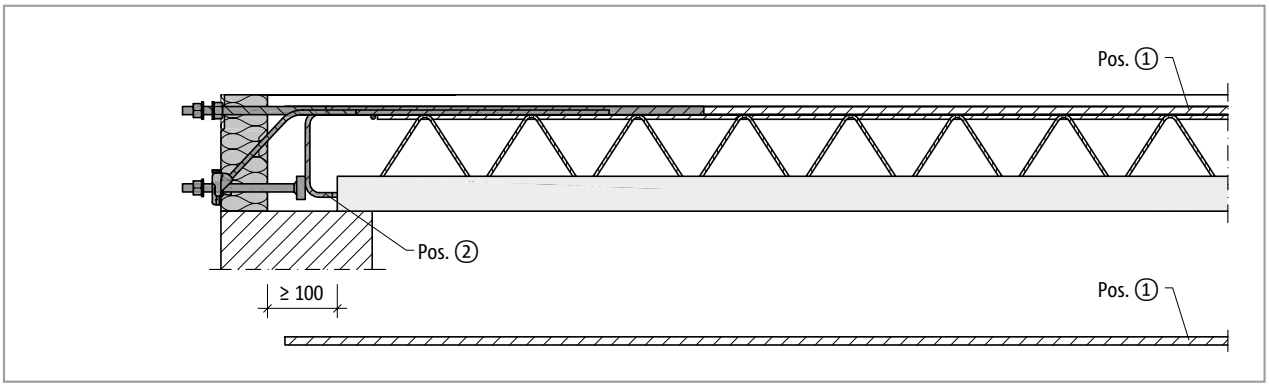


Fig. 42: Schöck Isokorb® T type SK-M1: On-site reinforcement for semi-precast construction: Cross section

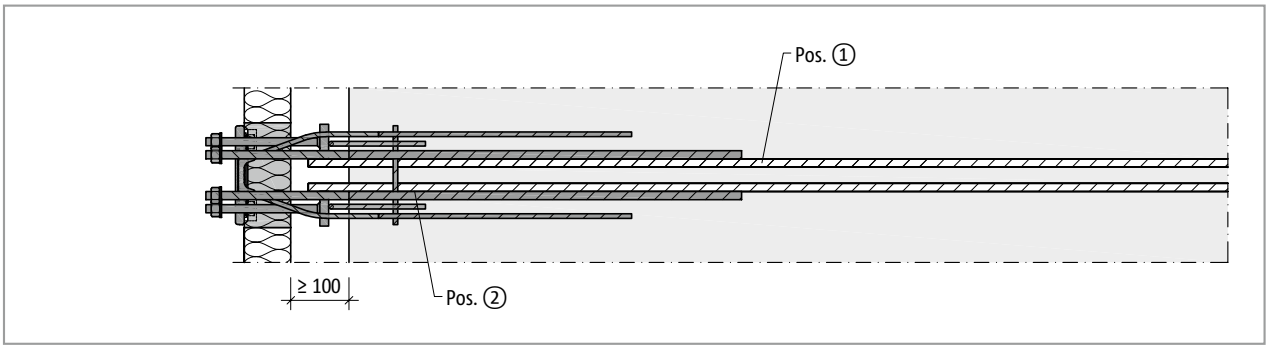


Fig. 43: Schöck Isokorb® T type SK-M1: On-site reinforcement for semi-precast construction: Plan view

Schöck Isokorb® T type SK			M1
On-site reinforcement	Type of bearing	Height H [mm]	Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure
Overlapping reinforcement			
Pos. 1	direct/indirect	180–280	2 • H16
Edge and splitting tensile reinforcement			
Pos. 2	direct/indirect	180–280	included with the product, alternative version with on-site stirrups 2 • H8

Information about on-site reinforcement

- T Type SK-M1 requires installation of transverse reinforcement as per BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA.
- If composite pre-cast flooring is being installed, the lower legs of the factory-supplied links can be shortened on site and replaced with two suitable ⌀8 stirrups.

End Plate

T type SK-M1 for transferring moment and positive shear force

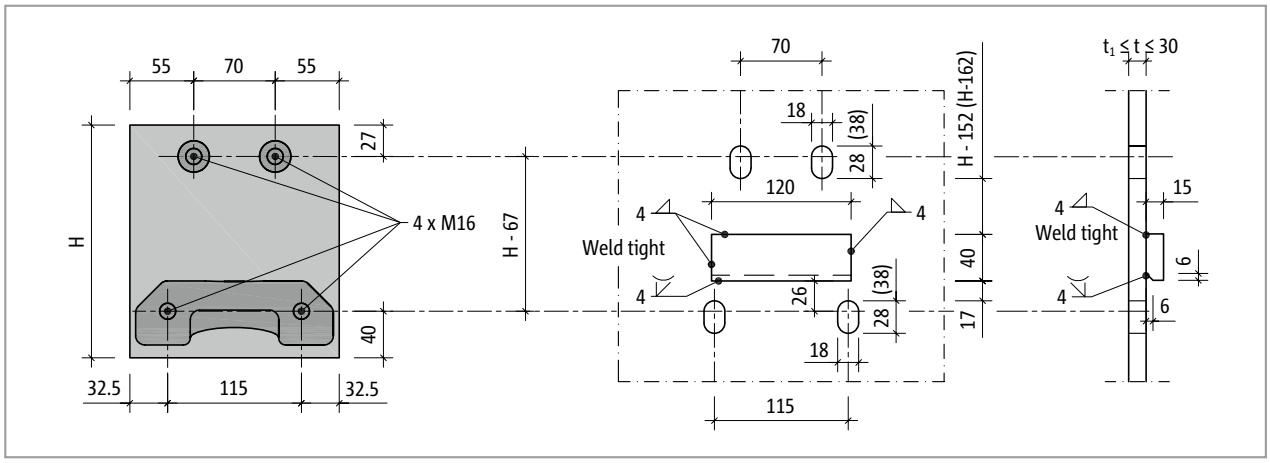


Fig. 44: Schöck Isokorb® T type SK-M1: Design of the fixing plate connection

T type SK-MM1 for transferring moment and positive or negative shear force

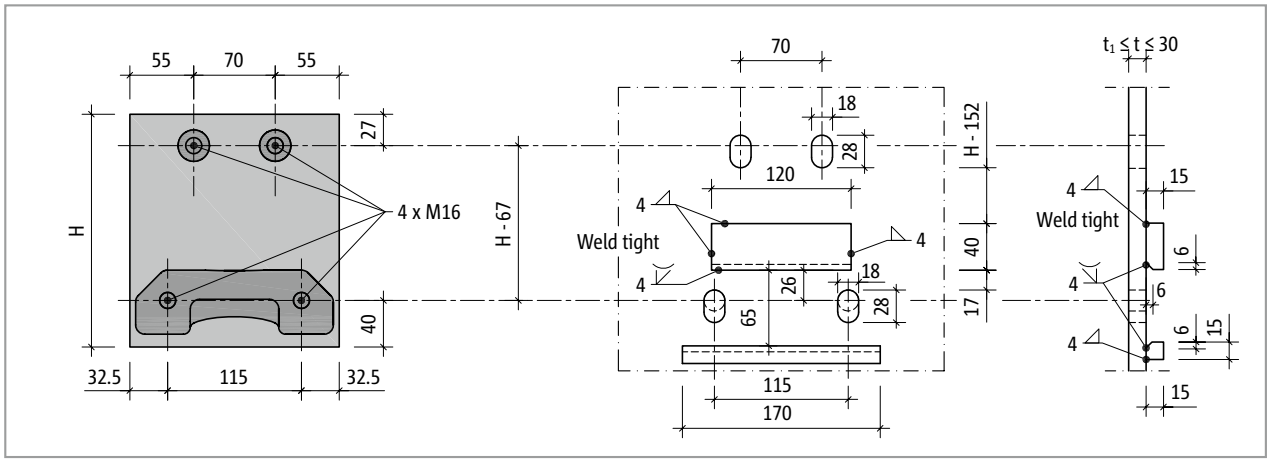


Fig. 45: Schöck Isokorb® T type SK-MM1: Design of the face plate connection; Round holes, alternatively slotted holes and a second cleat for the transfer of the negative shear force

The choice of fixing plate thickness t is determined by the minimum thickness t_1 as specified by the structural engineer. This thickness must not, however, be greater than the clamping distance of the Schöck Isokorb® T type SK.

End Plate

- The illustrated elongated holes allow an uplifting of the endplate of up to 10 mm. The values shown in brackets allow for the increase of the tolerances of up to 20 mm.
- The distance of the elongated holes to the flange of the beam has to be checked.
- If uplifting loads occur as planned, the lower section of the fixing plate must have round holes (rather than slots). This will result in reduction of the vertical tolerance.
- If horizontal forces $V_{Ed,y} > 0{,}342 \cdot$ min. $V_{Ed,z}$ parallel to the insulation joint occur, the lower section of the fixing plate must also be modified with round holes instead of slots to ensure load transfer.
- The structural engineer must specify the overall dimensions of the fixing plate
- The construction drawing must contain the tightening torque for the nuts, which is specified as follows:
  T type SK-M1, T type SK-MM1 (threaded rod M16 - wrench size s = 24 mm): M_r = 50 Nm
- The Schöck Isokorb® embedded in concrete are to be measured in-situ before the front slabs are produced.

End Plate

T type SK-MM2 for transferring moment and positive shear force

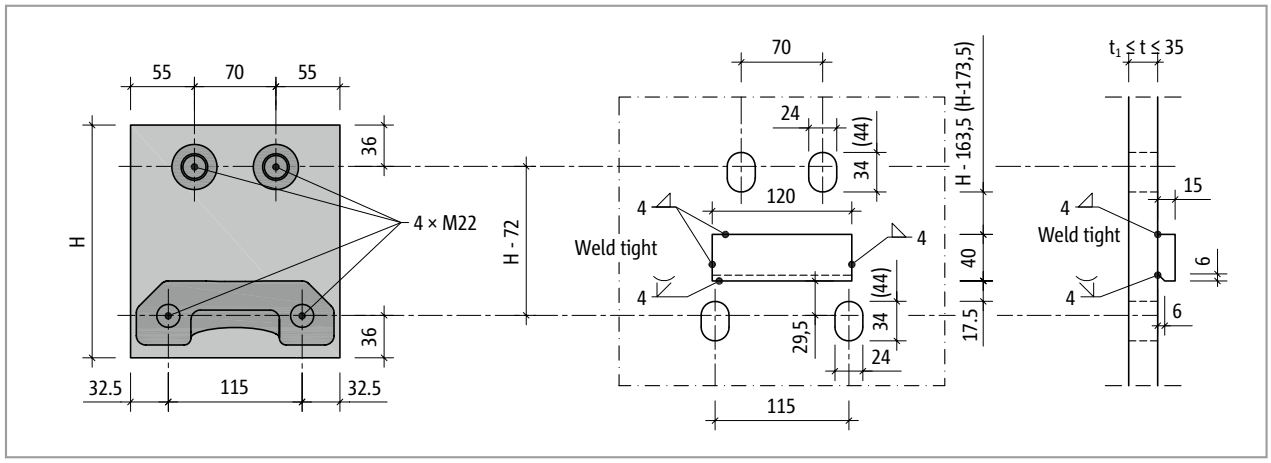


Fig. 46: Schöck Isokorb® T type SK-MM2: Design of the face plate connection

T type SK-MM2 for transferring moment and positive or negative shear force

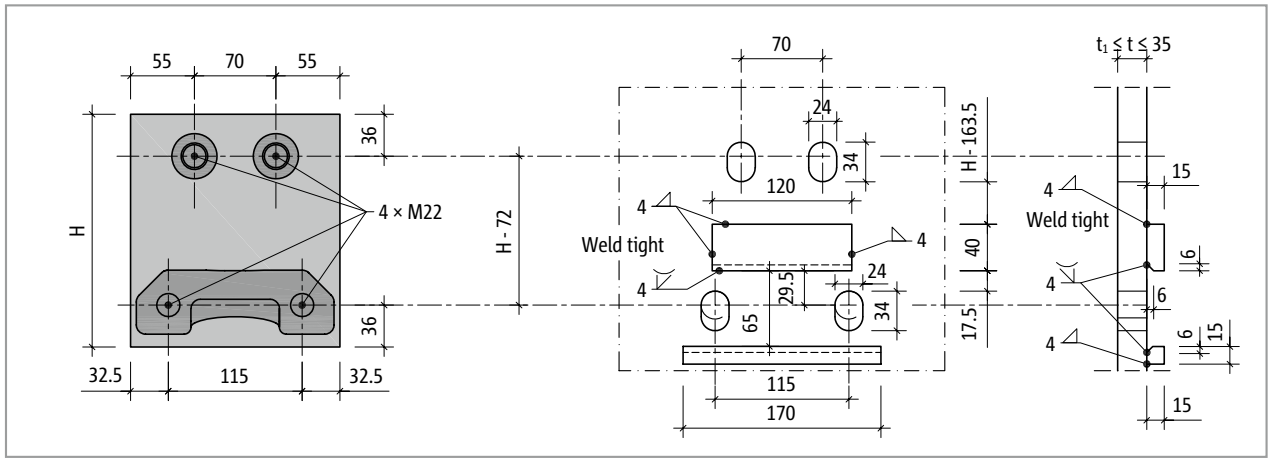


Fig. 47: Schöck Isokorb® T type SK-MM2: Design of the face plate connection; Round holes, alternatively slotted holes and a second cleat for the transfer of the negative shear force

The choice of fixing plate thickness t is determined by the minimum thickness t_1 as specified by the structural engineer. This thickness must not, however, be greater than the clamping distance of the Schöck Isokorb® T type SK.

End Plate

- The illustrated elongated holes allow an uplifting of the endplate of up to 10 mm. The values shown in brackets allow for the increase of the tolerances of up to 20 mm.
- The distance of the elongated holes to the flange of the beam has to be checked.
- If uplifting loads occur as planned, the lower section of the fixing plate must have round holes (rather than slots). This will result in reduction of the vertical tolerance.
- If horizontal forces $V_{Ed,y}$ > 0,342 • min. $V_{Ed,z}$ parallel to the insulation joint occur, the lower section of the fixing plate must also be modified with round holes instead of slots to ensure load transfer.
- The structural engineer must specify the overall dimensions of the fixing plate
- The construction drawing must contain the tightening torque for the nuts, which is specified as follows:
  T type SK-MM2 (threaded rod ⌀ 22): M_r = 80 Nm
- The Schöck Isokorb® embedded in concrete are to be measured in-situ before the front slabs are produced.
- Schöck Isokorb® T type SK-MM2 in H180 : A maximum of 10 mm tolerance is possible for the height adjustment. Relevant is the distance of the upper elongated holes to the on-site butt stop.

On-site butt stop

On-site butt stop

The on-site butt stop is absolutely crucial for transferring shear forces from the on-site front slab to the Isokorb® T type SK! The spacer shims supplied by Schöck are used for vertical adjustment between butt stop and Schöck Isokorb®.

On-site butt stop to transfer positive shear forces.

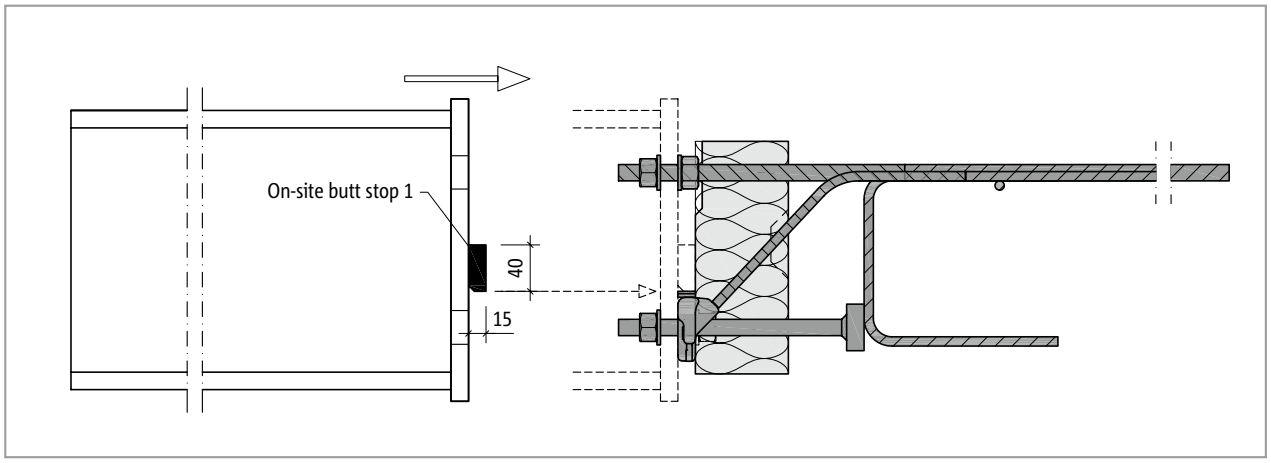


Fig. 48: Schöck Isokorb® T type SK: Mounting the steel member

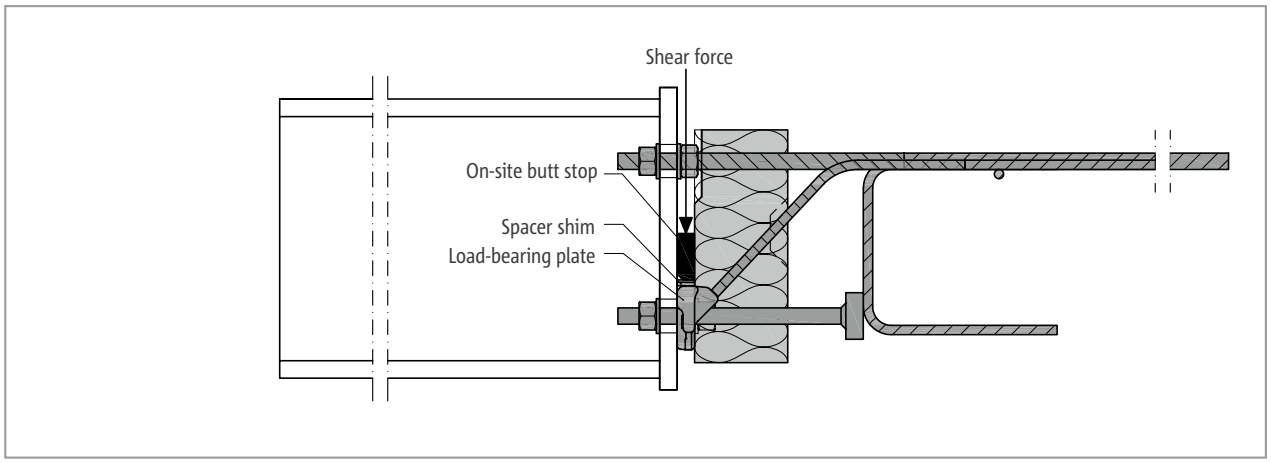


Fig. 49: Schöck Isokorb® T type SK: On-site butt stop for transferring shear forces

On-site butt stop

- Type of steel to match static requirements.
- Apply corrosion protection after welding.
- Steel construction: Checking for dimensional inaccuracy of the structure prior to fabrication is absolutely essential!

Spacer shims

- Details of dimensions and materials, see page 16
- With installation ensure they are free from burrs and are even.

On-site butt stop

2 on-site butt stops for the transfer of positive or negative shear force

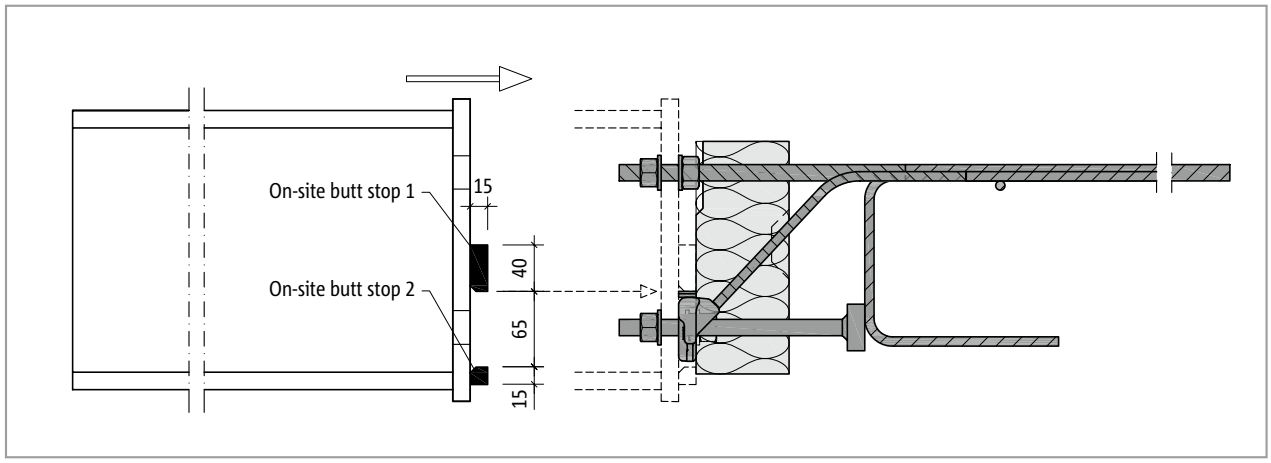


Fig. 50: Schöck Isokorb® T type SK: Mounting the steel member

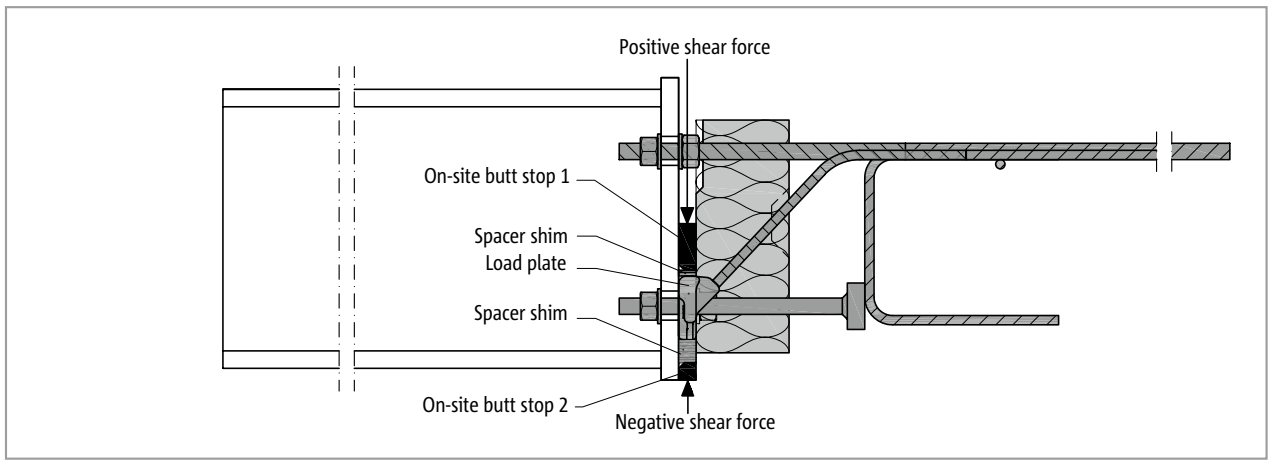


Fig. 51: Schöck Isokorb® T type SK: On-site dogs for the transfer of the shear force

On-site butt stop

- Type of steel to match static requirements.
- Apply corrosion protection after welding.
- Steel construction: Checking for dimensional inaccuracy of the structure prior to fabrication is absolutely essential!

Spacer shims

- Details of dimensions and materials, see page 16
- With installation ensure they are free from burrs and are even.

Design example

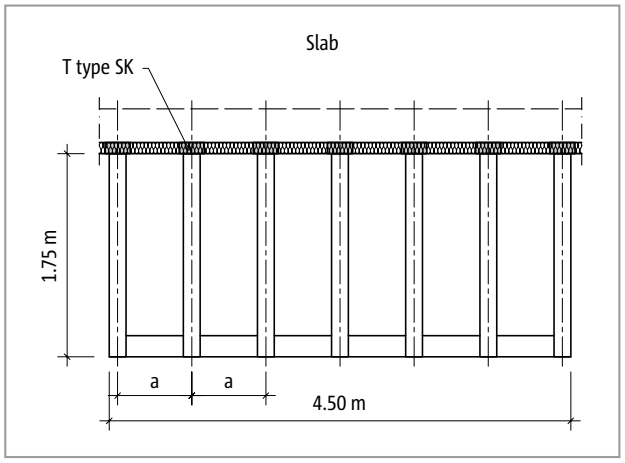


Fig. 52: Schöck Isokorb® T type SK: Plan view

Static system and load assumptions

Geometry:	Cantilever length	l_k = 1.75 m
	Balcony width	b = 4.50 m
Thickness of reinforced concrete inner slab		h = 200 mm
Axis spacing of the connections as chosen for the design		a = 0.7 m
Load assumptions:	Self-weight with lightweight finish	g = 0.6 kN/m²
	Live load	q = 4.0 kN/m²
	Self-weight of railing	F_G = 0.75 kN/m
Horizontal load on railing at rail height 1.0 m		H_G = 0.5 kN/m
Exposure class:	XC 1 on the inside	
chosen:	Concrete grade C25/30 for the floor slab	
	Concrete cover c_v = 20 mm for Isokorb® tension rods	
Connection geometry:	No height offset, no inner slab joist on slab edge, no balcony upstand	
Floor slab bearing:	Slab edge: directly supported	
Balcony bearing:	Cantilever fins clamped with T type SK	

Proof of limits of load-bearing capacity (moment stress and shear force)

Member forces:

M_{Ed} $= -[(\gamma_G \cdot g_B + \gamma_Q \cdot q) \cdot l_k^2/2 \cdot a + \gamma_G \cdot F_G \cdot a \cdot l_k + \gamma_Q \cdot \psi_0 \cdot H_G \cdot 1.0 \cdot a]$

M_{Ed} $= -[(1.35 \cdot 0.6 + 1.5 \cdot 4.0) \cdot 1.75^2/2 \cdot 0.7 + 1.35 \cdot 0.75 \cdot 0.7 \cdot 1.75 + 1.5 \cdot 0.7 \cdot 0.5 \cdot 1.0 \cdot 0.7]$

$= -8.9$ kNm

V_{Ed} $= (\gamma_G \cdot g_B + \gamma_Q \cdot q) \cdot a \cdot l_k + \gamma_G \cdot F_G \cdot a$

V_{Ed} $= (1.35 \cdot 0.6 + 1.5 \cdot 4.0) \cdot 0.7 \cdot 1.75 + 1.35 \cdot 0.75 \cdot 0.7 = +9.1$ kN

Requisite number of connections: n = (b/a) + 1 = 7.4 = 8 connections

Axis separation of the connections: ((4.50 - 0.18)/7) = 0.617 m, where beam width = width of Schöck Isokorb = 0.18 m

chosen: **8x Schöck Isokorbs® T type SK-M1-V1-R0-X80-H200-L180-1.0**

M_{Rd} = -12.9 kNm > M_{Ed} = -8.9 kNm

V_{Rd} = +10,0 kN (see page 24) > V_{Ed} = +9,1 kN

Design example | Installation instructions

Verification in the serviceability limit state (deformation/camber)

Deformation factor: $\tan \alpha$ = 0,7 (from table, see page 26)

Chosen load combination: $g + 0{,}3 \cdot q$

(recommendation for the determination of the camber from Schöck Isokorb®))

$M_{Ed,GZG}$ determine in the serviceability limit state

$M_{Ed,GZG} = -[(g_B + \psi_{2,i} \cdot q) \cdot l_k^2/2 \cdot a + F_G \cdot a \cdot l_k + \psi_{2,i} \cdot H_G \cdot 1{,}0 \cdot a]$

$M_{Ed,GZG} = -[(0{,}6 + 0{,}3 \cdot 4{,}0) \cdot 1{,}75^{\,2}/2 \cdot 0{,}7 + 0{,}75 \cdot 0{,}7 \cdot 1{,}75 + 0{,}3 \cdot 0{,}5 \cdot 1{,}0 \cdot 0{,}7] = -2{,}95$ kNm

Deformation: $w_ü = [\tan \alpha \cdot l_k \cdot (M_{Ed,GZG}/M_{Rd})] \cdot 10$ [mm]

$w_ü = [0{,}7 \cdot 1{,}75 \cdot (-2{,}95/-12{,}9)] \cdot 10 = 3$ mm

Arrangement of expansion joints: length of balcony: 4,50 m < 5,70 m

=> no expansion required

Installation instructions

The current installation instruction can be found online under:
www.schoeck.com/view/2739

☑ Check list

Check list for structural engineers

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Is there a situation in which, during the construction phase, the construction had to be dimensioned for an emergency or a special load?
- ☐ Have the fire protection requirements for the overall load-bearing structure been clarified? Are the on-site measures included in the construction drawings?
- ☐ Is the Schöck Isokorb® connection exposed to uplifting shear forces in conjunction with positive connection moments?
- ☐ When calculating the deflection of the overall structure, has the camber caused by Schöck Isokorb® been taken into account?
- ☐ Are temperature deformations directly attributed to the Isokorb® connection and has the maximum expansion joint spacing been taken into consideration in this respect?
- ☐ Is compliance with the conditions and dimensions of the on-site fixing plate assured?
- ☐ Do the construction drawings contain sufficient reference to the essential on-site butt stop?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ Has reasonable agreement been reached between the concrete and steel contractors with regard to the accuracy of installation of the Isokorb® T type SK to be achieved by the concrete contractor?
- ☐ Has the information about the required installation accuracy been incorporated into the concrete frame designs for the construction supervisor and concrete contractor construction documents?
- ☐ Are the tightening torques for the screwed connections noted in the construction drawings?

Check list for concrete contractor

- ☐ Does a formwork concept exist for developing an on-site template for installing the Isokorb®?
- ☐ Is Schöck's installation aid required to ensure best possible correct sitting and alignment of the Isokorb®?
- ☐ Are you in contact with the steel constructor to discuss the required accuracy of the Isokorb® installation?
- ☐ Has the required in-situ reinforcement for the Isokorb® been put in place?

Check list for steel constructors

- ☐ Has the position of the installed Isokorb® in the building structure been measured to determine the height of the on-site butt stop?
- ☐ Do the fixing plates of the adapters contain the necessary vertical/horizontal slots for on-site tolerance?
- ☐ Is the on-site butt stop present on the fixing plate for connecting the steel member to the Isokorb®?
- ☐ Has the gradient of the steel member been adjusted to incorporate the water drainage direction?
- ☐ Has the necessary tightening moment for the nuts on the Isokorb® been taken into consideration?
  T type SK-M1,MM1 (M16 thread): Mr = 50 Nm
  T type SK-MM2 (M22 thread): Mr = 80 Nm

Schöck Isokorb® T type SQ

Schöck Isokorb® T type SQ
Load-bearing thermal insulation element for supported steel constructions with connection to reinforced concrete floors. The element transfers positive shear forces.

Element arrangement | Installation cross sections

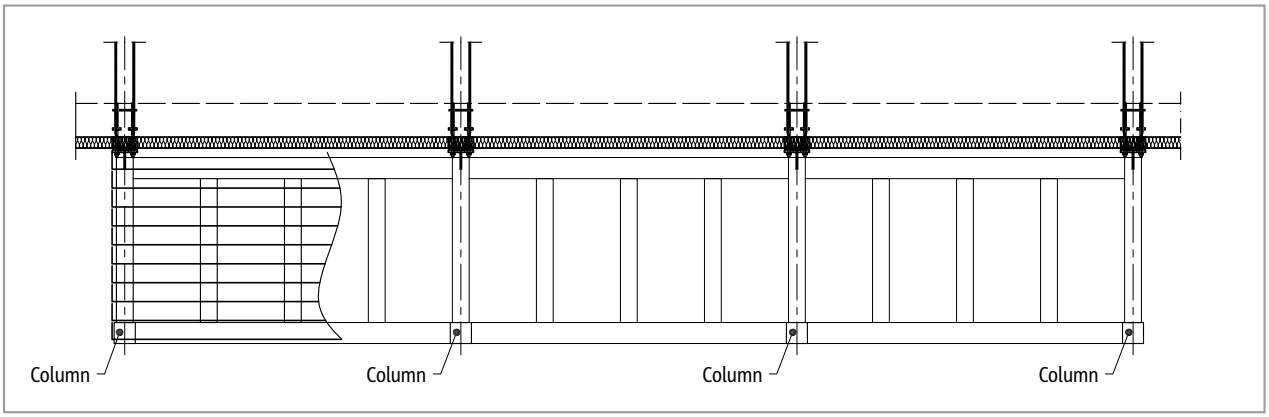


Fig. 53: Schöck Isokorb® T type SQ: Column supported balcony

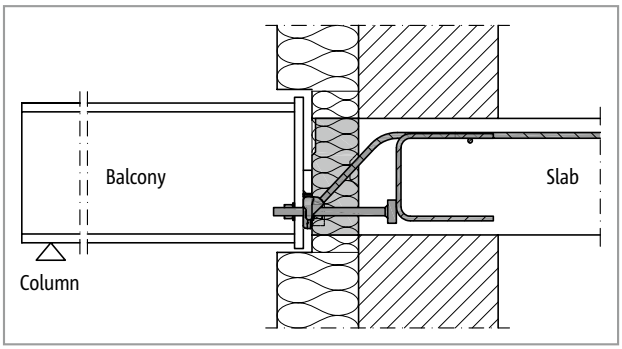


Fig. 54: Schöck Isokorb® T type SQ: Connection to reinforced concrete inner slab; insulating element within the core insulation zone.

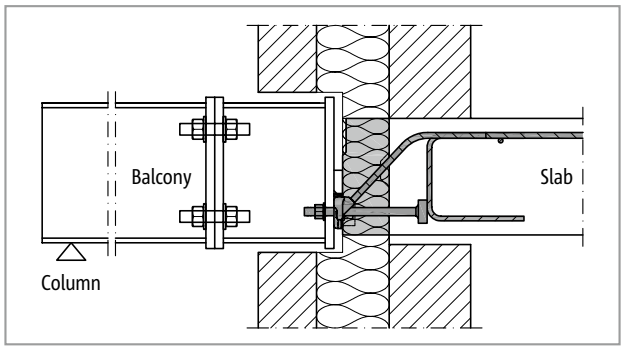


Fig. 55: Schöck Isokorb® T type SQ: Insulating element within the core insulation zone; steel stub adjuster between the Isokorb® and the balcony for flexible construction workflows

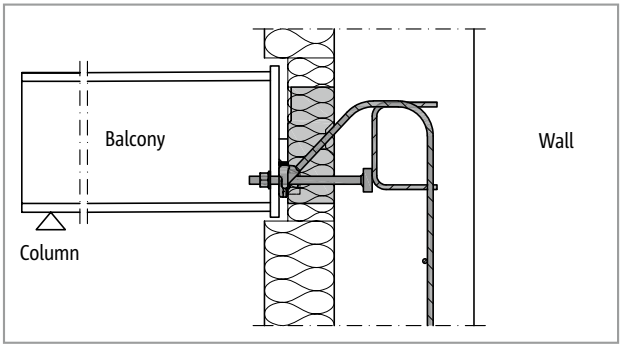


Fig. 56: Schöck Isokorb® T type SQ-WU: Special construction; required with connection to a reinforced concrete wall with a wall thickness from 200 mm

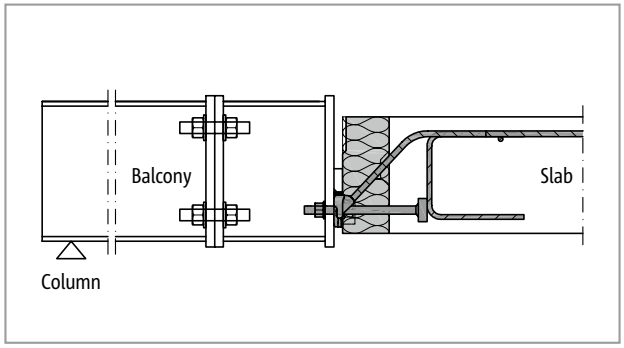


Fig. 57: Schöck Isokorb® T type SQ: Steel stub adjuster between the Isokorb® and the balcony supports flexible construction workflows

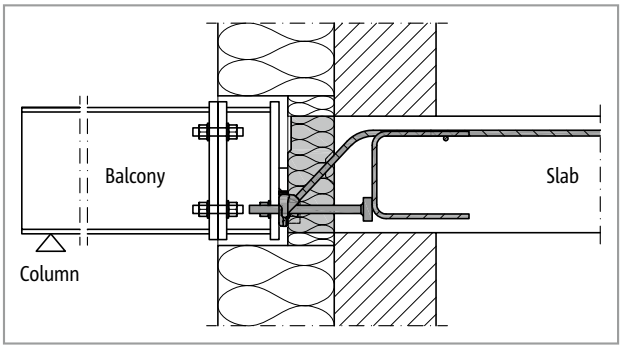


Fig. 58: Schöck Isokorb® T type SQ: Connection of the steel member to an adapter that equalises the thickness of the outer insulation

Special designs

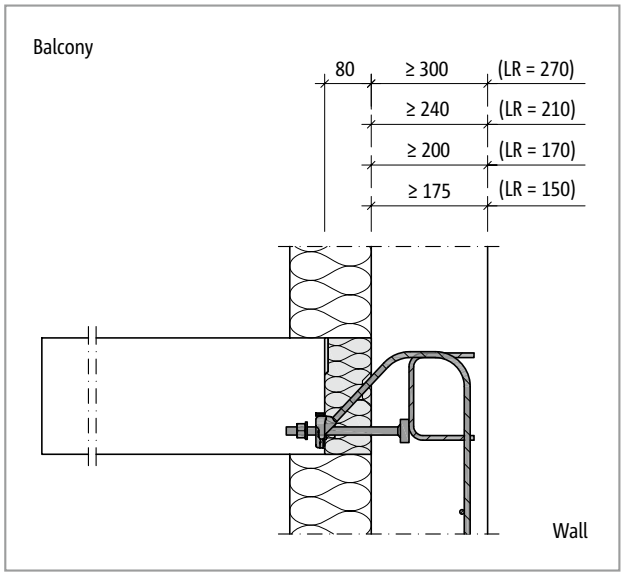


Fig. 59: Schöck Isokorb® T type SQ-WU: Special construction for wall connection

Special designs

- The geometric dimensions presented can be implemented using special designs. Contact is the design support department.
- Design values can deviate from the standard products.
- The bond length LR for special constructions is to be carried in the type designation: T type SQ-V3-R0-LR270-X80-H200-L180-D16-1.0

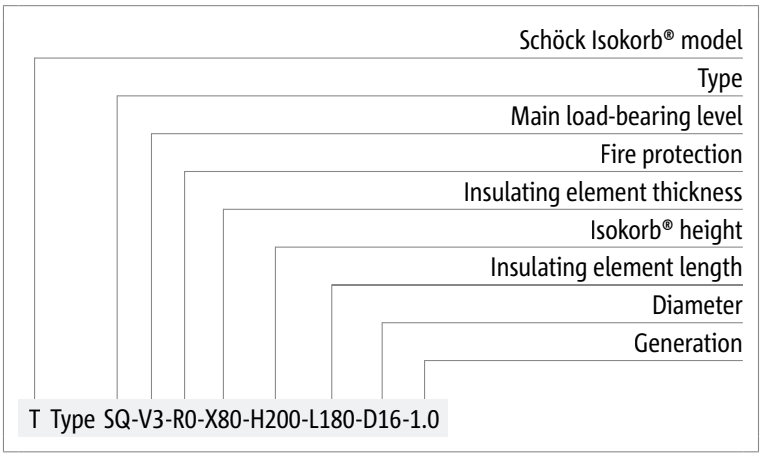
Product selection | Type designations | Special designs | Sign convention

Schöck Isokorb® T type SQ variants

The configuration of the Schöck Isokorb® T type SQ can be varied as follows:

- Main load-bearing level:
  Shear force level V1, V2, V3
- Fire resistance class:
  R 0
- Insulating element thickness:
  X80 = 80 mm
- Isokorb® Height:
  According to approval H = 180 mm to H = 280 mm, graduated in 10-mm steps
- Isokorb® length:
  L180 = 180 mm
- Thread diameter:
  D16 = M16
- Generation:
  1.0

Type designations in planning documents



Special designs

Please contact the design support department if you have connections that are not possible with the standard product variants shown in this information (contact details on page 3).

Sign convention for the design

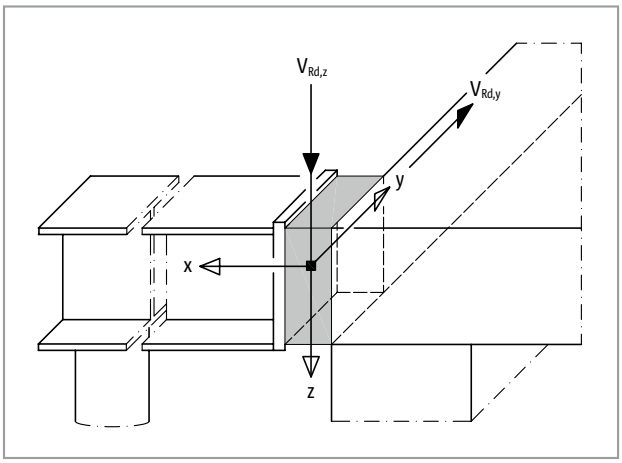


Fig. 60: Schöck Isokorb® T type SQ: Direction of internal forces and moments

Design

Design Schöck Isokorb® T type SQ

The application area of the Schöck Isokorb® T type SQ stretches over floor and balcony constructions with mainly static, evenly distributed traffic loads as per BS EN 1991-1-1, table 6.1. A static verification is to be presented for structural components adjoining on both sides of the Isokorb®. All variants of the Schöck Isokorb® T type SQ can transfer positive shear forces parallel to the z-axis. There are solutions for (lifting) shear forces using the Schöck Isokorb® T type SK.

Schöck Isokorb® T type SQ	V1	V2	V3
Design values with		$V_{Rd,z}$ [kN/element]	
	30.9	48.3	69.6
Concrete strength class ≥ C20/25		$V_{Rd,y}$ [kN/element]	
	±2.5	±4.0	±6.5

Schöck Isokorb® T type SQ	V1	V2	V3
Placement with		Isokorb® length [mm]	
	180	180	180
Shear force bars	2 ⌀ 8	2 ⌀ 10	2 ⌀ 12
Pressure bearing / compression bars	2 ⌀ 14	2 ⌀ 14	2 ⌀ 14
Thread	M16	M16	M16

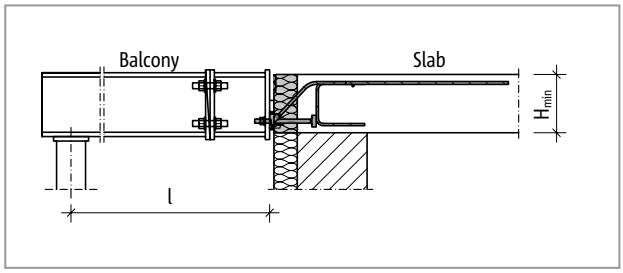


Fig. 61: Schöck Isokorb® T type SQ: Static system

Notes on design

- Design values are taken in relation to the rear edge of the fixing plate.
- When using an indirect bearing solution for the Schöck Isokorb® T type SQ, the structural engineer must provide evidence, in particular, of the load transfer in the reinforced concrete component.
- The nominal dimension c_{nom} of the concrete cover as per BS EN 1992-1-1 (EC2), 4.4.1 and BS EN 1992-1-1/NA is 20 mm for internal areas.
- Edge and centre-to-centre distances are to be taken into account, see pages 52 and 53.

Expansion joint spacing

Maximum expansion joint spacing

Expansion joints must be provided in the external component. Changes in length due to temperature deformation are determined by the maximum distance (e) from the centre of the outermost Schöck Isokorb® T type SQ. The balcony structure may overhang the outermost Schöck Isokorb® element. In the case of fixed points, such as corners, half the maximum distance (e) from the fixed point applies. The calculation of the permissible expansion joint spacing is based on a reinforced concrete balcony slab that is securely connected to the steel members. If design measures have been implemented to ensure there is movement between the balcony slab and the individual steel members, then only the distances of the non-moving connections are relevant, see detail.

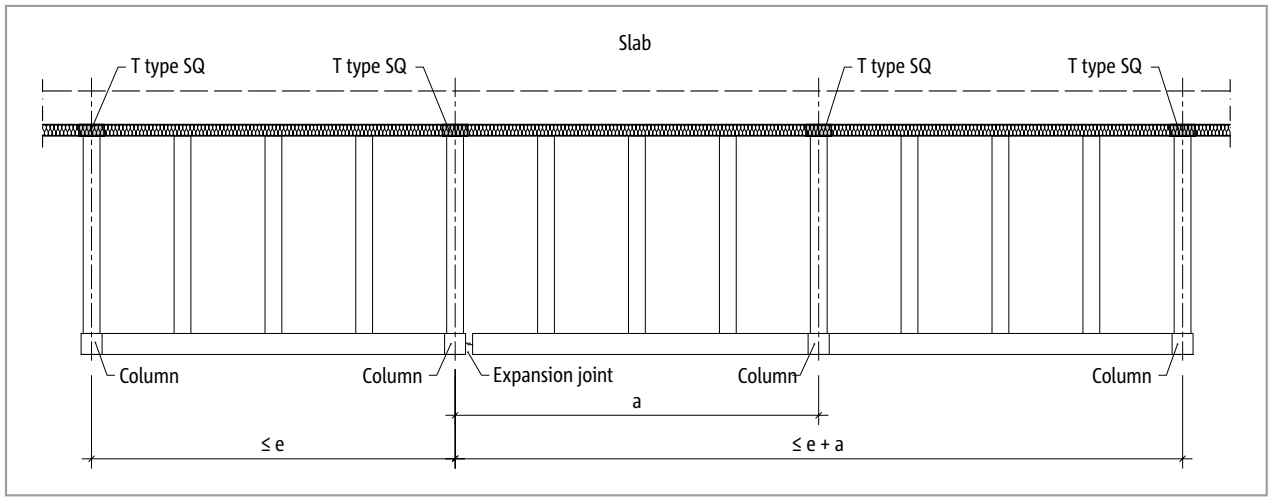


Fig. 62: Schöck Isokorb® T type SQ: Maximum expansion joint spacing e and lateral overhang a

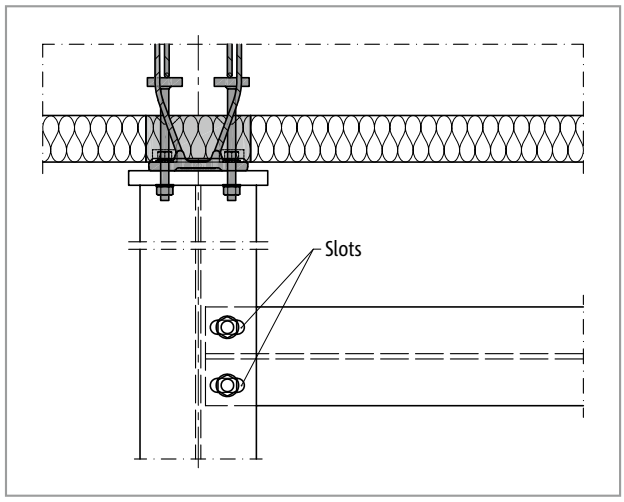


Fig. 63: Schöck Isokorb® T type SQ: Expansion joint detail to ensure movement during temperature expansion

Schöck Isokorb® T type SQ		V1 – V3
Maximum expansion joint spacing when		e [m]
Insulating element thickness [mm]	80	5.7

Expansion joints

- If the expansion joint detail permanently permits temperature conditioned displacements of the cross member of length a, the expansion joint spacing may be extended to a maximum of e + a .

Edge spacing

Edge spacing

The Schöck Isokorb® T type SQ must be so positioned that minimum edge spacing in relation to the inner reinforced concrete elements are complied with:

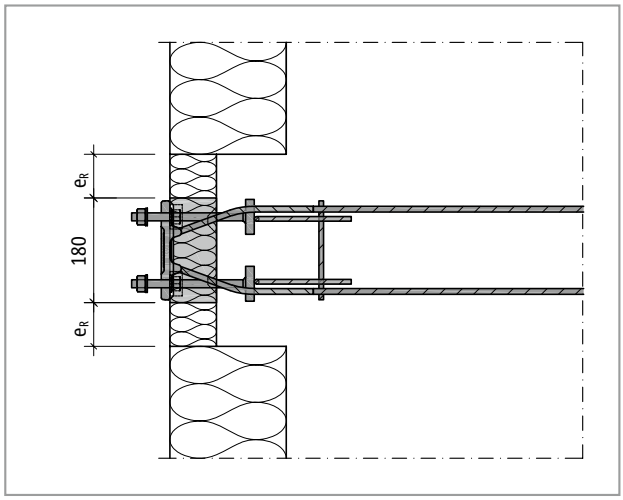


Fig. 64: Schöck Isokorb® T type SQ: Edge distances

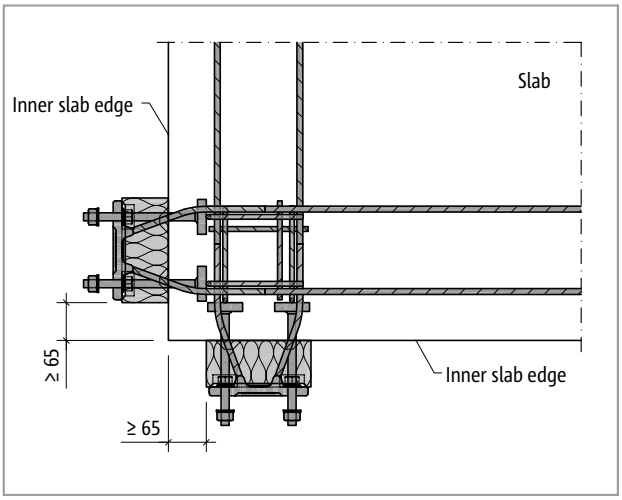


Fig. 65: Schöck Isokorb® T type SQ: Edge distances at the outer corner with Isokorbs® arranged vertically to each other

Acceptable shear force $V_{Rd,z}$ depending on the edge distance

Schöck Isokorb® T type SQ		V1	V2	V3
Design values with		Concrete strength class ≥ C20/25		
Isokorb® height H [mm]	Edge distance e_R [mm]	$V_{Rd,z}$ [kN/element]		
180–190	30 ≤ e_R < 74	14,2	20,4	28,5
200–210	30 ≤ e_R < 81			
220–230	30 ≤ e_R < 88			
240–280	30 ≤ e_R < 95			
180–190	e_R ≥ 74	No reduction required		
200–210	e_R ≥ 81			
220–230	e_R ≥ 88			
240–280	e_R ≥ 95			

Edge distances

- Edge distances e_R < 30 mm are not permitted!
- If two Isokorb® T type SQ are arranged vertically to each other at a corner. edge distances e ≥ 65 mm are required.

Centre-to-centre distances | Concrete cover

Centre-to-centre distances

The Schöck Isokorb® T type SQ must be so positioned that minimum centre-to-centre distances of Isokorb® to Isokorb® are complied with:

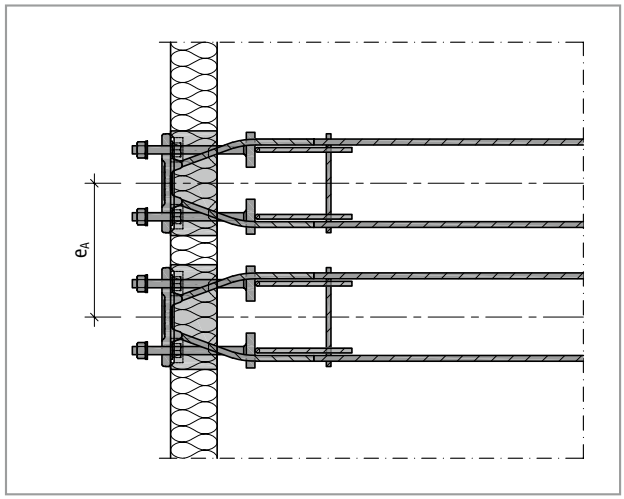


Fig. 66: Schöck Isokorb® T type SQ: Centre-to-centre distance

Design internal forces depending on the centre-to-centre distance

Schöck Isokorb® T type SQ		V1 – V3
Design values with		Concrete strength class ≥ C20/25
Isokorb® height H [mm]	Centre-to-centre distance e_A [mm]	$V_{Rd,z}$ [kN/element]
180–190	$e_A \geq 230$	No reduction required
200–210	$e_A \geq 245$	
220–230	$e_A \geq 255$	
240–280	$e_A \geq 270$	

Centre-to-centre distances

Upper concrete cover

Schöck Isokorb® T type SQ		V1	V2	V3
Concrete cover with		CV [mm]		
Isokorb® height H [mm]	180	26	24	34
	190	36	34	44
	200	26	24	34
	210	36	34	44
	220	26	24	34
	230	36	34	44
	240	26	24	34
	250	36	34	44
	260	46	44	54
	270	56	54	64
	280	66	64	74

Product description

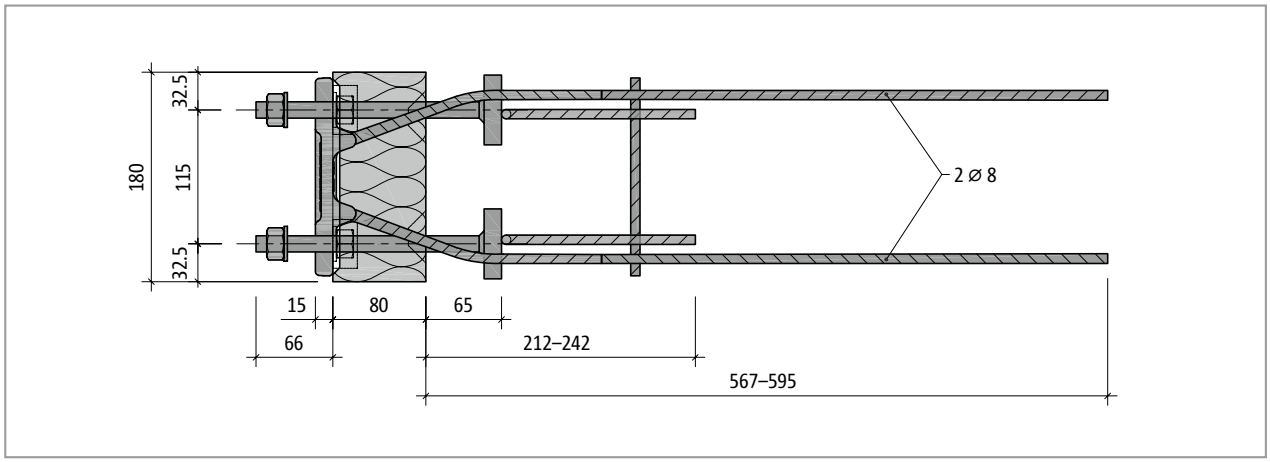


Fig. 67: Schöck Isokorb® T type SQ-V1: Plan view

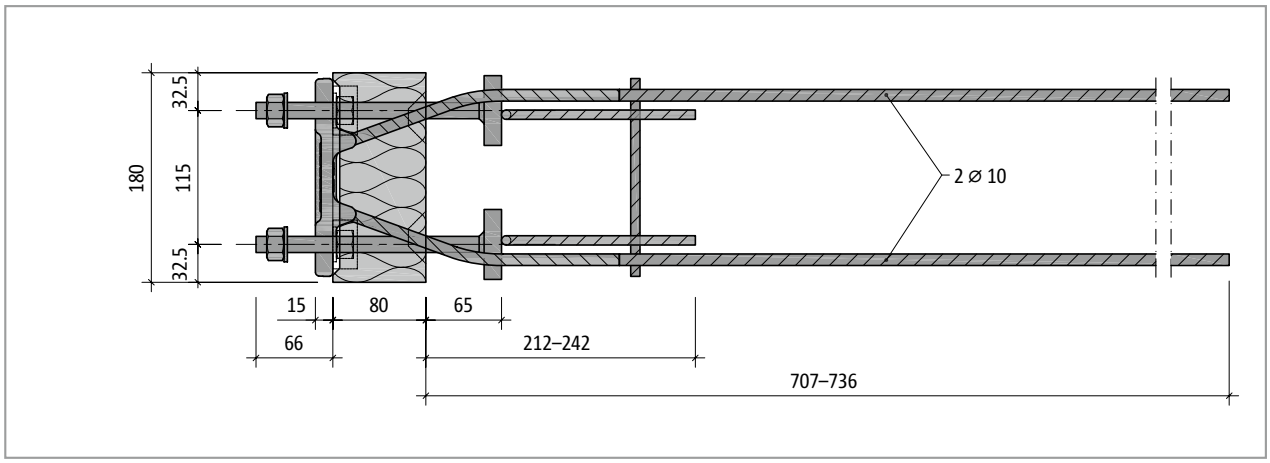


Fig. 68: Schöck Isokorb® T type SQ-V2: Plan view

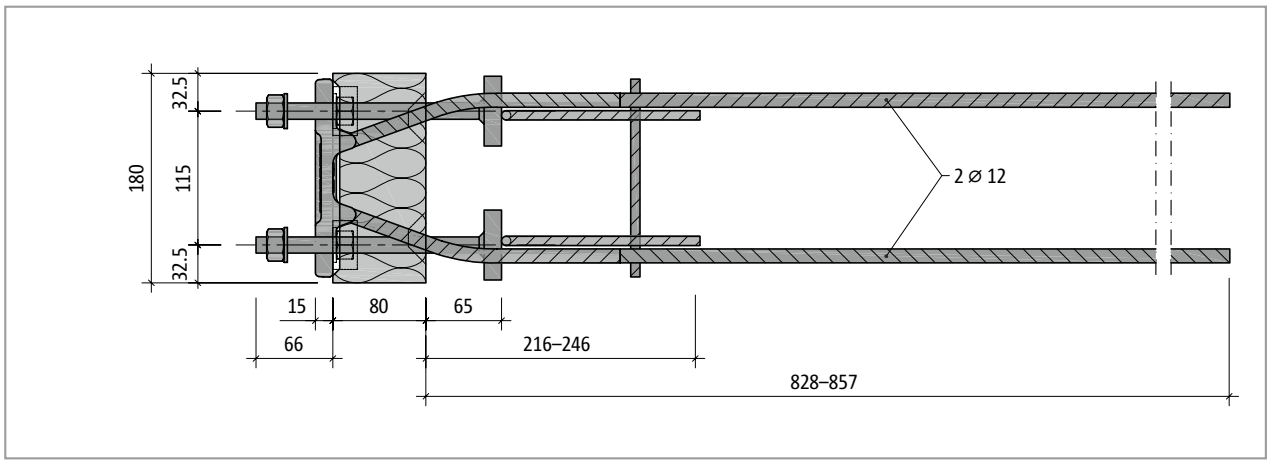


Fig. 69: Schöck Isokorb® T type SQ-V3: Plan view

Product information

- The free clamping distance on T type SQ is 30 mm.

Product description

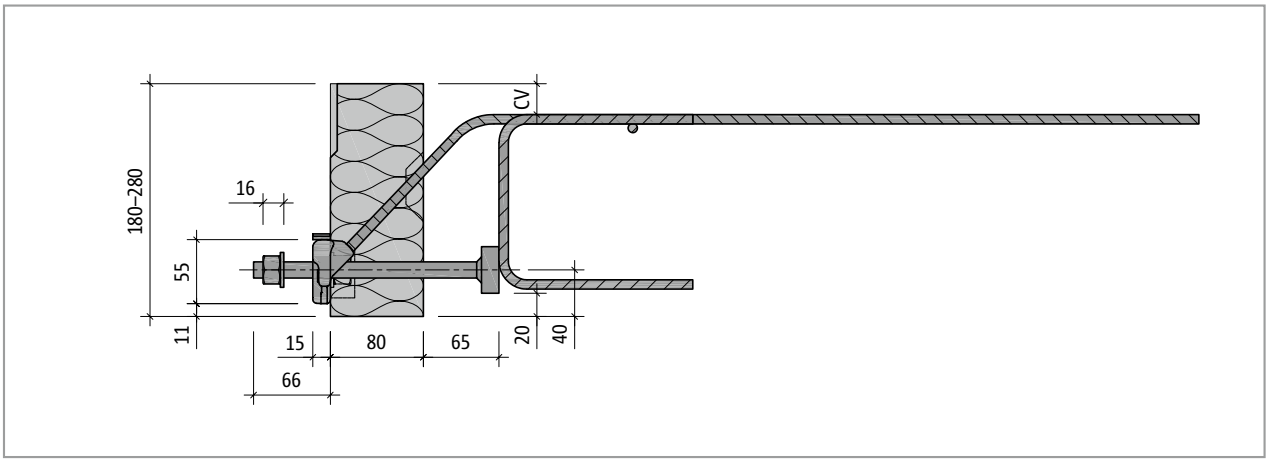


Fig. 70: Schöck Isokorb® T type SQ-V1: Cross section of the product

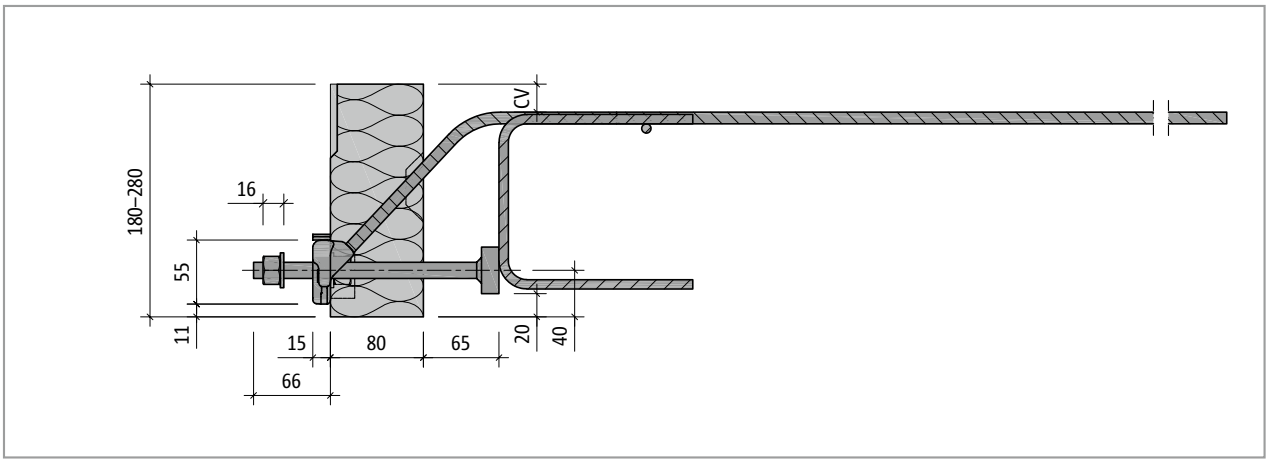


Fig. 71: Schöck Isokorb® T type SQ-V2: Cross section of the product

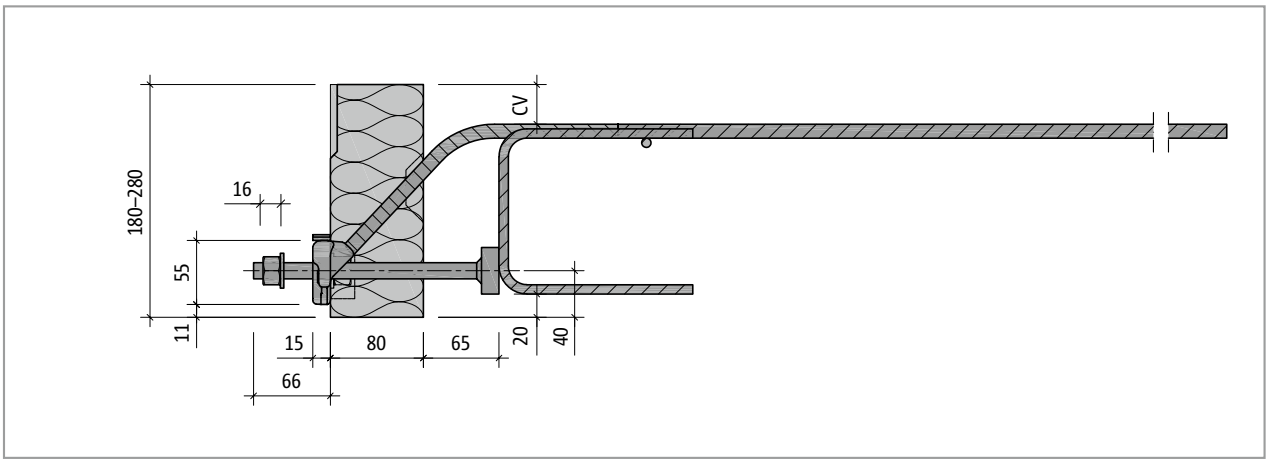


Fig. 72: Schöck Isokorb® T type SQ-V3: Cross section of the product

Product information

- The free clamping distance on T type SQ is 30 mm.
- Concrete cover of the shear force bars CV, see page 53.

On-site reinforcement - in-situ concrete construction

Schöck Isokorb® T type SQ

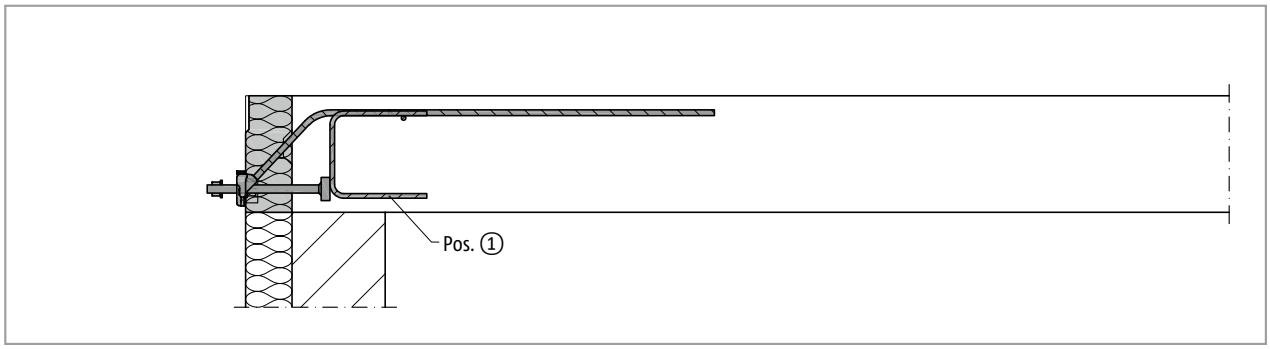


Fig. 73: Schöck Isokorb® T type SQ: On-site reinforcement: Cross section

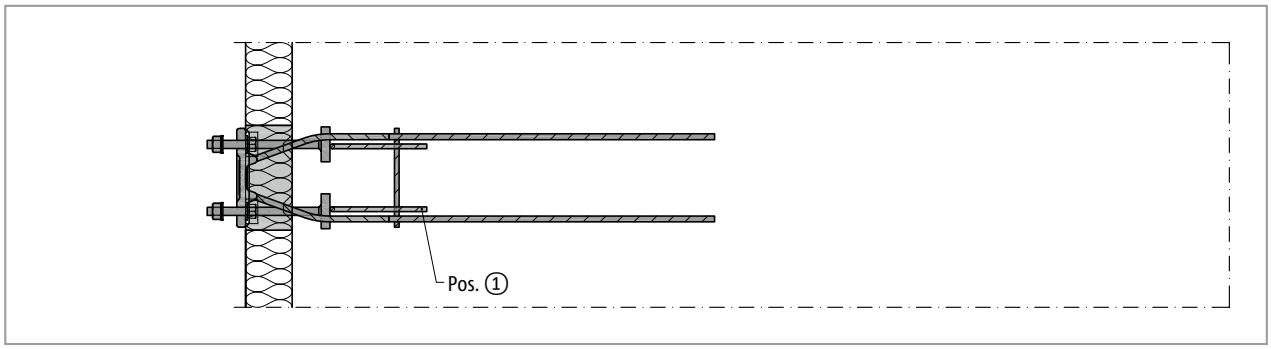


Fig. 74: Schöck Isokorb® T type SQ: On-site reinforcement: Plan view

Schöck Isokorb® T type SQ			V1	V2	V3
On-site reinforcement	Type of bearing	Height H [mm]	Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure		
Edge and splitting tensile reinforcement					
Pos. 1	direct/indirect	180–280	included with the product		

Information about on-site reinforcement

- The straight legs of the shear force rods must be lapped to the reinforced concrete slab reinforcement. The lap lengths must comply with BS EN 1992-1-1 (EC2), Section 8.4.

On-site reinforcement - precast construction

Schöck Isokorb® T type SQ

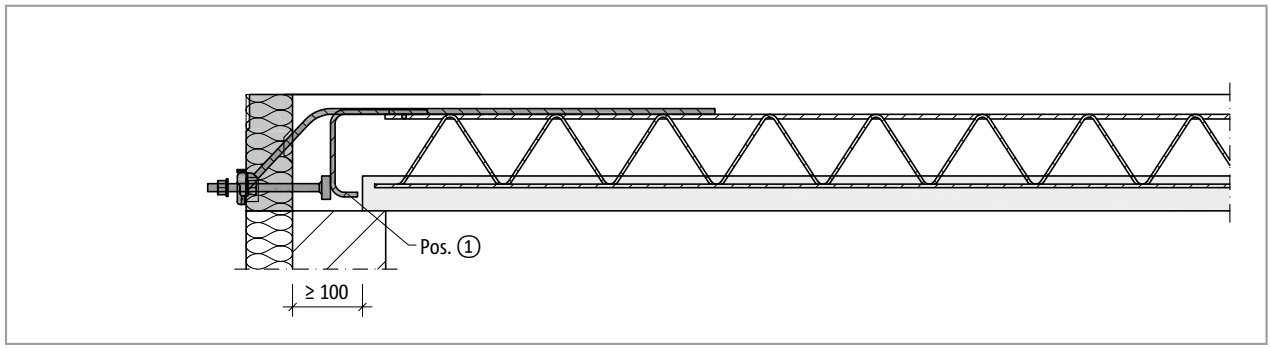


Fig. 75: Schöck Isokorb® T type SQ: On-site reinforcement for semi-precast construction: Cross section

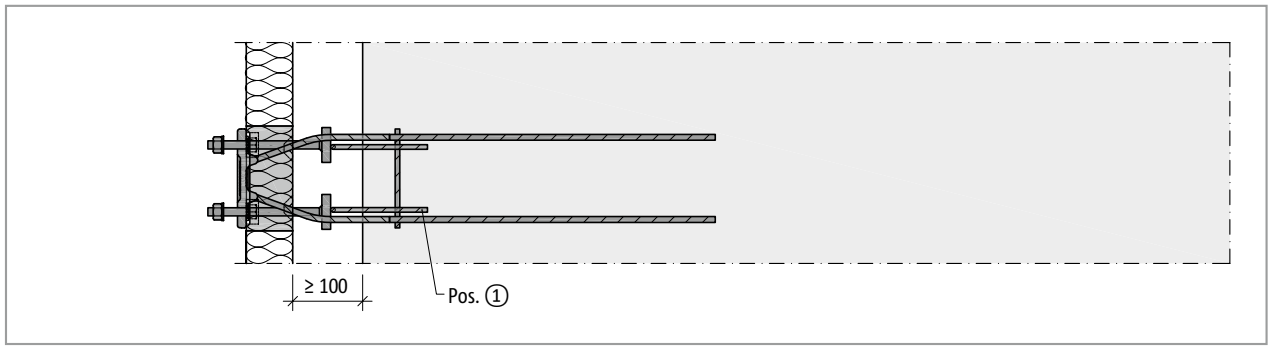


Fig. 76: Schöck Isokorb® T type SQ: On-site reinforcement for semi-precast construction: Plan view

Schöck Isokorb® T type SQ			V1	V2	V3
On-site reinforcement	Type of bearing	Height H [mm]	Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure		
Edge and splitting tensile reinforcement					
Pos. 1	direct/indirect	180–280	available on the product side, alternatively implementation using on-site stirrups 2 H 8		

Information about on-site reinforcement

- The straight legs of the shear force rods must be lapped to the reinforced concrete slab reinforcement. The lap lengths must comply with BS EN 1992-1-1 (EC2), Section 8.4.
- If composite pre-cast flooring is being installed, the lower legs of the factory-supplied links can be shortened on site and replaced with two suitable ⌀8 stirrups.

End Plate

T Type SQ for transferring positive shear forces

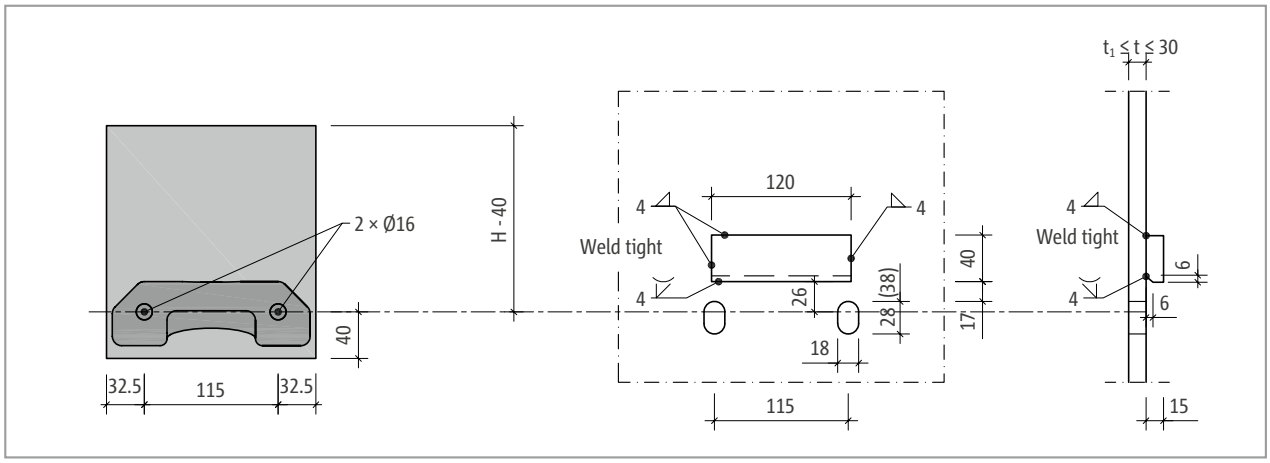


Fig. 77: Schöck Isokorb® T type SQ: Design of the fixing plate connection

The choice of fixing plate thickness t is determined by the minimum thickness t_1 as specified by the structural engineer. This thickness must not, however, be greater than the clamping distance of the Schöck Isokorb® T type SQ, which is 30 mm.

End Plate

- The illustrated elongated holes allow an uplifting of the endplate of up to 10 mm. The values shown in brackets allow for the increase of the tolerances of up to 20 mm.
- If horizontal forces $V_{Ed,y}$ > 0.342 • min. $V_{Ed,z}$ appear parallel to the insulation joint, it is necessary to fit the end plate with circular holes ⌀18 mm instead of slotted holes for the further transfer of the loads.
- The structural engineer must specify the overall dimensions of the fixing plate
- The construction drawing must contain the tightening torque for the nuts, which is specified as follows:
  T type SQ (threaded rod M16 - wrench size s = 24 mm): M_r = 50 Nm
- The Schöck Isokorb® embedded in concrete are to be measured in-situ before the front slabs are produced.

On-site butt stop

On-site butt stop

The on-site butt stop is absolutely crucial for transferring shear forces from the on-site front slab to the Isokorb® T type SQ! The spacer shims supplied by Schöck are used for vertical adjustment between butt stop and Schöck Isokorb®.

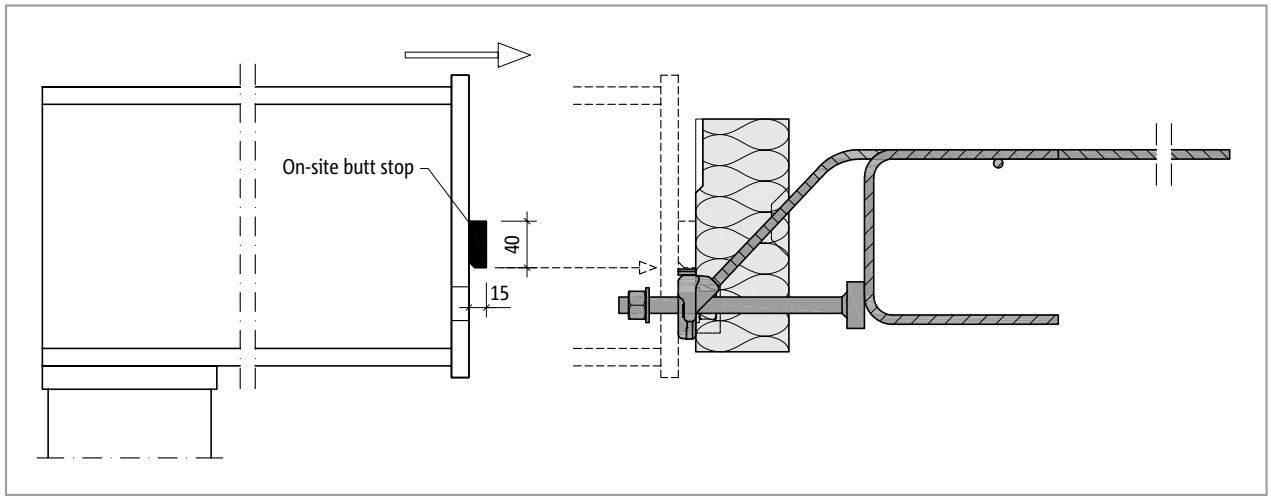


Fig. 78: Schöck Isokorb® T type SQ: Mounting the steel member

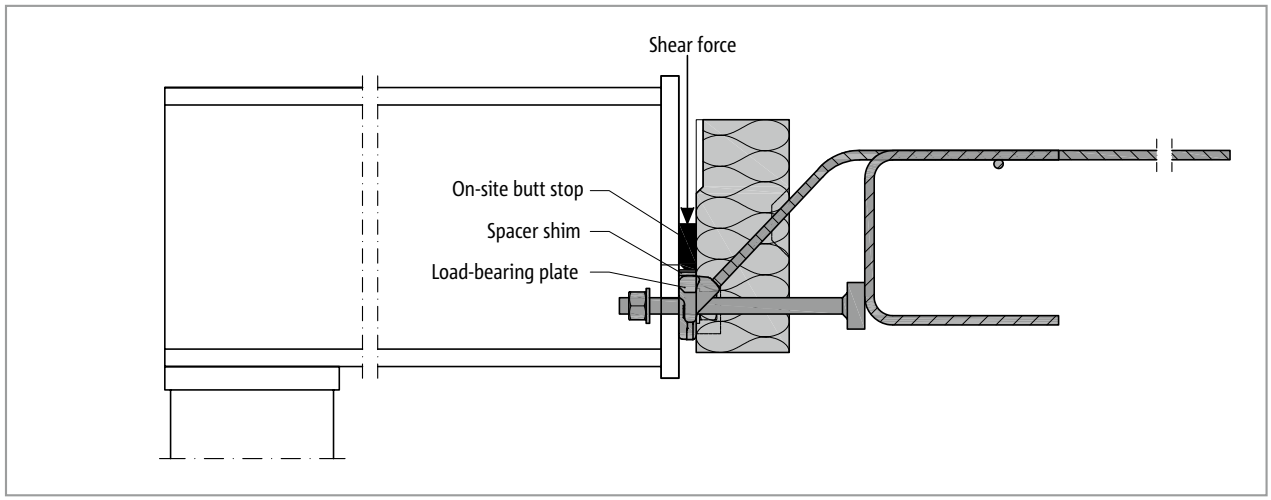


Fig. 79: Schöck Isokorb® T type SQ: On-site butt stop for transferring shear forces

On-site butt stop

- Type of steel to match static requirements.
- Apply corrosion protection after welding.
- Steel construction: Checking for dimensional inaccuracy of the structure prior to fabrication is absolutely essential!

Spacer shims

- Details of dimensions and materials, see page 16
- With installation ensure they are free from burrs and are even.

Type of bearing: supported | Installation instructions

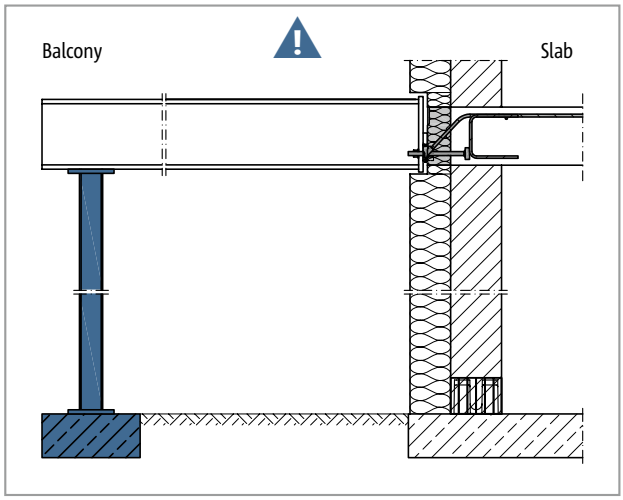


Fig. 80: Schöck Isokorb® T type SQ: Continuous support needed

Supported balcony

The Schöck Isokorb T Type SQ is developed for supported balconies. It only transfers shear forces, no bending moments.

Hazard warning - missing supports

- The balcony will collapse if not supported.
- At all stages of construction, the balcony must be supported with structurally suitable columns or supports.
- Even when completed, the balcony must be supported with structurally suitable columns or supports.
- Removal of the temporary supports is permitted only after the installation of the final support.

Installation instructions

The current installation instruction can be found online under:
www.schoeck.com/view/2743

☑ Check list

Check list for structural engineers

- ☐ Has the right type of Schöck Isokorb® been selected for the static system? T Type SQ is a connection purely for shear forces (moment joint).
- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Is there a situation in which, during the construction phase, the construction had to be dimensioned for an emergency or a special load?
- ☐ Have the fire protection requirements for the overall load-bearing structure been clarified? Are the on-site measures included in the construction drawings?
- ☐ Does a connection to a wall or with height offset necessitate the use of Isokorb® T type SQ-WU instead of T type SQ (see page 47) or another special design?
- ☐ Are temperature deformations directly attributed to the Isokorb® connection and has the maximum expansion joint spacing been taken into consideration in this respect?
- ☐ Is compliance with the conditions and dimensions of the on-site fixing plate assured?
- ☐ Do the construction drawings contain sufficient reference to the essential on-site butt stop?
- ☐ Has the cutout on the inner slab side been taken into account if using the Isokorb® T type SQ in precast element slabs?
- ☐ Has reasonable agreement been reached between the concrete contractor and steel constructor with regard to the accuracy of installation of the Isokorb® T type SQ?
- ☐ Has the information about the required installation accuracy been incorporated into the concrete frame designs for the construction supervisor and the concrete contractor?
- ☐ Are the tightening torques for the screwed connections noted in the construction drawings?

Check list for concrete contractor

- ☐ Does a formwork concept exist for developing an on-site template for installing the Isokorb®?
- ☐ Is Schöck's installation aid required to ensure best possible correct sitting and alignment of the Isokorb®?
- ☐ Are you in contact with the steel constructor to discuss the required accuracy of the Isokorb® installation?

Check list for steel constructors

- ☐ Has the position of the installed Isokorb® in the building structure been measured to determine the height of the on-site butt stop?
- ☐ Do the fixing plates of the adapters contain the necessary vertical/horizontal slots for on-site tolerance?
- ☐ Is the on-site butt stop present on the fixing plate for connecting the steel member to the Isokorb®?
- ☐ Has the gradient of the steel member been adjusted to incorporate the water drainage direction?
- ☐ Has the necessary tightening moment for the nuts on the Isokorb® been taken into consideration?
  T type SQ-V2, T type SQ-V3 (M16 thread): Mr = 50 Nm

Steel – steel

Approval | Construction materials

Approval Schöck Isokorb® T type S

Schöck Isokorb®	DiBt approval Z-14.4-518, BBA Agrement certificate 10/4801

Schöck Isokorb® T type S materials

Stainless steel	Grade.: 1.4401, 1.4404, 1.4362 and 1.4571	
threaded rods	Strength class 70	1.4404 (A4L), 1.4362 (-) and1.4571 (A5)
rectangular hollow profile	S 355	
pressure plate (Module S-V)	S 275	
spacer plate (Module S-N)	S 235	
insulating material	Neopor® – this insulating material is a polystyrole hard foam and a registered trademark of the BASF, λ = 0.031 W/(m·K), building material classification B1 (flame retardant) The version of the insulating material in mineral wool is available on request.	

Anti-corrosion protection
The stainless steel used with the Schöck Isokorb® T type S conforms to material No. 1.4401, 1.4404 or 1.4571. According to the general technical approval (Z-30.3-6) Annex 1 “Structural components and connecting elements made from stainless steel” these steels are classified in Resistance class III/medium.

Contact corrosion
The connection of the Schöck Isokorb® T type S in conjunction with a galvanised or anti-corrosion coated end plate is harmless with regard to contact corrosion resistance (see Approval Z-30.3-6, Section 2.1.6.5).
With connections using Schöck Isokorb® T type S, the surface of the base metal (steel end plate) is significantly larger than that of the stainless steel (bolts and shims), so that a failure of the connection as a result of contact corrosion can be excluded.

Stress corrosion
For protection against environments containing chloride (e.g. indoor swimming pool atmosphere, etc.) an appropriate system solution is to be provided by Schöck (see page 92). You can find out more about this from our design department (Contact see page 3).

i Note on shortening threaded rods
The threaded rods may be shortened on site provided at least two threads remain visible after installation, levelling and final tightening of the balcony structure. Nuts must be re-checked after cutting to ensure they have remained fully tightened.

Schöck Isokorb® T type S

Schöck Isokorb® T type S
Load-bearing thermal insulation elements for the connection of freely cantilevered steel constructions to steel structures. The element consists of the S-N and S-V modules and, depending on the module arrangement, transfers moments, shear forces and normal forces.

Installation cross sections

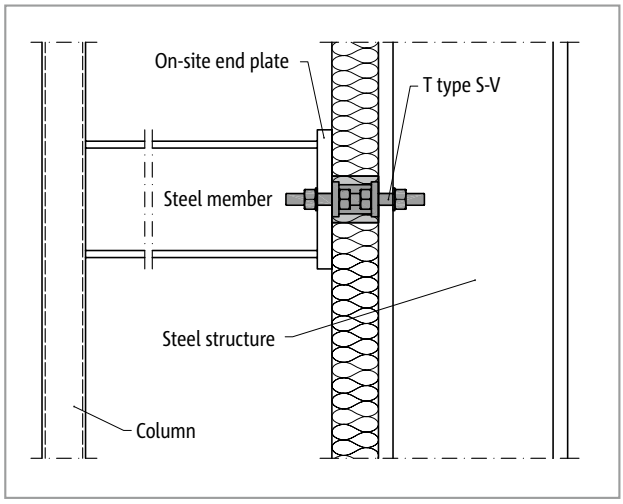


Fig. 81: Schöck Isokorb® T type S-V for supported steel structures

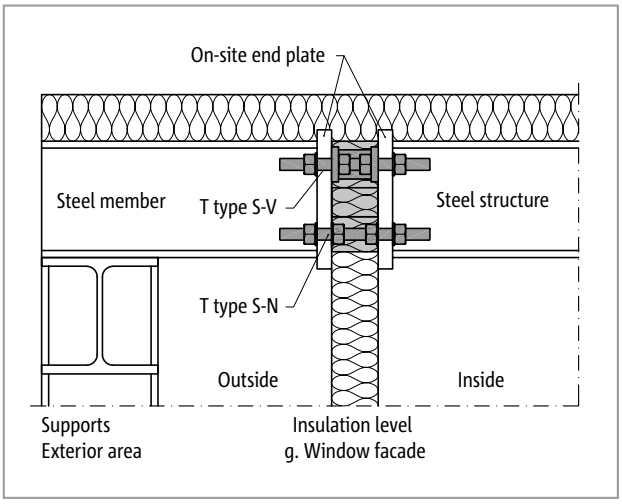


Fig. 82: Schöck Isokorb® T type S for thermal separation within the structural system

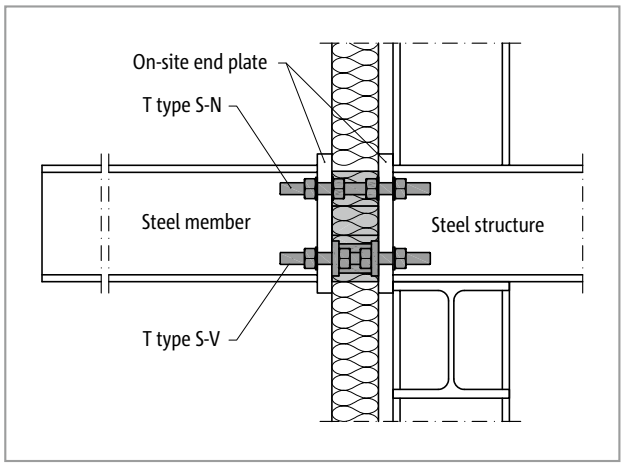


Fig. 83: Schöck Isokorb® T type S for cantilevered steel structures

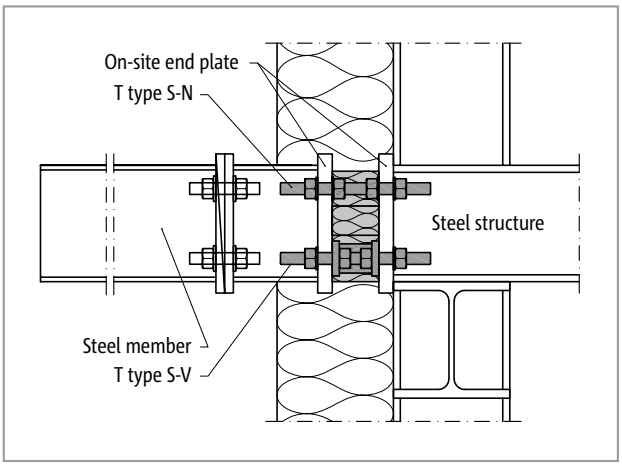


Fig. 84: Schöck Isokorb® T type S for cantilevered steel structures ; including first fix bracket

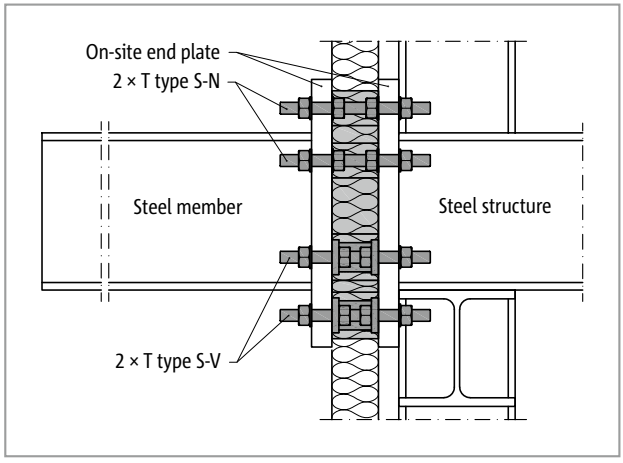


Fig. 85: Schöck Isokorb® T type S for cantilevered steel structures

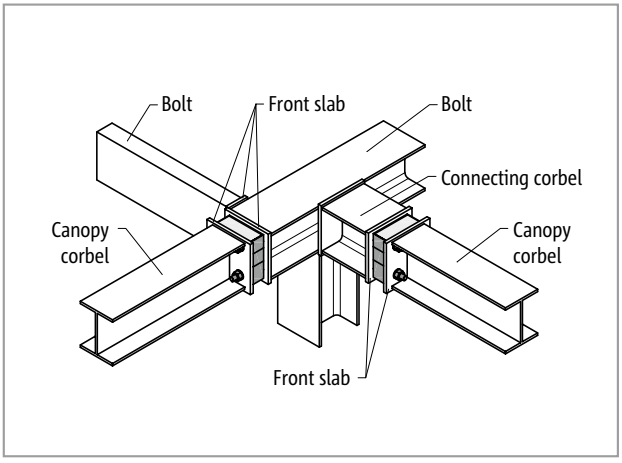


Fig. 86: Schöck Isokorb® T type S for outer corner detail

Installation cross sections

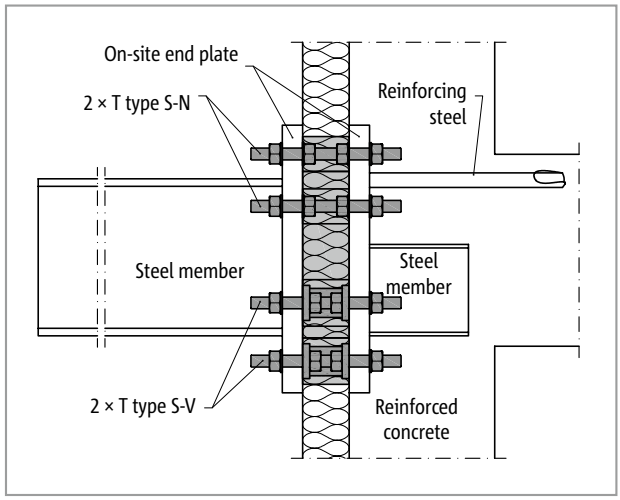


Fig. 87: Schöck Isokorb® T type S-N and T type S-V modules for connection of steel structure to reinforced concrete frame

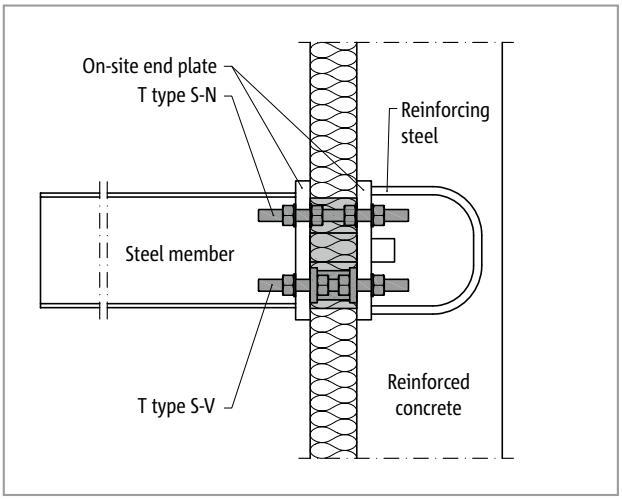


Fig. 88: Schöck Isokorb® T type S-N and T type S-V modules for connection of steel structure to reinforced concrete frame

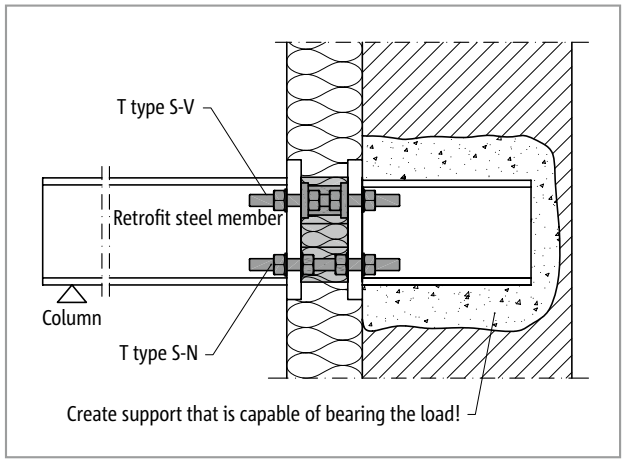


Fig. 89: Schöck Isokorb® T type S-N and T type S-V for retrofited supported steel structure; further examples of renovation see p. 90

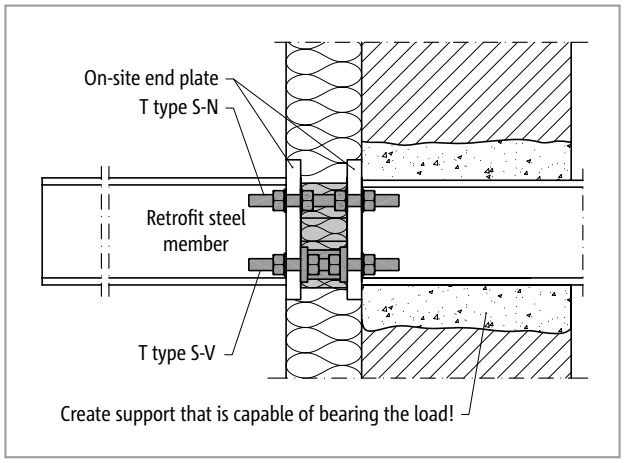


Fig. 90: Schöck Isokorb® T type S for retrofitted cantilevered steel structure; further examples of renovation see p. 90

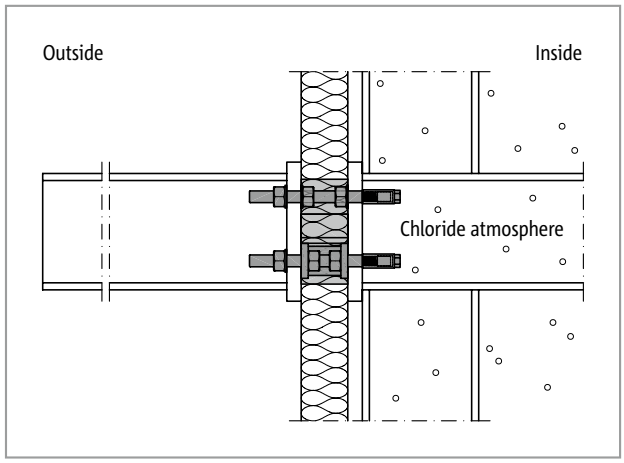


Fig. 91: Schöck Isokorb® T type S with protective caps for cantilevered steel structure in an internal atmosphere containing chloride

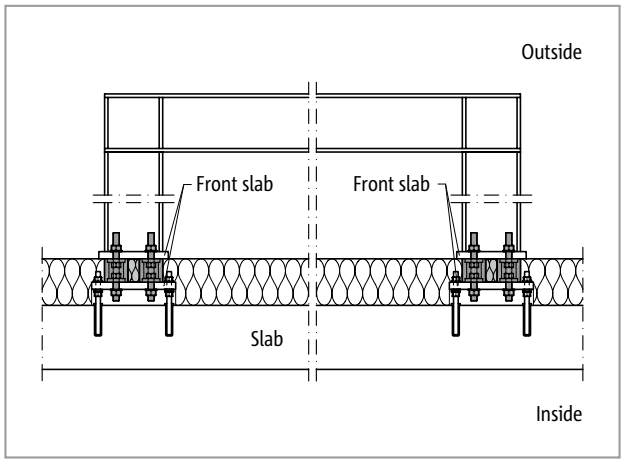


Fig. 92: Schöck Isokorb® T type S-V for rigid frame connection for secondary structures (additional moments from imperfections are to be taken into account)

Product selection

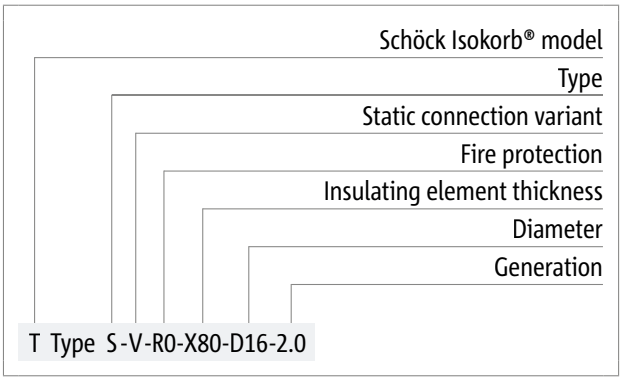
Schöck Isokorb® T type S variants

The configuration of the Schöck Isokorb® T type S can vary as follows:

- Static connection variants:
  N: Transfers normal force
  V: Transfers normal force and shear force: Absorbs compressive forces
- Fire resistance class:
  R 0
- Insulating element thickness:
  X80 = 80 mm
- Thread diameter:
  M16, M22
- Generation:
  2.0
- Height:
  T Type S-N H = 60 mm
  T Type S-V H = 80 mm
- Height with truncated insulation elements:
  T Type S-N H = 40 mm
  T Type S-V H = 60 mm
  (Insulation element cut off up to the steel plates; see p 86)
- Modular combination of Schöck Isokorb® T type S-N and T type S-V:
  Determine according to geometric and static requirements.
  Please take into account the number of required Schöck Isokorb® T type S-N, T type S-V modules in the request for proposal and with the order.

Type designations | Special designs

Type designations in planning documents



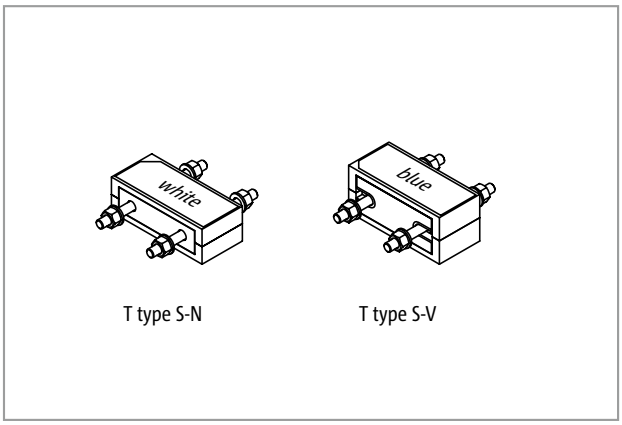


Fig. 93: Schöck Isokorb® T type S-N and T type S-V

Special designs

Please contact the design support department if you have connections that are not possible with the standard product variants shown in this information (contact details on page 3).

Design overview

Normal force $\pm N_{x,Ed}$; 1 T type S-N

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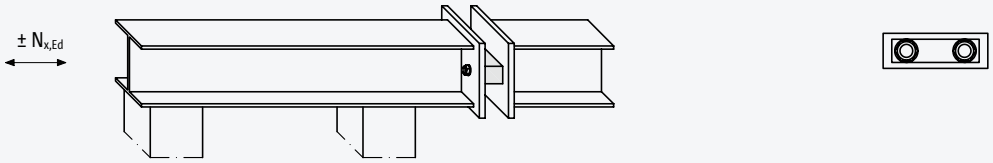
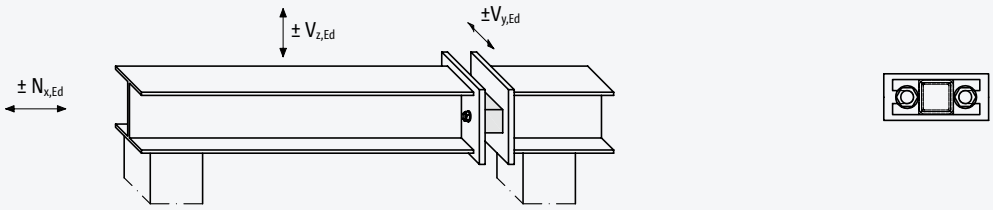


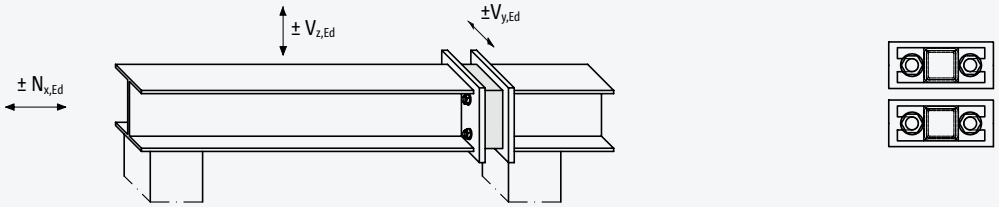
Normal force $\pm N_{x,Ed}$, shear force $\pm V_{z,Ed}$, $\pm V_{y,Ed}$; 1 T type S-V

Page 74



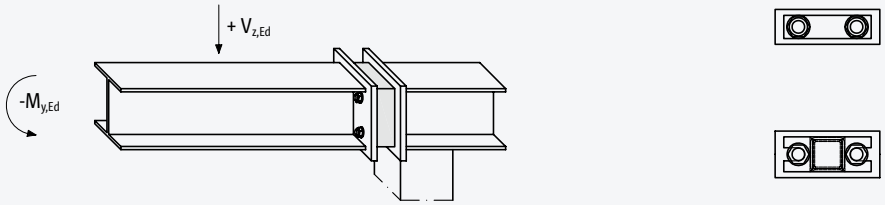
Normal force $\pm N_{x,Ed}$, shear force $\pm V_{z,Ed}$, $\pm V_{y,Ed}$; several T type S-V

Page 75



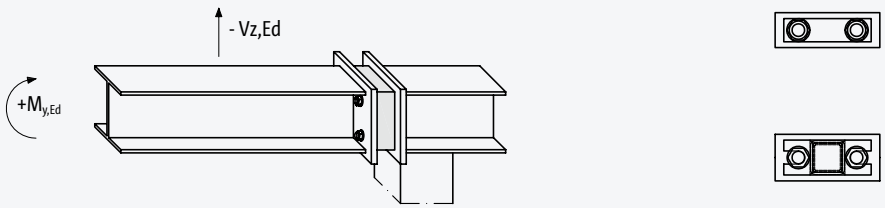
Shear force $+V_{z,Ed}$, moment $-M_{y,Ed}$; 1 T type S-N + 1 T type S-V

Page 76



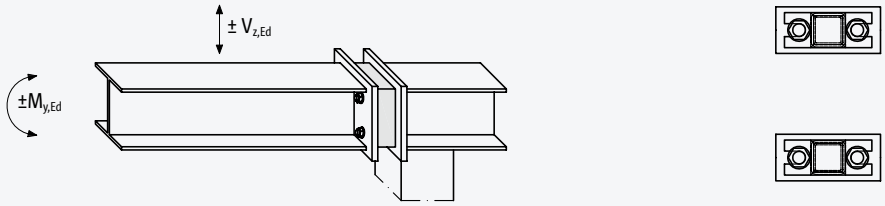
Shear force $-V_{z,Ed}$, moment $+M_{y,Ed}$; 1 T type S-N + 1 T type S-V

Page 76

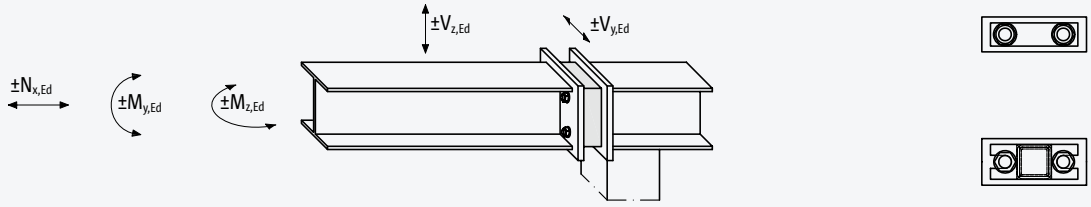


Design overview

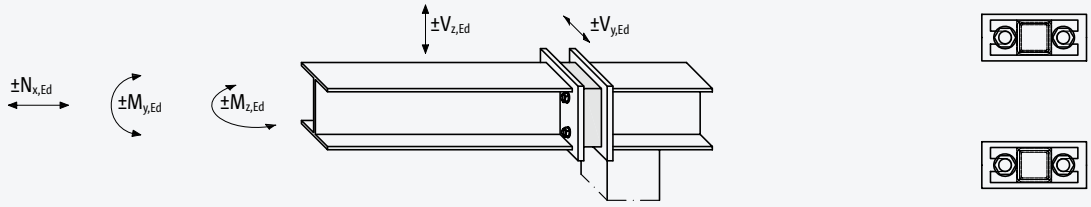
Shear force $\pm V_{z,Ed}$, moment $\pm M_{y,Ed}$; 2 × T type S-V Page 77



Normal force $\pm N_{x,Ed}$, shear force $\pm V_{z,Ed}$, $\pm V_{y,Ed}$, moment $\pm M_{y,Ed}$, $\pm M_{z,Ed}$; 1 T type S-N + 1 T type S-V Page 80



Normal force $\pm N_{x,Ed}$, shear force $\pm V_{z,Ed}$, $\pm V_{y,Ed}$, moment $\pm M_{y,Ed}$, $\pm M_{z,Ed}$; 2 × T type S-V Page 80

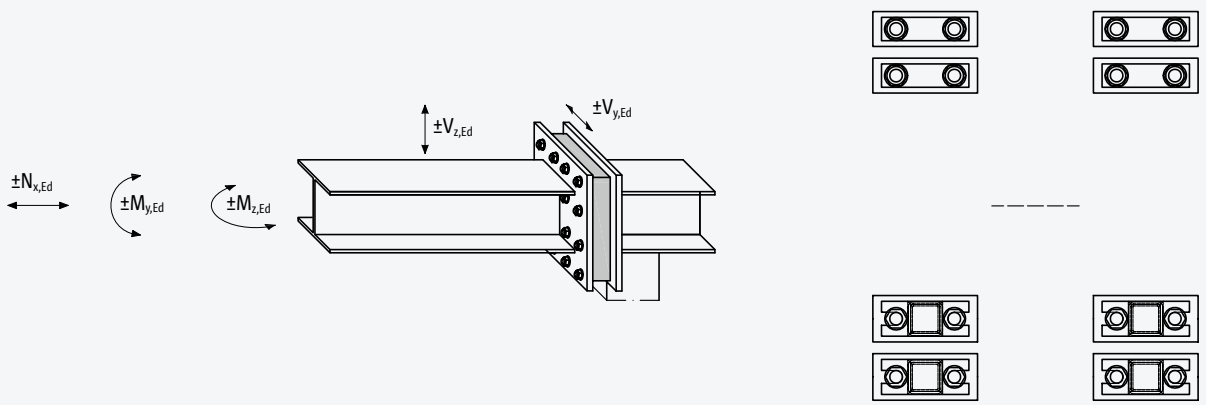


Design

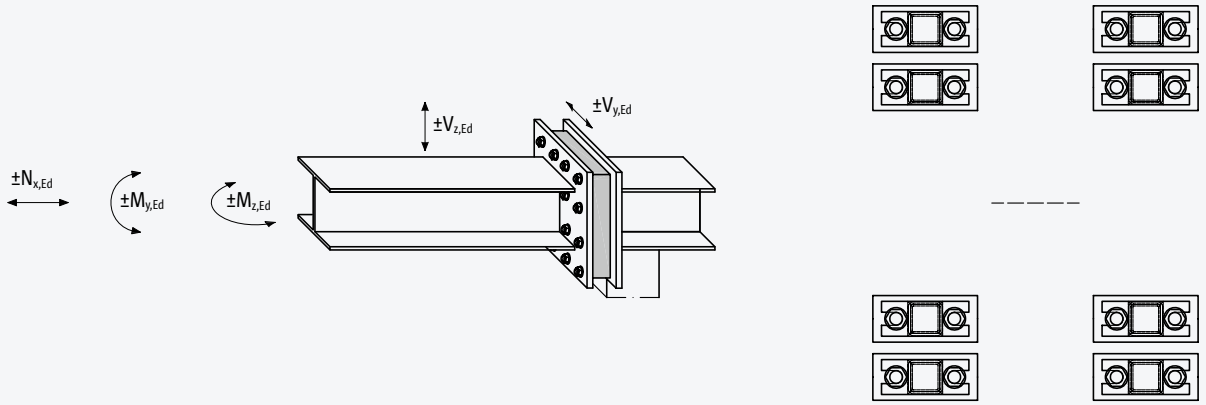
- The design software is available for a rapid and efficient design (Download under www.schoeck.com/en-gb/download).
- Further information can be requested from the design department (contact see p. 3).

Design overview

Normal force $\pm N_{x,Ed}$, shear force $\pm V_{z,Ed}$, $\pm V_{y,Ed}$, moment $\pm M_{y,Ed}$, $\pm M_{z,Ed}$; n × (T type S-N + T type S-V) Page 80



Normal force $\pm N_{x,Ed}$, shear force $\pm V_{z,Ed}$, $\pm V_{y,Ed}$, moment $\pm M_{y,Ed}$, $\pm M_{z,Ed}$; n × T v S-V Page 80



Design

- The design software is available for a rapid and efficient design (Download under www.schoeck.com/en-gb/download).
- Further information can be requested from the design department (contact see p. 3).

Sign convention | Notes

Sign convention for the design

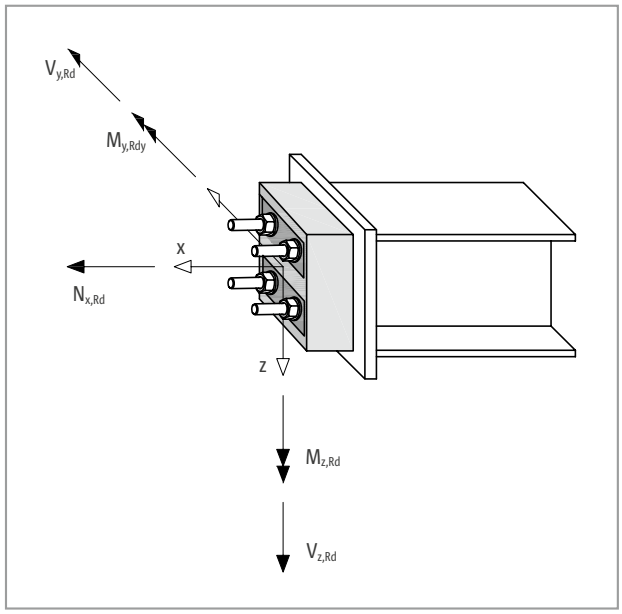


Fig. 94: Schöck Isokorb® T type S: Sign convention for the design

Notes on design

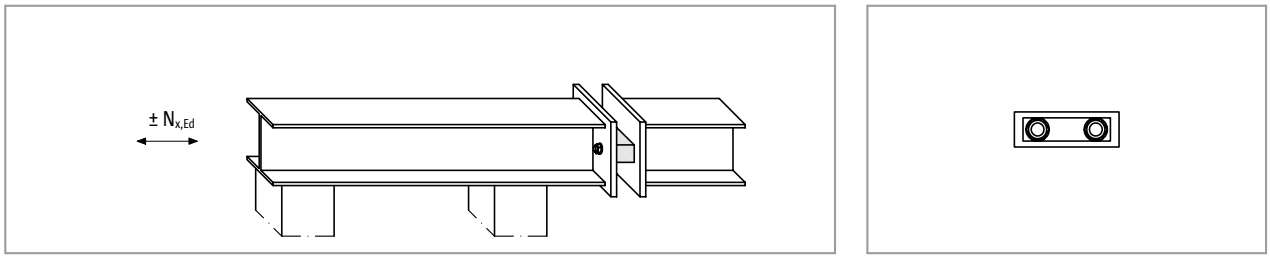
- The Schöck Isokorb® T type S is intended for use with primarily static loads.
- Design takes place in accordance with approval document No. Z-14.4-518

Design of the shear force

- A distinction is to be made as to which zone the Schöck Isokorb® T type S-V is to be arranged :
  Compression: Both threaded rods are pressure-loaded.
  Compression/tension: One threaded rod is compression loaded, the other threaded rod is tension-loaded, e.g. from $M_{z,Ed}$.
  tension: Both threaded rods are tension-loaded.
- Interaction for all zones:
  Allowable shear force in z-direction $V_{z,Rd}$ is dependent on the shear force in the y-direction $V_{y,Rd}$ and vice versa.
- Interaction in the ompression/tension and tension zones:
  Allowable shear force is dependent on thenormal force $N_{x,Ed}$ or the normal force from the moment $N_{x,Ed}(M_{Ed})$.

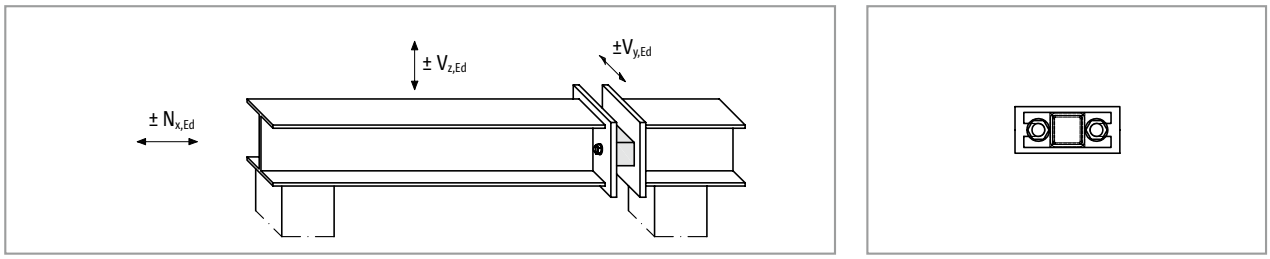
Design normal force | Design normal force and shear force

Normal force $N_{x,Rd}$ - 1 Schöck Isokorb® T type S-N module



Schöck Isokorb® T type S-N	D16	D22
Design value per	$N_{x,Rd}$ [kN/module]	
Module	116.8/–63.4	225.4/–149.6

Normal force $N_{x,Rd}$ and shear force V_{Rd} - 1 Schöck Isokorb® T type S-V module



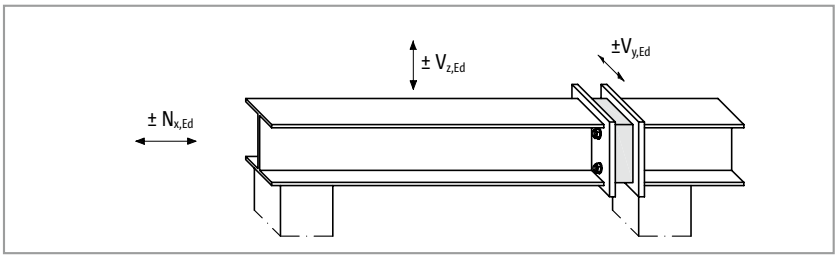
Schöck Isokorb® T type	S-V-D16			S-V-D22		
Design value per	$N_{x,Rd}$ [kN/module]					
Module	±116.8			±225.4		
Shear force compression zone						
Module	$V_{z,Rd}$ [kN/module]					
	für	$0 \le \lvert V_{y,Ed} \rvert \le 6$	±30	für	$0 \le \lvert V_{y,Ed} \rvert \le 6$	±36
	für	$6 < \lvert V_{y,Ed} \rvert \le 15$	$\pm(30 - \lvert V_{y,Ed} \rvert)$	für	$6 < \lvert V_{y,Ed} \rvert \le 18$	$\pm(36 - \lvert V_{y,Ed} \rvert)$
	$V_{y,Rd}$ [kN/module]					
	$\pm\min(15; 30 - \lvert V_{z,Ed} \rvert)$			$\pm\min(18; 36 - \lvert V_{z,Ed} \rvert)$		
Shear force tension zone						
Module	$V_{z,Rd}$ [kN/module]					
	für	$0 \le N_{x,Ed} \le 26,8$	$\pm(30 - \lvert V_{y,Ed} \rvert)$	für	$0 \le N_{x,Ed} \le 117,4$	$\pm(36 - \lvert V_{y,Ed} \rvert)$
	für	$26,8 < N_{x,Ed} \le 116,8$	$\pm(1/3\ (116,8 - N_{x,Ed}) - \lvert V_{y,Ed} \rvert)$	für	$117,4 < N_{x,Ed} \le 225,4$	$\pm(1/3\ (225,4 - N_{x,Ed}) - \lvert V_{y,Ed} \rvert)$
	$V_{y,Rd}$ [kN/module]					
	für	$0 \le N_{x,Ed} \le 26,8$	$\pm\min(15; 30 - \lvert V_{z,Ed} \rvert)$	für	$0 \le N_{x,Ed} \le 117,4$	$\pm\min(18; 36 - \lvert V_{z,Ed} \rvert)$
	für	$26,8 < N_{x,Ed} \le 116,8$	$\pm\min\{15; 1/3\ (116,8 - N_{x,Ed}) - \lvert V_{z,Ed} \rvert\}$	für	$117,4 < N_{x,Ed} \le 225,4$	$\pm\min\{18; 1/3\ (225,4 - N_{x,Ed}) - \lvert V_{z,Ed} \rvert\}$

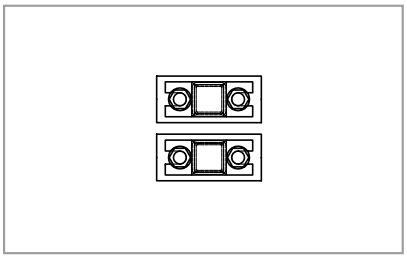
Notes on design

- The values given here apply only for a connection with precisely 1 Schöck Isokorb® T type S-V.
- The design values apply only for supported steel constructions and with a two-sided rigid connection of the on-site end plates.

Design normal force and shear force

Normal force $N_{x,Rd}$ and shear force V_{Rd} - n x Schöck Isokorb® T type S-V modules





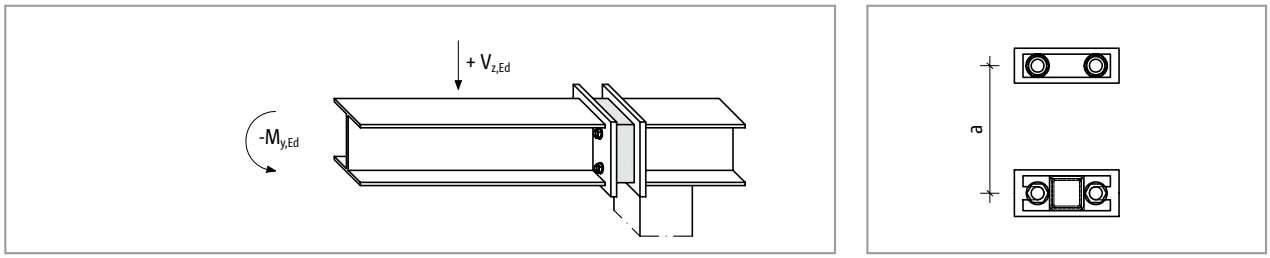
Schöck Isokorb® T type	n × S-V-D16			n × S-V-D22		
Design value per	$N_{x,Rd}$ [kN/module]					
Module	±116.8			±225.4		
Shear force compression zone						
Module	$V_{z,Rd}$ [kN/module]					
	±(46 - |$V_{y,Ed}$|)			±(50 - |$V_{y,Ed}$|)		
	$V_{y,Rd}$ [kN/module]					
	±min {23; 46 - |$V_{z,Ed}$|}			±min {25; 50 - |$V_{z,Ed}$|}		
Shear force tension zone						
Module	$V_{z,t,Rd}$ [kN/module]					
	für	$0 < N_{x,Ed} \leq 26{,}8$	±(30 - |$V_{y,Ed}$|)	für	$0 < N_{x,Ed} \leq 117{,}4$	±(36 - |$V_{y,Ed}$|)
	für	$26{,}8 < N_{x,Ed} \leq 116{,}8$	±(1/3 (116,8 - $N_{x,Ed}$) - |$V_{y,Ed}$|)	für	$117{,}4 < N_{x,Ed} \leq 225{,}4$	±(1/3 (225,4 - $N_{x,Ed}$) - |$V_{y,Ed}$|)
	$V_{y,Rd}$ [kN/module]					
	für	$0 < N_{x,Ed} \leq 26{,}8$	±min {23; 30 - |$V_{z,Ed}$|}	für	$0 < N_{x,Ed} \leq 117{,}4$	±min {25; 36 - |$V_{z,Ed}$|}
	für	$26{,}8 < N_{x,Ed} \leq 116{,}8$	±min {23; 1/3 (116,8 - $N_{x,Ed}$) - |$V_{z,Ed}$|}	für	$117{,}4 < N_{x,Ed} \leq 225{,}4$	±min {25; 1/3 (225,4 - $N_{x,Ed}$) - |$V_{z,Ed}$|}

Notes on design

- In accordance with the approval a Schöck Isokorb® T type S-V module is assigned to the tension zone for $N_{x,Ed} = 0$. Additional Schöck Isokorb® T type S-V can be assigned to the compression zone.
- The design values given in this table apply for a pure supported connection. It is to be ensured that a flexible connection is also available with the arrangement of several Schöck Isokorb® T type S-V modules.
- The design values apply only for supported steel constructions and with a two-sided rigid connection of the on-site end plates.
- The 4 Teflon sheets installed for each type S-V in use add approximately 4 mm. In particular with low balcony loading and with small centre-to-centre distance between type S-N and type S-V, these additional 4 mm in the compression zone have an impact relevant to the camber of the steel beams connected with Schöck Isokorb®. Should shims be necessary for on-site levelling in the tension zone, this would be taken into account with the construction planning.

Design shear force and moment

Positive shear force $V_{z,Rd}$ and negative moment $M_{y,Rd}$ - 1 Schöck Isokorb® T type S-N and 1 Schöck Isokorb® T type S-V

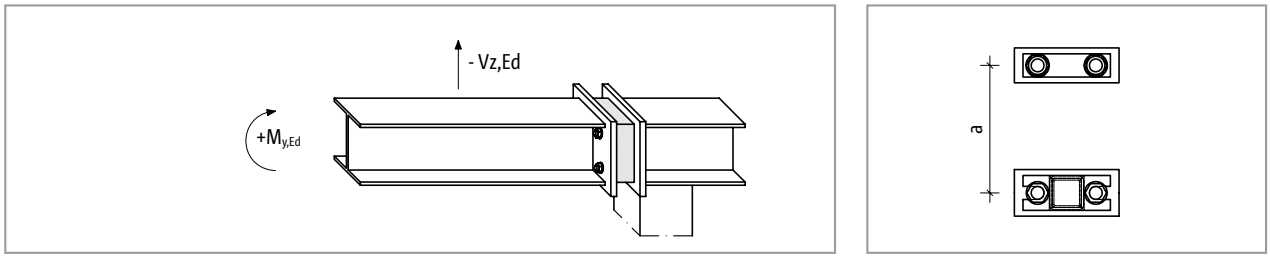


Schöck Isokorb® T type	1 × S-N-D16 + 1 × S-V-D16	1 × S-N-D22 + 1 × S-V-D22
Design value per	$M_{y,Rd}$ [kNm/connection]	
Connection	-116,8 • a	-225,4 • a
	$V_{z,Rd}$ [kN/connection]	
	46	50

Notes on design

- a [m]: Lever arm (separation between tension loaded and compression loaded threaded rods).
- Minimum lever arm a = 50 mm (without insulation spacers and after trimming of the insulating elements, see page 86)
- The load case presented here (positive shear force and negative moment) for the same connection can be combined with load case presented next (negative shear force and positive moment).

Negative shear force $V_{z,Rd}$ and positive moment $M_{y,Rd}$ - 1 Schöck Isokorb® T type S-N and 1 Schöck Isokorb® T type S-V



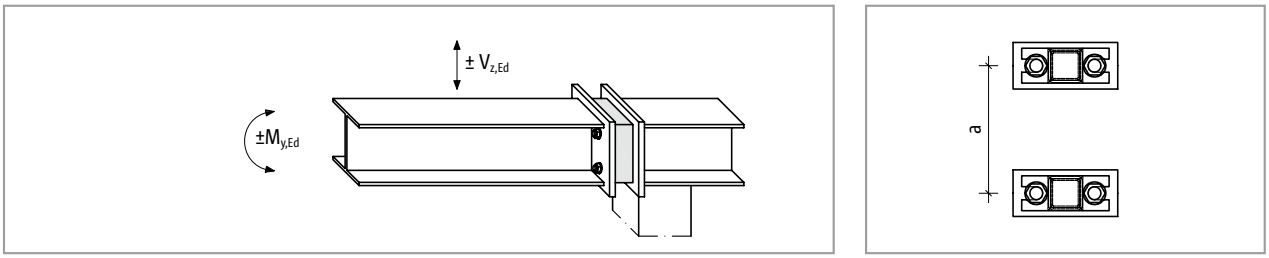
Schöck Isokorb® T type	1 × S-N-D16 + 1 × S-V-D16			1 × S-N-D22 + 1 × S-V-D22		
Design value per	$M_{y,Rd}$ [kNm/connection]					
Connection	63,4 • a			149,6 • a		
	$V_{z,Rd}$ [kN/connection]					
	für	$0 < N_{x,Ed}(M_{y,Ed}) \leq 26,8$	-30	für	$0 < N_{x,Ed}(M_{y,Ed}) \leq 117,4$	-36
	für	$26.8 < N_{x,Ed}(M_{y,Ed}) < 63.4$	$-1/3\ (116,8 - N_{x,Ed}(M_{y,Ed}))$	für	$117.4 < N_{x,Ed}(M_{y,Ed}) < 149.6$	$-1/3\ (225,4 - N_{x,Ed}(M_{y,Ed}))$
	für	63,4	-17,8	für	149,6	-25,3

Notes on design

- $N_{x,Ed}(M_{y,Ed}) = M_{y,Ed} / a$
- a [m]: Lever arm (separation between tension loaded and compression loaded threaded rods).
- Minimum lever arm a = 50 mm (without insulation spacers and after trimming of the insulating elements, see page 86)
- If the lifting loads for the Schöck Isokorb® T type are relevant then the reverse is recommended, T type S-V arranged above and T type S-N arranged below.
- The load case presented here (negative shear force and positive moment) for the same connection can be combined with load case presented previously (positive shear force and negative moment).

Design shear force and moment

Positive and negative shear force $V_{z,Rd}$ and negative and positive moment $M_{y,Rd}$ - 2 Schöck Isokorb® T type S-V modules



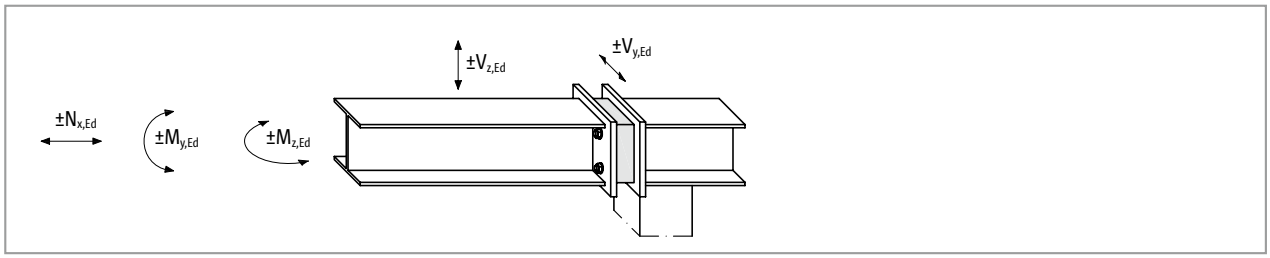
Schöck Isokorb® T type	2 × S-V-D16			2 × S-V-D22		
Design value per	$M_{y,Rd}$ [kNm/connection]					
Connection	±116,8 • a			±225,4 • a		
Shear force compression zone						
Module	$V_{z,Rd}$ [kN/module]					
	±46			±50		
Shear force tension zone						
Module	$V_{z,Rd}$ [kN/module]					
	für	$0 < N_{x,Ed}(M_{y,Ed}) \leq 26,8$	±30	für	$0 < N_{x,Ed}(M_{y,Ed}) \leq 117,4$	±36
	für	$26.8 < N_{x,Ed}(M_{y,Ed}) < 116.8$	$\pm 1/3\ (116,8 - N_{x,Ed}(M_{y,Ed}))$	für	$117.4 < \lvert N_{x,Ed}(M_{y,Ed}) \rvert \leq 225.4$	$\pm 1/3\ (225,4 - N_{x,Ed}(M_{y,Ed}))$

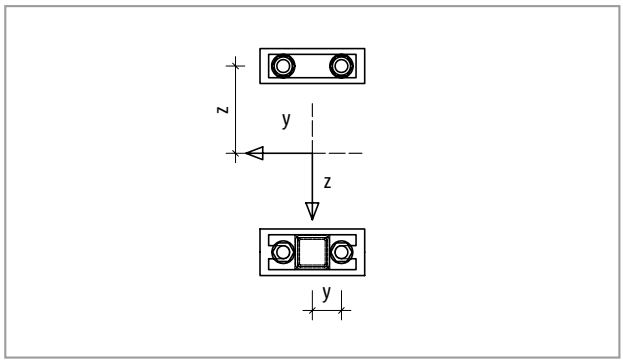
Notes on design

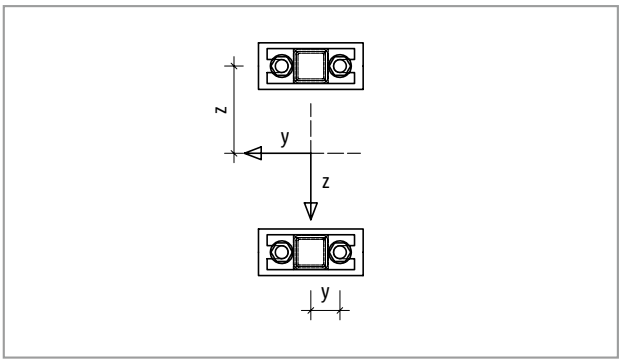
- $N_{x,Ed}(M_{y,Ed}) = M_{y,Ed} / a$
- a [m]: Lever arm (separation between tension loaded and compression loaded threaded rods).
- Minimum lever arm a = 50 mm (without insulation spacers and after trimming of the insulating elements, see page 86)

Design normal force, shear force and moment

Normal force $N_{x,Rd}$ and shear force $V_{z,Rd}$, $V_{y,Rd}$ and moments $M_{y,Rd}$, $M_{z,Rd}$ - 1 T type S-N + 1 T type







Allowable normal force $N_{x,Rd}$ per threaded rod, allowable moments $M_{y,Rd}$ $M_{z,Rd}$ per connection

Schöck Isokorb® T type	S-N-D16	S-N-D22	S-V-D16	S-V-D22
Design value per	$N_{GS,Rd}$ [kN/threaded rod]			
Threaded rod	+58,4/-31,7	+112,7/-74,8	±58,4	±112,7
	$N_{GS,Mz,Rd}$ [kN/threaded rod]			
	±29,2	±56,3	±29,2	±56,3

Algebraic sign definition

$+N_{GS,Rd}$: Threaded rod is in tension.
$-N_{GS,Rd}$: Threaded rod is in compression.

Each threaded rod is loaded by a normal force $N_{GS,Ed}$. This is made up of 3 subcomponents.

Subcomponents

from normal force $N_{x,Ed}$: $N_{1,GS,Ed} = N_{x,Ed} / 4$
from moment $M_{y,Ed}$: $N_{2,GS,Ed} = \pm M_{y,Ed} / (4 \cdot z)$
from moment $M_{z,Ed}$: $N_{3,GS,Ed} = \pm M_{z,Ed} / (4 \cdot y)$

Condition 1: $|N_{1,GS,Ed} + N_{2,GS,Ed} + N_{3,GS,Ed}| \leq |N_{GS,Rd}|$ [kN/threaded rod]
The maximum or minimum loaded threaded rod is critical.

Condition 2: $|N_{1,GS,Ed} + N_{3,GS,Ed}| \leq |N_{GS,Mz,Rd}|$ [kN/threaded rod]

Design normal force, shear force and moment

Allowable shear force per module and per connection

Schöck Isokorb® T type	S-V-D16			S-V-D22		
Design value per	Shear force compression zone					
Module	$V_{z,i,Rd}$ [kN/module]					
	±(46 - |$V_{y,i,Ed}$|)			±(50 - |$V_{y,i,Ed}$|)		
	$V_{y,i,Rd}$ [kN/module]					
	±min {23; 46 - |$V_{z,i,Ed}$|}			±min {25; 50 - |$V_{z,i,Ed}$|}		
Shear force tension zone/compression and tension						
Module	$V_{z,i,Rd}$ [kN/module]					
	für	0 < $N_{GS,i,Ed}$ ≤ 13,4	±(30 - |$V_{y,i,Ed}$|)	für	0 < $N_{GS,i,Ed}$ ≤ 58,7	±(36 - |$V_{y,i,Ed}$|)
	für	13,4 < $N_{GS,i,Ed}$ ≤ 58,4	±2/3 (58,4 - $N_{GS,i,Ed}$) - |$V_{y,i,Ed}$|	für	58,7 < $N_{GS,i,Ed}$ ≤ 112,7	±2/3 (112,7 - $N_{GS,i,Ed}$) - |$V_{y,i,Ed}$|
	$V_{y,i,Rd}$ [kN/module]					
	für	0 < $N_{GS,i,Ed}$ ≤ 13,4	±min {23; 30 - |$V_{z,i,Ed}$|}	für	0 < $N_{GS,i,Ed}$ ≤ 58,7	±min {25; 36 - |$V_{z,i,Ed}$|}
	für	13,4 < $N_{GS,i,Ed}$ ≤ 58,4	±min {23; 2/3 (58,4 - $N_{GS,i,Ed}$) - |$V_{z,i,Ed}$|}	für	58,7 < $N_{GS,i,Ed}$ ≤ 112,7	±min {25; 2/3 (112,7 - $N_{GS,i,Ed}$) - |$V_{z,i,Ed}$|}

Determination of the effective normal force $N_{GS,i,Ed}$ per threaded rod

$N_{GS,i,Ed} = N_{x,Ed}/4 \pm |M_{y,Ed}| / (4 \cdot z) \pm |M_{z,Ed}| / (4 \cdot y)$

Determination of the allowable shear force per Schöck Isokorb® T type S-V module

The allowable shear force per Schöck Isokorb® T type S-V depends on the load on the threaded rods.
Zones are defined for this purpose:

Compression: Both threaded rods are subjected to compression.
Compression/tension: One threaded rod is subjected to compression, the other is subjected to tension.
Tension: Both threaded rods are tension loaded.
(In the area, compression/tension and in the tension area the maximum positive normal force $+N_{GS,i,Ed}$ is to be applied in the design table)

$V_{z,i,Rd}$: Allowable shear force in the z-direction of the individual Schöck Isokorb® T type S-V module independent on $+N_{GS,i,Ed}$ in the respective module i.
$V_{y,i,Rd}$: Allowable shear force in the y-direction of the individual Schöck Isokorb® T type S-V module , depending on $+N_{GS,i,Ed}$ in the respective module i.

Determine $V_{z,i,Rd}$
Determine $V_{y,i,Rd}$

The vertical shear force $V_{z,Ed}$ and the horizontal shear force $V_{y,Ed}$ are in the ratio $V_{z,Ed}/V_{y,Ed}$ = constant distributed on the individual Schöck Isokorb® T type S-V.

Condition: $V_{z,Ed}/V_{y,Ed} = V_{z,i,Rd}/V_{y,i,Rd} = V_{z,Rd}/V_{y,Rd}$

If this condition is not met, $V_{z,i,Rd}$ or $V_{y,i,Rd}$ is reduced, so that the ratio is maintained.

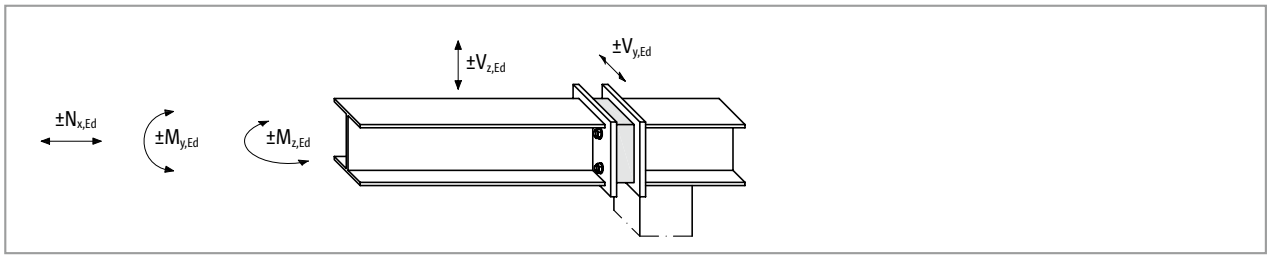
Verification: $V_{z,Ed} \leq \sum V_{z,i,Rd}$
$V_{y,Ed} \leq \sum V_{y,i,Rd}$

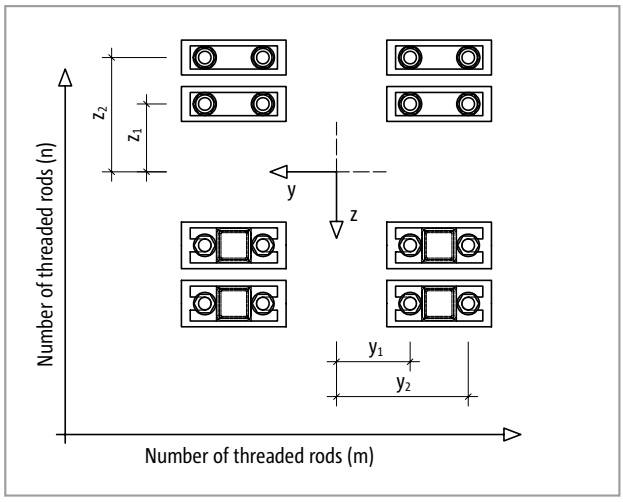
i Design

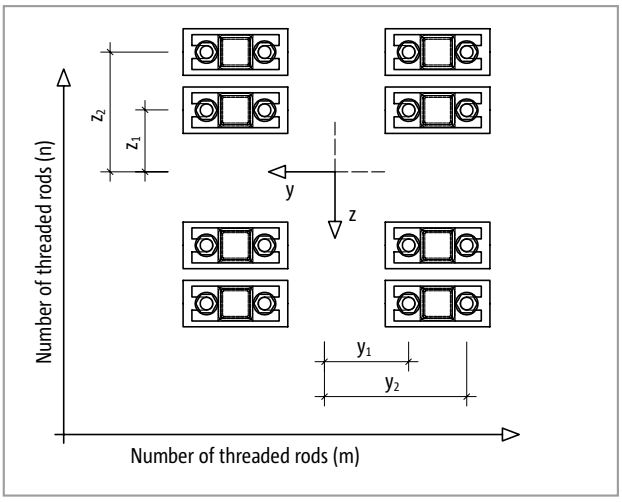
- The design software is available for a rapid and efficient design (Download under www.schoeck.com/en-gb/download).
- Further information can be requested from the design department (contact see p. 3).

Design normal force, shear force and moment

Normal force $N_{x,Rd}$ and shear force $V_{z,Rd}$, $V_{y,Rd}$ and moments $M_{y,Rd}$, $M_{z,Rd}$ - n × T type S-N and n × T type S-V







Allowable normal force $N_{x,Rd}$ per threaded rod, allowable moments $M_{y,Rd}$ $M_{z,Rd}$ per connection

Schöck Isokorb® T type	S-N-D16	S-N-D22	S-V-D16	S-V-D22
Design value per	$N_{GS,Rd}$ [kN/threaded rod]			
Threaded rod	+58,4/-31,7	+112,7/-74,8	±58,4	±112,7
	$N_{GS,Mz,Rd}$ [kN/threaded rod]			
	±29,2	±56,3	±29,2	±56,3

Algebraic sign definition

$+N_{GS,Rd}$: Threaded rod is in tension.
$-N_{GS,Rd}$: Threaded rod is in compression.

m: Number of threaded rods per connection in the z-direction
n: Number of threaded rods per connection in the y-direction

Each threaded rod is loaded with a normal force $N_{GS,Ed}$. This is made up of 3 subcomponents.

Subcomponents

from normal force $N_{x,Ed}$: $N_{1,GS,Ed} = N_{x,Ed} /(m \cdot n)$
from moment $M_{y,Ed}$: $N_{2,GS,Ed} = \pm M_{y,Ed} /(2 \cdot m \cdot z_2 + 2 \cdot m \cdot z_1/z_2 \cdot z_1)$
from moment $M_{z,Ed}$: $N_{3,GS,Ed} = \pm M_{z,Ed} /(2 \cdot n \cdot y_2 + 2 \cdot n \cdot y_1/y_2 \cdot y_1)$

Condition 1: $|N_{1,GS,Ed} + N_{2,GS,Ed} + N_{3,GS,Ed}| \leq |N_{GS,Rd}|$ [kN/threaded rod]
The maximum or minimum loaded threaded rod is critical.
Condition 2: $|N_{1,GS,Ed} + N_{3,GS,Ed}| \leq |N_{GS,Mz,Rd}|$ [kN/threaded rod]

Design normal force, shear force and moment

Allowable shear force per module and per connection

Schöck Isokorb® T type	S-V-D16			S-V-D22		
Design value per	Shear force compression zone					
Module	$V_{z,i,Rd}$ [kN/module]					
	$\pm(46 - \lvert V_{y,i,Ed} \rvert)$			$\pm(50 - \lvert V_{y,i,Ed} \rvert)$		
	$V_{y,i,Rd}$ [kN/module]					
	$\pm\min\{23; 46 - \lvert V_{z,i,Ed} \rvert\}$			$\pm\min\{25; 50 - \lvert V_{z,i,Ed} \rvert\}$		
Shear force tension zone/compression and tension						
Module	$V_{z,i,Rd}$ [kN/module]					
	für	$0 < N_{GS,i,Ed} \leq 13,4$	$\pm(30 - \lvert V_{y,i,Ed} \rvert)$	für	$0 < N_{GS,i,Ed} \leq 58,7$	$\pm(36 - \lvert V_{y,i,Ed} \rvert)$
	für	$13,4 < N_{GS,i,Ed} \leq 58,4$	$\pm 2/3\,(58,4 - N_{GS,i,Ed}) - \lvert V_{y,i,Ed} \rvert$	für	$58,7 < N_{GS,i,Ed} \leq 112,7$	$\pm 2/3\,(112,7 - N_{GS,i,Ed}) - \lvert V_{y,i,Ed} \rvert$
	$V_{y,i,Rd}$ [kN/module]					
	für	$0 < N_{GS,i,Ed} \leq 13,4$	$\pm\min\{23; 30 - \lvert V_{z,i,Ed} \rvert\}$	für	$0 < N_{GS,i,Ed} \leq 58,7$	$\pm\min\{25; 36 - \lvert V_{z,i,Ed} \rvert\}$
	für	$13,4 < N_{GS,i,Ed} \leq 58,4$	$\pm\min\{23; 2/3\,(58,4 - N_{GS,i,Ed}) - \lvert V_{z,i,Ed} \rvert\}$	für	$58,7 < N_{GS,i,Ed} \leq 112,7$	$\pm\min\{25; 2/3\,(112,7 - N_{GS,i,Ed}) - \lvert V_{z,i,Ed} \rvert\}$

Determination of the effective normal force $N_{GS,i,Ed}$ per threaded rod

$$N_{GS,i,Ed} = N_{x,Ed} / (m \cdot n) \pm \lvert M_{y,Ed} \rvert / (2 \cdot m \cdot z_2 + 2 \cdot m \cdot z_i/z_2 \cdot z_i) \pm \lvert M_{z,Ed} \rvert / (2 \cdot n \cdot y_2 + 2 \cdot n \cdot y_i/y_2 \cdot y_i)$$

Determination of the allowable shear force per Schöck Isokorb® T type S-V module

The allowable shear force per Schöck Isokorb® T type S-V depends on the load on the threaded rods.
Zones are defined for this purpose:

Compression: Both threaded rods are subjected to compression.
Compression/tension: One threaded rod is subjected to compression, the other is subjected to tension.
Tension: Both threaded rods are tension loaded.
(In the area, compression/tension and in the tension area the maximum positive normal force $+N_{GS,i,Ed}$ is to be applied in the design table)

$V_{z,i,Rd}$: Allowable shear force in the z-direction of the individual Schöck Isokorb® T type S-V module independent on $+N_{GS,i,Ed}$ in the respective module i.

$V_{y,i,Rd}$: Allowable shear force in the y-direction of the individual Schöck Isokorb® T type S-V module , depending on $+N_{GS,i,Ed}$ in the respective module i.

Determine $V_{z,i,Rd}$
Determine $V_{y,i,Rd}$

The vertical shear force $V_{z,Ed}$ and the horizontal shear force $V_{y,Ed}$ are in the ratio $V_{z,Ed} / V_{y,Ed}$ = constant distributed on the individual Schöck Isokorb® T type S-V.

Condition: $V_{z,Ed} / V_{y,Ed} = V_{z,i,Rd} / V_{y,i,Rd} = V_{z,Rd} / V_{y,Rd}$

If this condition is not met, $V_{z,i,Rd}$ or $V_{y,i,Rd}$ is reduced, so that the ratio is maintained.

Verification: $V_{z,Ed} \leq \sum V_{z,i,Rd}$
$V_{y,Ed} \leq \sum V_{y,i,Rd}$

i Design

- The design software is available for a rapid and efficient design (Download under www.schoeck.com/en-gb/download).
- Further information can be requested from the design department (contact see p. 3).

Deflection

Deflection of Schöck Isokorb® as a result of normal force $N_{x,Ed}$

Tension zone: $\Delta l_Z = |+ N_{x,Ed}| \cdot k_z$ [cm]

Compression zone: $\Delta l_D = |- N_{x,Ed}| \cdot k_D$ [cm]

Reciprocal spring stiffness constant in tension area: k_z

Reciprocal spring stiffness constant in compression area: k_D

Schöck Isokorb® T type		S-N		S-V	
Reciprocal spring constant		Thread diameter			
		D16	D22	D16	D22
per	Zone	k [cm/kN]			
Module	Tension	$2{,}27 \cdot 10^{-4}$	$1{,}37 \cdot 10^{-4}$	$1{,}69 \cdot 10^{-4}$	$1{,}15 \cdot 10^{-4}$
	Compression	$1{,}33 \cdot 10^{-4}$	$0{,}69 \cdot 10^{-4}$	$0{,}40 \cdot 10^{-4}$	$0{,}29 \cdot 10^{-4}$

Deflection of Schöck Isokorb®: 1 × T type S-N + 1 × T type S-V and 2 × T type S-V due to moment force $M_{y,Ed}$

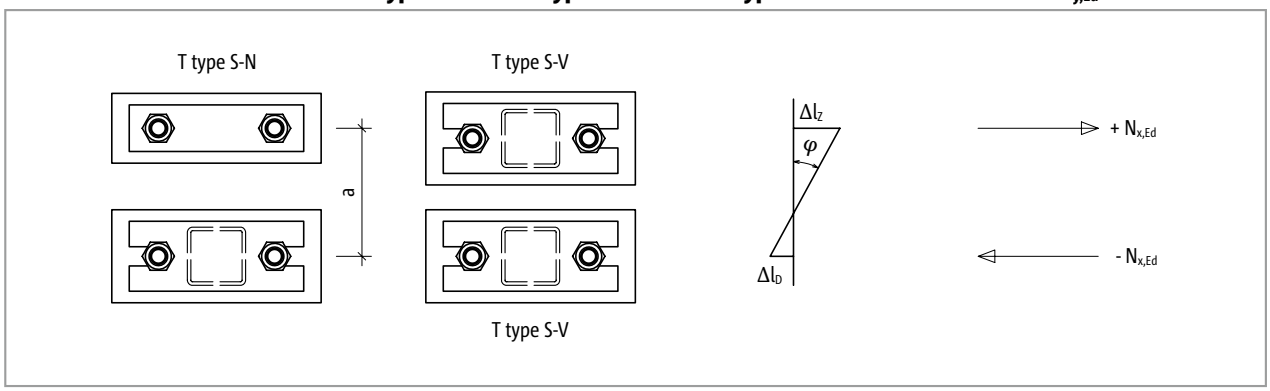


Fig. 95: Schöck Isokorb® T type S-N + T type S-V and 2 × T type S-V: Deflection angle $\varphi \approx \tan \varphi = (\Delta l_Z + \Delta l_D) / a$

A moment $M_{y,Ed}$ causes rotation of the Schöck Isokorb®. The deflection angle of the Schöck Isokorb® T type S or a Schöck Isokorb® connection with 2 × T Type S-V modules can be given approximately as follows:

$$\varphi = M_{y,Ed}/C \text{ [rad]}$$

φ	[rad]	deflection angle
$M_{y,Ed}$	[kN·cm]	characteristic moment for verification in the load case usability
C	[kN·cm/rad]	torsion spring stiffness
a	[cm]	lever arm

Conditions

- End plate is infinitely stiff
- Load due to moment M_y
- Deflection from shear force can be ignored
- In addition, deflections can result in the adjoining structural components.

Schöck Isokorb® T type	1 × S-N-D16 + 1 × S-V-D16	1 × S-N-D22 + 1 × S-V-D22	2 × S-V-D16	2 × S-V-D22
Torsion spring stiffness per	C [kN · cm/rad]			
Connection	$3700 \cdot a^2$	$6000 \cdot a^2$	$4700 \cdot a^2$	$6900 \cdot a^2$

Expansion joint spacing

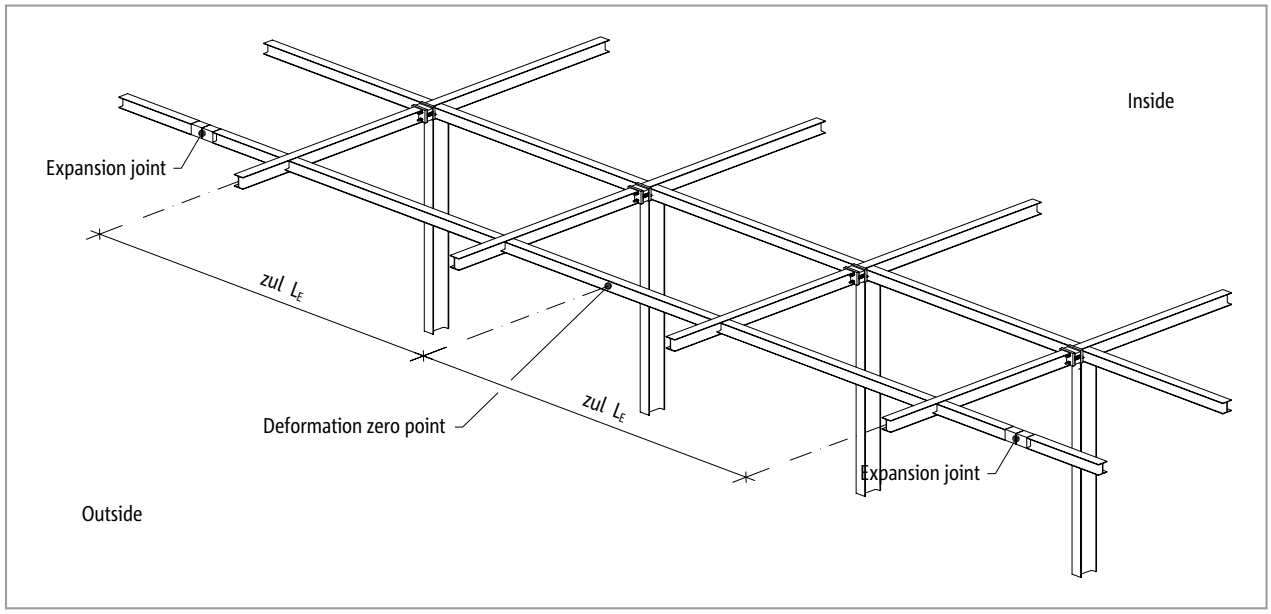


Fig. 96: Schöck Isokorb® T type S: Load influence length of the outer construction, which is loaded by temperature expansion

Changing temperatures lead to changes of length in the steel sections and thus to constraints, which can be taken up to a limited extent only by the Schöck Isokorb® T type S modules. Loading of the Schöck Isokorb® through temperature deformation of the outer steel construction should therefore generally be avoided, e.g. through slotted holes in the secondary beams.

If, nevertheless, temperature deformations are assigned directly to the Schöck Isokorb®, then the following allowable load influencing lengths can be realised.
The load influencing length is the length from the zero point of the deformation to the last Schöck Isokorb® before an arranged expansion joint.
The neutral point of the deformation lies either in the symmetry axis or is to be determined through a simulation taking into account the stiffness of the construction.

If expansion joints are arranged in the transverse beams, these must permit temperature-induced displacements of the transverse beam ends securely and safely without hindrance.

Schöck Isokorb® T type	S-N, S-V
Permissible deformation length with	Allowable L_E [m]
Nominal hole tolerance [mm]	
2	5,24

Product description

Schöck Isokorb® T type S-N

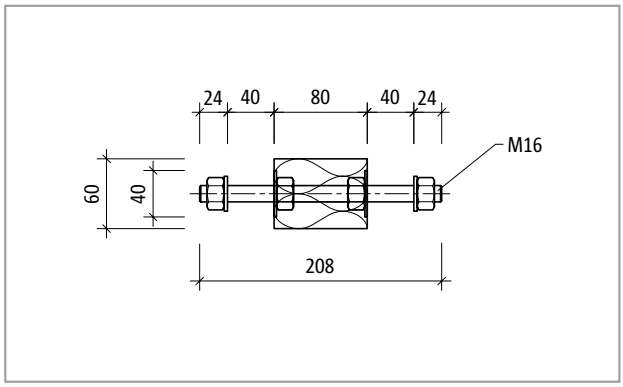


Fig. 97: Schöck Isokorb® T type S-N-D16: Cross section of the product

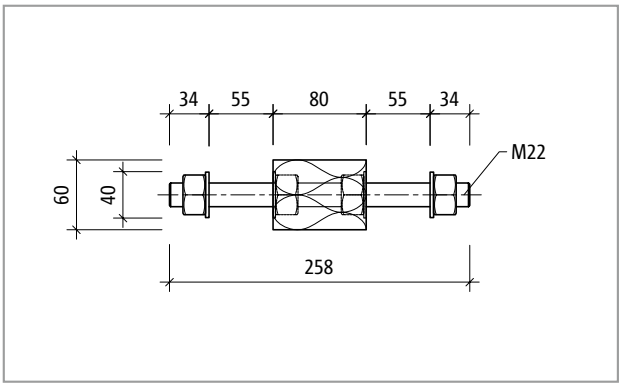


Fig. 98: Schöck Isokorb® T type S-N-D22: Cross section of the product

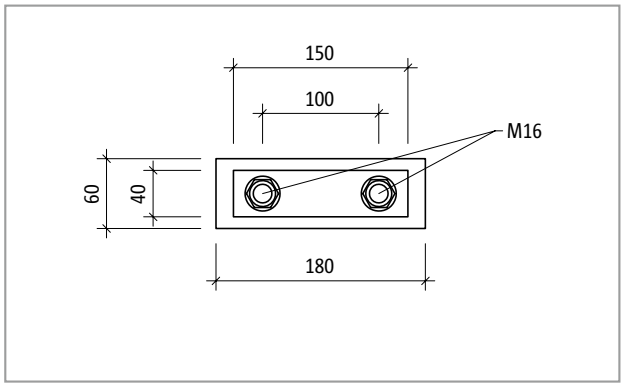


Fig. 99: Schöck Isokorb® T type S-N-D16: Elevation of the product

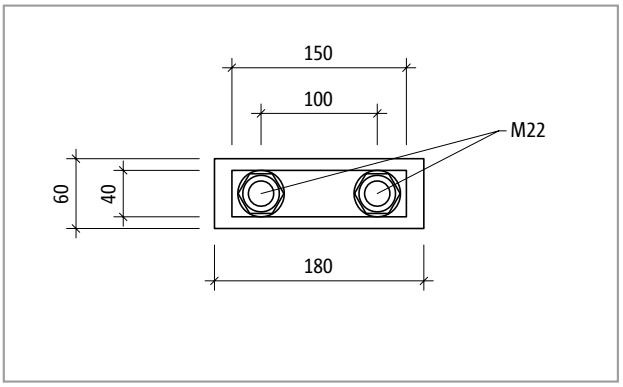


Fig. 100: Schöck Isokorb® T type S-N-D22: Elevation of the product

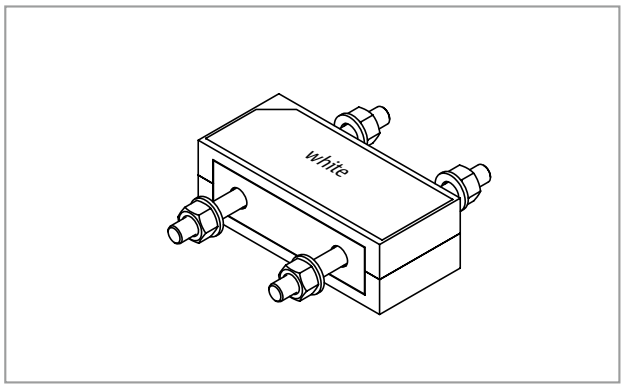


Fig. 101: Schöck Isokorb® T type S-N-D16: Isometric view; colour code T type S-N: White

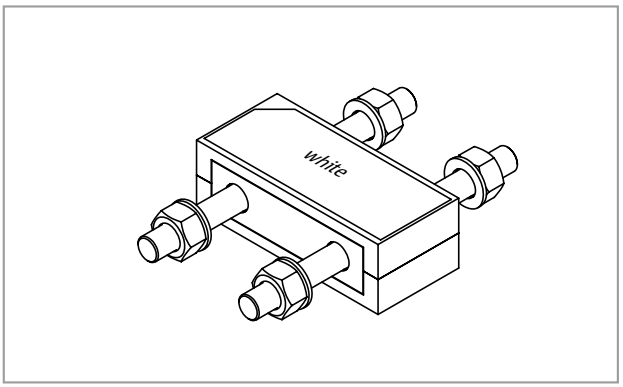


Fig. 102: Schöck Isokorb® T type S-N-D22: Isometric view; colour code T type S-N: White

Product information

- The insulating element, as required, can be cut up to the steel plates.
- The free clamp length is 40 mm with threaded rods M16 and 55 mm with threaded rods M22.
- The Schöck Isokorb® and the insulation spacers can be combined according to geometric and static requirements.
  For this please take into account both the number of required Schöck Isokorb® and also the number of required insulation spacers

Product description

Schöck Isokorb® T type S-V

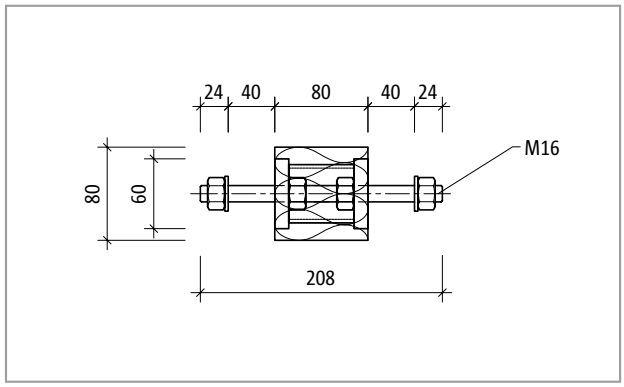


Fig. 103: Schöck Isokorb® T type S-N-D16: Cross section of the product

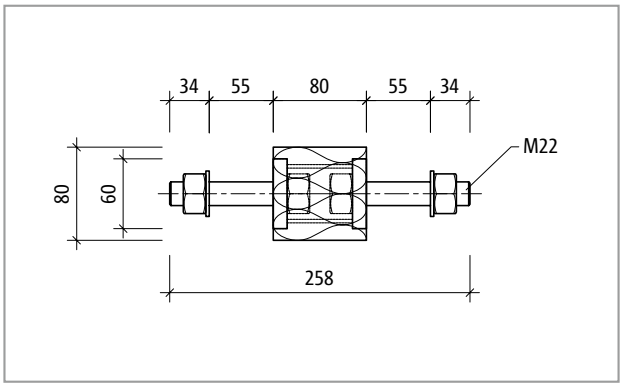


Fig. 104: Schöck Isokorb® T type S-V-D22: Cross section of the product

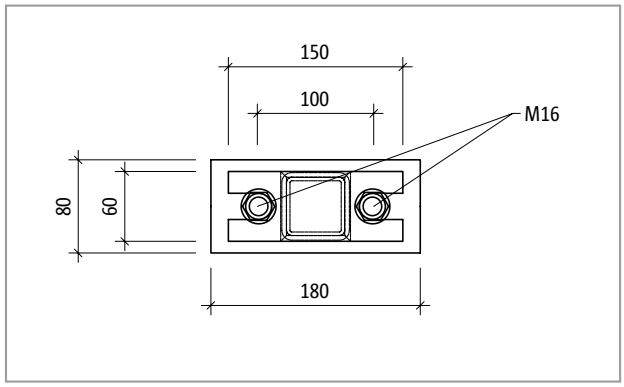


Fig. 105: Schöck Isokorb® T type S-V-D16: Elevation of the product

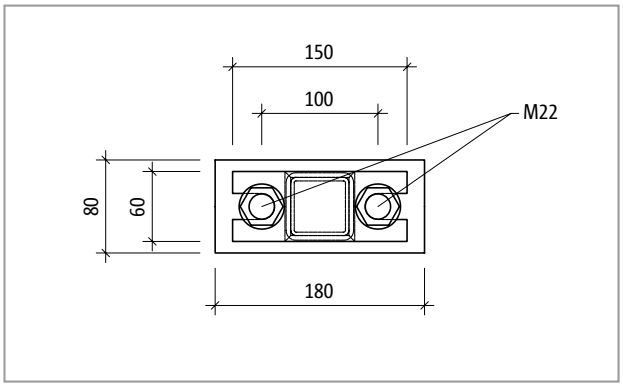


Fig. 106: Schöck Isokorb® T type S-V-D22: Elevation of the product

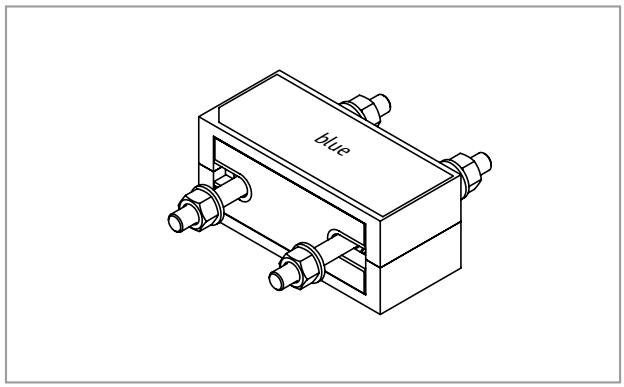


Fig. 107: Schöck Isokorb® T type S-V-D16: Isometric view; colour code T type S-V: Blue

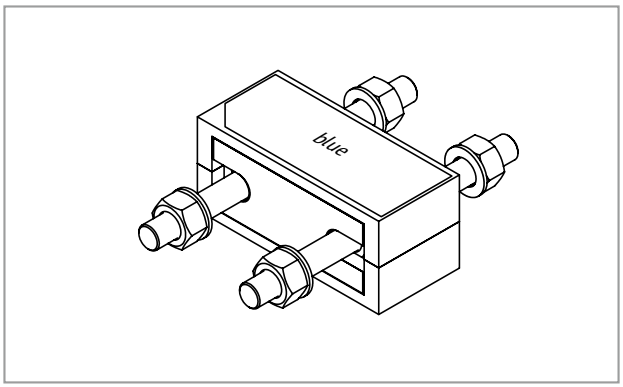


Fig. 108: Schöck Isokorb® T type S-V-D22: Isometric view; colour code T type S-V: Blue

Product information

- The insulating element, as required, can be cut up to the steel plates.
- The free clamp length is 40 mm with threaded rods M16 and 55 mm with threaded rods M22.
- The Schöck Isokorb® and the insulation spacers can be combined according to geometric and static requirements.
  For this please take into account both the number of required Schöck Isokorb® and also the number of required insulation spacers

Product description | On-site fire resistance

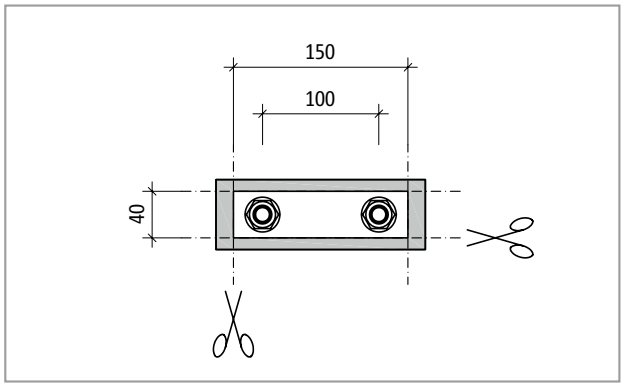


Fig. 109: Schöck Isokorb® T type S-N: Dimensions according to cutting of insulating element

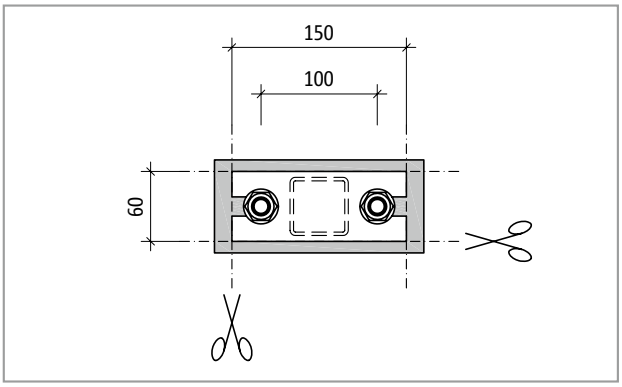


Fig. 110: Schöck Isokorb® T type S-V: Dimensions according to cutting of insulating element

Product information

- The insulating element, as required, can be cut up to the steel plates.
- With the combination 1 Schöck Isokorb® T type S-N with 1 T type S-V it applies that:
  If the insulating elements are cut around the steel plates, the lowest height is 100 mm with a vertical spacing of the threaded rods of 50 mm.

Fire protection

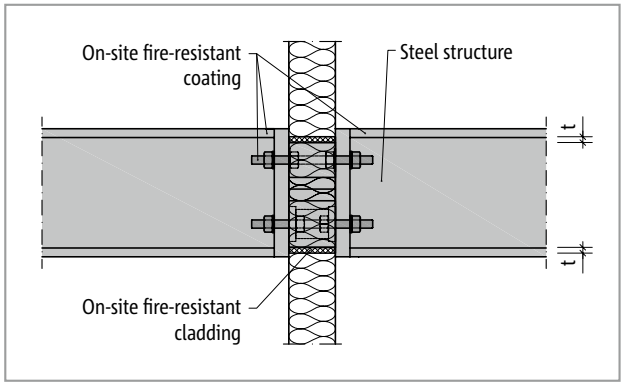


Fig. 111: Fire protection Schöck Isokorb® T type S: On-site fire protection cladding T type S, fire protection coated steel structure; section

Fire protection

- The Schöck Isokorb® is availabe only as variant without fire protection (-R0).
- Fire-resistant cladding of the Schöck Isokorb® must be planned and installed on site. The same on-site fire safety measures apply as for the overall load-bearing structure.
- For further information see page 12.

End Plate

The on site end plate can be verified as follows:

- Without more accurate verification through maintaining the minimum end plate thickness according to approval document No. Z-14.4-518 Annex 13;
- Load spread method and verification of the cantilever for a projecting end plate (approximately);
- Verification of the moment distribution for a flush end plate (approximately);
- More accurate verifications are possible with end plate programs; through this smaller end plate thicknesses can be achieved.

Maintaining the minimum end plate thickness following approval

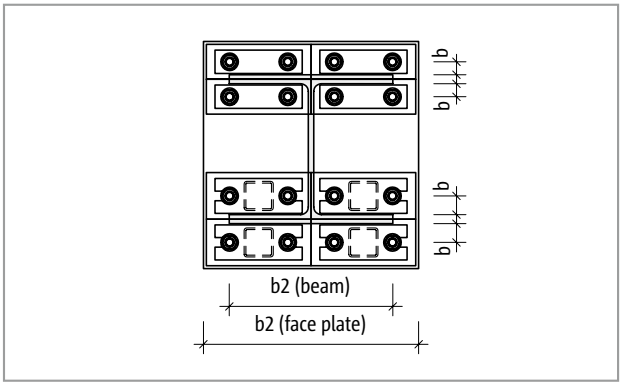


Fig. 112: End plate T type S: Geometric input values table; elevation

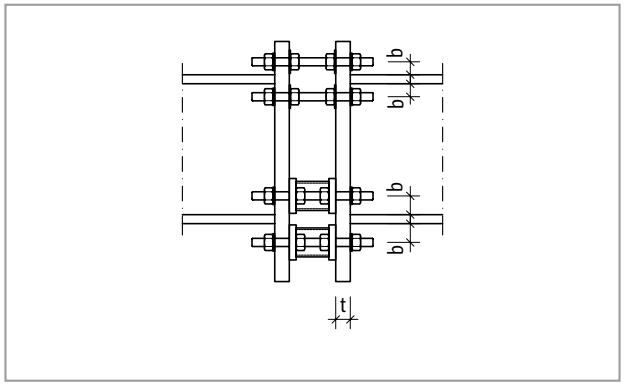


Fig. 113: End plate T type S: Geometric input values table; section

Schöck Isokorb® T type	S-N-D16, S-V-D16	S-N-D22, S-V-D22
Minimum thickness end plate with	b ≤ 35 mm b_2 ≥ 150 mm	b ≤ 50 mm b_2 ≥ 200 mm
$+N_{x,GS,Ed}/+N_{x,GS,Rd}$ ≤	t_{min} [mm]	
0,45	15	25
0.50	20	25
0.80	20	30
1,00	25	35

Table

- $+N_{x,Gs,Ed}$: Normal force in the threaded rod most heavily tension loaded
- b: Maximum spacing of the threaded rod axis to the flange edge
- b_2: Carrier width or width of the end plate; the smaller value is relevant.

Projecting on-site end plate

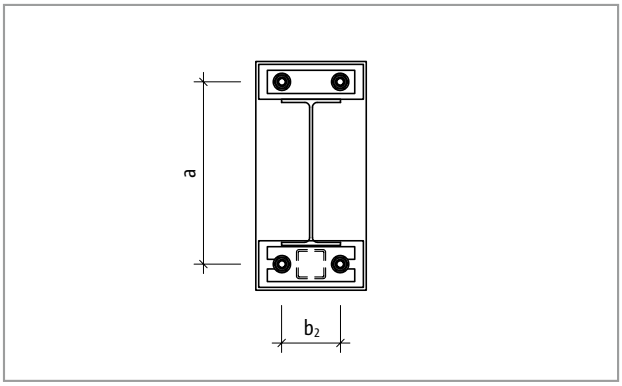


Fig. 114: Protruding end plate T type S: geometric input values from calculation; elevationt

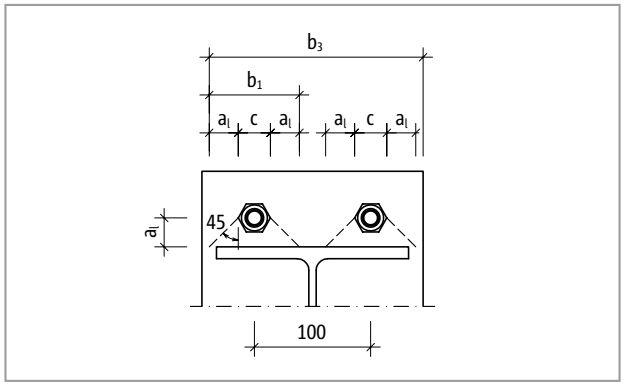


Fig. 115: Protruding end plate T type S: geometric input values from calculation; elevation

End Plate

Verification of the maximum moment in the end plate

Acting normal force per threaded rod: $N_{GS,\,i,\,Ed}$ (See e.g. p. 79), or $N_{GS,Ed}(M_{y,Ed}) = 1/2 \cdot M_{y,Ed} / a$

Acting moment end plate: $M_{Ed,\,STP} = N_{GS,Ed} \cdot a_l$ [kNmm]

Resistance moment end plate: $W = t^2 \cdot b_{ef} / 6$ [mm³]

b_{ef}	= min (b_1; $b_2/2$; $b_3/2$)
t	= thickness of end plate
c	= diameter plain washer; c (M16) = 30 mm; c (M22) = 39 mm
a_l	= separation flange to centre threaded rod
b_1	= 2 • a_l + c [mm]
b_2	= beam width or width end plate; the smaller value is relevant.
b_3	= 2 • a_l + c + 100 [mm]

Verification: $M_{Ed,\,STP} = N_{GS,Ed} \cdot a_1$ [kNmm] ≤ $M_{Rd,\,STP} = W \cdot f_{y,k} / 1.1$ [kNmm]

Flush on site end plate

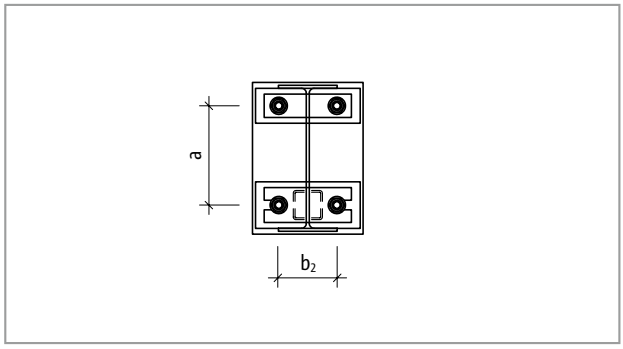


Fig. 116: Flush end plate T type S: Geometric input values calculation; elevation

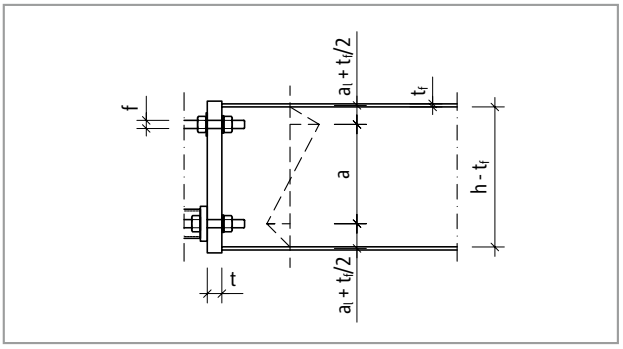


Fig. 117: Flush end plate T type S: Geometric input values calculation; section

Verification of the maximum moment in the end plate

Acting normal force per threaded rod: $N_{GS,\,i,\,Ed}$ (See e.g. p. 79), or $N_{GS,Ed}(M_{y,Ed}) = 1/2 \cdot M_{y,Ed} / a$

Acting moment in end plate: $M_{Ed,\,STP} = \pm N_{x,\,Ed} \cdot (a_l + t_f / 2)$ [kNmm]

Resistance moment end plate: $W_{pl} = t^2 \cdot b_{ef} / 4$ [mm³]

b_{ef}	= b_2 - 2 • f
t	= thickness of the end plate
f	= ⌀-through-hole; for M16: ⌀ 18 mm, for M22: ⌀ 24 mm
a_l	= separation to centre of threaded rod
t_f	= thick flange
b_2	= beam width or width of end plate; the smaller value is relevant.

Verification: $M_{Ed,\,STP} = \pm N_{x,Ed} \cdot (a_l + t_f/2)$ [kNmm] ≤ $M_{Rd,\,STP} = W_{pl} \cdot f_{y,k} / 1.1$ [kNmm]

i End Plate

- The minimum thickness of the on site end plate is to be verified by the structural engineer.
- The maximum free length is:
  T type S-N-D16, T type S-V-D16 40 mm
  T type S-N-D22, T type S-V-D22 55 mm
- The end plate is to be so reinforced that the spacing of a threaded rod to the nearest reinforcement is not larger than the spacing to the nearest threaded rod.
- A certain minimum end plate thickness depending on the diameter of the threaded rods of the Schöck Isokorb® is necessary for environments containing chloride.
- The end plate is to be implemented with a nominal hole tolerance of 2 mm.

Implementation planning

Implementation planning

- To avoid installation errors it is recommended, besides the type designation of the selected modules, their colour code is also to be entered in the implementation plans:
  Schöck Isokorb® T type S-N: white
  Schöck Isokorb® T type S-V: blue
- The tightening torque of the nuts are also to be entered in the implementation plan; the following tightening torques apply:
  T type S-N-D16, T type S-V-D16 (threaded rod M16 - wrench width s = 24 mm): M_r = 50 Nm
  T type S-N-D22, T type S-V-D22 (threaded rod M22 - wrench width s = 32 mm): M_r = 80 Nm
- After tightening the nuts are to be peened over.
- The 4 Teflon sheets installed for each type S-V in use add approximately 4 mm. In particular with low balcony loading and with small centre-to-centre distance between type S-N and type S-V, these additional 4 mm in the compression zone have an impact relevant to the camber of the steel beams connected with Schöck Isokorb®. Should shims be necessary for on-site levelling in the tension zone, this would be taken into account with the construction planning.

Renovation/retrofitting

The Schöck Isokorb® T type S-N, T type S-V modules can be employed in existing buildings both in renovation and in retrofitting of steel, in situ concrete and precast balconies.
Depending on the connection possibilities in the existing building, supported or cantilevered steel constructions and reinforced concrete balconies can be realised.

Free cantilevered and reinforced concrete constructions

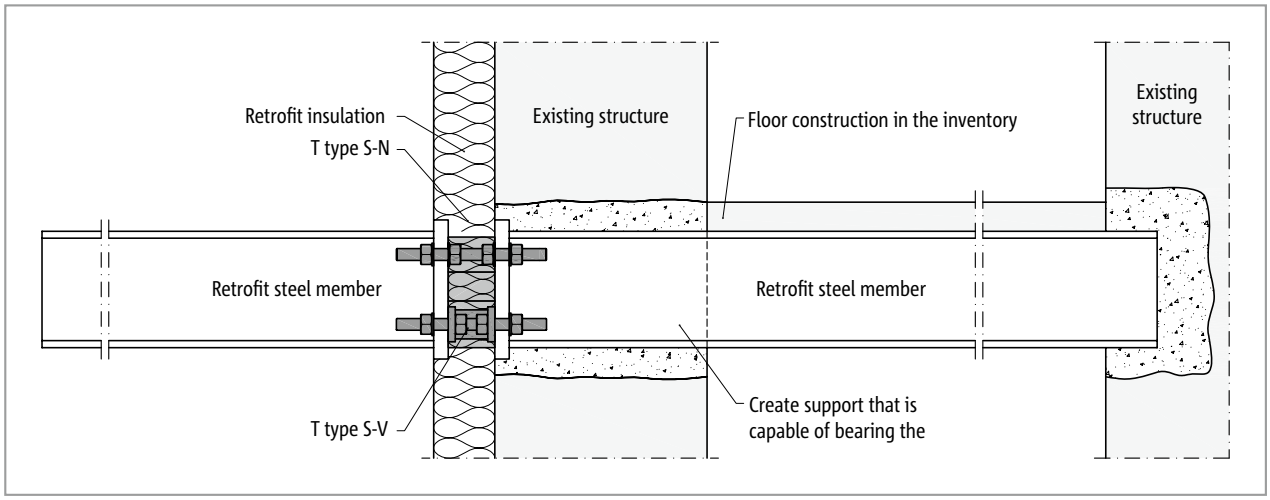


Fig. 118: Schöck Isokorb® T type S-N and T type S-V: Retrofitted cantilevered steel balcony, connected to retrofitted steel beam

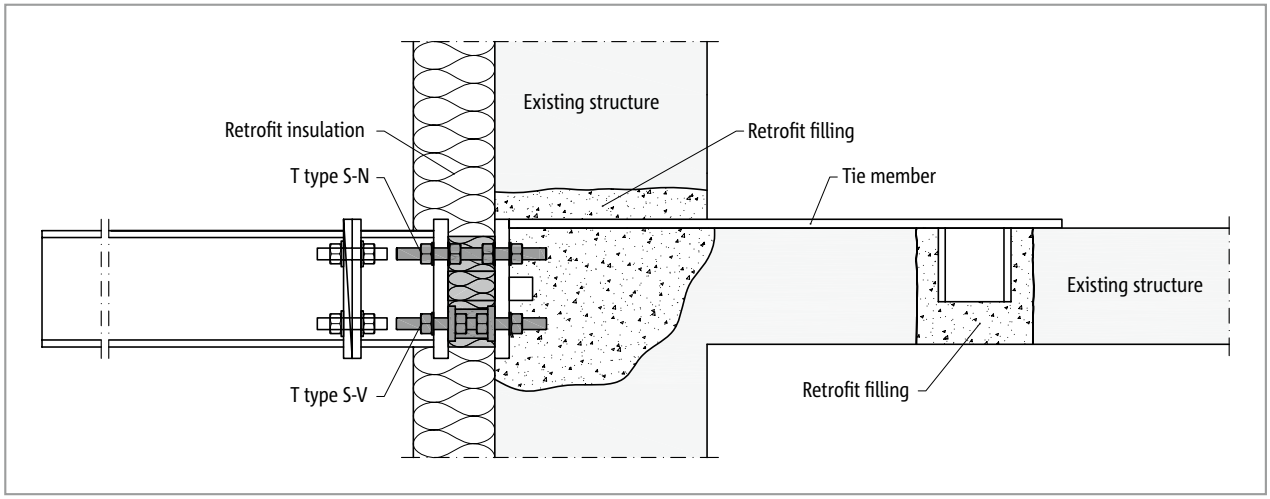


Fig. 119: Schöck Isokorb® T type S-N and T type S-V: Retrofitted cantilevered steel balcony with adapter, with support bracket connected to existing reinforced concrete slab

Renovation/retrofitting

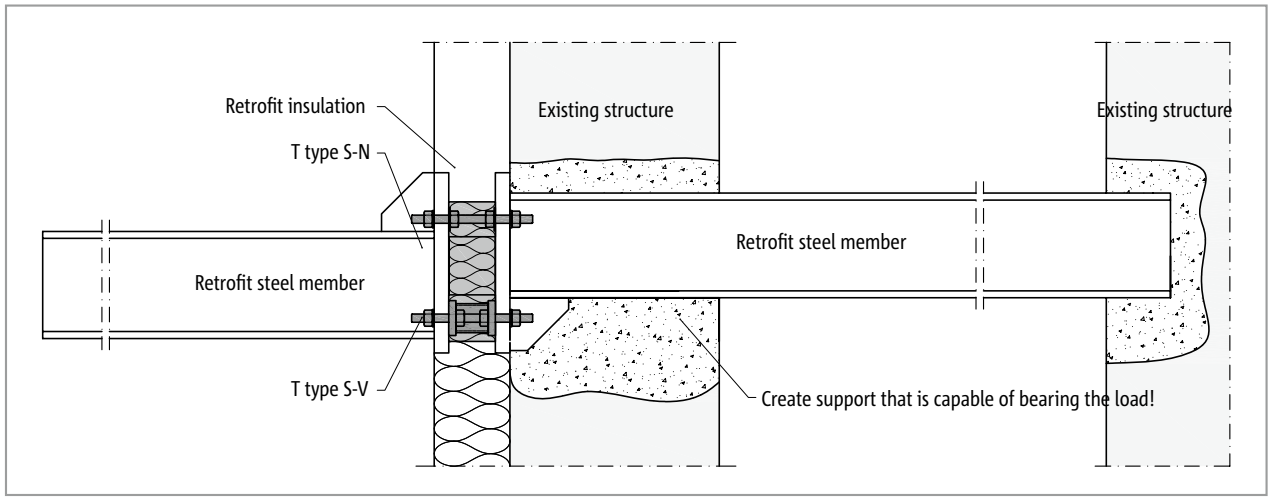


Fig. 120: Schöck Isokorb® T type S-N and T type S-V: Retrofitted cantilevered steel balcony connected with height offset retrofitted steel beam

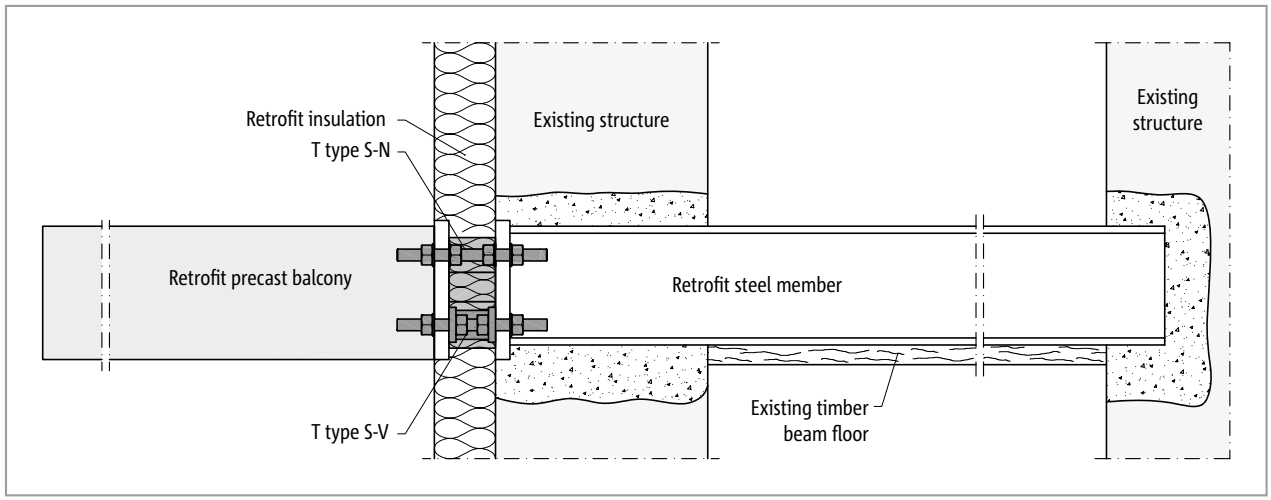


Fig. 121: Schöck Isokorb® T type S-N and T type S-V: Retrofitted cantilevered precast balcony connected to retrofitted steel beam

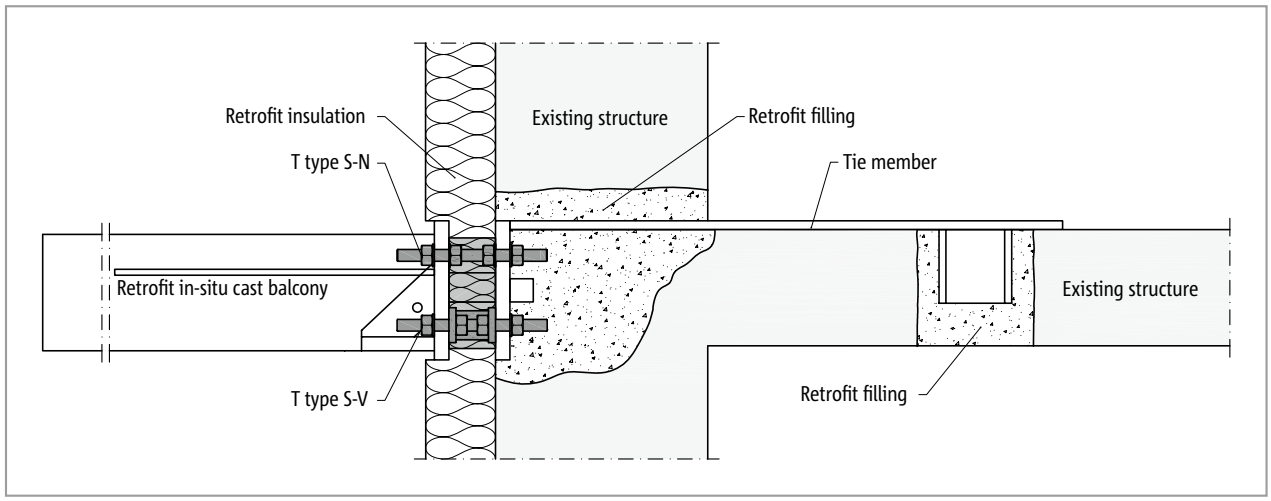


Fig. 122: Schöck Isokorb® T type S-N and T type S-V: Retrofitted cantilevered in situ concrete balcony, with support connected to existing reinforced concrete slab

Renovation/retrofitting | Atmosphere containing chloride

Supported steel and reinforced concrete constructions

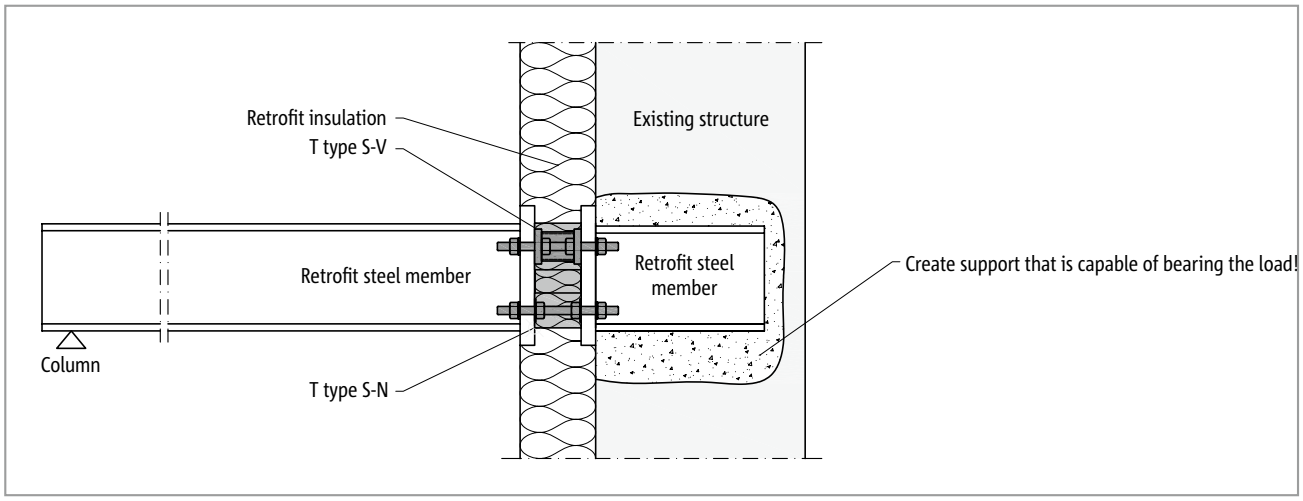


Fig. 123: Schöck Isokorb® T type S-N and T type S-V: Retrofitted supported steel balcony connected to retrofitted wall support

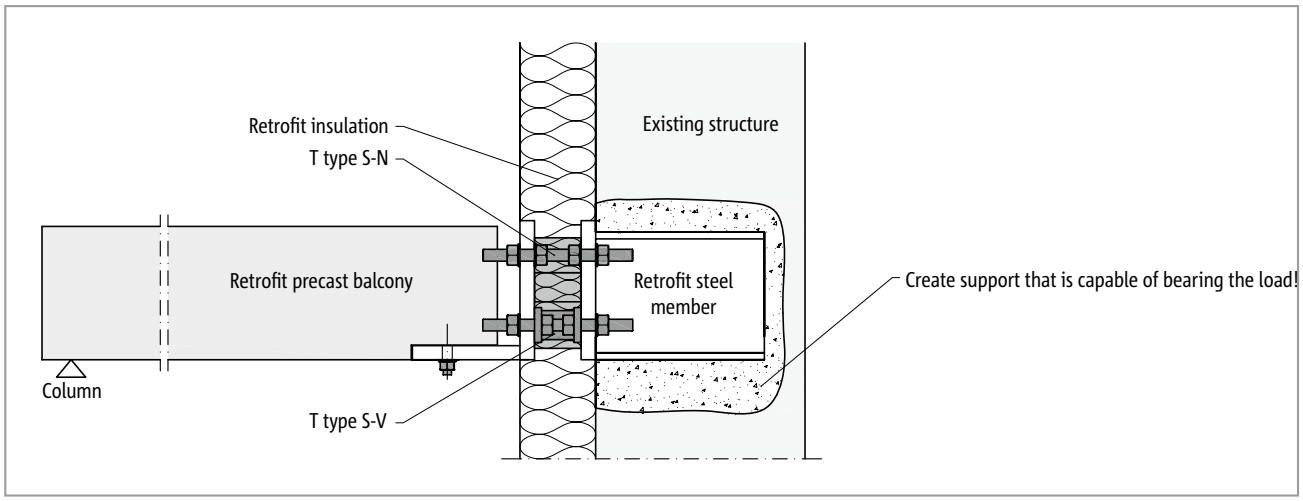


Fig. 124: Schöck Isokorb® T type S-N and T type S-V: Retrofitted supported precast balcony connected to retrofitted wall support

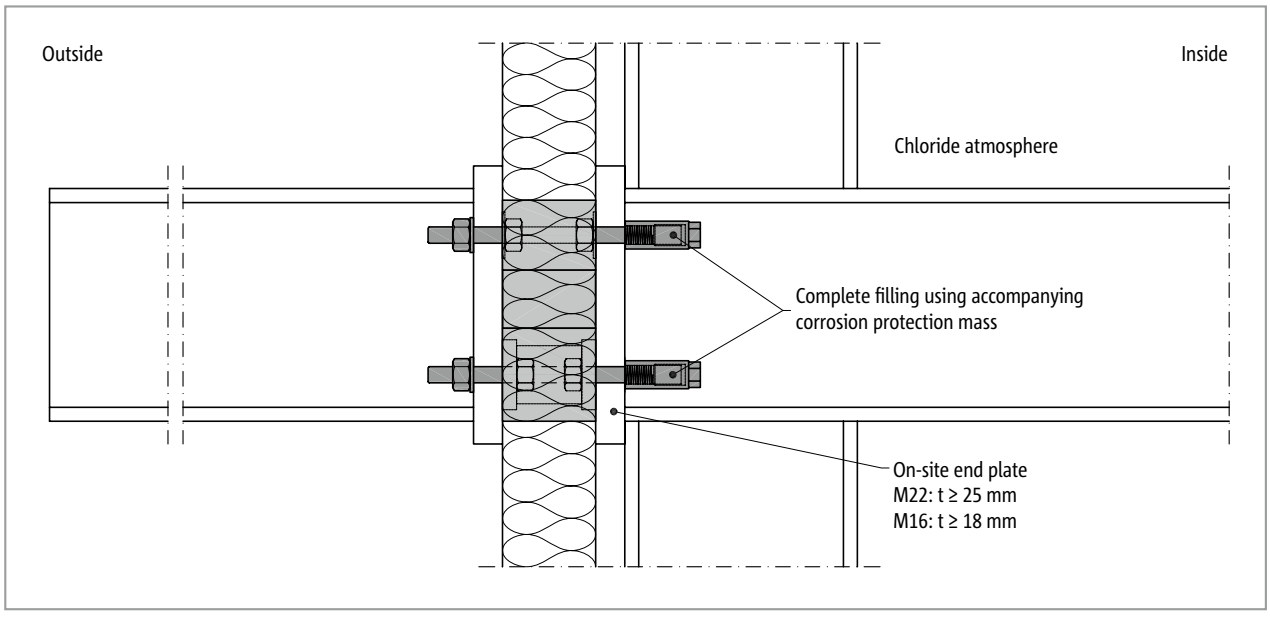


Fig. 125: Schöck Isokorb® T type S with cap nuts: Cantilevered steel structure; internal atmosphere containing chloride

Atmosphere containing chloride | Installation instructions

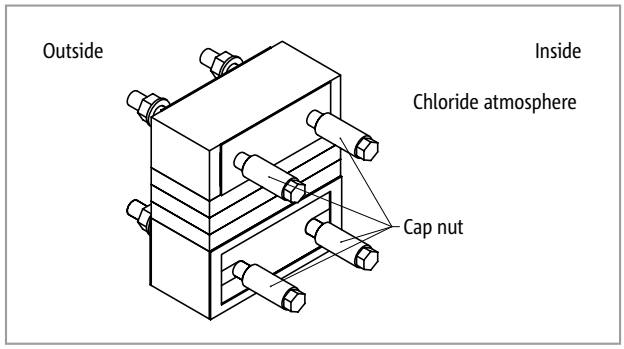


Fig. 126: Schöck Isokorb® T type S with cap nuts: Isometric; internal atmosphere containing chloride

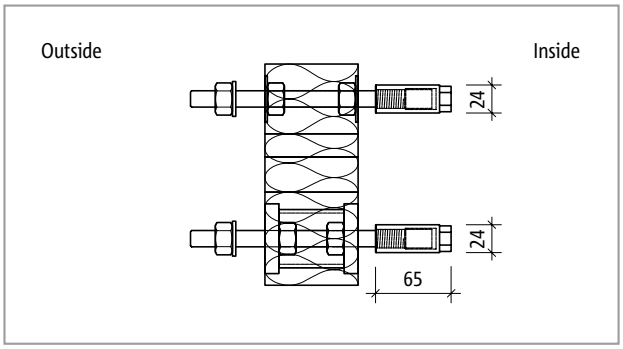


Fig. 127: Schöck Isokorb® type S with cap nuts: Product section

For the protection against atmospheres containing chloride, e.g. in indoor swimming pools, special protective caps must be mounted on the building side, on the threaded rods of the Schöck Isokorb® T type S. The Schöck Isokorb® T type S-N and T type S-V modules are installed according to static requirements and must be bolted together with the cap nuts on the inside.

Atmosphere containing chloride

- The protective caps must be completely filled with anti-corrosion sealant.
- Tighten protective caps hand tight without planned preloading, this corresponds with the following tightening torques
  T type S-N-D16, T type S-V-D16 (threaded rod M16): M_r = 50 Nm
  T type S-N-D22, T type S-V-D22 (threaded rod M22): M_r = 80 Nm
- The minimum thickness of the on site end plate is to be verified by the structural engineer.
- A certain minimum end plate thickness depending on the diameter of the threaded rods of the Schöck Isokorb® is necessary for environments containing chloride.

Installation instructions

The current installation instruction can be found online under:
www.schoeck.com/view/2741

☑ Check list

- ☐ Is the Schöck Isokorb® element to be used under primarily static loads?
- ☐ Have the member forces on the Isokorb connection been determined at the design level?
- ☐ Has the additional deformation due to the Schöck Isokorb® been taken into account?
- ☐ Are temperature deformations assigned directly to the Schöck Isokorb® and with this is the maximum expansion joint spacing taken into account?
- ☐ Have the fire protection requirements for the overall load-bearing structure been clarified? Are the on-site measures included in the construction drawings?
- ☐ Are the Schöck Isokorb® T type S-N and T type S-V planned with protective caps in environments containing chloride (e.g. outside air near the sea, indoor swimming pools)?
- ☐ Are the names of the Schöck Isokorb® T type S-N and T type S-V entered in the implementation plan and in the working drawing?
- ☐ Is the colour code of the Schöck Isokorb® modules entered in the implementation plan and the construction drawing?
- ☐ Are the tightening torques for the screwed connections noted in the construction drawings?

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