Schöck Isokorb® T type SK

Schöck Isokorb® T type SK
Suitable for cantilevered steel balconies and canopies. It transfers negative moments and positive shear forces. Schöck Isokorb® T types SK-MM2 and SK-MM1 transfer positive or negative moments and shear forces.

Element arrangement | Installation cross sections

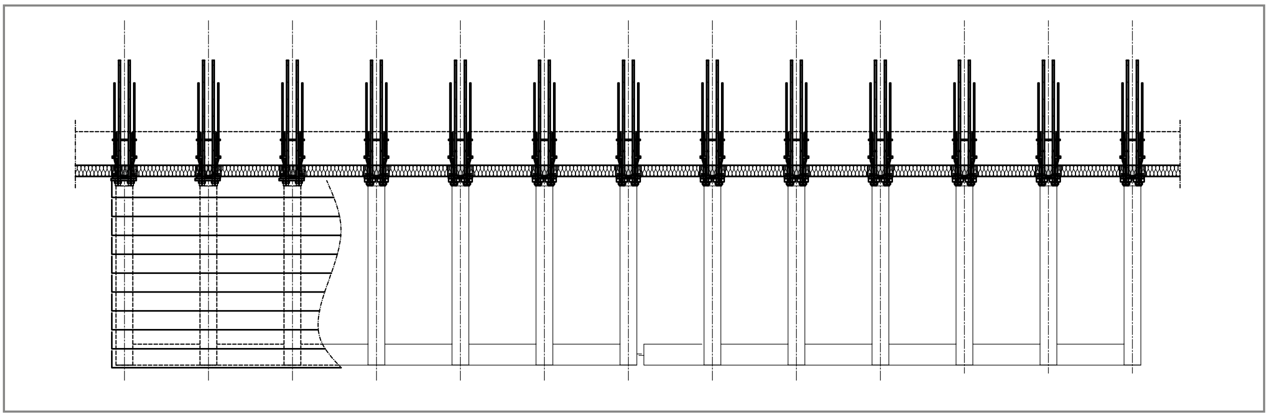


Fig. 12: Schöck Isokorb® T type SK: Balcony freely cantilevered

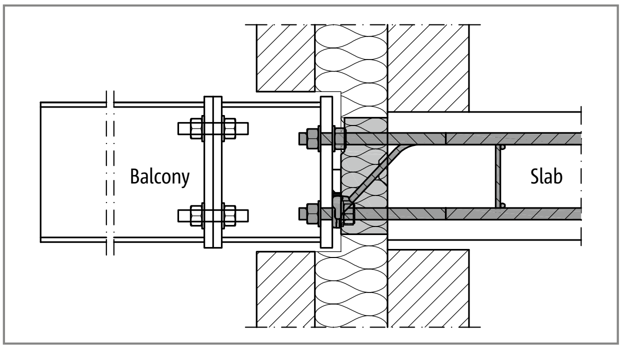


Fig. 13: Schöck Isokorb® T type SK: Insulating element inside the core insulation; on-site adapter between the Isokorb® and the balcony to enable flexible installation.

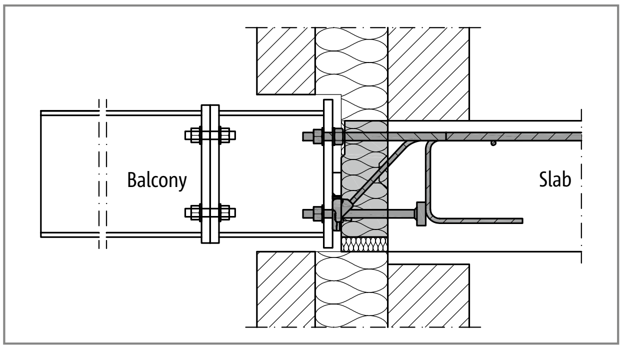


Fig. 14: Schöck Isokorb® T type SK: Connecting the cantilever fin with on-site adapter; Isokorb® insulating element with optional additional insulating strip

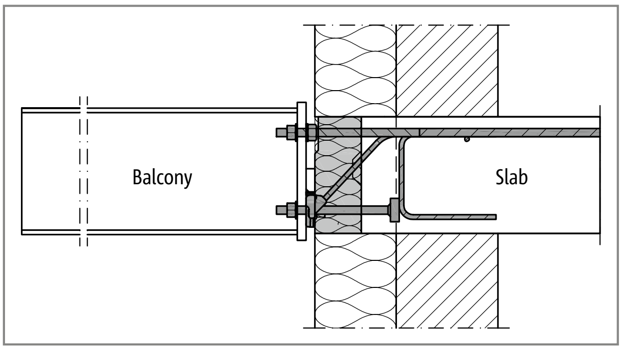


Fig. 15: Schöck Isokorb® T type SK: With the aid of the floor extension, the insulating element ends flush with the wall insulation; the spacing at the edges must be taken into consideration.

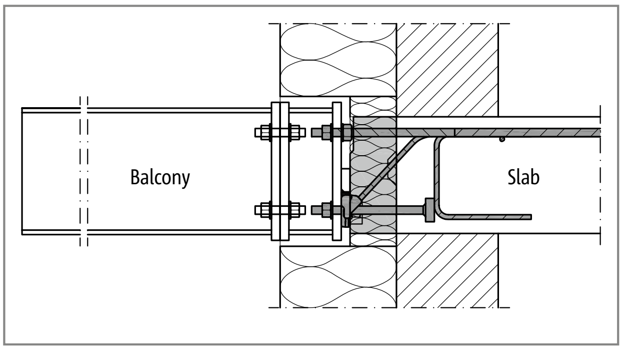


Fig. 16: Schöck Isokorb® T type SK: Connection of the steel member to an adapter that equalises the thickness of the outer insulation

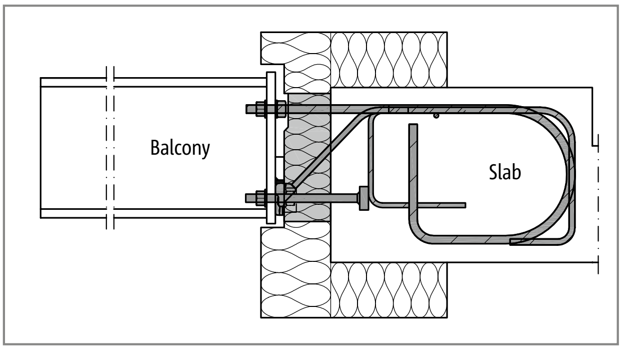


Fig. 17: Schöck Isokorb® T type SK-M1: Special design based on the lateral force load ranges M1

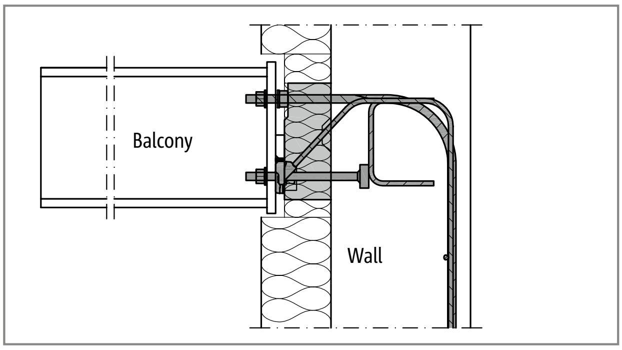


Fig. 18: Schöck Isokorb® T type SK-M1: Special construction for wall connection on the basis of the shear force bearing levels M1 for wall thicknesses from 200 mm

T
type SK

Steel – reinforced concrete

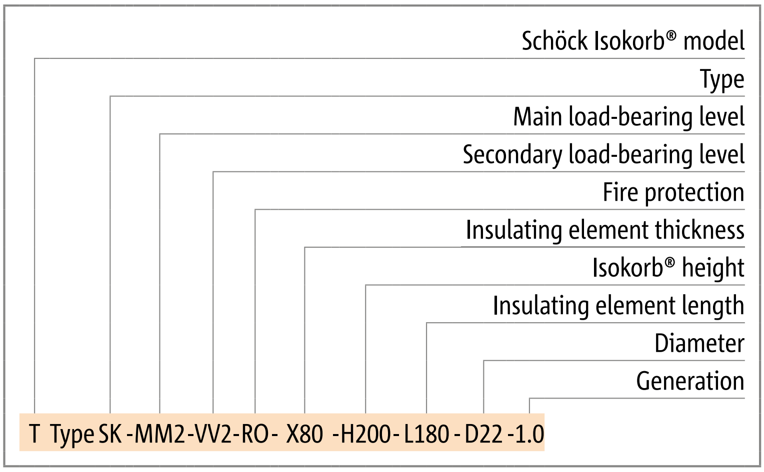
Product selection | Type designations | Special designs

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:
  R0
- 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).

Design force direction | Design

Direction of forces

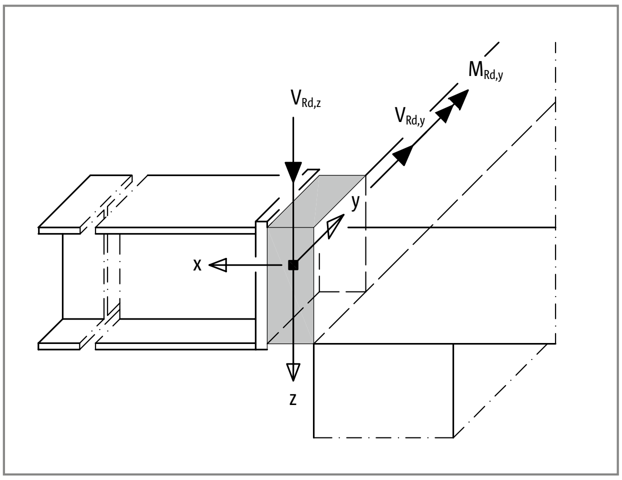


Fig. 19: Schöck Isokorb® T type SK: Direction of internal forces and moments

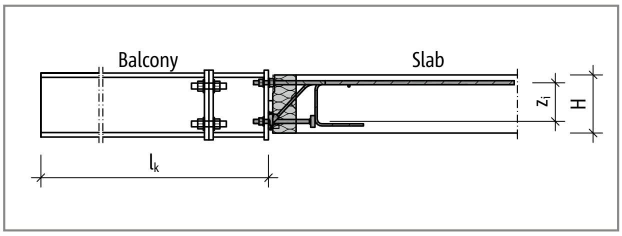


Fig. 20: Schöck Isokorb® T type SK: Structural system

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

Design with positive shear force and negative moment

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 ≥ C25/30
		$M_{Rd,y}$ [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
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

i 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.

T type SK

Steel – reinforced concrete

Design

Design with positive shear force and negative moment

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	-37,7	-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 ≥ C25/30	
		$M_{Rd,y}$ [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
Isokorb® length [mm]	180	180
Tension bars	2 ⌀ 20	2 ⌀ 20
Shear force bars	2 ⌀ 10	2 ⌀ 12
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.

T type SK

Steel – reinforced concrete

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

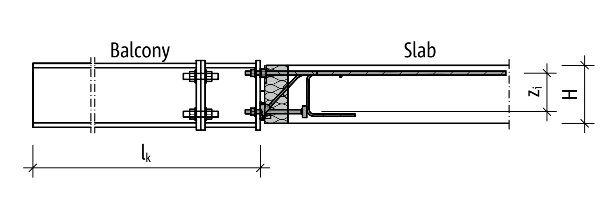


Fig. 21: Schöck Isokorb® T type SK: Structural system

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

Spring values

The spring values of the Schöck Isokorb® must be considered for verifications in 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 springs when		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.

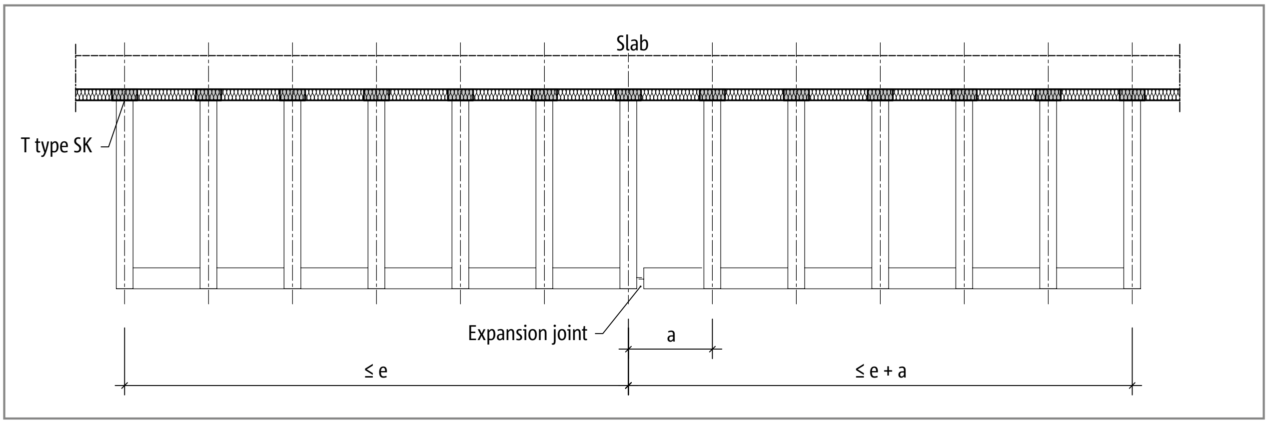


Fig. 22: Schöck Isokorb® T type SK: Maximum expansion joint spacing e

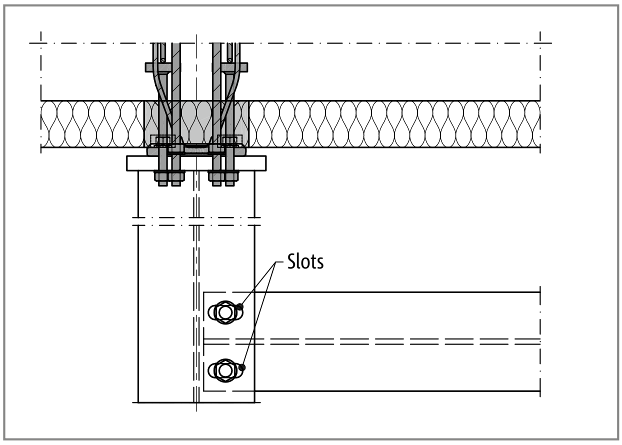


Fig. 23: Schöck Isokorb® T type SK: Expansion joint detail to ensure movement during temperature expansion

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 distances with regard to the inner reinforced concrete structural elements are maintained:

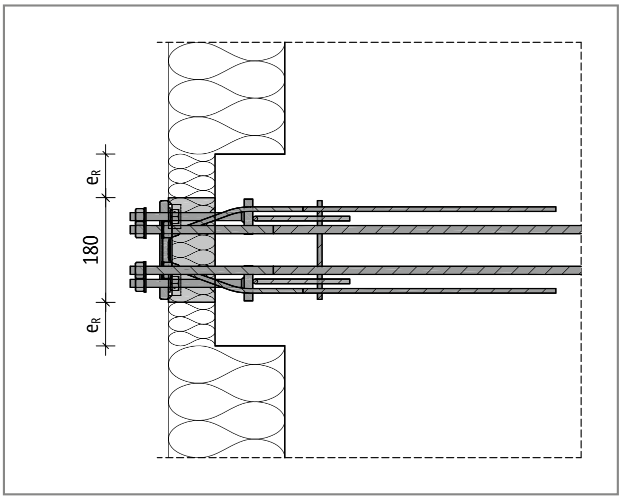


Fig. 24: Schöck Isokorb® T type SK: Edge distances

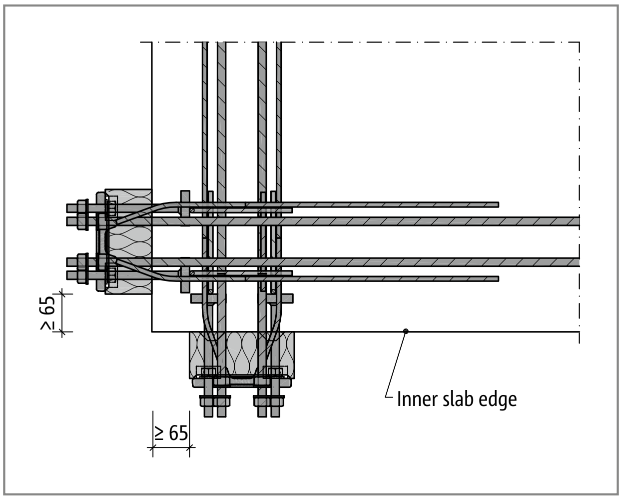


Fig. 25: Schöck Isokorb® T type SK: Edge distances at the outer corner with Isokorbs® arranged vertically to each other

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	$30 \leq e_R < 74$	14,2	20,4	14,2	21.3	28,5
200 - 210	$30 \leq e_R < 81$					
220 - 230	$30 \leq e_R < 88$					
240 - 280	$30 \leq e_R < 95$					
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 maintained:

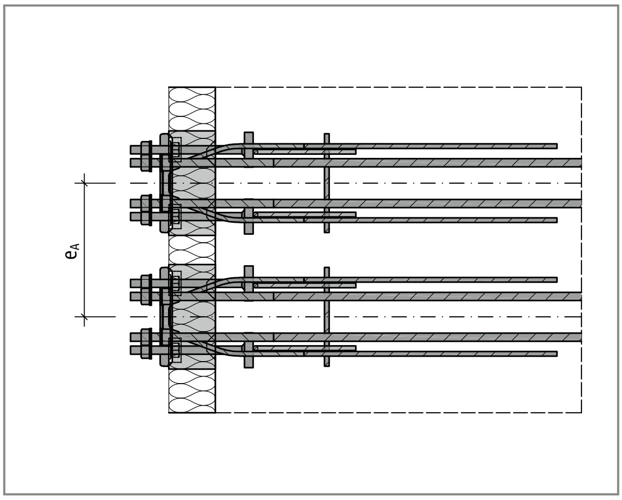


Fig. 26: Schöck Isokorb® T type SK: Centre-to-centre distance

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

Schöck Isokorb®		T type SK
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	$e_A \geq 255$	
240 - 280	$e_A \geq 270$	

i Centre-to-centre distances

- The load-bearing capacity of the Schöck Isokorb® T type SK is reduced if the axis spacing e_A is less than the minimum specification.
- Please contact the design support department at Schöck for the reduced design values. Contact see page 3.

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.

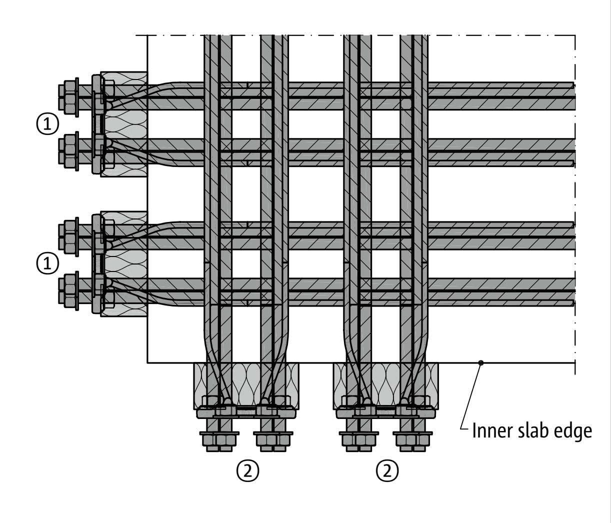


Fig. 27: Schöck Isokorb® T type SK: Outer corner

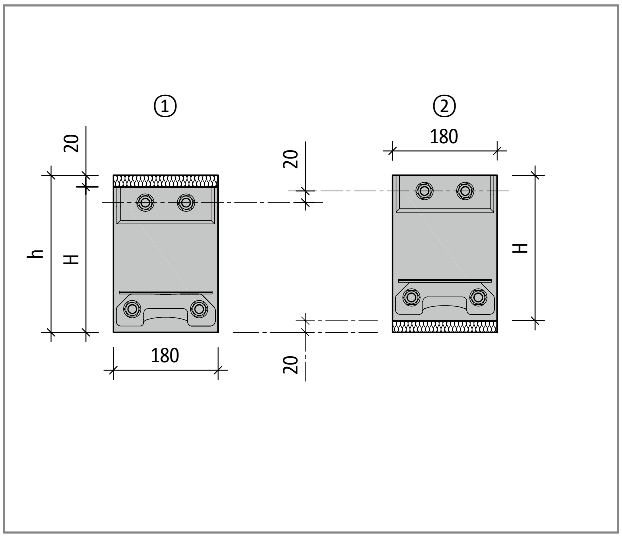


Fig. 28: Schöck Isokorb® T type SK: Layout with offset heights

Outer corner

- The corner solution using T type SK requires a slab thickness of h ≥ 200 mm!
- When building a corner balcony, care must be taken to ensure that the 20 mm height difference in the corner is also reflected in 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

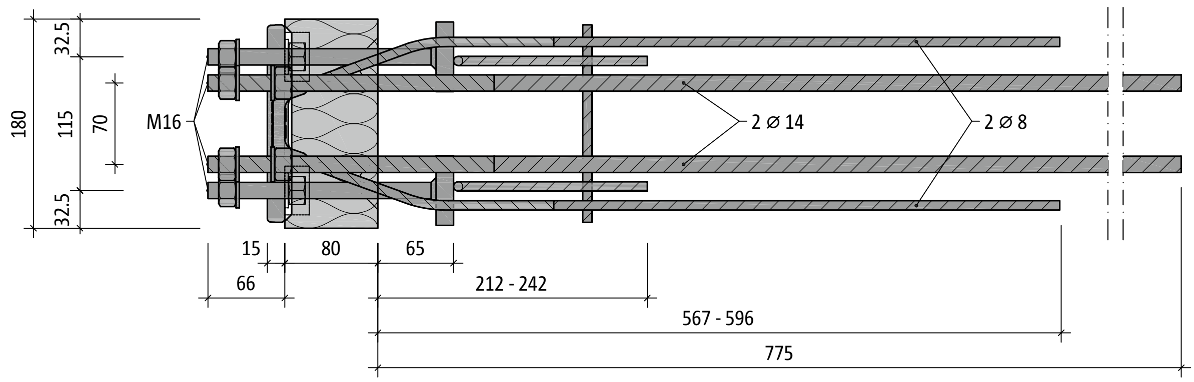


Fig. 29: Schöck Isokorb® T type SK-M1-V1: Plan view

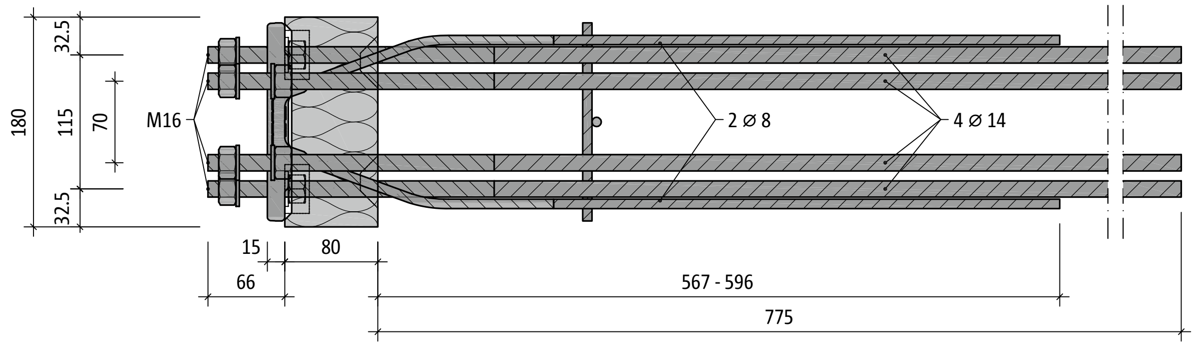


Fig. 30: Schöck Isokorb® T type SK-MM1-VV1: Plan view

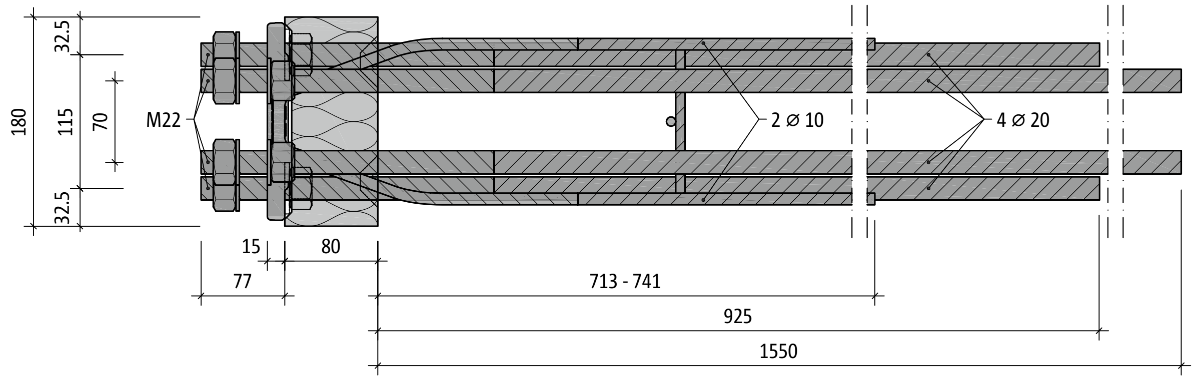


Fig. 31: Schöck Isokorb® T type SK-MM2-VV1: Plan view

Product information

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

T type SK

Steel – reinforced concrete

Product description

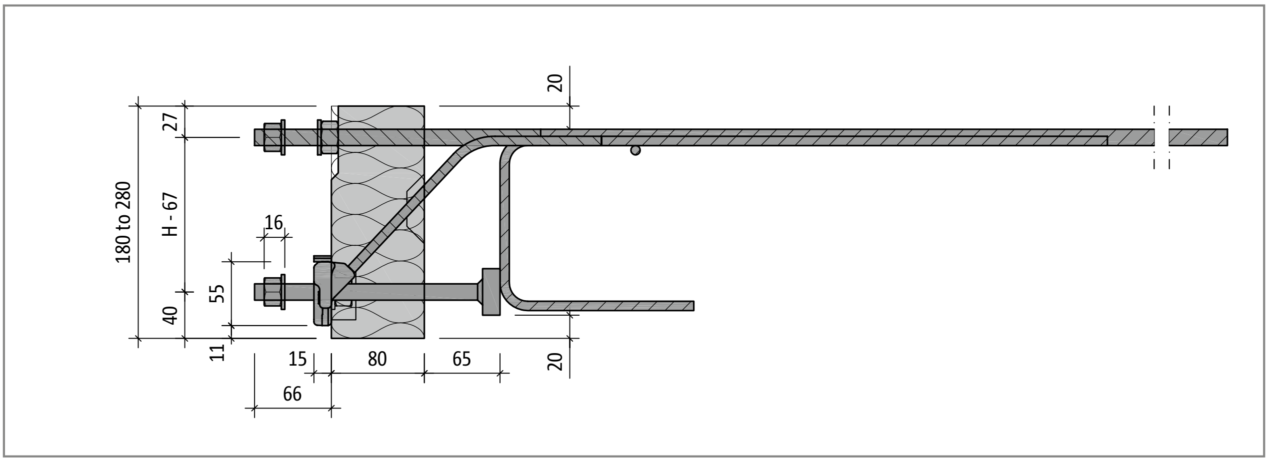


Fig. 32: Schöck Isokorb® T type SK-M1-V1: Cross section of the product

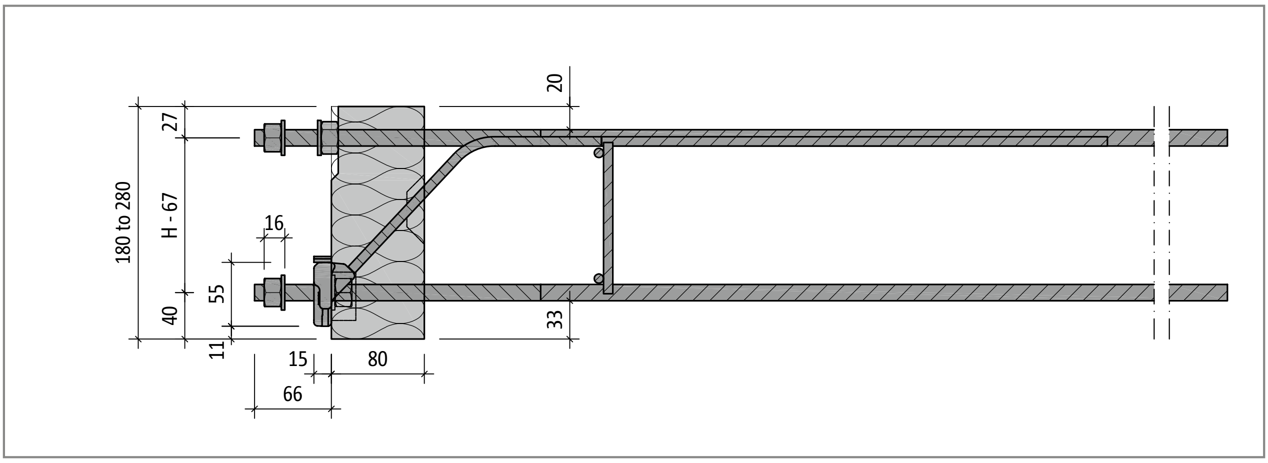


Fig. 33: Schöck Isokorb® T type SK-MM1-VV1: Cross section of the product

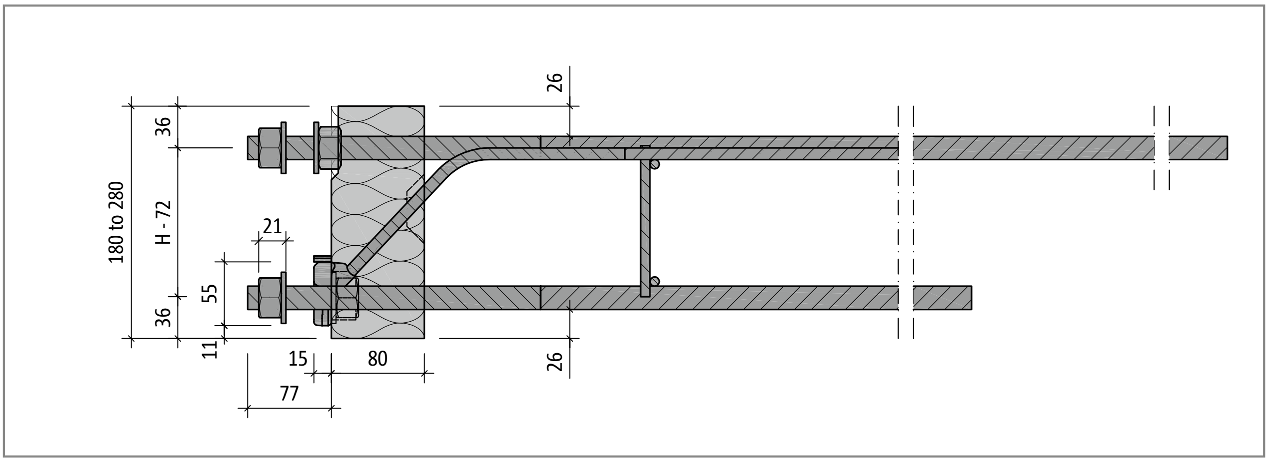


Fig. 34: Schöck Isokorb® T type SK-MM2-VV1: Cross section of the product

Product information

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

T
type SK

Steel – reinforced concrete

On-site reinforcement - In-situ concrete construction

Schöck Isokorb® T type SK-M1

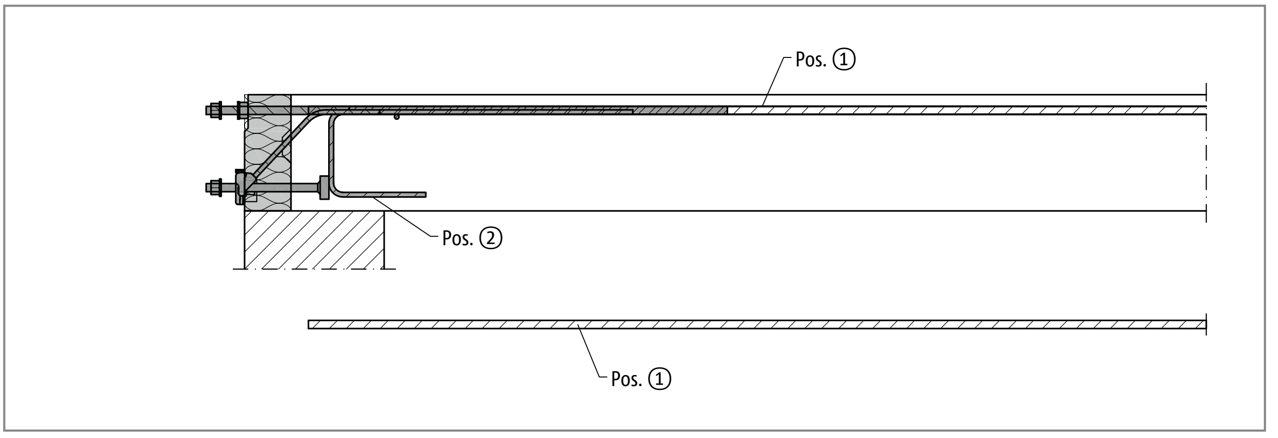


Fig. 35: Schöck Isokorb® T type SK-M1: On-site reinforcement: Cross section

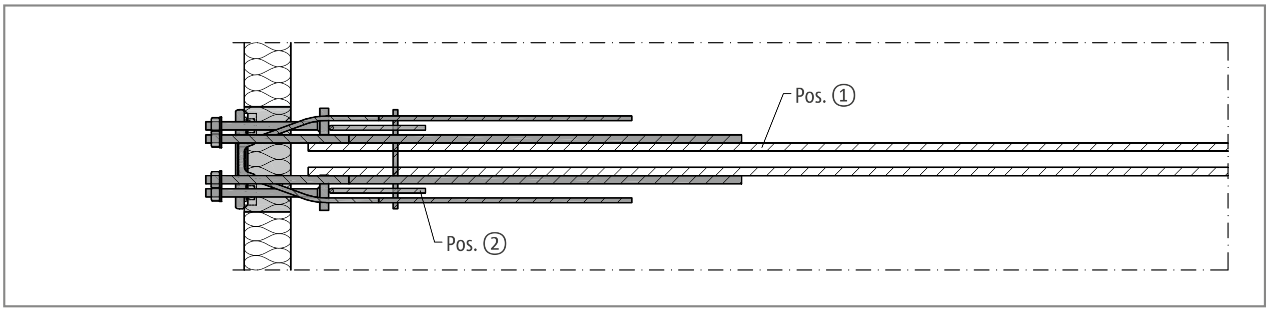


Fig. 36: Schöck Isokorb® T type SK-M1: On-site reinforcement: Plan view

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

i 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

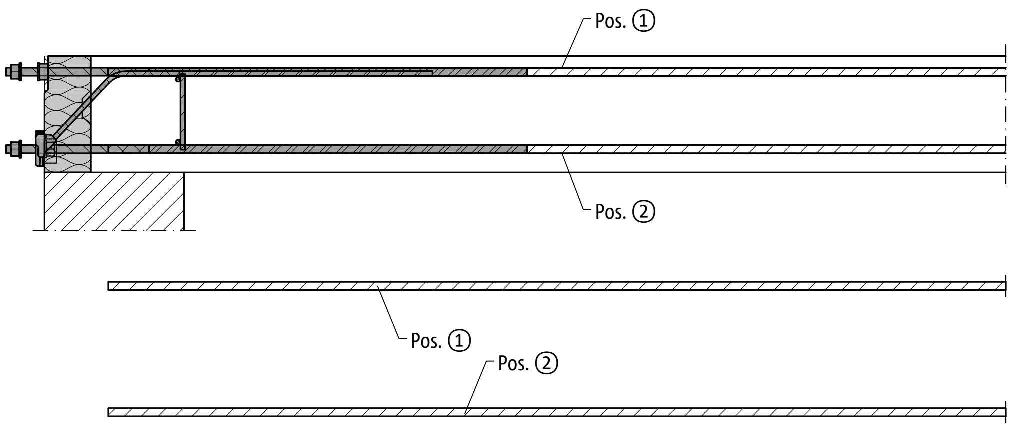


Fig. 37: Schöck Isokorb® T type SK-MM1: On-site reinforcement: Cross section

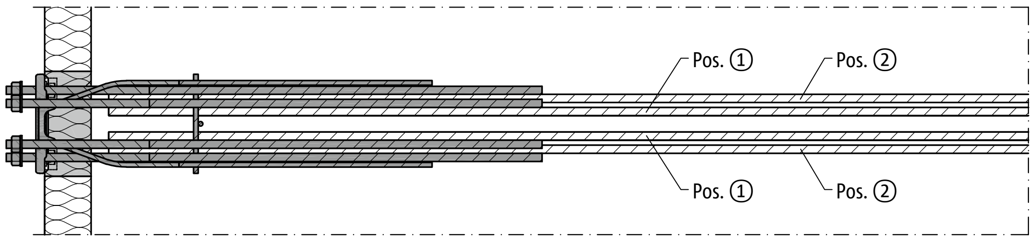


Fig. 38: Schöck Isokorb® T type SK-MM1: On-site reinforcement: Plan view

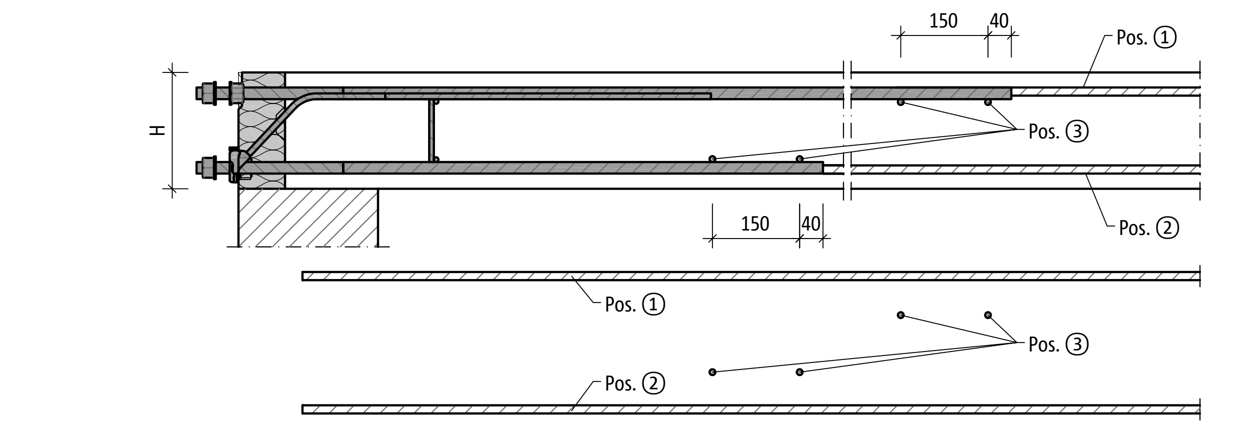
Schöck Isokorb® T type SK			MM1
On-site reinforcement	**Type of bearing**	**Height H [mm]**	**Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure**
Pos. 1 Lapping reinforcement			
Pos. 1	direct/indirect	180 - 280	2 • H16
Pos. 2 Overlapping reinforcement			
Pos. 2	direct/indirect	180 - 280	necessary in the tension zone, as specified by the structural engineer

Information about on-site reinforcement

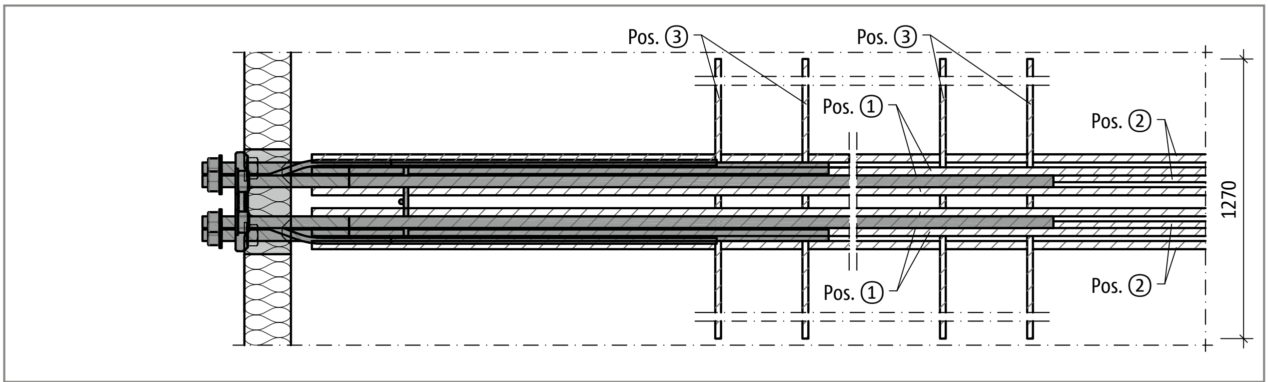
- T Type SK-MM1: In the case of exposure to uplifting loads (+M_{Ed}), as planned, an overlapping joint with the lower Isokorb® reinforcement may be necessary to cover the tensile force curve. The structural engineer must indicate whether this overlapping reinforcement is required.

On-site reinforcement - In-situ concrete construction

Schöck Isokorb® T type SK-MM2



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



40: 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**
Pos. 1 Lapping reinforcement			
Pos. 1	direct/indirect	180 - 280	4 • H16
Pos. 2 Overlapping reinforcement			
Pos. 2	direct/indirect	180 - 280	necessary in the tension zone, as specified by the structural engineer
Pos. 3 Transverse reinforcement			
Pos. 3	direct/indirect	180 - 280	4 • H10

i 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

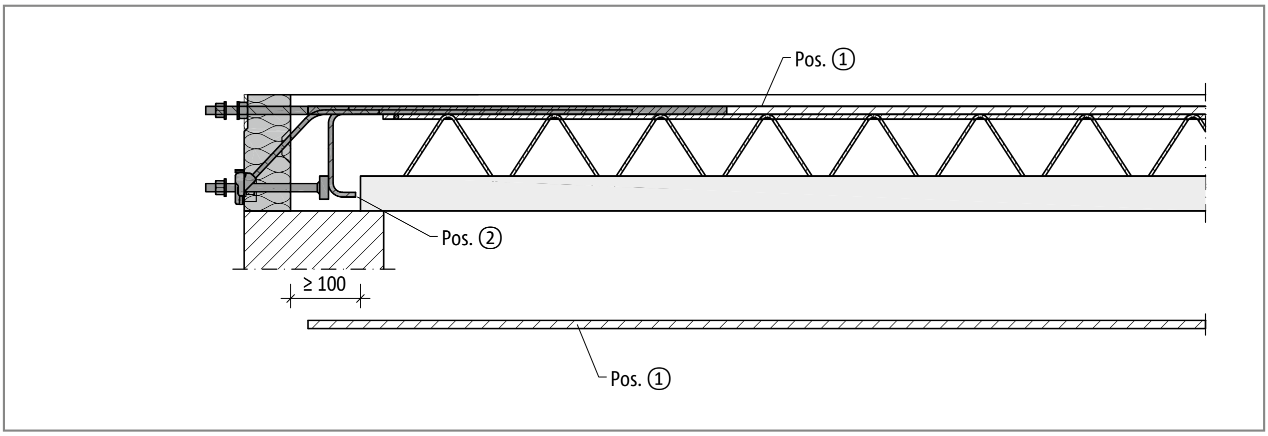


Fig. 41: Schöck Isokorb® T type SK-M1: On-site reinforcement for semi-precast construction: Cross section

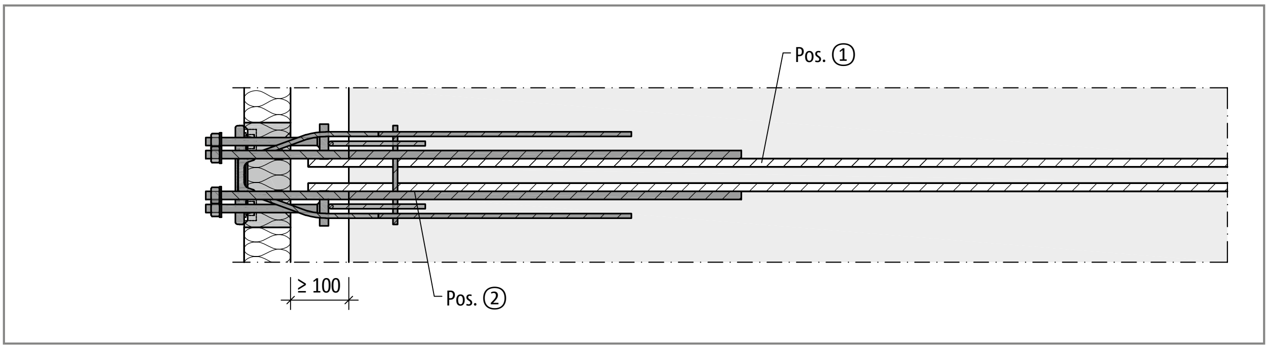


Fig. 42: Schöck Isokorb® T type SK-M1: On-site reinforcement for semi-precast construction: Plan view

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
Pos. 1 Lapping reinforcement			
Pos. 1	direct/indirect	180 - 280	2 • H16
Pos. 2 Edge and splitting tension reinforcement			
Pos. 2	direct/indirect	180 - 280	included with the product, alternative version with on-site stirrups 2 • H8

i 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.

Fixing Plate

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

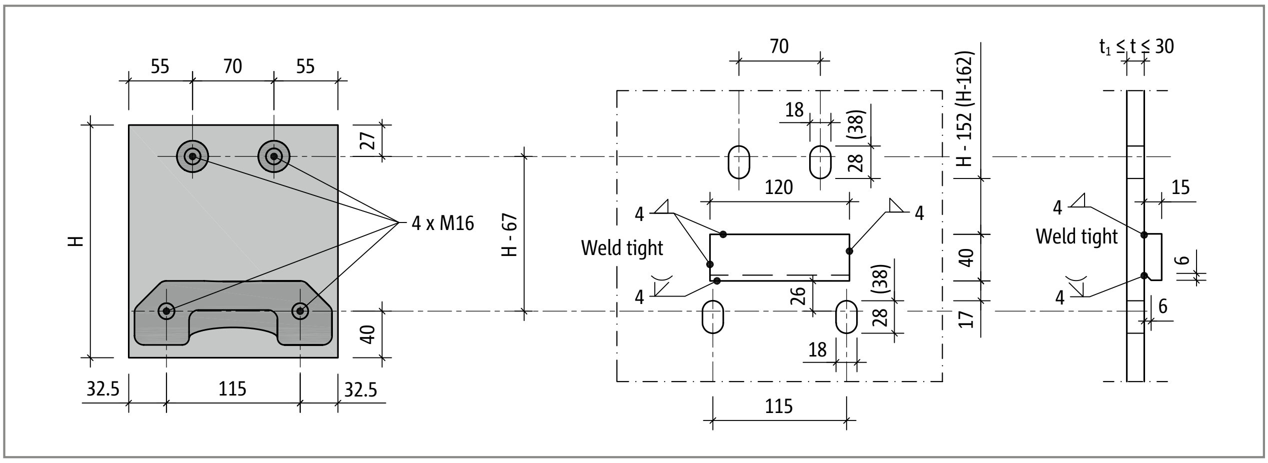


Fig. 43: Schöck Isokorb® T type SK-M1: Design of the fixing plate connection

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

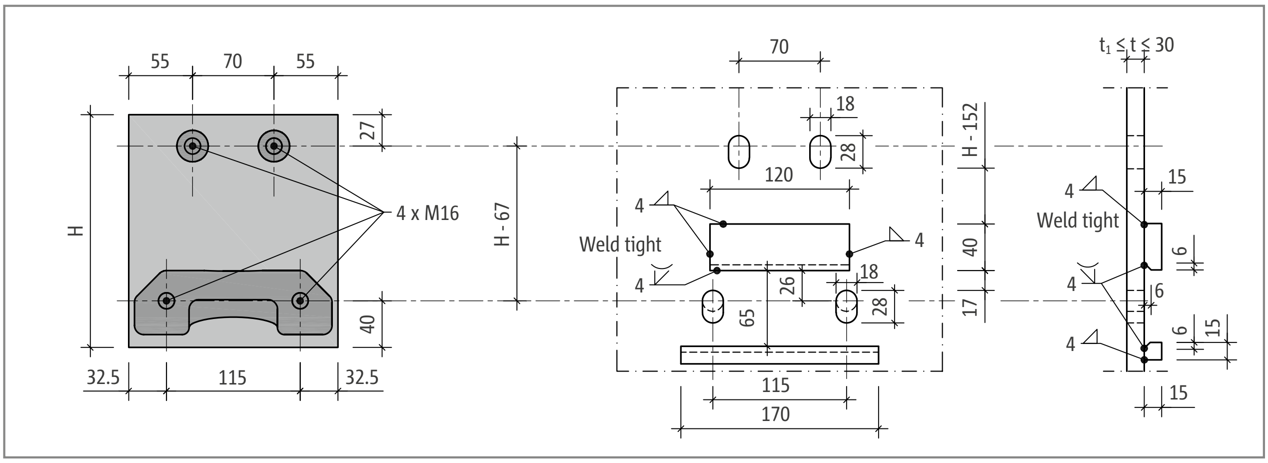


Fig. 44: Schöck Isokorb® T type SK-MM1: Design of the face plate connection; Round holes for the transfer of the negative shear force

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.

Fixing 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 $V_{Ed,y} > 0{,}342 \cdot \text{min. } V_{Ed,z}$ 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 ⌀ 16): M_r = 50 Nm
- The Schöck Isokorb® embedded in concrete are to be measured in-situ before the front slabs are produced.

Fixing Plate

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

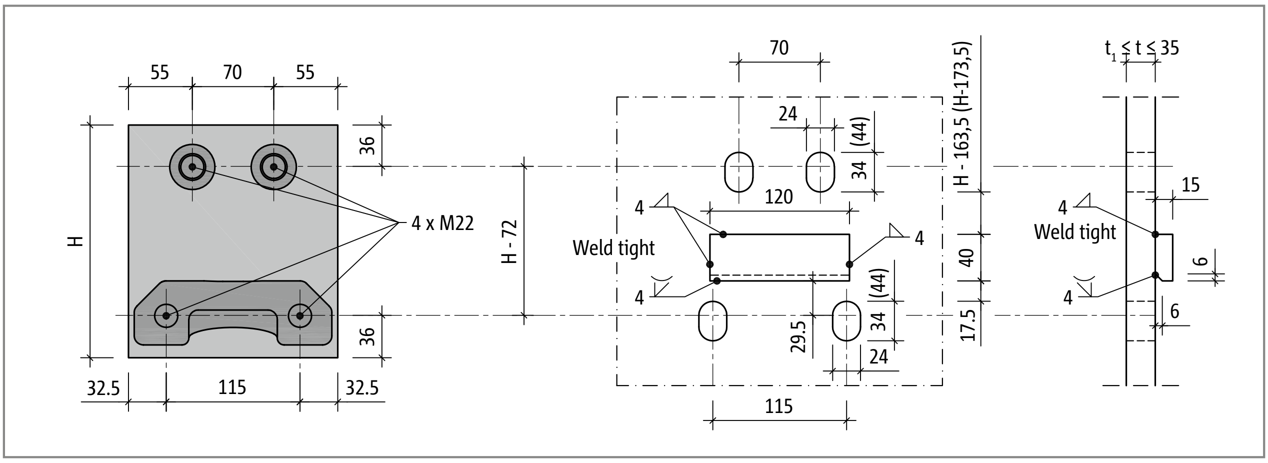


Fig. 45: Schöck Isokorb® T type SK-MM2: Design of the face plate connection

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

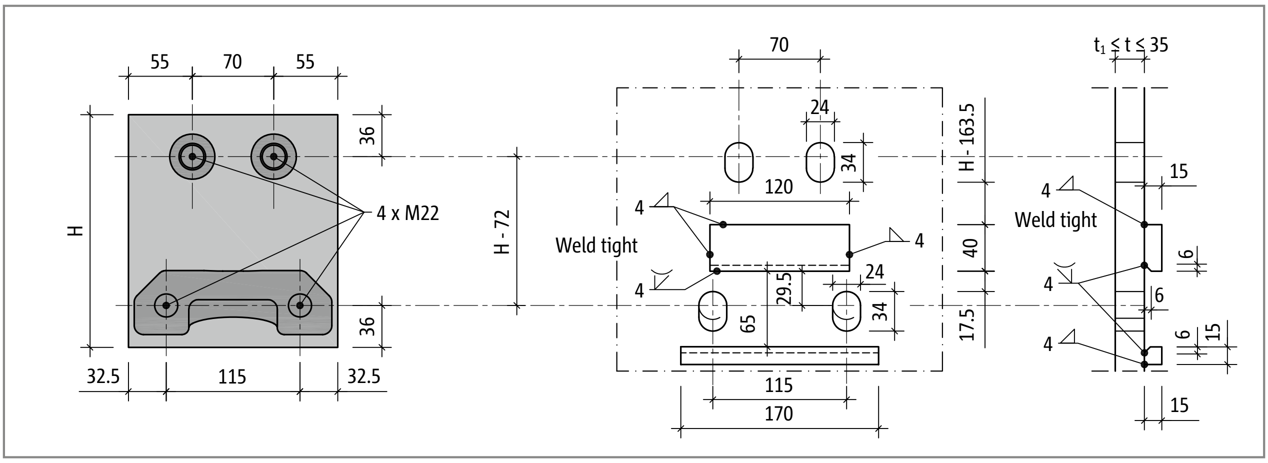


Fig. 46: Schöck Isokorb® T type SK-MM2: Design of the face plate connection; Round holes for the transfer of the negative shear force

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.

Fixing 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 $V_{Ed,y} > 0{,}342 \cdot \text{min. } V_{Ed,z}$ 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.

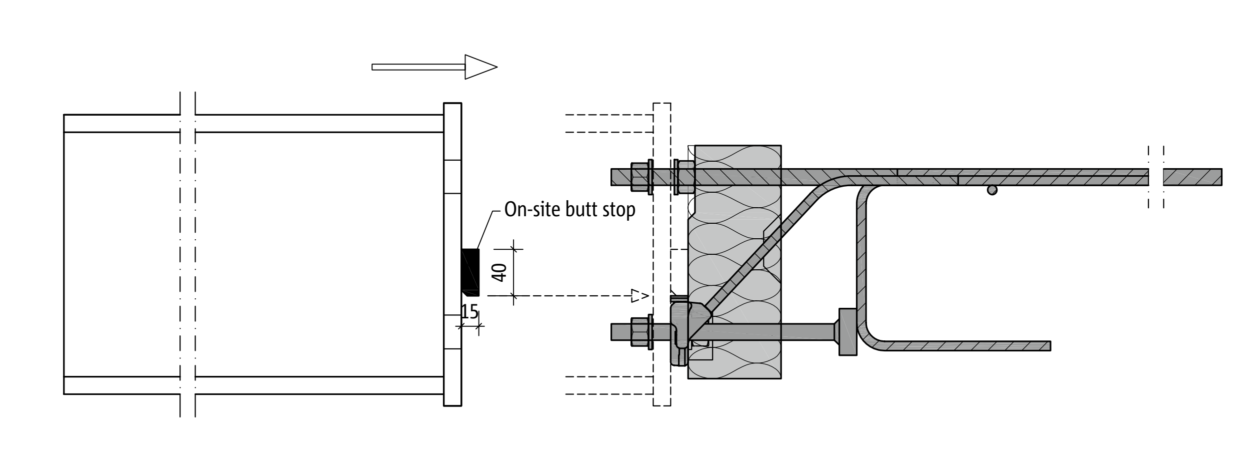


Fig. 47: Schöck Isokorb® T type SK: Mounting the steel member

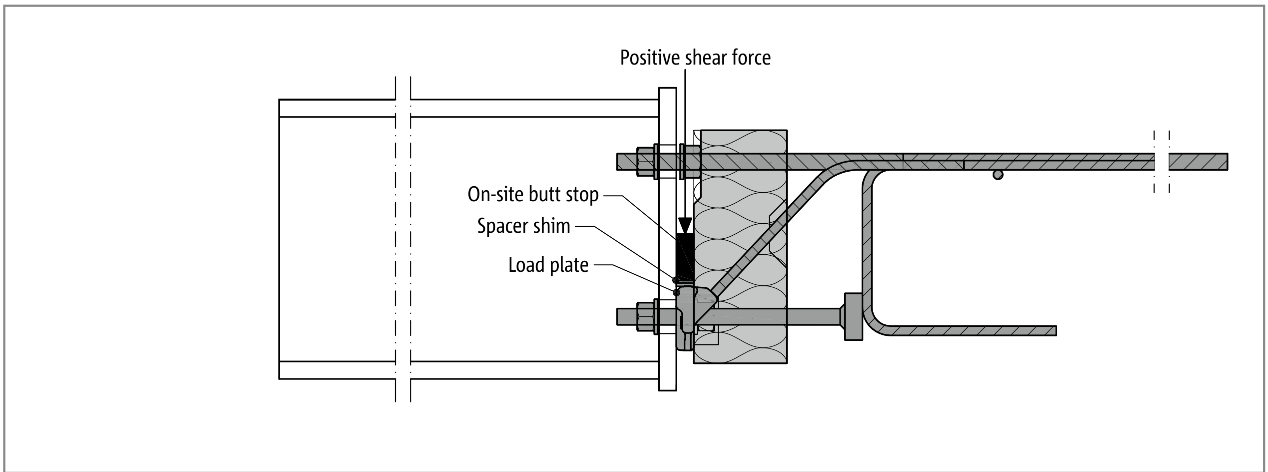


Fig. 48: Schöck Isokorb® T type SK: On-site butt stop for transferring shear forces

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

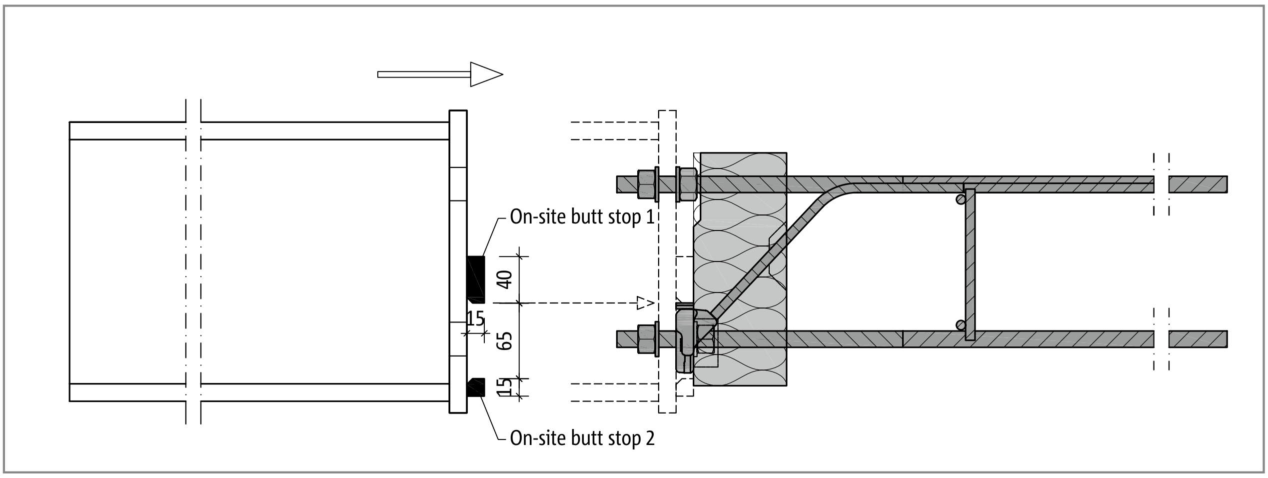


Fig. 49: Schöck Isokorb® T type SK: Mounting the steel member

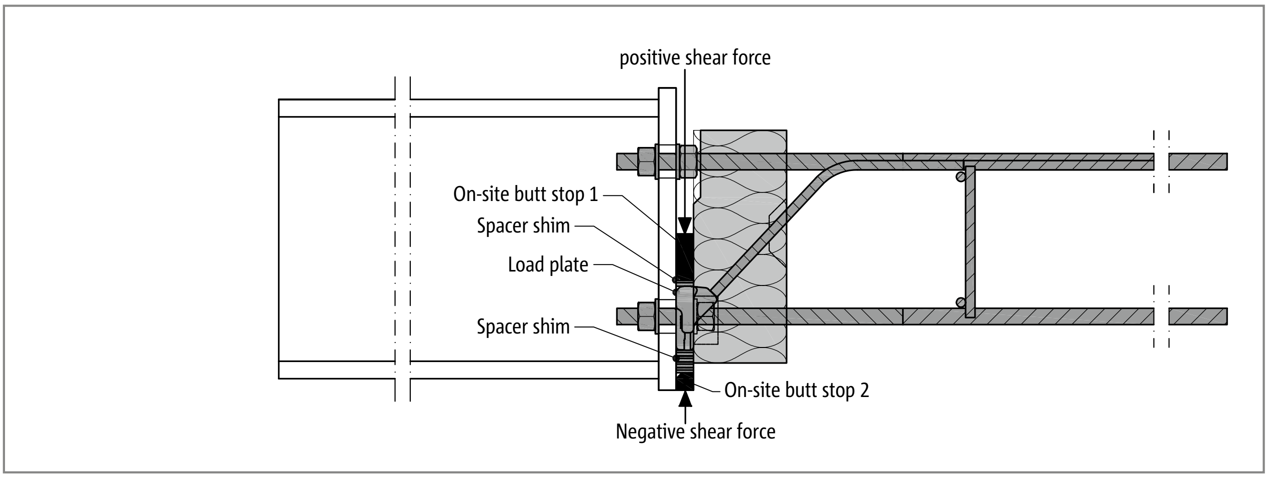


Fig. 50: Schöck Isokorb® T type SK: On-site dogs for the transfer of the shear force

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

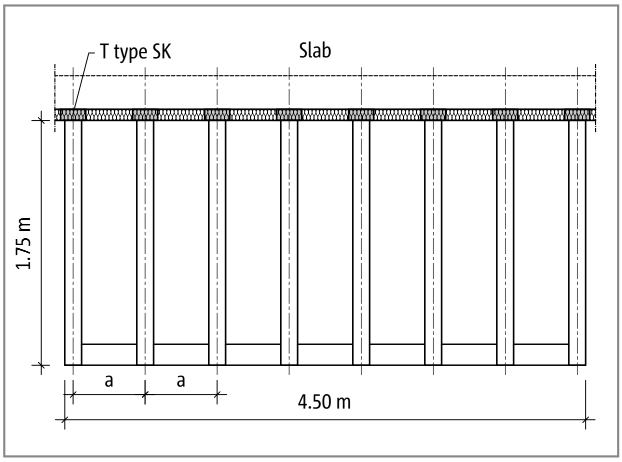


Fig. 51: Schöck Isokorb® T type SK: Plan view

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/m ^{2}
	Live load		q = 4.0 kN/m ^{2}
	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

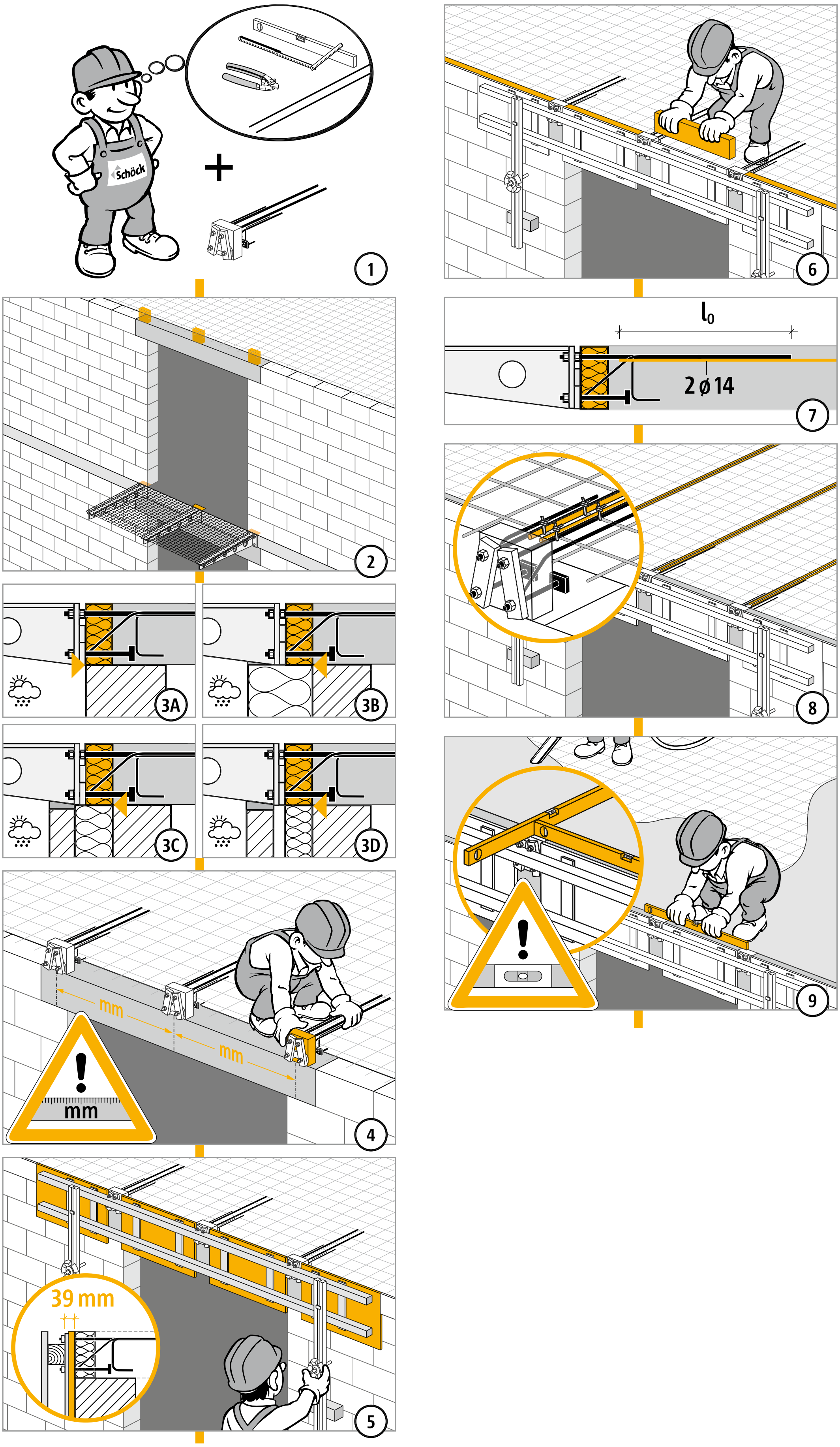
Verification in the serviceability limit state (deformation/camber)

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	

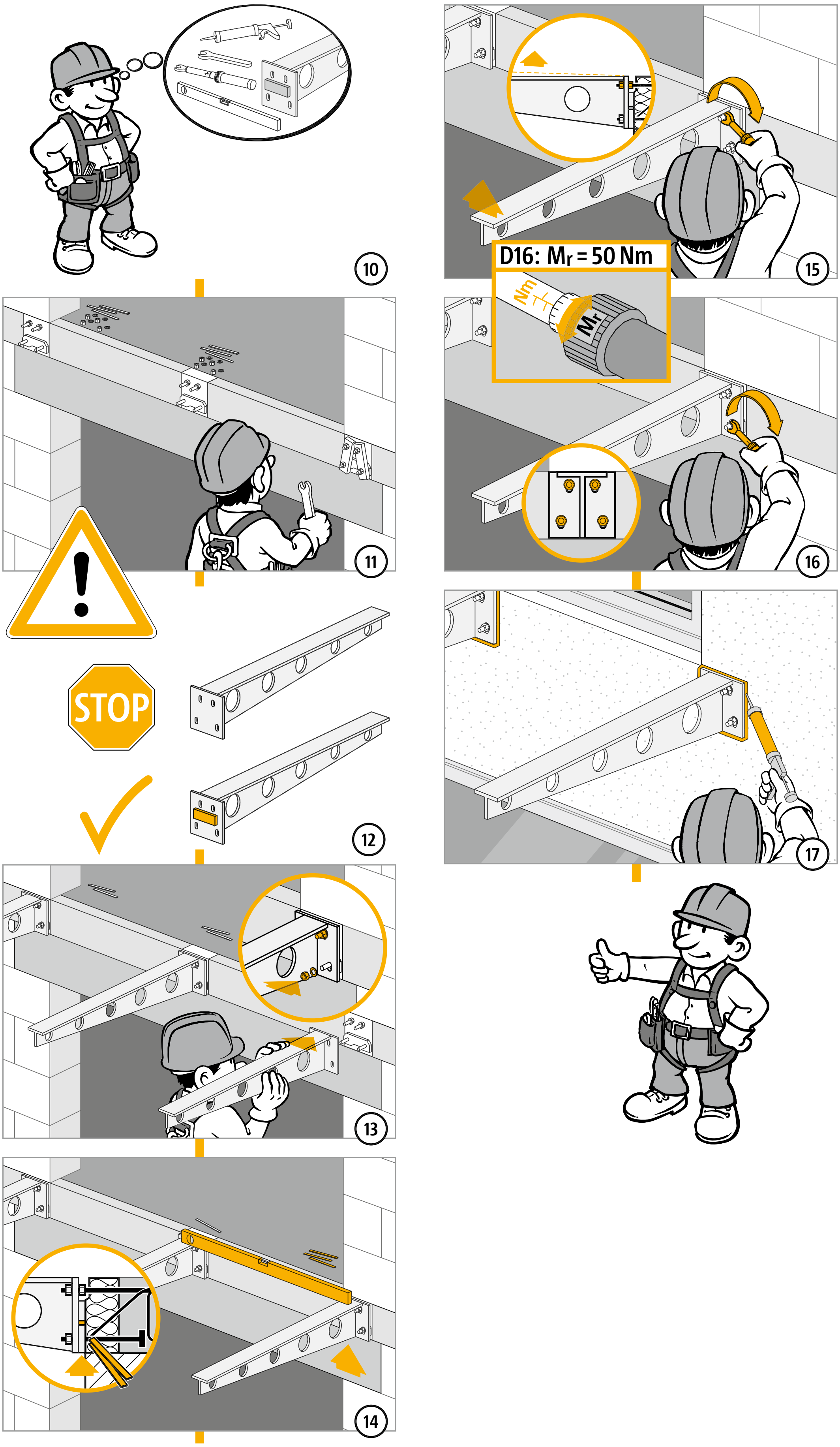
T type SK

Steel – reinforced concrete

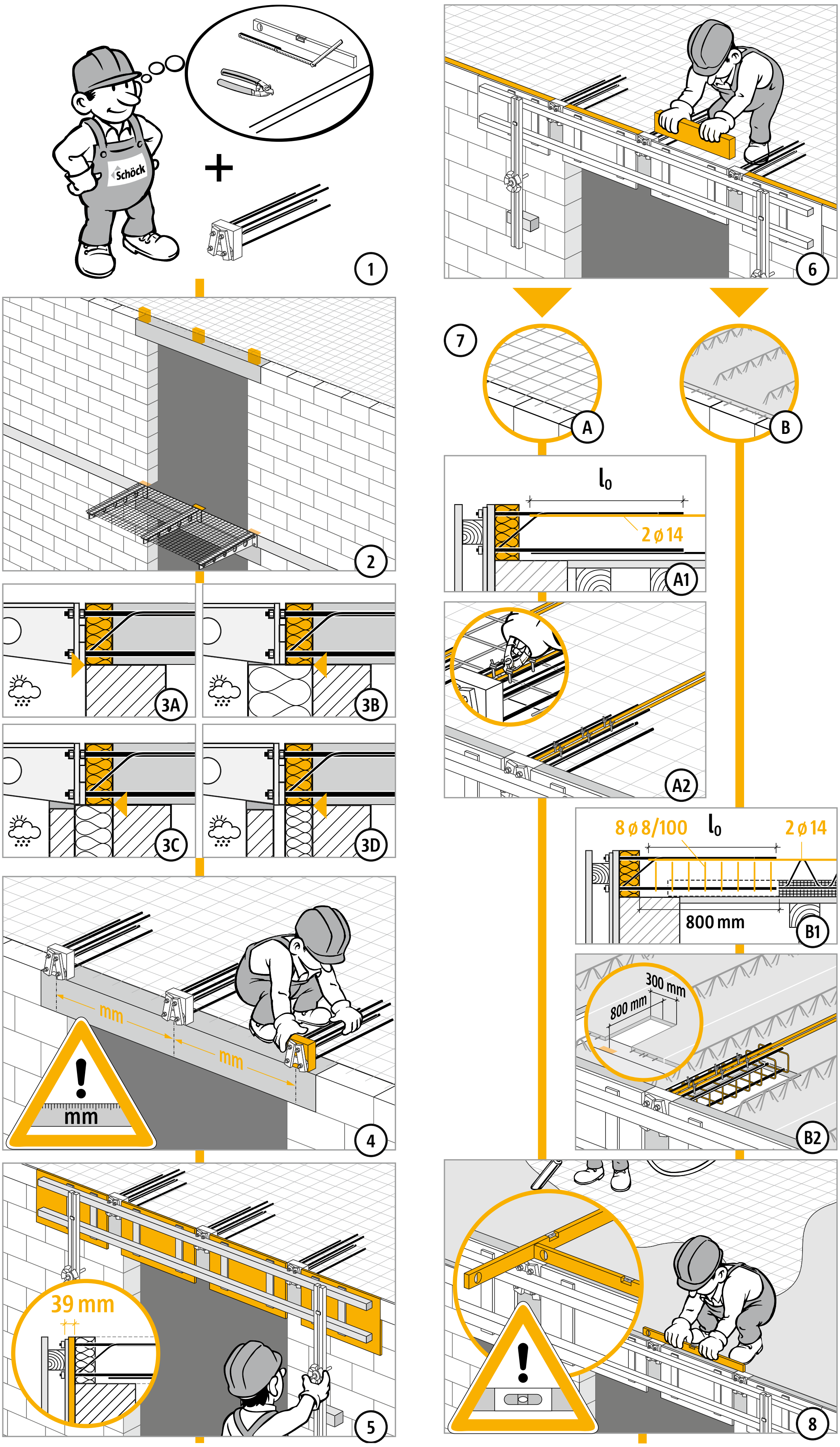
Installation instruction type SK-M1 - structural engineer



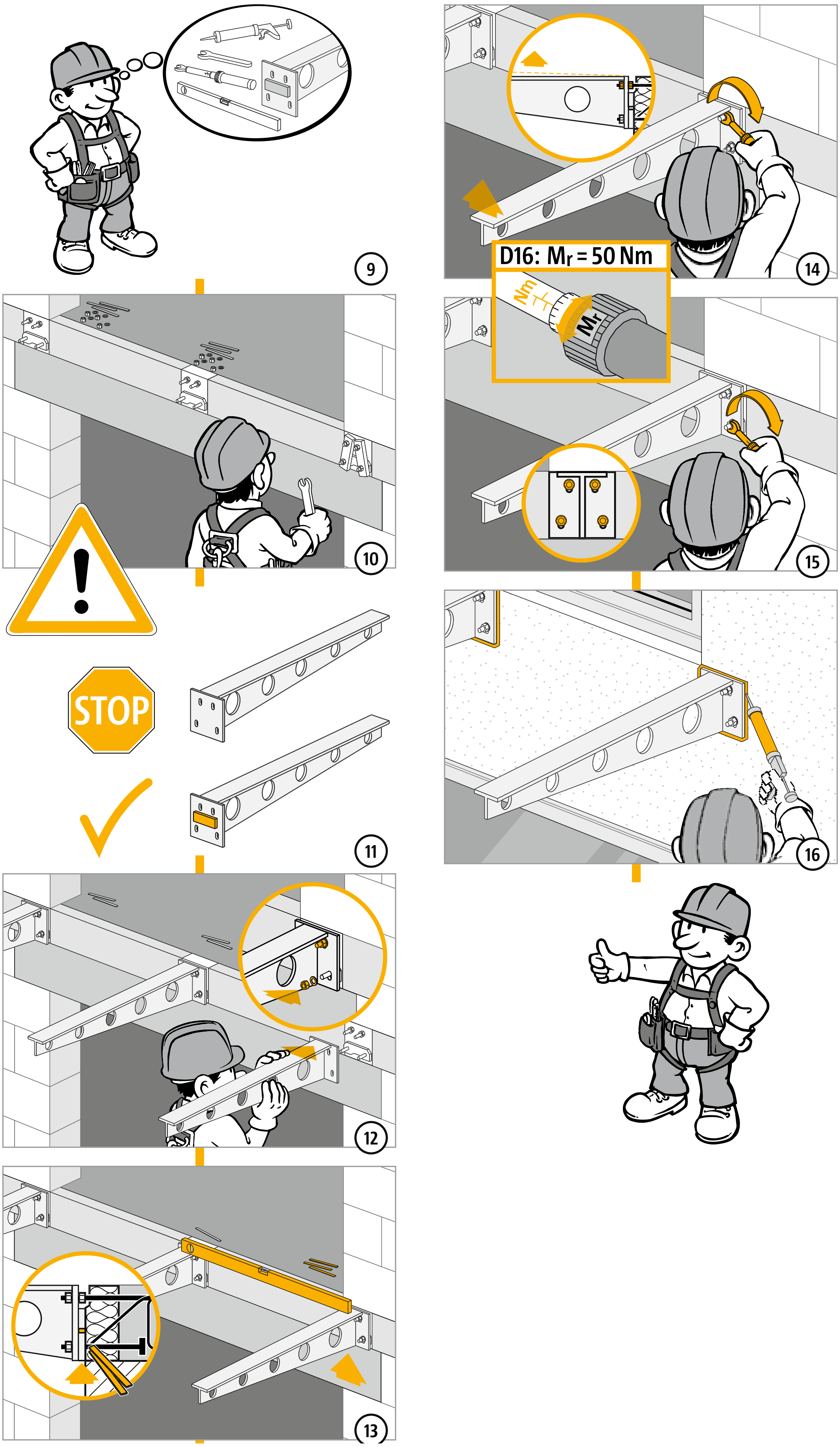
Installation instruction SK-M1 - steel constructor



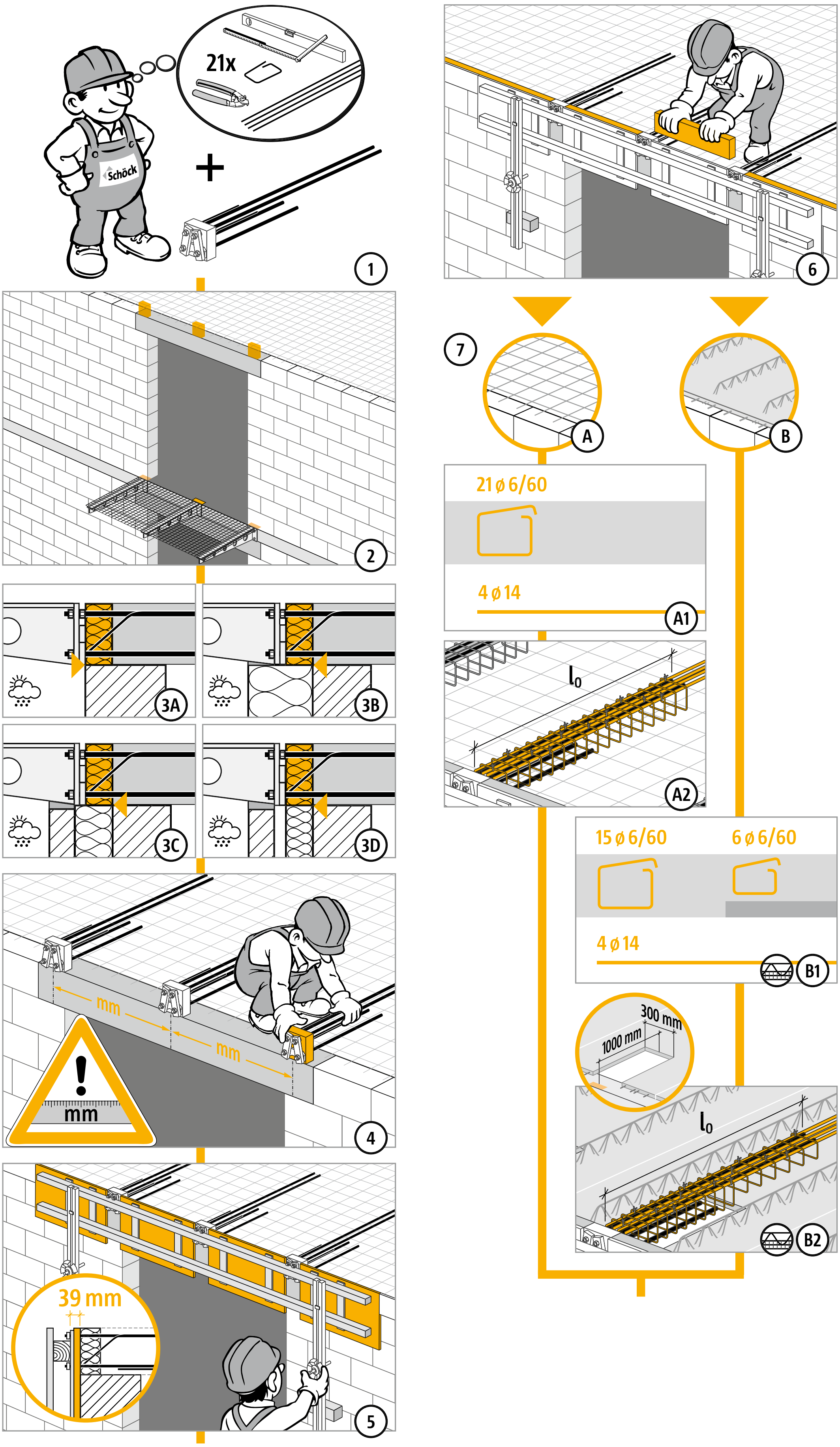
Installation instruction type SK-MM1 - structural engineer



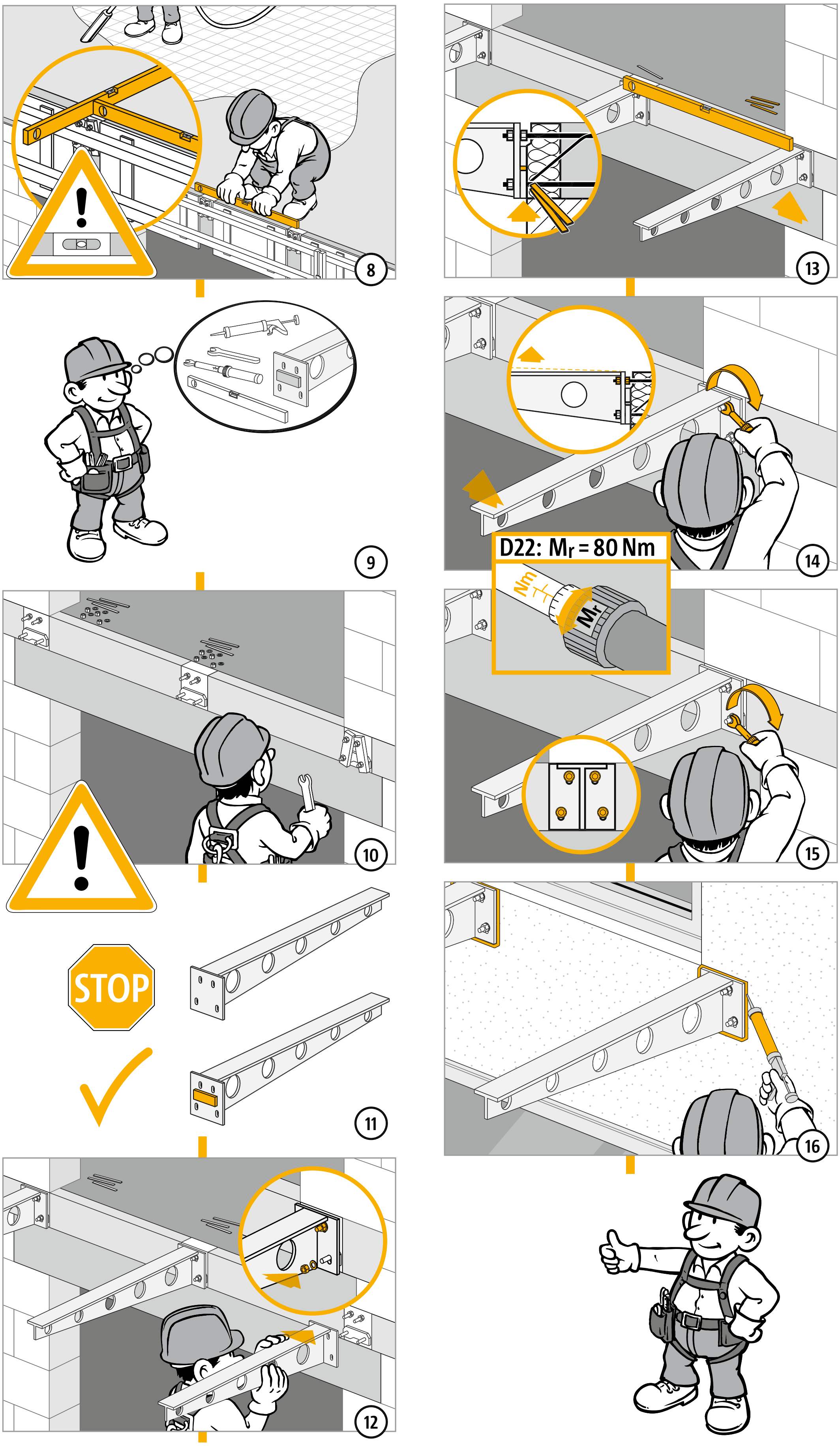
Installation instruction type SK-MM1 - steel constructor



Installation instruction type SK-MM2 - structural engineer



Installation instruction type SK-MM2 - steel constructor



✓ Check list

Check list for structural engineers

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ 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