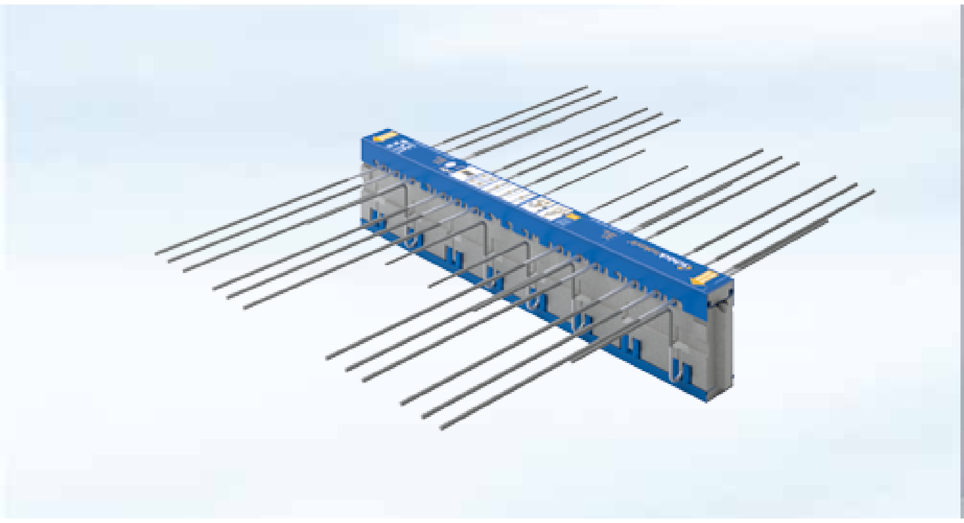

Technical Information
Schöck Isokorb® with 80 mm insulation

January 2017

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

Planning tools - downloads and requests
Tel.: 0845 241 3390
Fax: 0845 241 3391
E-mail: design@schoeck.co.uk
Web: www.schoeck.co.uk

CPD Seminars and on-site consultation
Tel.: 0845 241 3390
Fax: 0845 241 3391
Web: www.schoeck.co.uk

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
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Web: www.schoeck.co.uk

CPD Seminars and on-site consultation
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Fax: 0845 241-3391
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Notes | Symbols

Technical Information

- This Technical Information on the respective product application is valid only in its entirety 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 mis-leading information. Therefore dissemination lies in the sole responsibility of the user or rather the person carrying out the process!
- This Technical Information is valid solely for United Kingdom and takes into account the federal state-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.co.uk/en_gb/downloads.
- The characteristic physical values for all products are listed in the appropriate table in the “Building physics” section.

Special constructions - bending of reinforcing steel

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 page 3). 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. The bending of bars required for special constructions are carried out in the factory in each case on the individual steel bar. With this, it is monitored and ensured that the conditions of the general building supervisory approvals and of BS EN1992 1-1(EC2) and BS EN1992-1-1/NA are observed with regard to bending of reinforcing steel.

Attention: If reinforcing steel of the Schöck Isokorb® is bent or rebent on-site the observance and monitoring of the relevant conditions lies outside the influence of Schöck Bauteile GmbH. Therefore, in such cases, our warranty ceases.

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.

Tags

Hazard note

The yellow triangle with the exclamation mark indicates a hazard note. This means there is a danger to life and limb with non-observance!

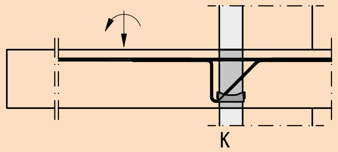
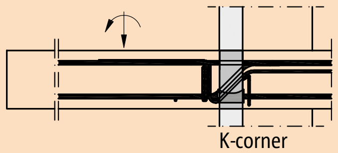
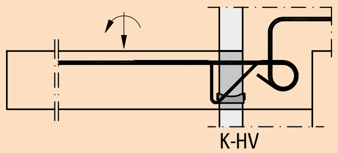
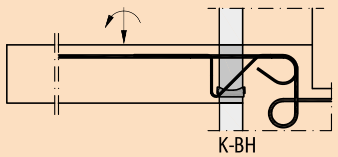
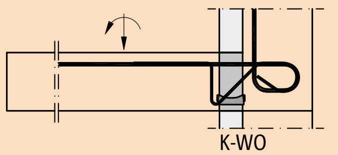
Info

The square with “i” indicates important information which, for example, is to be taken into account with the design.

Check list

The square with tick indicates the check list. Here the essential points of the design are summarised in brief.

Type overview reinforced concrete/reinforced concrete

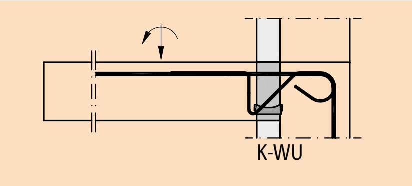
Application	Production type	Schöck Isokorb® type		
Free cantilevered balconies 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies Prefabricated component balconies	K	Page	53
Free cantilevered balconies with corner 	**Building site** In-situ concrete balconies **Precast concrete work** Prefabricated component balconies	K-corner	Page	79
Free cantilevered balconies with height offset downwards 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies	K-HV	Page	93
Free cantilevered balconies with height offset upwards 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies	K-BH	Page	93
Free cantilevered balconies with wall connection upwards 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies	K-WO	Page	93

Summary

Type overview reinforced concrete/reinforced concrete

Application | **Production type** | **Schöck Isokorb® type**

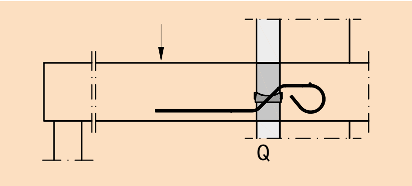
Free cantilevered balconies with wall connection downwards



Building site
In-situ concrete balconies
Precast concrete work
Completely prefabricated balconies

K-WU — Page 93

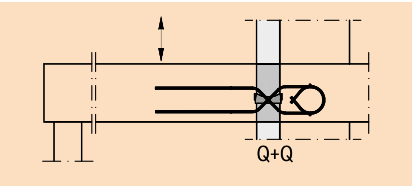
Supported balconies



Building site
In-situ concrete balconies
Precast concrete work
Completely prefabricated balconies
Prefabricated component balconies

Q — Page 115

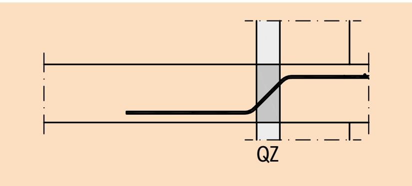
Supported balconies with positive and negative shear force



Building site
In-situ concrete balconies
Precast concrete work
Completely prefabricated balconies
Prefabricated component balconies

Q+Q — Page 115

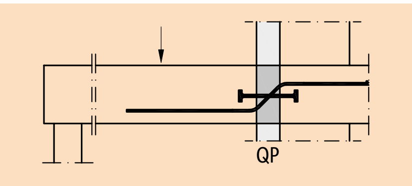
Zero-stress shear force connection



Building site
In-situ concrete balconies
Precast concrete work
Completely prefabricated balconies
Prefabricated component balconies

QZ — Page 115

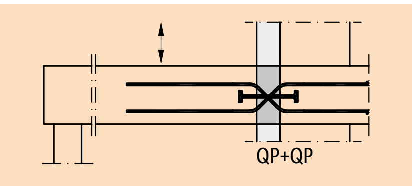
Supported balconies with point load peaks



Building site
In-situ concrete balconies
Precast concrete work
Completely prefabricated balconies
Prefabricated component balconies

QP — Page 133

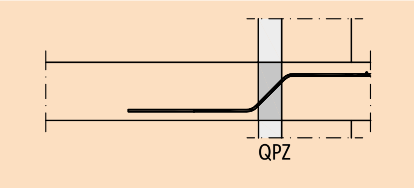
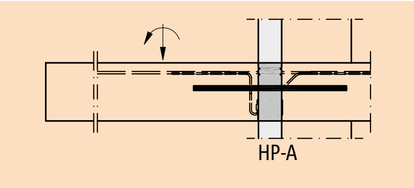
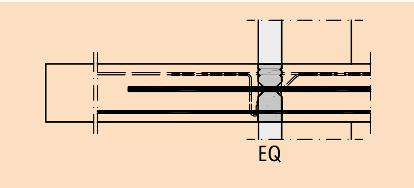
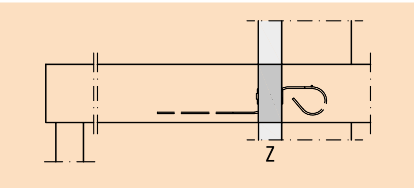
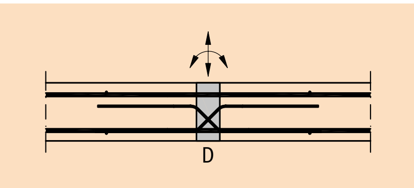
Supported balconies with positive and negative shear force with point load peaks



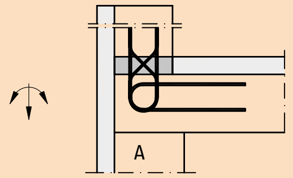
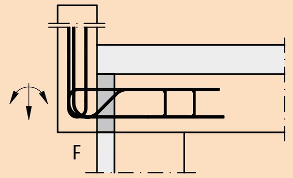
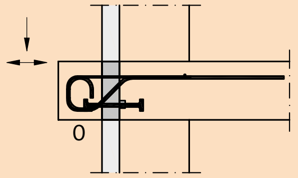
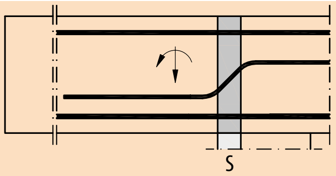
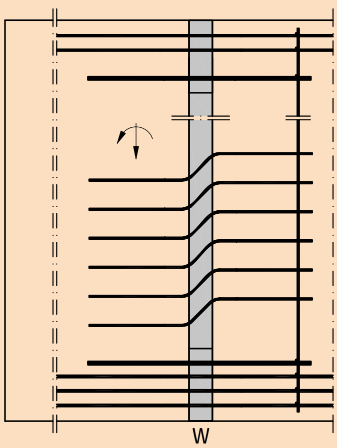
Building site
In-situ concrete balconies
Precast concrete work
Completely prefabricated balconies
Prefabricated component balconies

QP+QP — Page 133

Type overview reinforced concrete/reinforced concrete

Application	Production type	Schöck Isokorb® type	
Constraint-free transverse force connection with point peak loads 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies Prefabricated component balconies	**QPZ**	Page 133
Addition for horizontal loads 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies Prefabricated component balconies	**HP**	Page 153
Addition for horizontal loads and positive moments 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies Prefabricated component balconies	**EQ**	Page 163
Addition as insulating spacer without reinforcement 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies Prefabricated component balconies	**Z**	Page 173
Continuous floors with bending momemts and shear forces 	**Building site** In-situ concrete balconies **Precast concrete work** Completely prefabricated balconies Prefabricated component balconies	**D**	Page 179

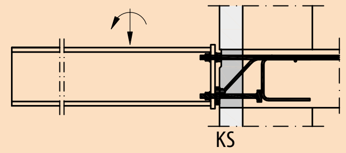
Type overview reinforced concrete/reinforced concrete

Application	Production type	Schöck Isokorb® type
Ballustrades and parapets (is replaced by AXT)  	**Building site** In-situ concrete **Precast concrete work** Completely prefabricated part	**A** Page 193
Advanced ballustrades (is replaced by FXT)  	**Building site** In-situ concrete **Precast concrete work** Completely prefabricated part	**F** Page 195
Corbels (is replaced by OXT)  	**Building site** In-situ concrete	**O** Page 197
Free cantilevered downstand beams and reinforced concrete beams  	**Building site** In-situ concrete **Precast concrete work** Completely prefabricated part	**S** Page 199
Free cantilevered shear wall  	**Building site** In-situ concrete **Precast concrete work** Completely prefabricated part	**W** Page 211

Type overview steel/reinforced concrete | Type overview timber/reinforced concrete

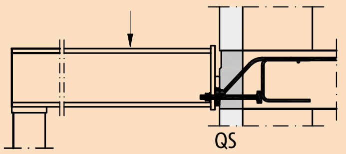
Application		Schöck Isokorb® type

Free cantilevered balconies on reinforced concrete on reinforced concrete structures



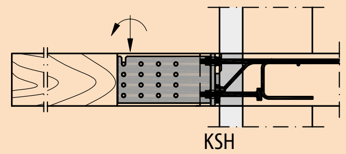
KS Page 227

Supported steel balconies on reinforced concrete structures



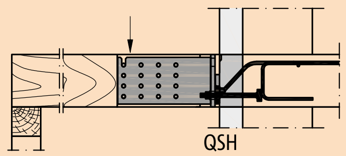
QS Page 259

Free cantilevered timber balconies on reinforced concrete structures



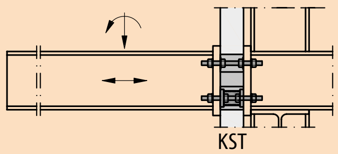
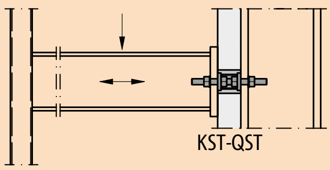
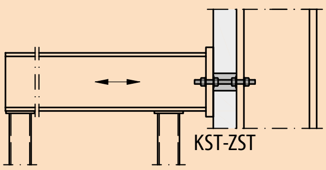
KSH Page 281

Supported timber balconies on reinforced concrete structures



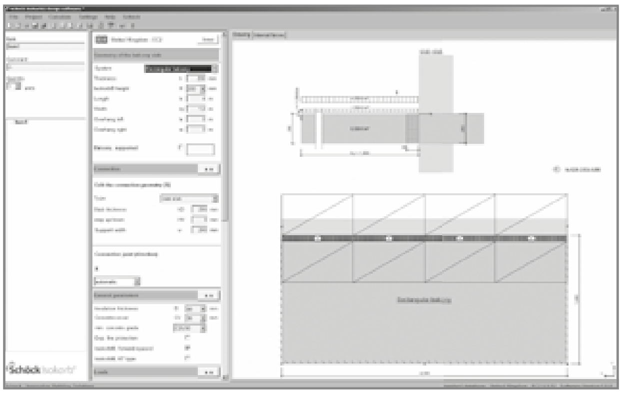
QSH Page 283

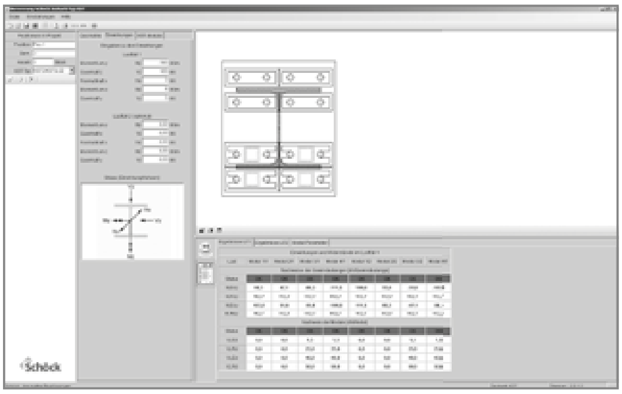
Type overview steel/steel

Application		Schöck Isokorb® type
Free cantilevered steel structures		
		**KST** Page 287
Supported steel structures (two supports)		
		**KST-QST** Page 287
Supported steel structures (four supports)		
		**KST-ZST** Page 287

Design software

The Schöck Isokorb® design software and the Schöck Isokorb® type KST design software provide the design of thermally separated structures.
The Schöck Isokorb® design software is available as a free download and can also be applied for on CD-ROM. It runs under MS Windows using MS Framework 3.5.





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).

Building physics

Reinforced concrete/reinforced concrete

Steel/reinforced concrete

Timber/reinforced concrete

Steel/steel

Building physics

Thermal bridges

Definition of thermal bridges

Thermal bridges are local component areas in the building shell, in which heat loss occurs. The increased heat loss results in that the component area deviates from the even shape ("geometric thermal bridge") or in that the component area concerned, local materials with increased thermal conductivity are present ("material-conditioned thermal bridge").

Effects of thermal bridges

In the area of the thermal bridge the locally increased heat loss leads to a lowering of the inner surface temperatures. As soon as the surface temperature falls below the so-called "mildew temperature" Θ_S, mould forms. What is more, if the surface temperature falls below the dew-point temperature Θ_τ, then the moisture in the ambient air condenses on the cold surfaces in the form of condensate.
If mould has formed in the area of a thermal bridge, then considerable impairments can occur to health for the resident due to the emitted mould spores in the room. Mould spores cause allergies and can therefore provoke allergic reactions in people, such as, for example, asthma. Through the general long-lasting daily exposure in dwellings there is a high risk that the allergic reactions will become chronic.

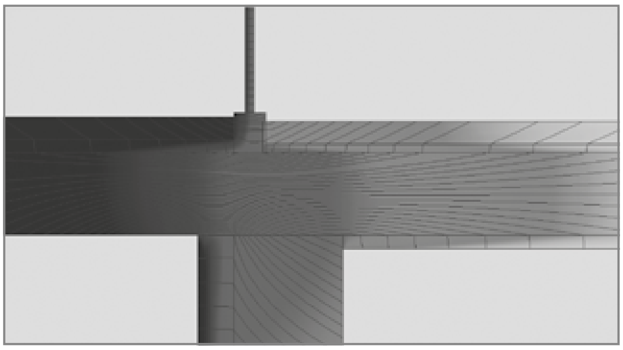
Summarised, the effects of thermal bridges are thus:
- Danger of the formation of mould
- Danger of impairments to health (allergies etc.)
- Danger of occurrence of condensation
- Increased thermal energy loss

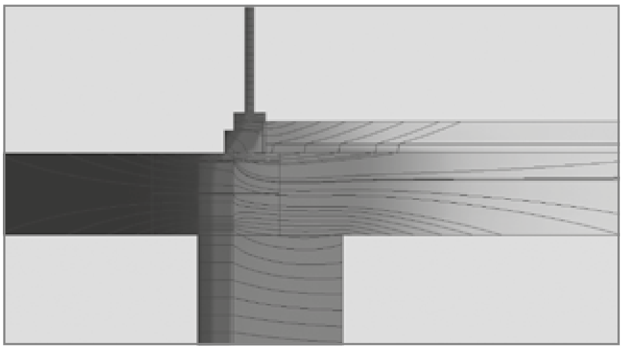
Uninsulated cantilevered structural components

With uninsulated cantilevered structural components such as, for example, reinforced concrete balconies or steel girders, the co-action of the geometric thermal bridge (cooling fin effect of the cantilever) as well as of the material-conditioned thermal bridge (breaching of the heat insulating layer with reinforced concrete or steel), there is a strong heat drainage. With this, cantilevers are among the most critical thermal bridges of the building shell. The results of uninsulated cantilevers are considerable heat losses and a significant lowering of the surface temperature. This leads to a marked increase of heating costs and a very high risk of mould in the area of the connection of the cantilever.

Effective heat insulation using Schöck Isokorb®

The Schöck Isokorb®, through its thermotechnically and statically optimised design (minimised reinforcement cross-section with optimised load-bearing capacity and employment of particularly good heat insulating materials), represents a very effective insulation of the cantilever.





Heat progressions of balcony connections, from dark-coloured, cold balcony to light-coloured, warm internal area.
Left: Continuous reinforced concrete floor without thermal separation. Right: Thermal separation using Schöck Isokorb®

Thermal bridges

Dew-point temperature

The dew-point temperature θ_τ of a room is that temperature at which the moisture present in the ambient air can no longer be held by the room air and is then released in the form of water droplets. The relative ambient air humidity is then 100 %.

The areas of the air layer which have direct contact with the colder structural component surfaces, due to this contact, adopt the temperature of the cold structural component surface. If the minimum surface temperature of a thermal bridge lies below the dew-point temperature, then the air temperature directly at this point will also lie below the dew-point temperature. This has the result that the moisture held in this layer of ambient air is precipitated in the form of condensation on the cold surface: Condensation water “drops out”.
The dew-point temperature depends only on the ambient air temperature and the ambient air humidity (see Figure 1). The higher the ambient air temperature and the higher the ambient air humidity, the higher is the dew-point temperature, i. e. the more easily condensation forms on cold surfaces.

The normal ambient air climate in interior rooms on average is ca 20 °C and ca 50 % relative ambient air humidity. This results in a dew-point temperature of 9.3 °C. In rooms heavily loaded with moisture such as, for example, bathrooms, high humidities of 60 % and more are also reached. The dew-point temperature is correspondingly high and the risk of the formation of condensation increases. Thus the dew-point temperature with an ambient air humdity of 60 % is already 12.0 °C (see Figure 1). You recognise this sensitive dependency of the dew-point temperature on the ambient air humidity very easily from the steepness of the curve in Figure 1: Already small increases of the ambient air humidity lead to a substantial increase of the dew-point temperature of the ambient air. This has as a result a significant increase of the risk of condensation on cold structural component surfaces.

Mildew temperature

The humidity required for the growth of mould on structural component surfaces is already achieved upwards from an an ambient air humidity of 80 %. This means, mould then forms on cold structural component surfaces, if the structural component surface is at least as cold, so that a humdity of 80 % is triggered in the directly adjacent layer of air. The temperature at which this occurs is the so-called “mildew temperature” θ_S.

Mould growth thus occurs already with temperatures above the dew-point temperature. For the atmospheric environment 20 °C/50 % the mildew temperature is 12.6 °C (see Figure 2) thus 3.3 °C higher than the dew-point temperature. Therefore, for the avoidance of structural damage (formation of mould), the mildew temperature is more important than the dew-point temperature. It does not suffice if the interior surfaces are warmer than the dew-point of the ambient air: The surface temperatures must lie above the mildew temperature!

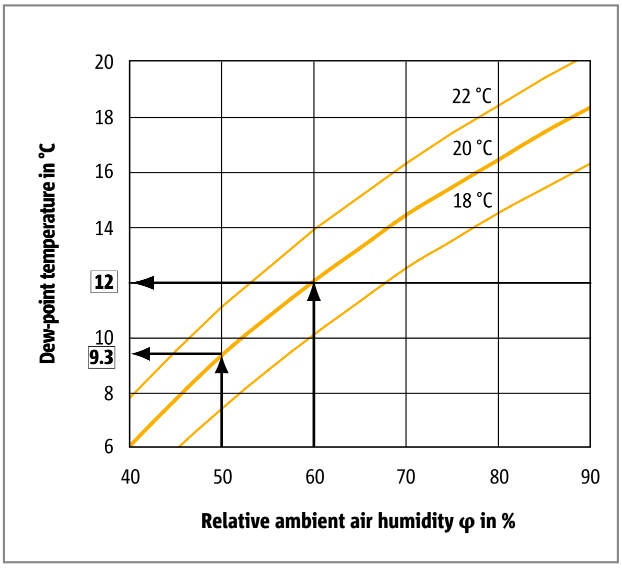


Figure 1: Dependency of the dew-point temperature on ambient air humidity and temperature

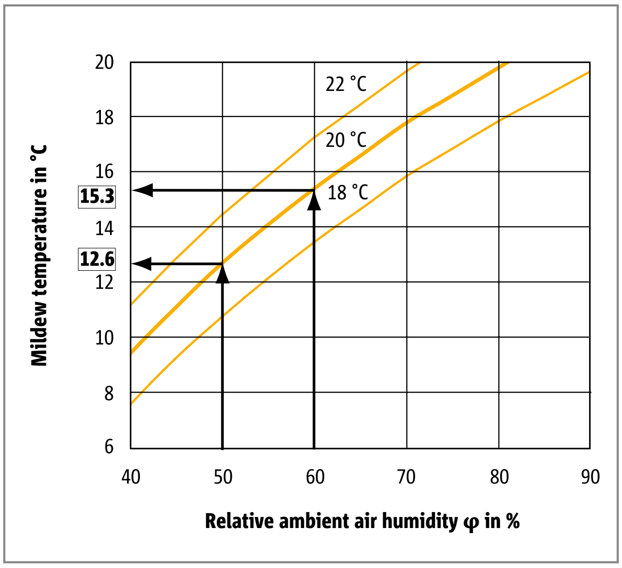


Figure 2: Dependency of the mould temperature on ambient air humidity and temperature

Characteristic building-physical values

Thermal characteristic building-physical values of thermal bridges

Summarised, the effects of thermal bridges are thus:

Thermal effects	Characteristic building-physical values	
	Qualitative representation	Quantitative single value
Mould formation **Condensation result**	Isotherms with temperature scaling	Minimum surface temperature Θ_{min} Temperature factor f_{Rsi}
Heat loss	Heat flow lines	ψ-value χ-value

The mathematical determination of these characteristic values is possible exclusively through a thermal FE calculation of the precise existing thermal bridge. For this the geometric build-up of the structure in the area of the thermal bridge is modelled in the computer together with the thermal conductivities of the materials used. The constraints to be applied with the calculation and modelling are regulated in BS EN 10211.

The FE calculation provides, along with the quantitative characteristics, also a representation of the temperature distribution within the structure (isotherm presentation) as well as the progress of the heat flow lines. The representation using the heat flow lines shows on which path through the structure the heat is lost, and it thus allows easy recognition of the thermal weak points of the thermal bridge. The isotherms are lines or surfaces of equal temperature and show the temperature distribution within the calculated structural component. Isotherms are often presented with a temperature step width of 1 °C. Heat flow lines and isotherms are always perpendicular to each (see Figures 3 and 4).

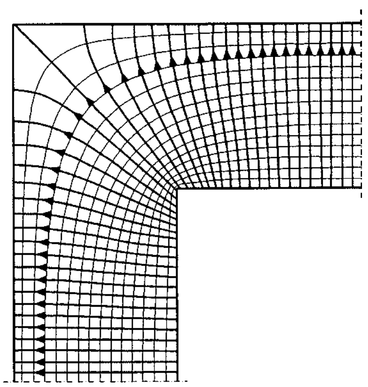


Figure 3: Example of a pure, geometric thermal bridge. Representation of isotherms and heat flow lines (arrows).

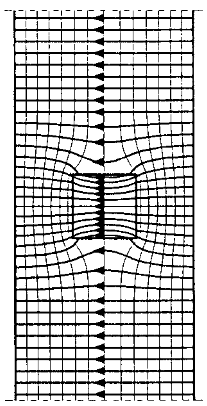


Figure 4: Example of a pure. material-conditioed thermal bridge. Representation of isotherms and heat flow lines (arrows).

Characteristic building-physical values

The minimum surface temperature $\Theta_{si,min}$ and the temperature factor f_{Rsi}

The minimum surface temperature $\Theta_{si,min}$ is the lowest temperature occurring in the area of a thermal bridge. The value of the minimum surface temperature is decisive for whether condensation occurs on a thermal bridge or mould forms. The minimum surface temperature is thus a characteristic value for the humidity effects of a thermal bridge.

The characteristic values $\Theta_{si,min}$ and ψ-value depend on the structural setup of the thermal bridge (geometry and thermal conductivities of the materials forming the thermal bridge). The minimum surface temepraure is, in addition, still dependent on the set outside air temperature: The lower the outside air temperature the lower is the minimum surface temperature (see Figure 5).

The temperature factor f_{Rsi} is also used as an alternative to the minimum surface temperature as humidity characteristic value. The temperature factor f_{Rsi} is the temperature difference between inside and outside (Θ_i - Θ_e) related to the temperature difference between minimim surface temperature and the outside air temperature ($\Theta_{si,min}$ - Θ_e):

$$f_{Rsi} = \frac{\Theta_{si,min} - \Theta_e}{\Theta_i - \Theta_e}$$

The f_{Rsi}-value is a relative value and thus has the advantage that this is dependent on the design of the thermal bridge and not, like $\Theta_{si,min}$,on the applied outside and inside air temperatures. If one knows the f_{Rsi}-value of a thermal bridge then conversely the minimum surface temperature can be calculated with the aid of the air temperatures:

$$\Theta_{si,min} = \Theta_e + f_{Rsi} \cdot (\Theta_i - \Theta_e)$$

In Figure 5, with a constant inside temperature of 20 °C, the dependency of the minimum surface temperature on the existing outside temperature is depicted for various f_{Rsi}-values. Depicted in Figure 6 is the relationship between $\Theta_{si,min}$ and f_{Rsi}, under the assumption of an outside temperature of -5 °C.

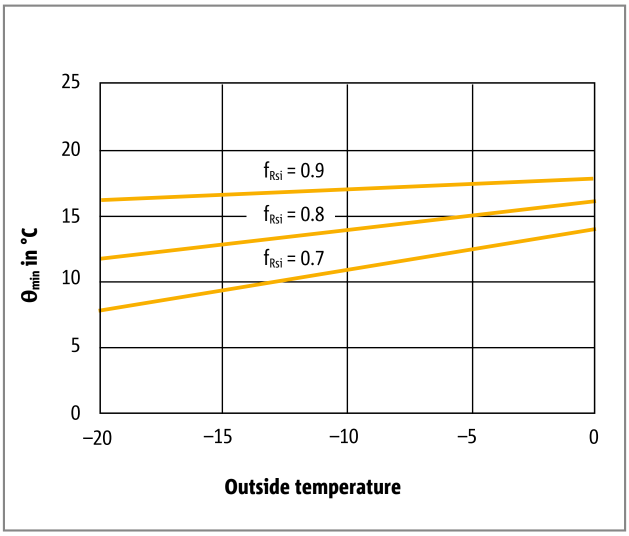


Figure 5: Dependency of the minimum surface temperature on the adjacent outside temperature. Inner temperature constant 20 °C.

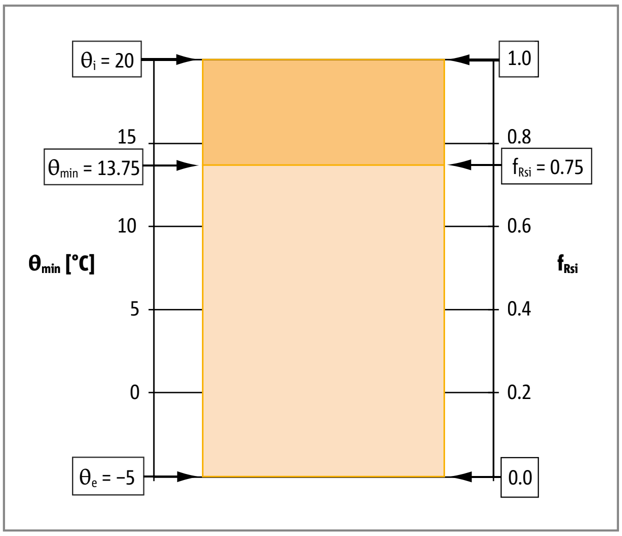


Figure 6: For the definition of the f_{Rsi}-value

Characteristic building-physical values

The thermal transmission coefficients ψ and χ

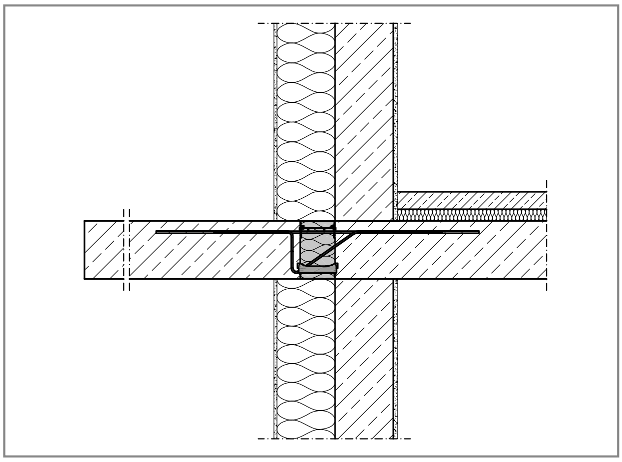
The linear thermal transmission coefficient ψ ("ψ-value")indicates the per meter run. of additionally occurring heat loss of a linear-shaped thermal bridge. The point heat transmission coefficient χ ("χ-value") indicates the additional heat loss via a point thermal bridge.

The equivalent thermal conductivity λ_{eq}

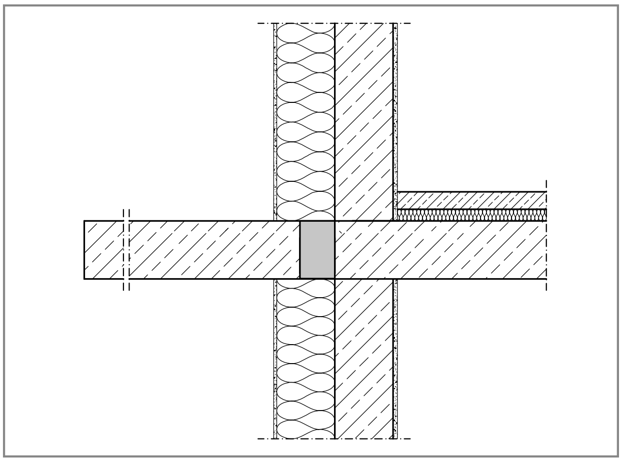
The equivalent thermal conductivity λ_{eq} is the overall thermal conductivity of the Schöck Isokorb® insulating element determined over the various surface parts and, with equal insulating element thickness, a measure for the the insulating effect of the connection. The smaller the λ_{eq}, the higher the insulation of the balcony connection. As the equivalent thermal conductivity takes into account the surface part of the materials employed, λ_{eq} is dependent on the load bearing level of the Schöck Isokorb®.

λ_{eq} as basis for f_{Rsi} and ψ-value

With a modelling of a balcony connection in the conventional thermal bridge program, the Schöck Isokorb® consisting of several materials can, with the aid of λ_{eq} can be depicted simply as homogenous, box-shaped substitute insulating element with identical measurements, see figure. This substitute insulating element is then assigned the "equivalent thermal conductivity" λ_{eq} for the calculation.



Representation of a sectional drawing with detailed Schöck Isokorb® model



Representation of a sectional drawing with substitute insulating element

The process for the determination of λ_{eq} has been validated on the basis of BS EN ISO 10211 for the Schöck Isokorb® in the Approval (Z-15.7-240). Thereby, in accordance with this approval, along with the heat losses of the thermal bridge (ψ-value), the surface temperatures Θ_{si} and thereby also the temperature f_{Rsi} may be calculated.

Difference between ψ-value and λ_{eq}

The equivalent thermal conductivity λ_{eq} of the insulating element of the Schöck Isokorb® is a measure for the the heat insulating effect of the element, while the ψ-value represents a measure for the heat insulationof the complete "balcony" structure. The ψ-value changes with construction even if the connection element remains unchanged.

Conversely, the ψ-value with firmly specified design is dependent on the equivalent thermal conductivity λ_{eq} of the connection element: The smaller λ_{eq}, the smaller the ψ-value (the higher the minimum surface temperature).

Requirements

Condensation control and temperature factor

Building Regulations Part L includes the requirement that minimum internal surface temperatures should be such that condensation risk is minimized and mould growth avoided.
Approved Document L1A (L2A for non-residential buildings) cites the BRE Information Paper IP1/06 (Assessing the effects of thermal bridging at junctions and around openings) which includes some limiting values for f_{Rsi}:

Type of building	Minimum f_{Rsi}
Dwellings, residential buildings, schools	0.75
Offices, retail premises	0.50
Sports halls, kitchens, canteens, buildings heated with unflued gas heaters	0.80

Details using Schöck thermal breaks show temperature factors far in excess of Part L requirements in all cases. Temperature factors can be calculated by Schöck on request to provide bespoke details that verify code compliance.

Heat Losses

To pass Building Control requirements in England it is necessary to demonstrate compliance with Building Regulations. The lastest version of the Building Regulations Part L (2013) and associated guidance document for residential construction Approved Document L1A (ADL1A) require that thermal bridging be included in the fabric heat loss calculations.

The government Standard Assessment Procedure (SAP 2012) is the simple energy use and carbon emissions model used to provide evidence that the carbon emissions target has been achieved. The SAP calculation includes the term H_{TB} (heat loss due to thermal bridging) which is calculated or estimated as below:

a) The sum of all linear thermal transmittances (ψ) · length of detail (L)

$$H_{TB} = \sum(L \cdot \psi)$$

or, if no linear thermal transmittances are known:

b) Using the factor y = 0.15 in the equation below:

$$H_{TB} = y \cdot \sum A_{exp} \quad \text{(where } A_{exp} = \text{total exposed fabric area)}$$

Linear thermal transmittance values (ψ) used in (a) can be a combination of:
- Approved Design Details if used (in 'Approved' column of SAP Appendix K Table K1)
- Uncalculated details (in 'Default' column of SAP Appendix K Table K1)
- Modelled details, in which numerical modelling has been carried out by a person of suitable experience and expertise.

Method (a) is always preferable as it avoids the penalty imposed by (b) which can double the overall calculated heat loss in a well-insulated construction. A similar approach is taken for non-residential buildings in Part L2A, in which the Simplified Bilding Energy Model (SBEM) is used in place of SAP.

One off calculations of ψ can be carried out on request for all details using Schöck thermal breaks to obtain the optimal solution.

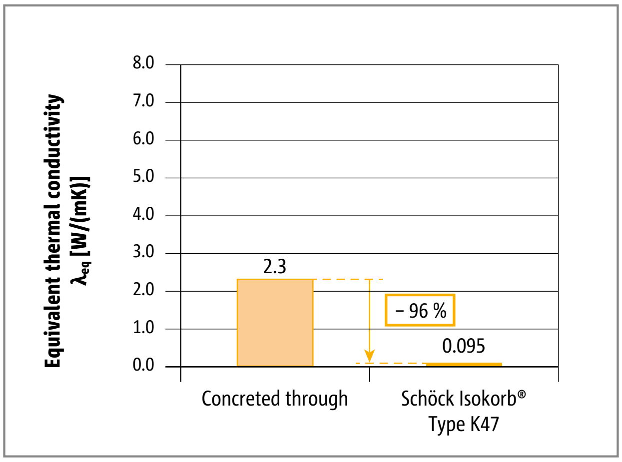
The balcony as thermal bridge

Schöck Isokorb® for reinforced concrete balconies

In the area of the balcony connection the Schöck Isokorb® cuts through the otherwise continuous reinforced concrete slab. The heat conductive concrete and very heat conductive concrete steel are replaced by insulation material made from Neopor® and by, in comparison to carbon steel, significantly poorer heat conductive stainless steel as well as through optimised HTE modules made of high-strength fine concrete in the compression area, see table. This results in, taking for example the Schöck Isokorb® type K47, a thermal conductivity reduced by ca. 96 % compared to the through reinforced concrete connection.

	Uninsulated bacony connection	Balcony connection with Schöck Isokorb®	Reduction of the thermal conductivity compared to uninsulated by
Materials balcony connection	Concrete steel/construction steel with $\lambda = 50$ W/(mK)	Stainless steel with $\lambda = 15$ W/(mK)	70 %
		Pressure bearing with high-strength fine concrete with $\lambda = 0.8$ W/(mK)	98 %
	Concrete with $\lambda = 1.65$ W/(mK)	Neopor® with $\lambda = 0.031$ W/(mK)	98 %

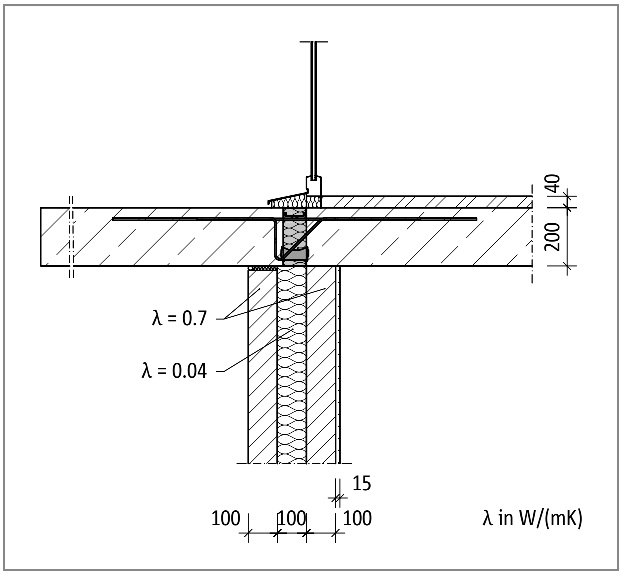
Thermal conductivities of various balcony connection materials in comparison



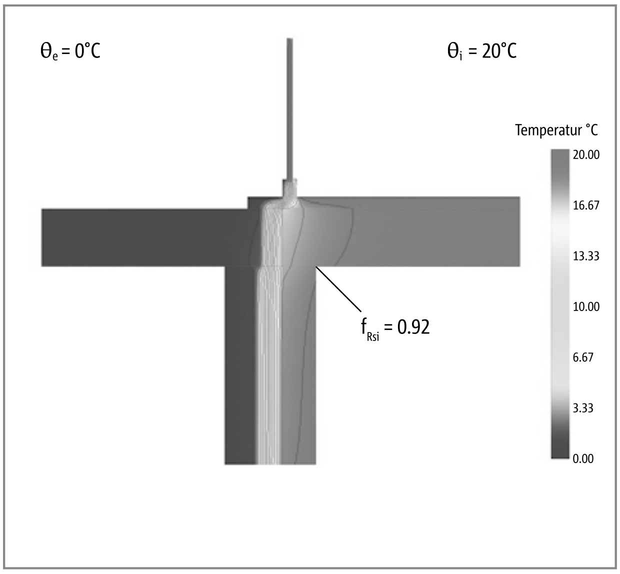
Equivalent thermal conductivity λ_{eq} of reinforced concrete slab connections

Schöck Isokorb® type	K47
Equivalent thermal conductivity λ_{eq}	
[W/(mK)]	0.095
The thermal transmission coefficient ψ (external dimension-related)	
[W/(mK)]	0.175
Temperature factor f_{Rsi}	
[-]	0.92
Minimum inside surface temperature $\Theta_{si,min}$	
[°C]	18.35

Typical thermal bridge characteristic values of a connection with Schöck Isokorb® type K47



Schöck Isokorb® type K47: Connection with cavity wall with core insulation



Thermography

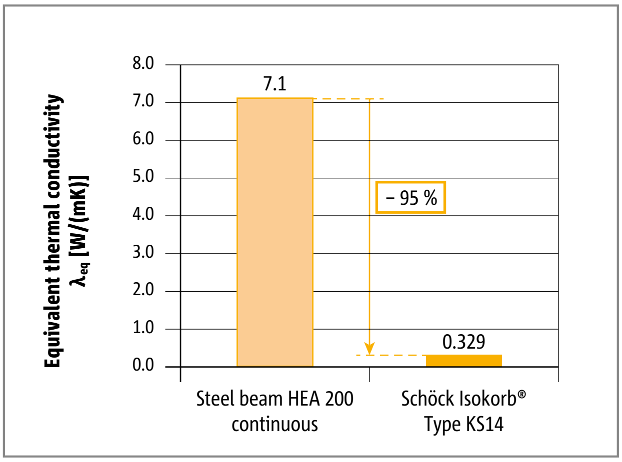
Further information on this can be found in the thermal bridge portal and in the Oxford Brookes investigative reports at www.schoeck.co.uk.

Cantilevered steel beams as thermal bridges

Schöck Isokorb® for steel balconies

A common design feature in the UK is to connect a steel balcony to an interior concrete slab. Schöck Isokorb® type KS is the solution which thermally separates the exterior balcony from the interior slab. The main body of Schöck Isokorb® type KS consists of 80 mm thick EPS insulation. It offers high thermal resistance by using stainless bars to act as tension, shear and compression reinforcement.
This results in, taking for example the Schöck Isokorb® type KS14, a thermal conductivity reduced by ca. 95% compared to an uninsulated connection with an assumed related cross-sectional area of 190 mm x 200 mm and a thermal conductivity of the insulation of 0.035 W/(mK).

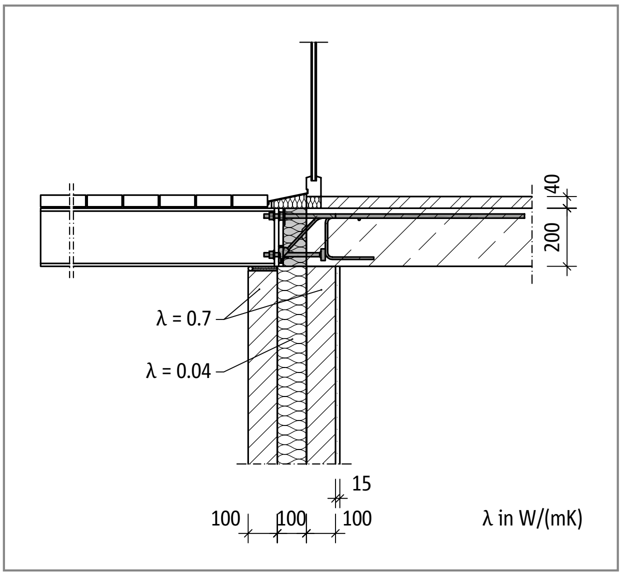
Presented in the following table are results of a study, which was carried out by the Oxford Brookes University. One recognises that the KS14 with a f_{Rsi}-value = 0.90 contains the requirements according to IP1/06 ($f_{Rsi} \geq 0.75$).



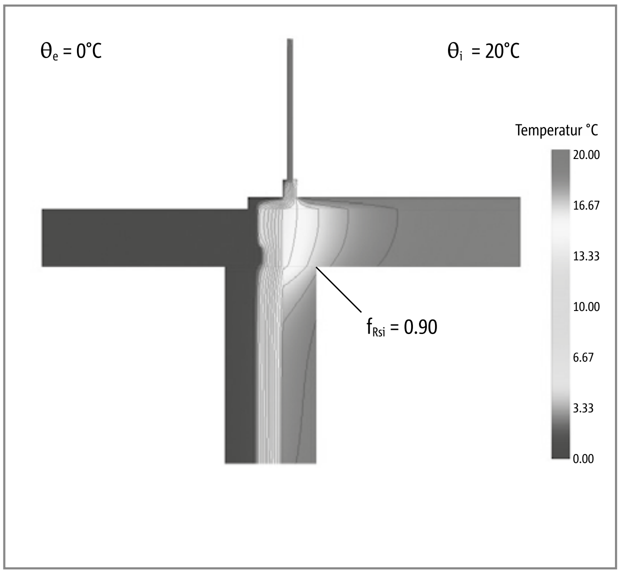
Equivalent thermal conductivity λ_{eq} of steel beam connections

Schöck Isokorb® type	KS14
Equivalent thermal conductivity λ_{eq}	
[W/(mK)]	0.329
The thermal transmission coefficient χ (point-related)	
[W/K]	0.077
Temperature factor f_{Rsi}	
[-]	0.90

Typical thermal bridge characteristic values of a connection with Schöck Isokorb® type KS14



Schöck Isokorb® type KS14: Connection with cavity wall with core insulation



Thermography

Further information on this can be found in the thermal bridge portal and in the Oxford Brookes investigative reports at www.schoeck.co.uk.

Cantilevered steel beams as thermal bridges

Schöck Isokorb® for steel canopies on steel structures

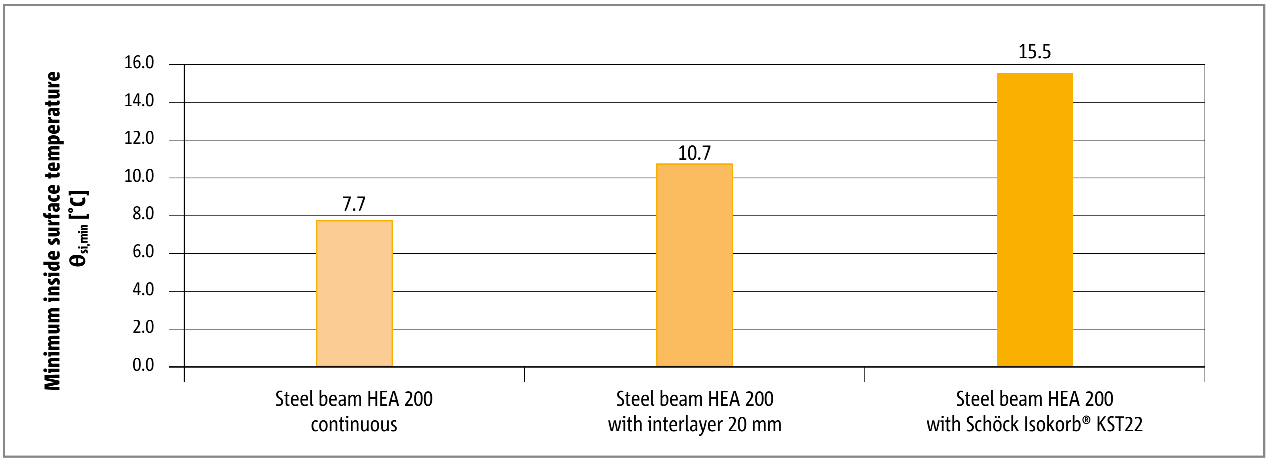
Exterior canopies penetrating the envelope typically occuring in schools, universities etc. are another critical thermal bridge which leads to significant heat loss. Schöck Isokorb® type KST is the solution to thermally separate the exterior steel structures from interior steel structures.

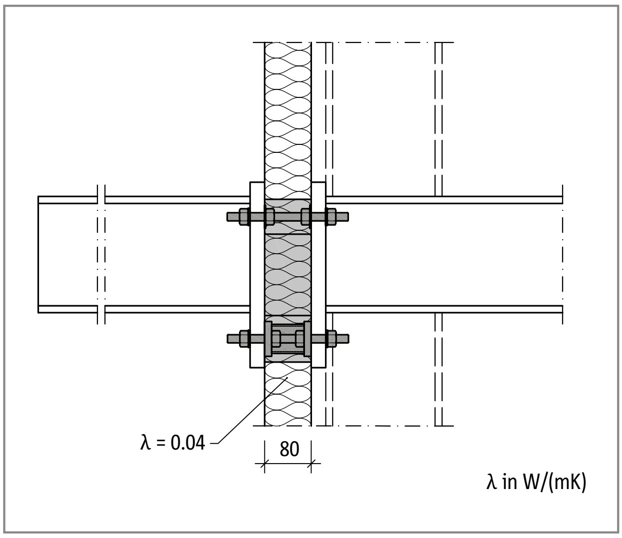
The highly conductive structural steel (λ = 50 W/(mK)) at the connection is replaced with expanded polystyrene (EPS, λ = 0.031 W/(mK)) with a thickness of 80 mm to give an effective thermal separation of the steel beam. Stainless steel is used within the Schöck Isokorb® module for the structural elements (bolts and a hollow section) to transfer the loadings, while further reducing the thermal conductivity, since stainless steel (λ = 15 W/(mK)) has a thermal conductivity 30% that of carbon steel (50 W/(mK)).

Presented below are the results of a study on effectiveness of the Schöck Isokorb® carried out by the Oxford Brookes University.

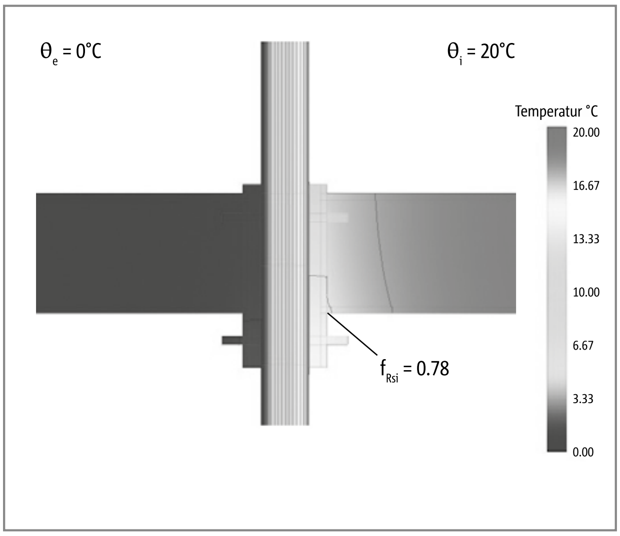
Structure	Minimum inside surface temperature $\Theta_{si,min}$ [°C]	Temperature factor f_{Rsi}	Thermal transmision coefficient (point-related) χ [W/K]
Continuous steel beam HEA 220	7.7	0.51	0.77
Steel beam HEA 200 with 20 mm PTFE, stainless steel bolts	10.7	0.62	0.88
Steel beam HEA 220 with Isokorb KST 22	15.5	0.82	0.26

Various insulation variants with steel beams in comparison





Schöck Isokorb® type KST: Connection steel beam on steel structure



Thermography

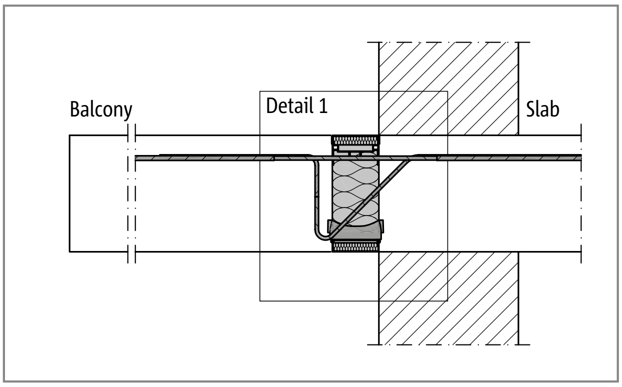
Fire protection configuration

Fire protection configuration Schöck Isokorb® reinforced concrete/reinforced concrete

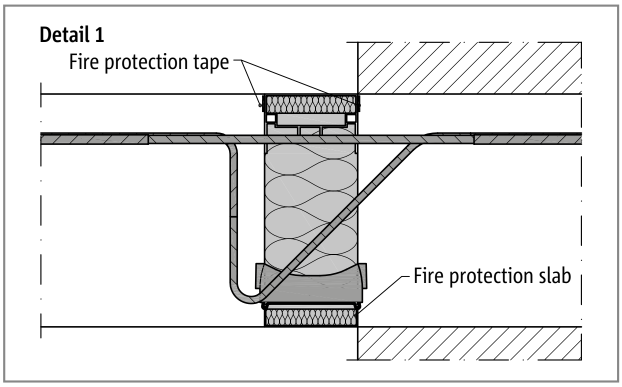
Every Schöck Isokorb® reinforced concrete/reinforced concrete can also be obtained in a fire protection configuration. Designation e.g. Schöck Isokorb® type K45-CV35-H180-REI120.

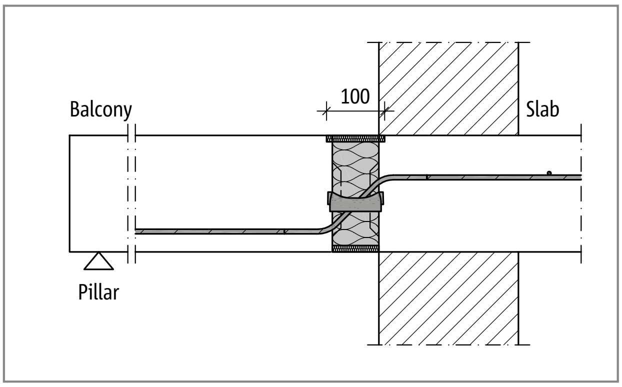
For this purpose fire protection boards are mounted on the upper and lower sides of the Schöck Isokorb® (see figure). Prerequisite for the fire resistance classification of the balcony connection is that the balcony slab and the floor also fulfil the requirements on the necessary fire resistance class according to BS EN 1992-1-1 and -2 (EC 2). If, in a case of fire, in addition to the load-bearing capacity (R) the integrity (E) and the insulation (I) are required, block-outs between the Schöck Isokorb® are to be closed e.g. using the Schöck Isokorb® type Z in fire protection configuration.

The Schöck Isokorb® reinforced concrete/reinforced concrete has been tested in room closure configuration on the basis of floors according to BS EN 1365-2. According to BS EN 13501-2 only the requirement R (load-bearing capacity in the case of fire) is required. The basis for this test is BS EN 1365-5. The fire protection of the Schöck Isokorb® is additionally further tested on the basis of floors according to BS EN 1365-2. From this results the classification REI.
(R - load-bearing capacity, E - integrity, I - insulation under the influence of fire.)
The requirement from the fire tests with Schöck Isokorb® with flush integrated lateral fire protection bands or 10 mm projecting fire protection boards has been implemented. The integrated fire protection bands made from material forming insulation layers or respectively the 10 mm projecting fire protection boards on the upper side of the Schöck Isokorb® ensure that the joints, which have opened due to the effect of the fire, are closed. Thus the room integrity and the insulation in the case of fire are ensured (see figures below).
The fire protection configuration of the respective Schöck Isokorb® type is presented in the Product chapter subject: Fire Protection Configuration.

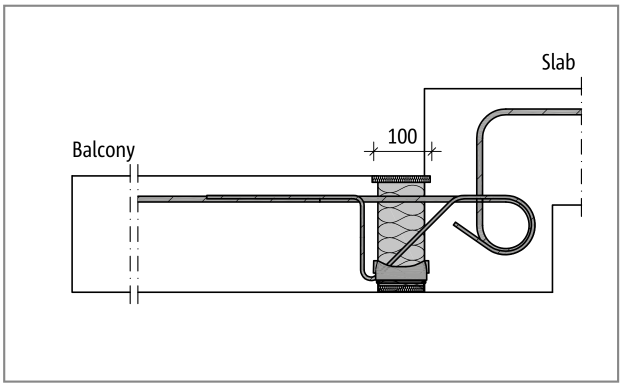


Schöck Isokorb® type K with REI120: Fire protection boards top and bottom; lateral integrated fire protection bands





Schöck Isokorb® type Q with REI120: Fire protection board at top, projecting laterally



Schöck Isokorb® type K-HV with REI120: Fire protection board at top, projecting laterally

Fire protection classes

Fire protection classes REI120, R90, EI120

The reaction to fire of structural components is classified on the basis of the European Standard BS EN 13501-2.

Schöck Isokorb® type	K, K-corner, K-HV, K-BH, K-WO, K-WU K110, K150, Q, Q+Q, QZ QP, QP+QP, QPZ, HP, EQ, D	S, W
Fire protection class	REI120	R90

Schöck Isokorb® type	Z
Fire protection class	EI120

Fire protection

- For the insulation between the Schöck Isokorb® there are Schöck Isokorb® supplementary type Z (see page 173) available with or without fire protection performance. The rating of the Schöck Isokorb® (REI90, REI120) is relevant for the fire protection of the connection .

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.

Two design variants are possible for fire protection requirements on the steel structure:

- The entire structure can be clad on site using fire protection boards. Board thickness is dependent on the requisite fire protection class.
  The board cladding is either to be led through the insulation layer or the cladding of the steel structure is to overlap the cladding of the Schöck Isokorb® by 30 mm.
- The steel structure including the outer threaded rods is painted with a fire protection coating. In addition to this the Schöck Isokorb® is clad on site with fire protection boards of the appropriate thickness.

Requirements on the fire protection material:

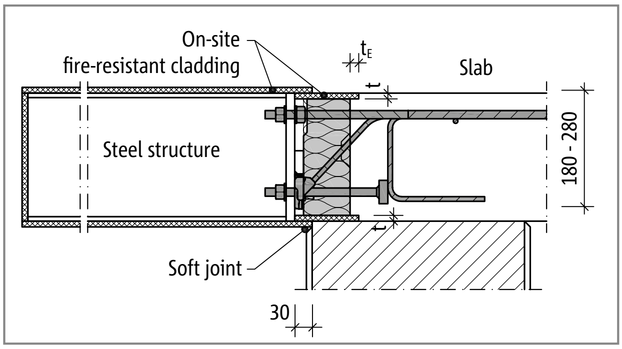
- Thermal conductivity λ_p 0.11 [W/mK]
- Specific thermal conductivity c_p 950 [J/kgK]
- Bulk density ρ 450 [kg/m³]

To achieve the fire resistance duration R according to EC3-2-1 the following board thicknesses t and following anchoring depths t_E are required:

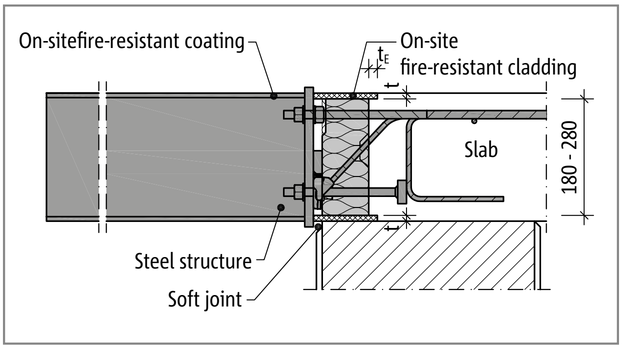
On site fire protection cladding [mm]		
Fire protection class	**Board thickness t [mm]**	**Anchoring depth t_E [mm]**
R30	15	10
R60	20	15
R90	25	20
R120	30	25

On-site fire resistance

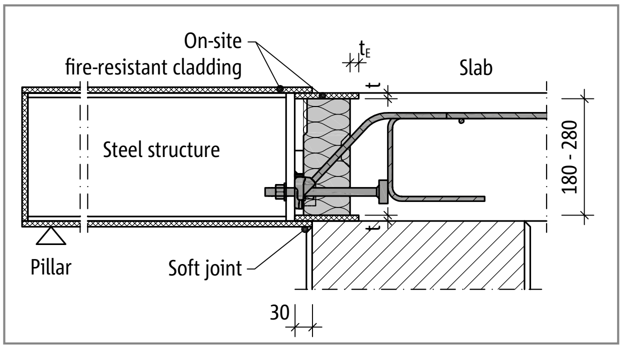
On site Schöck Isokorb® fire protection configuration type KS, QS



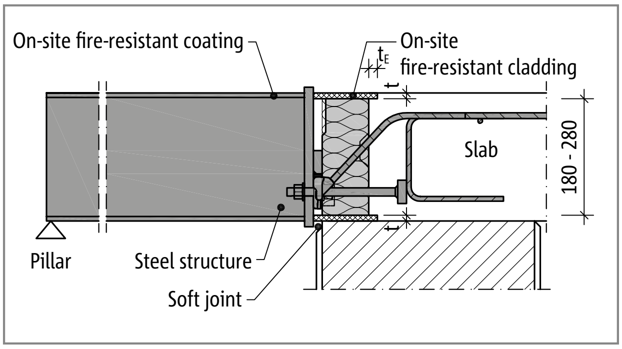
Schöck Isokorb® type KS: On-site fire-resistant cladding type KS and steel structure; cross-section



Schöck Isokorb® type KS: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant coating: Cross section



Schöck Isokorb® type QS: On-site fire-resistant cladding type QS and steel structure; cross-section



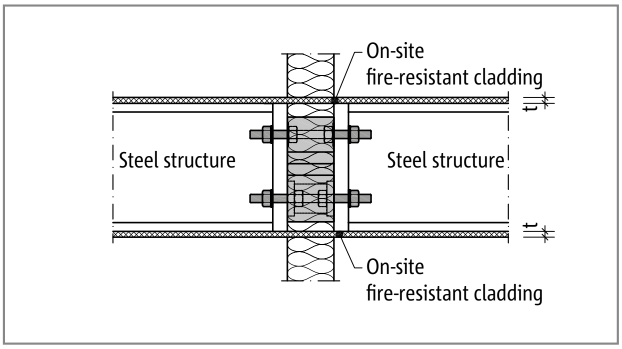
Schöck Isokorb® type QS: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant cladding

Fire protection

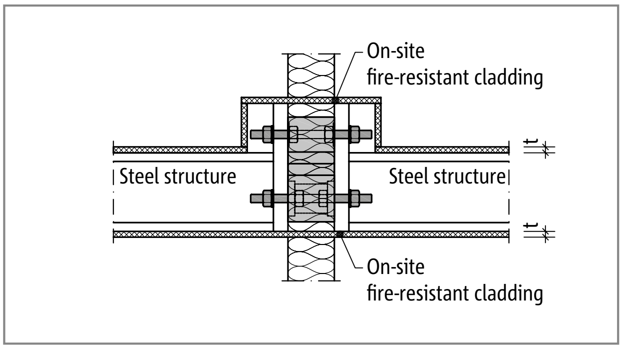
- The selected structure is to be agreed with the project fire expert.

On-site fire resistance

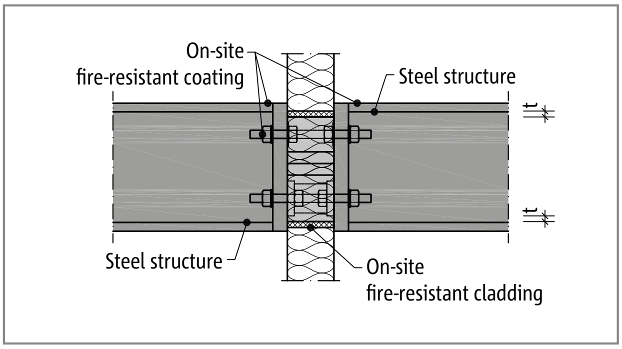
On-site fire protection configuration Schöck Isokorb® type KST



Fire protection Schöck Isokorb® type KST: On-site fire-resistant cladding with flush front boards; cross-section



Fire protectionSchöck Isokorb® type KST: On-site fire-resistant cladding with projecting front boards; cross-section



Fire protection Schöck Isokorb® type KST: On-site fire-resistant cladding type KST, fire-resistant coated steel structure; cross-section

Fire protection

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

Building physics

Schöck Isokorb® type K

Fire resistance class R0

Type	K10		K10-V8		K20		K20-V8		K25	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	1.277	0.062	1.141	0.069	1.013	0.078	0.925	0.086	0.893	0.089
170	1.320	0.060	1.182	0.067	1.053	0.075	0.964	0.082	0.931	0.085
180	1.360	0.058	1.222	0.065	1.091	0.073	1.000	0.079	0.967	0.082
190	1.399	0.057	1.260	0.063	1.128	0.070	1.036	0.076	1.002	0.079
200	1.435	0.055	1.296	0.061	1.163	0.068	1.070	0.074	1.035	0.076
210	1.470	0.054	1.330	0.060	1.196	0.066	1.102	0.072	1.068	0.074
220	1.502	0.053	1.363	0.058	1.229	0.064	1.134	0.070	1.099	0.072
230	1.534	0.052	1.395	0.057	1.260	0.063	1.164	0.068	1.129	0.070
240	1.564	0.051	1.425	0.056	1.289	0.061	1.194	0.066	1.158	0.068
250	1.592	0.050	1.454	0.054	1.318	0.060	1.222	0.065	1.186	0.067

Fire resistance class R0

Type	K25-V8		K25-V10		K35		K35-V8		K35-V10	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.809	0.098	0.696	0.114	0.819	0.097	0.747	0.106	0.667	0.119
170	0.845	0.094	0.728	0.109	0.855	0.093	0.781	0.101	0.699	0.113
180	0.879	0.090	0.759	0.104	0.889	0.089	0.814	0.097	0.729	0.109
190	0.912	0.087	0.790	0.100	0.922	0.086	0.846	0.094	0.759	0.104
200	0.944	0.084	0.819	0.097	0.955	0.083	0.876	0.090	0.788	0.101
210	0.975	0.081	0.848	0.093	0.986	0.080	0.906	0.087	0.816	0.097
220	1.005	0.079	0.876	0.090	1.016	0.078	0.935	0.085	0.843	0.094
230	1.034	0.077	0.903	0.088	1.045	0.076	0.963	0.082	0.870	0.091
240	1.062	0.075	0.930	0.085	1.073	0.074	0.991	0.080	0.896	0.088
250	1.089	0.073	0.955	0.083	1.101	0.072	1.017	0.078	0.921	0.086

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Schöck Isokorb® type K

Fire resistance class R0

Type	K35-VV		K45		K45-V8		K45-V10		K45-VV	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.524	0.151	0.752	0.105	0.691	0.115	0.602	0.132	0.500	0.158
170	0.551	0.144	0.786	0.101	0.723	0.109	0.631	0.125	0.526	0.151
180	0.576	0.137	0.819	0.097	0.755	0.105	0.660	0.120	0.551	0.144
190	0.602	0.132	0.851	0.093	0.785	0.101	0.688	0.115	0.575	0.138
200	0.626	0.126	0.882	0.090	0.814	0.097	0.715	0.111	0.599	0.132
210	0.651	0.122	0.911	0.087	0.843	0.094	0.741	0.107	0.622	0.127
220	0.674	0.117	0.940	0.084	0.871	0.091	0.767	0.103	0.645	0.123
230	0.697	0.114	0.969	0.082	0.898	0.088	0.792	0.100	0.667	0.119
240	0.720	0.110	0.996	0.080	0.924	0.086	0.817	0.097	0.689	0.115
250	0.742	0.107	1.023	0.077	0.950	0.083	0.841	0.094	0.711	0.111

Fire resistance class R0

Type	K47		K47-V8		K47-V10		K47-VV		K55-V8	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.707	0.112	0.653	0.121	0.520	0.152	0.440	0.180	0.512	0.155
170	0.740	0.107	0.684	0.116	0.546	0.145	0.463	0.171	0.537	0.147
180	0.772	0.103	0.714	0.111	0.572	0.139	0.486	0.163	0.563	0.141
190	0.802	0.099	0.744	0.107	0.597	0.133	0.508	0.156	0.588	0.135
200	0.832	0.095	0.772	0.103	0.621	0.128	0.530	0.149	0.612	0.129
210	0.861	0.092	0.800	0.099	0.645	0.123	0.551	0.144	0.636	0.125
220	0.889	0.089	0.827	0.096	0.669	0.118	0.572	0.138	0.659	0.120
230	0.917	0.086	0.853	0.093	0.692	0.115	0.593	0.134	0.682	0.116
240	0.943	0.084	0.879	0.090	0.714	0.111	0.613	0.129	0.704	0.113
250	0.969	0.082	0.904	0.088	0.736	0.108	0.633	0.125	0.726	0.109

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Building physics

Schöck Isokorb® type K

Fire resistance class R0

Type	K55-V10		K55-VV		K65-V8		K65-V10		K65-VV	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.485	0.163	0.371	0.214	0.466	0.170	0.455	0.174	0.352	0.225
170	0.510	0.155	0.391	0.203	0.490	0.162	0.478	0.166	0.371	0.214
180	0.534	0.148	0.410	0.193	0.514	0.154	0.502	0.158	0.390	0.203
190	0.558	0.142	0.430	0.184	0.537	0.147	0.524	0.151	0.408	0.194
200	0.581	0.136	0.449	0.177	0.560	0.142	0.547	0.145	0.426	0.186
210	0.604	0.131	0.467	0.169	0.582	0.136	0.568	0.139	0.444	0.178
220	0.627	0.126	0.486	0.163	0.604	0.131	0.590	0.134	0.462	0.171
230	0.649	0.122	0.504	0.157	0.625	0.127	0.611	0.130	0.480	0.165
240	0.670	0.118	0.522	0.152	0.646	0.123	0.632	0.125	0.497	0.159
250	0.691	0.115	0.539	0.147	0.667	0.119	0.652	0.121	0.514	0.154

Fire resistance class R0

Type	K75-V8		K75-V10		K75-VV		K90-V8		K90-V10	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.389	0.203	0.381	0.208	0.349	0.227	0.343	0.231	0.337	0.235
170	0.410	0.193	0.402	0.197	0.368	0.215	0.362	0.219	0.356	0.223
180	0.431	0.184	0.422	0.188	0.387	0.205	0.381	0.208	0.374	0.212
190	0.451	0.176	0.442	0.179	0.405	0.196	0.399	0.199	0.392	0.202
200	0.471	0.168	0.461	0.172	0.423	0.187	0.417	0.190	0.409	0.193
210	0.490	0.162	0.480	0.165	0.441	0.180	0.434	0.182	0.427	0.186
220	0.509	0.156	0.499	0.159	0.459	0.173	0.452	0.175	0.444	0.178
230	0.528	0.150	0.518	0.153	0.476	0.166	0.469	0.169	0.461	0.172
240	0.547	0.145	0.536	0.148	0.493	0.161	0.486	0.163	0.478	0.166
250	0.565	0.140	0.554	0.143	0.510	0.155	0.502	0.158	0.494	0.160

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Schöck Isokorb® type K

Fire resistance class R0

Type	K90-VV		K100-V10		K100-VV		K110-V10		K110-V12	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.320	0.248	0.328	0.241	0.312	0.254				
170	0.338	0.235	0.346	0.229	0.329	0.241				
180	0.355	0.223	0.364	0.218	0.346	0.229	0.212	0.378	0.205	0.391
190	0.372	0.213	0.381	0.208	0.363	0.218	0.222	0.360	0.215	0.372
200	0.389	0.204	0.399	0.199	0.379	0.209	0.233	0.343	0.225	0.355
210	0.406	0.195	0.416	0.191	0.395	0.200	0.244	0.328	0.236	0.340
220	0.422	0.188	0.432	0.183	0.412	0.192	0.254	0.315	0.246	0.326
230	0.438	0.181	0.449	0.176	0.427	0.185	0.264	0.303	0.256	0.313
240	0.454	0.174	0.465	0.170	0.443	0.179	0.275	0.291	0.266	0.301
250	0.470	0.168	0.481	0.165	0.459	0.173	0.285	0.281	0.276	0.290

Fire resistance class R0

Type	K110-V14		K150-V10		K150-V12		K150-V14	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
180			0.183	0.437	0.178	0.450		
190	0.206	0.388	0.192	0.416	0.187	0.428	0.180	0.444
200	0.216	0.371	0.202	0.396	0.196	0.408	0.189	0.424
210	0.226	0.354	0.211	0.379	0.205	0.390	0.198	0.405
220	0.236	0.340	0.220	0.363	0.214	0.374	0.206	0.388
230	0.245	0.326	0.229	0.349	0.223	0.359	0.215	0.372
240	0.255	0.314	0.238	0.335	0.232	0.345	0.223	0.358
250	0.264	0.303	0.247	0.323	0.240	0.333	0.232	0.345

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Building physics

Schöck Isokorb® type K

Fire resistance class REI120

Type	K10		K10-V8		K20		K20-V8		K25	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.979	0.081	0.897	0.088	0.816	0.097	0.758	0.104	0.736	0.108
170	1.018	0.078	0.934	0.085	0.852	0.093	0.792	0.100	0.770	0.103
180	1.056	0.075	0.970	0.082	0.886	0.089	0.825	0.096	0.802	0.099
190	1.092	0.073	1.005	0.079	0.919	0.086	0.857	0.092	0.834	0.095
200	1.126	0.070	1.039	0.076	0.951	0.083	0.888	0.089	0.865	0.092
210	1.160	0.068	1.071	0.074	0.983	0.081	0.918	0.086	0.894	0.089
220	1.192	0.066	1.102	0.072	1.013	0.078	0.947	0.084	0.923	0.086
230	1.223	0.065	1.132	0.070	1.042	0.076	0.976	0.081	0.951	0.083
240	1.252	0.063	1.162	0.068	1.070	0.074	1.003	0.079	0.978	0.081
250	1.281	0.062	1.190	0.067	1.097	0.072	1.030	0.077	1.004	0.079

Fire resistance class REI120

Type	K25-V8		K25-V10		K35		K35-V8		K35-V10	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.678	0.117	0.597	0.133	0.685	0.116	0.634	0.125	0.576	0.138
170	0.710	0.112	0.626	0.127	0.717	0.110	0.665	0.119	0.604	0.131
180	0.741	0.107	0.654	0.121	0.748	0.106	0.694	0.114	0.632	0.125
190	0.771	0.103	0.682	0.116	0.778	0.102	0.723	0.110	0.659	0.120
200	0.800	0.099	0.709	0.112	0.808	0.098	0.751	0.105	0.685	0.116
210	0.828	0.096	0.735	0.108	0.836	0.095	0.778	0.102	0.711	0.111
220	0.856	0.093	0.760	0.104	0.864	0.092	0.805	0.098	0.736	0.108
230	0.883	0.090	0.785	0.101	0.891	0.089	0.830	0.095	0.760	0.104
240	0.909	0.087	0.810	0.098	0.917	0.086	0.856	0.093	0.784	0.101
250	0.934	0.085	0.834	0.095	0.942	0.084	0.880	0.090	0.807	0.098

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Schöck Isokorb® type K

Fire resistance class REI120

Type	K35-VV		K45		K45-V8		K45-V10		K45-VV	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.466	0.170	0.638	0.124	0.593	0.133	0.527	0.150	0.447	0.177
170	0.490	0.162	0.668	0.119	0.622	0.127	0.553	0.143	0.470	0.168
180	0.514	0.154	0.698	0.114	0.650	0.122	0.579	0.137	0.493	0.161
190	0.537	0.148	0.726	0.109	0.678	0.117	0.604	0.131	0.515	0.154
200	0.559	0.142	0.755	0.105	0.705	0.112	0.629	0.126	0.537	0.147
210	0.582	0.136	0.782	0.101	0.731	0.108	0.653	0.121	0.559	0.142
220	0.604	0.131	0.809	0.098	0.757	0.105	0.677	0.117	0.580	0.137
230	0.625	0.127	0.834	0.095	0.781	0.101	0.700	0.113	0.601	0.132
240	0.646	0.123	0.860	0.092	0.806	0.098	0.723	0.110	0.621	0.127
250	0.667	0.119	0.884	0.090	0.830	0.095	0.745	0.106	0.641	0.123

Fire resistance class REI120

Type	K47		K47-V8		K47-V10		K47-VV		K55-V8	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.605	0.131	0.565	0.140	0.462	0.171	0.399	0.199	0.456	0.174
170	0.634	0.125	0.593	0.134	0.486	0.163	0.420	0.189	0.480	0.165
180	0.663	0.119	0.620	0.128	0.510	0.155	0.441	0.180	0.503	0.158
190	0.691	0.115	0.647	0.122	0.533	0.149	0.461	0.172	0.526	0.151
200	0.718	0.110	0.673	0.118	0.555	0.143	0.481	0.165	0.548	0.145
210	0.745	0.106	0.698	0.113	0.577	0.137	0.501	0.158	0.570	0.139
220	0.770	0.103	0.723	0.110	0.599	0.132	0.521	0.152	0.591	0.134
230	0.796	0.100	0.747	0.106	0.620	0.128	0.540	0.147	0.612	0.129
240	0.820	0.097	0.771	0.103	0.641	0.124	0.559	0.142	0.633	0.125
250	0.844	0.094	0.794	0.100	0.662	0.120	0.577	0.137	0.653	0.121

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Building physics

Schöck Isokorb® type K

Fire resistance class REI120

Type	K55-V10		K55-VV		K65-V8		K65-V10		K65-VV	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.435	0.182	0.340	0.233	0.419	0.189	0.410	0.193	0.324	0.244
170	0.458	0.173	0.359	0.221	0.442	0.179	0.432	0.183	0.342	0.231
180	0.480	0.165	0.377	0.210	0.463	0.171	0.453	0.175	0.360	0.220
190	0.502	0.158	0.395	0.200	0.485	0.163	0.474	0.167	0.377	0.210
200	0.523	0.151	0.413	0.192	0.506	0.157	0.495	0.160	0.394	0.201
210	0.545	0.145	0.431	0.184	0.526	0.150	0.515	0.154	0.411	0.193
220	0.565	0.140	0.448	0.177	0.547	0.145	0.535	0.148	0.428	0.185
230	0.586	0.135	0.465	0.170	0.566	0.140	0.555	0.143	0.444	0.178
240	0.606	0.131	0.482	0.164	0.586	0.135	0.574	0.138	0.460	0.172
250	0.625	0.127	0.498	0.159	0.605	0.131	0.593	0.134	0.476	0.166

Fire resistance class REI120

Type	K75-V8		K75-V10		K75-VV		K90-V8		K90-V10	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.356	0.222	0.350	0.227	0.322	0.246	0.317	0.249	0.312	0.254
170	0.376	0.211	0.369	0.215	0.340	0.233	0.335	0.236	0.329	0.240
180	0.395	0.201	0.387	0.204	0.357	0.222	0.352	0.225	0.346	0.229
190	0.413	0.192	0.406	0.195	0.375	0.211	0.369	0.215	0.363	0.218
200	0.432	0.183	0.424	0.187	0.392	0.202	0.386	0.205	0.380	0.209
210	0.450	0.176	0.442	0.179	0.408	0.194	0.403	0.197	0.396	0.200
220	0.468	0.169	0.459	0.172	0.425	0.186	0.419	0.189	0.412	0.192
230	0.485	0.163	0.477	0.166	0.441	0.180	0.435	0.182	0.428	0.185
240	0.503	0.158	0.494	0.160	0.457	0.173	0.451	0.176	0.444	0.178
250	0.520	0.152	0.511	0.155	0.473	0.167	0.467	0.170	0.459	0.172

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Schöck Isokorb® type K

Fire resistance class REI120

Type	K90-VV		K100-V10		K100-VV		K110-V10		K110-V12	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.297	0.266	0.304	0.260	0.290	0.273				
170	0.314	0.252	0.321	0.247	0.306	0.259				
180	0.330	0.240	0.338	0.235	0.322	0.246	0.202	0.397	0.195	0.410
190	0.346	0.229	0.354	0.224	0.338	0.234	0.212	0.377	0.205	0.390
200	0.362	0.219	0.370	0.214	0.354	0.224	0.222	0.360	0.215	0.372
210	0.378	0.210	0.386	0.205	0.369	0.215	0.232	0.344	0.225	0.356
220	0.393	0.201	0.402	0.197	0.384	0.206	0.242	0.330	0.235	0.341
230	0.409	0.194	0.418	0.190	0.399	0.198	0.252	0.317	0.244	0.327
240	0.424	0.187	0.433	0.183	0.414	0.191	0.262	0.305	0.254	0.315
250	0.439	0.181	0.448	0.177	0.429	0.185	0.272	0.294	0.263	0.304

Fire resistance class REI120

Type	K110-V14		K150-V10		K150-V12		K150-V14	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
180			0.176	0.456	0.171	0.469		
190	0.197	0.406	0.185	0.433	0.179	0.446	0.173	0.462
200	0.207	0.387	0.194	0.413	0.188	0.425	0.182	0.440
210	0.216	0.370	0.203	0.395	0.197	0.406	0.190	0.421
220	0.225	0.355	0.211	0.378	0.206	0.389	0.198	0.403
230	0.235	0.341	0.220	0.363	0.214	0.374	0.207	0.387
240	0.244	0.328	0.229	0.349	0.223	0.359	0.215	0.372
250	0.253	0.316	0.238	0.337	0.231	0.346	0.223	0.359

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

i Characteristic building-physical values

For further characteristic building-physical values please contact Application Engineering (Contact see page 3).

Schöck Isokorb® type Q

Fire resistance class R0

Type	Q10		Q20		Q30		Q40		Q50	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	1.443	0.055	1.378	0.058	1.319	0.061	1.214	0.066	1.125	0.071
170	1.482	0.054	1.418	0.056	1.358	0.059	1.253	0.064	1.163	0.069
180	1.519	0.053	1.454	0.055	1.395	0.057	1.291	0.062	1.200	0.067
190	1.553	0.052	1.489	0.054	1.430	0.056	1.326	0.060	1.235	0.065
200	1.585	0.050	1.522	0.053	1.463	0.055	1.359	0.059	1.269	0.063
210	1.615	0.050	1.552	0.052	1.495	0.054	1.391	0.058	1.301	0.062
220	1.643	0.049	1.582	0.051	1.524	0.052	1.421	0.056	1.331	0.060
230	1.670	0.048	1.609	0.050	1.552	0.052	1.450	0.055	1.360	0.059
240	1.696	0.047	1.635	0.049	1.579	0.051	1.477	0.054	1.388	0.058
250	1.720	0.047	1.660	0.048	1.604	0.050	1.503	0.053	1.414	0.057

Fire resistance class R0

Type	Q70		Q80		Q90		Q100		Q110	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	1.098	0.073								
170	1.136	0.070	1.021	0.078	0.939	0.085				
180	1.173	0.068	1.057	0.076	0.974	0.082	0.831	0.096	0.758	0.106
190	1.208	0.066	1.091	0.073	1.007	0.079	0.862	0.093	0.787	0.102
200	1.241	0.064	1.124	0.071	1.039	0.077	0.892	0.090	0.816	0.098
210	1.273	0.063	1.155	0.069	1.069	0.075	0.921	0.087	0.843	0.095
220	1.303	0.061	1.185	0.068	1.099	0.073	0.949	0.084	0.870	0.092
230	1.332	0.060	1.214	0.066	1.127	0.071	0.976	0.082	0.896	0.089
240	1.360	0.059	1.241	0.064	1.154	0.069	1.002	0.080	0.921	0.087
250	1.387	0.058	1.268	0.063	1.181	0.068	1.027	0.078	0.946	0.085

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Schöck Isokorb® type Q

Fire resistance class REI120

Type	Q10		Q20		Q30		Q40		Q50	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	1.050	0.076	1.015	0.079	0.982	0.081	0.923	0.087	0.870	0.092
170	1.088	0.074	1.053	0.076	1.020	0.078	0.959	0.083	0.906	0.088
180	1.124	0.071	1.089	0.073	1.055	0.076	0.994	0.080	0.940	0.085
190	1.159	0.069	1.123	0.071	1.089	0.073	1.028	0.078	0.973	0.082
200	1.192	0.067	1.156	0.069	1.122	0.071	1.060	0.075	1.004	0.080
210	1.224	0.065	1.187	0.067	1.153	0.069	1.091	0.073	1.034	0.077
220	1.254	0.064	1.218	0.066	1.183	0.068	1.120	0.071	1.063	0.075
230	1.283	0.062	1.246	0.064	1.212	0.066	1.149	0.070	1.092	0.073
240	1.311	0.061	1.274	0.063	1.240	0.065	1.176	0.068	1.119	0.072
250	1.337	0.060	1.301	0.061	1.266	0.063	1.202	0.067	1.145	0.070

Fire resistance class REI120

Type	Q70		Q80		Q90		Q100		Q110	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
170	0.889	0.090								
180	0.923	0.087	0.849	0.094	0.795	0.101				
190	0.955	0.084	0.881	0.091	0.825	0.097	0.725	0.110	0.671	0.119
200	0.987	0.081	0.911	0.088	0.854	0.094	0.752	0.106	0.697	0.115
210	1.017	0.079	0.940	0.085	0.882	0.091	0.779	0.103	0.723	0.111
220	1.046	0.076	0.968	0.083	0.910	0.088	0.804	0.099	0.747	0.107
230	1.074	0.075	0.995	0.080	0.936	0.085	0.829	0.096	0.771	0.104
240	1.101	0.073	1.022	0.078	0.962	0.083	0.854	0.094	0.794	0.101
250	1.127	0.071	1.047	0.076	0.987	0.081	0.877	0.091	0.817	0.098

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Characteristic building-physical values

For further characteristic building-physical values please contact Application Engineering (Contact see page 3).

Building physics

Schöck Isokorb® type KS, QS

Fire resistance class R0

Type	KS14-V8		KS14-V10		KS14-VV		KS20-V10		KS20-V12	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
180	0.221	0.362	0.206	0.388	0.221	0.362	0.117	0.684	0.112	0.716
200	0.243	0.329	0.227	0.352	0.243	0.329	0.129	0.619	0.124	0.648
220	0.265	0.302	0.248	0.323	0.265	0.302	0.141	0.565	0.135	0.592
240	0.287	0.279	0.268	0.299	0.287	0.279	0.154	0.521	0.147	0.545
250	0.297	0.269	0.278	0.288	0.297	0.269	0.160	0.501	0.153	0.524
260	0.308	0.260	0.288	0.278	0.308	0.260	0.166	0.483	0.158	0.505
280	0.328	0.244	0.307	0.261	0.328	0.244	0.177	0.451	0.170	0.471

Fire resistance class R0

Type	QS10		QS12	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
180	0.325	0.246	0.288	0.278
200	0.357	0.224	0.316	0.253
220	0.387	0.207	0.344	0.233
240	0.416	0.192	0.370	0.216
250	0.431	0.186	0.383	0.209
260	0.445	0.180	0.396	0.202
280	0.473	0.169	0.422	0.190

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Schöck Isokorb® type KST

Fire resistance class R0

Type	KST16		KST22	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
160	0.114	0.705	0.076	1.057
170	0.120	0.665	0.080	0.997
180	0.127	0.630	0.085	0.943
190	0.134	0.598	0.089	0.895
200	0.140	0.570	0.094	0.852
210	0.147	0.544	0.098	0.813
220	0.154	0.521	0.103	0.777
230	0.160	0.500	0.107	0.745
240	0.167	0.480	0.112	0.715
250	0.173	0.462	0.116	0.688

Fire resistance class R0

Type	KST-QST16		KST-QST22	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
80	0.083	0.960	0.062	1.293

Fire resistance class R0

Type	KST-ZST16		KST-ZST22	
H [mm]	R_{eq}	λ_{eq}	R_{eq}	λ_{eq}
60	0.136	0.588	0.074	1.085

- R_{eq} Equivalent thermal transmission resistance in $(m^2 \cdot K)/W$
- λ_{eq} Equivalent thermal conductivity in $W/(m \cdot K)$

Building physics

Reinforced concrete/reinforced concrete

Steel/reinforced concrete

Timber/reinforced concrete

Steel/steel

Notes

Notes

- The short Schöck Isokorb® types QP, QP+QP, QPZ, HP, EQ are, as a basic principle, to be combined with Schöck Isokorb® types of length 1 m.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- A static verification is to be provided for the adjacent reinforced concrete structural component on both sides of the Schöck Isokorb®.
- The tight fit between the pressure bearings and the concrete must be ensured, therefore construction joints are to be arranged underneath the pressure bearings. With construction joints between precast concrete members and the Schöck Isokorb® an in-situ concreting or grouting strips ≥ 100 mm is carried out.
- The fire protection board of the Schöck Isokorb® may not be penetrated by nails or screws.

Special constructions - bending of reinforcing steel

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 page 3). 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. The bending of bars required for special constructions are carried out in the factory in each case on the individual steel bar. With this, it is monitored and ensured that the conditions of the general building supervisory approvals and of BS EN1992 1-1(EC2) and BS EN1992-1-1/NA are observed with regard to bending of reinforcing steel.

Attention: If reinforcing steel of the Schöck Isokorb® is bent or rebent on-site the observance and monitoring of the relevant conditions lies outside the influence of Schöck Bauteile GmbH. Therefore, in such cases, our warranty ceases.

Adjustment of load capacities

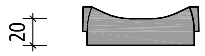
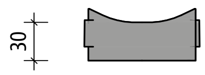
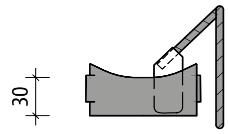
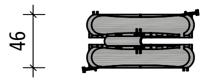
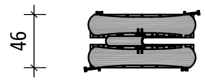
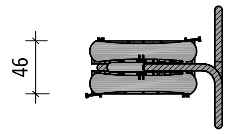
A listing of the new product programme in comparison with the previous programme is reproduced in the following table.

New product programme		Previous product programme
K10	remains	K10
K20	remains	K20
K25	replaced	K30
K35	replaced	K40
K45	amended	–
K47	replaced	K50
K55	amended	–
K65	replaced	K60
K75	replaced	K70
	not applicable	K80
K90	remains	K90
K100	remains	K100
K110	amended	–
K150	amended	–

Notes
- Check load-bearing capacity with substitution of K30 by K25.
- Check load-bearing capacity with substitution of K40 by K35.
- Check load-bearing capacity with substitution of K50 by K47.
- Check load-bearing capacity with substitution of K60 by K65.
- Check load-bearing capacity with substitution of K70 by K75.

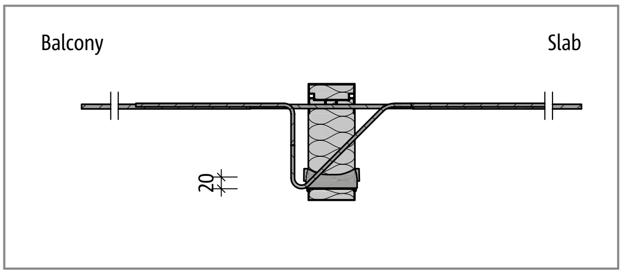
HTE Compact

Summary of the application of the HTE Compact pressure bearing in the Schöck Isokorb® types.

HTE Compact 20	HTE Compact 30	HTE Compact 30 with special stirrup
		
		

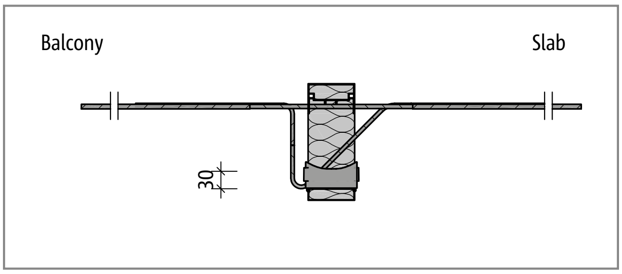
Schöck Isokorb® type K

HTE Compact 20



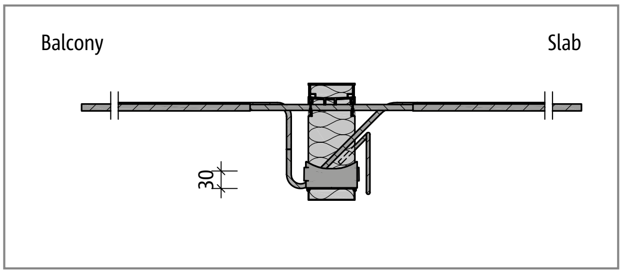
Schöck Isokorb® type K10 to K35: Product section

HTE Compact 30



Schöck Isokorb® type K45 and K47: Product section

HTE Compact 30 with special stirrup

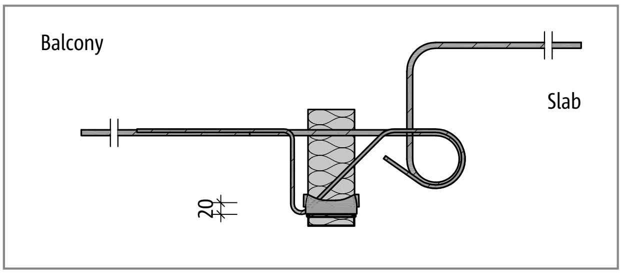


Schöck Isokorb® type K55 to K100: Product section

HTE Compact

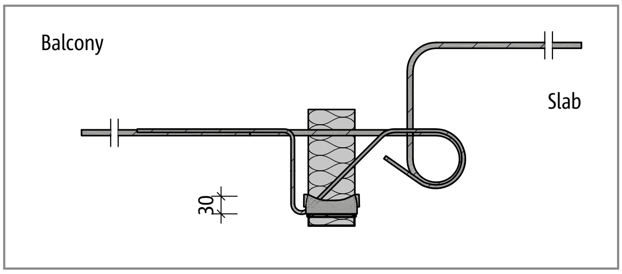
Schöck Isokorb® type K-HV (analogue type K-BH, K-WO, K-WU)

HTE Compact 20



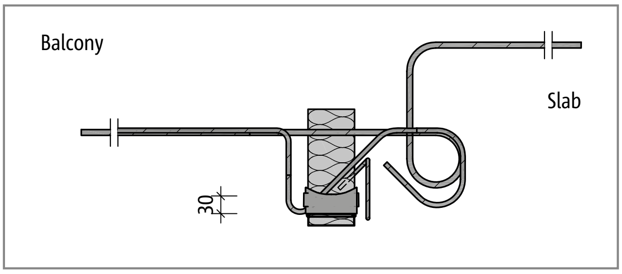
Schöck Isokorb® type K20-HV and K30-HV: Product section

HTE Compact 30



Schöck Isokorb® type K50-HV: Product section

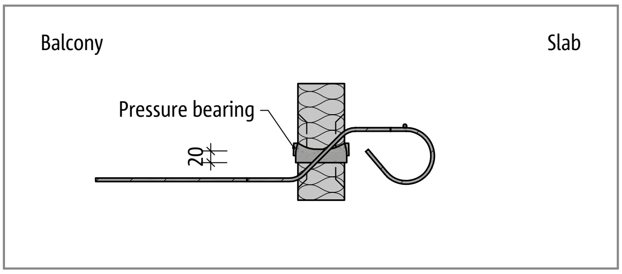
HTE Compact 30 with special stirrup



Schöck Isokorb® type K60-HV: Product section

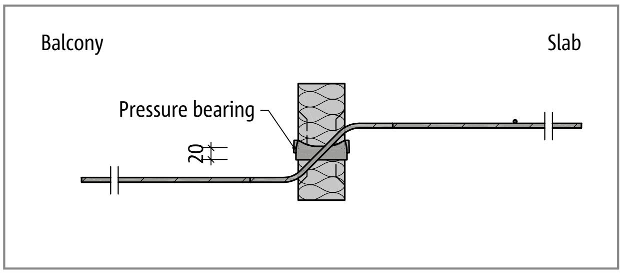
Schöck Isokorb® type Q

HTE Compact 20



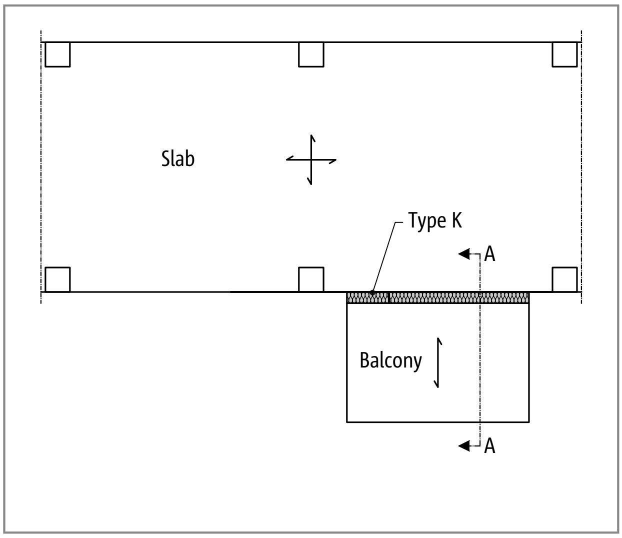
Schöck Isokorb® type Q10 to Q50: Product section

HTE Compact 20

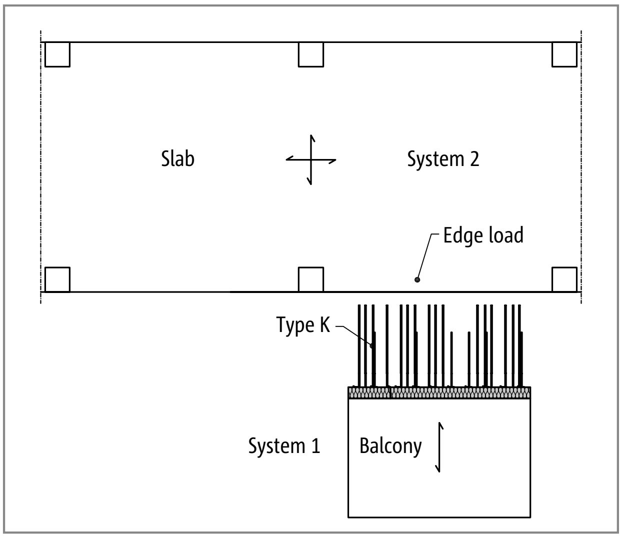


Schöck Isokorb® type Q70 to Q110: Product section

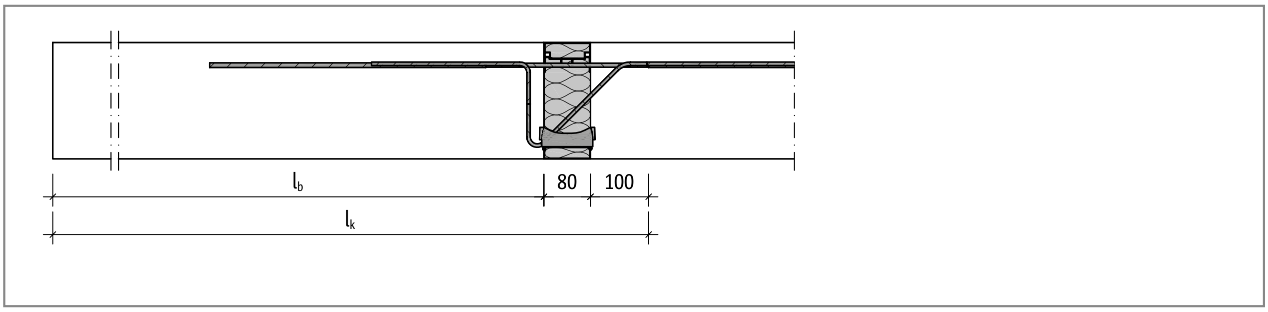
FEM guidelines



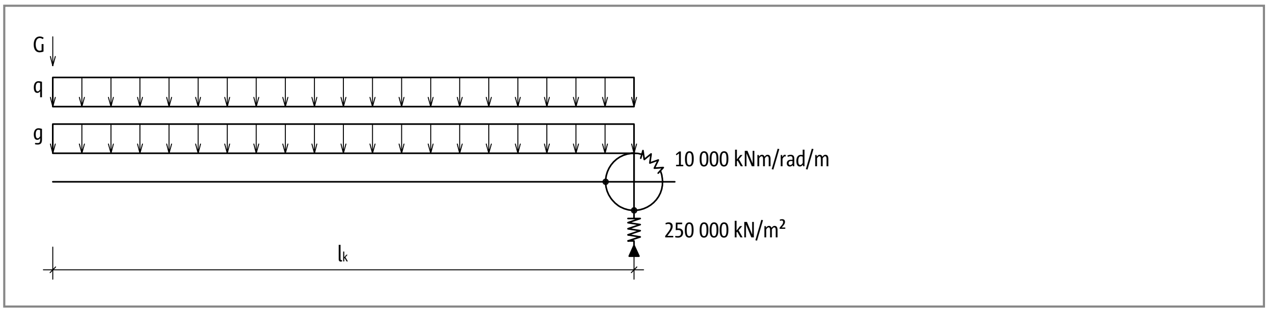
Static overall system balcony and floor



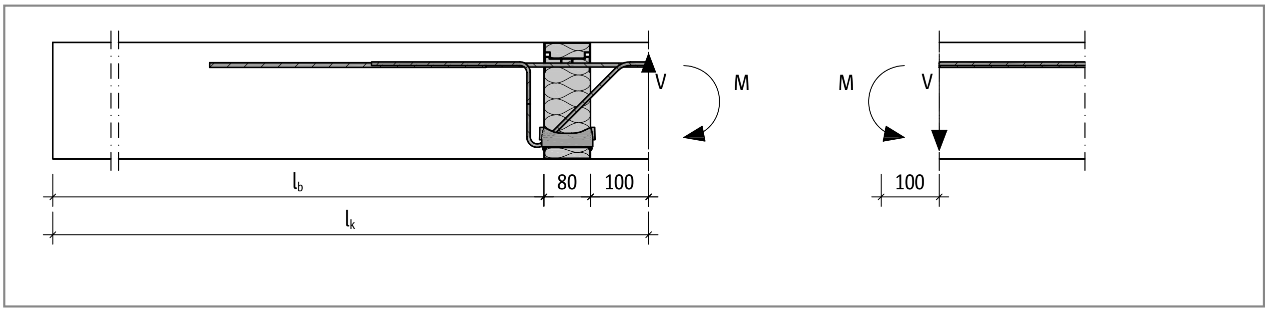
For the design of the floor and of the balcony the balcony slab is to be decoupled from the overall system (System 1 and 2)



Schöck Isokorb® type K: System cantilever length (l_k) for design and geometric cantilever length (l_b)



Schöck Isokorb® type KXT-Combar: Approximate adoption of the spring stiffness



Schöck Isokorb® type K: Approximate adoption of the spring stiffness

Reinforced concrete/reinforced concrete

FEM guidelines

FEM guidelines

Recommended method for the design of Schöck Isokorb® types by means of FEM systems:

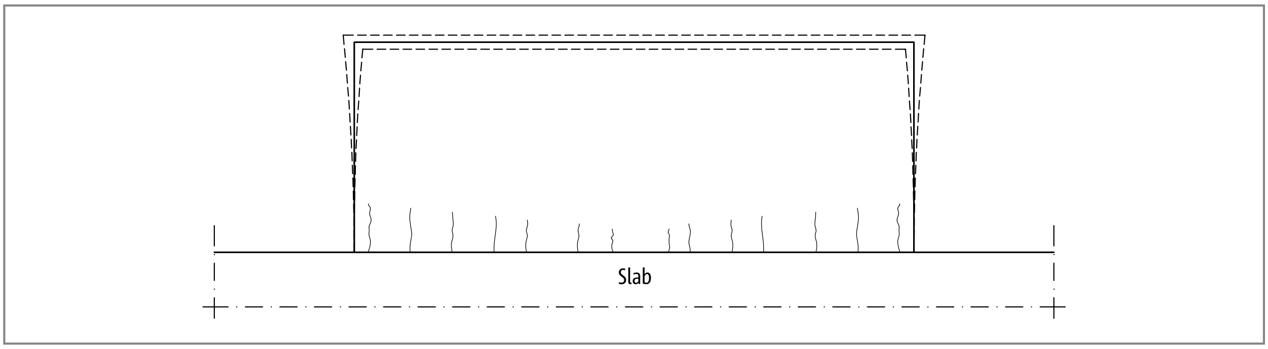
- Separate balcony slab from the supporting structure of the building
- Determine internal forces on the balcony slab support taking into account the spring stiffness values (satisfactorily accurate approximation of the Schöck Isokorb® load-bearing behaviour)
  10,000 kNm/rad/m (rotation)
  250,000 kN/m^2 (vertical)
- Select Schöck Isokorb® type and add the calculated values v_{ed} and m_{ed} as external edge loads to the load-bearing structure of the building.

The stiffnesses in the area of the support of the load-bearing structure (inner slab/wall) are, in the normal case, assumed to be infinitely stiff . Only with very different stiffness relationships of connecting and supporting structural components are the linearly changing moments and shear forces along the edges of the slab to be taken into account.
The achievable internal forces are used for both the design of the Schöck Isokorb®, as well as for the design of the inner slab and wall construction of the building.

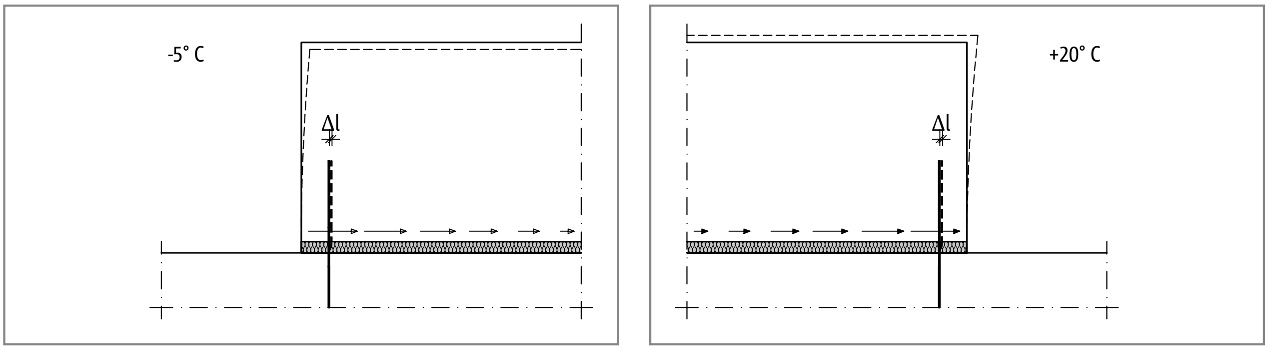
i FEM guidelines

- The Schöck Isokorb® can transmit no twisting moments.

Fatigue/Temperature effect



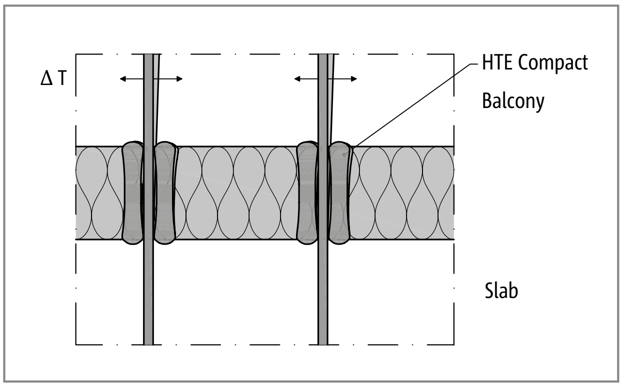
Balcony slab without Schöck Isokorb®: Crack formation through fatigue possible



Schöck Isokorb®: Displacement of the outer bars of a balcony slab by Δl as a result of temperature deformation

Balcony slabs, external walkways and canopy constructions expand with warming and contract with cooling. With a continuous reinforced concrete slab cracks in the reinforced concrete slab can result at this point through which moisture can penetrate. The Schöck Isokorb® defines a joint which with correct execution prevents cracks in the concrete.

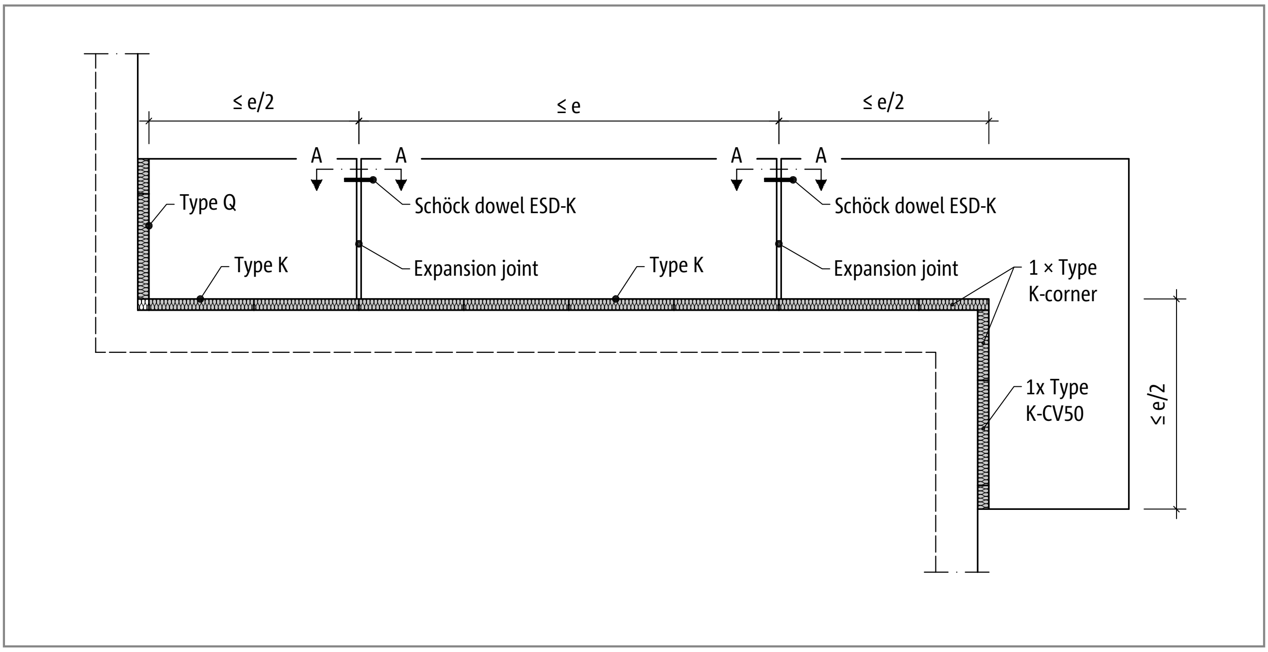
The tension bars, the shear force bars and the HTE Compact pressure bearings in the Schöck Isokorb® are consistently deflected transverse to their axis through thermal stressing. Therefore a verification of the fatigue safety is to be carried out for the Schöck Isokorb®. This verification of the fatigue safety is provided through the observation of the respective expansion joint spacings ‘e’ for the Schöck Isokorb® type (as per approval document). Thus material fatigue and the failure of the structural component over the planned useful life is excluded.



Schöck Isokorb® detail: deflection of the pressure bearing as a result of temperature difference

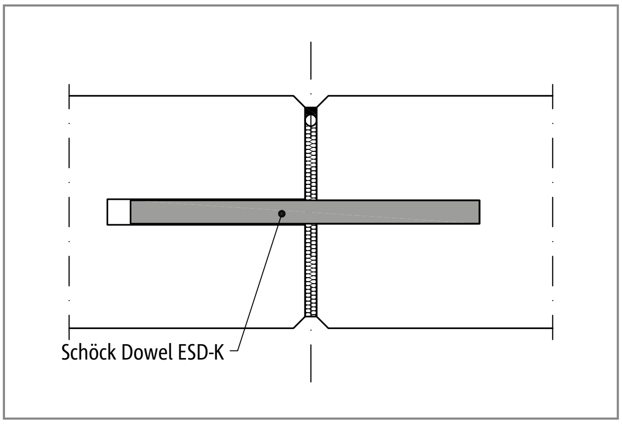
The HTE Compact pressure bearing compensates the movement of the structural component through individual inclination of each individual compression element. The bars are deflected only in the fatigue safe area.

Fatigue | Expansion joint spacing

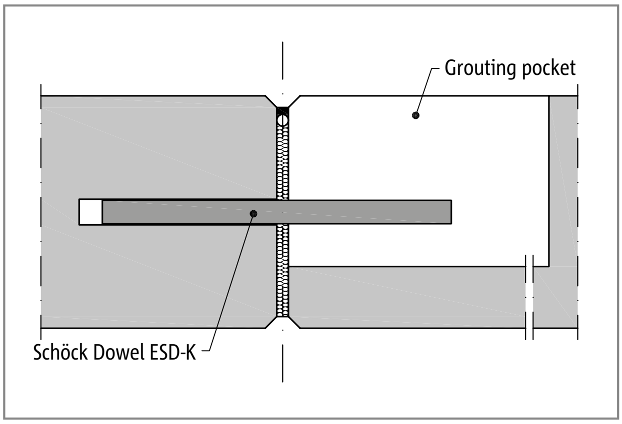


Schöck Isokorb® type K: Expansion joint formation with longitudinally displaceable shear force dowel, e.g. Schöck dowel

The maximum expansion joint spacings ‘e’ of the Schöck Isokorb® types are different as bar diameter and type of construction of the Schöck Isokorb® types are different. For the respective Schöck Isokorb® type the maximum expansion joint spacings are given in the Product chapter.
The shear force transmission in the expansion joint can be ensured using a longitudinally displaceable shear force dowel, e.g. Schöck Dowel.



Schöck Dowel: Expansion joint formation in in-situ concrete



Schöck Dowel: Expansion joint formation precast concrete balcony

Expansion joints

- Details for the formation of expansion joints see also: Technical Information Schöck Dowel Systems application examples.

Indicative minimum concrete strength classes

The concrete cover CV for balcony slab connections with Schöck Isokorb® and the indicative minimum concrete strength class are selected depending on exposure classes and the approval document. The higher minimum concrete strength class is relevant.
In addition, the indicative minimum concrete strength classes of exposure classes XF1, and XF3 are to be noted.

Indicative minimum concrete strength classes (extract from BS EN 1992-1-1 Table 4.1 and BS8500-1:2006)

Exposure class	Indicative minimum concrete strength classes			Concrete cover CV [mm]
BS EN 1992-1-1 Table 4.1	BS 8500-1:2006	Approval internal component	Approval external component	Schöck Isokorb®
XC1	C20/25	C25/30	C32/40	30
XC3/4	C40/50			35 (Δc = 5 mm)
XC3/4	C30/37			50
XD1	C35/40			50
XS1	C45/55			50 (Δc = 5 mm)
XF1, XF3	acc. to BS EN 206-1			-

Concrete cover

- Due to suitable quality measures with the Schöck Isokorb® manufacture, Δc_{dev} (BS EN 1992-1-1/NA, NDP to 4.4.1.3(3)) may be reduced by 5 mm with the determination of the concrete cover CV.
- Types K, KF, K-corner, K-HV, K-BH, K-WO, K-WU: CV30, CV35 and CV50 is the concrete cover of the tension bars.
- Type D: CV30 and CV35 is the concrete cover of the overhead tension bars. The lower tension bars, in both cases, have a concrete cover of 30 mm.
  CV50 is the concrete cover of the upper and lower tension bars.
- Types Q, Q+Q, QZ: Concrete cover balcony side under at least 30 mm (as a rule less exposed than the balcony surface).
- Types QP, QP+QP and QPZ: Concrete cover balcony below 40 mm.
- With special requirements on the concrete cover further product variants can be requested from Schöck Technical Design Department.

Construction materials

Schöck Isokorb® construction materials

Reinforcing steel	BS4449
Structural steel	S 235 JRG1, S 235 JO, S 235 J2, S 355 JR, S 355 J2, or S 355 JO according to BS EN 10025-2 for the pressure slabs
Stainless steel	Ribbed round steel B500B NR, Material No. 1.4362, 1.4571 or 1.4482 according to Approval document Z-15.7-240 Tension bars Material No. 1.4362 f_{yk} = 600 N/mm^2) Plain steel bars, Material No. 1.4571 or 1.4404 of hardening level S 460
Concrete pressure bearings	HTE Compact pressure bearings (pressure bearings made from micro-steel fibre-reinforced high performance fine concrete) HDPE plastic sheathing
Insulating material	Neopor® - this polystyrene hard foam is a registered trademark of BASF, λ = 0.031 W/m·K, building material classification B1 (flame retardant)
Fire protection material	Light building panels of building material class A1, cement-bonded fire protection panels, mineral wool: $\rho \geq$ 150 kg/m^3, melting point T $\geq$ 1000 °C and integrated fire

Connected components

Reinforcing steel	B500A, B500B or B500C acc. to BS 4449 or BS 4483
Beton	Standard concrete acc. to BS EN 206-1 with a dry apparent density of 2000 kg/m^3 to 2600 kg/m^3 (lightweight concrete is not permitted) **Indicative minimum concrete strength class of the external structural component:** Minimim C32/40 and depending on the environmental classes acc. to EC2 and NA **Indicative concrete strength class of internal structural components:** Minimum C25/30 and depending on the environmental classes acc. to EC2 and NA

Information on the bending of reinforcing steel

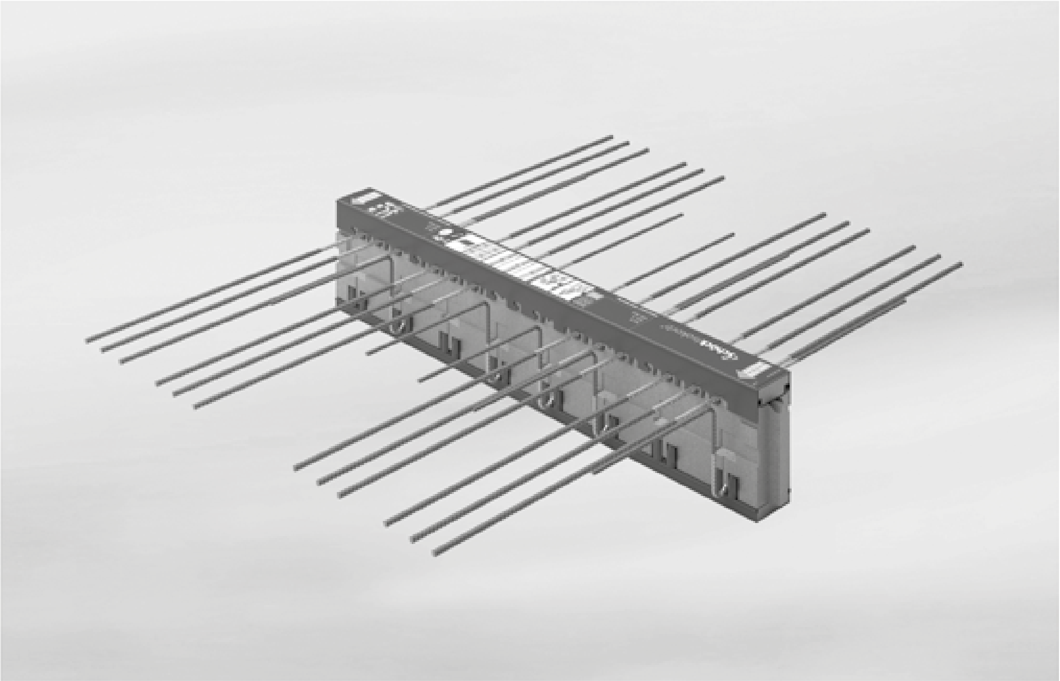
With the production of the Schöck Isokorb® in the factory it is ensured through monitoring that the conditions of the general building supervisory approval document and of BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA with regard to bending of reinforcing steel are oberved.

Attention: If reinforcing steel of the Schöck Isokorb® is bent or bent and bent back on-site, the observation and the monitoring of the respective conditions (building supervisory appoval document, 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, the warranty ceases.

Characteristic physical values

- The characteristic physical values for all products are listed in the appropriate table in the “Building physics” section.

Schöck Isokorb® type K



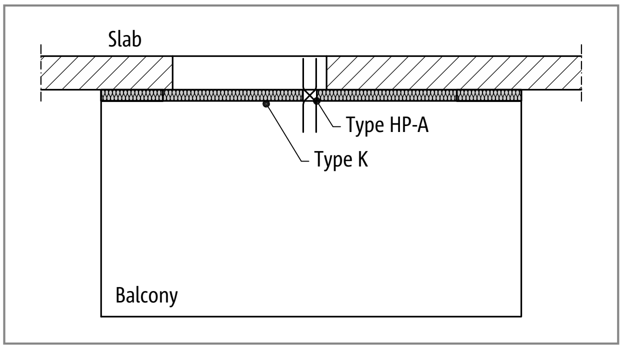
Schöck Isokorb® type K

Schöck Isokorb® type K (cantilever)
Suitable for cantilevered balconies. It transfers negative moments and positive shear forces. The Schöck Isokorb® type K of the shear force variant VV transmits negative moments, positive and negative shear forces.

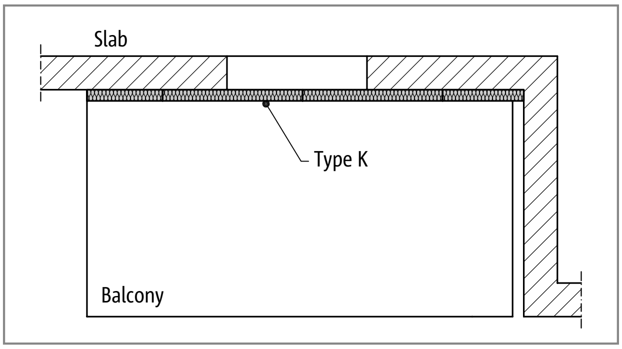
K

Reinforced concrete/reinforced concrete

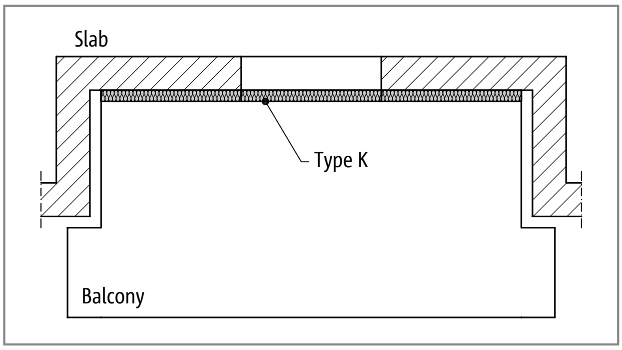
Element arrangement | Installation cross sections



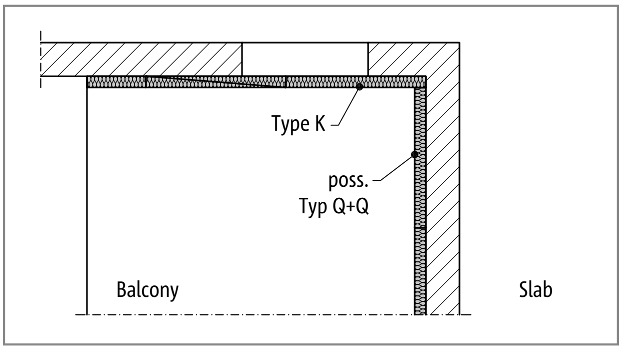
Schöck Isokorb® type K: Balcony freely cantilevered, optional with type HP-A (from page 153) with planned horizontal loads, e.g. closed balustrades



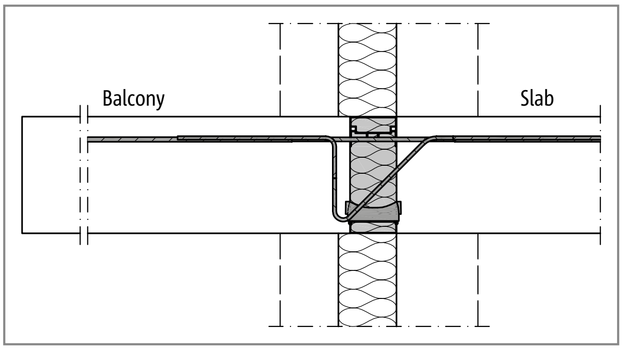
Schöck Isokorb® type K: Balcony with facade offset



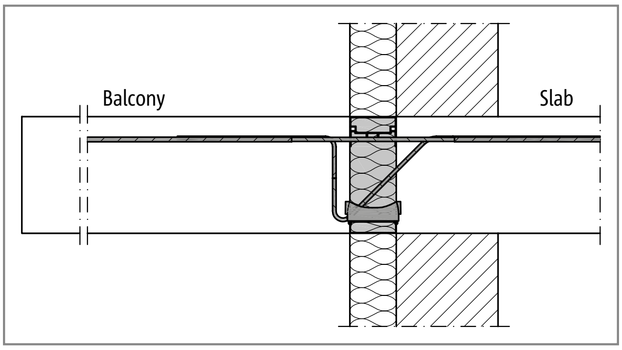
Schöck Isokorb® type K: Balcony with facade recess



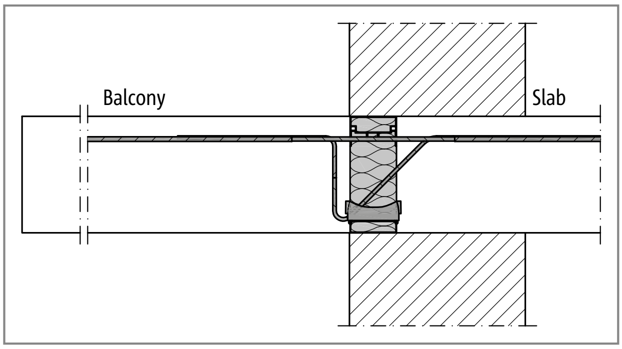
Schöck Isokorb® type K, Q+Q: Balcony with inside corner, freely supported on two sides



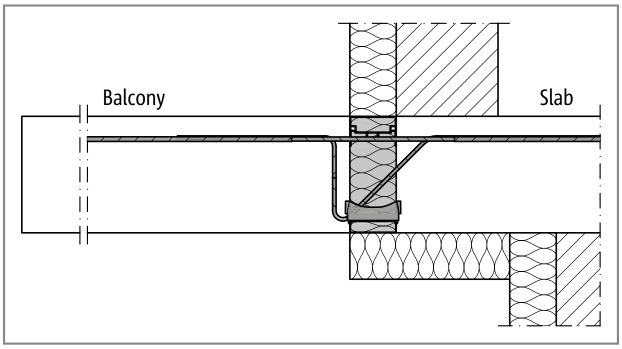
Schöck Isokorb® type K: Connection with non-load-bearing cavity wall



Schöck Isokorb® type K: Connection with thermal insulation composite system (WDVS)



Schöck Isokorb® type K: Connection with single-leaf masonry



Schöck Isokorb® type K: Connection with indirectly positioned floor and WD-VS

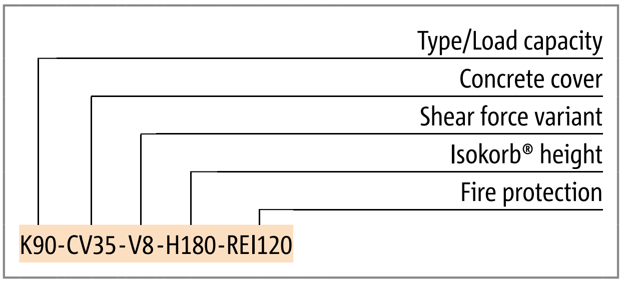
Product selection | Type designations | Special designs

Schöck Isokorb® type K variants

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

- Load-bearing level:
  K10 to K100, K110 and K150
- Concrete cover of the tension bars:
  CV30 = 30 mm, CV35 = 35 mm, CV50 = 50 mm (e.g.: K45-CV30-V6-H200)
- Shear force variant:
  Number and diameter of the shear force bars V6, V8, V10, V12, V14, VV (e.g. K45-CV30-V8-H200); varying in number and in diameter of the shear force bars
- Height:
  H = H_{min} - 250 mm for Schöck Isokorb® type K10 to K100, K110, K150 and concrete cover CV30, CV35 and CV50
- Fire resistance class:
  R0 (Standard), REI120 for types K10 to K150

Type designations in planning documents



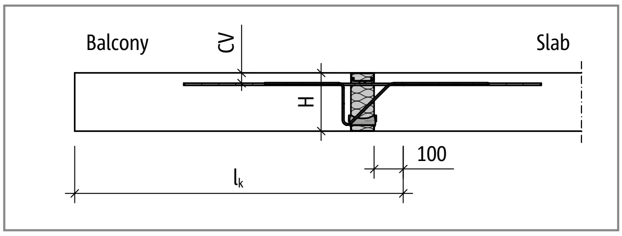
Special designs

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).
In accordance with approval heights up to 500 mm are possible.
This also applies with additional requirements as a result of precast concrete construction. For additional requirements determined by manufacturing or transportation there are solutions available with coupler bars.

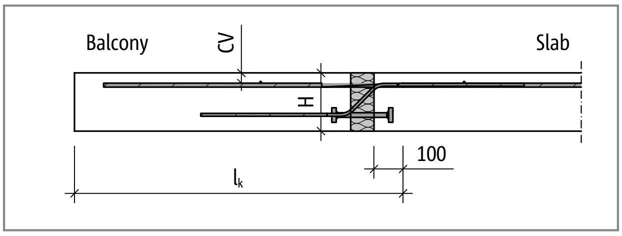
Design

Notes on design

- Minimum height H_{min} Schöck Isokorb® type K10 to K100 with CV50: H_{min}=180mm, K110 and K150 see page 56.
- For cantilever slab structures Schöck Isokorb® type K10 to K100 without live load, stressed from moment loading without direct shear force activity or light structures, please use Schöck design software or contact our application engineering dept.



Schöck Isokorb® type K: Static system



Schöck Isokorb® type K110: Static system

K

Reinforced concrete/reinforced concrete

C25/30 design

Schöck Isokorb® type				K10	K20	K25	K35	K45	K47
Design values with	Concrete cover CV [mm]			Concrete strength class ≥ C25/30					
	CV30	CV35	CV50	$m_{Rd,y}$ [kNm/m]					
Isokorb® height H [mm]	-	160	-	-7.9	-15.6	-20.5	-23.8	-26.1	-28.5
	160	-	180	-8.4	-16.5	-21.7	-25.1	-27.7	-30.3
	-	170	-	-8.9	-17.4	-23.0	-26.5	-29.3	-32.2
	170	-	190	-9.3	-18.3	-24.2	-27.8	-30.8	-34.0
	-	180	-	-9.8	-19.2	-25.5	-29.2	-32.4	-35.9
	180	-	200	-10.3	-20.1	-26.7	-30.6	-34.0	-37.7
	-	190	-	-10.7	-21.0	-27.9	-31.9	-35.6	-39.6
	190	-	210	-11.2	-21.9	-29.1	-33.3	-37.1	-41.4
	-	200	-	-11.7	-22.8	-30.3	-34.6	-38.7	-43.2
	200	-	220	-12.1	-23.7	-31.5	-36.0	-40.3	-45.1
	-	210	-	-12.6	-24.7	-32.7	-37.3	-41.9	-47.0
	210	-	230	-13.1	-25.5	-33.8	-38.7	-43.4	-48.8
	-	220	-	-13.6	-26.5	-35.0	-40.0	-45.0	-50.7
	220	-	240	-14.0	-27.4	-36.2	-41.4	-46.6	-52.5
	-	230	-	-14.5	-28.3	-37.4	-42.7	-48.2	-54.5
	230	-	250	-15.0	-29.2	-38.6	-44.1	-49.7	-56.4
	-	240	-	-15.5	-30.1	-39.8	-45.4	-51.3	-58.3
	240	-	-	-16.0	-31.0	-40.9	-46.8	-52.9	-60.2
	-	250	-	-16.5	-32.0	-42.1	-48.1	-54.4	-62.2
	250	-	-	-16.9	-32.9	-43.3	-49.5	-56.0	-64.0
Shear force variant				$v_{Rd,z}$ [kN/m]					
	V6			34.8	34.8	43.5	43.5	43.5	43.5
	V8			61.8	61.8	77.3	77.3	77.3	77.3
	V10			-	-	123.6	123.6	123.6	123.6
	VV			-	-	-	±61.8	±61.8	±61.8

Schöck Isokorb® type	K10	K20	K25	K35	K45	K47
Isokorb® length [mm]	1000	1000	1000	1000	1000	1000
Tension bars V6/V8/V10	4 ⌀ 8	8 ⌀ 8	10 ⌀ 8	12 ⌀ 8	14 ⌀ 8	15 ⌀ 8
Tension bars VV	-	-	-	14 ⌀ 8	15 ⌀ 8	8 ⌀ 12
Shear force bars V6	4 ⌀ 6	4 ⌀ 6	5 ⌀ 6	5 ⌀ 6	5 ⌀ 6	5 ⌀ 6
Shear force bars V8	4 ⌀ 8	4 ⌀ 8	5 ⌀ 8	5 ⌀ 8	5 ⌀ 8	5 ⌀ 8
Shear force bars V10	-	-	8 ⌀ 8	8 ⌀ 8	8 ⌀ 8	8 ⌀ 8
Shear force bars VV	-	-	-	4 ⌀ 8 + 4 ⌀ 8	4 ⌀ 8 + 4 ⌀ 8	4 ⌀ 8 + 4 ⌀ 8
Pressure bearing V6/V8 (piece)	4	6	7	8	7	8
Pressure bearing V10 (piece)	-	-	8	8	8	10
Pressure bearing VV (piece)	-	-	-	11	12	13

Notes on design

- Static system and infomation on the design see page 56.
- Schöck Isokorb® type K47-V10 tension bars: 7⌀12
- Schöck Isokorb® type K47-VV special stirrup: 4 piece.

K

Reinforced concrete/reinforced concrete

C25/30 design

Schöck Isokorb® type				K55	K65	K75	K90	K100	K100
Design values with	Concrete cover CV [mm]			Concrete strength class ≥ C25/30					≥ C30/37
	CV30	CV35	CV50	$m_{Rd,y}$ [kNm/m]					
Isokorb® height H [mm]	-	160	-	-32.5	-36.4	-40.4	-46.4	-46.4	-50.2
	160	-	180	-34.5	-38.7	-42.9	-49.2	-49.2	-53.2
	-	170	-	-36.7	-41.1	-45.6	-52.1	-52.1	-56.4
	170	-	190	-38.7	-43.4	-48.1	-54.9	-54.9	-59.4
	-	180	-	-40.9	-45.8	-50.8	-57.8	-57.8	-62.5
	180	-	200	-42.9	-48.1	-53.3	-60.7	-60.7	-65.6
	-	190	-	-45.1	-50.6	-56.0	-63.5	-63.5	-68.7
	190	-	210	-47.2	-52.9	-58.6	-66.4	-66.4	-71.8
	-	200	-	-49.4	-55.3	-61.3	-69.3	-69.3	-74.9
	200	-	220	-51.5	-57.7	-63.9	-72.1	-72.1	-78.0
	-	210	-	-53.7	-60.1	-66.6	-75.0	-75.0	-81.1
	210	-	230	-55.8	-62.5	-69.2	-77.8	-77.8	-84.2
	-	220	-	-58.0	-65.0	-71.7	-80.7	-80.7	-87.3
	220	-	240	-60.1	-67.4	-74.3	-83.6	-83.6	-90.4
	-	230	-	-62.4	-69.9	-76.8	-86.4	-86.4	-93.5
	230	-	250	-64.5	-72.2	-79.4	-89.3	-89.3	-96.6
	-	240	-	-66.8	-74.7	-81.9	-92.2	-92.2	-99.7
	240	-	-	-68.9	-77.0	-84.5	-95.0	-95.0	-102.8
	-	250	-	-71.2	-79.4	-87.0	-97.9	-97.9	-105.9
	250	-	-	-73.4	-81.7	-89.5	-100.7	-100.7	-109.0
Shear force variant				$v_{Rd,z}$ [kN/m]					
	V8			92.7	108.2	108.2	123.6	-	-
	V10			123.6	123.6	123.6	139.1	139.1	139.1
	VV			108.2/−61.8	108.2/−61.8	108.2/−61.8	123.6/−61.8	123.6/−61.8	123.6/−61.8

Schöck Isokorb® type	K55	K65	K75	K90	K100	K100
Isokorb® length [mm]	1000	1000	1000	1000	1000	1000
Tension bars V8/V10	8 ⌀ 12	9 ⌀ 12	10 ⌀ 12	12 ⌀ 12	13 ⌀ 12	13 ⌀ 12
Tension bars VV	9 ⌀ 12	10 ⌀ 12	11 ⌀ 12	12 ⌀ 12	13 ⌀ 12	13 ⌀ 12
Shear force bars V8	6 ⌀ 8	7 ⌀ 8	7 ⌀ 8	8 ⌀ 8	-	-
Shear force bars V10	8 ⌀ 8	8 ⌀ 8	8 ⌀ 8	9 ⌀ 8	9 ⌀ 8	9 ⌀ 8
Shear force bars VV	7 ⌀ 8 + 4 ⌀ 8	7 ⌀ 8 + 4 ⌀ 8	7 ⌀ 8 + 4 ⌀ 8	8 ⌀ 8 + 4 ⌀ 8	8 ⌀ 8 + 4 ⌀ 8	8 ⌀ 8 + 4 ⌀ 8
Pressure bearing V6/V8 (piece)	11	12	16	18	18	18
Pressure bearing VV (piece)	16	17	16	18	18	18
Special stirrup (piece)	4	4	4	4	4	4

i Notes on design

- Static system and infomation on the design see page 56.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- Note FEM guidelines if a FEM program is to be used for design.

C25/30 design

Schöck Isokorb® type				K110	K150
Design values with	Concrete cover CV [mm]			Concrete strength class ≥ C25/30	
	CV30	CV35	CV50	$m_{Rd,y}$ [kNm/m]	
Isokorb®-height H [mm]	-	180	-	-59.8	-86.5
	180	-	200	-63.5	-90.9
	-	190	-	-67.1	-95.2
	190	-	210	-70.7	-99.5
	-	200	-	-74.3	-103.8
	200	-	220	-77.9	-108.2
	-	210	-	-81.5	-112.5
	210	-	230	-85.1	-116.8
	-	220	-	-88.7	-121.1
	220	-	240	-92.3	-125.5
	-	230	-	-95.9	-129.8
	230	-	250	-99.5	-134.1
	-	240	-	-103.1	-138.4
	240	-	-	-106.7	-142.8
	-	250	-	-110.3	-147.1
	250	-	-	-113.9	-151.4
Shear force variant				$v_{Rd,z}$ [kN/m]	
	V10			96.6	96.6
	V12			144.9	144.9
	V14			208.6	208.6

Schöck Isokorb® type	K110	K150
Isokorb® length [mm]	1000	1000
Tension bars	12 ⌀ 14	14 ⌀ 14
Pressure bearing / compression bars	10 ⌀ 16	12 ⌀ 16
Shear force bars V10	4 ⌀ 10	4 ⌀ 10
Shear force bars V12	6 ⌀ 10	6 ⌀ 10
Shear force bars V14	6 ⌀ 12	6 ⌀ 12
H_{min} with V14 CV30/35 [mm]	190	190
H_{min} with V10/V12 CV50 [mm]	200	200
H_{min} with V14 CV50 [mm]	210	210

Notes on design

- Static system and infomation on the design see page 56.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- Note FEM guidelines if a FEM program is to be used for design.

Deflection/Camber

Deflection

The deflection factors given in the table (tan α [%]) result alone from the deflection of the Schöck Isokorb® under 100% steel utilisation. They serve for the estimation of the required camber. The total arithmetic camber of the balcony slab formwork results from the calculation according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA plus the deflection from Schöck Isokorb®. The camber of the balcony slab formwork to be given by the structural engineer/designer in the implementation plans (Basis: Calculated total deflection from cantilever slab + floor rotation angle + Schöck Isokorb®) should be so rounded that the scheduled drainage direction is maintained (round up: with drainage to the building facade, round down: with drainage towards the cantilever slab end).

Deflection (p) as a result of Schöck Isokorb®

$p = \tan\alpha \cdot l_k \cdot (m_{pd} / m_{Rd}) \cdot 10$ [mm]

Factors to be applied

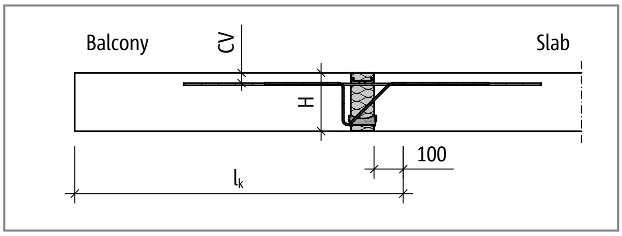
$\tan\alpha$ = apply value from table

l_k = cantilever length [m]

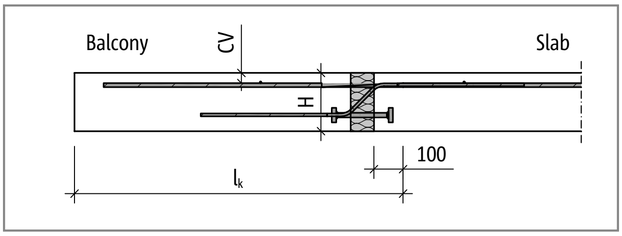
m_{pd} = relevant bending moment [kNm/m] in the ultimate limit state for the determination of the p [mm] from Schöck Isokorb®.
The load combination to be applied for the deflection is determined by the structural engineer.
(Recommendation: Load combination for the determination of the camber p : determine g+q/2, m_{pd} in the ultimate limit state)

m_{Rd} = maximum design moment [kNm/m] of the Schöck Isokorb®

Calculation example see page 76



Schöck Isokorb® type K: Static system



Schöck Isokorb® type K110: Static system

Schöck Isokorb® type		K10-K45, K47-V6/V8			K47-V10/VV, K55-K100		
Deflection factors when		tan α [%]			tan α [%]		
		CV30	CV35	CV50	CV30	CV35	CV50
Isokorb® height H [mm]	160	0.9	0.9	-	1.2	1.2	-
	170	0.8	0.8	-	1.0	1.0	-
	180	0.8	0.8	0.9	0.9	0.9	1.1
	190	0.7	0.7	0.8	0.9	0.9	1.0
	200	0.6	0.6	0.7	0.8	0.8	0.9
	210	0.6	0.6	0.7	0.7	0.7	0.8
	220	0.6	0.6	0.6	0.7	0.7	0.8
	230	0.5	0.5	0.6	0.6	0.6	0.7
	240	0.5	0.5	0.5	0.6	0.6	0.7
	250	0.5	0.5	0.5	0.6	0.6	0.6

Deflection/Camber | Slenderness

Schöck Isokorb® type		K110			K150		
Deflection factors when		tan α [%]			tan α [%]		
		CV30	CV35	CV50	CV30	CV35	CV50
Isokorb® height H [mm]	180	0.8	0.8	-	1.2	1.2	-
	190	0.7	0.7	-	1.1	1.1	-
	200	0.7	0.7	0.8	1.0	1.0	1.2
	210	0.6	0.6	0.7	0.9	0.9	1.1
	220	0.6	0.6	0.7	0.9	0.9	1.0
	230	0.5	0.5	0.6	0.8	0.8	0.9
	240	0.5	0.5	0.6	0.8	0.8	0.9
	250	0.5	0.5	0.5	0.7	0.7	0.8

Slenderness

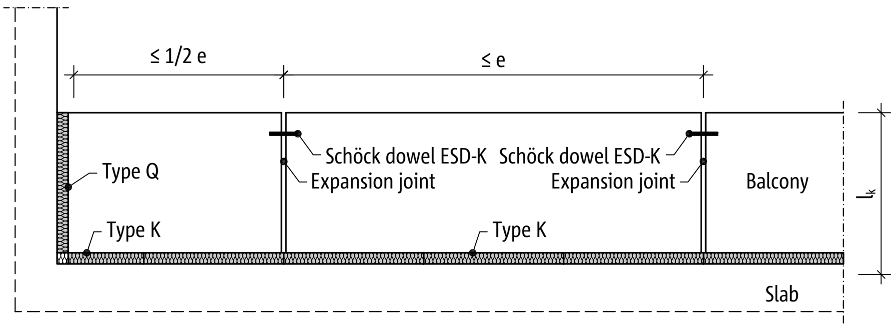
In order to safeguard the serviceability limit state we recommend the limitation of the slenderness to the following maximum cantilever lengths max l_k [m]:

Schöck Isokorb® type		K10-K150		
maximum cantilever length with		$l_{k,max}$ [m]		
		CV30	CV35	CV50
Isokorb® height H [mm]	160	1.81	1.74	-
	170	1.95	1.88	-
	180	2.10	2.03	1.81
	190	2.25	2.17	1.95
	200	2.39	2.32	2.10
	210	2.54	2.46	2.25
	220	2.68	2.61	2.39
	230	2.83	2.76	2.54
	240	2.98	2.90	2.68
	250	3.12	3.05	2.83

Expansion joint spacing

Maximum expansion joint spacing

If the length of the structural component exceeds the maximum expansion joint spacing, expansion joints must be incorporated in the exterior concrete components at right angles to the insulation layer in order to limit the effect as a result of temperature changes. With fixed points such as, for example, corners of balconies, parapets and balustrades or with the employment of the supplementary types HP or EQ half the maximum expansion joint spacing e/2 from the fixed point applies.



Schöck Isokorb® type K: Expansion joint spacing

Schöck Isokorb® type		K10 - K47-V6,V8	K47-VV - K100
Maximum expansion joint spacing		e [m]	
Insulating element thickness [mm]	80	13.5	13.0

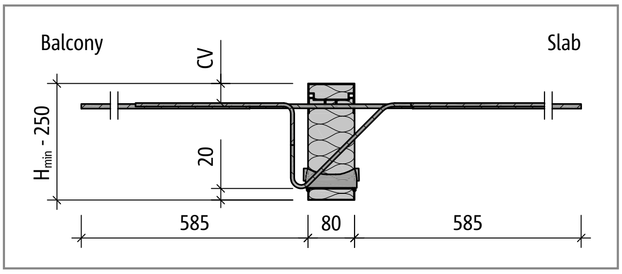
Schöck Isokorb® type		K110, K150
Maximum expansion joint spacing e		e [m]
Insulating element thickness [mm]	80	9.2

i Edge distances

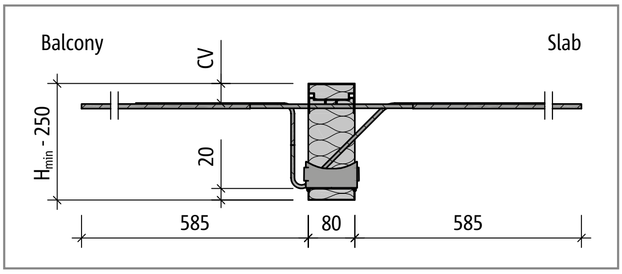
The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

- For the centre distance of the tension bars from the free edge or from the expansion joint: $e_R \geq 50$ mm and $e_R \leq 150$ mm applies.
- For the centre distance of the compression elements from the free edge or from the expansion joint: $e_R \geq 50$ mm applies.
- For the centre distance of the shear force bars from the free edge or from the exapansion joint: $e_R \geq 100$ mm and $e_R \leq 150$ mm applies.

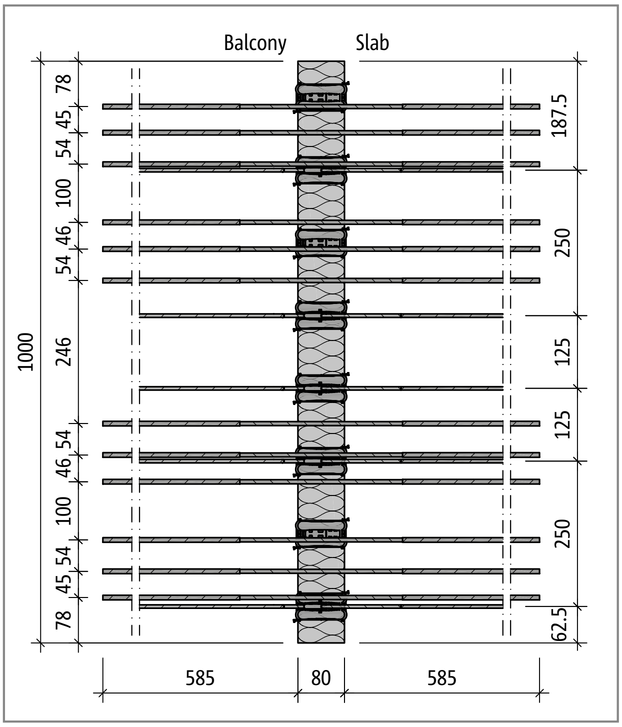
Product description



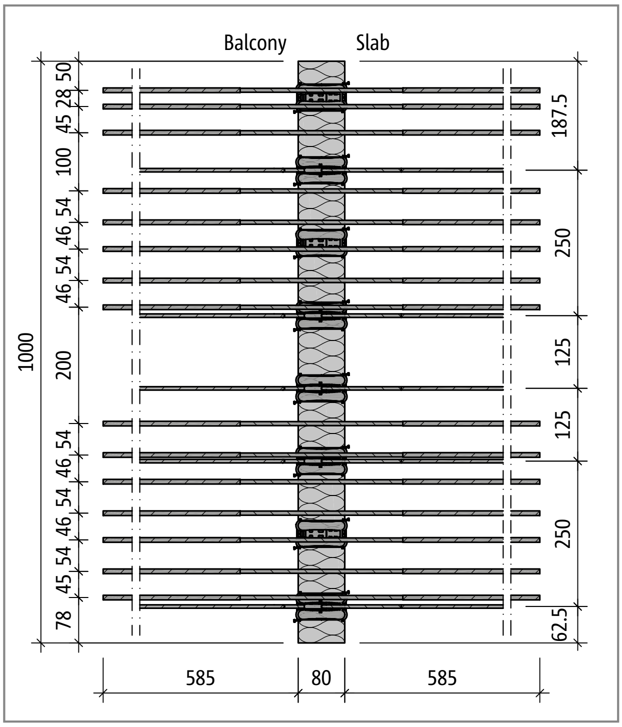
Schöck Isokorb® type K10 to K35: Product section



Schöck Isokorb® type K45 and K47: Product section



Schöck Isokorb® type K35-V6: Product layout



Schöck Isokorb® type K47-V6: Product layout

Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download
- Minimum height Schöck Isokorb® type K with CV50: H_{min} = 180 mm
- On-site spacing of the Schöck Isokorb® type K on the unreinforced positions possible; take into account the load-bearing capacity reduced due to the spacing; take into account required edge distances
- Concrete cover of the tension bars: CV30 = 30 mm, CV35 = 35 mm, CV50 = 50 mm
- Schöck Isokorb® type K47-V10/VV: Tension bar length L= 725 mm

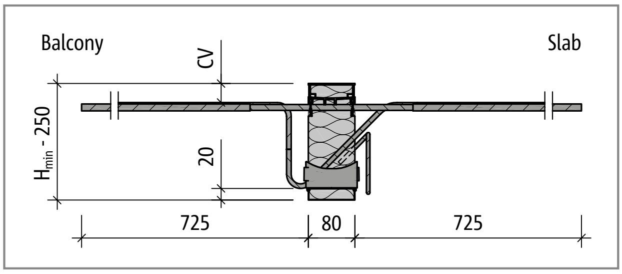
K

Reinforced concrete/reinforced concrete

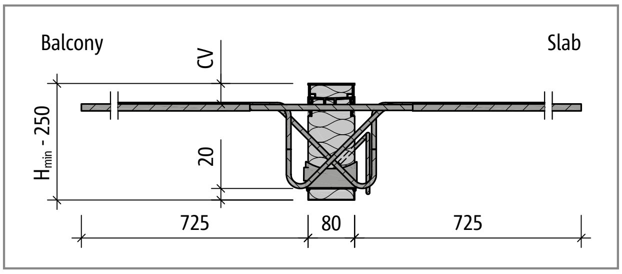
K

Reinforced concrete/reinforced concrete

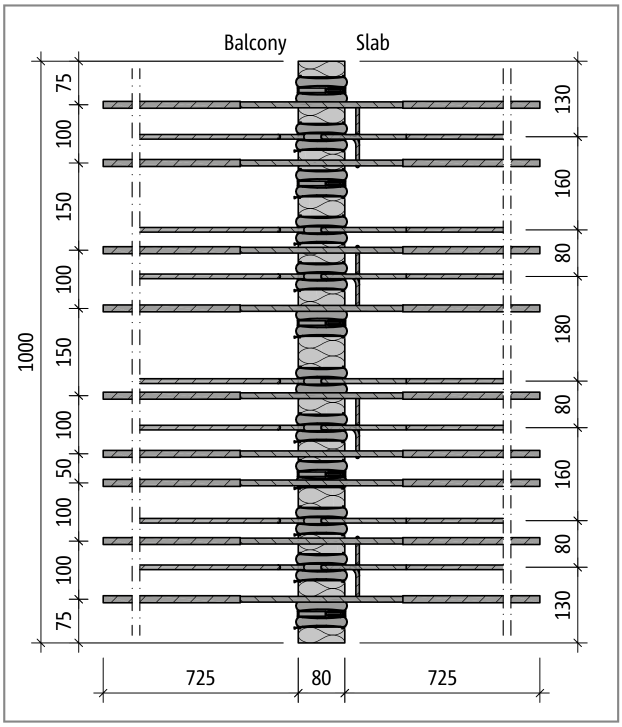
Product description



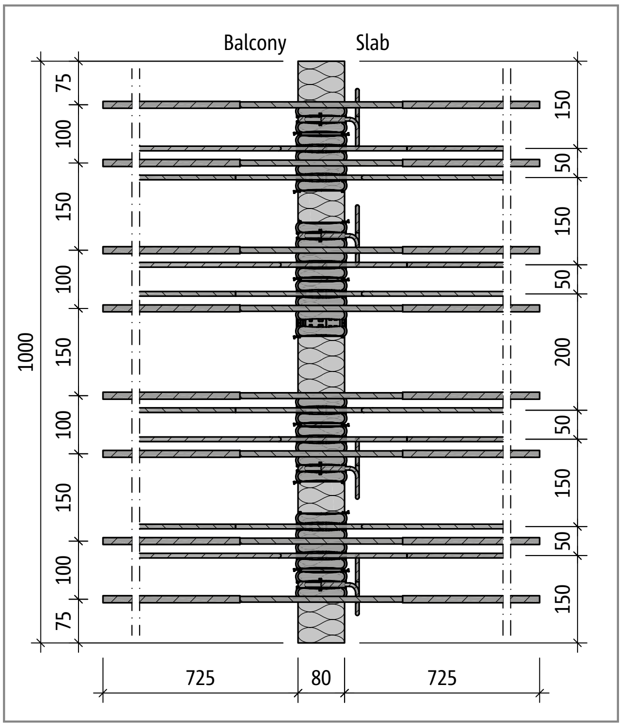
Schöck Isokorb® type K55 to K100: Product section



Schöck Isokorb® type K47-VV: Product section



Schöck Isokorb® type K65-V8: Product layout

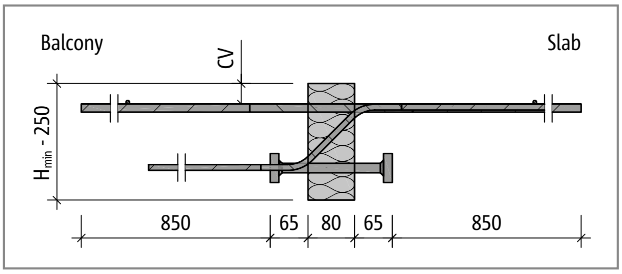


Schöck Isokorb® type K47-VV: Product layout

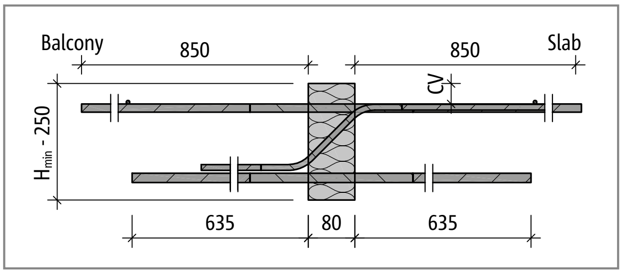
Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download
- Minimum height Schöck Isokorb® type K with CV50: H_{min} = 180 mm
- On-site spacing of the Schöck Isokorb® type K on the unreinforced positions possible; take into account the load-bearing capacity reduced due to the spacing; take into account required edge distances
- Concrete cover of the tension bars: CV30 = 30 mm, CV35 = 35 mm, CV50 = 50 mm

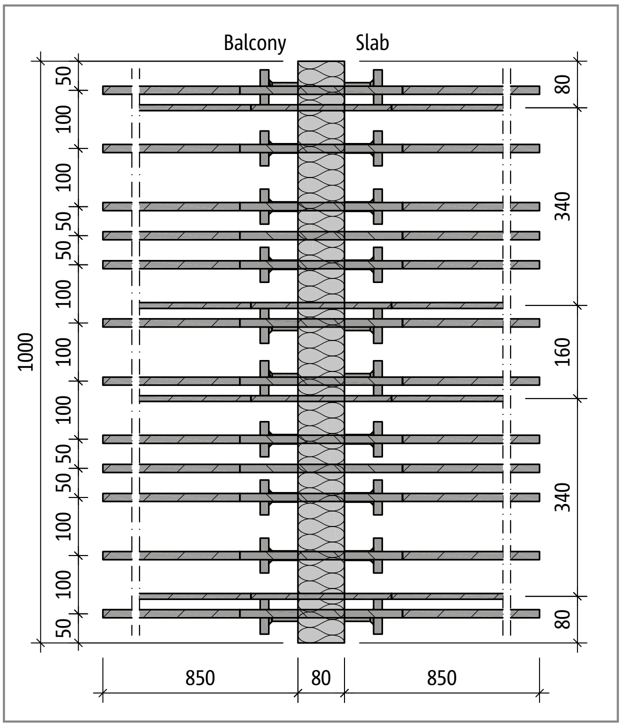
Product description



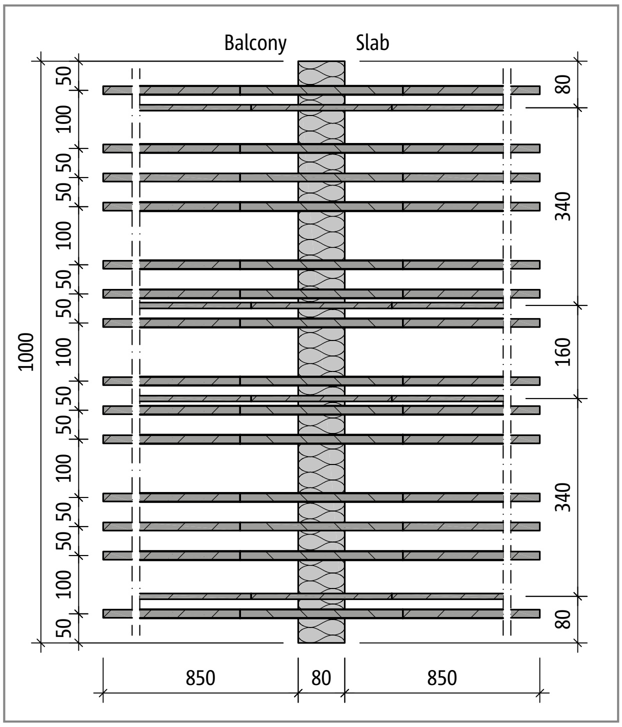
Schöck Isokorb® type K110: Product section



Schöck Isokorb® type K150: Product section



Schöck Isokorb® type K110-V10: Product layout



Schöck Isokorb® type K150-V10: Product layout

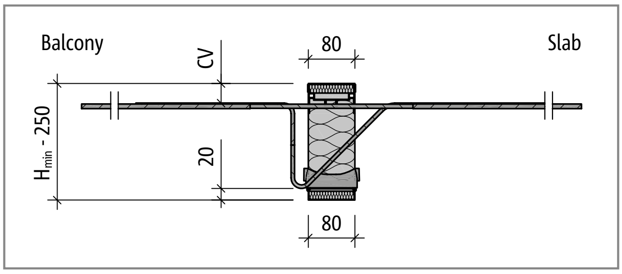
Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download
- Minimum height H_{min} Schöck Isokorb® type K110 and K150 see page 56
- On-site spacing of the Schöck Isokorb® type K on the unreinforced positions possible; take into account the load-bearing capacity reduced due to the spacing; take into account required edge distances
- Concrete cover of the tension bars: CV30 = 30 mm, CV35 = 35 mm, CV50 = 50 mm

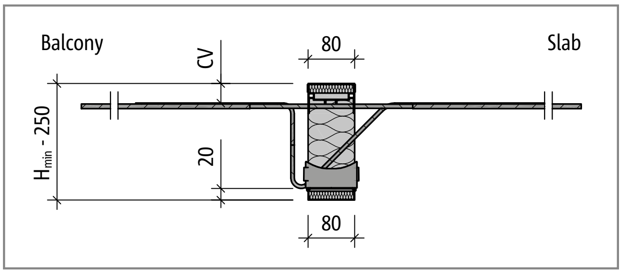
K

Reinforced concrete/reinforced concrete

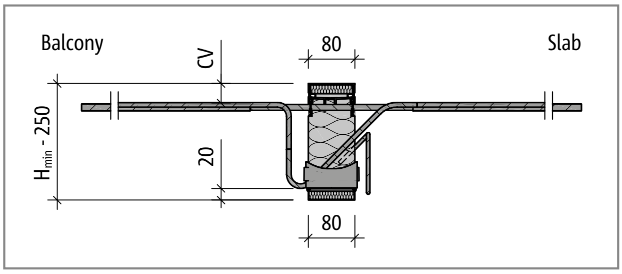
Fire protection configuration



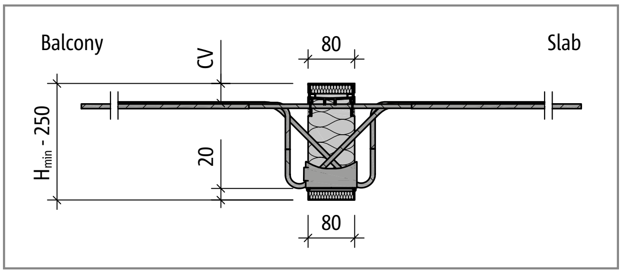
Schöck Isokorb® type K10 to K35 with REI120: Product section



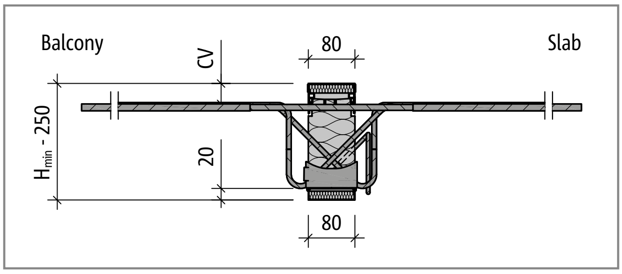
Schöck Isokorb® type K45 and K47 with REI120: Product section



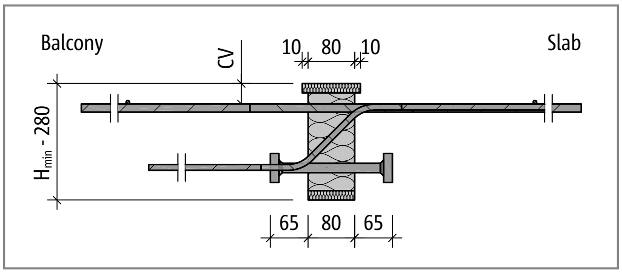
Schöck Isokorb® type K55 to K100 with REI120: Product section



Schöck Isokorb® type K35-VV and K45-VV with REI120: Product section



Schöck Isokorb® type K47-VV to K100-VV with REI120: Product section

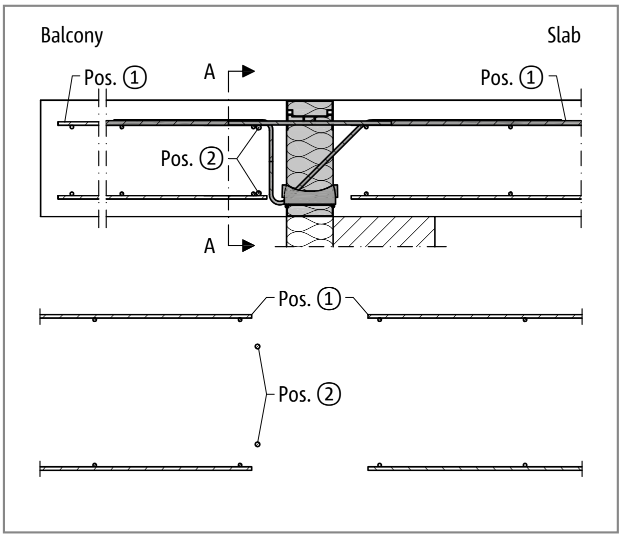


Schöck Isokorb® type K110 with REI120: Product section

On-site reinforcement

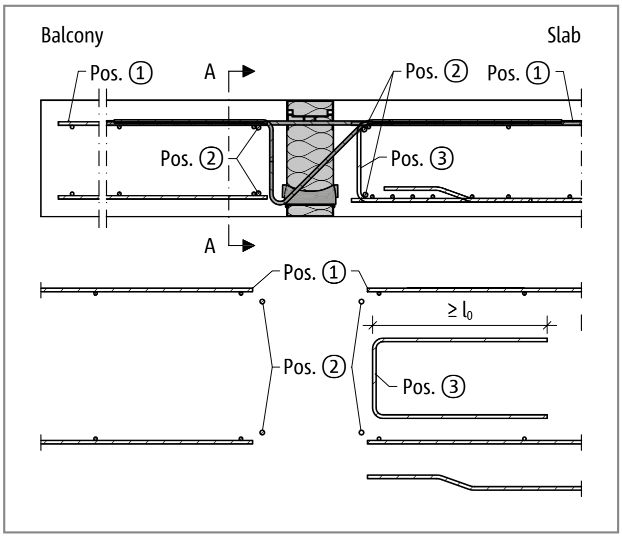
On-site reinforcement Schöck Isokorb® type K10 to K100

Direct support



Schöck Isokorb® type K: On-site reinfircement with direct support

Indirect support

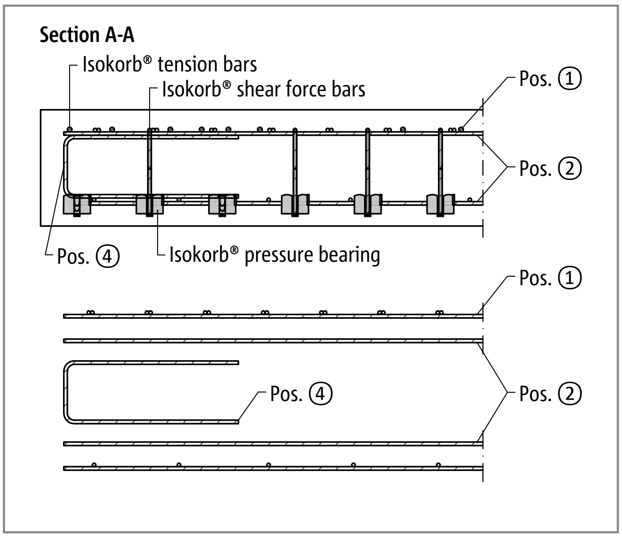


Schöck Isokorb® type K: On-site reinforcement with indirect support

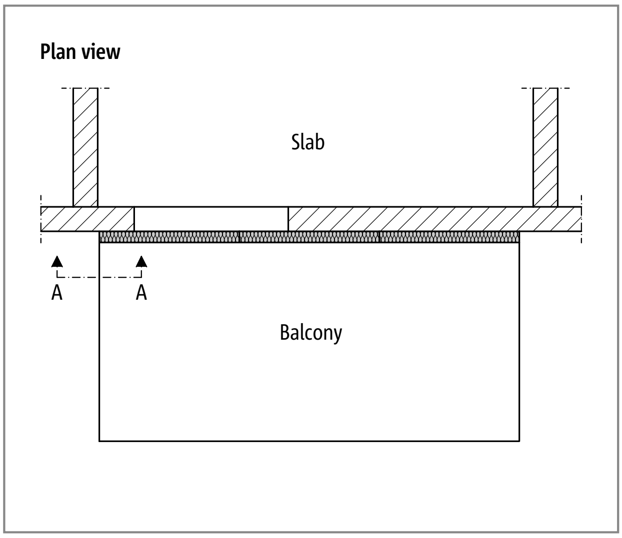
Information on side reinforcement

- The side reinforcement of the slab edge parallel to the Schöck Isokorb® is covered on-site by the integrated suspension reinforcement of the Schöck Isokorb®.

Direct and indirect support



Schöck Isokorb® type K: On-site reinforcement on the balcony side in the Section A-A; Pos.4 = side reinforcement on the free edge perpendicular to the Schöck Isokorb®



Schöck Isokorb® type K: Diagram of the position of Section A-A

The reinforcement in the reinforced concrete slab is determined from the structural engineer's design. With this both the effective moment and the effective shear force should be taken into account.
In addition, it is to be ensured that the tension bars of the Schöck Isokorb® are 100% lapped. The existing inner slab reinforcement can be taken into account as long as the maximum separation to the tension bars of the Schöck Isokorb® of 4⌀ is maintained. Additional reinforcement may be required.

On-site reinforcement

On-site reinforcement Schöck Isokorb® type K10 to K100

Recommendation for the on-site connection reinforcement

Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars.

Schöck Isokorb® type			K10	K20	K25	K35
On-site reinforcement	Type of bearing	Height [mm]	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement						
Pos. 1 [mm²/m]	direct/indirect	160 - 250	201	402	503	604
Pos. 1 Variant	direct/indirect	160 - 250	H8@150 mm	H8@120 mm	H10@150 mm	H10@125 mm
Pos. 2 Steel bars along the insulation joint						
Pos. 2	direct	160 - 250	2 • H8	2 • H8	2 • H8	2 • H8
Pos. 2	indirect	160 - 250	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Edge- and splitting tension reinforcement						
Pos. 3 [mm²/m]	indirect	160 - 250	113	113	114	125
Pos. 4 Side reinforcement at the free edge						
Pos. 4	direct/indirect	160 - 250	acc. to BS EN 1992-1-1 (EC2), 9.3.1.4			

Schöck Isokorb® type			K45	K47	K55	K65
On-site reinforcement	Type of bearing	Height [mm]	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement						
Pos. 1 [mm²/m]	direct/indirect	160-250	704	792	905	1018
Pos. 1 Variant	direct/indirect	160-250	H10@110 mm	H12@140 mm	H12@120 mm	H12@100 mm
Pos. 2 Steel bars along the insulation joint						
Pos. 2	direct	160-250	2 • H8	2 • H8	2 • H8	2 • H8
Pos. 2	indirect	160-250	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Edge- and splitting tension reinforcement						
Pos. 3 [mm²/m]	indirect	160	141	153	228	256
		170	141	153	242	272
		180	141	153	255	286
		190	141	153	266	298
		200	141	153	277	310
		210	141	153	286	321
		220	141	153	295	331
		230	141	153	304	340
		240	141	153	312	348
		250	141	153	319	355
Pos. 4 Side reinforcement at the free edge						
Pos. 4	direct/indirect	160-250	acc. to BS EN 1992-1-1 (EC2), 9.3.1.4			

On-site reinforcement

On-site reinforcement Schöck Isokorb® type K10 to K100

Schöck Isokorb® type			K75	K90	K100
On-site reinforcement	Type of bearing	Height [mm]	Concrete strength class ≥ C25/30		
Pos. 1 Lapping reinforcement					
Pos. 1 [mm²/m]	direct/indirect	160 - 250	1131	1357	1470
Pos. 1 Variant	direct/indirect	160 - 250	H12@95 mm	H12@80 mm	H12@75 mm
Pos. 2 Steel bars along the insulation joint					
Pos. 2	direct	160 - 250	2 • H8	2 • H8	2 • H8
Pos. 2	indirect	160 - 250	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Edge- and splitting tension reinforcement					
Pos. 3 [mm²/m]	indirect	160	284	325	352
		170	301	344	372
		180	317	360	390
		190	331	375	405
		200	344	388	420
		210	355	400	433
		220	365	411	444
		230	374	421	455
		240	382	430	465
		250	389	438	474
Pos. 4 Side reinforcement at the free edge					
Pos. 4	direct/indirect	160 - 250	acc. to BS EN 1992-1-1 (EC2), 9.3.1.4		

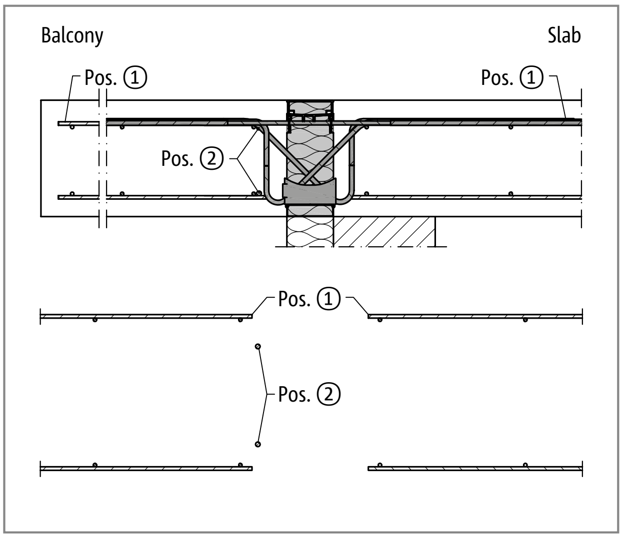
Information about on-site reinforcement

- Alternative reinforcements are possible. Determine lap length according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA.A reduction of the required lap length using m_{Ed}/m_{Rd} is permitted.For overlapping (l_0) with the Schöck Isokorb®, with types K10 to K47-V8 a length of the tension bars of 545 mm and with types K47-V10 to K100 a length of the tension bars of 675 mm can be input in the calculation.
- The reinforcement at the free edges Pos. 4 of the structural component perpendicular to the Schöck Isokorb® should be selected as low as possible so that it can be arranged between the upper and lower reinforcement layer.
- The indicative minimum concrete strength class of the external structural component is C32/40.

On-site reinforcement

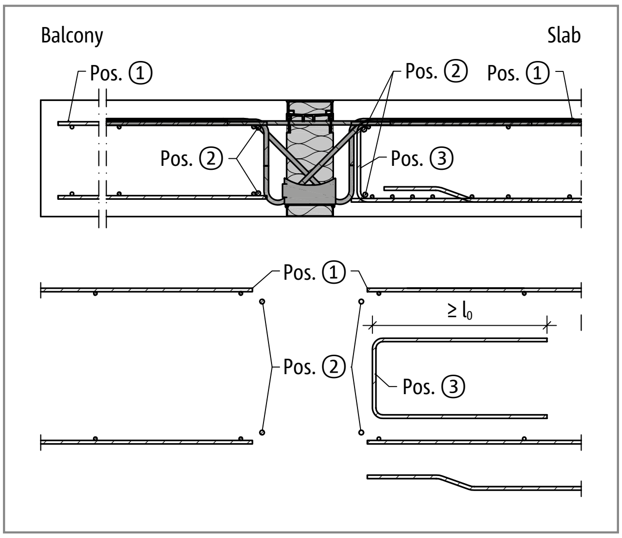
On-site reinforcement Schöck Isokorb® type K35-VV to K100-VV

Direct support



Schöck Isokorb® type K-VV: On-site reinforcement with direct support

Indirect support



Schöck Isokorb® type K-VV: On-site reinforcement with indirect support

The reinforcement in the reinforced concrete slab is determined from the structural engineer's design. With this both the effective moment and the effective shear force should be taken into account.
In addition, it is to be ensured that the tension bars of the Schöck Isokorb® are 100% lapped. The existing inner slab reinforcement can be taken into account as long as the maximum separation to the tension bars of the Schöck Isokorb® of 4⌀ is maintained. Additional reinforcement may be required.

Information on side reinforcement

- The side reinforcement of the slab edge parallel to the Schöck Isokorb® is covered on-site by the integrated suspension reinforcement of the Schöck Isokorb®.

Schöck Isokorb® type			K35-VV	K45-VV	K47-VV	K55-VV
On-site reinforcement	Type of bearing	Height [mm]	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement						
Pos. 1 [mm²/m]	direct/indirect	160 - 250	704	754	905	1018
Pos. 1 Variant	direct/indirect	160 - 250	H10@110 mm	H10@100 mm	H12@120 mm	H12@100 mm
Pos. 2 Steel bars along the insulation joint						
Pos. 2	direct	160 - 250	2 • H8	2 • H8	2 • H8	2 • H8
Pos. 2	indirect	160 - 250	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Edge- and splitting tension reinforcement						
Pos. 3 [mm²/m]	indirect	160 - 250	-	-	92	128
Pos. 4 Side reinforcement at the free edge						
Pos. 4	direct/indirect	160 - 250	acc. to BS EN 1992-1-1 (EC2), 9.3.1.4			

On-site reinforcement

On-site reinforcement Schöck Isokorb® type K35-VV to K100-VV

Schöck Isokorb® type			K65-VV	K75-VV	K90-VV	K100-VV
On-site reinforcement	Type of bearing	Height [mm]	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement						
Pos. 1 [mm²/m]	direct/indirect	160 - 250	1131	1243	1356	1470
Pos. 1 Variant	direct/indirect	160 - 250	H12@95 mm	H12@90 mm	H12@80 mm	H12@75 mm
Pos. 2 Steel bars along the insulation joint						
Pos. 2	direct	160 - 250	2 • H8	2 • H8	2 • H8	2 • H8
Pos. 2	indirect	160 - 250	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Edge- and splitting tension reinforcement						
Pos. 3 [mm²/m]	indirect	160	71	88	124	151
		170	86	105	143	171
		180	100	119	159	188
		190	112	132	174	204
		200	123	144	187	219
		210	133	154	199	231
		220	142	164	210	243
		230	150	173	219	254
		240	158	181	229	264
		250	165	188	237	273
Pos. 4 Side reinforcement at the free edge						
Pos. 4	direct/indirect	160 - 250	acc. to BS EN 1992-1-1 (EC2), 9.3.1.4			

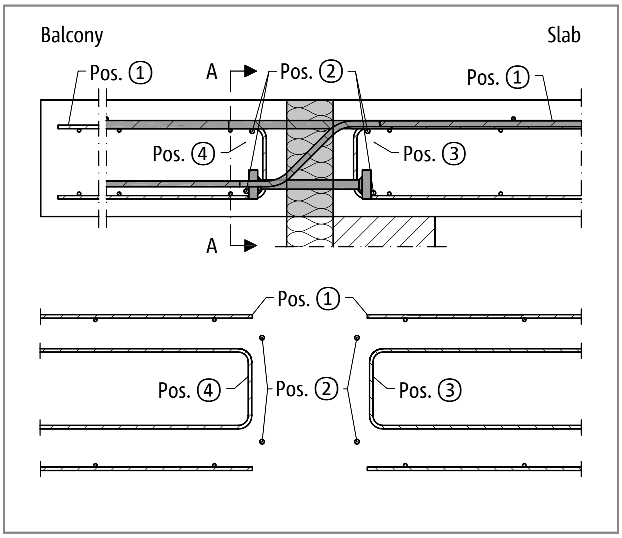
Information about on-site reinforcement

- Alternative reinforcements are possible. Determine lap length according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA.A reduction of the required lap length using m_{Ed}/m_{Rd} is permitted.For overlapping (l_0) with the Schöck Isokorb®, with types K10 to K47-V8 a length of the tension bars of 545 mm and with types K47-V10 to K100 a length of the tension bars of 675 mm can be input in the calculation.
- The reinforcement at the free edges Pos. 4 of the structural component perpendicular to the Schöck Isokorb® should be selected as low as possible so that it can be arranged between the upper and lower reinforcement layer.
- The indicative minimum concrete strength class of the external structural component is C32/40.

On-site reinforcement

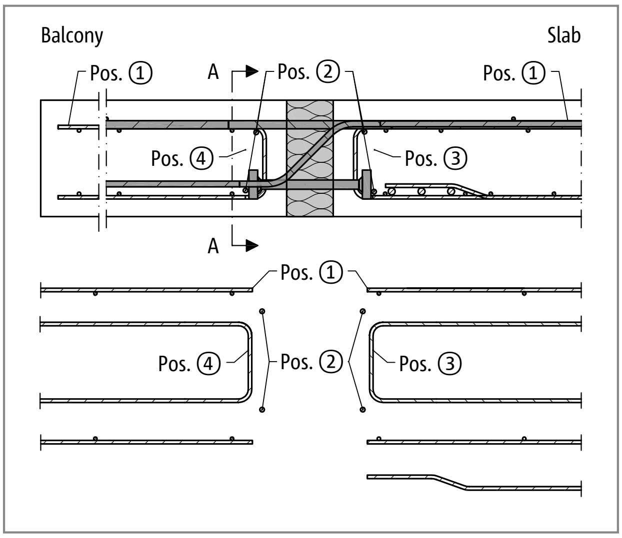
On-site reinforcement Schöck Isokorb® type K110 and K150

Direct support



Schöck Isokorb® type K110: On-site reinforcement with direct support

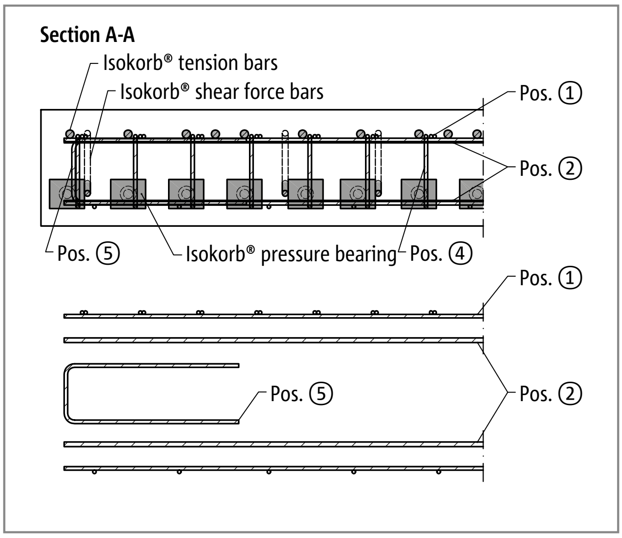
Indirect support



Schöck Isokorb® type K110: On-site reinforcement with indirect support

Information on side reinforcement

- The side reinforcement of the slab edge parallel to the Schöck Isokorb® is covered on-site by the integrated suspension reinforcement of the Schöck Isokorb®.



Schöck Isokorb® type K110: On-site reinforcment on the balcony side in the Section A-A; Pos.5 = structural edging at the free edge perpendicular to the Schöck Isokorb®

The reinforcement in the reinforced concrete slab is determined from the structural engineer's design. With this both the effective moment and the effective shear force should be taken into account.
In addition, it is to be ensured that the tension bars of the Schöck Isokorb® are 100% lapped. The existing inner slab reinforcement can be taken into account as long as the maximum separation to the tension bars of the Schöck Isokorb® of 4⌀ is maintained. Additional reinforcement may be required.

On-site reinforcement

On-site reinforcement Schöck Isokorb® type K110 and K150

Schöck Isokorb® type			K110	K150-V10	K150-V12	K150-V14
On-site reinforcement	Type of bearing	Height [mm]	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement						
Pos. 1 [mm²/m]	direct/indirect	180 - 250	1848	2156		
Pos. 1 Variant A	direct/indirect	180 - 250	-	-		
Pos. 1 Variante B	direct/indirect	180 - 250	H16@80 mm	H16@70 mm		
Pos. 1 Variante C	direct/indirect	180 - 250	-	-		
Pos. 2 Steel bars along the insulation joint						
Pos. 2	direct	180 - 250	2 • H8	2 • H8		
	indirect	180 - 250	2 • H8	2 • H8		
Pos. 3 Edge- and splitting tension reinforcement						
Pos. 3 [mm²/m]	direct	180 - 250	-	-	-	-
	indirect	180 - 250	514	113		
Pos. 4 Edge and splitting tension reinforcement						
Pos. 4	direct	180 - 250	514	222	333	480
	indirect	180 - 250				
Pos. 5 Side reinforcement at the free edge						
Pos. 5	direct/indirect	180 - 250	acc. to BS EN 1992-1-1 (EC2), 9.3.1.4			

Information about on-site reinforcement

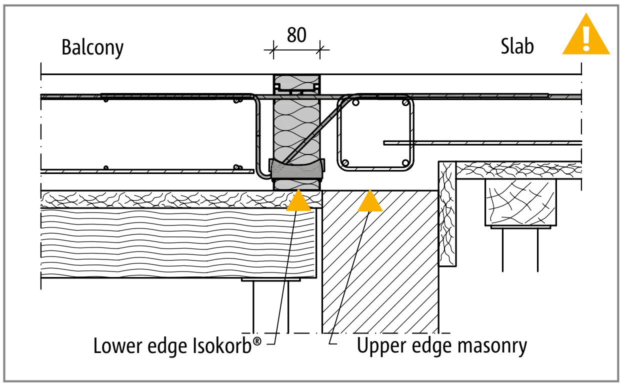
- Alternative reinforcements are possible. Determine lap length according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA. A reduction of the required lap length using m_{Ed}/m_{Rd} is permitted. For overlapping (l_0) with the Schöck Isokorb®, with types K110 a length of the tension bars of 710 mm and with types K150 a length of the tension bars of 730 mm can be in put in the calculation.
- The side reinforcement Pos. 5 should be selected so low that it can be arranged between the upper and lower reinforcement position.
- The indicative minimum concrete strength class of the external structural component is C32/40.

K

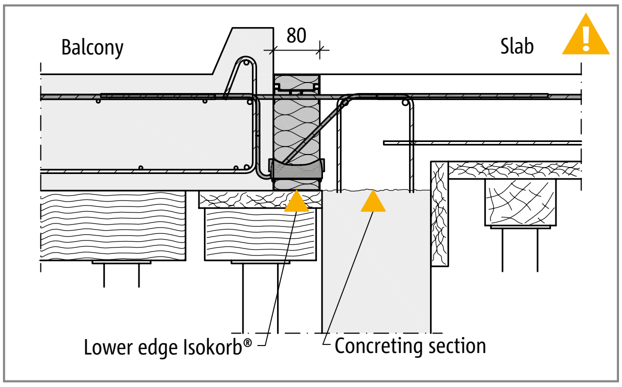
Reinforced concrete/reinforced concrete

Tight fit/Concreting section | Precast/Compression joints

Tight fit/Concreting section



Schöck Isokorb® type K: In situ concrete with height offset floor on masonry wall



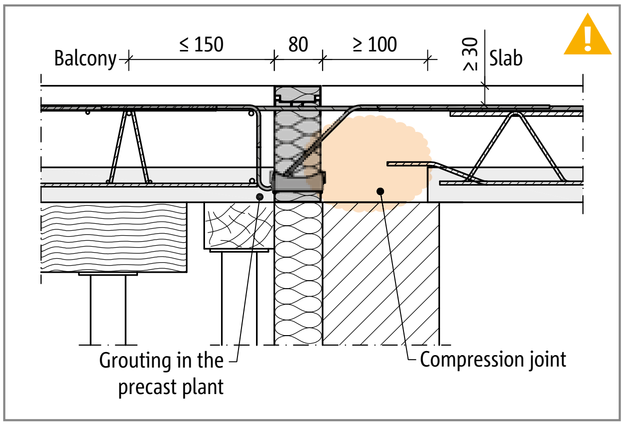
Schöck Isokorb® type K: Fully-finished balcony with height offset floor on fully-finished reinforced concrete wall

⚠ Hazard note: Tight fit with different height levels

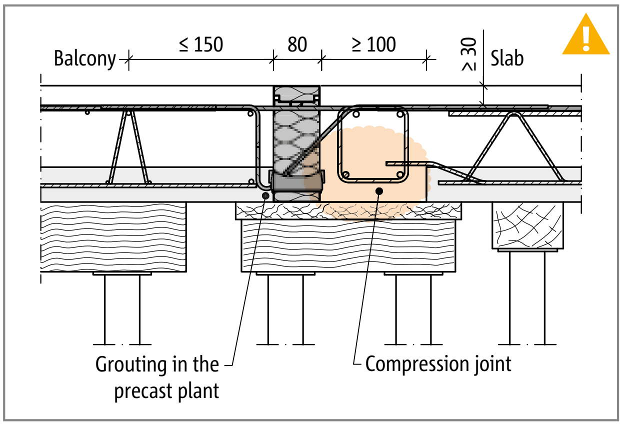
The tight fit of the pressure bearings to the freshly poured concrete is to be ensured, therefore the upper edge of the masonry respectively of the concreting section is to be arranged below the lower edge of the Schöck Isokorb®. This is to be taken into account above all with a different height level between inner slab and balcony.

- The concreting joint and the upper edge of the masonry are to be arranged below the lower edge of the Schöck Isokorb®.
- The position of the concreting section is to be indicated in the formwork and reinforcement drawing.
- The joint planning is to be coordinated between precast concrete plant and construction site.

Precast/Compression joints



Schöck Isokorb® type K/KF: Direct support, installation in conjunction with prefabricated slabs (here: h ≤ 200 mm), compression joint on the floor side



Schöck Isokorb® type K/KF: Indirect support, installation in conjunction with prefabricated slabs(here: h ≤ 200 mm), compression joint on the floor side

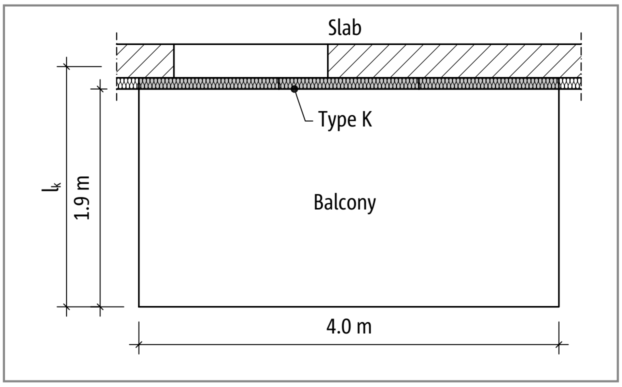
⚠ Hazard note: Compression joints

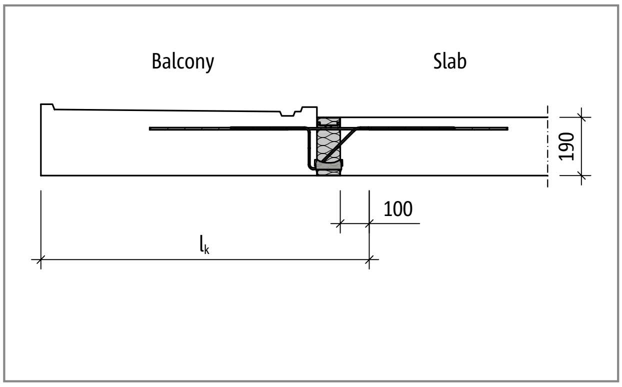
Compression joints are joints which, with unfavourable loading combination, remain always in compression. The underside of a cantilever balcony is always a compression zone. If the cantilever balcony is a precast part or an element slab, and/or the floor is an element slab, then the definition of the standard is effective.

- Compression joints are to be indicated in the formwork and reinforcement drawing!
- Compression joints between precast parts are always to be grouted using in-situ concrete. This also applies for compression joints with the Schöck Isokorb®!
- With compression joints between precast parts (on the inner slab or balcony side) and the Schöck Isokorb® an in-situ concrete resp. pour of ≥ 100 mm width is to be cast. This is to be entered in the working drawings.
- We recommend the installation of the Schöck Isokorb® and the pouring of the balcony-side compression joint already in the precast concrete plant.

Design example

Example calculation





Static system and load assumptions

Geometry:	Projection length	$l_k = 2.06$ m
	Balcony slab thickness	h = 190 mm
Design loads:	Balcony slab and screed	$g = 6.25$ kN/m^2
	Service load	$q = 2.5$ kN/m^2
	Edge load (balustrade)	$g_R = 1.5$ kN/m
Explosure classes:	External XC 4	
	Internal XC 1	
Selected:	Concrete strength class C25/30 for floor and C32/ 40 for balcony	
	Concrete cover $c_v = 35$ mm for Isokorb® tension bars	
Connection geometry:	No height offset, no floor downstand beam, no balcony upstand	
Support floor:	Floor edge directly supported	
Support balcony:	Restraint of cantilever slab using type K	

Recommendation on slenderness

Geometry:	Projection length	$l_k = 2.06$ m
	Balcony slab thickness	h = 190 mm
	Concrete cover	CV35
	Maximum projection length	$l_{k,max} = 2.17$ m (from table, see page 61) $> l_k$

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

Internal forces:

$m_{Ed} = -[(\gamma_G \cdot g_Q + \gamma \cdot q) \cdot l_k{}^2/2 + \gamma_G \cdot g_R \cdot l_k)]$

$m_{Ed} = -[(1.35 \cdot 6.25 + 1.5 \cdot 2.5) \cdot 2.06^2/2 + 1.35 \cdot 1.5 \cdot 2.06)] = -30.0$ kNm/m

$v_{Ed} = +(\gamma_G \cdot g + \gamma_q \cdot q) \cdot l_k + \gamma_G \cdot g_R$

$v_{Ed} = +(1.35 \cdot 6.25 + 1.5 \cdot 2.5) \cdot 2.06 + 1.35 \cdot 1.5 = +27.1$ kN/m

Selected: **Schöck Isokorb® type K35-CV35-V6-H190**

$m_{Rd} = -31.9$ kNm/m (see page 57) $> m_{Ed}$

$v_{Rd} = +43.5$ kN/m (see page 57) $> v_{Ed}$

$\tan \alpha = 0.7$ % (see page 60)

K

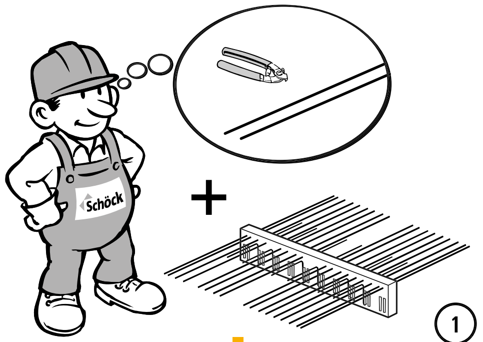
Reinforced concrete/reinforced concrete

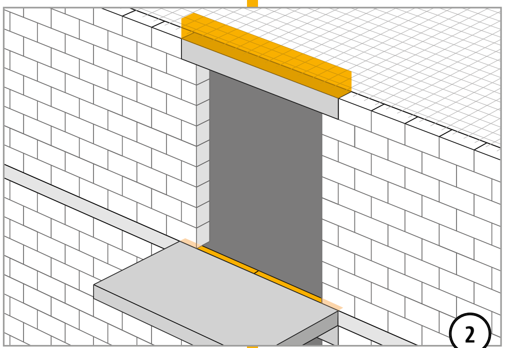
Design example

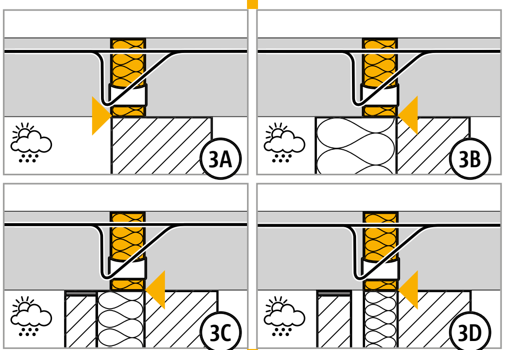
Serviceability limit state (deflection/precamber)

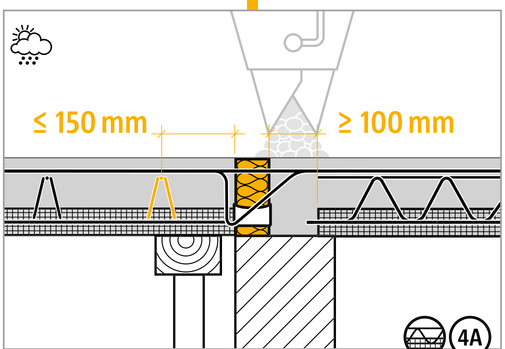
Deflection factor:	$\tan \alpha$	= 0.7 (from table, see page 60)
Selected load combination:	$g + q/2$	
	(Recommendation for the determination of the precamber from Schöck Isokorb®)	
	Determine $m_{üd}$ in the ultimate limit state	
	m_{pd}	$= -[(\gamma_G \cdot g + \gamma_Q \cdot q/2) \cdot l_k^2/2 + \gamma_G \cdot g_R \cdot l_k]$
	m_{pd}	$= -[(1.35 \cdot 6.25 + 1.5 \cdot 2.5/2) \cdot 2.06^2/2 + 1.35 \cdot 1.5 \cdot 2.06] = -26.0$ kNm/m
	p	$= [\tan \alpha \cdot l_k \cdot (m_{pd} / m_{Rd})] \cdot 10$ [mm]
	p	$= [0.7 \cdot 2.06 \cdot (26.0/31.9)] \cdot 10 = 11.8$ mm
Arrangement of expansion joint		Length of balcony : 4.00 m < 11.30 m
	=> No expansion joints required	

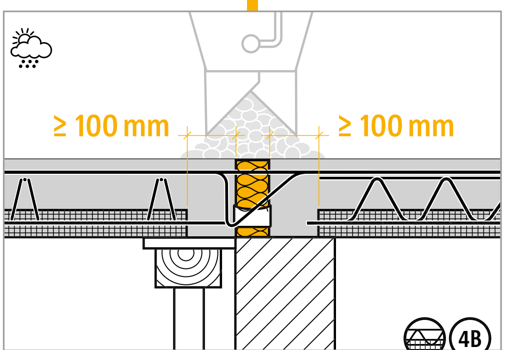
Installation instructions

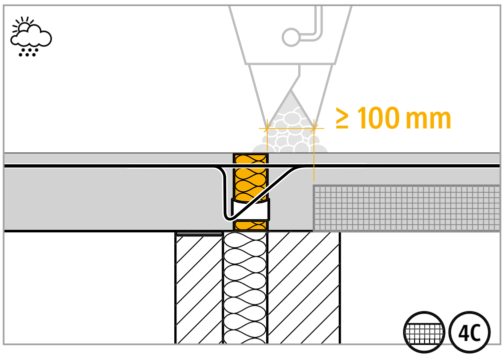




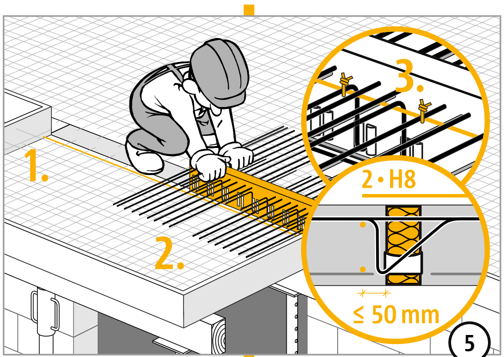


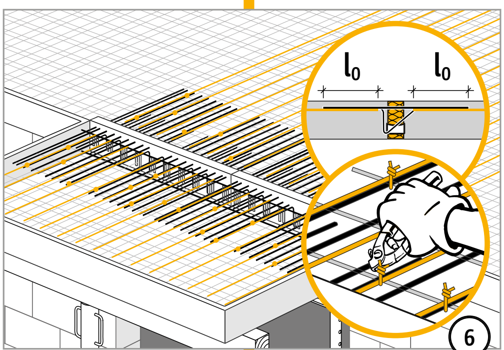






(4A)-(4C) Without fail fill compression joint with in-situ concrete! Joint width ≥ 100 mm.

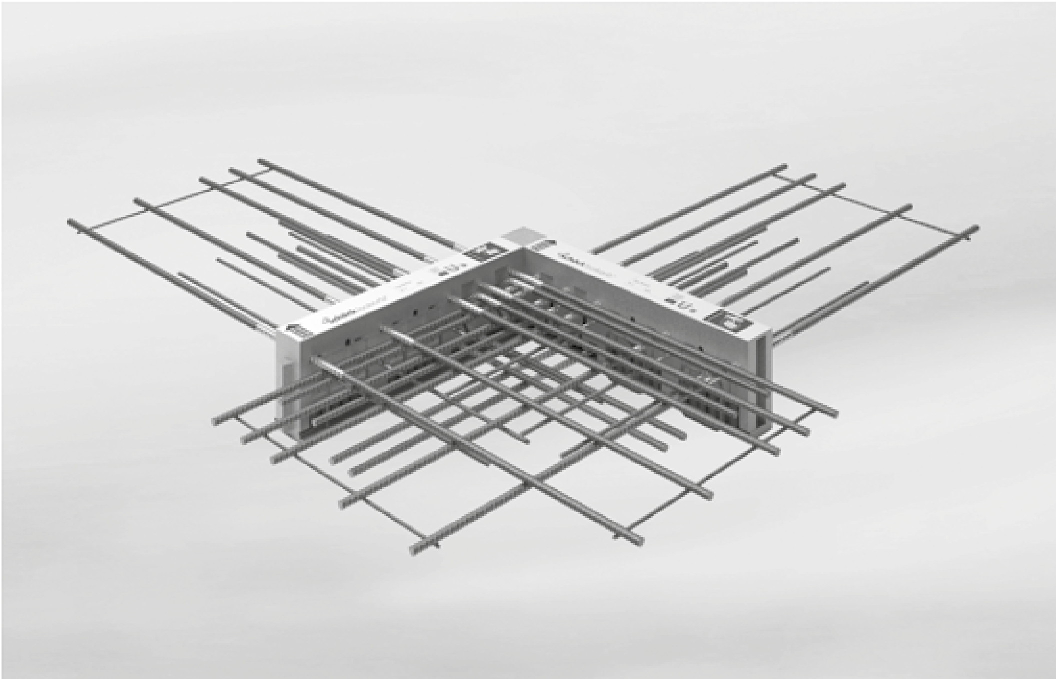




☑ Check list

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ Has the additional proportionate deflection resulting from the Schöck Isokorb® been taken into account?
- ☐ Is the drainage direction taken into account with the resulting camber information? Is the degree of camber entered in the working drawings?
- ☐ Is the minimum slab thickness H_{min} for the respective Schöck Isokorb® type taken into account?
- ☐ Are the recommendations for the limitation of the slenderness observed?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Are the Schöck FEM guidelines taken into acount with the calculation using FEM?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Are planned existing horizontal loads e.g. from wind pressure taken into account? Are additional Schöck Isokorb® supplementary type HP or supplementary type EQ required for this?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ Have the required in-situ concrete strips for the type K and type KF, in conjunction with inner slab elements (width ≥ 100 mm from compression element), been charted in the implementation plans?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ With precast balconies are possibly necessary gaps for the front side transportation anchors and downpipes with internal drainage taken into account? Is the maximum centre distance of 300 mm for the Isokorb® bars observed?
- ☐ Is the increased minimum slab thickness (≥ 180 mm) and the required 2nd position (-CV50) been taken into account with the corner balcony?
  Is a type K-CV50 (2nd position) planned in the connection to the K-corner sub-member?
- ☐ Is, instead of Isokorb® type K, the type K-HV, K-BH, K-WO, K-WU (from page 93) or special design required with connect with height offset or to a wall?

Schöck Isokorb® type K-corner



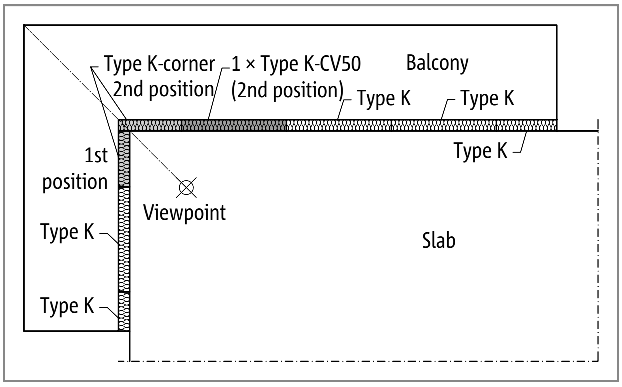
Schöck Isokorb® type K-corner

Schöck Isokorb® type K-corner
Suitable for cantilevered corner balconies. It transfers negative moments and positive shear forces.

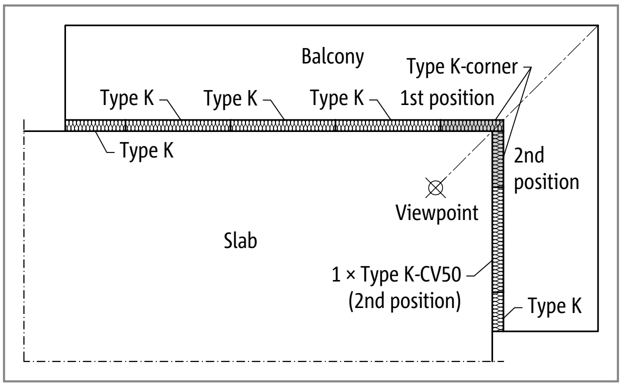
K-corner

Reinforced concrete/reinforced concrete

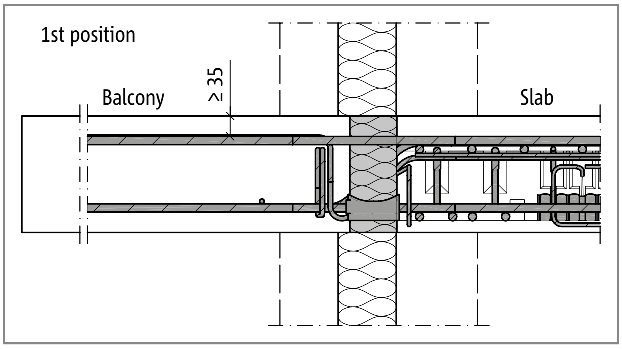
Element arrangement | Installation cross sections



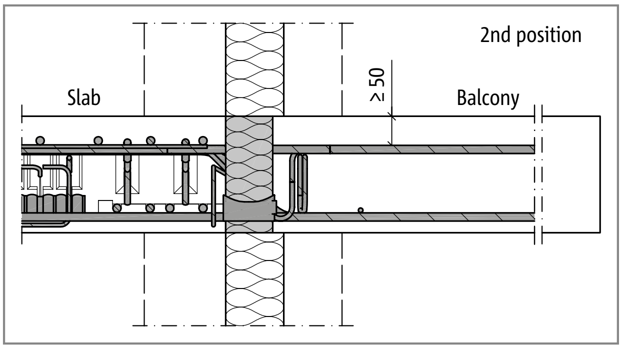
Schöck Isokorb® type K-corner: Balcony with outside corner freely cantilevered



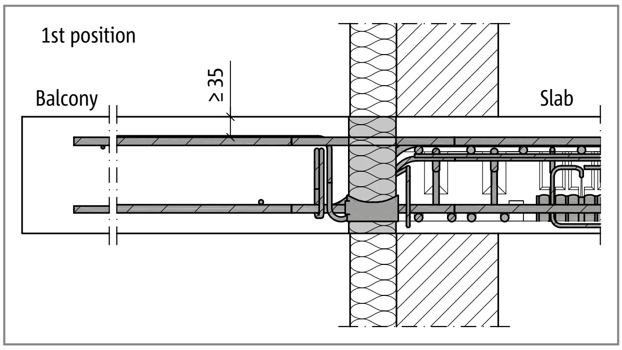
Schöck Isokorb® type K-corner: Balcony with outside corner freely cantilevered



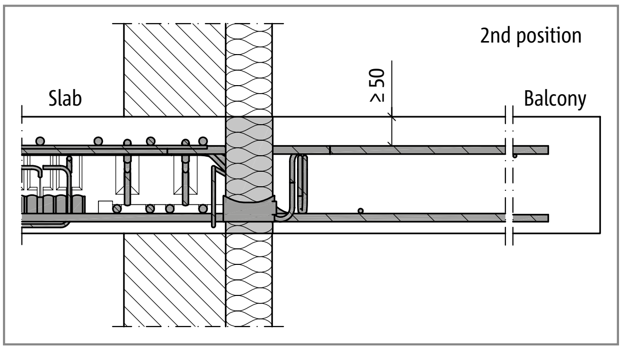
Schöck Isokorb® type K-corner: Section 1st position; connection with non-load-bearing cavity walls



Schöck Isokorb® type K-corner: Section 2nd position; connection with non-load-bearing cavity walls



Schöck Isokorb® type K-corner: Section 1st position; connection with thermal insulation composite system (TICS)



Schöck Isokorb® type K-corner: Section 2nd position; connection with thermal insulation composite system (TICS)

Element arrangement

- Subcomponent 1st position and subcomponent 2nd position of the Schöck Isokorb® type K-corner cannot be exchanged.
- In the connection to a Schöck Isokorb® type K-corner subcomponent 2nd position a component Schöck Isokorb® type K-CV50 (2nd position) is required.

Product selection | Type designations | Special designs

Schöck Isokorb® type K-corner variants

The Schöck Isokorb® type K-corner always consists of a subcomponent 1st position and a subcomponent 2nd position.

The configuration of the Schöck Isokorb® type K-corner can be varied as follows:

- Load-bearing level:
  K20-corner, K30-corner, K50-corner
- Combination:
  e.g. K20-CV35 with K20-corner-CV35
- Arrangement:
  2 components: Subcomponent 1st position, subcomponent 2nd position
  1st position: Left from the viewpoint on the floor
  2nd position: Right from the viewpoint on the floor
- Fire resistance class:
  R0: Standard
  REI120: for K20-corner to K50-corner

Type designations in planning documents

Type/Load capacity
Concrete cover
Isokorb® height
Fire protection

K50-corner-CV35-H180-REI120

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).
In accordance with approval heights up to 500 mm are possible.

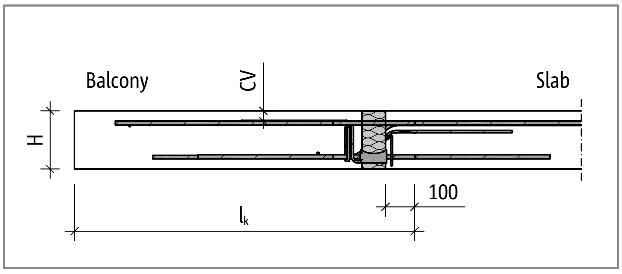
K-corner

Reinforced concrete/reinforced concrete

C25/30 design

Schöck Isokorb® type			K20-corner	K30-corner	K50-corner
Design values with	Concrete cover CV [mm]		Concrete strength class ≥ C25/30		
	CV30	CV35	$M_{Rd,y}$ [kNm] per subcomponent 1st position and 2nd position		
Isokorb® height H [mm]		180	-14.3	-28.7	-32.9
	180		-15.1	-30.4	-34.8
		190	-16.0	-32.0	-36.6
	190		-16.9	-33.6	-38.4
		200	-17.7	-35.2	-40.2
	200		-18.6	-36.8	-42.0
		210	-19.4	-38.4	-43.9
	210		-20.3	-40.0	-45.7
		220	-21.2	-41.6	-47.5
	220		-22.0	-43.2	-49.3
		230	-22.9	-44.8	-51.2
	230		-23.7	-46.4	-53.0
		240	-24.6	-48.0	-54.8
	240		-25.5	-49.6	-56.6
		250	-26.3	-51.2	-58.5
	250		-27.2	-52.8	-60.3
Shear force variant			$V_{Rd,z}$ [kN] per subcomponent 1st position and 2nd position		
	H = 180-190 mm		37.3	78.6	91.1
	H ≥ 200 mm		37.3	106.7	119.2

Schöck Isokorb® type	K20-corner		K30-corner		K50-corner	
	1st position	2nd position	1st position	2nd position	1st position	2nd position
Isokorb® length [mm]	500	500	620	620	620	620
Tension bars	8 ⌀ 8	8 ⌀ 8	5 ⌀ 14	5 ⌀ 14	6 ⌀ 14	6 ⌀ 14
Compression bars	-	-	3 ⌀ 14	3 ⌀ 14	4 ⌀ 14	4 ⌀ 14
Pressure bearing	5	5	6	6	6	6
Shear force bars H = 180 - 190 mm	3 ⌀ 8	3 ⌀ 8	3 ⌀ 8 + 2 ⌀ 10	3 ⌀ 8 + 2 ⌀ 10	4 ⌀ 8 + 2 ⌀ 10	4 ⌀ 8 + 2 ⌀ 10
Shear force bars H ≥ 200 mm	3 ⌀ 8	3 ⌀ 8	3 ⌀ 8 + 2 ⌀ 12	3 ⌀ 8 + 2 ⌀ 12	4 ⌀ 8 + 2 ⌀ 12	4 ⌀ 8 + 2 ⌀ 12
Special stirrups	-	-	2 ⌀ 6	2 ⌀ 6	2 ⌀ 6	2 ⌀ 6



Schöck Isokorb® type K-corner: Static system

C25/30 design

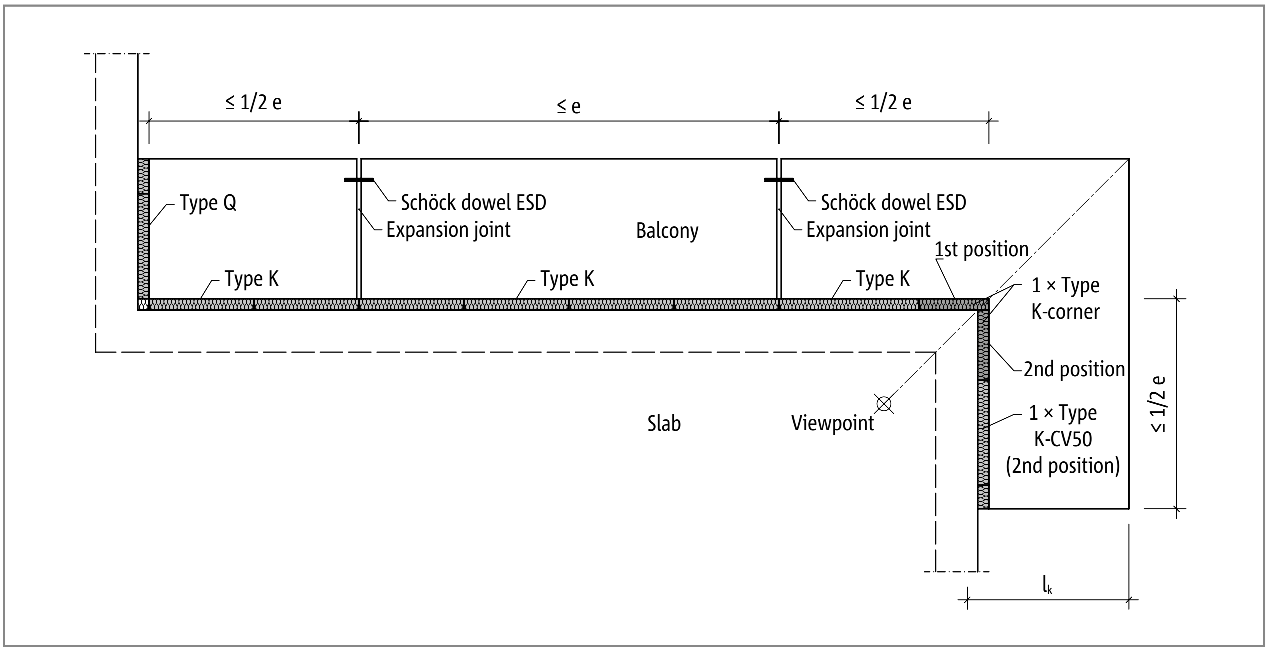
Notes on design

- The Schöck Isokorb® type K-corner with small cantilever lengths can also be replaced through the combination Schöck Isokorb® type K (1st position) and Schöck Isokorb® type K-CV50 (2nd position).
- The design takes place according to F. Leonhardt's "Vorlesung über Massivbau" ["Lecture on solid construction"] Part 3, Chap. 8.3.4.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- Note FEM guidelines if a FEM program is to be used for design.
- The deflection and required precamber of the balcony corner is to be determined depending on the overall system and the direction of drainage.

Expansion joint spacing

Maximum expansion joint spacing

If the length of the structural component exceeds the maximum expansion joint spacing, expansion joints must be incorporated in the exterior concrete components at right angles to the insulation layer in order to limit the effect as a result of temperature changes. With fixed points such as, for example, corners of balconies, parapets and balustrades or with the employment of the supplementary types HP or EQ half the maximum expansion joint spacing e/2 from the fixed point applies.
The shear force transmission in the expansion joint can be ensured using a longitudinally displaceable shear force dowel, e.g. Schöck Dowel.



Schöck Isokorb® type K-corner: Expansion joint spacing

Expansion joint spacing

Schöck Isokorb® type		K20-corner	K30-corner, K50-corner
Maximum expansion joint spacing		e [m]	
Insulating element thickness [mm]	80	13.5	10.1

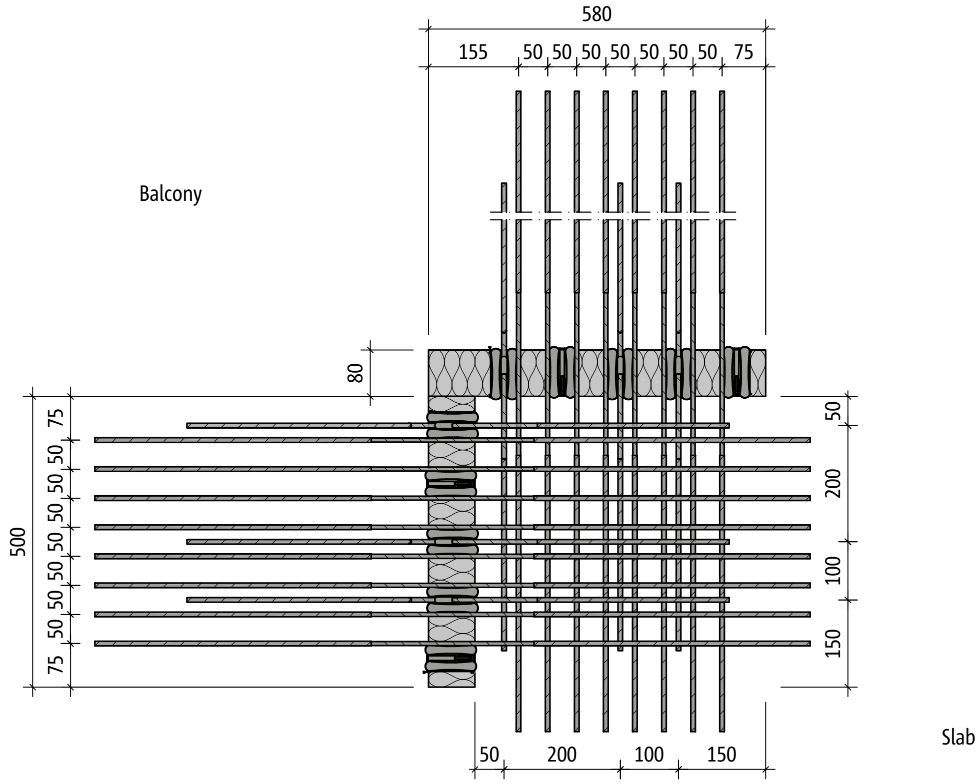
Schöck Isokorb® type		K20-corner	K30-corner, K50-corner
Maximum expansion joint spacing from fixed point		e/2 [m]	
Insulating element thickness [mm]	80	6.8	5.1

Edge distances

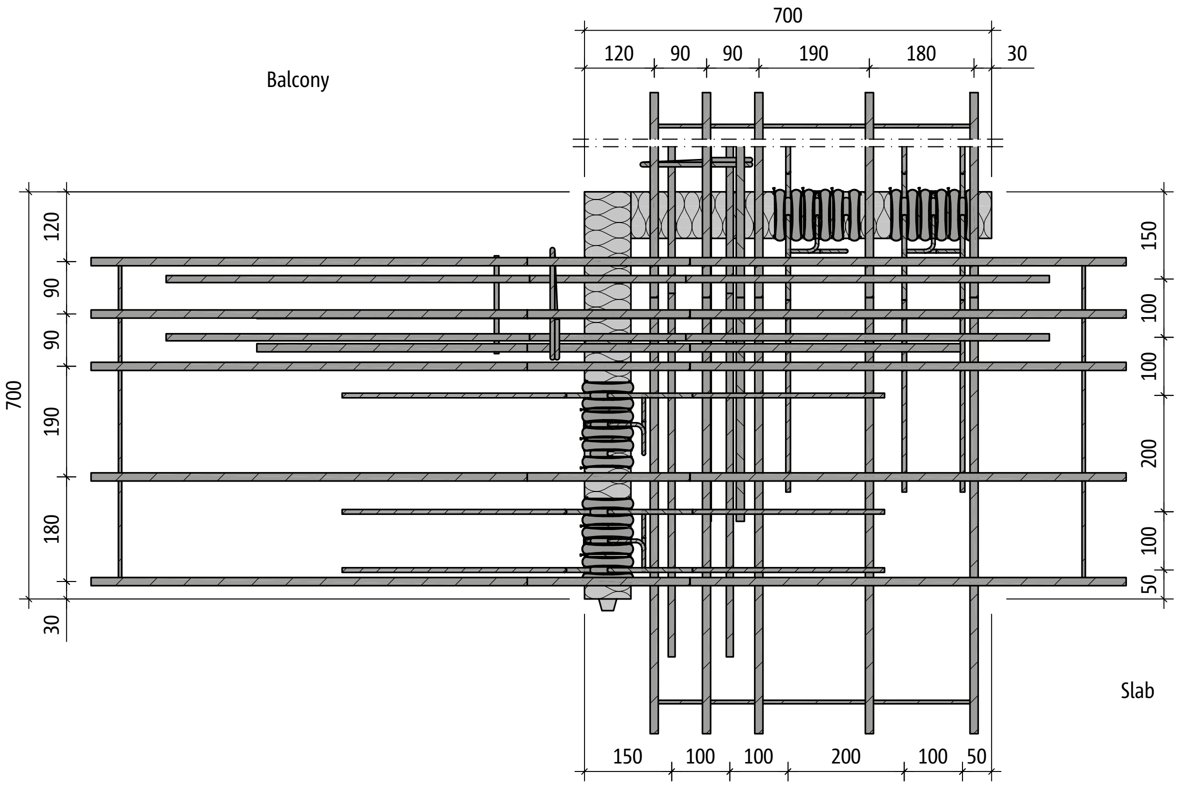
The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

- For the centre distance of the tension bars from the free edge or from the expansion joint: $e_R \geq 50$ mm and $e_R \leq 150$ mm applies.
- For the centre distance of the compression elements from the free edge or from the expansion joint: $e_R \geq 50$ mm applies.
- For the centre distance of the shear force bars from the free edge or from the exapansion joint: $e_R \geq 100$ mm and $e_R \leq 150$ mm applies.

Product description

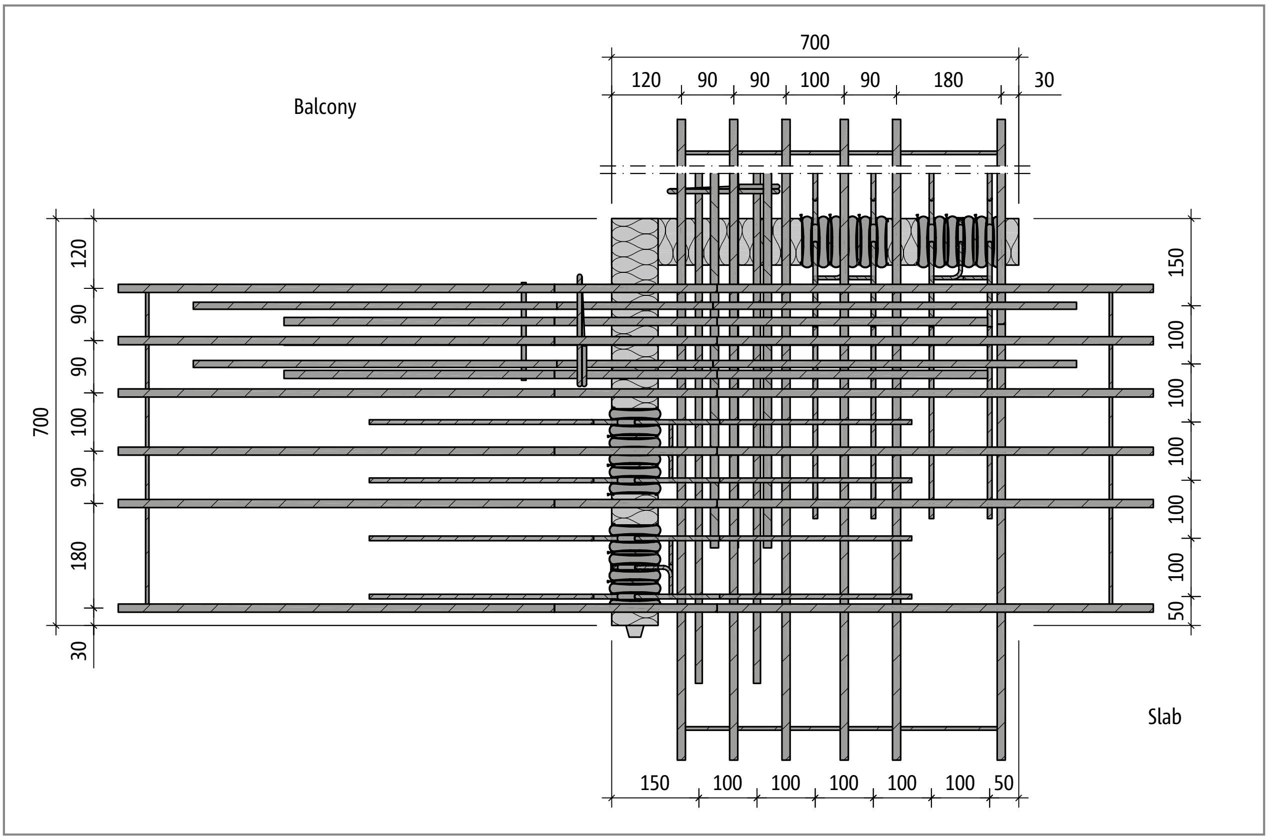


Schöck Isokorb® type K20-corner: Product layout



Schöck Isokorb® type K30-corner: Product layout

Product description

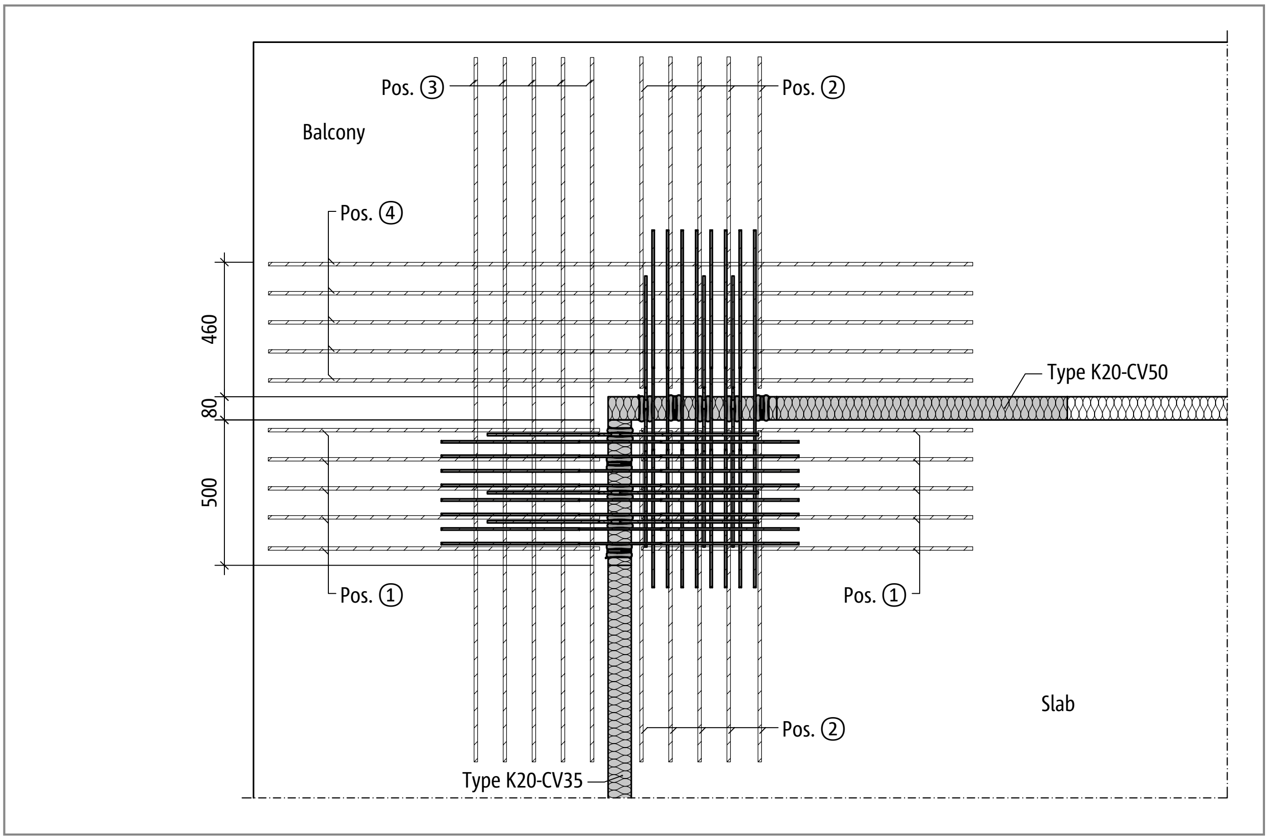


Schöck Isokorb® type K50-corner: Product layout

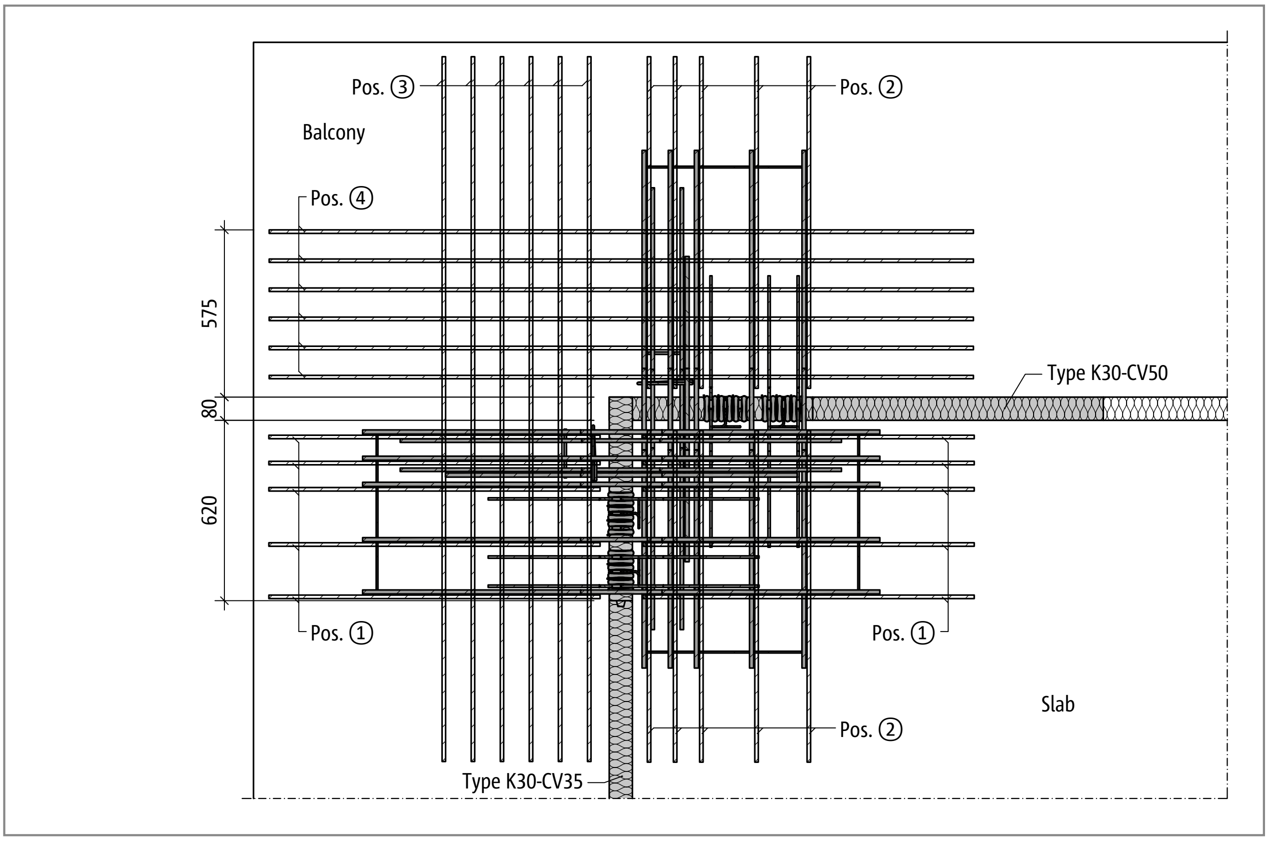
Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download

On-site reinforcement

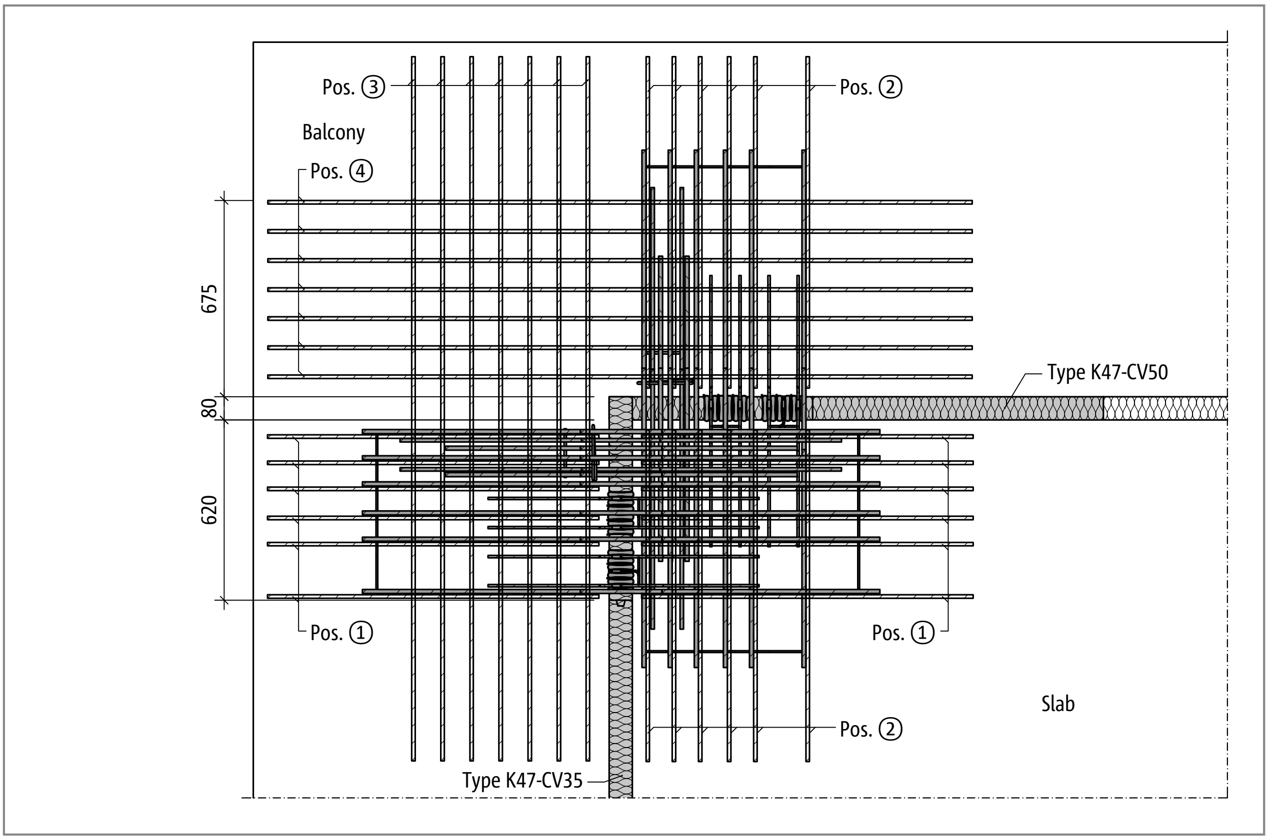


Schöck Isokorb® type K20-corner: On-site reinforcement (top position)



Schöck Isokorb® type K30-corner: On-site reinforcement (top position)

On-site reinforcement



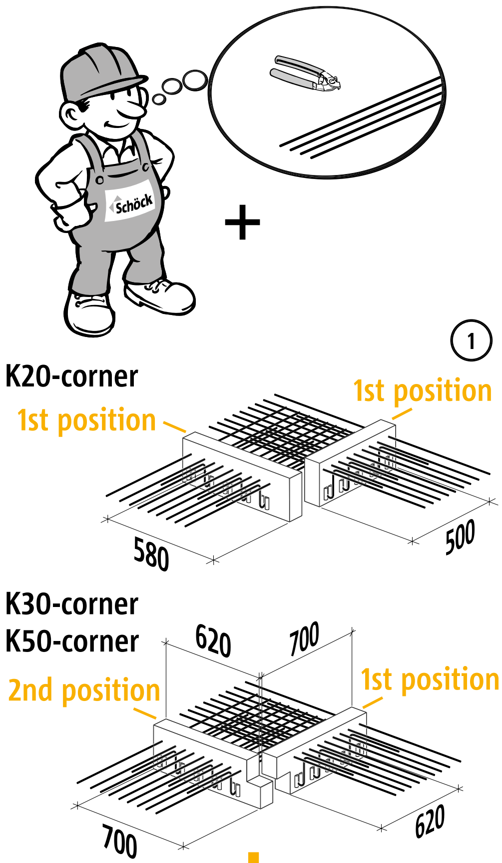
Schöck Isokorb® type K50-corner: On-site reinforcement (top position)

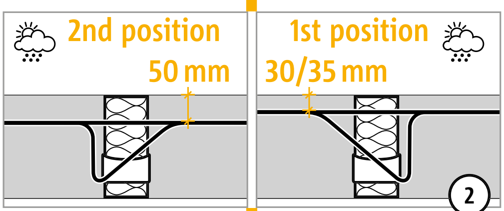
Schöck Isokorb® type		K20-corner	K30-corner	K50-corner
On-site reinforcement	Location	Concrete strength class ≥ C25/30		
Pos. 1 Overlapping reinforcement (1st position)				
Pos. 1	Balcony/floor side	2 • 5 • H12@100	2 • 5 • H16	2 • 6 • H16
Pos. 1 Bar length	Balcony/floor side	l_k - 70 mm	l_k - 70 mm	l_k - 70 mm
Pos. 2 Overlapping reinforcement(2nd position)				
Pos. 2	Balcony/floor side	2 • 5 • H12@100	2 • 5 • H16	2 • 6 • H16
Pos. 2 Bar length	Balcony/floor side	l_k - 70 mm	l_k - 70 mm	l_k - 70 mm
Pos. 3 Bar steel along the insulation joint (1st position)				
Pos. 3	Balcony side	5 • H12@100	6 • H16@100	7 • H16@100
Pos. 3 Bar length	Balcony side	2 × l_k	2 × l_k	2 × l_k
Pos. 4 Bar steel along the insulation joint (2nd position)				
Pos. 4	Balcony side	5 • H12@100	6 • H16@100	7 • H16@100
Pos. 4 Bar length	Balcony side	2 × l_k	2 × l_k	2 × l_k

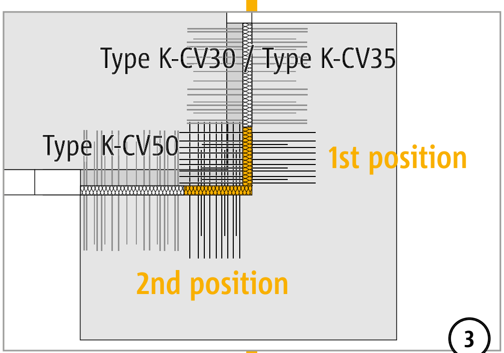
Information about on-site reinforcement

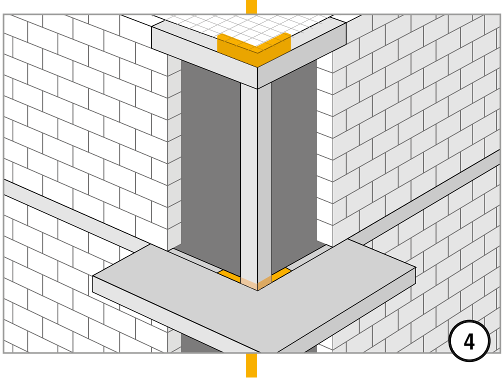
- The suspenson reinforcement and edging along the insulation joint is factory-integrated.
- Design of the overlap joints, precamber of the balcony slab and concrete cover according to the details from the structural engineer.
- With concreting, uniform filling and compacting on both sides is required for the positional security of the Schöck Isokorb®.
- The indicative minimum concrete strength class of the external structural component is C32/40.

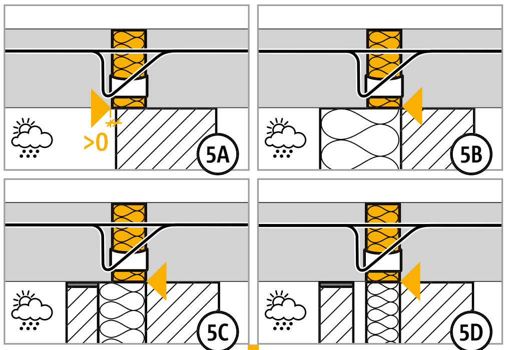
Installation instructions

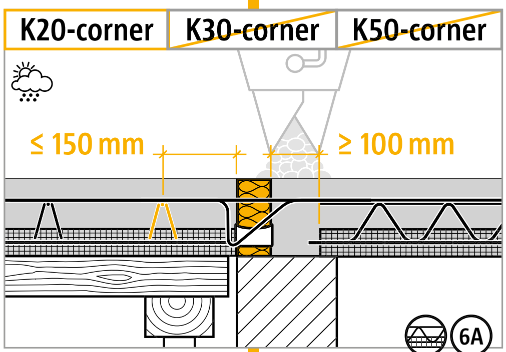


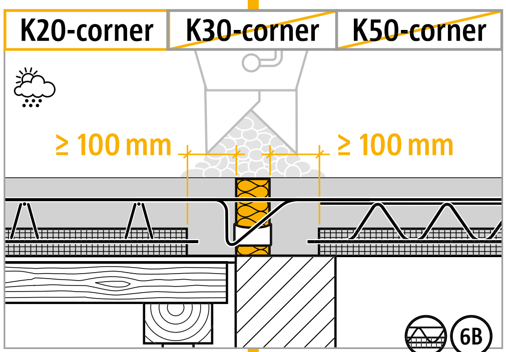


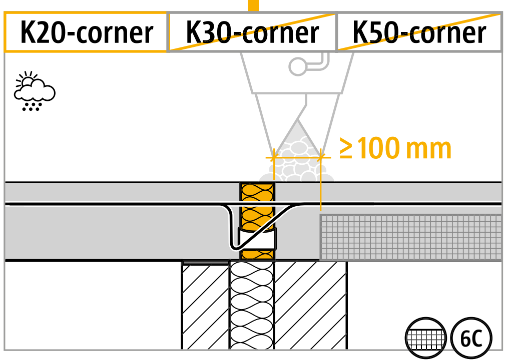






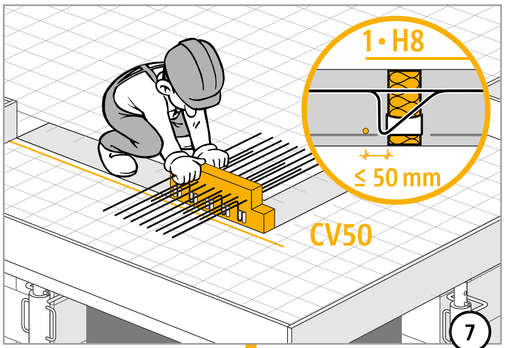


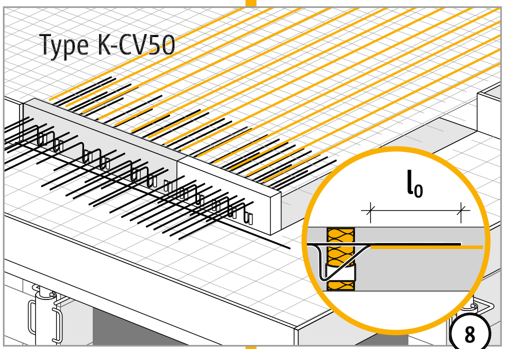


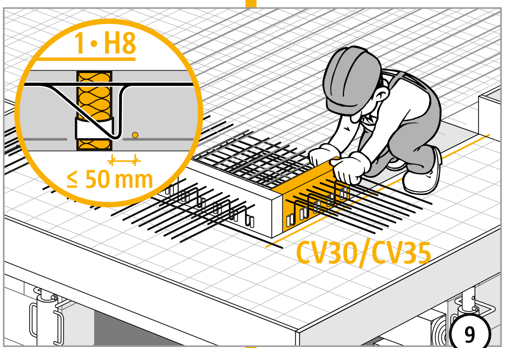


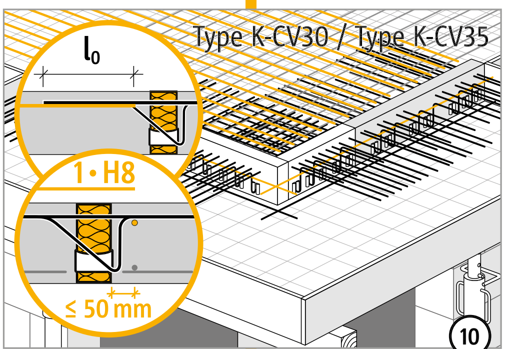
6A – 6C Without fail fill compression joint with in-situ concrete! Joint width ≥ 100 mm.

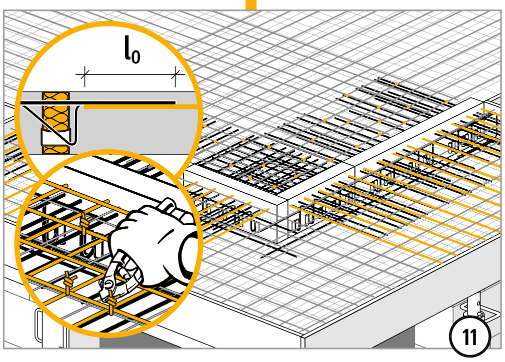
Installation instructions











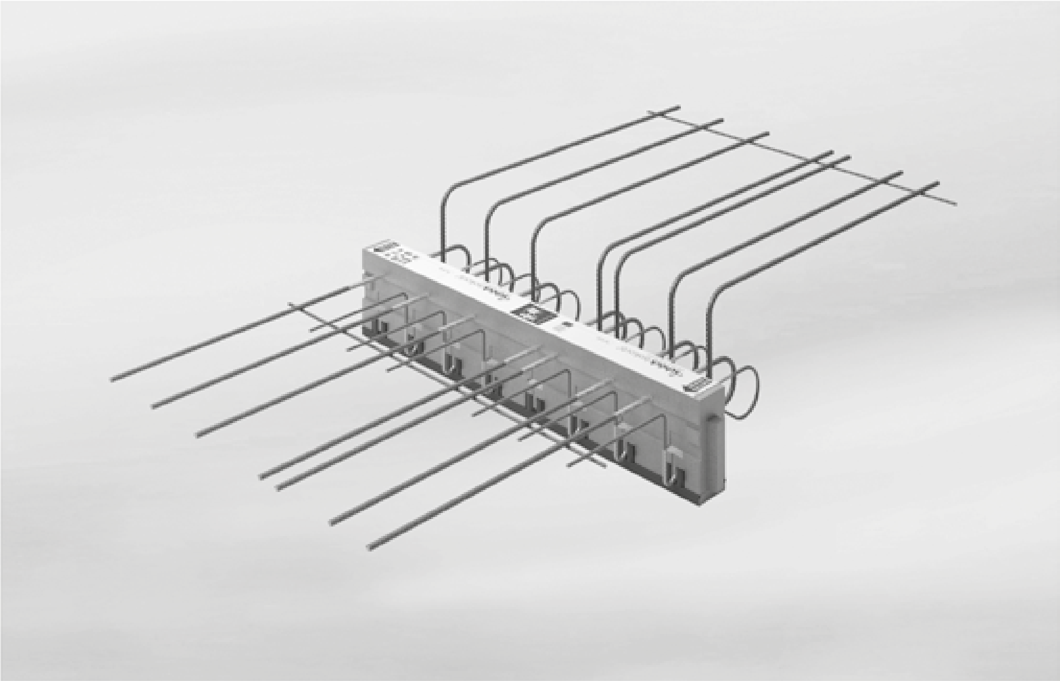
K-corner

Reinforced concrete/reinforced concrete

✓ Check list

- ☐ With the corner balcony has the required 2nd position (-CV50) been taken into account? In the connection to the Schöck Isokorb®type K-corner (2nd position) is a Schöck Isokorb® type K-CV50 planned?
- ☐ Is the minimum slab thickness (H_{min} = 180 mm) of the Schöck Isokorb® type K-corner taken into account?
- ☐ Are the recommendations for the limitation of the slenderness observed?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ Have the in-situ concrete strips (width ≥ 100 mm from insulation body of the Schöck Isokorb®type K20-corner, width ≥ 200 mm from insulation body of the Schöck Isokorb® type K30-corner and type K50-corner) been charted in the implementation plans?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ Are the Schöck FEM guidelines taken into acount with the calculation using FEM?
- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Has the additional proportionate deflection resulting from the Schöck Isokorb® been taken into account?
- ☐ Is the drainage direction taken into account with the resulting camber information? Is the degree of camber entered in the working drawings?
- ☐ Are planned existing horizontal loads e.g. from wind pressure taken into account? Are additional Schöck Isokorb® supplementary type HP or supplementary type EQ required for this?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ With precast balconies are possibly necessary gaps for the front side transportation anchors and downpipes with internal drainage taken into account? Is the maximum centre distance of 300 mm for the Isokorb® bars observed?
- ☐ Is, instead of Isokorb® type K, the type K-HV, K-BH, K-WO, K-WU (from page 93) or special design required with connect with height offset or to a wall?

Schöck Isokorb® type K-HV, K-BH, K-WO, K-WU



Schöck Isokorb® type K-HV

Schöck Isokorb® type K-HV
Suitable for cantilevered lower lying balconies. The balcony lies lower than the floor slab.
It transfers negative moments and positive shear forces.

Schöck Isokorb® type K-BH
Suitable for cantilevered higher lying balconies. The balcony lies higher than the floor slab.
It transfers negative moments and positive shear forces.

Schöck Isokorb® type K-WO
Suitable for cantilevered balconies, which are connected to a reinforced concrete wall at the top.
It transfers negative moments and positive shear forces.

Schöck Isokorb® type K-WU
Suitable for cantilevered balconies, which are connected to a reinforced concrete wall at the bottom.
It transfers negative moments and positive shear forces.

Lower lying balconies with Schöck Isokorb® type K

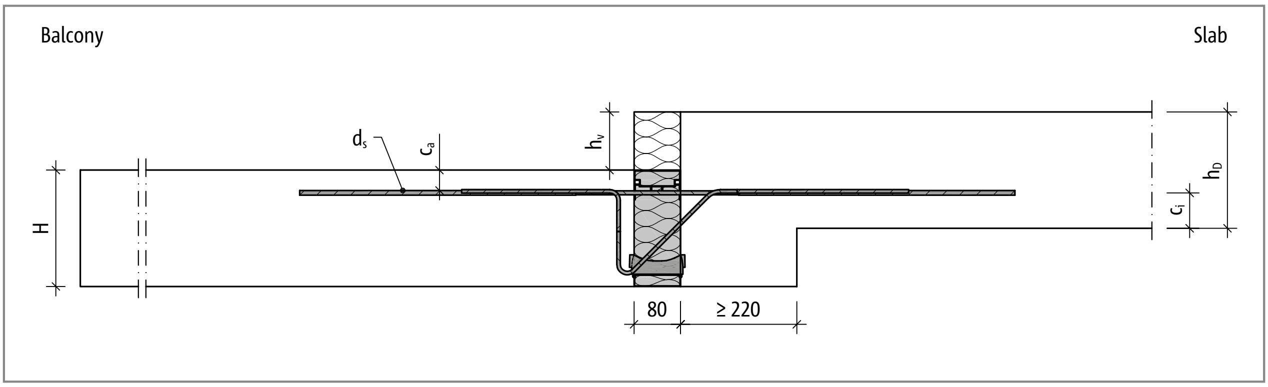
height offset $h_V \leq h_D - c_a - d_s - c_i$

- If $h_V \leq h_D - c_a - d_s - c_i$ then the Schöck Isokorb® type K can be selected with straight tension bar.

h_V = Height offset
h_D = Floor thickness
c_a = Outer concrete cover
d_s = Diameter tension bar Isokorb
c_i = Required inner concrete covern
H = Isokorb height

Example: Schöck Isokorb® type K47-CV35
h_D = 180 mm, c_a = 35 mm, d_s = 8 mm, c_i = 30 mm
max. h_V = 180 - 35 - 8 - 30 = 107 mm

- Recommendation: Downstand beam width at least 220 mm
- With floor-side arrangement of element slabs for c_i the element slab thickness + $\varnothing_S$ is to be applied.



Schöck Isokorb® type K: Smaller height offset downwards (balcony lying lower)

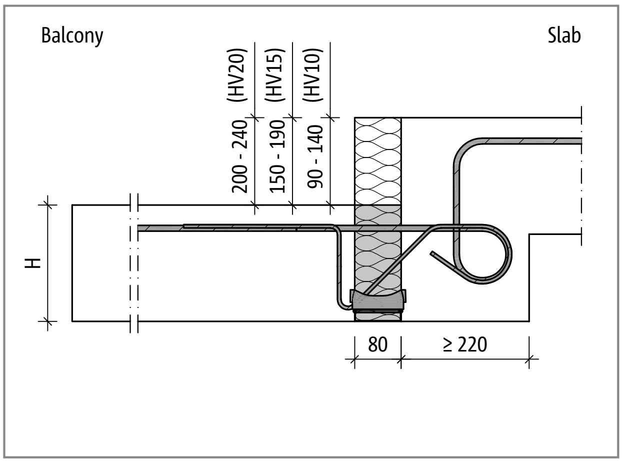
Height offset $h_V > h_D - c_a - d_s - c_i$

If the condition $h_V \leq h_D - c_a - d_s - c_i$ not met, the connection can be implemented using these variants:

- K-HV10-CV35 for height offsets of 90 mm to 140 mm
- K-HV15-CV35 for height offsets of 150 mm to 190 mm
- K-HV20-CV35 for height offsets of 200 mm to 240 mm

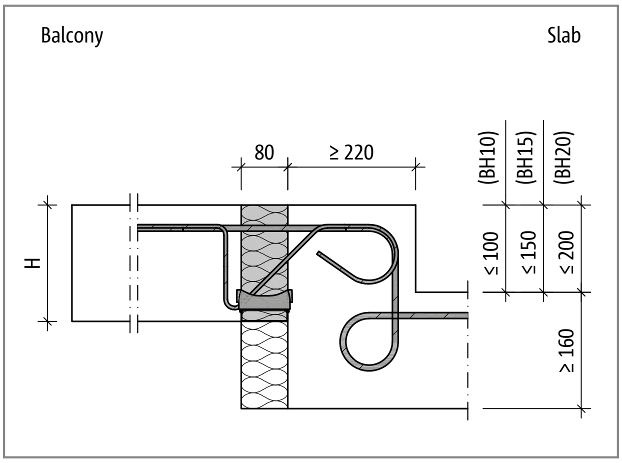
Installation cross sections

Lower lying balcony



Schöck Isokorb® type K-HV: Lower lying balcony and exterior insulation

Higher lying balcony

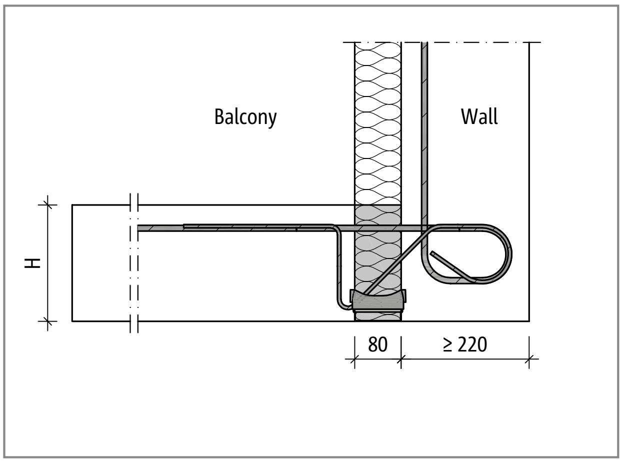


Schöck Isokorb® type K-BH: Higher lying balcony and external insulation

Downstand/upstand beam width

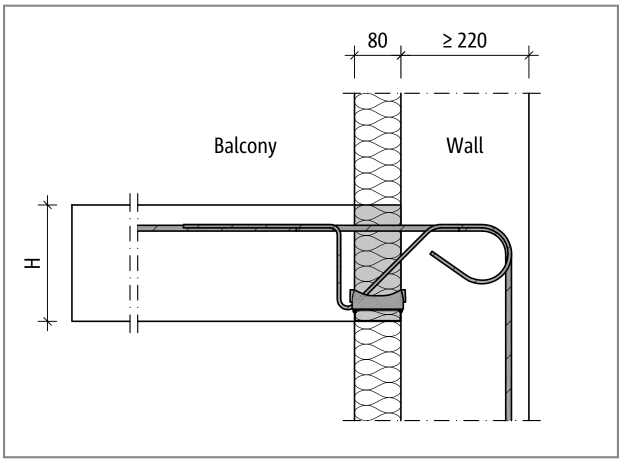
- at least 220 mm
- Special designs are also available for lower downstand/upstand beam widths.

Wall connection upwards



Schöck Isokorb® type K-WO: Wall connection upwards with external insulation

Wall connection downwards



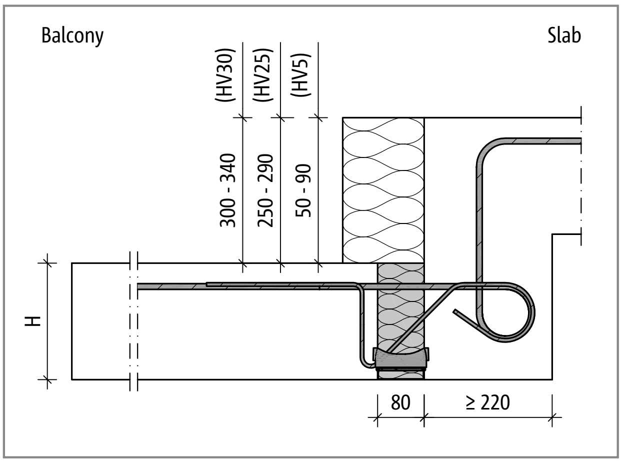
Schöck Isokorb® type K-WU: Wall connection downwards with external insulation

Wall thickness

- at least 220 mm
- Special designs are also available for lower wall thicknesses.

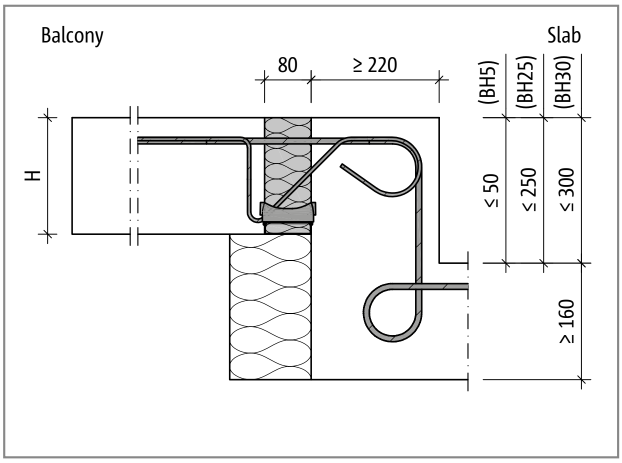
Special designs

Lower lying balcony

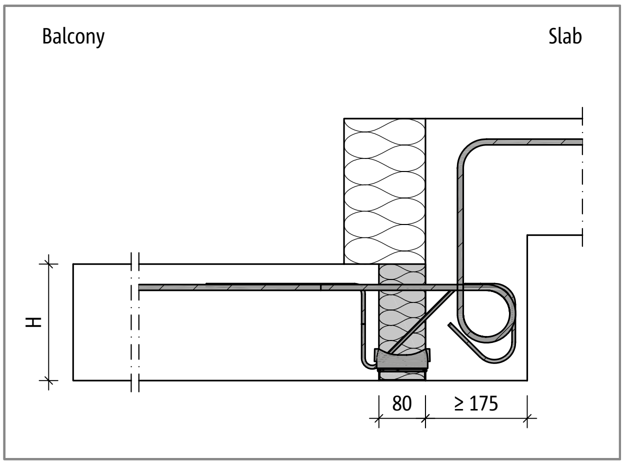


Schöck Isokorb® type K-HV: Lower lying balcony and exterior insulation

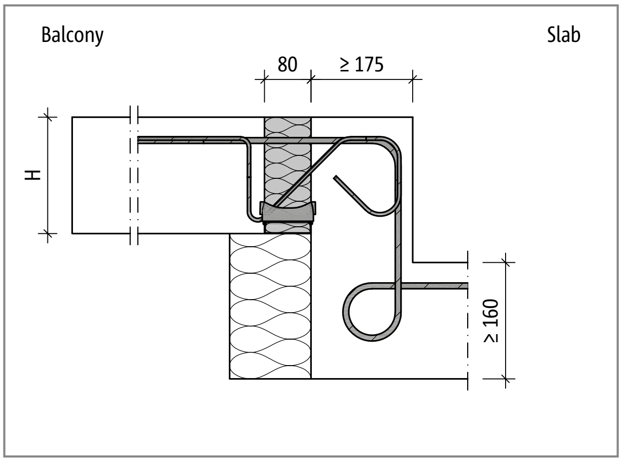
Higher lying balcony



Schöck Isokorb® type K-BH: Higher lying balcony and external insulation

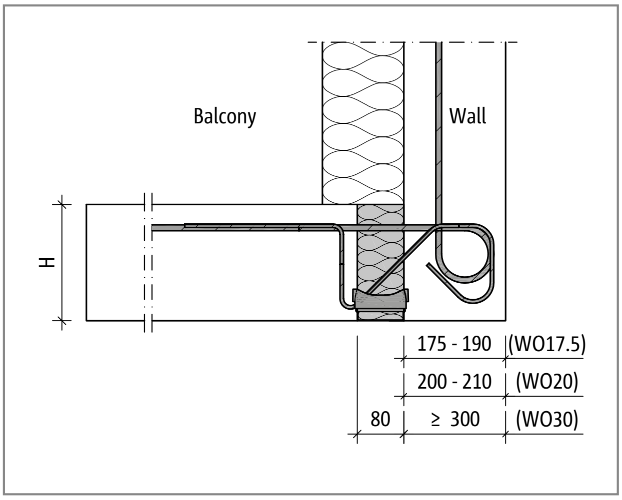


Schöck Isokorb® type K-HV: Lower lying balcony and exterior insulation



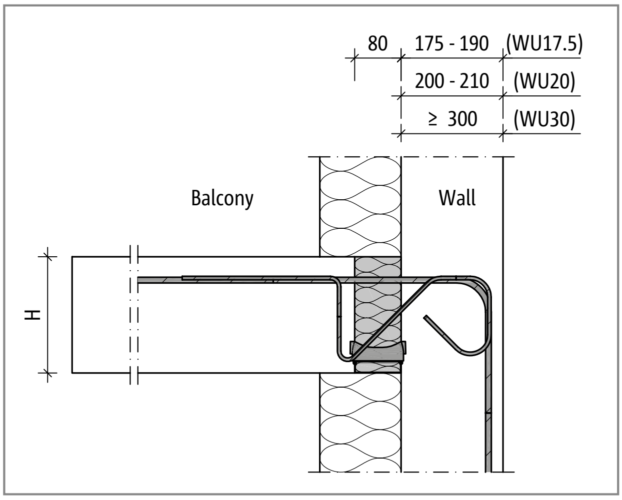
Schöck Isokorb® type K-BH: Higher lying balcony and external insulation

Wall connection upwards



Schöck Isokorb® type K-WO: Wall connection upwards with external insulation

Wall connection downwards



Schöck Isokorb® type K-WU: Wall connection downwards with external insulation

Special designs

- The geometric dimensions presented can be implemented using special designs. Contact is the application engineering dept. (contact see page 3).
- Design values can deviate from the standard products.

Product selection | Type designations | Special designs

Schöck Isokorb® type K-HV variants

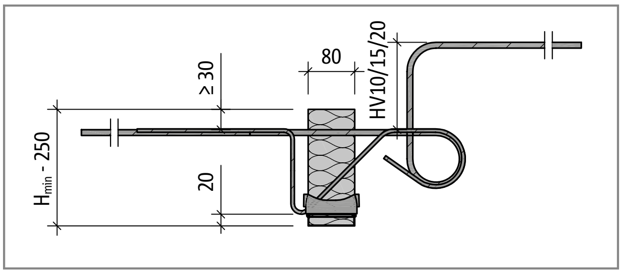
The configuration of the Schöck Isokorb® type K-HV can be varied as follows:

- Load-bearing level: K20-HV, K30-HV, K50-HV, K60-HV
- Connection geometry:
  HV10 = Isokorb® height offset: 90 - 140 mm
  HV15 =Isokorb® height offset: 150 - 190 mm
  HV20 = Isokorb® height offset: 200 - 240 mm
- Concrete cover of the tension bars:
  CV30 = 30mm, CV35 = 35 mm, CV50 = 50 mm (e.g.: K50-HV15-CV35-V6-H200)
- Shear force variant:
  Number and diameter of the shear force bars V6, V8 available only with K60-... ; varying in number and in diameter of the shear force bars
- Fire resistance class: R0 (Standard), REI120

Type designations in planning documents

Type/Load capacity
Isokorb® height offset
Concrete cover
Isokorb® height
Fire protection

K50-HV15-CV35-H180-REI120



Schöck Isokorb® type K-HV: Product section

Schöck Isokorb® type K-BH variants

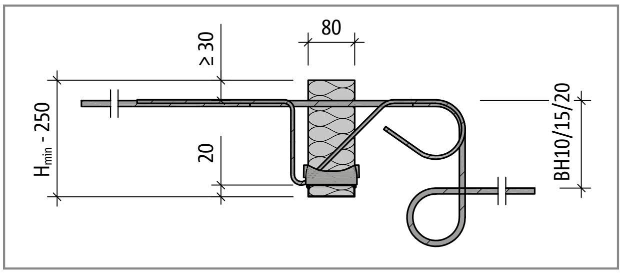
The configuration of the Schöck Isokorb® type K-BH can be varied as follows:

- Load-bearing level: K20-BH, K30-BH, K50-BH, K60-BH
- Connection geometry:
  BH10 = Isokorb® height offset: ≤ 100 mm
  BH15 = Isokorb® height offset: ≤ 150 mm
  BH20 = Isokorb® height offset: ≤ 200 mm
- Concrete cover of the tension bars:
  CV30 = 30mm, CV35 = 35 mm, CV50 = 50 mm (e.g.: K50-BH15-CV35-V6-H200)
- Shear force variant:
  Number and diameter of the shear force barsV6, V8 available only with K60-... ; varying in number and in diameter of the shear force bars
- Fire resistance class: R0 (Standard), REI120

Type designation in planning documents

Type/Load capacity
Isokorb® height offset
Concrete cover
Isokorb® height
Fire protection

K50-BH15-CV35-H180-REI120



Schöck Isokorb® type K-BH: Product section

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).

Product selection | Type designations | Special designs

Schöck Isokorb® type K-WO variants

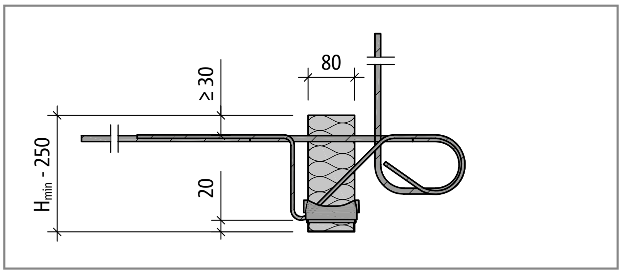
The configuration of the Schöck Isokorb® type K-WO can be varied as follows:

- Load-bearing level: K20-WO, K30-WO, K50-WO, K60-WO
- Connection geometry:
  WO = Connection to a wall upwards
- Concrete cover of the tension bars:
  CV30 = 30mm, CV35 = 35 mm, CV50 = 50 mm (e.g.: K50-WO-CV35-V6-H200)
- Shear force variant:
  Number and diameter of the shear force bars V6, V8 available only with K60-... ; varying in number and in diameter of the shear force bars
- Fire resistance class: R0 (Standard), REI120

Type designation in planning documents

Type/Load capacity
Wall connection upwards
Concrete cover
Isokorb® height
Fire protection

K50-WO-CV35-H180-REI120



Schöck Isokorb® type K-WO: Product section

Schöck Isokorb® type K-WU variants

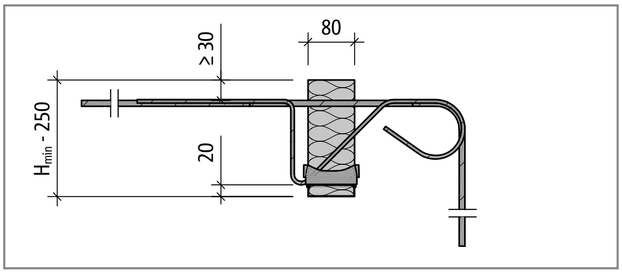
The configuration of the Schöck Isokorb® type K-WU can be varied as follows:

- Load-bearing level: K20-WU, K30-WU, K50-WU, K60-WU
- Connection geometry:
  WU = connection to a wall downwards
- Concrete cover of the tension bars:
  CV30 = 30mm, CV35 = 35 mm, CV50 = 50 mm (e.g.: K50-WU-CV35-V6-H200)
- Shear force variant:
  Number and diameter of the shear force bars V6, V8 available only with K60-... ; varying in number and in diameter of the shear force bars
- Fire resistance class: R0 (Standard), REI120

Type designation in planning documents

Type/Load capacity
Wall connection downwards
Concrete cover
Isokorb® height
Fire protection

K50-WU-CV35-H180-REI120



Schöck Isokorb® type K-WU: Product section

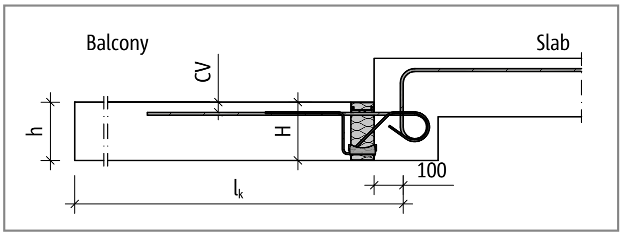
i Special designs

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).

C25/30 design

Schöck Isokorb® type				K20-HV10/15/20 K20-BH10/15/20 K20-WO K20-WU	K30-HV10/15/20 K30-BH10/15/20 K30-WO K30-WU	K50-HV10/15/20 K50-BH10/15/20 K50-WO K50-WU	K60-HV10/15/20 K60-BH10/15/20 K60-WO K60-WU
Design values with	Concrete cover CV [mm]			Concrete strength class ≥ C25/30			
	CV30	CV35	CV50	$m_{Rd,y}$ [kNm/m]			
Isokorb® height H [mm]		160		-14.9	-20.8	-28.0	-36.4
	160		180	-15.7	-22.0	-29.7	-38.6
		170		-16.6	-23.2	-31.4	-40.8
	170		190	-17.4	-24.4	-33.1	-43.1
		180		-18.3	-25.6	-34.8	-45.3
	180		200	-19.1	-26.8	-36.5	-47.5
		190		-20.0	-28.0	-38.2	-49.7
	190		210	-20.8	-29.2	-40.0	-51.9
		200		-21.7	-30.4	-41.7	-54.2
	200		220	-22.5	-31.6	-43.4	-56.4
		210		-23.4	-32.7	-45.1	-58.6
	210		230	-24.2	-33.9	-46.8	-60.8
		220		-25.1	-35.1	-48.5	-63.0
	220		240	-26.0	-36.3	-50.2	-65.3
		230		-26.8	-37.5	-51.9	-67.5
	230		250	-27.7	-38.7	-53.6	-69.7
		240		-28.5	-39.9	-55.3	-71.9
	240			-29.4	-41.1	-57.0	-74.1
		250		-30.2	-42.3	-58.7	-76.4
	250			-31.1	-43.5	-60.4	-78.6
Shear force variant				$v_{Rd,z}$ [kN/m]			
	V6			32.9	49.4	49.4	65.8
	V8			-	-	-	76.8

Schöck Isokorb® type	K20-HV10/15/20 K20-BH10/15/20 K20-WO K20-WU	K30-HV10/15/20 K30-BH10/15/20 K30-WO K30-WU	K50-HV10/15/20 K50-BH10/15/20 K50-WO K50-WU	K60-HV10/15/20 K60-BH10/15/20 K60-WO K60-WU
Isokorb® length [mm]	1000	1000	1000	1000
Tension bars	5 ⌀ 10	7 ⌀ 10	10 ⌀ 10	13 ⌀ 10
Shear force bars V6	4 ⌀ 6	6 ⌀ 6	6 ⌀ 6	6 ⌀ 8
Shear force bars V8	-	-	-	7 ⌀ 8
Pressure bearing (piece)	6	8	10	12
Special stirrup (piece)	-	-	-	4



Schöck Isokorb® type K-HV: Static system

C25/30 design

Notes on design

- With CV50, H = 180 mm is the lowest Isokorb® height, this requires a minimum slab thickness of h = 180 mm.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- Note FEM guidelines if a FEM program is to be used for design.

Deflection/Camber

Deflection

The deflection factors given in the table (tan α [%]) result alone from the deflection of the Schöck Isokorb® under 100% steel utilisation. They serve for the estimation of the required camber. The total arithmetic camber of the balcony slab formwork results from the calculation according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA plus the deflection from Schöck Isokorb®. The camber of the balcony slab formwork to be given by the structural engineer/designer in the implementation plans (Basis: Calculated total deflection from cantilever slab + floor rotation angle + Schöck Isokorb®) should be so rounded that the scheduled drainage direction is maintained (round up: with drainage to the building facade, round down: with drainage towards the cantilever slab end).

Deflection (p) as a result of Schöck Isokorb®

p = $\tan\alpha \cdot l_k \cdot (m_{pd} / m_{Rd}) \cdot 10$ [mm]

Factors to be applied

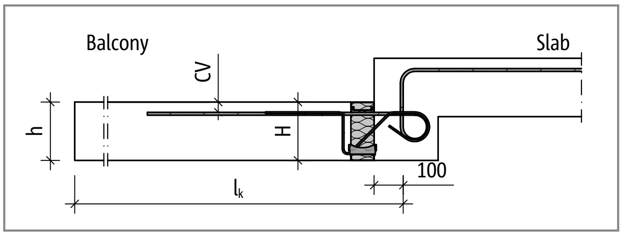
tan α = apply value from table

l_k = cantilever length [m]

m_{pd} = relevant bending moment [kNm/m] in the ultimate limit state for the determination of the p [mm] from Schöck Isokorb®.
The load combination to be applied for the deflection is determined by the structural engineer.
(Recommendation: Load combination for the determination of the camber p : determine g+q/2, m_{pd} in the ultimate limit state)

m_{Rd} = maximum design moment [kNm/m] of the Schöck Isokorb®

Calculation example see page 76



Schöck Isokorb® type K-HV: Static system

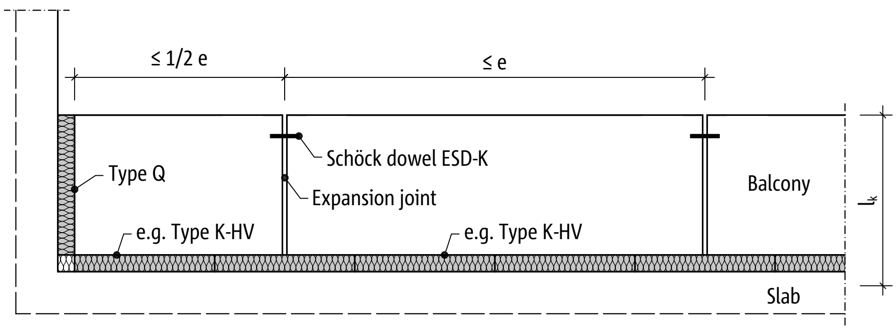
Schöck Isokorb® type		**K-HV, -BH, -WO, -WU**	
Deflection factors when		**tan α [%]**	
		CV30/CV35	**CV50**
Isokorb® height H [mm]	**160**	0.9	-
	170	0.8	-
	180	0.7	0.8
	190	0.7	0.8
	200	0.6	0.7
	210	0.6	0.6
	220	0.5	0.6
	230	0.5	0.5
	240	0.5	0.5
	250	0.4	0.5

Slenderness

Slenderness

In order to safeguard the serviceability limit state we recommend the limitation of the slenderness to the following maximum cantilever lengths max l_k [m]:

Schöck Isokorb® type		K-HV, -BH, -WO, -WU		
maximum cantilever length with		$l_{k,max}$ [m]		
		CV30	CV35	CV50
Isokorb® height H [mm]	160	1.81	1.74	-
	170	1.95	1.88	-
	180	2.10	2.03	1.81
	190	2.25	2.17	1.95
	200	2.39	2.32	2.10
	210	2.54	2.46	2.25
	220	2.68	2.61	2.39
	230	2.83	2.76	2.54
	240	2.98	2.90	2.68
	250	3.12	3.05	2.83



Schöck Isokorb® type K-HV: Formation of expansion joints with longitudinally relocatable shear force dowel, e.g. Schöck dowel

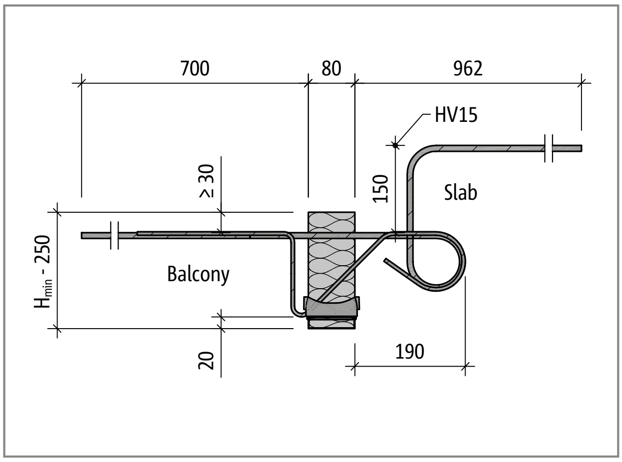
Schöck Isokorb® type		K-HV, -BH, -WO, -WU
Maximum expansion joint spacing e		e [m]
Insulating element thickness [mm]	80	13.0

Edge distances

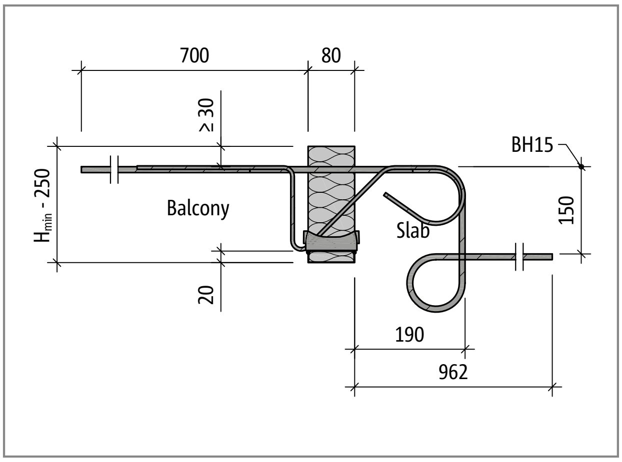
The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

- For the centre distance of the tension bars from the free edge or from the expansion joint: $e_R \geq 50$ mm and $e_R \leq 150$ mm applies.
- For the centre distance of the compression elements from the free edge or from the expansion joint: $e_R \geq 50$ mm applies.
- For the centre distance of the shear force bars from the free edge or from the exapansion joint: $e_R \geq 100$ mm and $e_R \leq 150$ mm applies.

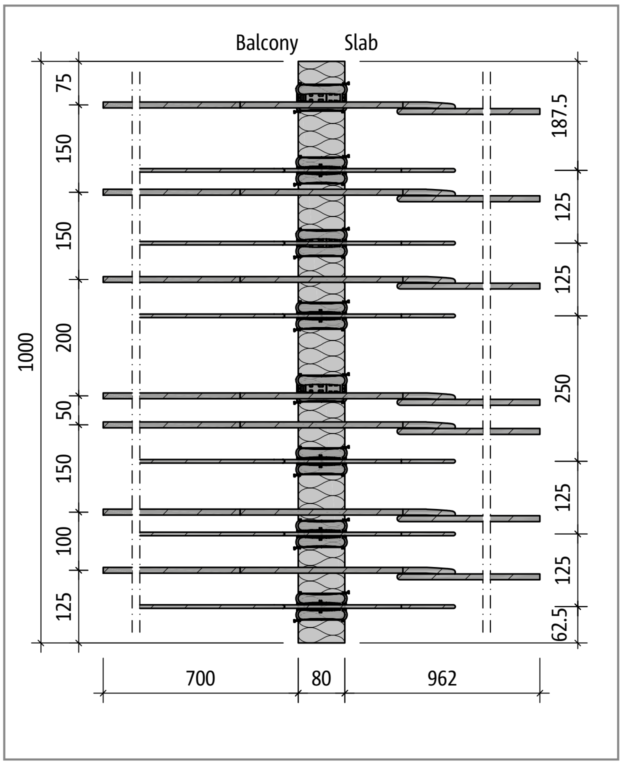
Product description



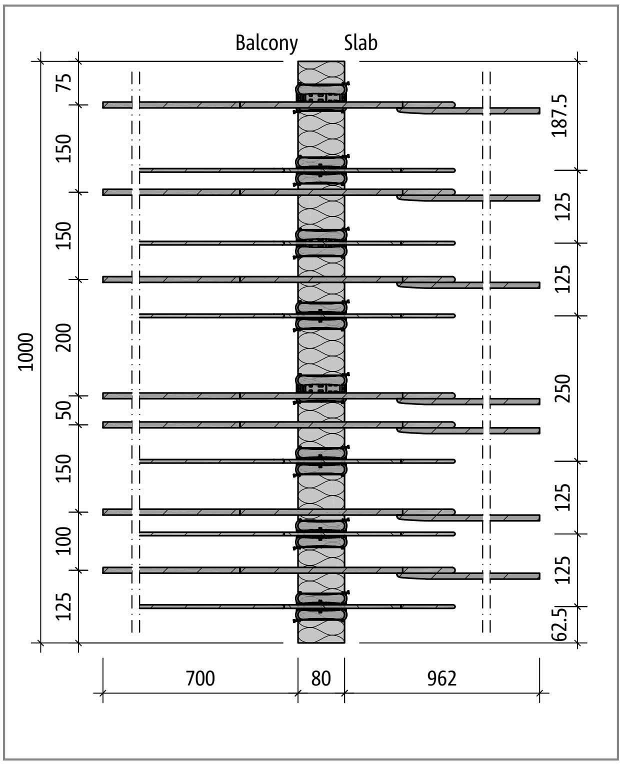
Schöck Isokorb® type K30-HV15: Product section



Schöck Isokorb® type K30-BH15: Product section



Schöck Isokorb® type K30-HV15: Product layout

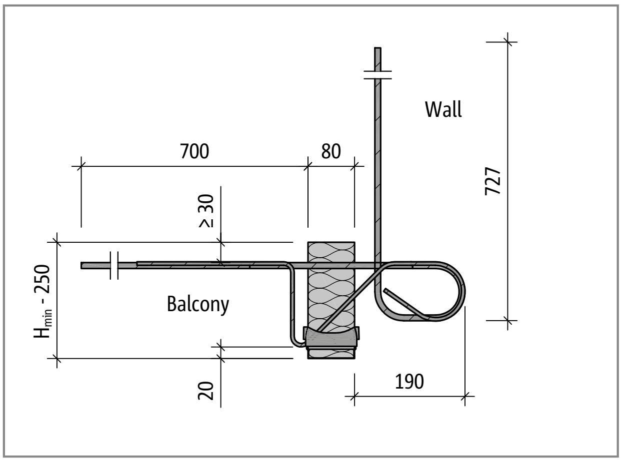


Schöck Isokorb® type K30-BH15: Product layout

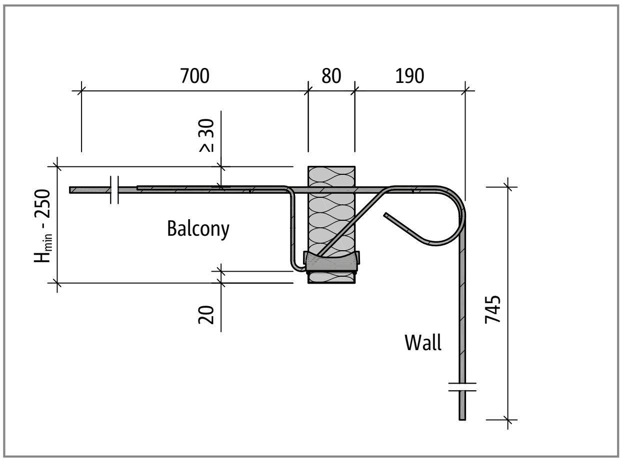
i Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download
- Minimum height Schöck Isokorb® type K-HV, -BH: H_{min} = 160 mm
- On-site spacing of the Schöck Isokorb® type K-HV, -BH possible on the unreinforced positions; take into account reduced load-bearing force due to spacing; take into account required edge distances
- Concrete cover of the tension bars: CV30 = 30 mm, CV35 = 35 mm, CV50 = 50 mm

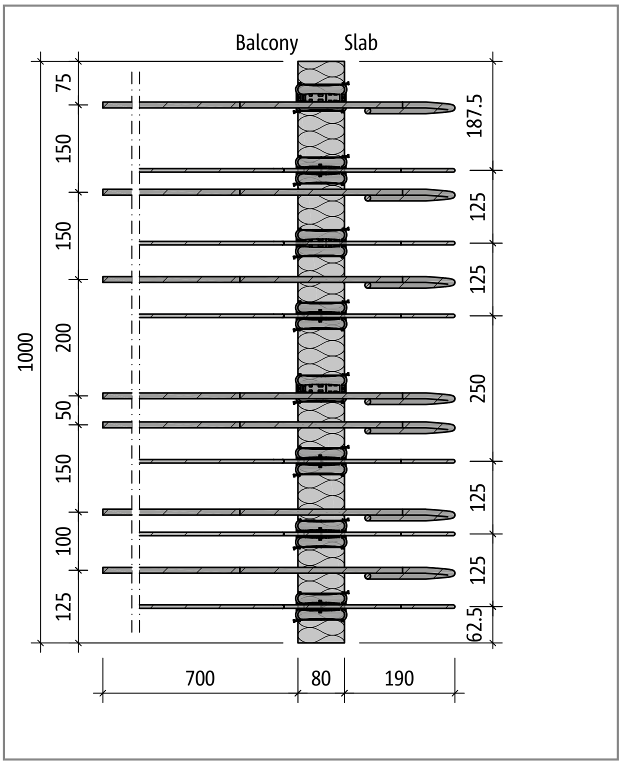
Product description



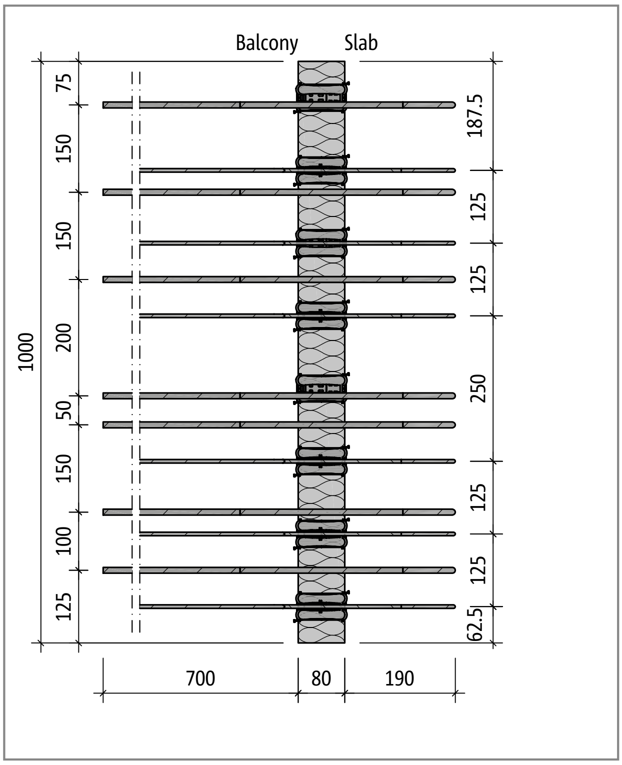
Schöck Isokorb® type K30-WO: Product section



Schöck Isokorb® type K30-WU: Product section



Schöck Isokorb® type K30-WO: Product layout

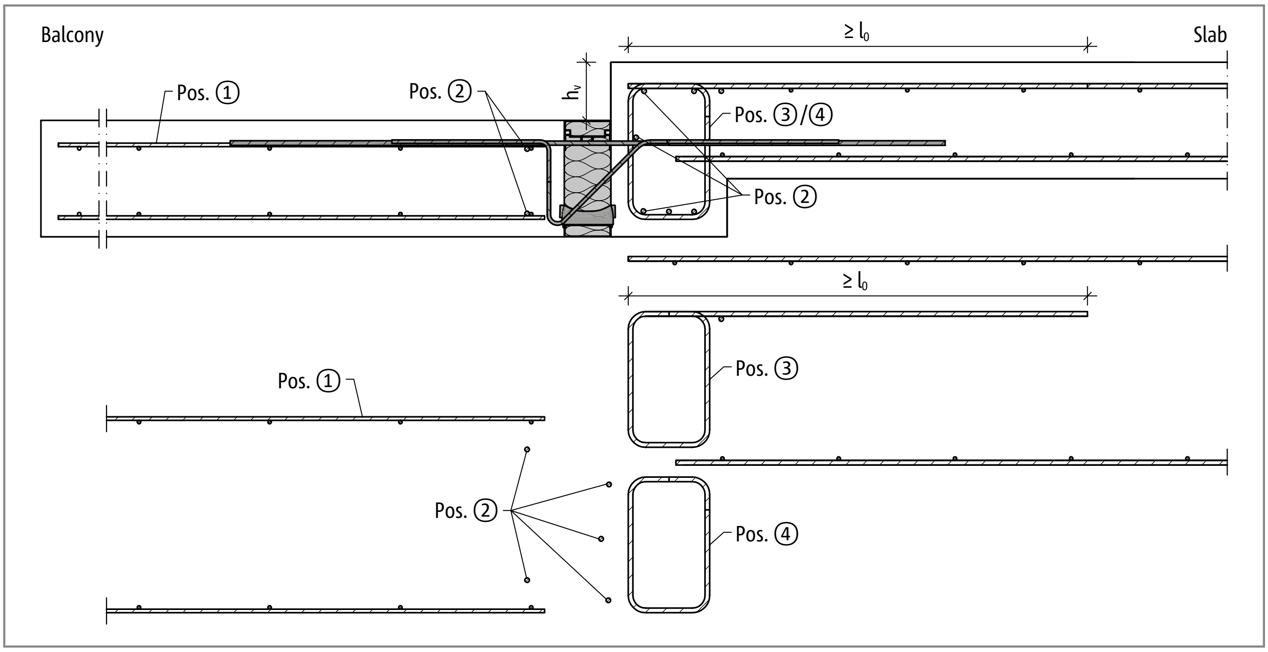


Schöck Isokorb® type K30-WU: Product layout

Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download
- Minimum height Schöck Isokorb® type K-WO, -WU: H_{min} = 160 mm
- On-site spacing of the Schöck Isokorb® type K-WU,WO possible at the unreinforced points; take into account reduced load-bearing capacity due to spacing; take into account required edge distances
- Concrete cover of the tension bars: CV30 = 30 mm, CV35 = 35 mm, CV50 = 50 mm

On-site reinforcement - Schöck Isokorb® type K



Schöck Isokorb® type K: On-site reinforcement for small height offset

Information about on-site reinforcement

- Due to the reinforcement density in the downstand beam use is recommended to K65 only.
- For the redirection of the tension force on the floor-side, a stirrup reinforcement Pos. 3 is required in the floor edge beam (upper side length $l_{0,bü}$). This stirrup reinforcement Pos.3 safeguards the load transmission from the Schöck Isokorb®.
- The shear force reinforcement Pos. 4 conforms to the loading of balcony, floor and the supporting width of the downstand/ upstand beam. Therefore the shear force reinforcement in individual cases is to be verified by the structural engineer.
- The required lateral reinforcement in the upstand beam area is to be verified according to BS EN 1992-1-1 (EC2), 8.7 to 8.8 and BS EN 1992-1-1/NA, NDPs for 8.8.
- The Schöck Isokorb® type K is to be placed as necessary before the installation of the downstand or upstand reinforcement.
- Pos. 3: Value for Isokorb® heights between 160 mm and 250 mm may be interpolated.
- Pos. 3: For larger downstand beam widths a reduction of the required reinforcement acc. to the structural engineer's details is possible.
- The indicative minimum concrete strength class of the external structural component is C32/40.

On-site reinforcement - Schöck Isokorb® type K

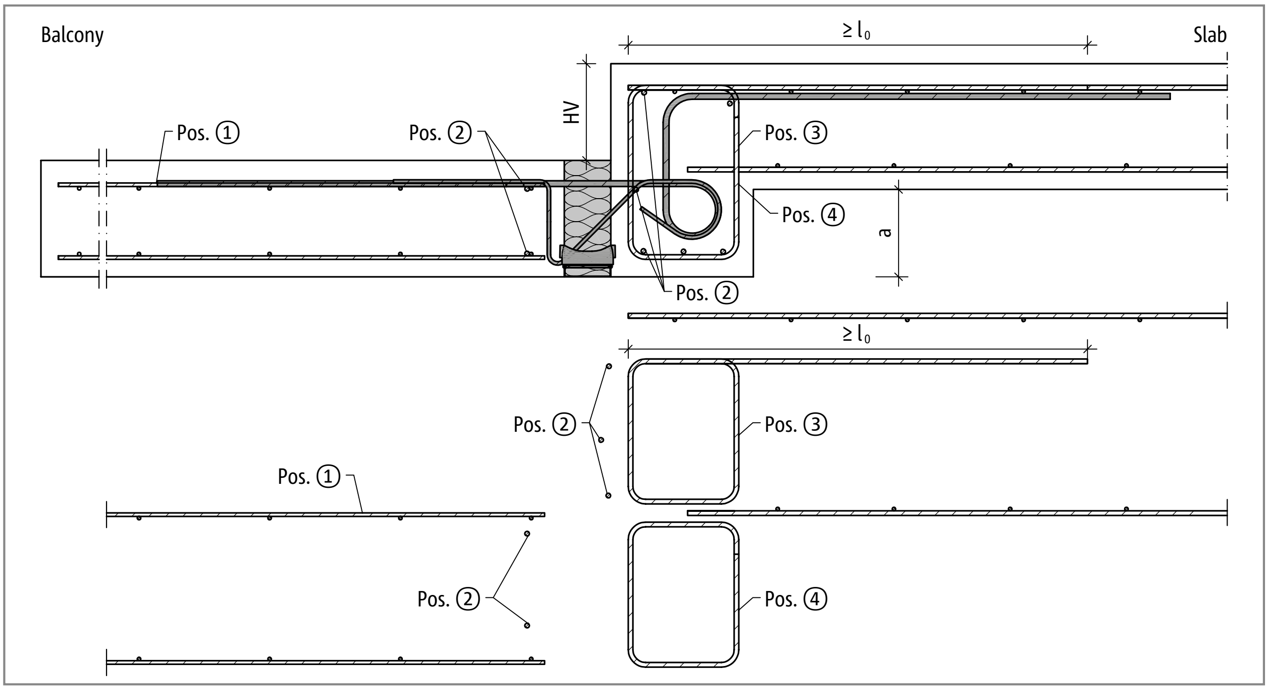
Recommendation for the on-site connection reinforcement

Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars.

Schöck Isokorb® type			K10	K20	K25	K35
On-site reinforcement	Location	Height [mm]	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement						
Pos. 1 [mm²/m]	Balcony side	160 - 250	201	402	503	604
Pos. 2 Steel bars along the insulation joint						
Pos. 2	Balcony side	160 - 250	2 • H8	2 • H8	2 • H8	2 • H8
	Floor side	160 - 250	3 • H8	3 • H8	3 • H8	3 • H8
Pos. 3 Stirrup reinforcement for the redirection of the tension force						
Pos. 3 [mm²/m]	Floor side	160	266	453	621	674
		250	406	730	969	1062
Pos. 4 Stirrup reinforcement acc. to shear force design						
Pos. 4	Floor side	160 - 250	Stirrup reinforcement acc. to BS EN 1992-1-1 (EC2), 6.2.3, 9.2.2			

Schöck Isokorb® type			K45	K47	K55	K65
On-site reinforcement	Location	Height [mm]	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement						
Pos. 1 [mm²/m]	Balcony side	160 - 250	704	792	905	1018
Pos. 2 Steel bars along the insulation joint						
Pos. 2	Balcony side	160 - 250	2 • H8	2 • H8	2 • H8	2 • H8
	Floor side	160 - 250	3 • H8	3 • H8	3 • H8	3 • H8
Pos. 3 Stirrup reinforcement for the redirection of the tension force						
Pos. 3 [mm²/m]	Floor side	160	821	889	1005	1120
		250	1320	1441	1651	1859
Pos. 4 Stirrup reinforcement acc. to shear force design						
Pos. 4	Floor side	160 - 250	Stirrup reinforcement acc. to BS EN 1992-1-1 (EC2), 6.2.3, 9.2.2			

On-site reinforcement - Schöck Isokorb® type K-HV



Recommendation for the on-site connection reinforcement

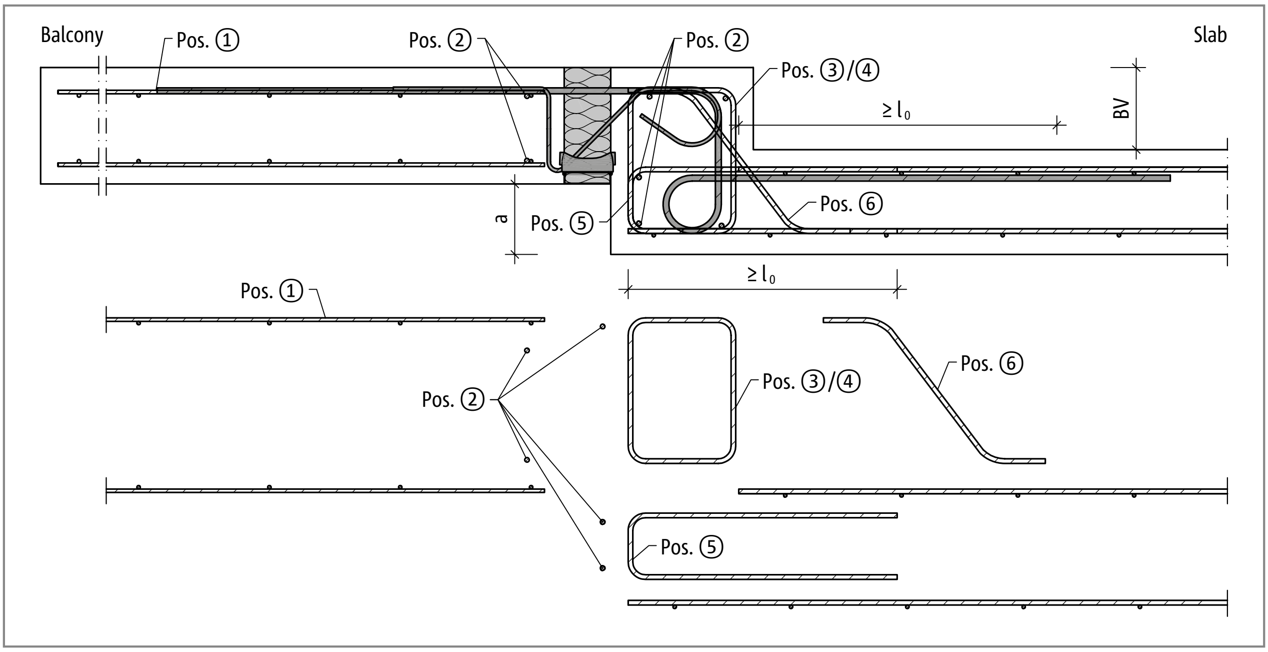
Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars.

Schöck Isokorb® type		K20-HV	K30-HV	K50-HV	K60-HV
On-site reinforcement	Location	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement					
Pos. 1 [mm²/m]	Balcony side	393	550	785	1020
Pos. 2 Steel bars along the insulation joint					
Pos. 2	Balcony side/downstand beam	5 • H8	5 • H8	5 • H8	5 • H8
Pos. 3 Stirrup					
Pos. 3 [mm²/m]	Downstand beam a = 260 mm	749	1084	1591	2065
	Downstand beam a = 135 mm	462	665	946	1203
Pos. 4 Stirrup					
Pos. 4	Downstand beam	Taking into account of shear forces and moments by the structural engineer			

Information about on-site reinforcement

- For the redirection of the tension force on the floor-side, a stirrup reinforcement Pos. 3 is required in the floor edge beam (upper side length $l_{0,bü}$). This stirrup reinforcement Pos.3 safeguards the load transmission from the Schöck Isokorb®.
- l_0 for l_0 (⌀10) ≥ 570 mm, l_0 (⌀12) ≥ 680 mm and l_0 (⌀14) ≥ 790 mm.
- Pos. 3 applies for downstand widths b = 220 mm. For b > 220 mm a reduction is possible.
- Pos. 3 is given for two offset dimensions a. In between it can be interpolated.
- The shear force reinforcement Pos. 4 conforms to the loading of balcony, floor and the supporting width of the downstand/upstand beam. Therefore the shear force reinforcement in individual cases is to be verified by the structural engineer.
- The required lateral reinforcement in the upstand beam area is to be verified according to BS EN 1992-1-1 (EC2), 8.7 to 8.8 and BS EN 1992-1-1/NA, NDPs for 8.8.
- The Schöck Isokorb® type K-HV is to be placed as necessary before the installation of the downstand or upstand reinforcement.

On-site reinforcement - Schöck Isokorb® type K-BH



Recommendation for the on-site connection reinforcement

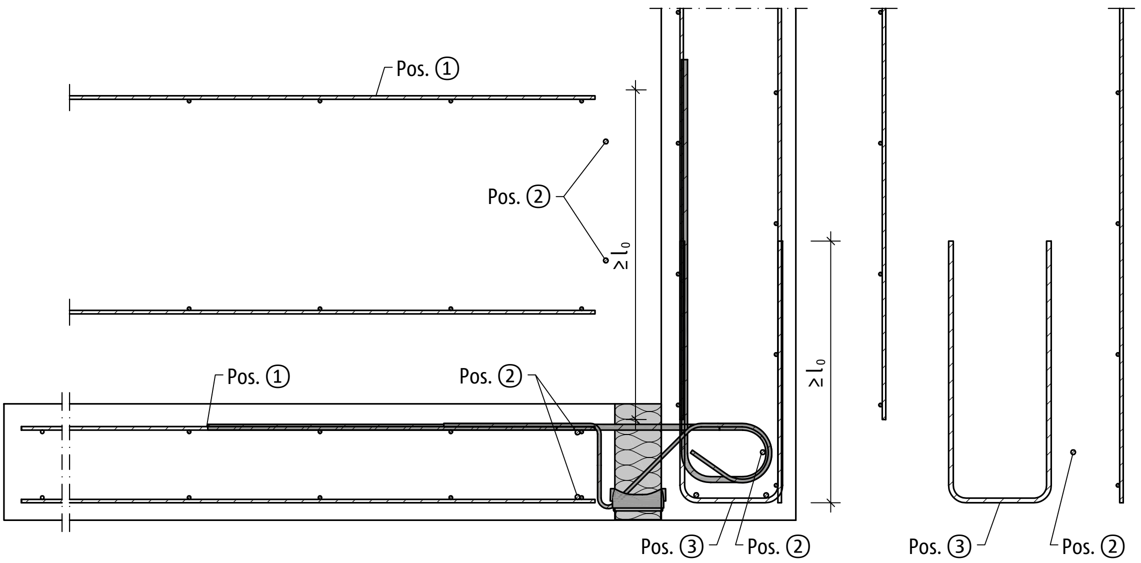
Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars.

Schöck Isokorb® type		K20-BH	K30-BH	K50-BH	K60-BH
On-site reinforcement	Location	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement					
Pos. 1 [mm²/m]	Balcony side	393	550	785	1020
Pos. 2 Steel bars along the insulation joint					
Pos. 2	Balcony/upstand beam	5 • H8	5 • H8	5 • H8	5 • H8
Pos. 3 and Pos. 5 Stirrup					
Pos. 3 and Pos. 5 [mm²/m]	Upstand beam a = 260 mm	749	1084	1591	2065
	Upstand beam a = 135 mm	462	665	946	1203
Pos. 4 Stirrup					
Pos. 4	Upstand beam	Taking into account of shear forces and moments by the structural engineer			
Pos. 6 Inclined reinforcement					
Pos. 6	Upstand beam	H8@200	H8@200	H8@110	H10@130

i Information about on-site reinforcement

- For the redirection of the tension force on the floor side, a stirrup reinforcement Pos. 3 is required in the floor edge beam (upper side length $l_{0,bü}$). This stirrup reinforcement Pos.3 + Pos.5 safeguards the load passing from the Schöck Isokorb®.
- l_0 for l_0 (⌀10) ≥ 570 mm, l_0 (⌀12) ≥ 680 mm and l_0 (⌀14) ≥ 790 mm.
- Pos. 3 and Pos. 5 apply for upstand beam widths b = 220 mm. For b > 220 mm a reduction is possible.
- Pos. 3 and Pos. 5 are given for two offset dimensions a. In b tween it can be interpolated.
- The shear force reinforcement Pos. 4 conforms to the loading of balcony, floor and the supporting width of the downstand/ upstand beam. Therefore the shear force reinforcement in individual cases is to be verified by the structural engineer.
- The required lateral reinforcement in the upstand beam area is to be verified according to BS EN 1992-1-1 (EC2), 8.7 to 8.8 and BS EN 1992-1-1/NA, NDPs for 8.8.
- The Schöck Isokorb® type K-BH is to be placed as necessary before the installation of the downstand or upstand reinforcement.

On-site reinforcement - Schöck Isokorb® type K-WO



Recommendation for the on-site connection reinforcement

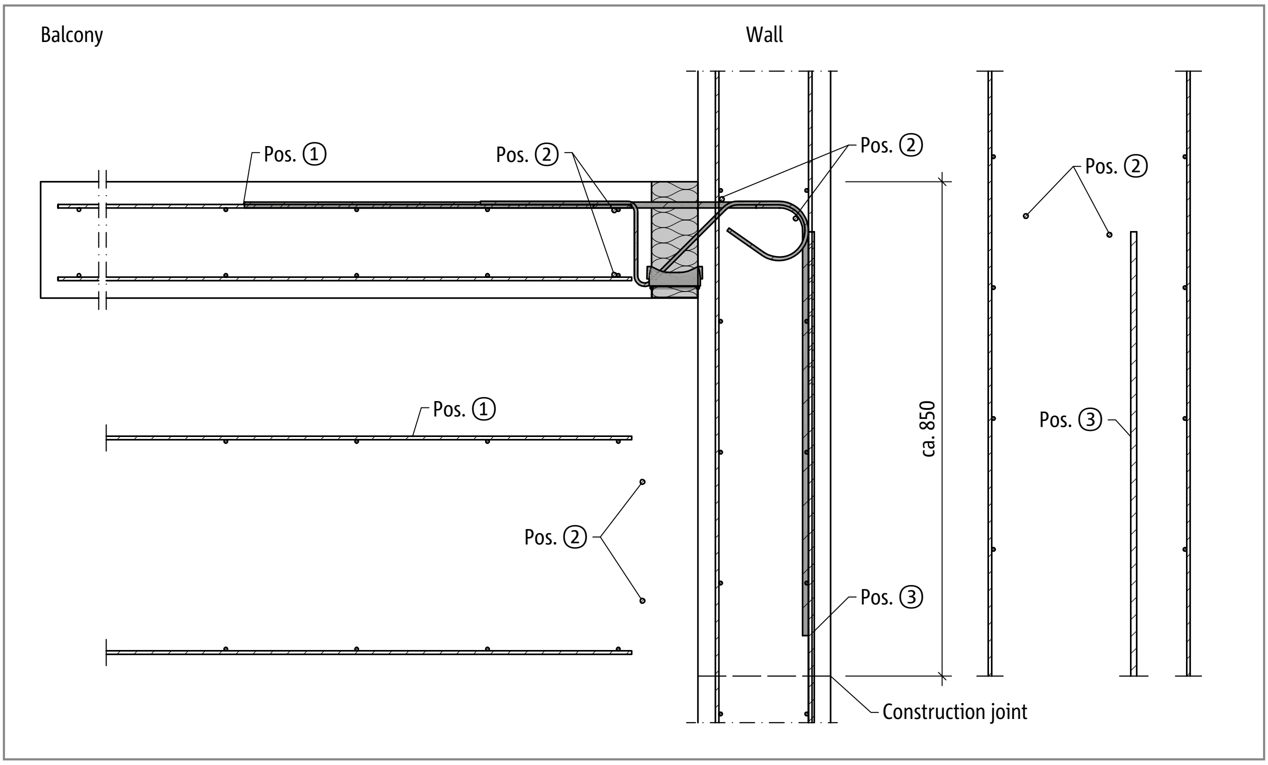
Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars.

Schöck Isokorb® type		K20-WO	K30-WO	K50-WO	K60-WO
On-site reinforcement	Location	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement					
Pos. 1 [mm²/m]	Balcony side	393	550	785	1020
Pos. 2 Steel bars along the insulation joint					
Pos. 2	Balcony side/wall side	3 • H8	3 • H8	3 • H8	3 • H8
Pos. 3 Stirrup					
Pos. 3	Wall side	H10@135	H12@135	⌀ 14/135	H16@95
l_0 [mm]	Wall side	≥ 570	≥ 680	≥ 790	≥ 790

Information about on-site reinforcement

- The required lateral reinforcement in the upstand beam area is to be verified according to BS EN 1992-1-1 (EC2), 8.7 to 8.8 and BS EN 1992-1-1/NA, NDPs for 8.8.
- The Schöck Isokorb® type K-WO is to be placed as necessary before the installation of the downstand or upstand reinforcement.
- The indicative minimum concrete strength class of the external structural component is C32/40.

On-site reinforcement - Schöck Isokorb® type K-WU



Recommendation for the on-site connection reinforcement

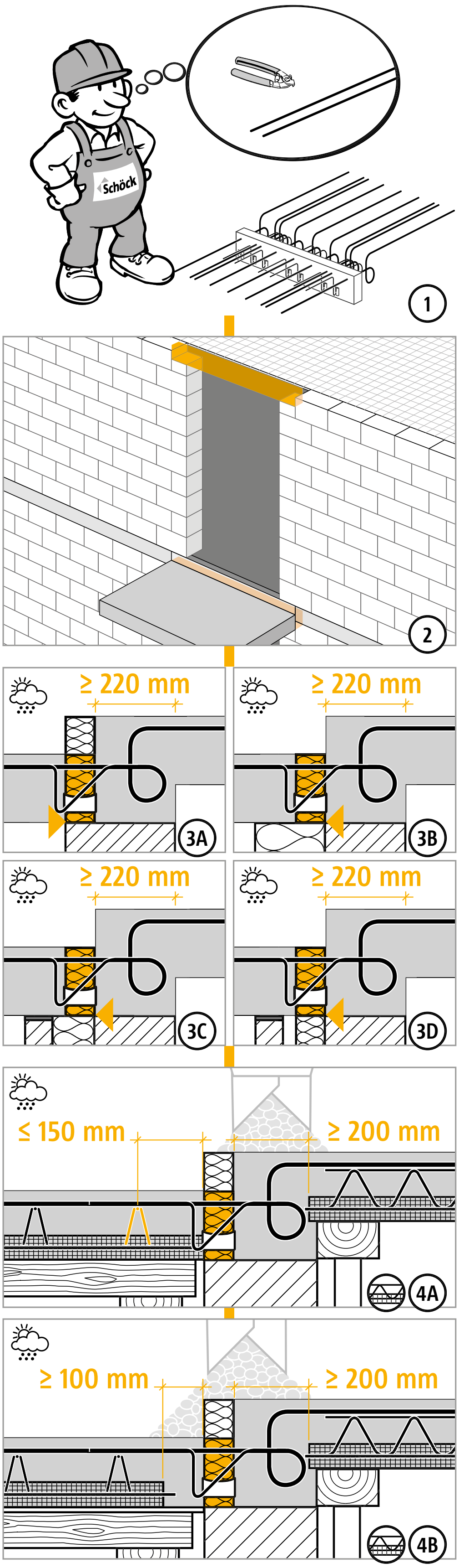
Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars.

Schöck Isokorb® type		K20-WU	K30-WU	K50-WU	K60-WU
	Location	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement					
Pos. 1 [mm²/m]	Balcony side	393	550	785	1020
Pos. 2 Steel bars along the insulation joint					
Pos. 2	Balcony side/wall side	4 • H8	4 • H8	4 • H8	4 • H8
Pos. 3 Bar steel					
Pos. 3	Wall side	H10@135	H12@135	⌀ 14/135	H16@95
l_0 [mm]	Wall side	≥ 570	≥ 680	≥ 790	≥ 790

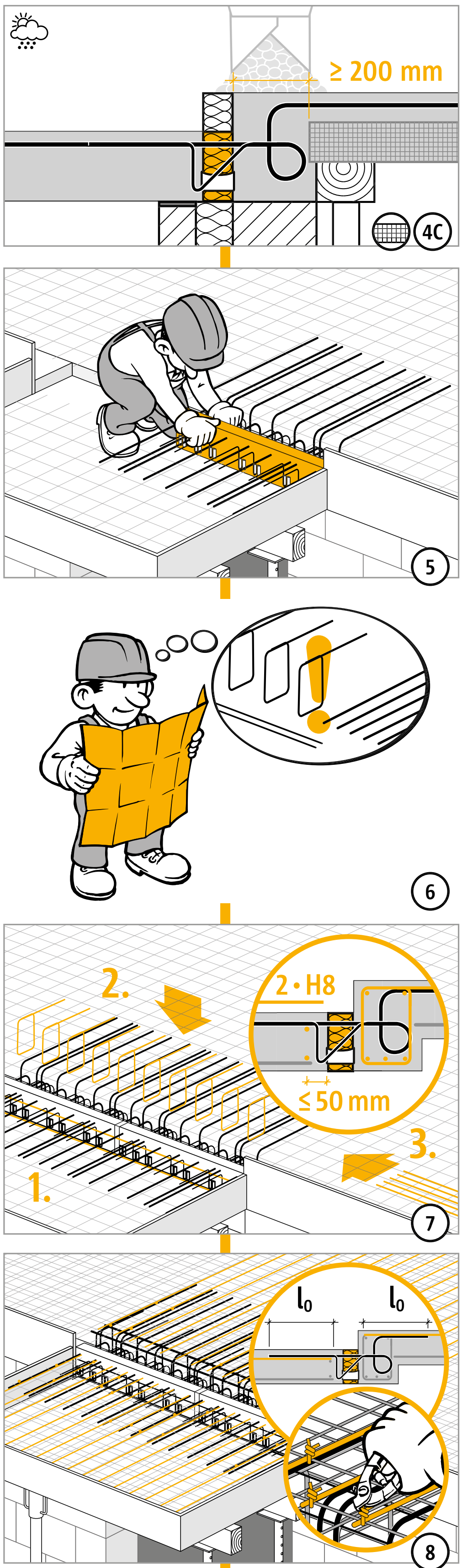
Information about on-site reinforcement

- The required lateral reinforcement in the upstand beam area is to be verified according to BS EN 1992-1-1 (EC2), 8.7 to 8.8 and BS EN 1992-1-1/NA, NDPs for 8.8.
- The Schöck Isokorb® type K-WU is to be placed as necessary before the downstand or upstand reinforcement.
- The indicative minimum concrete strength class of the external structural component is C32/40.

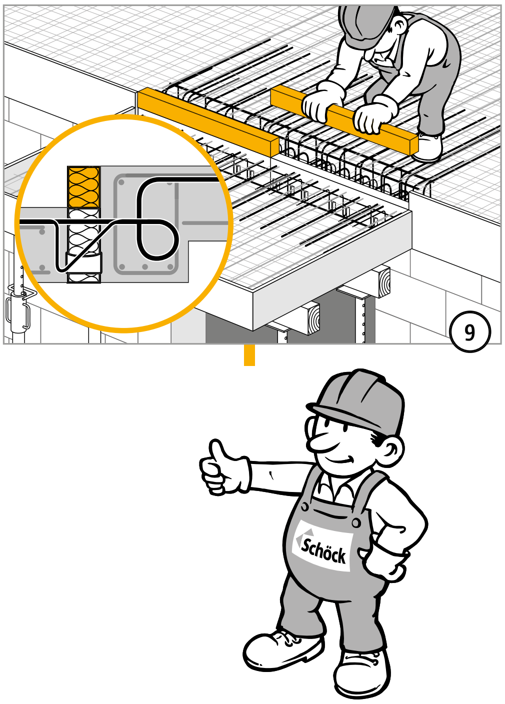
Installation instructions



Without fail fill compression joint with
in-situ concrete! Joint width ≥ 100 mm.



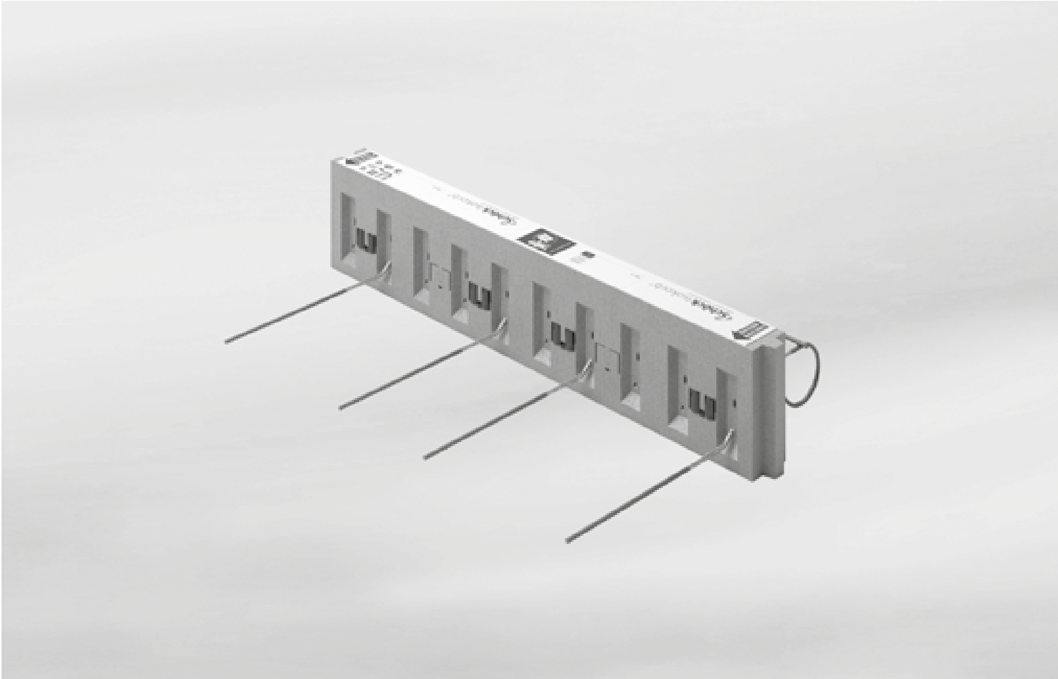
Installation instructions



✓ Check list

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ Has the additional proportionate deflection resulting from the Schöck Isokorb® been taken into account?
- ☐ Is the drainage direction taken into account with the resulting camber information? Is the degree of camber entered in the working drawings?
- ☐ Is the increased minimum slab thickness taken into account with CV50?
- ☐ Are the recommendations for the limitation of the slenderness observed?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Are the Schöck FEM guidelines taken into acount with the calculation using FEM?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Are planned existing horizontal loads e.g. from wind pressure taken into account? Are additional Schöck Isokorb® supplementary type HP or supplementary type EQ required for this?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ Have the required in-situ concrete strips for the type K-HV, K-BH, K-WO, K-WU in conjunction with inner slab elements (width $\geq$ 100 mm from compression element), been charted in the implementation plans?
- ☐ Is the required component geometry present with the connection to a floor or a wall? Is a special design required?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ With precast balconies are possibly necessary gaps for the front side transportation anchors and downpipes with internal drainage taken into account? Is the maximum centre distance of 300 mm for the Isokorb® bars observed?

Schöck Isokorb® type Q, Q+Q, QZ



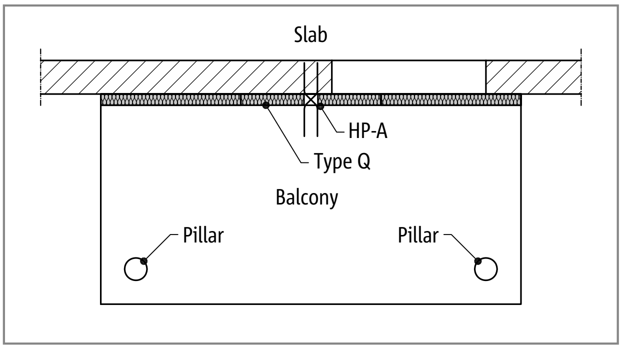
Schöck Isokorb® type Q

Schöck Isokorb® type Q
Suitable for supported balconies. It transfers positive shear forces.

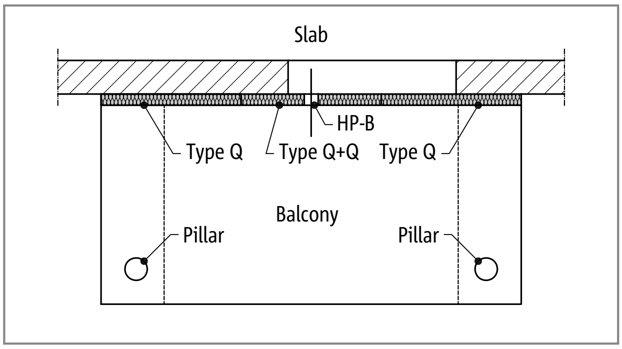
Schöck Isokorb® type Q+Q
Suitable for supported balconies. It transfers positive and negative shear forces.

Schöck Isokorb® type QZ
Suitable for supported balconies with connection free of constraint forces. It transfers positive shear forces.

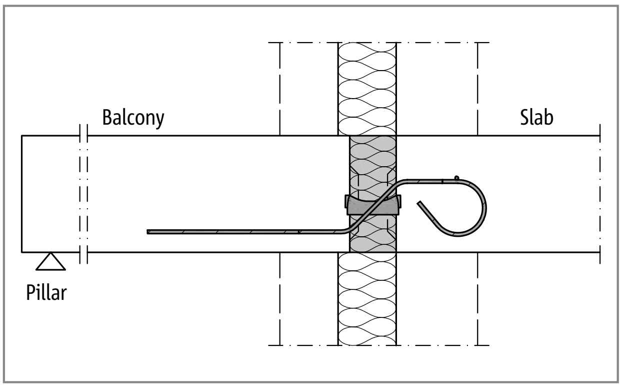
Element arrangement | Installation cross sections



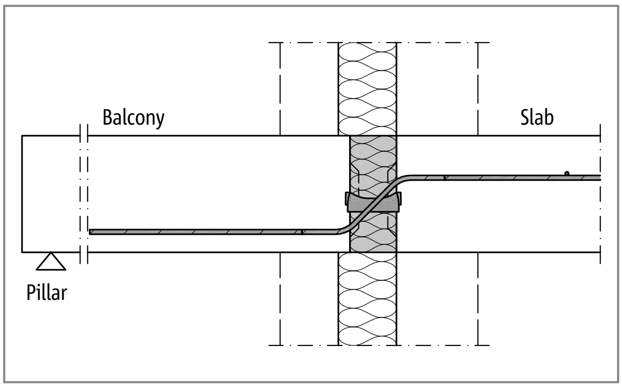
Schöck Isokorb® type Q: Balcony with pillar support



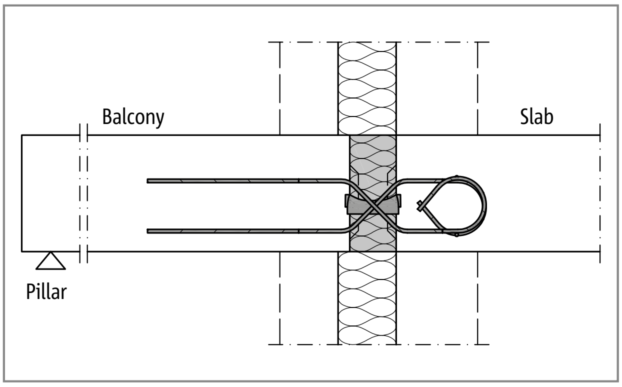
Schöck Isokorb® type Q, Q+Q: Supported balcony with various bearing stiffnesses; type HP-B (optional) with ordinary horizontal forcet



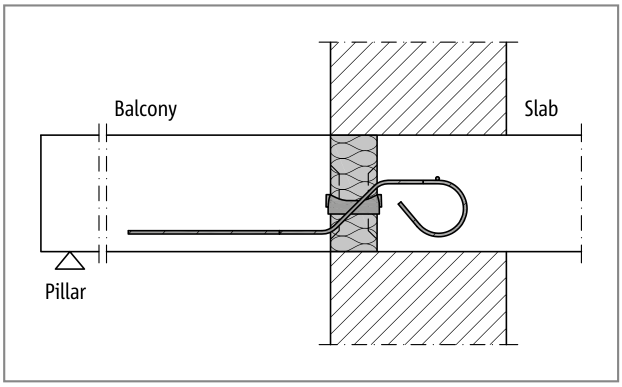
Schöck Isokorb® type Q: Connection with non-load-bearing cavity masonry (e.g. type Q10 to type Q50)



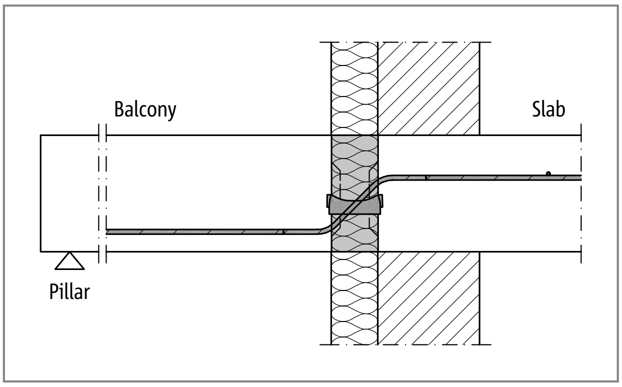
Schöck Isokorb® type Q: Connection with non-load-bearing cavity masonry (e.g. type Q70 to Q110)



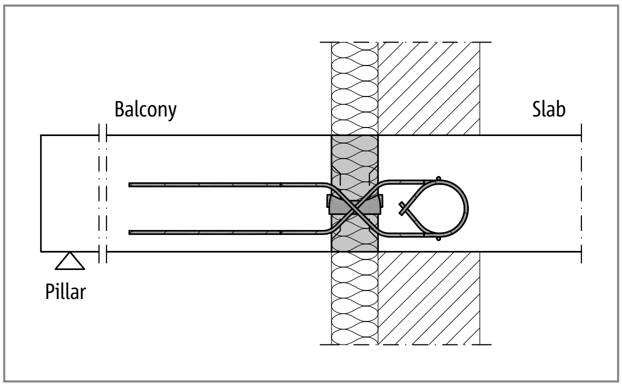
Schöck Isokorb® type Q+Q: Connection with non-load-bearing cavity masonry (e.g. type Q10+Q10 to Q50+Q50)



Schöck Isokorb® type Q: Connection with thermal insulating cavity masonry (e.g. type Q10 to type Q50)

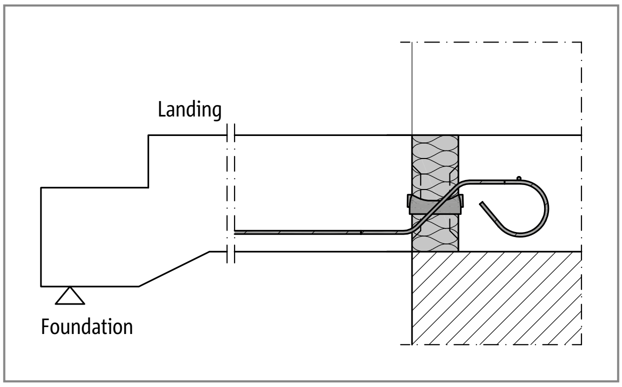


Schöck Isokorb® type KXT: Connection with thermal insulation bonded system (WDVS) (e.g. type Q70 to Q110)

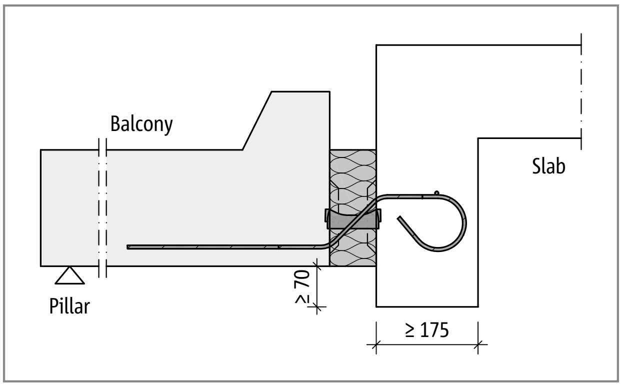


Schöck Isokorb® type Q+Q: Connection with thermal insulation bonded system (WDVS) (e.g. type Q10+Q10 to Q50+Q50)

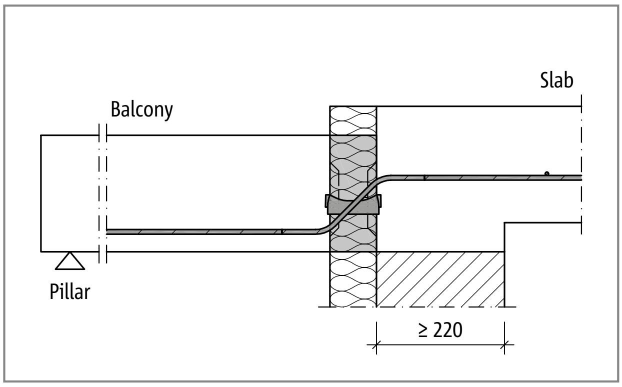
Installation cross sections



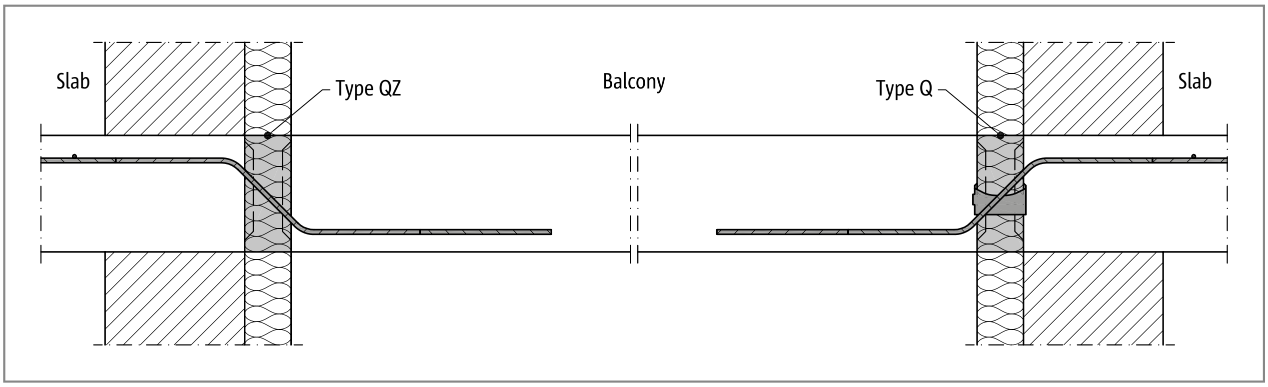
Schöck Isokorb® type Q: Connection stair flight with thermal insulating cavity masonry (e.g. type Q10 to Q50)



Schöck Isokorb® type Q: Installation situation "Balcony slab precast unit" (e.g. type Q10 to Q50)



Schöck Isokorb® type Q: Installation situation with small height offset (e.g. type Q70 to Q110)



Schöck Isokorb® type QZ, Q: Application case one-way reinforced concrete slab

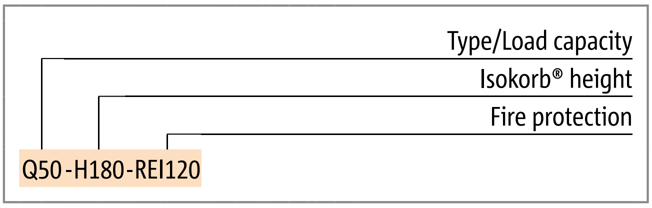
Product selection | Type designations | Special designs

Schöck Isokorb® type Q, Q+Q, QZ variants

The configuration of the Schöck Isokorb® types Q and Q+Q can be varied as follows:
Type Q: Shear force bar for positive shear force
Type Q+Q: Shear force bar for positive and negative shear force
Type QZ: Free of constraint forces without pressure bearing, shear force bar for positive shear force

- Load-bearing level:
  Q10 to Q50, Q70 to Q110
  Q10+Q10, Q30+Q30, Q50+Q50
  QZ10 to QZ50, QZ70 to QZ110
  Load-bearing levels 10 to 50: Shear force bar on floor side bent, balcony side straight.
  Load-bearing levels 70 to 110: Shear force bars floor side straight, balcony side straight.
- Concrete cover of the shear force bars
  bottom: CV = 30 mm
  top: CV ≥ 35 mm (depending on height of the Schöck Isokorb®)
- Height:
  $H = H_{min}$ to 250 mm (minimum slab height depending on load-bearing level and fire protection)
- Fire resistance class:
  R0: Standard
  REI120: Fire protection board projecting on both sides by 10 mm.

Type designations in planning documents



Special designs

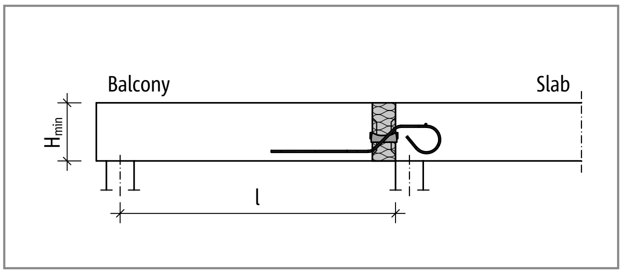
Please contact the design support department if you have connections that are not possible with the standard product variants shown in this information (contact details on page 3).
In accordance with approval heights up to 500 mm are possible.
This also applies with additional requirements as a result of precast concrete construction. For additional requirements determined by manufacturing or transportation there are solutions available with coupler bars.

Design

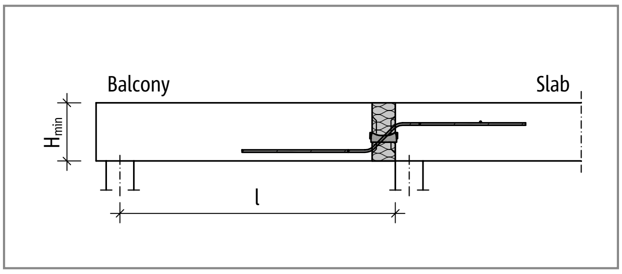
Design table type Q

Schöck Isokorb® type	Q10	Q20	Q30	Q40	Q50	Q70	Q80	Q90	Q100	Q110
Design values with	$v_{Rd,z}$ [kN/m]									
Concrete C25/30	34.8	43.5	52.2	69.5	86.9	92.5	112.1	134.5	173.9	208.6

Isokorb® length [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Shear force bars	4 ⌀ 6	5 ⌀ 6	6 ⌀ 6	8 ⌀ 6	10 ⌀ 6	6 ⌀ 8	5 ⌀ 10	6 ⌀ 10	5 ⌀ 12	6 ⌀ 12
Pressure bearing (piece)	4	4	4	4	4	4	4	4	6	6
H_{min} width R0 [mm]	160	160	160	160	160	160	170	170	180	180
H_{min} width REI120 [mm]	160	160	160	160	160	170	180	180	190	190



Schöck Isokorb® type Q: Static system (type Q10 to Q50)

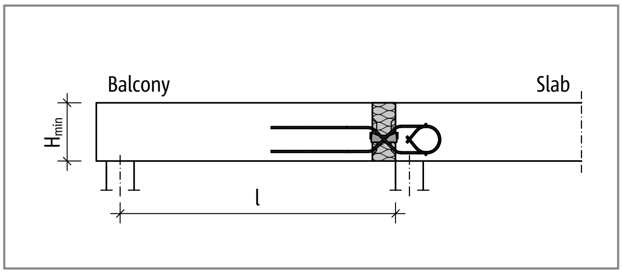


Schöck Isokorb® type Q: Static system (type Q70 to Q110)

Design table type Q+Q

Schöck Isokorb® type	Q10+Q10	Q30+Q30	Q50+Q50
Design values with	$v_{Rd,z}$ [kN/m]		
Concrete C25/30	±34.8	±52.2	±86.9

Isokorb® length [mm]	1000	1000	1000
Shear force bars	2x 4 ⌀ 6	2x 6 ⌀ 6	2x 10 ⌀ 6
Pressure bearing (piece)	4	4	4
H_{min} width R0 [mm]	160	160	160
H_{min} width REI120 [mm]	160	160	160



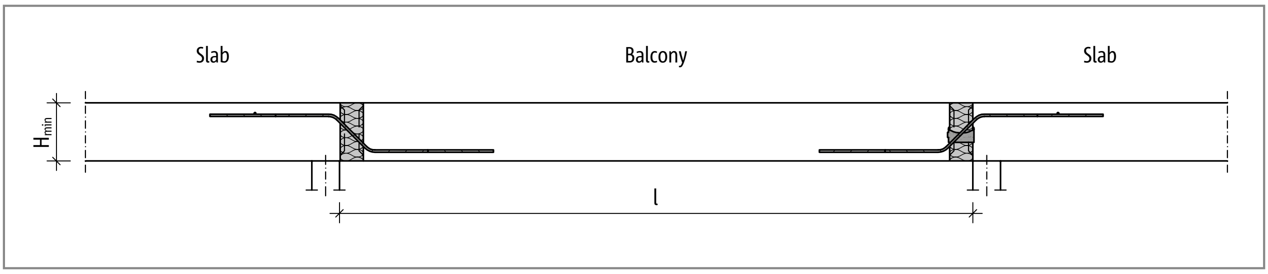
Schöck Isokorb® type Q+Q: Static system (type Q10+Q10 to Q50+Q50)

Design

Design table type QZ

Schöck Isokorb® type	QZ10	QZ20	QZ30	QZ40	QZ50	QZ70	QZ80	QZ90	QZ100	QZ110
Design values with	$v_{Rd,z}$ [kN/m]									
Concrete C25/30	34.8	43.5	52.2	69.5	86.9	92.5	112.1	134.5	173.9	208.6

Isokorb® length [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Shear force bars	4 ⌀ 6	5 ⌀ 6	6 ⌀ 6	8 ⌀ 6	10 ⌀ 6	6 ⌀ 8	5 ⌀ 10	6 ⌀ 10	5 ⌀ 12	6 ⌀ 12
Pressure bearing (piece)	-	-	-	-	-	-	-	-	-	-
H_{min} width R0 [mm]	160	160	160	160	160	160	170	170	180	180
H_{min} width REI120 [mm]	160	160	160	160	160	170	180	180	190	190



Schöck Isokorb® type QZ, Q: Static system (type QZ70 to QZ110, Q70 to Q110)

Notes on design

- A structural analysis is to be produced for the reinforced concrete structural components adjacent on both sides of the Shöck Isokorb®. With a connection using Schöck Isokorb® type Q a freely rotatable support (pin connection) is to be assumed.
- For the transfer of ordinary horizontal forces additional Schöck Isokorb® type HP (see page 153) are required.
- With horizontal tension forces at right angles to the outer wall which are greater than the existing shear forces, the Schöck Isokorb® type HP is additionally to be arranged point by point.
- Due to the excentric force application of the Schöck Isokorb® type Q, type Q+Q and type QZ an offset moment is generated at the adjacent slab edges. This is to be taken into account with the design of the slabs.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- The indicative minimum concrete strength class of the external structural component is C32/40.

Q

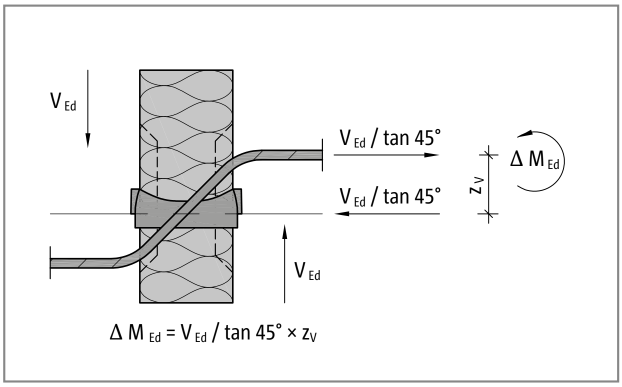
Reinforced concrete/reinforced concrete

Moments from excentric connection

Moments from excentric connection

Moments from excentric connection are to be taken into account for the design of the connection reinforcement on both sides of the shear force transferring Schöck Isokorb® types Q, Q+Q and QZ. These moments are respectively to be overlaid with the moments from the ordinary loading, if they have the same sign.

The following table values ΔM_{Ed} have been calculated with 100% utilisation of v_{Rd}.



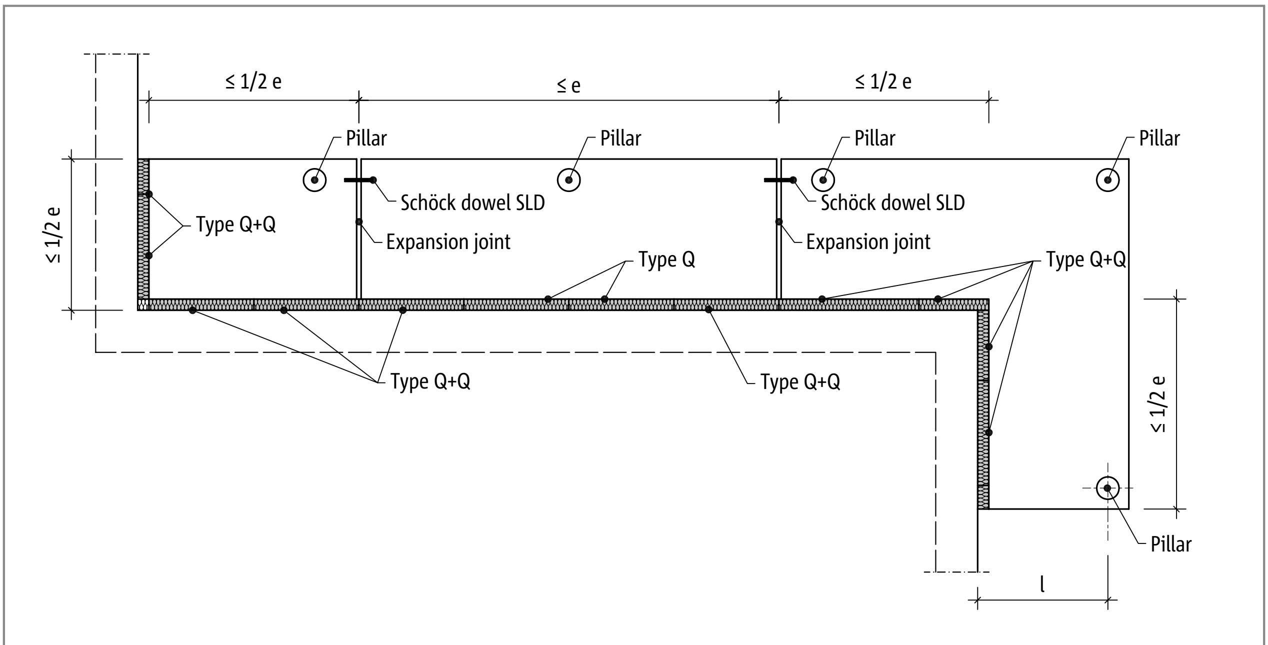
Schöck Isokorb® type	Q10, Q10+Q10, QZ10	Q20, QZ20	Q30, Q30+Q30, QZ30	Q40, QZ40	Q50, Q50+Q50, QZ50
Design values with	ΔM_{Ed} [kNm/Element]				
Concrete C25/30	1.5	1.9	2.3	3.1	3.8

Schöck Isokorb® type	Q70, QZ70	Q80, QZ80	Q90, QZ90	Q100, QZ100	Q110, QZ110
Design values with	ΔM_{Ed} [kNm/Element]				
Concrete C25/30	4.4	5.8	7.0	10.1	12.1

Expansion joint spacing

Maximum expansion joint spacing

If the length of the structural component exceeds the maximum expansion joint spacing, expansion joints must be incorporated in the exterior concrete components at right angles to the insulation layer in order to limit the effect as a result of temperature changes. With fixed points such as, for example, corners of balconies, parapets and balustrades or with the employment of the supplementary types HP or EQ half the maximum expansion joint spacing e/2 from the fixed point applies.
The shear force transmission in the expansion joint can be ensured using a longitudinally displaceable shear force dowel, e.g. Schöck Dowel.



Schöck Isokorb® type Q, Q+Q: Expansion joint arrangement

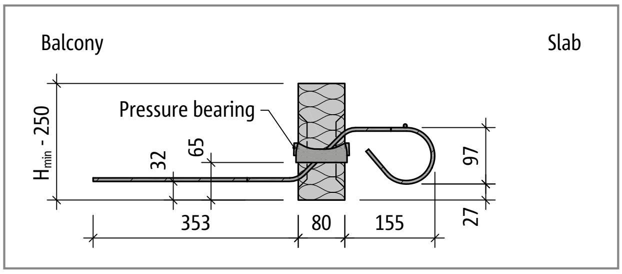
Schöck Isokorb® type		Q10 - Q70 Q10+Q10 - Q50+Q50 QZ10 - QZ70	Q80 - Q90 QZ80 - QZ90	Q100, Q110 QZ100, QZ110
Maximum expansion joint spacing	80	13.5	13.0	11.7

Edge distances

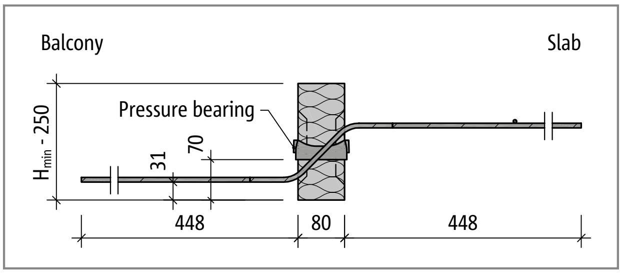
The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

- For the centre distance of the compression elements from the free edge or from the expansion joint: $e_R \geq 50$ mm applies.
- For the centre distance of the shear force bars from the free edge or from the exapansion joint: $e_R \geq 100$ mm and $e_R \leq 150$ mm applies.

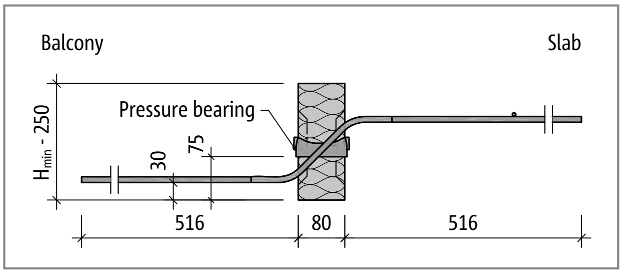
Product description



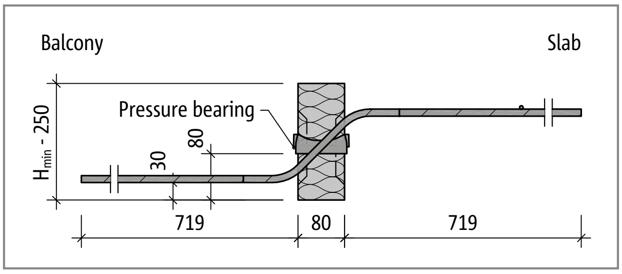
Schöck Isokorb® type Q10 to Q50: Product section



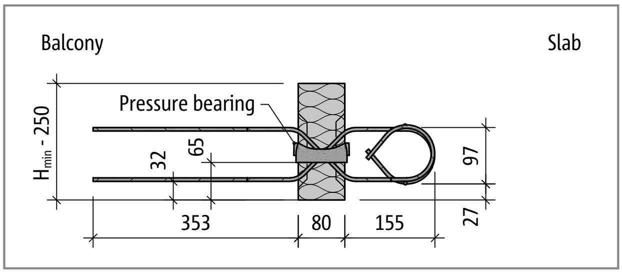
Schöck Isokorb® type Q70: Product section



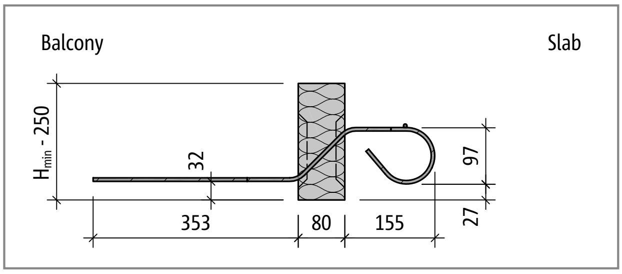
Schöck Isokorb® type Q80 and Q90: Product section



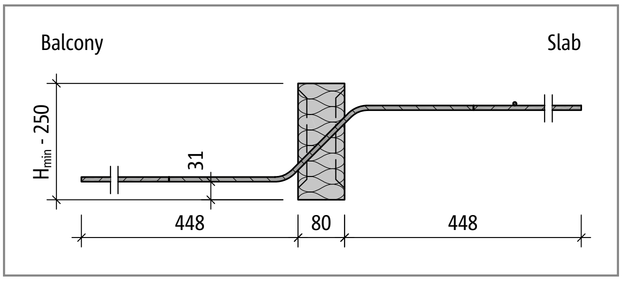
Schöck Isokorb® type Q100 and Q110: Product section



Schöck Isokorb® type Q10+Q10 toQ50+Q50: Product section

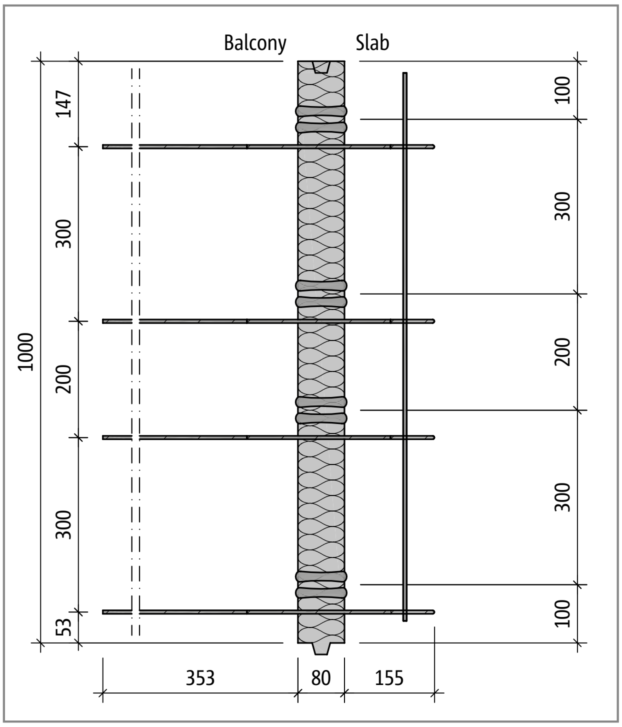


Schöck Isokorb® type QZ10 to QZ50: Product section

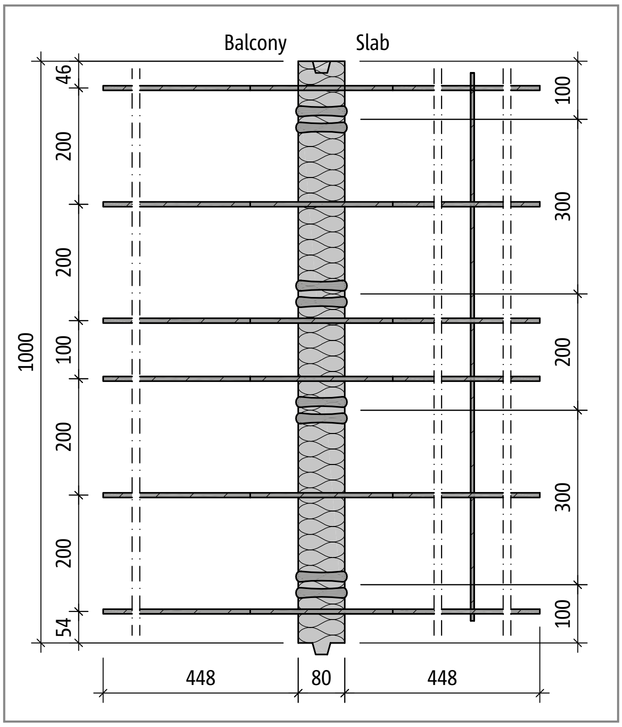


Schöck Isokorb® type QZ70: Product section

Product description | Fire protection configuration



Schöck Isokorb® type Q10: Product layout

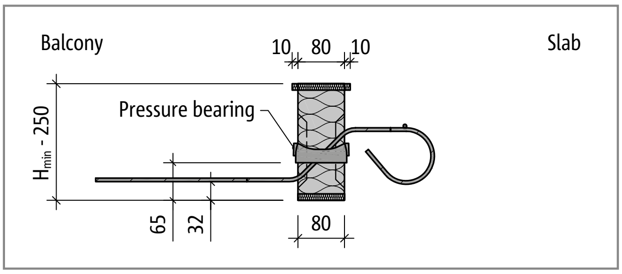


Schöck Isokorb® type Q70: Product layout

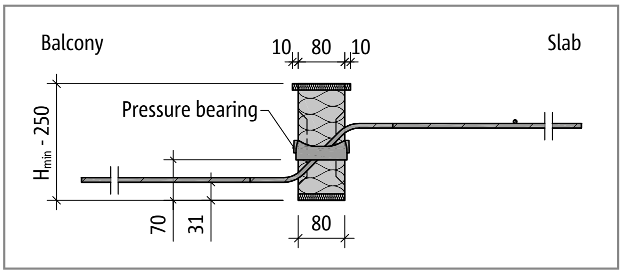
Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download
- Note minimum height H_{min} Schöck Isokorb® type Q, Q+Q, Q.

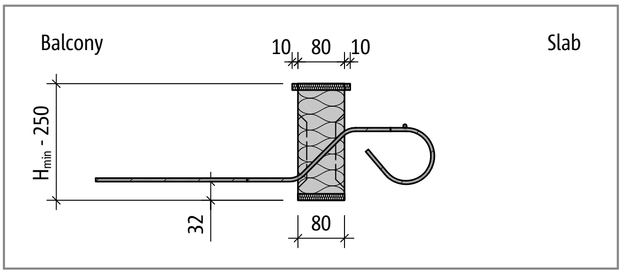
Product configuration with fire protection requirement



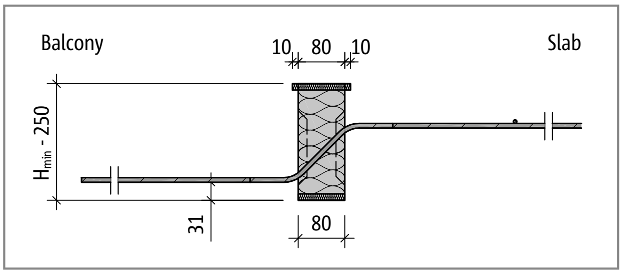
Schöck Isokorb® type Q10 to Q50 with REI120: Product section



Schöck Isokorb® type Q70 with REI120: Product section



Schöck Isokorb® type QZ10 to QZ50 with REI120: Product section



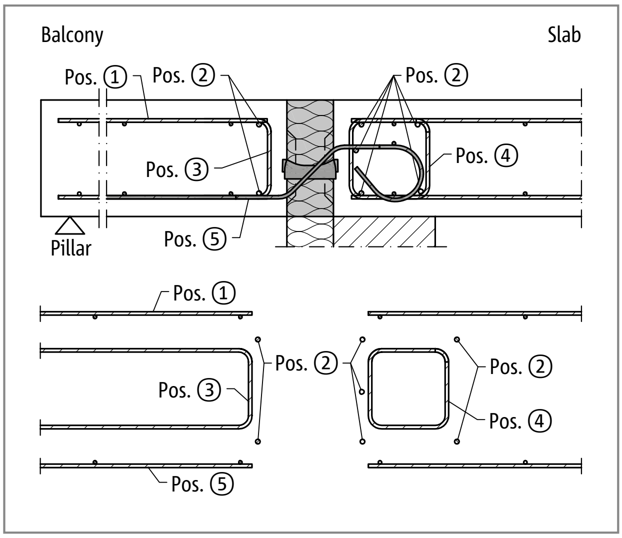
Schöck Isokorb® type QZ70 with REI120: Product section

Fire protection

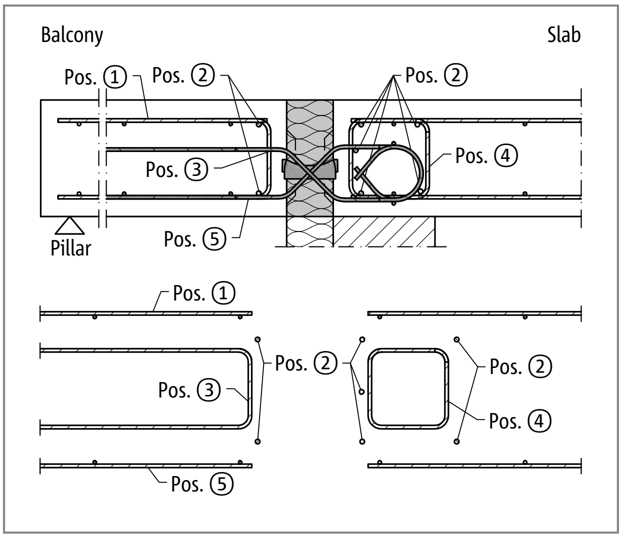
- Note minimum height H_{min} Schöck Isokorb® type Q, Q+Q, Q.

On-site reinforcement

On-site reinforcement Schöck Isokorb® type Q10-Q50 and type Q10+Q10-Q50+Q50



Schöck Isokorb® type Q10 to Q50: On-site reinforcement



Schöck Isokorb® type Q10+Q10 to Q50+Q50: On-site reinforcement

The reinforcement in the reinforced concrete slab is determined from the structural engineer's design. With this both the effective moment and the effective shear force should be taken into account.
In addition, it is to be ensured that the shear force bars of the Schöck Isokorb® are 100% lapped, insofar as they lie in the tension zone.

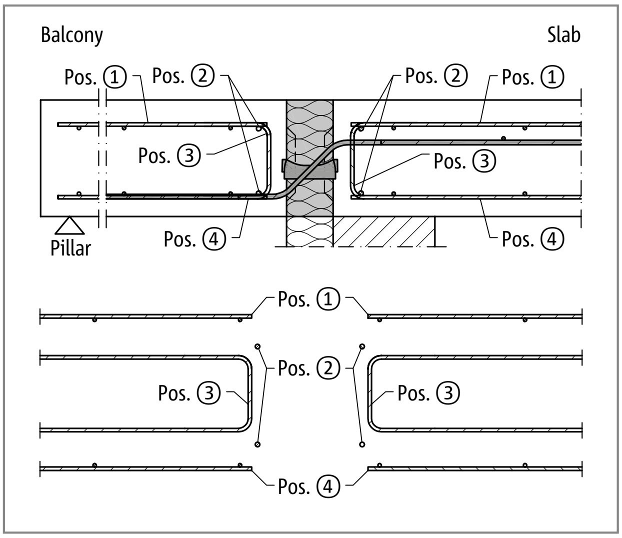
Schöck Isokorb® type		Q10, QZ10 Q10+Q10	Q20, QZ20	Q30, QZ30 Q30+Q30	Q40, QZ40	Q50, QZ50 Q50+Q50
On-site reinforcement	Location	Concrete strength class ≥ C25/30				
Pos. 1 Lapping reinforcement						
Pos. 1	Balcony side	acc. to the specifications of the structural engineer				
Pos. 2 Steel bars along the insulation joint						
Pos. 2	Balcony side	2 • H8	2 • H8	2 • H8	2 • H8	2 • H8
Pos. 2	Floor side	5 • H8	5 • H8	5 • H8	5 • H8	5 • H8
Pos. 3 Stirrup						
Pos. 3 [mm²/m]	Balcony side	80	100	120	160	200
Pos. 4 Closed stirrup (edge beam according to Z-15.7-240 3.2.2.6)						
Pos. 4 [mm²/m]	Floor side	141	141	141	141	141
Pos. 4	Floor side	H8@200	H8@200	H8@200	H8@200	H8@200
Pos. 5 Lapping reinforcement						
Pos. 5	Balcony side	necessary in the tension zone, as specified by the structural engineer				
Pos. 6 Side reinforcement at the free edge						
Pos. 6		Edging acc. to BS EN 1992-1-1 (EC2), 9.3.1.4 (not shown)				

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.
- The shear force bars are to be anchored with their straight ends in the pressure zone. In the tension zone the shear force bars are to be lapped.
- The side reinforcement Pos. 6 should be selected as low as possible so that it can be arranged between top and bottom reinforcement position.
- The indicative minimum concrete strength class of the external structural component is C32/40.

On-site reinforcement

On-site reinforcement Schöck Isokorb® type Q70-Q110



Schöck Isokorb® type Q70 to Q110: On-site reinforcement

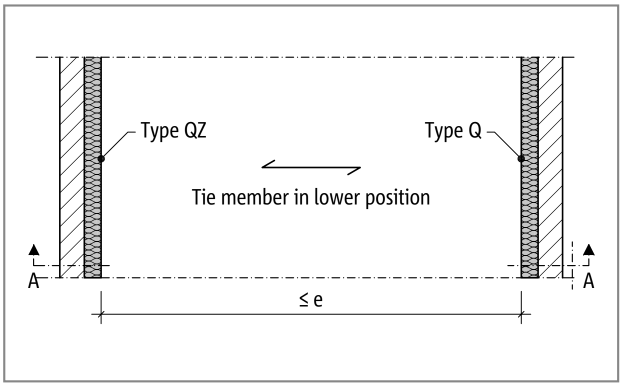
The reinforcement in the reinforced concrete slab is determined from the structural engineer's design. With this both the effective moment and the effective shear force should be taken into account.
In addition, it is to be ensured that the shear force bars of the Schöck Isokorb® are 100% lapped, insofar as they lie in the tension zone.

Schöck Isokorb® type		Q70, QZ70	Q80, QZ80	Q90, QZ90	Q100, QZ100	Q110, QZ110
On-site reinforcement	**Location**	**Concrete strength class ≥ C25/30**				
Pos. 1 Lapping reinforcement						
Pos. 1	**Balcony/floor side**	acc. to the specifications of the structural engineer				
Pos. 2 Steel bars along the insulation joint						
Pos. 2	**Balcony/floor side**	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Stirrup						
Pos. 3 [mm²/m]	**Balcony/floor side**	213	258	309	400	480
Pos. 4 Lapping reinforcement						
Pos. 4	**Balcony/floor side**	necessary in the tension zone, as specified by the structural engineer				
Pos. 5 Side reinforcement at the free edge						
Pos. 5		Edging acc. to BS EN 1992-1-1 (EC2), 9.3.1.4 (not shown)				

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.
- The shear force bars are to be anchored with their straight ends in the pressure zone. In the tension zone the shear force bars are to be lapped.
- The side reinforcement Pos. 5 should be selected so low that it can be arranged between the upper and lower reinforcement position.
- The indicative minimum concrete strength class of the external structural component is C32/40.

Application example reinforced concrete slab spanning in one direction

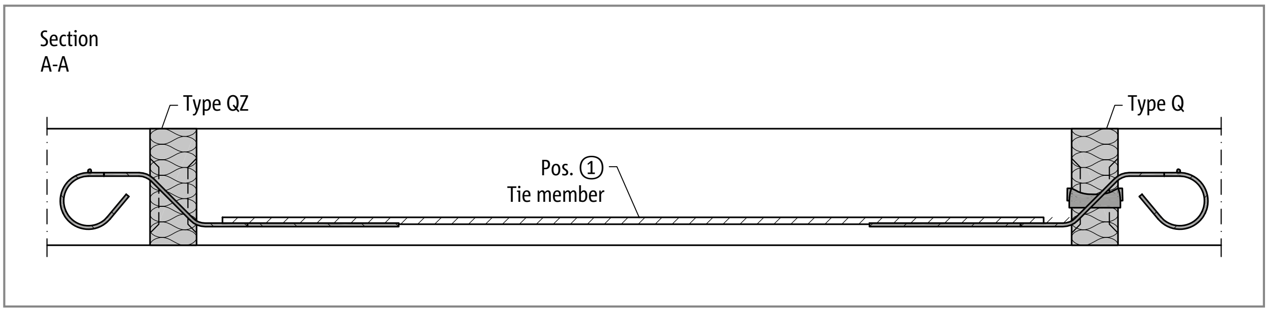


Schöck Isokorb® type QZ, Q: One-way reinforced concrete slab

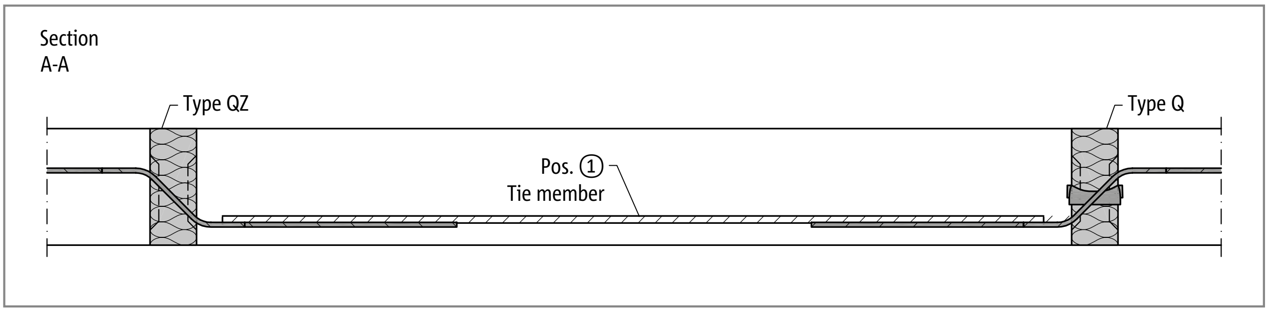
A type QZ without pressure bearing is to be arranged on one side for support free of constraint forces. A type Q pressure bearing is then required on the opposite side. In order to maintain the balance of forces a tie bar, which laps with the shear force transfering Isokorb® bars, is to reinforce between type QZ and type Q.

Expansion joints

- Expansion joint spacing e see p. 123



Schöck Isokorb® type QZ10 to QZ50, Q10 to Q50: Section A-A; one-way reinforced concrete slab



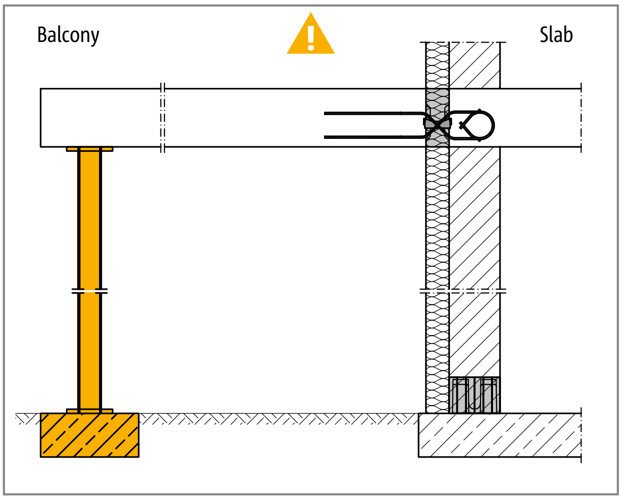
Schöck Isokorb® type QZ70 to QZ110, Q70 toQ110: Section A-A; one-way reinforced concrete slab

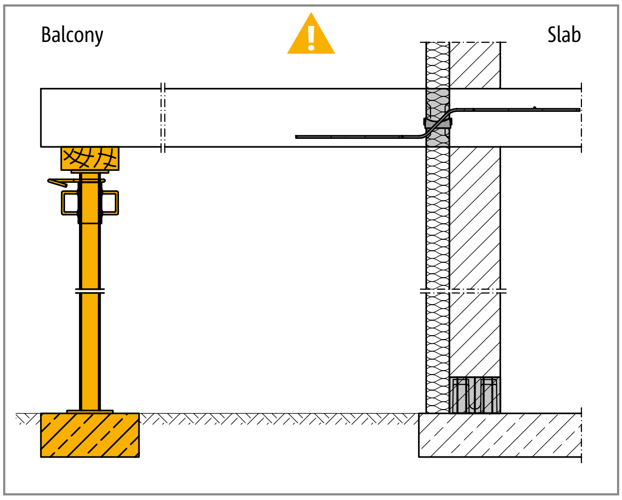
Schöck Isokorb® type	Q10, QZ10	Q20, QZ20	Q30, QZ30	Q40, QZ40	Q50, QZ50	Q70, QZ70	Q80, QZ80	Q90, QZ90	Q100, QZ100	Q110, QZ110
On-site reinforcement	Concrete strength class ≥ C25/30									
Pos. 1 Tie										
Pos. 1	4 • H8	5 • H8	6 • H8	8 • H8	10 • H8	6 • H8	5 • H10	6 • H10	5 • H12	6 • H12

Information about on-site reinforcement

- The required suspension reinforcement and the on-site slab reinforcement are not shown here.
- On-site reinforcement analogue to Schöck Isokorb® type Q see S. 126

Type of bearing: supported





Supported balcony

The Schöck Isokorb type Q, Q+Q and QZ is developed for supported balconies. It transfers exclusively shear forces, no bending moments.

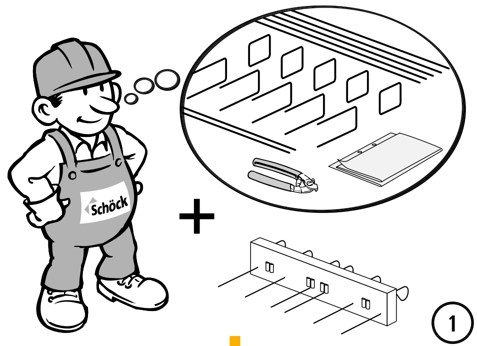
Warning - omitting the pillars

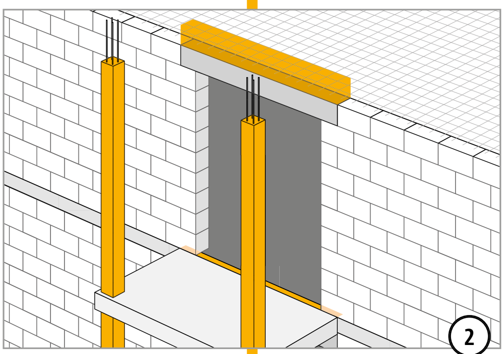
- The balcony will collapse if not supported.
- At all stages of construction, the balcony must be supported with statically suitable pillars or supports.
- Even when completed, the balcony must be supported with statically suitable pillars or supports.
- A removal of temporary support is permitted only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

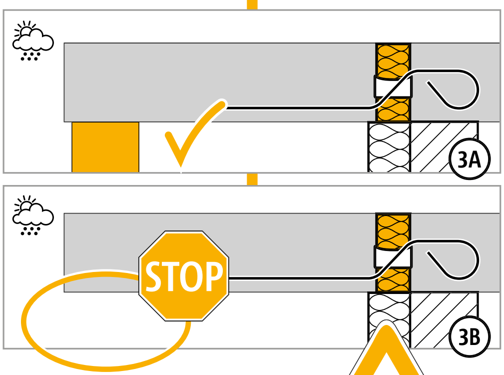
Q

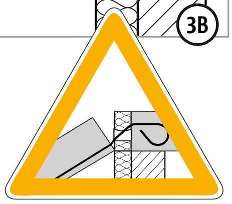
Reinforced concrete/reinforced concrete

Installation instructions



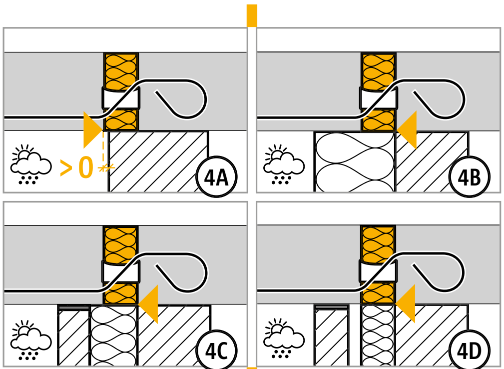


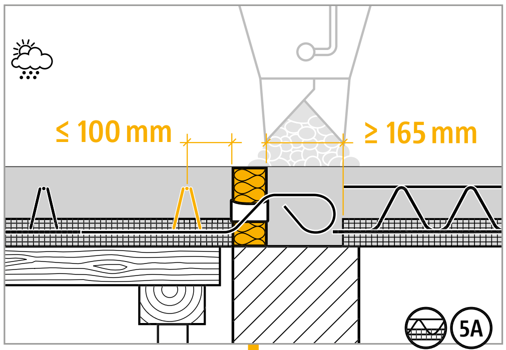


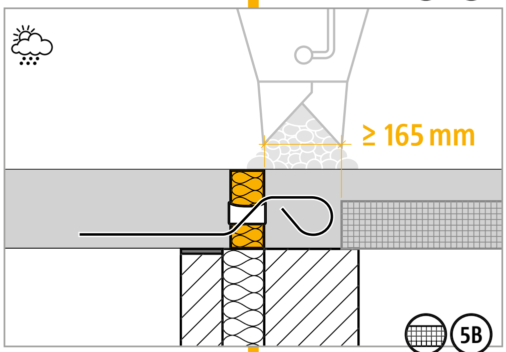


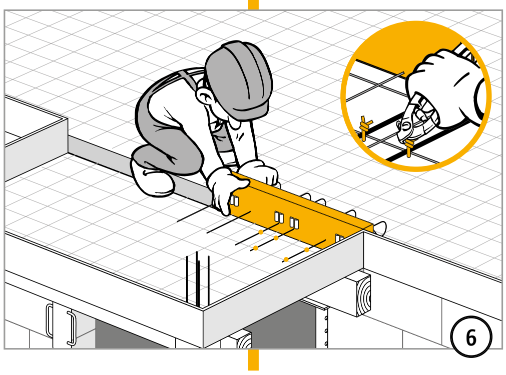
WARNING

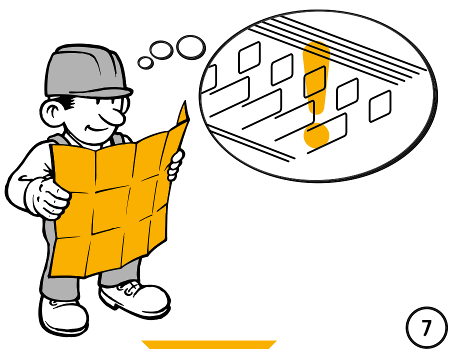
Without support the balcony will collapse!
The balcony must always be supported statically designed. Remove temporary support only after installation of final support.

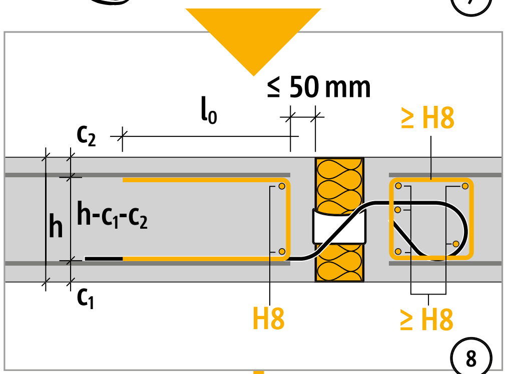




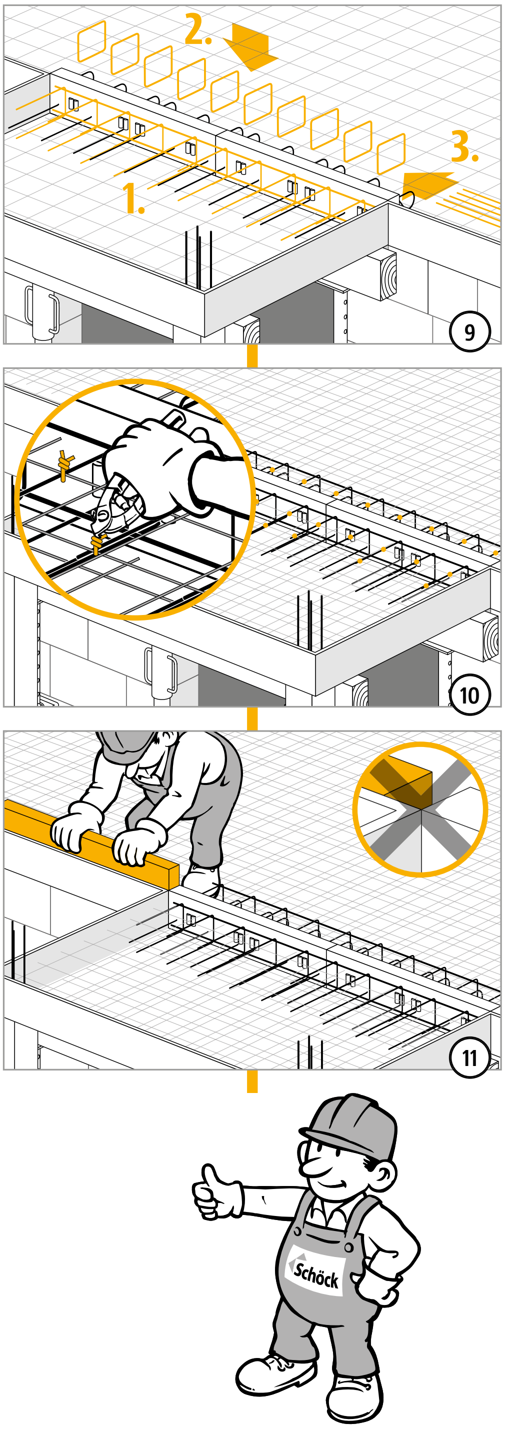








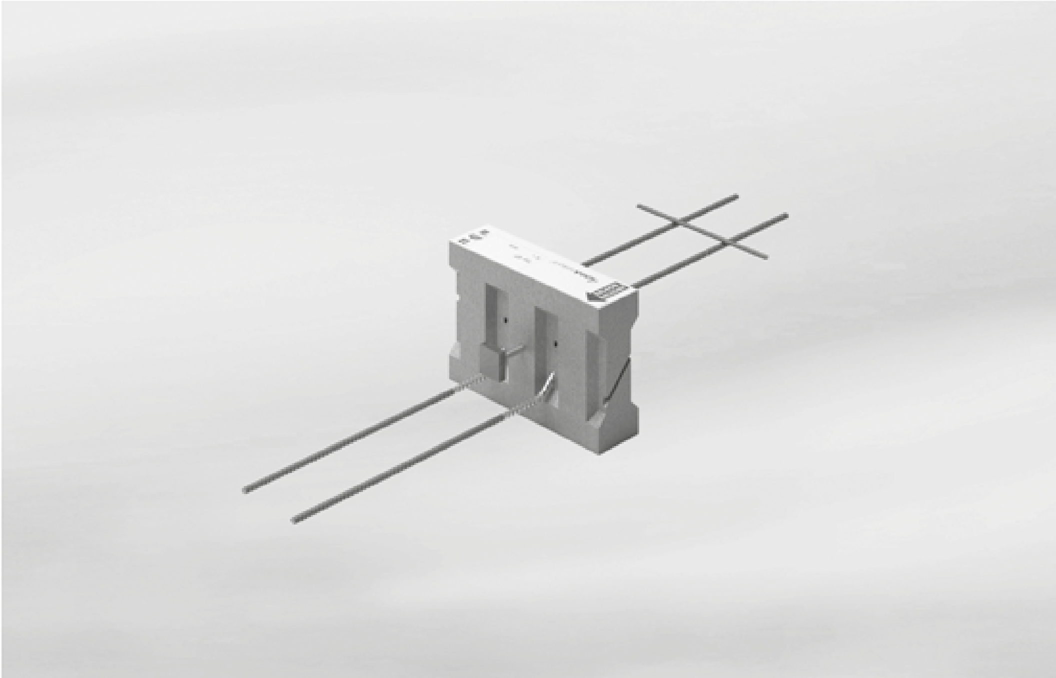
Installation instructions



✓ Check list

- ☐ Has the right type of Schöck Isokorb® been selected for the static system? Type Q is a connection purely for shear force (moment joint).
- ☐ Is the balcony so planned that a continuous support is ensured in all stages of construction and in the final status?
- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ Are the Schöck FEM guidelines taken into acount with the calculation using FEM?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Is the minimum slab thickness taken into consideration with Schöck Isokorb® types in fire protection configuration?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Is the required component geometry present with the connection to a floor or a wall? Is a special design required?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ Are planned existing horizontal loads e.g. from wind pressure taken into account? Are additional Schöck Isokorb® supplementary type HP or supplementary type EQ required for this?
- ☐ With precast balconies are possibly necessary gaps for the front side transportation anchors and downpipes with internal drainage taken into account? Is the maximum centre distance of 300 mm for the Isokorb® bars observed?
- ☐ With 2- or 3-sided support has a Schöck Isokorb® (possibly type QZ, type QPZ) been selected for a connection free of constraint forces?

Schöck Isokorb® type QP, QP+QP, QPZ



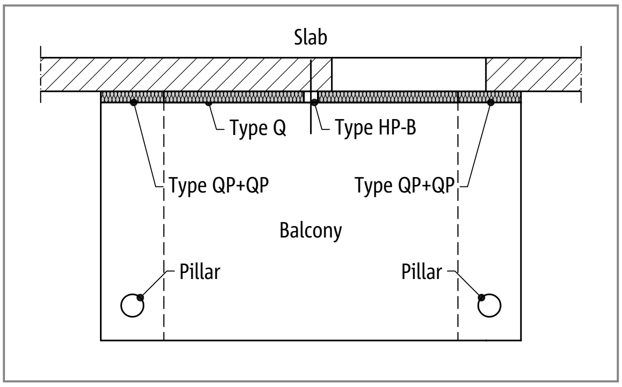
Schöck Isokorb® type QP

Schöck Isokorb® type QP (shear force)
Suitable for load peaks with supported balconies. It transfers positive shear forces.

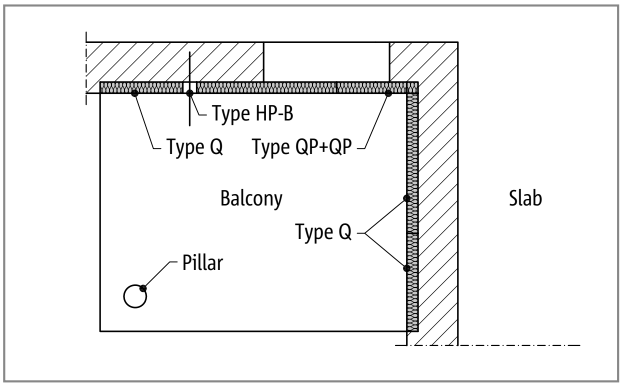
Schöck Isokorb® type QP+QP (shear force)
Suitable for load peaks with supported balconies. It transfers positive and negative shear forces.

Schöck Isokorb® type QPZ (shear force free of restraint)
Suitable for peak loads with supported balconies. It transfers positive shear forces.

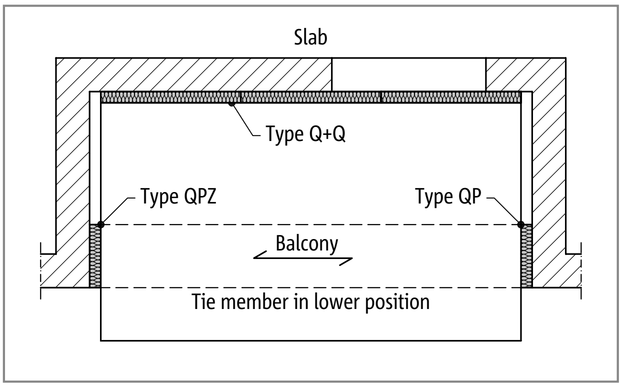
Element arrangement



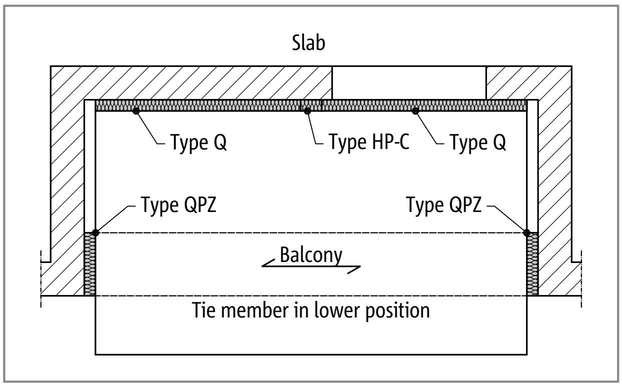
Schöck Isokorb® type QP+QP, Q: balcony with pillar support, connection with various bearing stiffnesses; optionally with type HP-B for the transfer of ordinary horizontal force



Schöck Isokorb® type Q, QP+QP: Balcony supported on two sides with pillar and positive shear forces

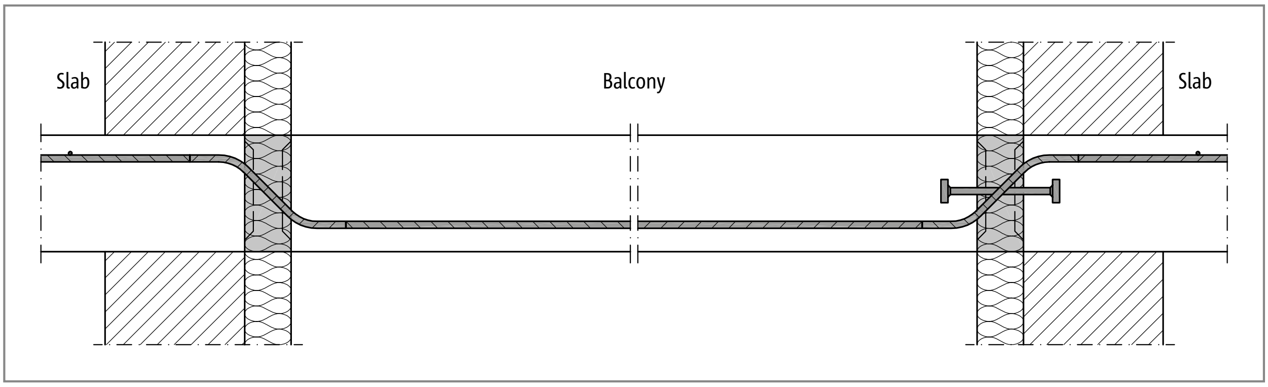


Schöck Isokorb® type Q+Q, QP, QPZ: Recessed balcony supported on three sides with tie member

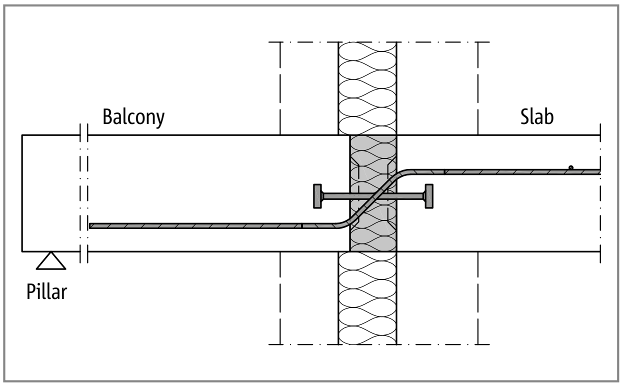


Schöck Isokorb® type Q, QPZ: Recessed balcony supported on three sides - symmetric with tie member

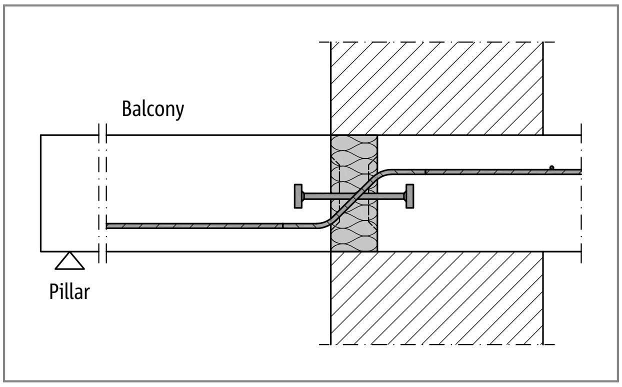
Installation cross sections



Schöck Isokorb® type QPZ, QP: Recessed balcony application see also page 146



Schöck Isokorb® type QP: Supported balcony with non-load-bearing cavity wall



Schöck Isokorb® type QP: Connection of supported balcony with thermal insulating cavity wall

Product selection | Type designations | Special designs

Schöck Isokorb® type QP, QP+QP, QPZ variants

The configuration of the Schöck Isokorb® types QP, QP+QP and QPZ can be varied as follows:
Shear force bar on floor side straight, on balcony side straight, applies for all bearing levels.
Type QP: Shear force bar for positive shear force
Type QP+QP: Shear force bar for positive and negative shear force
Type QPZ: Free of constraint forces without pressure bearing, shear force bar for positive shear force

- Bearing level:
  QP10 to QP90
  QP10+QP10, QP40+QP40, QP60+QP60, QP70+QP70
  QPZ10, QPZ40, QPZ60 to QPZ80
- Concrete cover:
  Bottom: CV ≥ 30 (depending on height of the Schöck Isokorb®)
  Top: CV ≥ 21 (depending on height of the Schöck Isokorb®)
- Height:
  $H = H_{min}$ up to 250 mm (note minimum slab height depending on bearing level and fire protection)
- Fire resistance class:
  R0: Standard
  REI120: Top fire protection board projecting on both sides 10 mm

Type designations in planning documents

Type/Load capacity
Isokorb® height
Fire protection
QP50-H190-REI120

Special designs

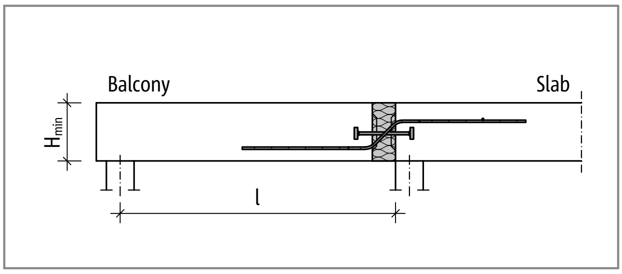
Please contact the design support department if you have connections that are not possible with the standard product variants shown in this information (contact details on page 3).
In accordance with approval heights up to 500 mm are possible.
This also applies with additional requirements as a result of precast concrete construction. For additional requirements determined by manufacturing or transportation there are solutions available with coupler bars.

Design

Design table type QP

Schöck Isokorb® type	QP10	QP20	QP30	QP40	QP50	QP60	QP70	QP80	QP90
Design values with	$V_{Rd,z}$ [kN/element]								
Concrete C25/30	30.9	46.4	61.8	44.8	65.4	65.4	98.6	85.9	128.9

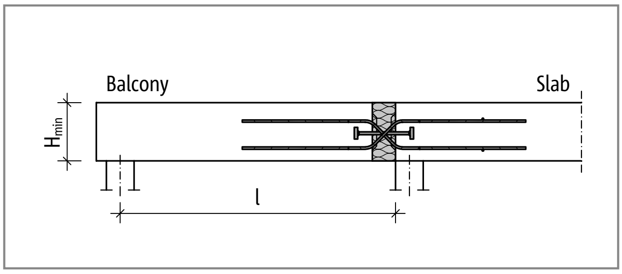
Isokorb® length [mm]	300	400	500	300	400	300	400	300	400
Shear force bars	2 ⌀ 8	3 ⌀ 8	4 ⌀ 8	2 ⌀ 10	3 ⌀ 10	2 ⌀ 12	3 ⌀ 12	2 ⌀ 14	3 ⌀ 14
Pressure bearing (piece)	1 ⌀ 10	2 ⌀ 10	2 ⌀ 10	1 ⌀ 12	2 ⌀ 10	2 ⌀ 10	2 ⌀ 12	2 ⌀ 12	3 ⌀ 12
H_{min} width R0 [mm]	170	170	170	180	180	190	190	200	200
H_{min} width REI120 [mm]	180	180	180	190	190	200	200	210	210



Design table type QP+QP

Schöck Isokorb® type	QP10+QP10	QP40+QP40	QP60+QP60	QP70+QP70
Design values with	$V_{Rd,z}$ [kN/element]			
Concrete C25/30	±30.9	±44.8	±65.4	±98.6

Isokorb® length [mm]	300	300	300	400
Shear force bars	2 × 2 ⌀ 8	2 × 2 ⌀ 10	2 × 2 ⌀ 12	2 × 3 ⌀ 12
Pressure bearing (piece)	1 ⌀ 10	1 ⌀ 12	2 ⌀ 10	2 ⌀ 12
H_{min} width R0 [mm]	180	190	200	200
H_{min} width REI120 [mm]	180	190	200	200



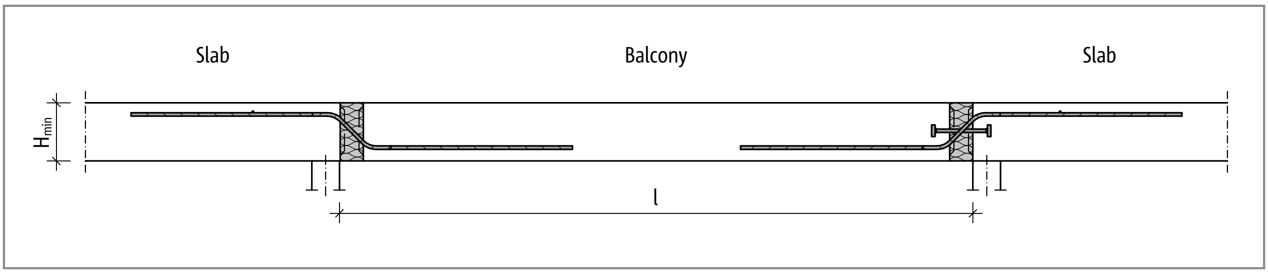
Schöck Isokorb® type QP+QP: Static system

Design

Design table type QPZ

Schöck Isokorb® type	QPZ10	QPZ40	QPZ60	QPZ70	QPZ80
Design values with	$V_{Rd,z}$ [kN/element]				
Concrete C25/30	30.9	44.8	65.4	98.6	85.9

Isokorb® length [mm]	300	300	300	400	300
Shear force bars	2 ⌀ 8	2 ⌀ 10	2 ⌀ 12	3 ⌀ 12	2 ⌀ 14
Pressure bearing (piece)	-	-	-	-	-
H_{min} width R0 [mm]	170	180	190	190	200
H_{min} width REI120 [mm]	180	190	200	200	210



Schöck Isokorb® type QPZ, QP: Static system

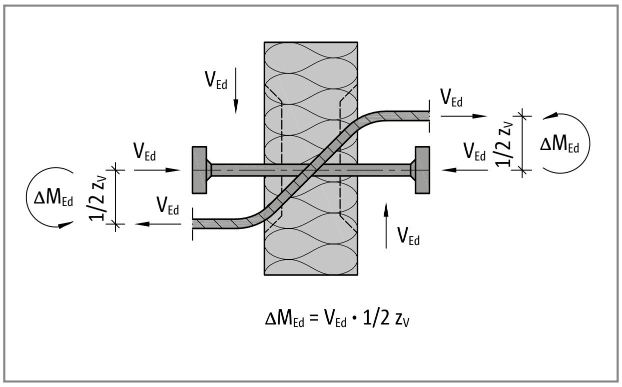
Notes on design

- For the transfer of ordinary horizontal forces additional Schöck Isokorb® type HP (see page 153) are required.
- A structural analysis is to be produced for the reinforced concrete structural components adjacent on both sides of the Shöck Isokorb®. With a connection using Schöck Isokorb® type QP and type QP+QP a freely rotatable support (pin connetion) is to be assumed as static system.
- The Schöck Isokorb® type QPZ for connection free of constraint forces requires a reinforced tie bar in the lower position. Select $A_{s,req}$ according to application example recessed balcony page 146.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.

Moments from excentric connection

Moments from excentric connection

Moments from excentric connection are to be taken into account for the design of the connection reinforcement on both sides of the shear force transferring Schöck Isokorb® types QP and QP+QP. These moments are respectively to be overlaid with the moments from the ordinary loading, if they have the same sign.
The following table values ΔM_{Ed} have been calculated with 100% utilisation of V_{Rd}



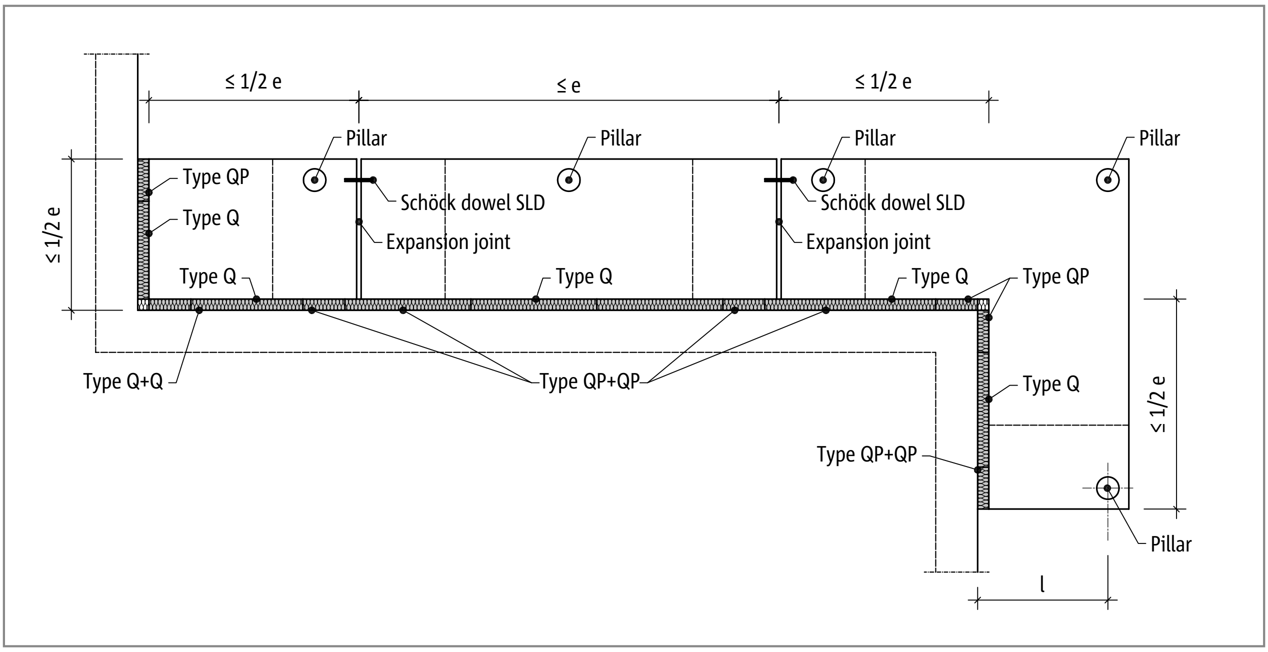
Schöck Isokorb® type	QP10, QP10+QP10	QP20	QP30	QP40, QP40+QP40	QP50
Design values with	ΔM_{Ed} [kNm/Element]				
Concrete C25/30	1.4	2.2	2.9	2.3	3.4

Schöck Isokorb® type	QP60, QP60+QP60	QP70, QP70+QP70	QP80	QP90
Design values with	ΔM_{Ed} [kNm/Element]			
Concrete C25/30	3.7	5.6	5.4	8.0

Expansion joint spacing

Maximum expansion joint spacing

If the length of the structural component exceeds the maximum expansion joint spacing, expansion joints must be incorporated in the exterior concrete components at right angles to the insulation layer in order to limit the effect as a result of temperature changes. With fixed points such as, for example, corners of balconies, parapets and balustrades or with the employment of the supplementary types HP or EQ half the maximum expansion joint spacing e/2 from the fixed point applies.
The shear force transmission in the expansion joint can be ensured using a longitudinally displaceable shear force dowel, e.g. Schöck Dowel.



Schöck Isokorb® type QP, QP+QP: Expansion joint arrangement

Schöck Isokorb® type		QP10	QP20	QP30	QP40	QP50	QP60	QP70	QP80	QP90
Maximum expansion joint spacing		e [m]								
Insulating element thickness [mm]	80	13.0	13.0	13.0	11.7	13.0	11.7	11.7	10.1	10.1

Schöck Isokorb® type		QP10+QP10	QP40+QP40	QP60+QP60	QP70+QP70
Maximum expansion joint spacing		e [m]			
Insulating element thickness [mm]	80	13.0	11.7	11.7	11.7

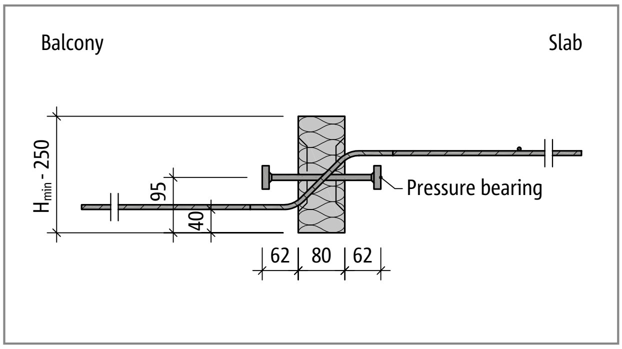
Schöck Isokorb® type		QPZ10	QPZ40	QPZ60	QPZ70	QPZ80
Maximum expansion joint spacing		e [m]				
Insulating element thickness [mm]	80	13.5	13.0	11.7	11.7	10.1

i Edge distances

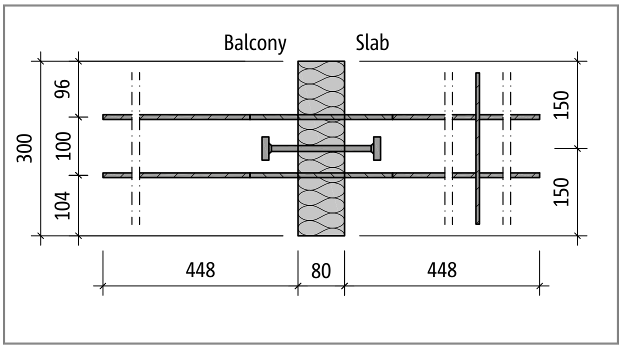
The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

- For the centre distance of the compression elements from the free edge or from the expansion joint: $e_R \geq 50$ mm applies.
- For the centre distance of the shear force bars from the free edge or from the exapansion joint: $e_R \geq 100$ mm and $e_R \leq 150$ mm applies.

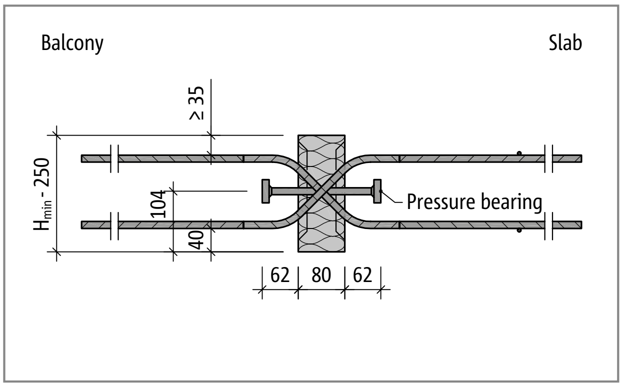
Product description



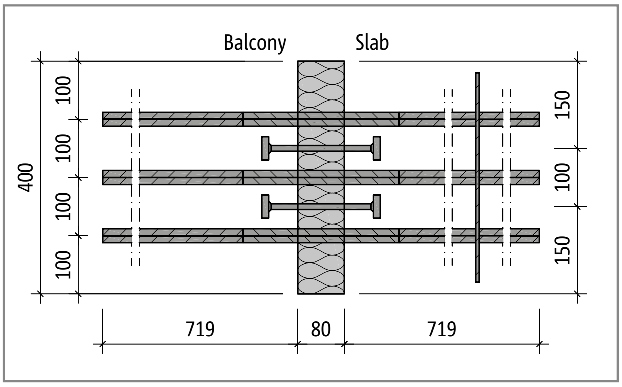
Schöck Isokorb® type QP: Product section



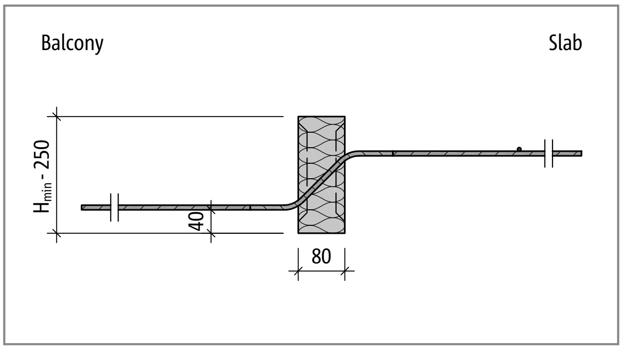
Schöck Isokorb® type QP10: Product layout



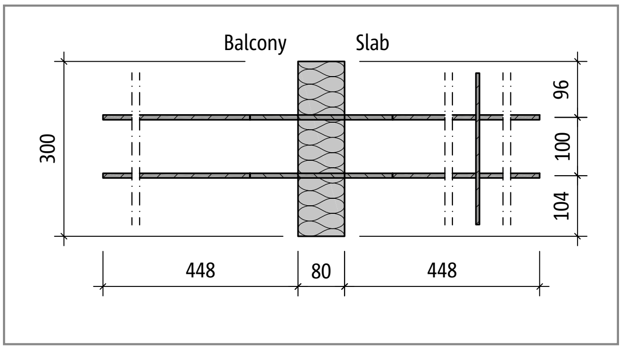
Schöck Isokorb® type QP+QP: Product section



Schöck Isokorb® type QP70+QP70: Product layout



Schöck Isokorb® type QPZ: Product section

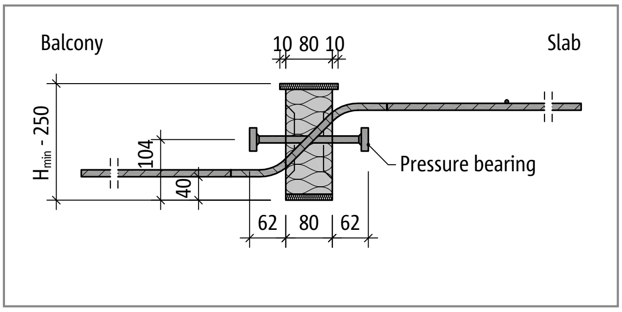


Schöck Isokorb® type QPZ10: Product layout

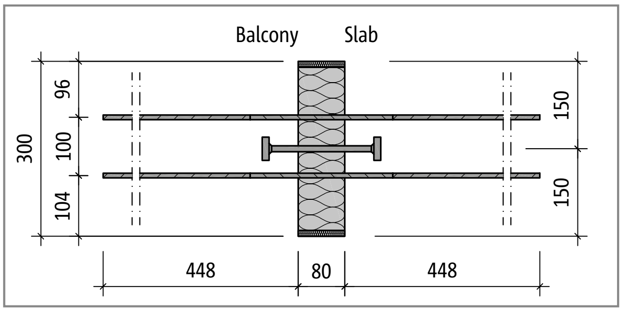
Product information

- Note minimum height H_{min} Schöck Isokorb® type QP, QP+QP, QPZ.
- The length of the Schöck Isokorb® varies dependent on the load-bearing level.
- The upper fire protection slab projects on both sides of the Schöck Isokorb® by 10 mm.
- Download further product plan views and cross-sections at www.schoeck.co.uk/download

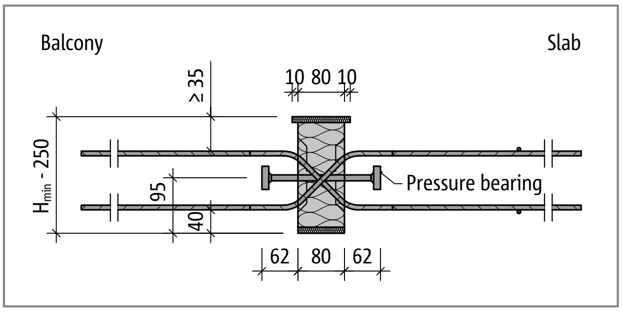
Fire protection configuration



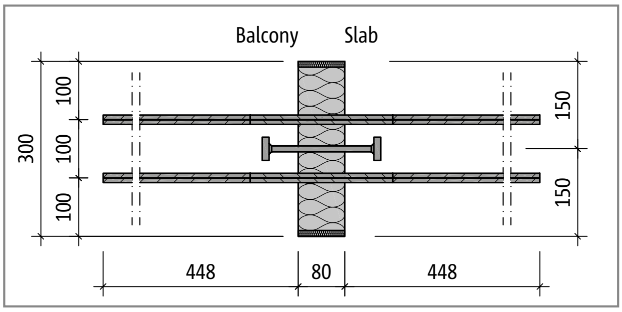
Schöck Isokorb® type QP with REI120: Product section; Fire protection board top and bottom



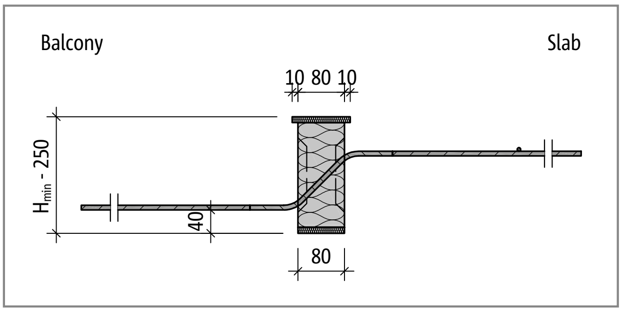
Schöck Isokorb® type QP10 with REI120: Product layout; Fire protection boards at the side



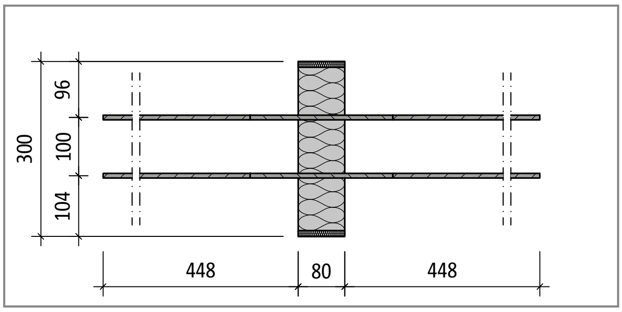
Schöck Isokorb® type QP+QP with REI120: Product section; fire protection board top and bottom



Schöck Isokorb® type QP10+QP10 with REI120: Product layout; fire protection boards at the side



Schöck Isokorb® type QPZ with REI120: Product section; fire protection board top and bottom



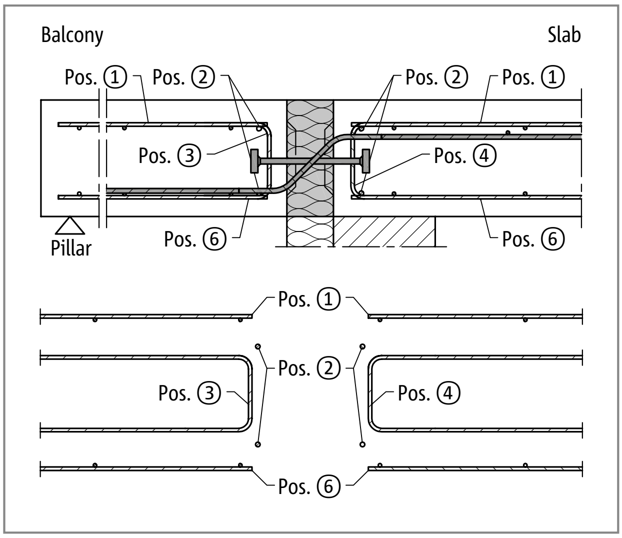
Schöck Isokorb® type QP10 with REI120: Product layout; Fire protection boards at the side

QP

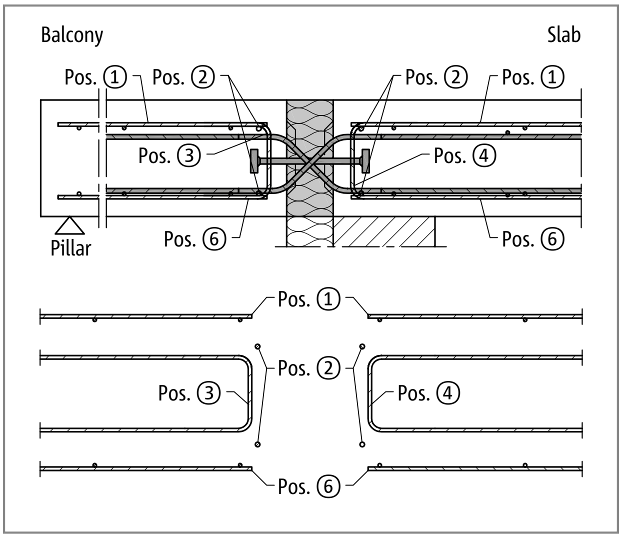
Reinforced concrete/reinforced concrete

On-site reinforcement - In-situ concrete construction

Schöck Isokorb® type QP10 to QP90 and type QP10+QP10 to QP70+QP70



Schöck Isokorb® type QP: On-site reinforcement



Schöck Isokorb® type QP+QP: On-site reinforcement

The reinforcement in the reinforced concrete slab is determined from the structural engineer's design. With this both the effective moment and the effective shear force should be taken into account.
In addition, it is to be ensured that the shear force bars of the Schöck Isokorb® are 100% lapped, insofar as they lie in the tension zone.

i Information about on-site reinforcement

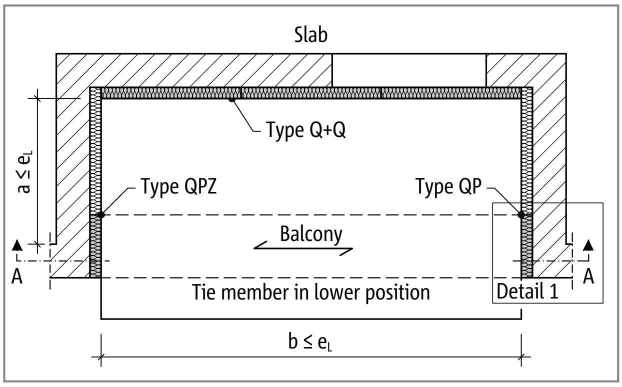
- Lapping of the reinforcement in the connecting reinforced concrete components must be applied as close as possible to the insulating element of the Schöck Isokorb®, the required concrete cover must be observed.
- The side reinforcement Pos. 5 at the edge of the structural component should be selected as low as possible so that it can be arranged between top and bottom reinforcement position.
- The Schöck Isokorb® type QP and QPZ for connection free of constraint forces requires a reinforced tie bar in the lower position. Select $A_{s,req}$ according to application example recessed balcony page 146.
- The shear force bars are to be anchored with their straight ends in the pressure zone. In the tension zone the shear force bars are to be lapped.
- The indicative minimum concrete strength class of the external structural component is C32/40.

On-site reinforcement - In-situ concrete construction

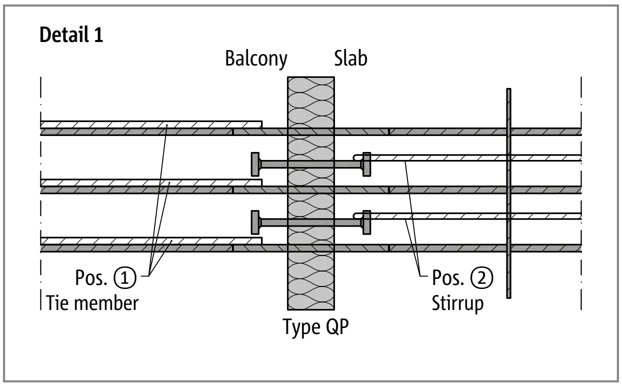
Schöck Isokorb® type		QP10, QPZ10, QP10+QP10	QP20	QP30	QP40, QPZ40, QP40+QP40	QP50
On-site reinforcement	Location	Concrete strength class ≥ C25/30				
Pos. 1 Lapping reinforcement						
Pos. 1	Balcony/floor side	necessary in the tension zone, as specified by the structural engineer				
Pos. 2 Steel bars along the insulation joint						
Pos. 2	Balcony/floor side	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Stirrup						
Pos. 3 [mm²/Element]	Balcony/floor side	71	107	142	103	150
Pos. 4 Side reinforcement at the free edge						
Pos. 4	Balcony/floor side	Edging acc. to BS EN 1992-1-1 (EC2), 9.3.1.4 (not shown)				
Pos. 5 Lapping reinforcement						
Pos. 5		necessary in the tension zone, as specified by the structural engineer				

Schöck Isokorb® type		QP60, QPZ60, QP60+QP60	QP70, QPZ70, QP70+QP70	QP80, QPZ80	QP90
On-site reinforcement	Location	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement					
Pos. 1	Balcony/floor side	necessary in the tension zone, as specified by the structural engineer			
Pos. 2 Steel bars along the insulation joint					
Pos. 2	Balcony/floor side	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Stirrup					
Pos. 3 [mm²/Element]	Balcony/floor side	150	227	197	296
Pos. 4 Side reinforcement at the free edge					
Pos. 4	Balcony/floor side	Edging acc. to BS EN 1992-1-1 (EC2), 9.3.1.4 (not shown)			
Pos. 5 Lapping reinforcement					
Pos. 5		necessary in the tension zone, as specified by the structural engineer			

Application case recessed balcony

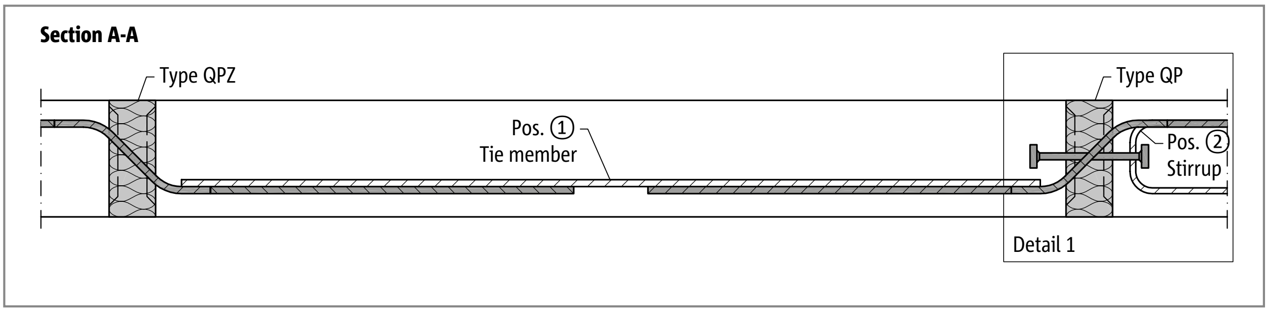


Schöck Isokorb® type QPZ, QP: Layout recessed balcony



Schöck Isokorb® type QP: Detail 1; Reinforcement connection tie bar

A type QPZ without pressure bearing is to be arranged on one side for support free of constraint forces. A type QP with pressure bearing is then required on the opposite side. In order to maintain the balance of forces a tie bar, which laps with the shear force transfering Isokorb® bars, is to reinforce between type QPZ and type QP.



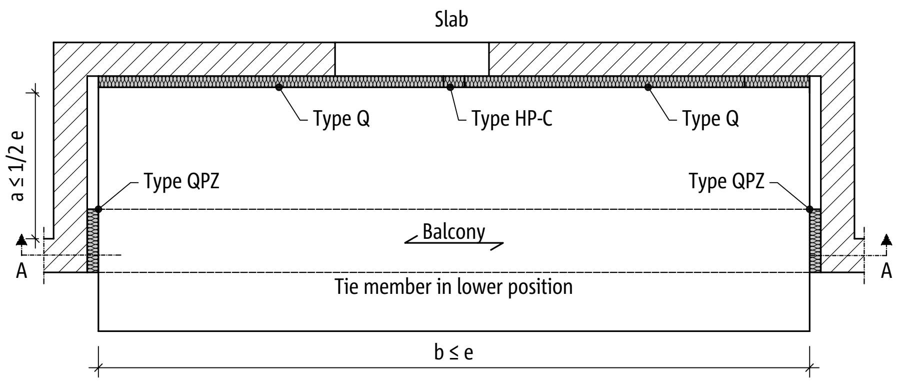
Schöck Isokorb® type	QP10, QPZ10	QP40, QPZ40	QP60, QPZ60	QP70, QPZ70	QP80, QPZ80
On-site reinforcement	Concrete strength class ≥ C25/30				
Pos. 1 Tie					
Pos. 1	2 • H8	2 • H10	2 • H12	3 • H12	2 • H16
Pos. 2 Stirrup (bracing)					
Pos. 2	1 • H8	1 • H10	2 • H8	1 • H10	2 • H10

Schöck Isokorb® type	QP10, QPZ10	QP40, QPZ40	QP60, QPZ60	QP70, QPZ70	QP80, QPZ80
Fixed point separation recessed balcony	e_L [m]				
a, b ≤	6.50	5.85	5.85	5.85	5.50

Information on tie bar

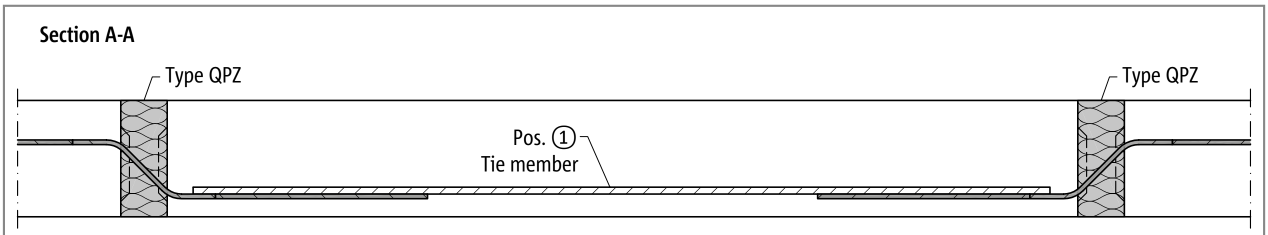
- The fixed point separations a, b are to be selected witht $a \leq e_L$ and $b \leq e_L$.
- The floor side bracing of the tie is carried out via on-site stirrups, which are tied to the pressure bearings.
- The required suspension reinforcement and the on-site slab reinforcement are not shown here.

Application example recessed balcony - symmetrical



Schöck Isokorb® type QPZ: Recessed balcony - symmetrical

A type QPZ without pressure bearing is to be arranged on both sides for support free of constraint forces. In order to maintain the balance of forces a tie bar, which laps with the shear force transfering Isokorb® bars, is to reinforce between QPZ types.



Schöck Isokorb® type	QPZ10	QPZ40	QPZ60	QPZ70	QPZ80
On-site reinforcement	Concrete strength class ≥ C25/30				
Pos. 1 Tie					
Pos. 1	2 • H8	2 • H10	2 • H12	3 • H12	2 • H16

Schöck Isokorb® type		QPZ10	QPZ40	QPZ60	QPZ70	QPZ80
Maximum expansion joint spacing		e [m]				
Insulating element thickness [mm]	80	13.5	13.0	11.7	11.7	10.1

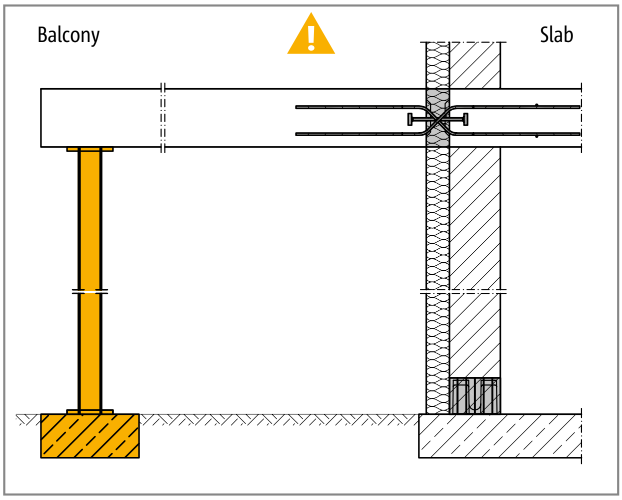
Recessed balcony

- The fixed point spacings a, b are to be selected as a ≤ 1/2 e and b ≤ e.
- The required suspension reinforcement and the on-site slab reinforcement are not shown here.
- This arrangement of the Schöck Isokorb® (type QPZ opposing) is suitable for symmetrical layouts only, if the asymmetrical load case is not relevant.

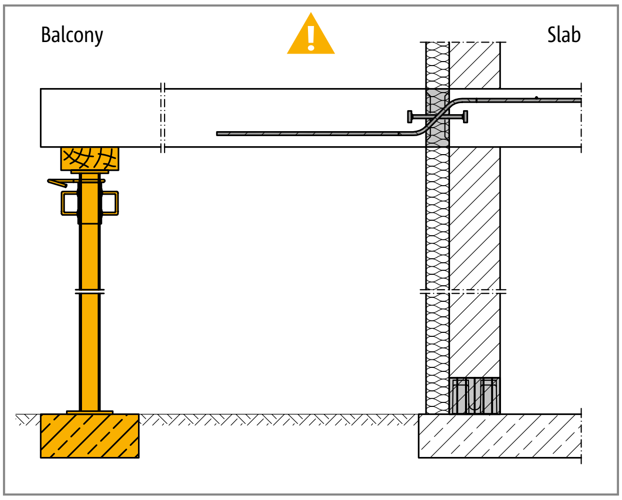
QP

Reinforced concrete/reinforced concrete

Type of bearing: supported



Schöck Isokorb® type QP+QP: Continuous support needed



Schöck Isokorb® type QP: Continuous support needed

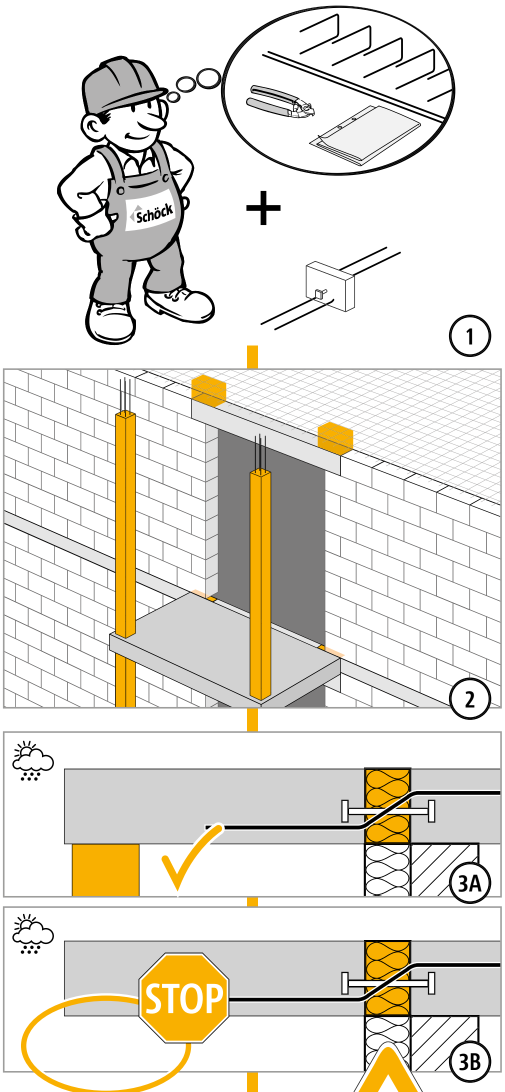
Supported balcony

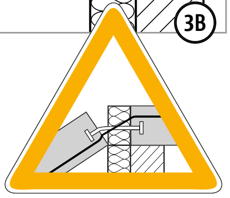
The Schöck Isokorb type QP, QP+QP is developed for supported balconies. It transfers exclusively shear forces, no bending moments.

Warning - omitting the pillars

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

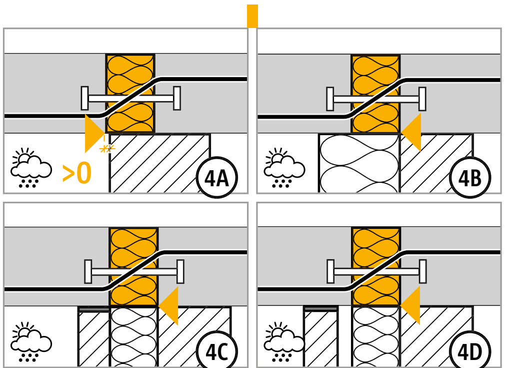
Installation instructions

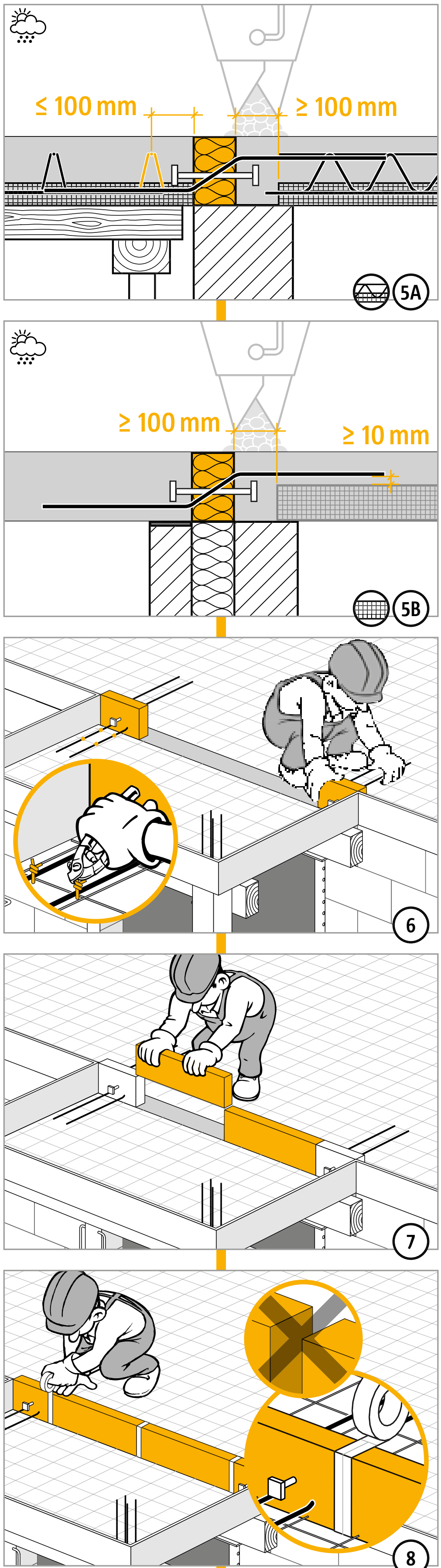




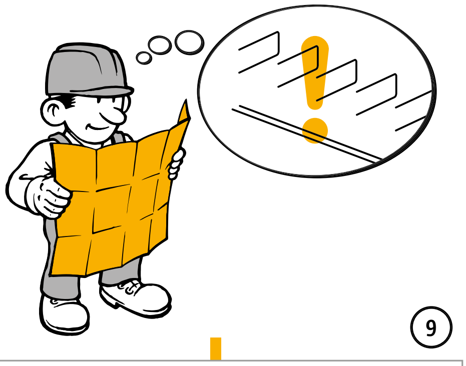
⚠ WARNING

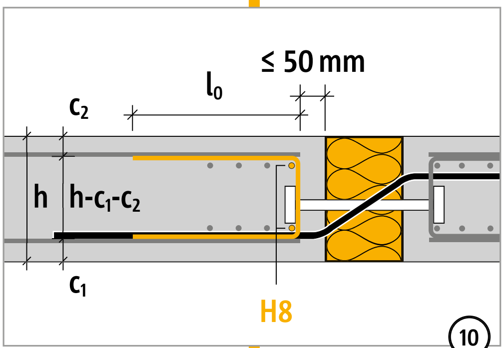
Without support the balcony will collapse!
The balcony must always be supported statically designed. Remove temporary support only after installation of final support.

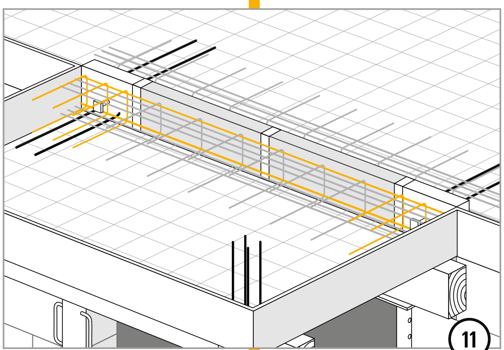


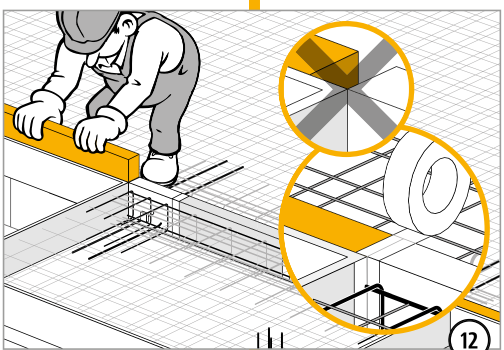


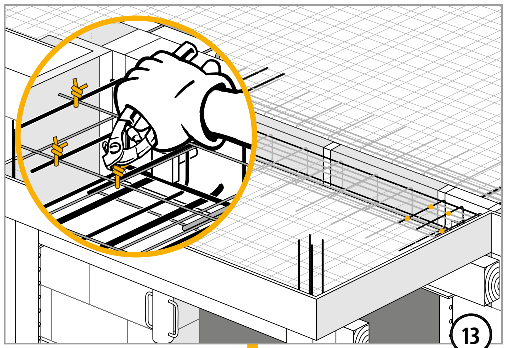
Installation instructions







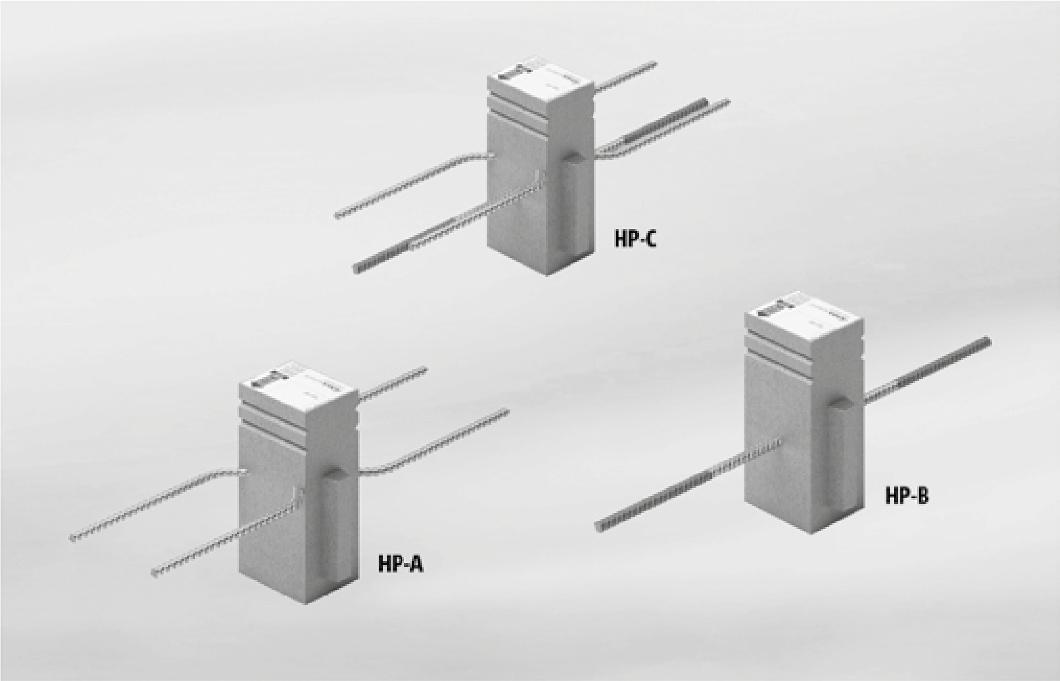




☑ Check list

- ☐ Has the right type of Schöck Isokorb® been selected for the static system?. Type QP is a connection purely for shear forces (pin connection).
- ☐ Is the balcony so planned that a continuous support is ensured in all stages of construction and in the final status?
- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ Are the Schöck FEM guidelines taken into acount with the calculation using FEM?
- ☐ Is the minimum slab thickness taken into consideration with Schöck Isokorb® types in fire protection configuration?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Is the required component geometry present with the connection to a floor or a wall? Is a special design required?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ Are planned existing horizontal loads e.g. from wind pressure taken into account? Are additional Schöck Isokorb® supplementary type HP or supplementary type EQ required for this?
- ☐ With precast balconies are possibly necessary gaps for the front side transportation anchors and downpipes with internal drainage taken into account? Is the maximum centre distance of 300 mm for the Isokorb® bars observed?
- ☐ With 2- or 3-sided support has a Schöck Isokorb® (possibly type QZ, type QPZ) been selected for a connection free of constraint forces?

Schöck Isokorb® supplementary type HP



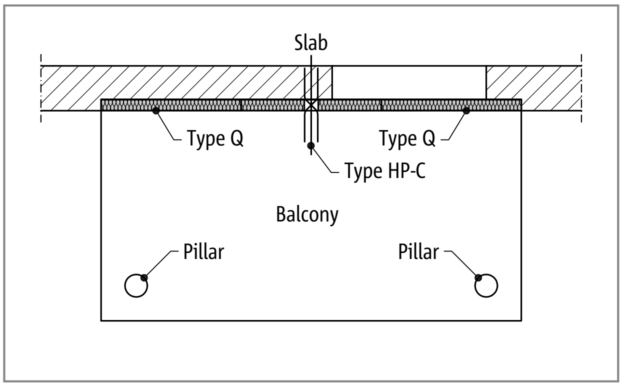
Schöck Isokorb® types HP-A, HP-B, HP-C

Schöck Isokorb® supplementary type HP
Suitable for ordinary existing horizontal forces.

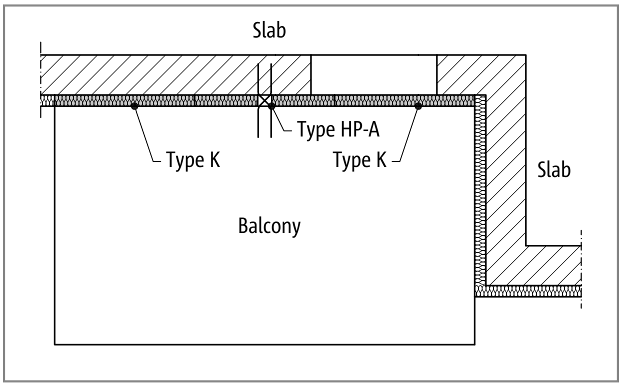
The Schöck Isokorb® supplementary type HP-A transfers forces parallel to the insulation level.
The Schöck Isokorb® supplementary type HP-Btransfers forces at right angles to the insulation layer.
The Schöck Isokorb® supplementary type HP-C transfers forces both parallel and also at right angles to the insulation level.

The Schöck Isokorb® supplementary type HP-A or supplementary type HP-B is to be scheduled only in conjunction with an approved Isokorb® type K, type Q, type QP or type D.

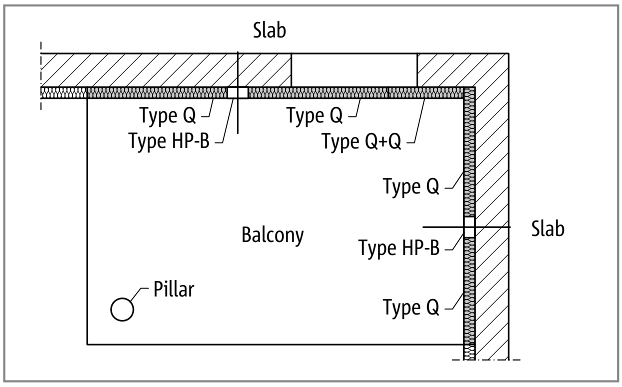
Element arrangement | Installation cross sections



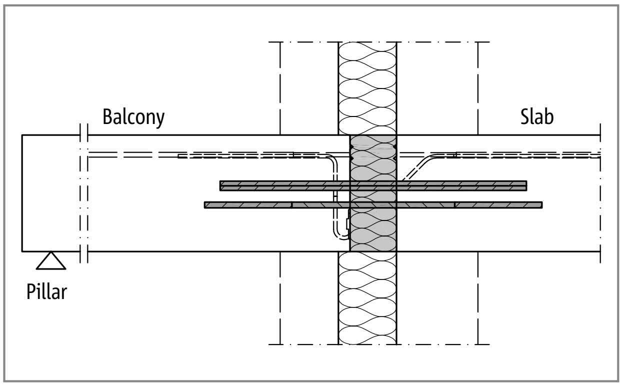
Schöck Isokorb® type HP: Balcony with pillar support



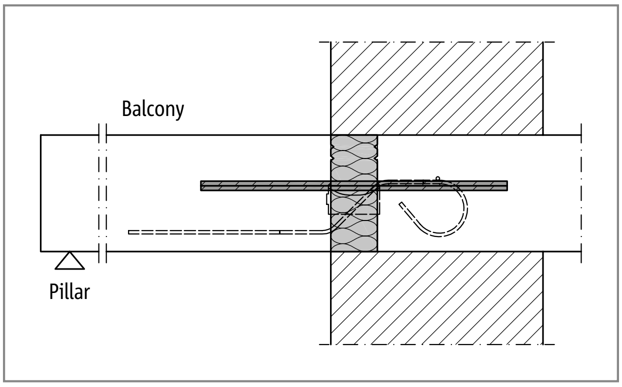
Schöck Isokorb® type HP: Balcony freely cantilevered



Schöck Isokorb® type HP: Balkon supported on two sides using pillars



Schöck Isokorb® type K, HP-A: Connection with non-load-bearing cavity masonry



Schöck Isokorb® type Q, HP-A: Connection with cavity masonry

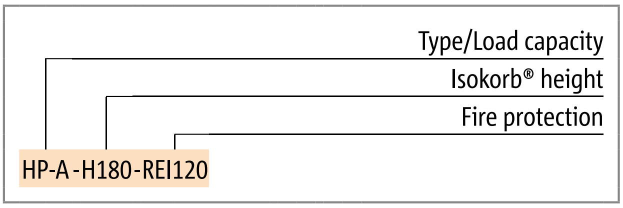
Product selection | Type designations | Special designs

Schöck Isokorb® supplementary type HP variants

The design of the Schöck Isokorb® supplementary type HP can vary as follows:

- Load-bearing level:
  HP-A, HP-B and HP-C
- Height:
  H = 160 - 250 mm
- Fire resistance class:
  R0: Standard
  REI120: Top fire protection board projecting on both sides 10 mm

Type designations in planning documents



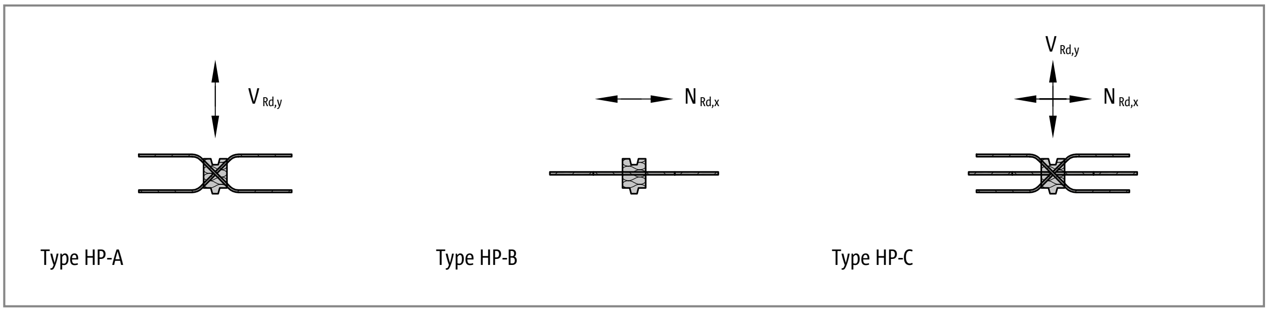
Special designs

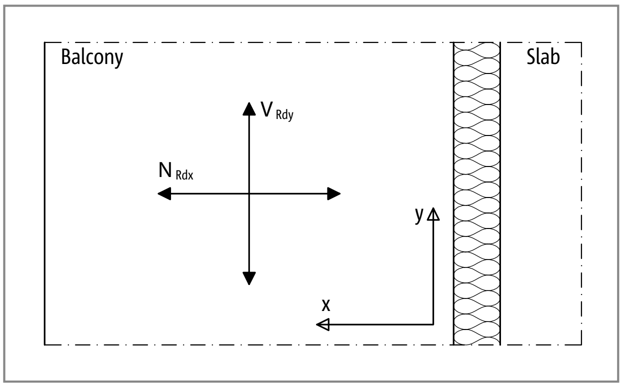
Please contact the design support department if you have connections that are not possible with the standard product variants shown in this information (contact details on page 3).
In accordance with approval heights up to heights mm are possible.

Design

Schöck Isokorb® type	HP-A		HP-B		HP-C	
Design values with	$V_{Rd,y}$ [kN]	$N_{Rd,x}$ [kN]	$V_{Rd,y}$ [kN]	$N_{Rd,x}$ [kN]	$V_{Rd,y}$ [kN]	$N_{Rd,x}$ [kN]
Concrete C25/30	±8.6	0.0	0.0	±20.9	±8.6	±20.9

Shear force bars, horizontal	2 × 1 ⌀ 8	-	2 × 1 ⌀ 8
Tension bars/compression bars	-	1 ⌀ 10	1 ⌀ 10
Isokorb® length [mm]	100	100	100
Isokorb® height H [mm]	160 - 250	160 - 250	160 - 250





Schöck Isokorb® type HP: Sign rule for the design

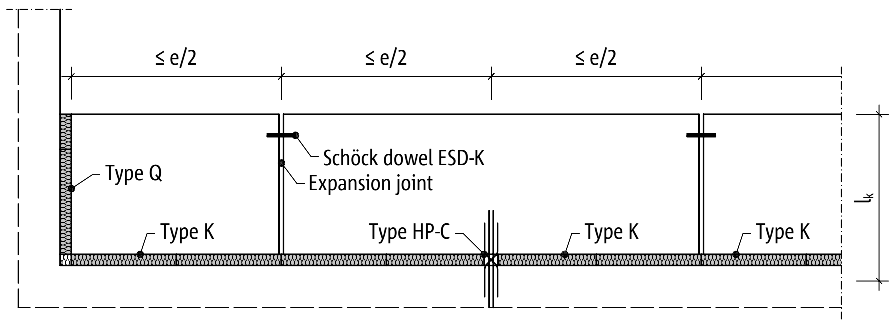
Notes on design

- With the design of a linear connection, attention is to be paid that, with the employment of the supplementary type HP, the design values of the linear connection can be reduced (e.g. type Q with L = 1.0 m and supplementary type HP with L = 0.1 m in regular exchange signifies a reduction by ca. 9 % of v_{Rd} of the linear connection using type Q).
- With the type selection (supplementary type HP-A, HP-B or HP-C) and arrangement, attention is to be paid that no unnecessary fixed points are created and the maximum expansion joint spacings (of e.g. type K, type Q or type D) are maintained.
- The required number of Schöck Isokorb® supplementary type HP-A, HP-B or HP-C is to be laid down according to static requirements.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.

Expansion joint spacing

Maximum expansion joint spacing

If the length of the structural component exceeds the maximum expansion joint spacing, expansion joints must be incorporated in the exterior concrete components at right angles to the insulation layer in order to limit the effect as a result of temperature changes. With fixed points such as, for example, corners of balconies, parapets and balustrades or with the employment of the supplementary types HP or EQ half the maximum expansion joint spacing e/2 from the fixed point applies.
The shear force transmission in the expansion joint can be ensured using a longitudinally displaceable shear force dowel, e.g. Schöck Dowel.



Schöck Isokorb® type HP: Expansion joint arrangement

Schöck Isokorb® type HP combined with	K	K-HV, K-BH, K-WU, K-WO	Q, Q+Q	QP, QP+QP, QPZ	D
maximum expansion joint spacing from fixed point e/2 [m]	≤ e/2 see p. 62	6.5	≤ e/2 see p. 123	≤ e/2 see p. 123	5.9

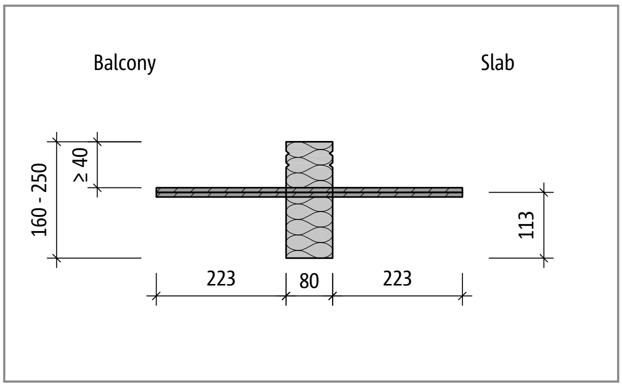
Edge distances

The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

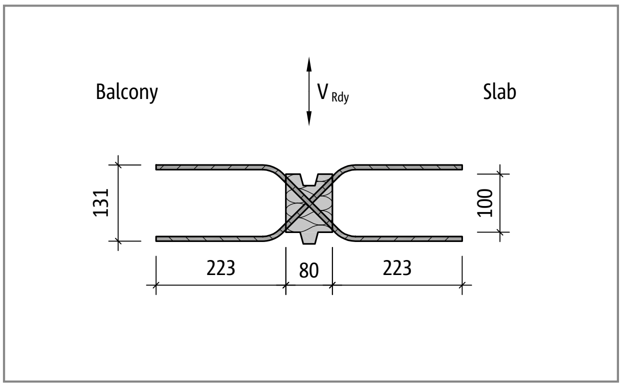
- For the centre distance of the tension bars from the free edge or from the expansion joint: $e_R \geq 50$ mm and $e_R \leq 150$ mm applies.
- For the centre distance of the compression elements from the free edge or from the expansion joint: $e_R \geq 50$ mm applies.
- For the centre distance of the shear force bars from the free edge or from the exapansion joint: $e_R \geq 100$ mm and $e_R \leq 150$ mm applies.

Product description

Schöck Isokorb® supplementary type HP-A for the transfer of horizontal forces $V_{Ed,y}$ parallel to the insulation level

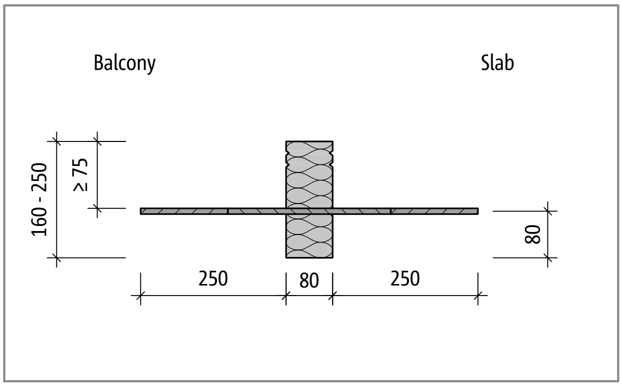


Schöck Isokorb® type HP-A: Product section

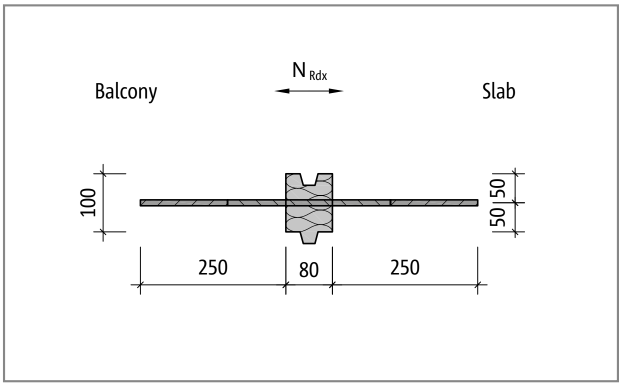


Schöck Isokorb® type HP-A: Product layout

Schöck Isokorb® supplementary type HP-B for the transfer of horizontal forces $N_{Ed,x}$ perpendicular to the insulation level

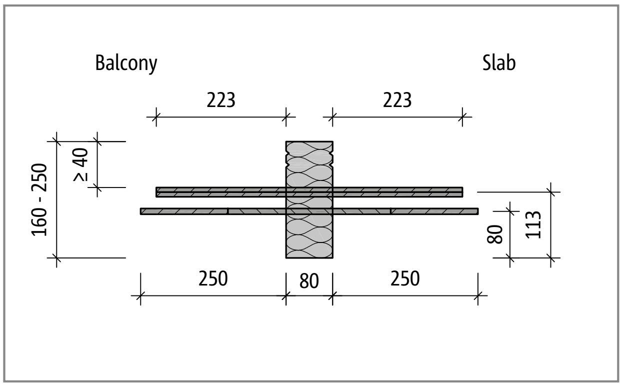


Schöck Isokorb® type HP-B: Product section

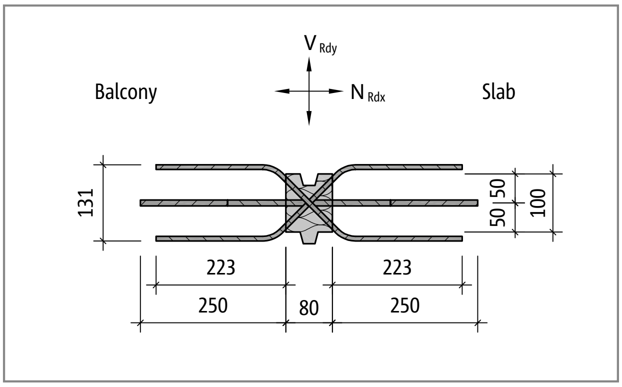


Schöck Isokorb® type HP-B: Product layout

Schöck Isokorb® supplementary type HP-C for the transfer of horizontal forces $V_{Ed,y}$ parallel and $N_{Ed,x}$ perpendicular to the insulation level



Schöck Isokorb® type HP-C: Product section



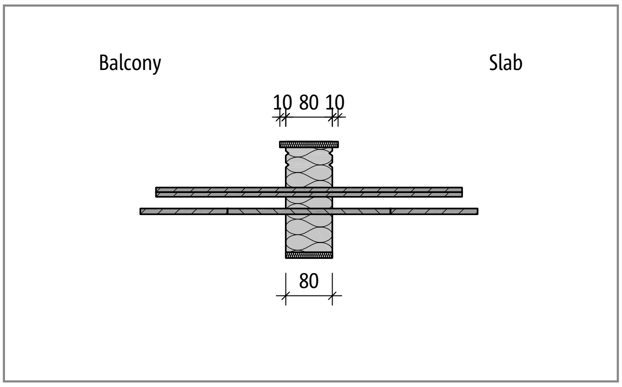
Schöck Isokorb® type HP-C: Product layout

Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download

Fire protection configuration

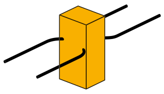
Product configuration with fire protection requirement



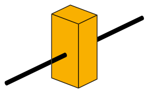
Schöck Isokorb® type HP-C with REI120: Product section; fire protection board top and bottomn

Installation instructions

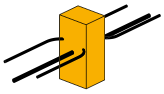
Type HP-A
Type HPXT-A

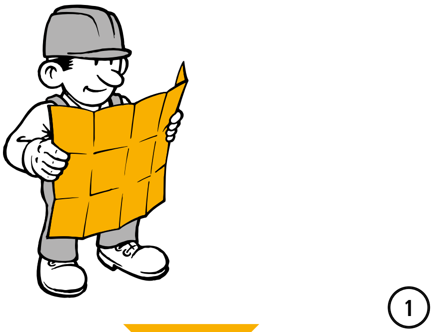


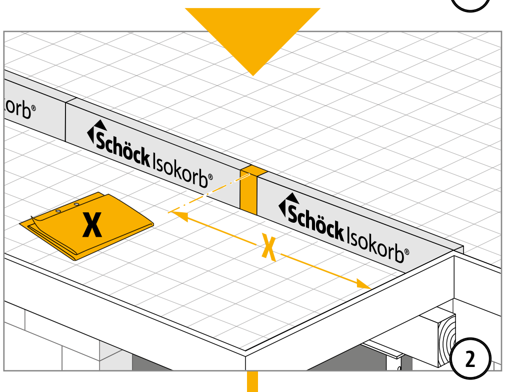
Type HP-B
Type HPXT-B

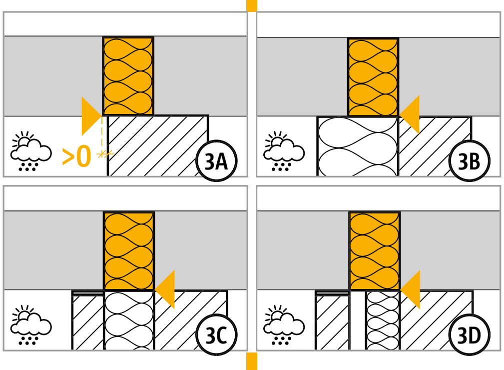


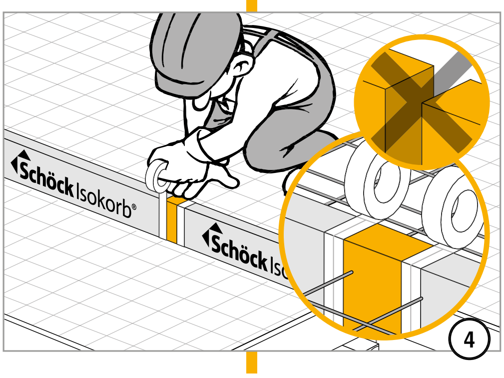
Type HP-C
Type HPXT-C

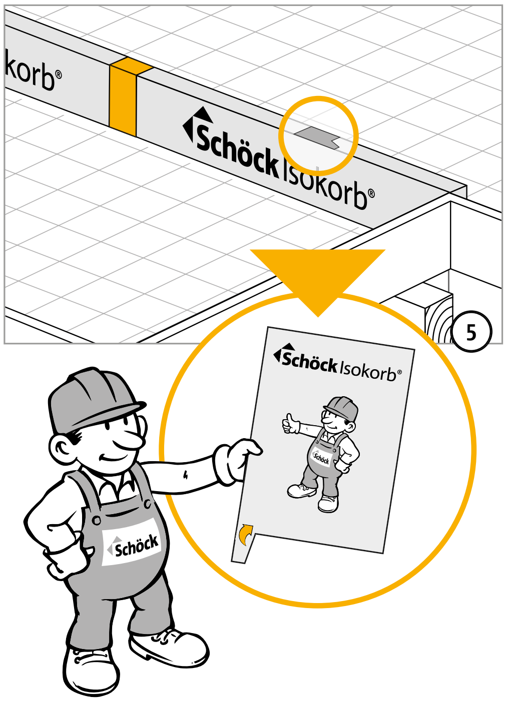








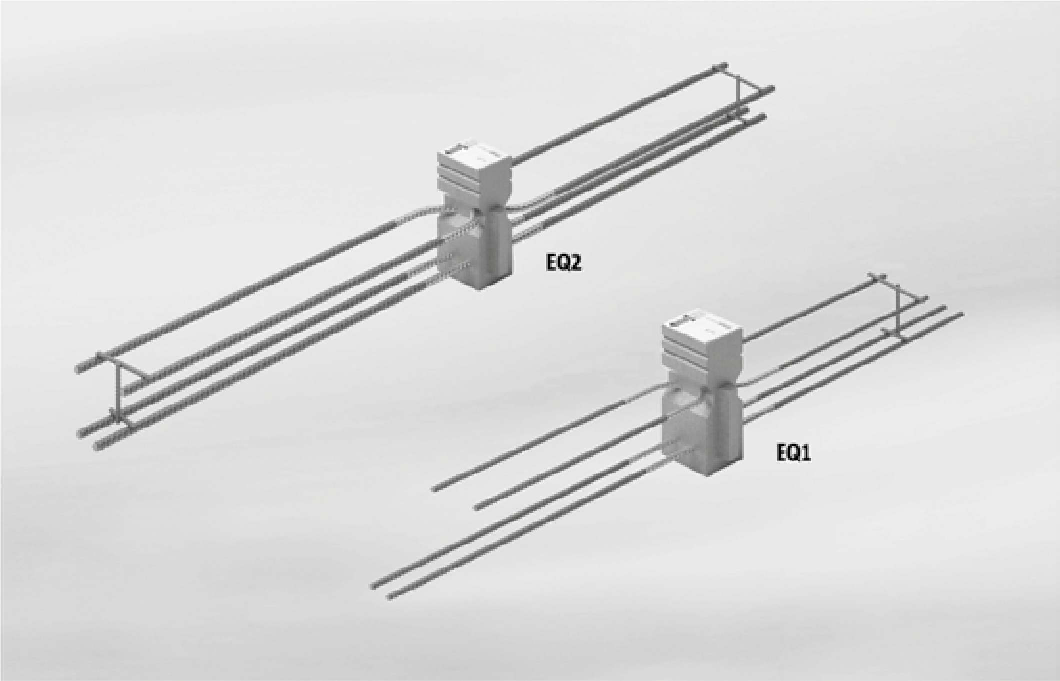




✓ Check list

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ With a linear connection in combination with Schöck Isokorb® of length 1 m, has the reduction of the design values of the linear connection been taken into account?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Is the required component geometry present with the connection to a floor or a wall? Is a special design required?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?

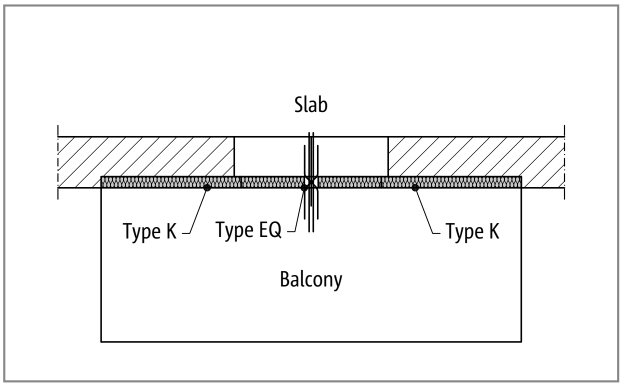
Schöck Isokorb® supplementary type EQ



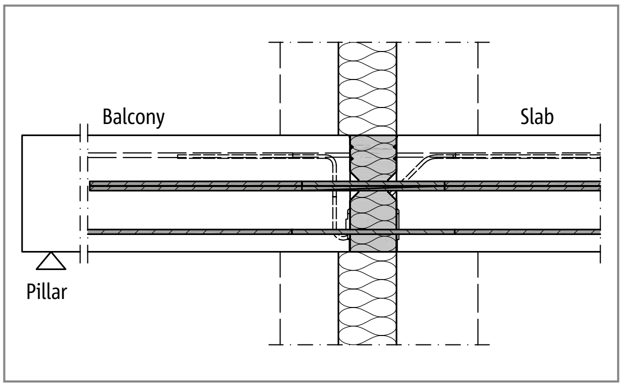
Schöck Isokorb® types EQ1, EQ2

Schöck Isokorb® supplementary type EQ
Suitable for ordinarily existing horizontal forces or positive moments.
It transfers horizontal shear forces and tension forces.
In conjunction with the Schöck Isokorb® type K it transfers horizontal shear forces and positive moments, or tension forces.
The Schöck Isokorb® supplementary type EQ is to be scheduled only in conjunction with an approved Isokorb® type K, type Q, type QP or type.

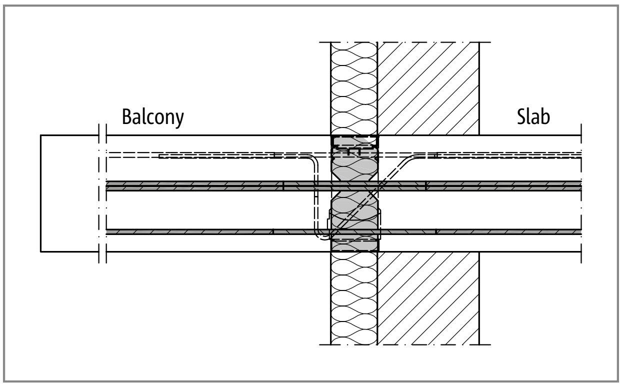
Element arrangement | Installation cross sections



Schöck Isokorb® type EQ: Balcony freely cantilevered with positive moment loading



Schöck Isokorb® type K, EQ: Non-load-bearing cavity masonry with core insulation



Schöck Isokorb® type K, EQ: Thermal insulating composite system (TICS)

Product selection | Type designations | Special designs

Schöck Isokorb® supplementary type EQ variants

The configuration of the Schöck Isokorb® supplementary type EQ can be varied as follows:

- Load-bearing level:
  EQ1 and EQ2
- Height:
  H = 160 - 250 mm
- Fire resistance class:
  R0: Standard
  REI120: Top fire protection board projecting on both sides 10 mm

Type designations in planning documents

Type/Load capacity
Isokorb® height
Fire protection

EQ1 - H180 - REI120

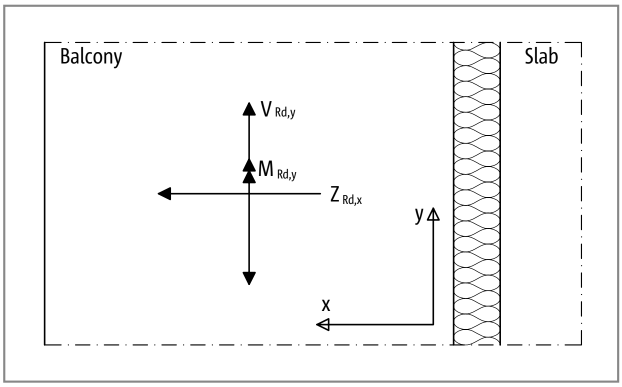
Special designs

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).
In accordance with approval heights up to 500 mm are possible.

C25/30 design

Schöck Isokorb® type				EQ1	EQ2
Recommended design values with	Concrete cover CV [mm]			Concrete strength class ≥ C25/30	
	CV30	CV35	CV50	$M_{Rd,y}$ [kNm/element] bei $N_{Rd,x}(Z_{Rd,x})$ = 0	
Isokorb® height H [mm]		160		3.8	8.3
	160		180	4.0	8.8
		170		4.3	9.2
	170		190	4.5	9.7
		180		4.7	10.2
	180		200	4.9	10.7
		190		5.1	11.2
	190		210	5.4	11.7
		200		5.6	12.2
	200		220	5.8	12.7
		210		6.0	13.2
	210		230	6.2	13.7
		220		6.5	14.2
	220		240	6.7	14.7
		230		6.9	15.2
	230		250	7.1	15.6
		240		7.3	16.1
	240			7.5	16.6
		250		7.8	17.1
	250			8.0	17.6
				$N_{Rd,x}(Z_{Rd,x})$ [kN/element] bei $M_{Rd,y}$=0	
Isokorb® height	160 - 250			43.7	83.7
				$V_{Rd,y}$ [kN/element]	
Isokorb® height	160 - 250			±15.4	±34.7

Schöck Isokorb® type	EQ1	EQ2
Isokorb® length [mm]	100	100
Tension bars	2 ⌀ 8	2 ⌀ 12
Shear force bars horizontal	2 × 1 ⌀ 8	2 × 1 ⌀ 12



Schöck Isokorb® type EQ: Sign rule for the design

C25/30 design

Notes on design

- With the design internal force variables either $M_{Rd,y}$ or $N_{Rd,x}$ ($Z_{Rd,x}$) applies, not both at the same time.
- A combination of the Schöck Isokorb® supplementary type EQ with the Schöck Isokorb® type K is recommendded as follows:
  Schöck Isokorb® supplementary type EQ1 with Isokorb® type K40 to K50,
  Schöck Isokorb® supplementary type EQ2 at least with type K60.
  For the activation of the positive design moments the combination of the Schöck Isokorb® supplementary type EQ2 at least with type K60 is required.
- With the design of a linear connection, attention is to be paid that, with the employment of the supplementary type EQ, the design values of the linear connection can be reduced (e.g. type K wih L = 1.0 m and supplementary type EQ with L = 0.1 m in regular exchange signifies a reduction of v_{Rd} of the linear connection using type K by ca. 9 %).
- With the type selection (supplementary type EQ) and arrangement, attention is to be paid, that no unnecessary fixed points are created and the maximum expansion joint spacings (of e.g. type K, type Q or type D) are maintained.
- The required number of Schöck Isokorb® supplementary type EQ is to be laid down according to static requirements.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.

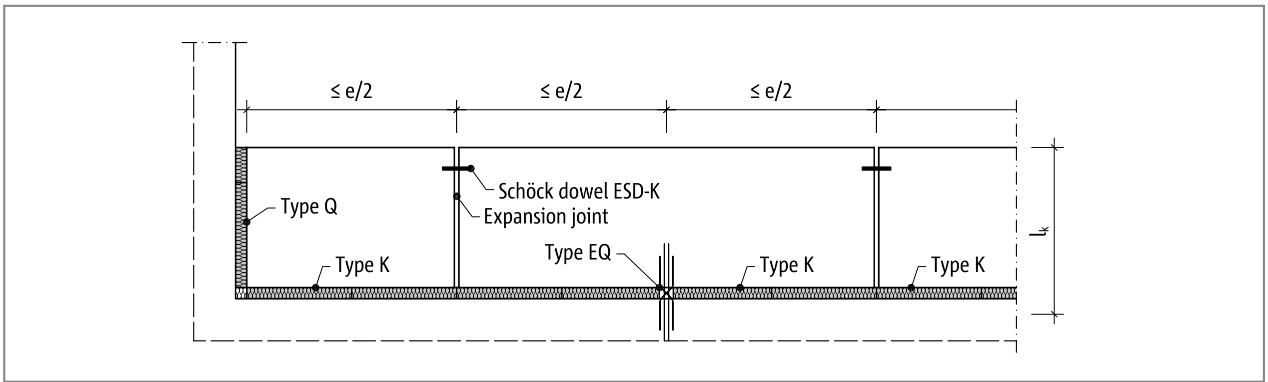
EQ

Reinforced concrete/reinforced concrete

Expansion joint spacing | Product description

Maximum expansion joint spacing

If the length of the structural component exceeds the maximum expansion joint spacing, expansion joints must be incorporated in the exterior concrete components at right angles to the insulation layer in order to limit the effect as a result of temperature changes. With fixed points such as, for example, corners of balconies, parapets and balustrades or with the employment of the supplementary types HP or EQ half the maximum expansion joint spacing e/2 from the fixed point applies.
The shear force transmission in the expansion joint can be ensured using a longitudinally displaceable shear force dowel, e.g. Schöck Dowel.



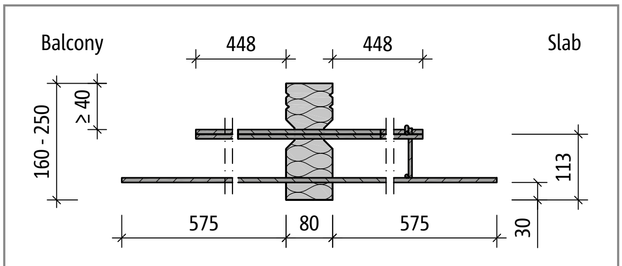
Schöck Isokorb® type EQ: Expansion joint spacing

Schöck Isokorb® type EQ combined with	K	K-HV, K-BH, K-WU, K-WO	Q, Q+Q	QP, QP+QP, QPZ	D
maximum expansion joint spacing from fixed point e/2 [m]	≤ e/2 see p. 62	6.5	≤ e/2 see p. 123	≤ e/2 see p. 123	5.9

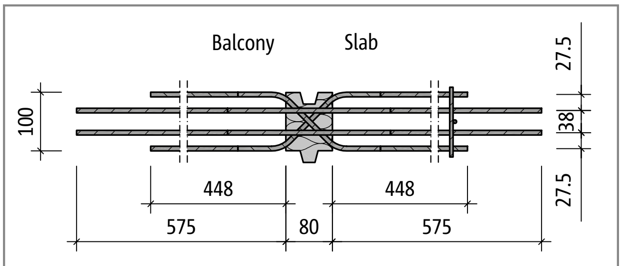
Edge distances

The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

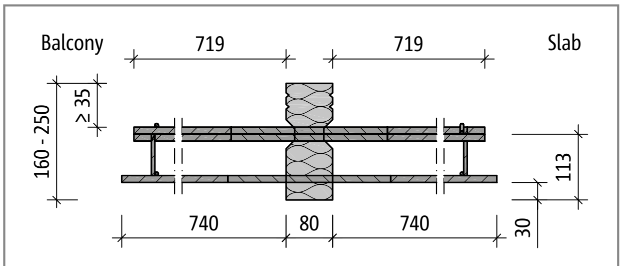
- For centre distance of the tension bars from the free edge resp. from the expansion joint: $e_R \geq 50$ mm applies.
- For the centre distance of the compression bars from the free edge resp. exapansion joint: $e_R \geq 100$ mm applies.



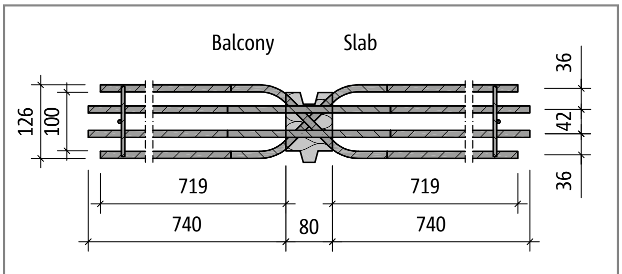
Schöck Isokorb® type EQ1: Product section



Schöck Isokorb® type EQ1: Product section



Schöck Isokorb® type EQ2: Product section



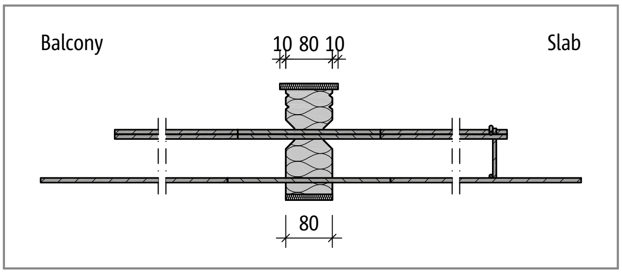
Schöck Isokorb® type EQ2: Product layout

Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download

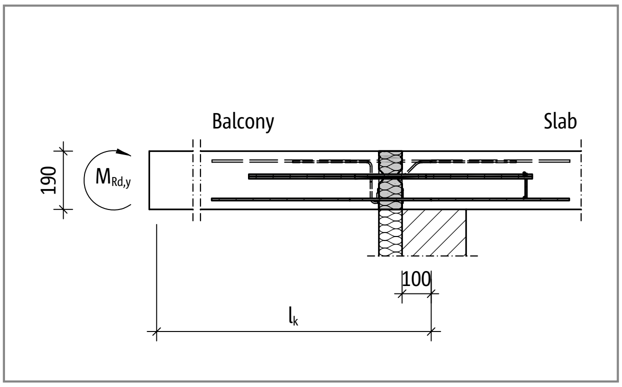
Fire protection configuration | Design example

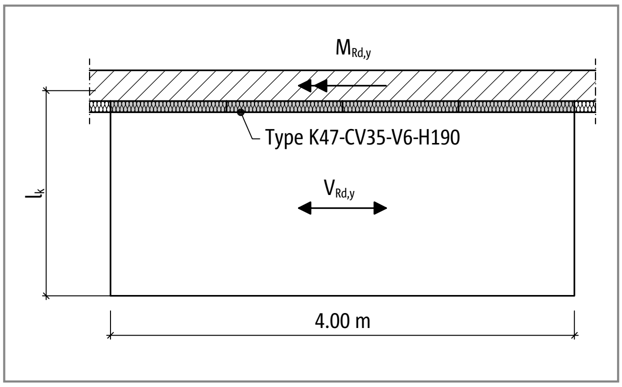
Product configuration with fire protection requirement



Schöck Isokorb® type EQ1 Product section with REI120: Fire protection boards top and bottom

Schöck Isokorb® type K and with EQ with ordinary positive moment effect



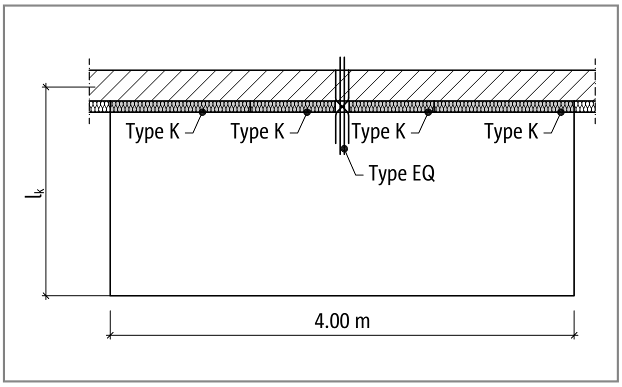


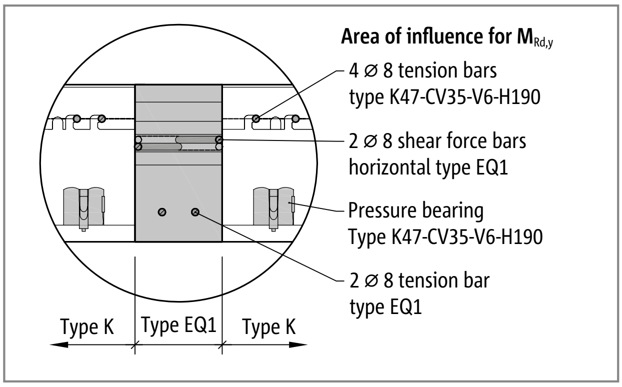
given: cantilevered slab connection with Schöck Isokorb® type K47-CV35-V6-H190, concrete strength class C25/30
Design of the connection and selection of the corresponding Schöck Isokorb® type K load-bearing level see p. 75
Ordinary positive moment and positive normal force:
$V_{Ed,y}$ = 14.0 kN/slab
$M_{Ed,y}$ = 4.1 kNm/slab

selected: Schöck Isokorb® with EQ1
$V_{Rd,y}$ = 15.4 kN ≥ $V_{Ed,y}$ = 14.0 kN/slab
$M_{Rd,y}$ = 5.1 kNm ≥ $M_{Ed,y}$ = 4.1 kNm/slab

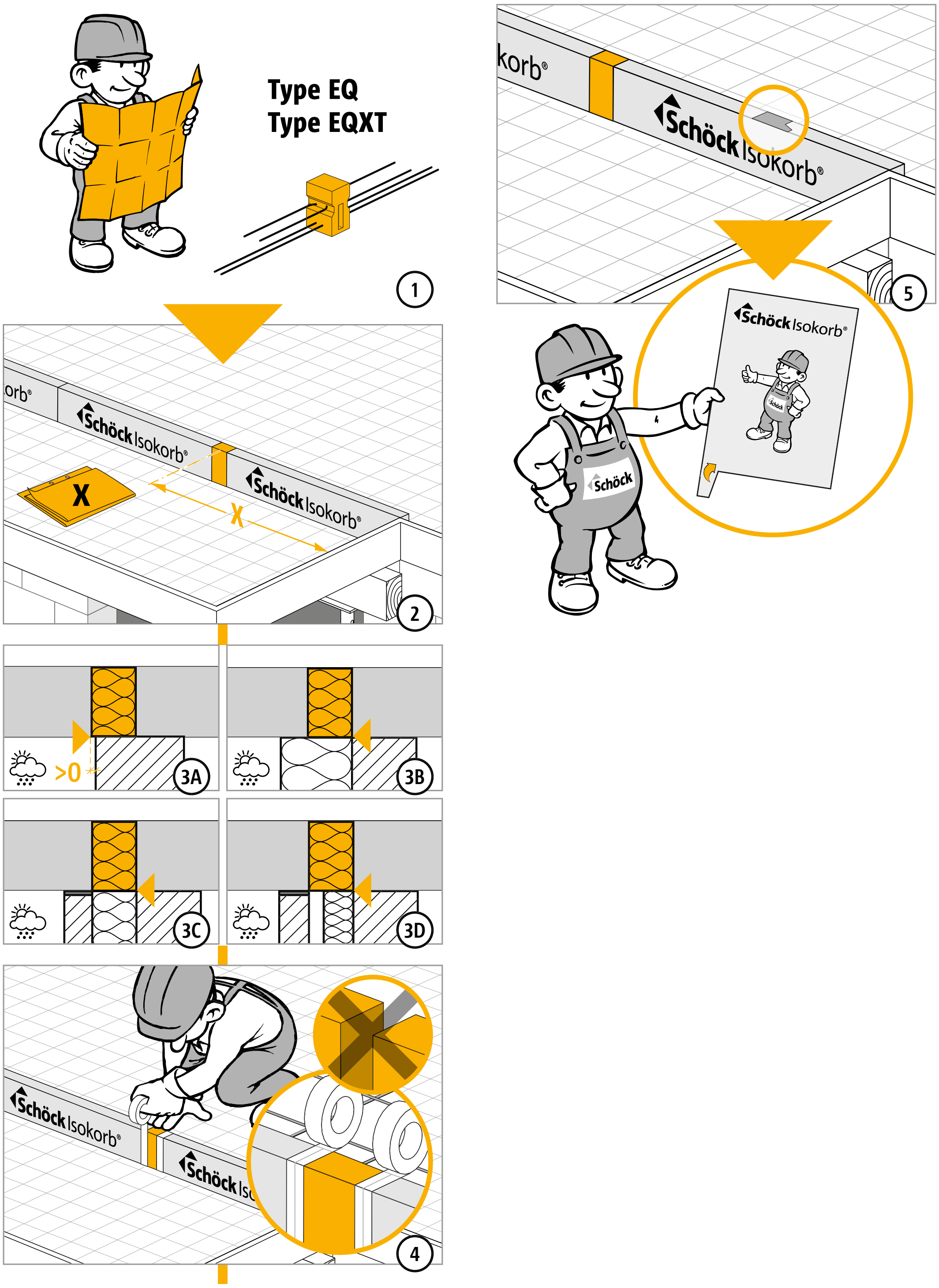
i Design example

- For the activation of $M_{Rd,y}$ Schöck Isokorb® type K are required directly adjacent on the Schöck Isokorb® type K EQ.
- Arrangement of the Schöck Isokorb® supplementary type EQ according to page 166 and the check list page 171.





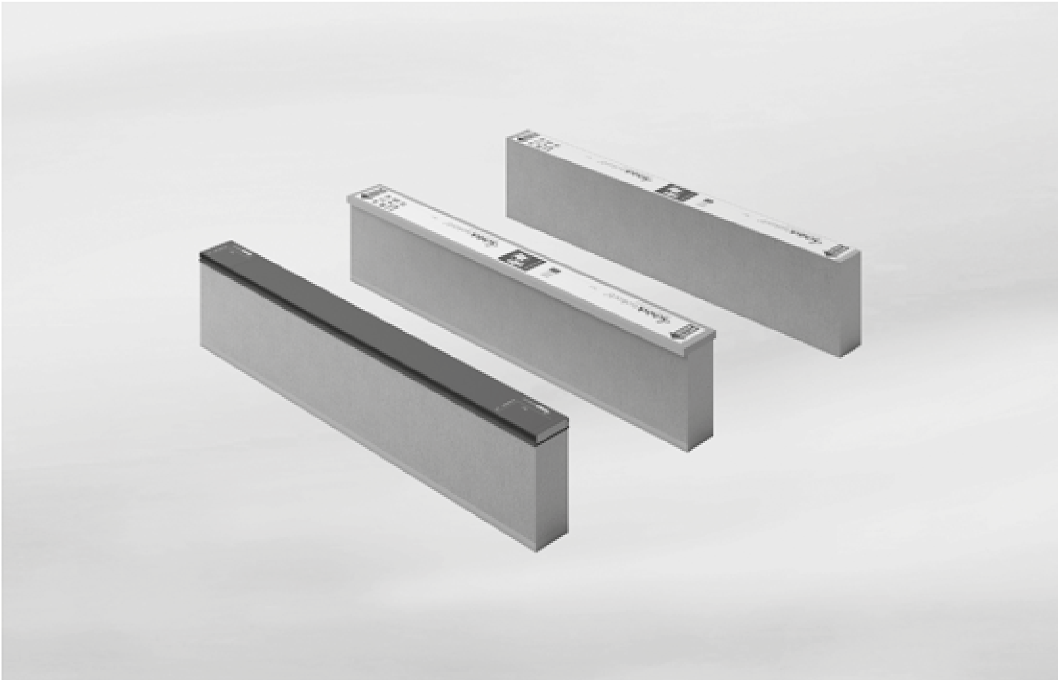
Installation instructions



☑ Check list

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ With a linear connection in combination with Schöck Isokorb® of length 1 m, has the reduction of the design values of the linear connection been taken into account?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Is the required component geometry present with the connection to a floor or a wall? Is a special design required?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?

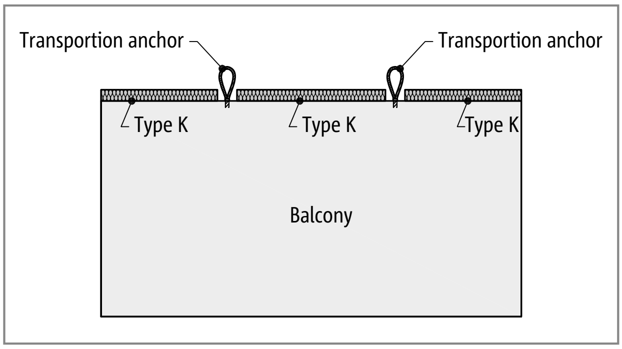
Schöck Isokorb® supplementary type Z



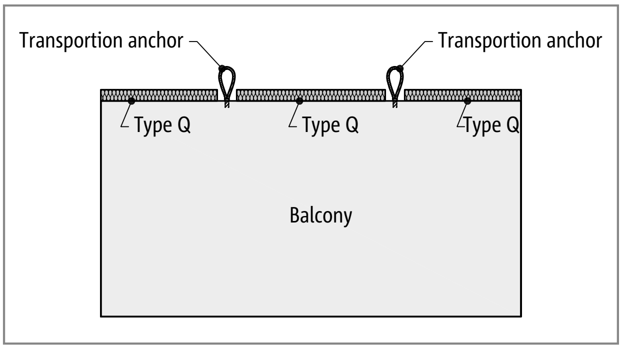
Schöck Isokorb® supplementary type Z

Schöck Isokorb® supplementary type Z
Suitable as insulating spacer for various installation situations and fire protection requirements. The Schöck Isokorb® supplementary type Z transfers no forces

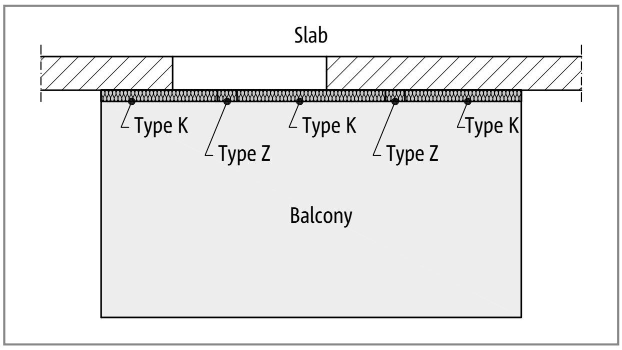
Element arrangement | Installation cross sections



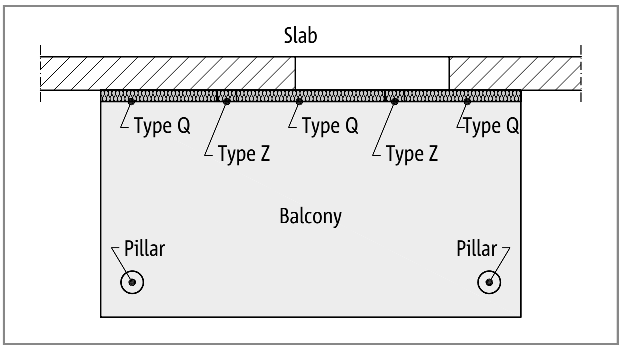
Schöck Isokorb® type K: Prefabricated balcony with transport anchors; insulation spacer type Z can be inserted on-site



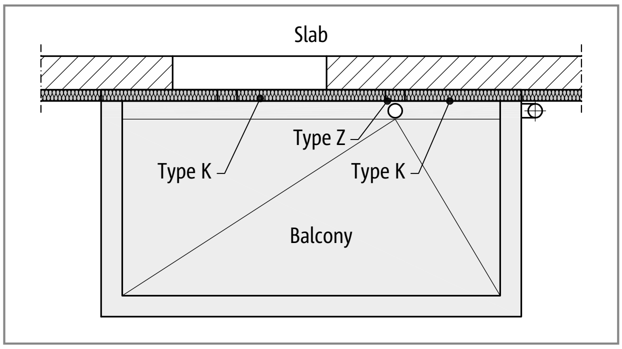
Schöck Isokorb® type Q: Prefabricated balcony with transport anchors; insulation spacer type Z can be inserted on-site



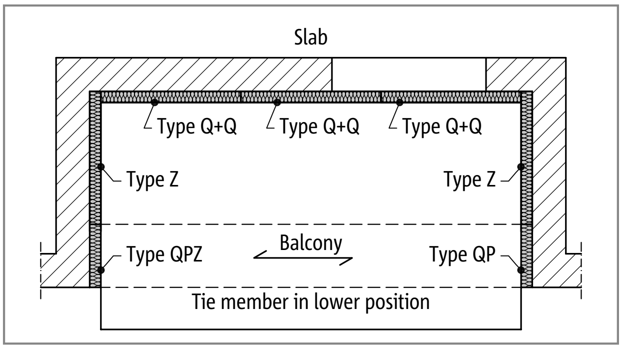
Schöck Isokorb® type Z, K: Balcony freely cantilevered



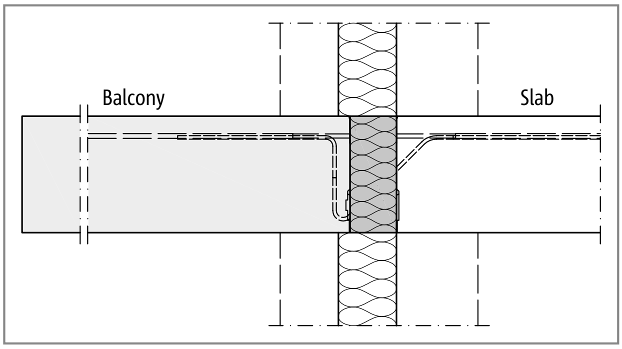
Schöck Isokorb® type Z, K: Balcony with pillar supports



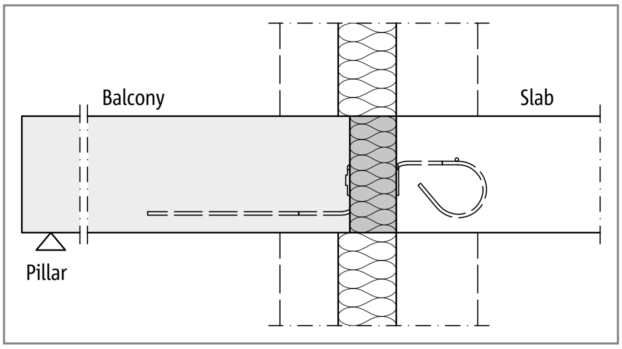
Schöck Isokorb® type Z, K: Block-out for drainage with Schöck Isokorb® type Z



Schöck Isokorb® type Z, Q+Q, QP, QPZ: Recessed balcony supported on three sides with tie bar



Schöck Isokorb® type Z, K: Indirect support, non-load-bearing cavity masonry



Schöck Isokorb® type Z, Q: Indirect support, non-load-bearing cavity masonry

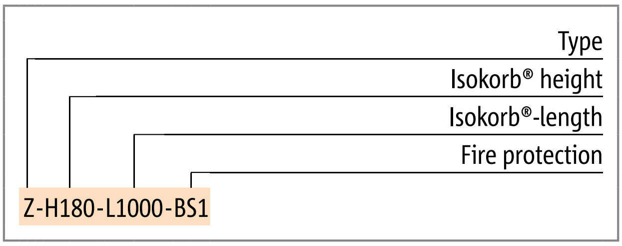
Product selection | Type designations

Schöck Isokorb® supplementary type Z variants

The configuration of the Schöck Isokorb® supplementary type Z can be varied as follows:

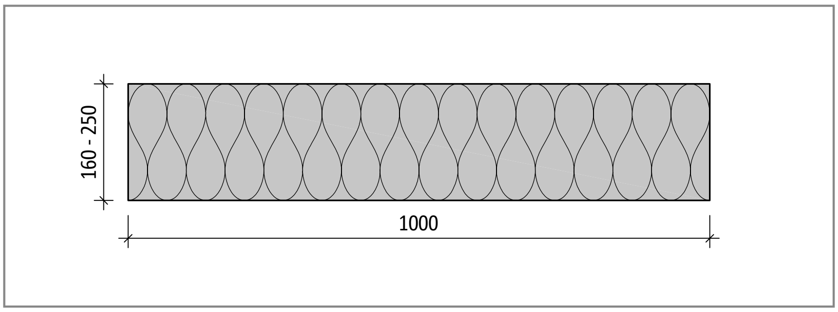
- Height:
  H = 160 - 250 mm
- Length:
  L = 1000 mm (L = 100 mm, L = 150 mm on request)
- Fire resistance class
  R0: Standard
  BS1: Fire protection boards top and bottom, top fire protection board without projection, with slide bar and fire protection strip
  BS2: Fire protection board top and bottom, top fire protection board projecting on both sides by 10 mm

Type designations in planning documents

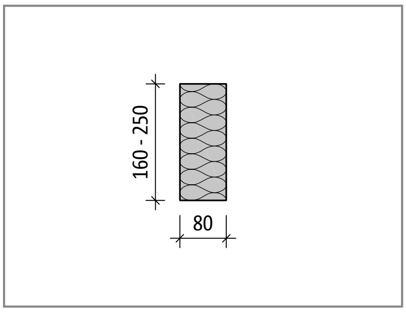


Product description

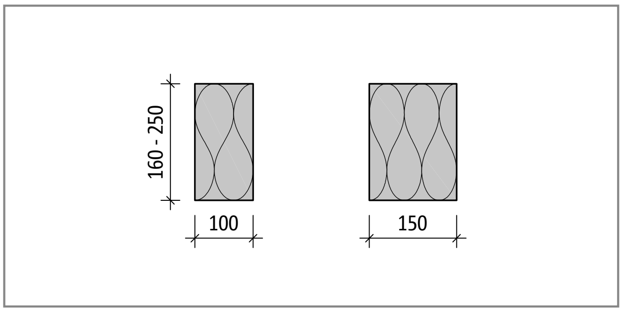
Schöck Isokorb® supplementary type Z



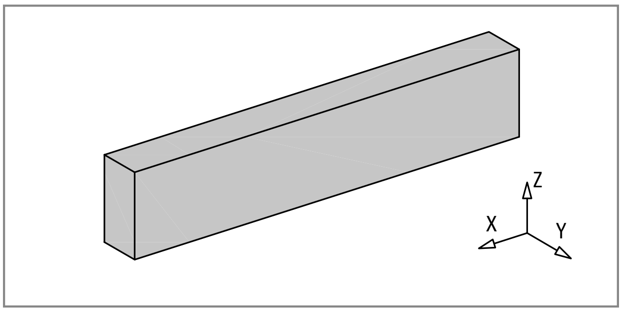
Schöck Isokorb® type Z-L1000: Product view



Schöck Isokorb® type Z: Product section



Schöck Isokorb® type Z-L100, Z-L150: Product view



Schöck Isokorb® type Z: 3D-model

Product information

- The Schöck Isokorb® type Z is supplied with a length of 1000 mm (widths 100 mm and 150 mm on request))
- The Schöck Isokorb® type Z-L1000 can, as required, be shortened to the desired length.
- Download further product plan views and cross-sections at www.schoeck.co.uk/download

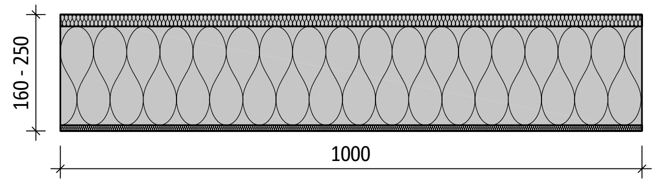
Notes on design

- Edge and centre distances of the adjacent Schöck Isokorb® types are to be noted.
- With the design of a linear connection, attention is to be paid that, with the employment of the supplementary type Z, the design values of the linear connection can be reduced (e.g. type K wih L = 1.0 m and supplementary type Z with L = 0.1 m in regular exchange signifies a reduction by ca. 9 % of v_{Rd} of the linear connection using type K.

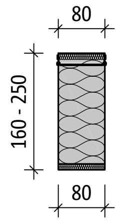
Fire protection configuration

Schöck Isokorb® supplementary type Z-BS1

Fire protection board top and bottom, no projection



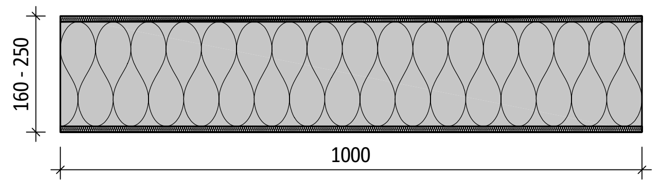
Schöck Isokorb® type Z-BS1: Product view; fire protection board top and bottom flush



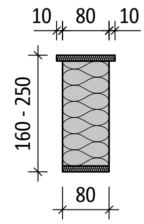
Schöck Isokorb® type Z-BS1: Product section

Schöck Isokorb® supplementary type Z-BS2

Fire protection board top and bottom, top fire protection board projecting on both sides by 10 mm



Schöck Isokorb® type Z-BS2: Product view; fire protection board top and bottom



Schöck Isokorb® type Z-BS2: Product section

Fire protection

- The Schöck Isokorb® type Z-BS1 is suitable for employment with Schöck Isokorb® type K and KF.
- The Schöck Isokorb® type Z-BS2 is suitable fpr employment with Schöck Isokorb® type K-HV, K-BH, K-WU, K-WO, Q, QP and D.
- The Schöck Isokorb® type Z-BS1 can be inserted later (e.g. transportation anchor holes with precast balconies), as fire protection boars without projection.
- The fire protection class of the Schöck Isokorb® supplementary type Z corresponds with maximum fire protection class of the connected, load-bearing Schöck Isokorb type (e.g. K→REI120).

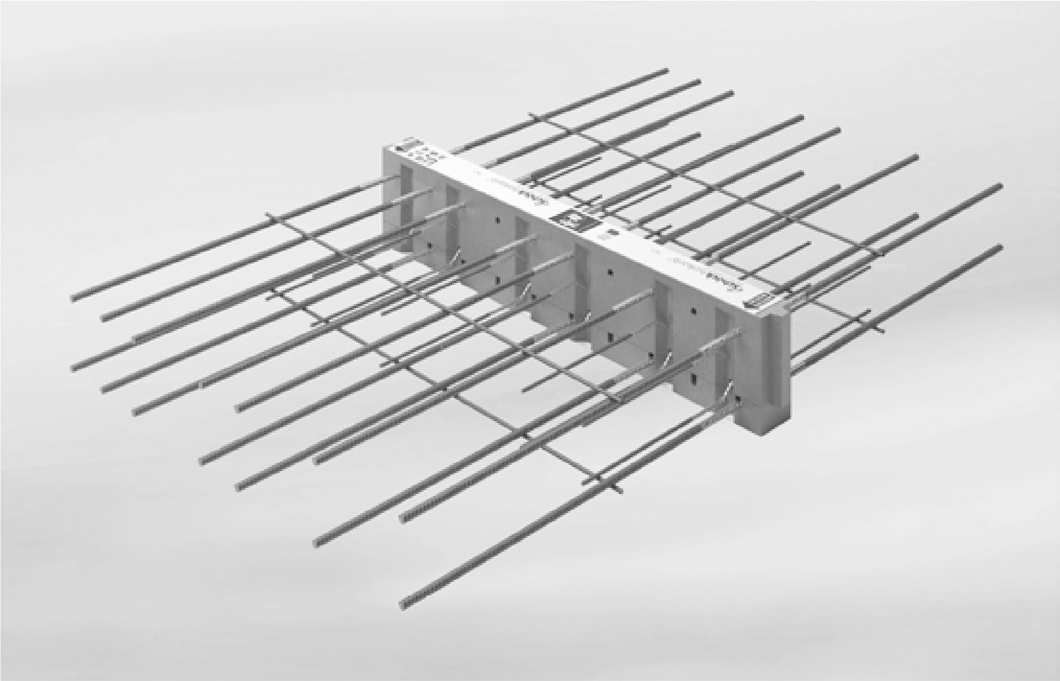
Z

Reinforced concrete/reinforced concrete

✓ Check list

- ☐ With a linear connection in combination with Schöck Isokorb® of length 1 m, has the reduction of the design values of the linear connection been taken into account?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?

Schöck Isokorb® type D



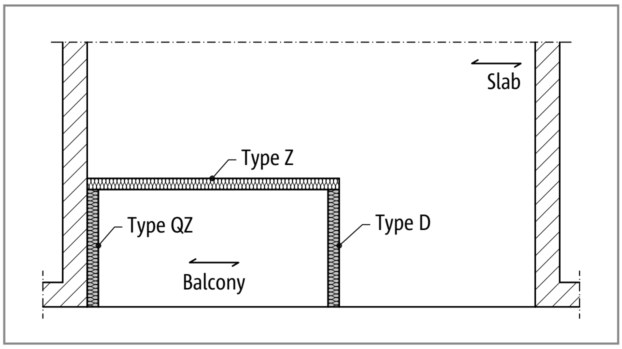
Schöck Isokorb® type D

Schöck Isokorb® type D
Suitable for continous floors. It transferst negative moments and positive shear forces with the cantilevered balcony or positive field moment combined with shear forces.

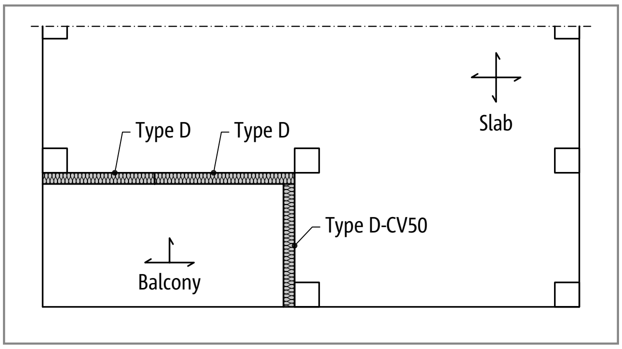
D

Reinforced concrete/reinforced concrete

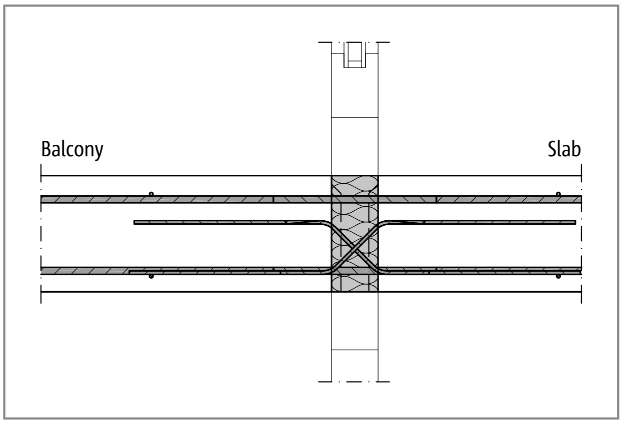
Element arrangement | Installation cross sections



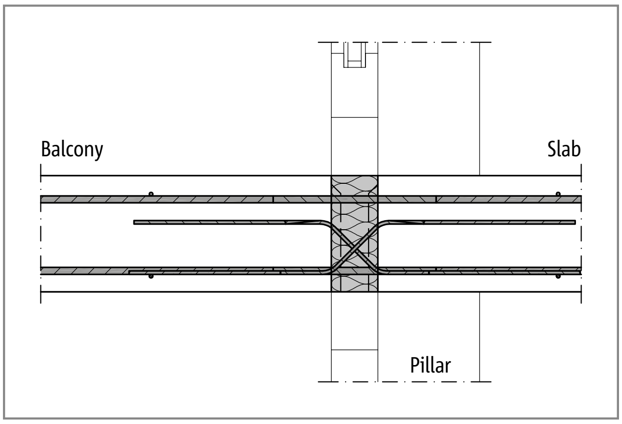
Schöck Isokorb® type D, QZ, Z: One-way spanning



Schöck Isokorb® type D: Two-way spanning



Schöck Isokorb® type D: Installation section; one-way spanning



Schöck Isokorb® type D: Installation section; two-way spanning

Element arrangement

- With connection across corner with Schöck Isokorb® type D, a type D-CV50 (2nd position) is required in one axial direction. Therefore a minimum slab thickness of 200 mm.

Product selection | Type designations | Special designs

Schöck Isokorb® type D variants

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

- Load-bearing level:
  D30, D50, D70, D90
  D20 are available on demand
- Concrete cover on the tension bars:
  CV30: top CV = 30 mm, bottom CV = 30 mm
  CV35: top CV = 35 mm, bottom CV = 30 mm (e.g: D50-CV35-VV6-H200)
  CV50: top CV = 50 mm, bottom CV = 50 mm
- Shear force variant:
  Depending on diameter of the shear force bars VV6, VV8, VV10, (e.g.: D50-CV35-VV8-H200)
- Height:
  H = H_{min} to 250 mm (H_{min} is dependent on concrete cover and shear force load-bearing level see p. 182)
- Fire resistance class:
  R0: Standard
  REI120: Top and bottom fire protection board projecting on both sides by 10 mm

Type designation in planning documents

Type/Load capacity
Concrete cover
Shear force variant
Isokorb® height
Fire protection

D50 - CV35 - VV8 - H180 - REI120

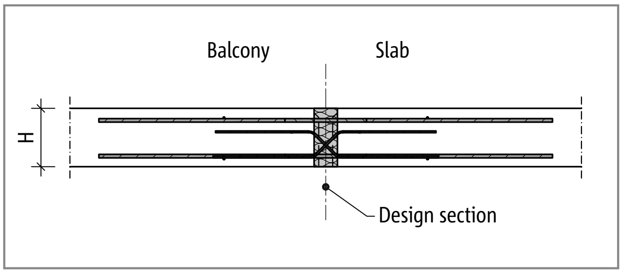
Special designs

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).
In accordance with approval heights up to 500 mm are possible.

C25/30 design

Schöck Isokorb® type				D30-VV6	D30-VV8	D30-VV10	D50-VV6	D50-VV8	D50-VV10
Design values with	Concrete cover CV [mm]			Concrete strength class ≥ C25/30					
	CV30	CV35	CV50	$m_{Rd,y}$ [kNm/m]					
Isokorb® height H [mm]		160		±18.3	-	-	±26.5	-	-
	160		200	±19.4	-	-	±28.1	-	-
		170		±20.5	±18.6	-	±29.7	±27.8	-
	170		210	±21.6	±19.6	-	±31.3	±29.3	-
		180		±22.7	±20.6	±18.5	±32.9	±30.8	±28.6
	180		220	±23.8	±21.6	±19.4	±34.5	±32.3	±30.0
		190		±24.9	±22.6	±20.3	±36.1	±33.8	±31.4
	190		230	±26.0	±23.6	±21.2	±37.6	±35.3	±32.8
		200		±27.1	±24.6	±22.1	±39.2	±36.7	±34.2
	200		240	±28.2	±25.6	±23.0	±40.8	±38.2	±35.6
		210		±29.3	±26.6	±23.9	±42.4	±39.7	±37.0
	210		250	±30.4	±27.6	±24.8	±44.0	±41.2	±38.4
		220		±31.5	±28.6	±25.6	±45.6	±42.7	±39.7
	220			±32.6	±29.6	±26.5	±47.2	±44.2	±41.1
		230		±33.7	±30.6	±27.4	±48.8	±45.7	±42.5
	230			±34.8	±31.6	±28.3	±50.4	±47.2	±43.9
		240		±35.9	±32.6	±29.2	±52.0	±48.7	±45.3
	240			±37.0	±33.6	±30.1	±53.6	±50.2	±46.7
		250		±38.1	±34.6	±31.0	±55.2	±51.7	±48.1
	250			±39.2	±35.6	±31.9	±56.8	±53.2	±49.5
Shear force variant				$v_{Rd,z}$ [kN/m]					
	VV6/VV8/VV10			±52.2	±92.7	±134.4	±52.2	±92.7	±134.4

Schöck Isokorb® type	D30-VV6	D30-VV8	D30-VV10	D50-VV6	D50-VV8	D50-VV10
Isokorb® length [mm]	1000			1000		
Tension bars/compression members	2 × 5 ⌀ 12			2 × 7 ⌀ 12		
Shear force bars	2 × 6 ⌀ 6	2 × 6 ⌀ 8	2 × 6 ⌀ 10	2 × 6 ⌀ 6	2 × 6 ⌀ 8	2 × 6 ⌀ 10
H_{min} with CV30 [mm]	160	170	180	160	170	180
H_{min} with CV35 [mm]	160	170	180	160	170	180
H_{min} with CV50 [mm]	200	210	220	200	210	220



Schöck Isokorb® type D: Static system

C25/30 design

Schöck Isokorb® type				D70-VV6	D70-VV8	D70-VV10	D90-VV6	D90-VV8	D90-VV10
Design values with	Concrete cover CV [mm]			Concrete strength class ≥ C25/30					
	CV30	CV35	CV50	$m_{Rd,y}$ [kNm/m]					
Isokorb® height H [mm]		160		±38.8	-	-	±46.9	-	-
	160		200	±41.1	-	-	±49.8	-	-
		170		±43.4	±41.5	-	±52.6	±50.7	-
	170		210	±45.8	±43.8	-	±55.4	±53.4	-
		180		±48.1	±46.0	±43.9	±58.3	±56.2	±54.0
	180		220	±50.4	±48.2	±46.0	±61.1	±58.9	±56.6
		190		±52.8	±50.5	±48.1	±63.9	±61.6	±59.3
	190		230	±55.1	±52.7	±50.3	±66.7	±64.3	±61.9
		200		±57.4	±54.9	±52.4	±69.6	±67.1	±64.5
	200		240	±59.8	±57.2	±54.5	±72.4	±69.8	±67.1
		210		±62.1	±59.4	±56.6	±75.2	±72.5	±69.8
	210		250	±64.4	±61.6	±58.8	±78.0	±75.2	±72.4
		220		±66.8	±63.9	±60.9	±80.9	±78.0	±75.0
	220			±69.1	±66.1	±63.0	±83.7	±80.7	±77.6
		230		±71.4	±68.3	±65.2	±86.5	±83.4	±80.2
	230			±73.8	±70.6	±67.3	±89.4	±86.2	±82.9
		240		±76.1	±72.8	±69.4	±92.2	±88.9	±85.5
	240			±78.4	±75.0	±71.5	±95.0	±91.6	±88.1
		250		±80.8	±77.3	±73.7	±97.8	±94.3	±90.7
	250			±83.1	±79.5	±75.8	±100.7	±97.1	±93.4
Shear force variant				$v_{Rd,z}$ [kN/m]					
	VV6/VV8/VV10			±52.2	±92.7	±134.4	±52.2	±92.7	±134.4

Schöck Isokorb® type	D70-VV6	D70-VV8	D70-VV10	D90-VV6	D90-VV8	D90-VV10
Isokorb® length [mm]	1000			1000		
Tension bars/compression members	2 × 10 ⌀ 12			2 × 12 ⌀ 12		
Shear force bars	2 × 6 ⌀ 6	2 × 6 ⌀ 8	2 × 6 ⌀ 10	2 × 6 ⌀ 6	2 × 6 ⌀ 8	2 × 6 ⌀ 10
H_{min} with CV30 [mm]	160	170	180	160	170	180
H_{min} with CV35 [mm]	160	170	180	160	170	180
H_{min} with CV50 [mm]	200	210	220	200	210	220

i Notes on design

- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- A static verification is to be provided for the adjacent reinforced concrete structural component on both sides of the Schöck Isokorb®.
- The indicative minimum concrete strength class of the external structural component is C32/40.
- The Schöck Isokorb® type D transfers only bending moments perpendicular to the insulation body. The Schöck Isokorb® transfers no torsion moments. Therefore the arrangement of a Schöck Isokorb® type D in in a point-supported slab without downstand beams is not sensible.

Expansion joint spacing

Maximum expansion joint spacing

If the length of the structural component exceeds the maximum expansion joint spacing, expansion joints must be incorporated in the exterior concrete components at right angles to the insulation layer in order to limit the effect as a result of temperature changes. With fixed points such as, for example, corners of balconies, parapets and balustrades or with the employment of the supplementary types HP or EQ half the maximum expansion joint spacing e/2 from the fixed point applies.

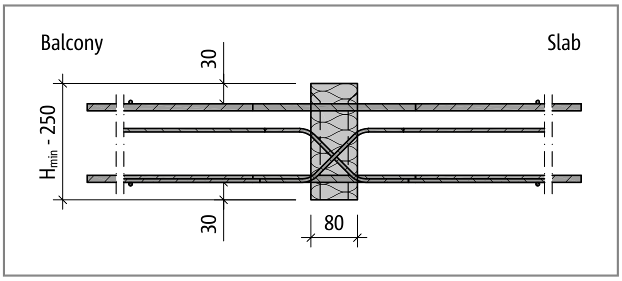
Schöck Isokorb® type		D30	D50	D70	D90
Maximum expansion joint spacing e		e [m]			
Insulating element thickness [mm]	80	11.7			

Edge distances

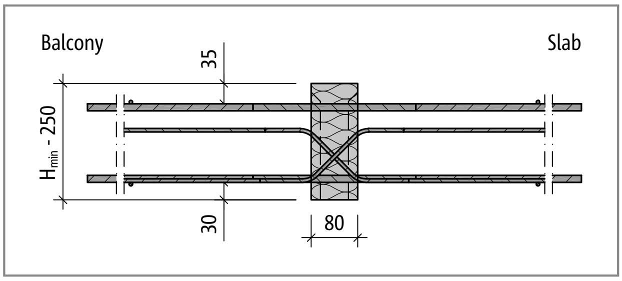
The Schöck Isokorb® must be so arranged at the expansion joint that the following conditions are met:

- For the centre distance of the tension bars from the free edge or from the expansion joint: $e_R \geq 50$ mm and $e_R \leq 150$ mm applies.
- For the centre distance of the compression members from the free edge or from the expansion joint the following applies: $e_R \geq 50$ mm.
- For the centre distance of the shear force bars from the free edge or from the expansion joint the following applies: $e_R \geq 100$ mm and $e_R \leq 150$ mm.

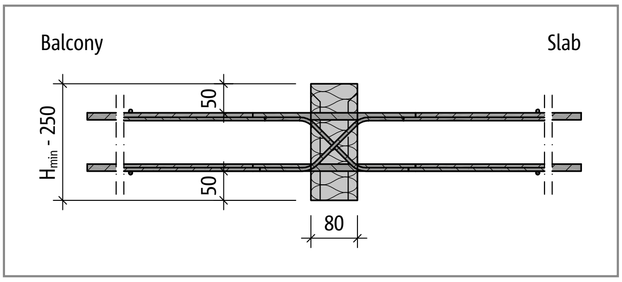
Product description



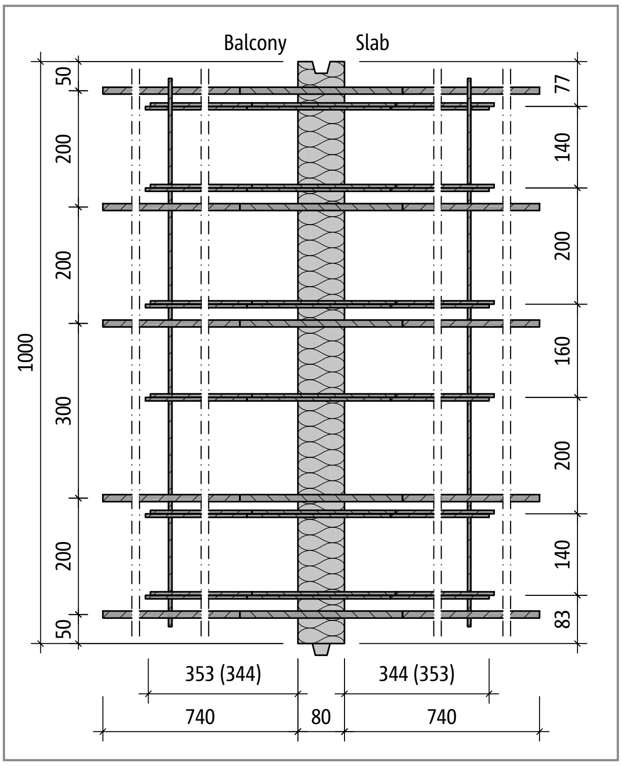
Schöck Isokorb® type D with CV30: Product section



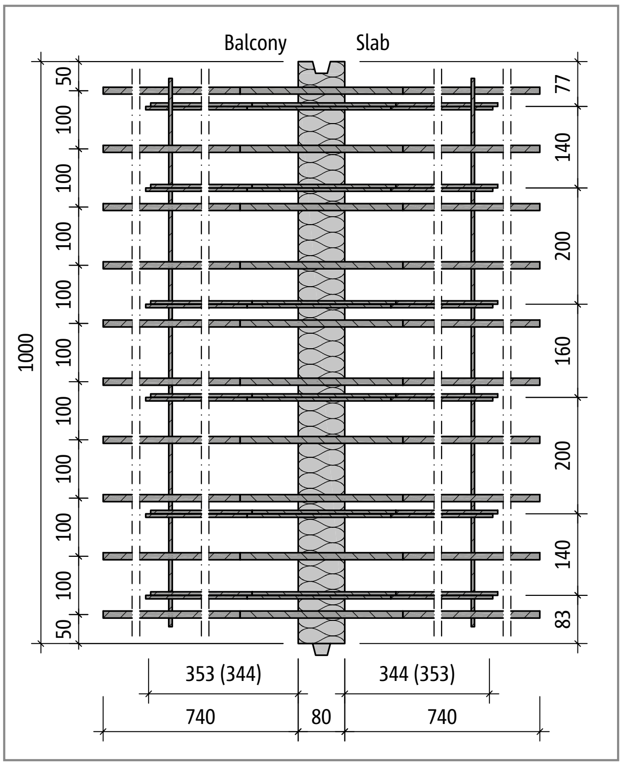
Schöck Isokorb® type D with CV35: Product section



Schöck Isokorb® type D with CV50: Product section



Schöck Isokorb® type D30-VV6: Layout



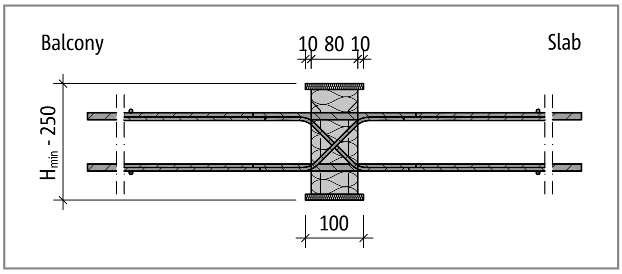
Schöck Isokorb® type D70-VV6: Layout

i Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download

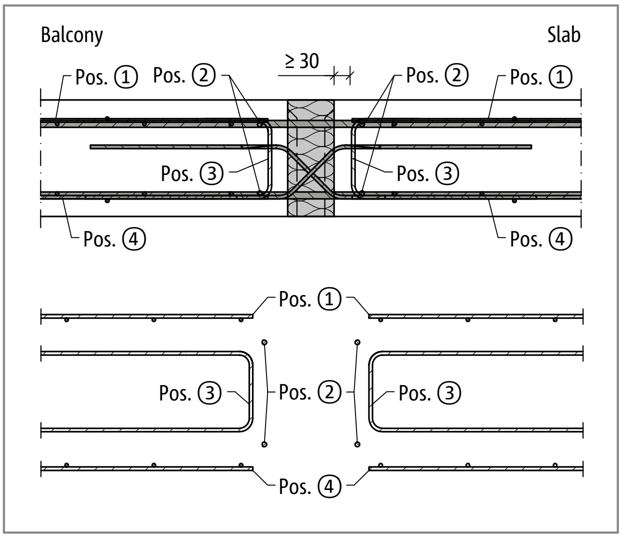
Fire protection configuration

Product configuration with fire protection requirement



Schöck Isokorb® type D with REI120: Product section

On-site reinforcement



Schöck Isokorb® type D: On-site reinforcement

The reinforcement in the reinforced concrete slab is determined from the structural engineer's design. With this both the effective moment and the effective shear force should be taken into account.
In addition, it is to be ensured that the tension bars of the Schöck Isokorb® are 100% lapped. The existing inner slab reinforcement can be taken into account as long as the maximum separation to the tension bars of the Schöck Isokorb® of 4⌀ is maintained. Additional reinforcement may be required.

Schöck Isokorb® type	D30-VV6	D30-VV8	D30-VV10	D50-VV6	D50-VV8	D50-VV10
On-site reinforcement	Concrete strength class ≥ C25/30					
Pos. 1 Lapping reinforcement (required with negative moment))						
Pos. 1 [mm²/m]	565	565	565	792	792	792
Pos. 2 Steel bars along the insulation joint						
Pos. 2	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Edge and suspension reinforcement						
Pos. 3	H8@150	H8@100	H8@75	H8@150	H8@100	H8@75
Pos. 4 Lapping reinforcement (required with positive moment)						
Pos. 4 [mm²/m]	565	565	565	792	792	792

On-site reinforcement

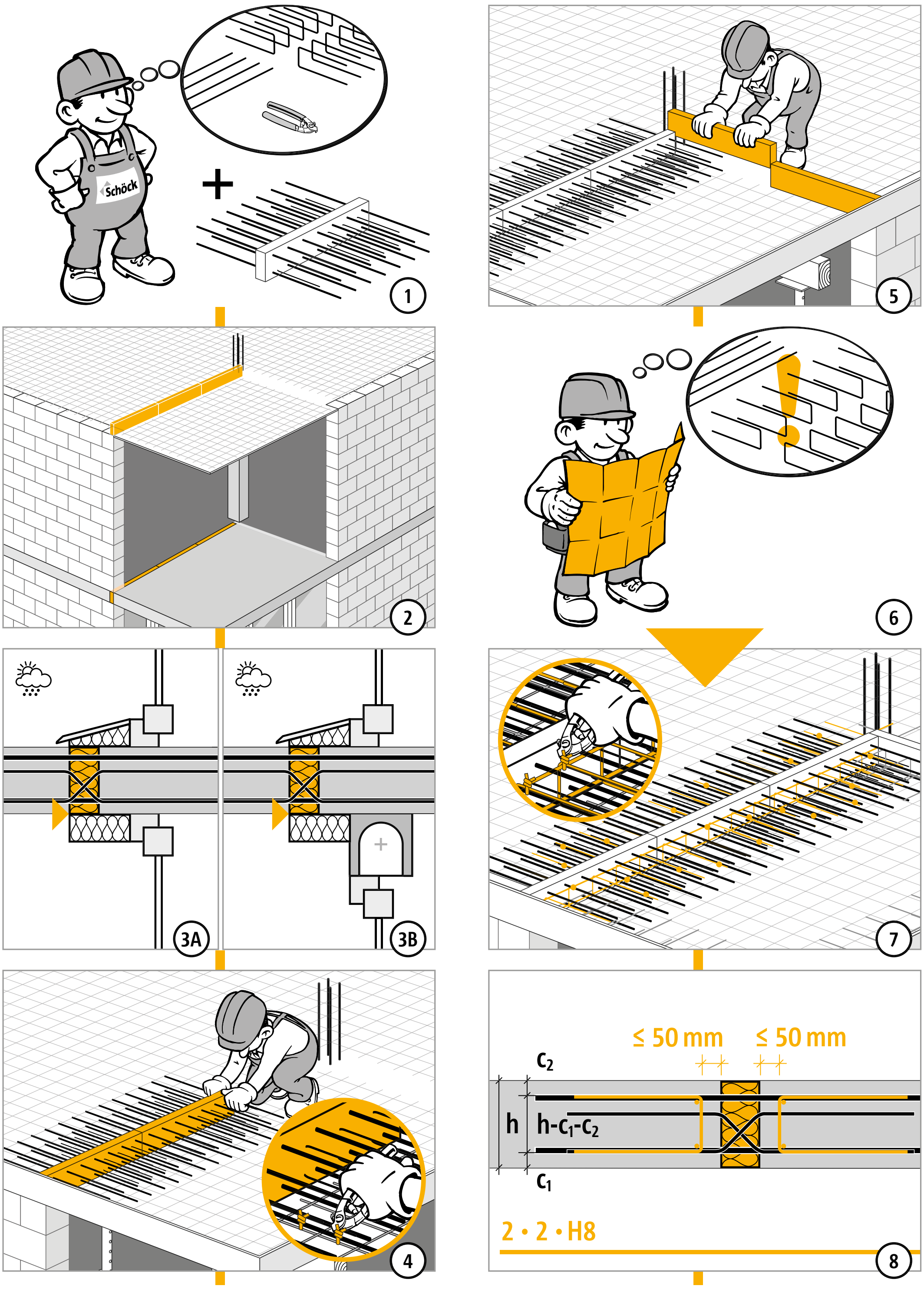
Schöck Isokorb® type	D70-VV6	D70-VV8	D70-VV10	D90-VV6	D90-VV8	D90-VV10
On-site reinforcement	Concrete strength class ≥ C25/30					
Pos. 1 Lapping reinforcement (required with negative moment))						
Pos. 1 [mm²/m]	1131	1131	1131	1357	1357	1357
Pos. 2 Steel bars along the insulation joint						
Pos. 2	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8	2 • 2 • H8
Pos. 3 Edge and suspension reinforcement						
Pos. 3	H8@150	H8@100	H8@75	H8@150	H8@100	H8@75
Pos. 4 Lapping reinforcement (required with positive moment)						
Pos. 4 [mm²/m]	1131	1131	1131	1357	1357	1357

On-site reinforcement

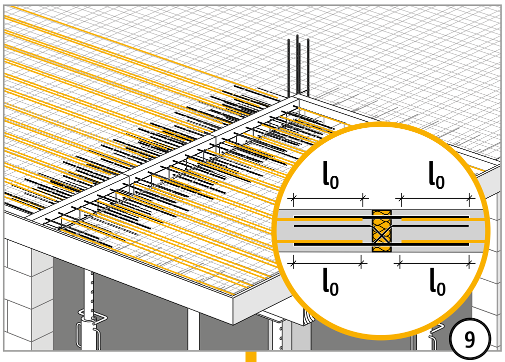
Information about on-site reinforcement

- The rules according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA apply for the determination of the lap length. A reduction of the required lap length with m_{Ed}/m_{Rd} is permitted. For the lapping (l) with Schöck Isokorb® with the rules according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA D a length of the tension bars of 710 mm iis accounted for.
- Edge and suspension reinforcement (Pos. 3) is to be arranged on both sides of the Isokorb® type DXT. Details in the table apply for Schöck Isokorb® with a loading of 100% of the maimum design internal forces with C25/30.

Installation instructions



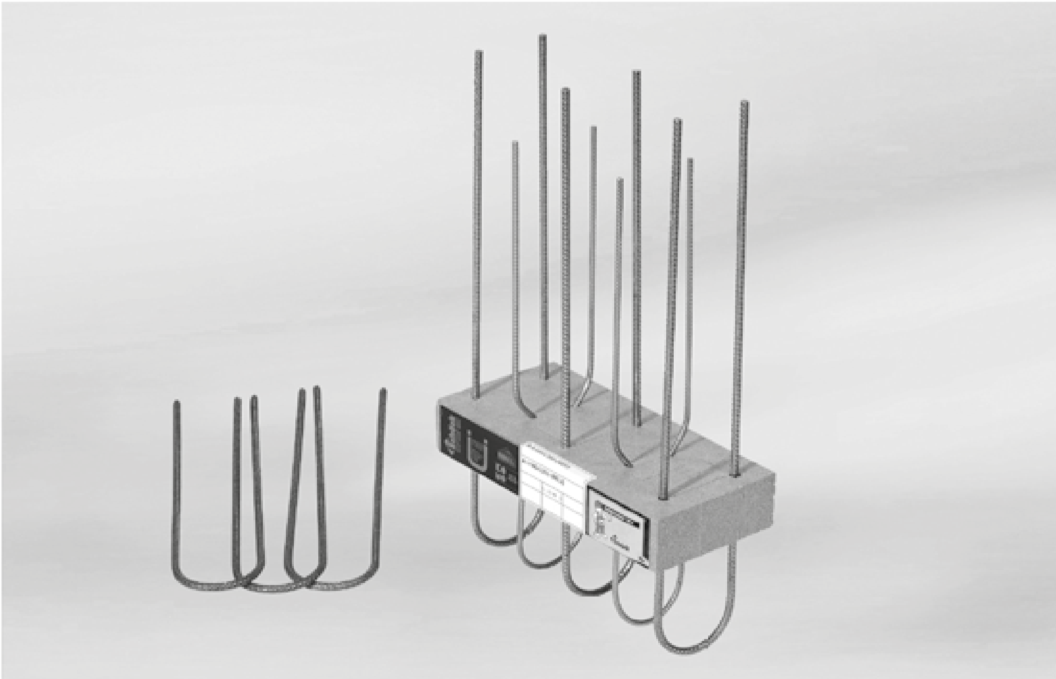
Installation instructions



☑ Check list

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ With connection across corner with Schöck Isokorb® type D, has the minimum slab thickness (≥ 200 mm) and the required 2nd position (-CV50) been taken into account?.
- ☐ Has the required block-out (width ≥ 760 mm from insulation body) with type D in conjunction with element floors been charted in the implementation plans and is the on-site reinforcement matched structurally?
- ☐ With 2- or 3-sided support has a Schöck Isokorb® (possibly type QZ, type QPZ) been selected for a connection free of constraint forces?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?

Schöck Isokorb® type A



Schöck Isokorb® type A

A

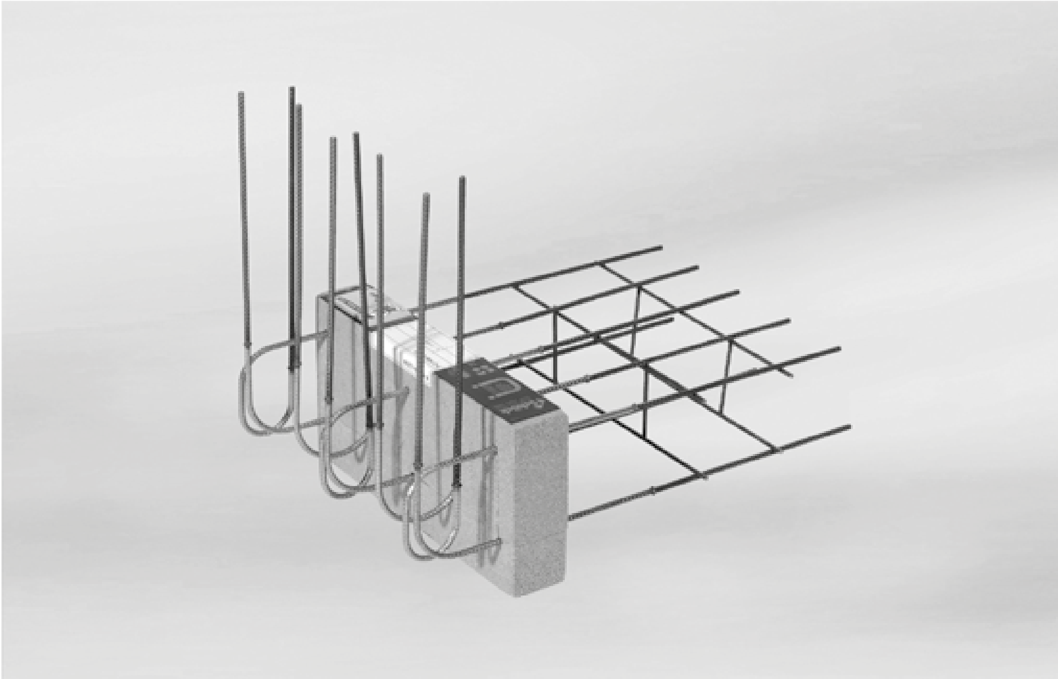
Reinforced concrete/reinforced concrete

Schöck Isokorb® type A
Suitable for attics and balustrades. It transfers moments and shear forces and compression forces.

Type A

- The Schöck Isokorb® type A is replaced by the Schöck Isokorb® type AXT.

Schöck Isokorb® type F



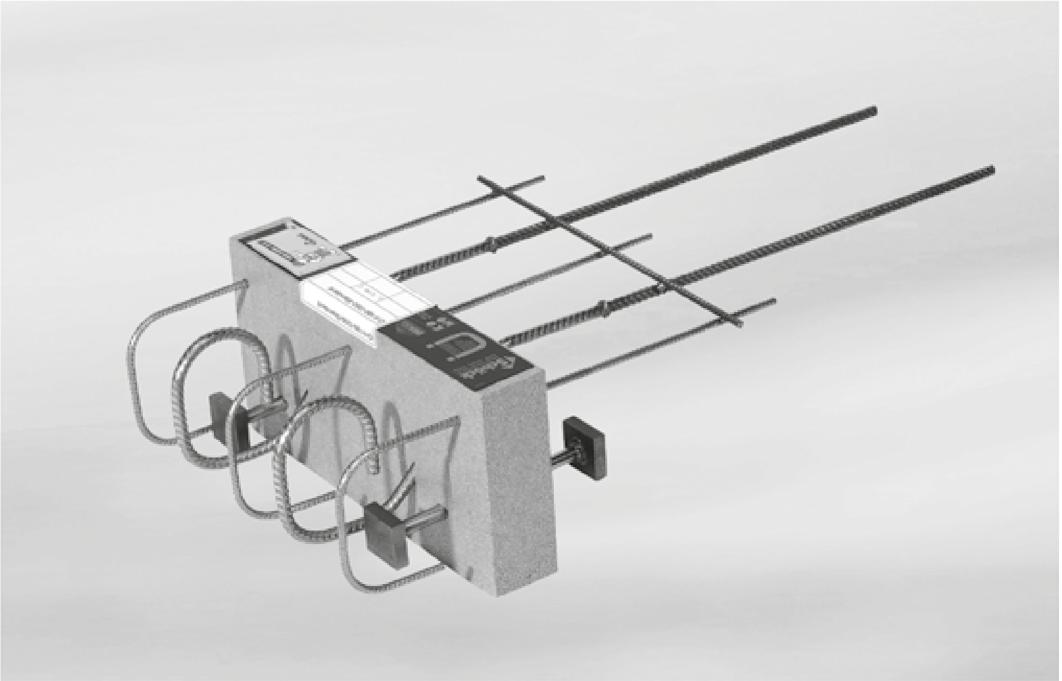
Schöck Isokorb® type F

Schöck Isokorb® type F
Suitable for attached balustrades. It transfers normal forces, positive and negative moments and shear forces.

Type F

- The Schöck Isokorb® type F is replaced by the Schöck Isokorb® type FXT. With special geometric requirements the Schöck Isokorb® type F is available on request.

Schöck Isokorb® type O



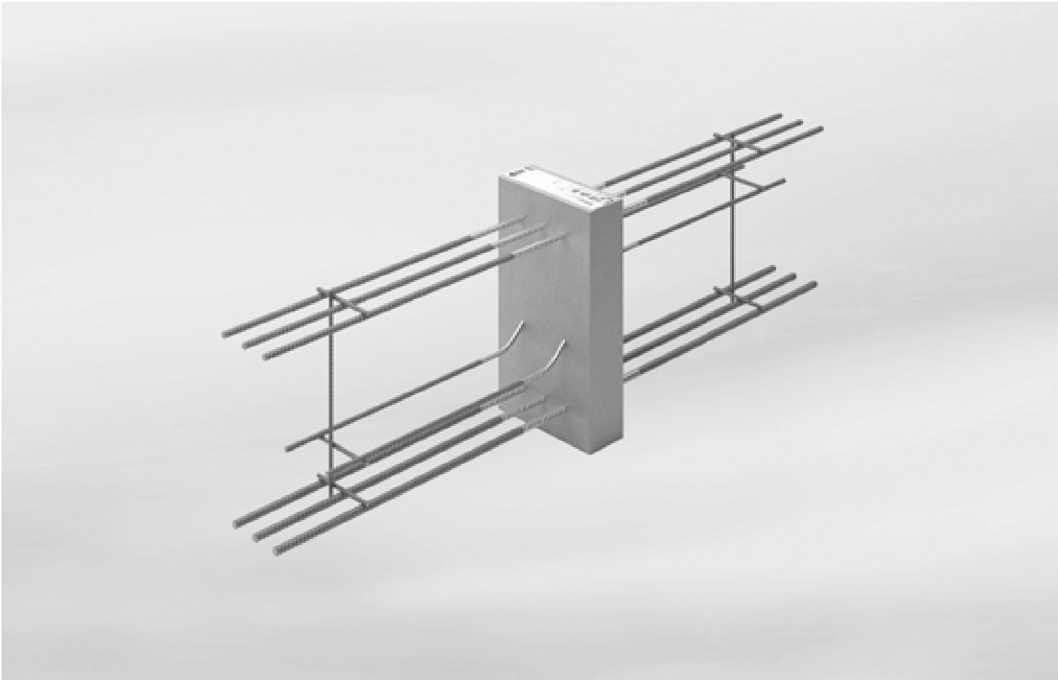
Schöck Isokorb® type O

Schöck Isokorb® type O
Suitable for corbels It transfers positive Querkräfte and normal forces.

Type O

- The Schöck Isokorb® type O is replaced by the Schöck Isokorb® type OXT. With special geometric requirements the Schöck Isokorb® type F is available on request.

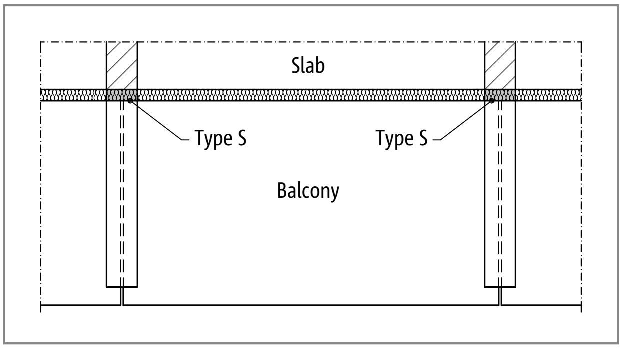
Schöck Isokorb® type S



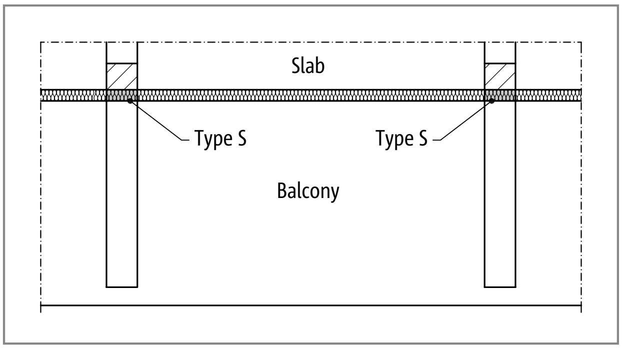
Schöck Isokorb® type S

Schöck Isokorb® type S
Suitable for cantilevered downstand beams and reinforced concrete balconies. It transfers negative moments and positive shear forces.

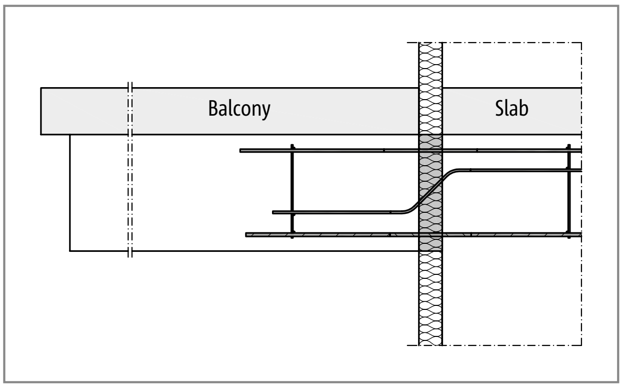
Element configurations | Installation cross sections



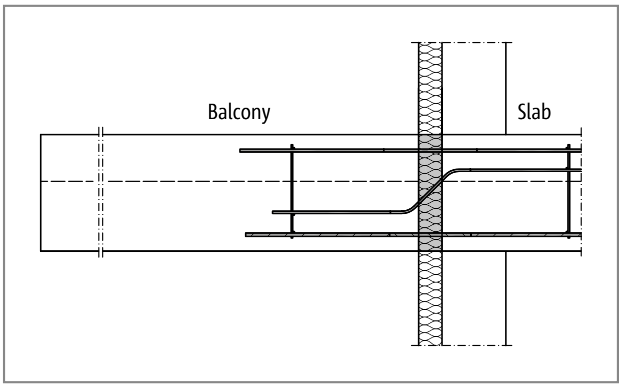
Schöck Isokorb® type S: Balcony structure with freely cantilevered down-stand beams (precast balcony)



Schöck Isokorb® type S: Balcony structure with freely cantilevered down-stand beams



Schöck Isokorb® type S: Balcony structure with freely cantilevered down-stand beams (precast balcony)



Schöck Isokorb® type S: Balcony structure with freely cantilevered down-stand beams

Product selection | Type designations | Special designs

Schöck Isokorb® type S variants

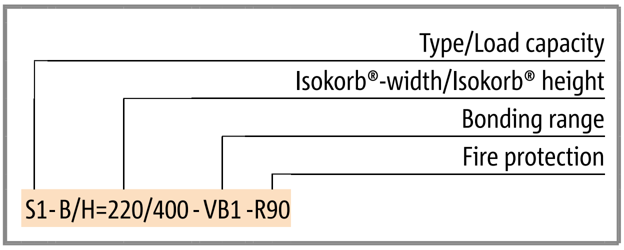
The configuration of the Schöck Isokorb® type S can be varied as follows:

- Load-bearing level:
  S1 to S4
- Bonding range:
  VB1 good bonding (bonding range I)
  VB2 poor bonding (bonding range II)
- Width:
  B = 220 mm
- Height:
  H = 400 mm
- Fire resistance class:
  R0: Standard
  R90: Top fire protection board projecting on both sides by 10 mm

Variants

- State desired dimensions when ordering.

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).

S

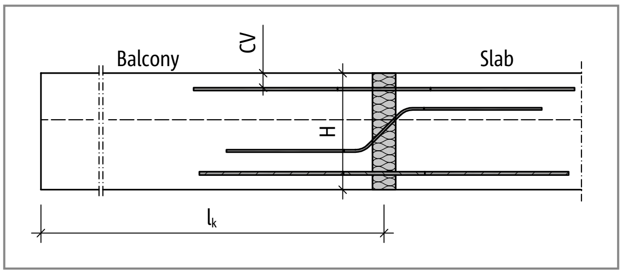
Reinforced concrete/reinforced concrete

Design

Concrete strength class ≥ C25/30

Schöck Isokorb® type		S1	S2	S3	S4
Design values with		Concrete strength class ≥ C25/30			
		$M_{Rd,y}$ [kNm/element]			
Isokorb® height H [mm]	400	-29.6	-39.1	-51.7	-71.1
		$V_{Rd,z}$ [kN/element]			
	400	30.9	48.3	69.5	94.7

Schöck Isokorb® type	S1	S2	S3	S4
Isokorb® height H [mm]	400	400	400	400
Isokorb® width [mm]	220	220	220	220
Tension bars	3 ⌀ 10	3 ⌀ 12	3 ⌀ 14	3 ⌀ 16
Tension bars VB1 (good)	615	725	850	1360
Tension bars VB2 (poor)	855	1020	1180	1890
Shear force bars	2 ⌀ 8	2 ⌀ 10	2 ⌀ 12	2 ⌀ 14
Compression bars	3 ⌀ 12	3 ⌀ 14	3 ⌀ 16	3 ⌀ 20
Compression bar length	595	565	635	840



Schöck Isokorb® type S: Static system

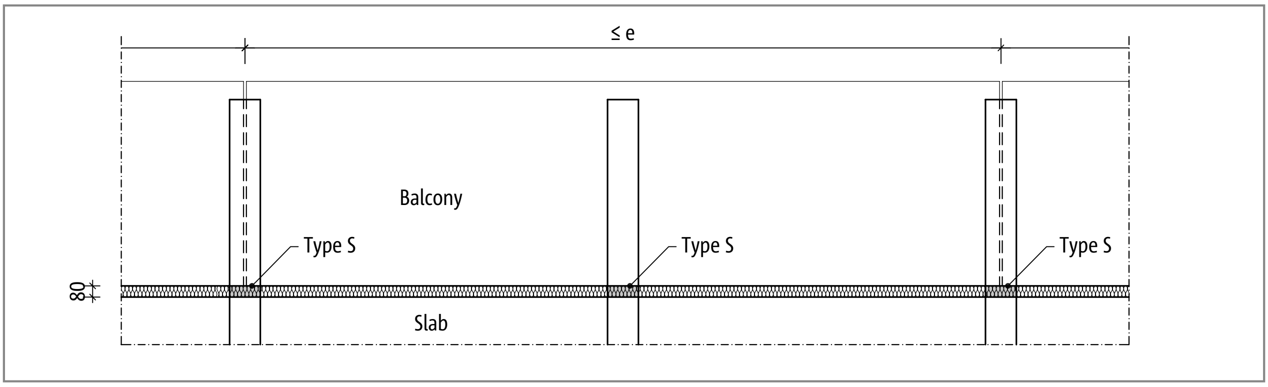
Notes on design

- Poor bonding conditions (bonding range II) are the basis for the determination of the compression member anchoring lengths.
- With different concrete strength classes (e.g. balcony C32/40, inner slab C25/30) basically the weaker concrete is relevant for the design of the Schöck Isokorb®.
- The indicative minimum concrete strength class of the external structural component is C32/40.

Expansion joint spacing

Maximum expansion joint spacing

If the structural component length exceeds the maximum expansion joint spacing e, expansion joints must be installed in the exterior concrete structural components at right angles to the insulation plane, in order to limit the effect as a result of temperature changes.



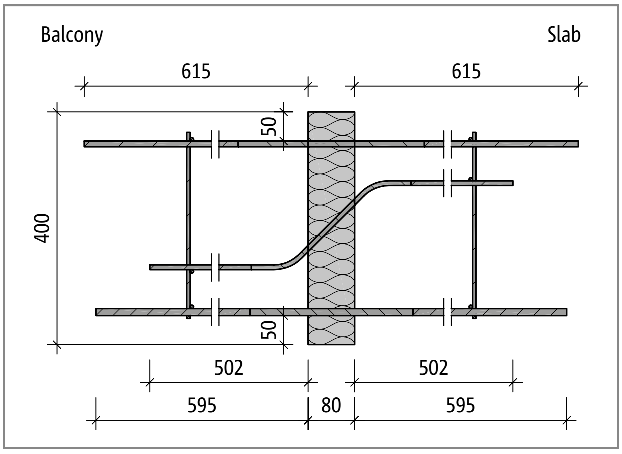
Schöck Isokorb® type S: Expansion joint spacing

Schöck Isokorb® type		S1	S2	S3	S4
Maximum expansion joint spacing e		e [m]			
Insulating element thickness [mm]	80	11.7	10.1	9.2	8.0

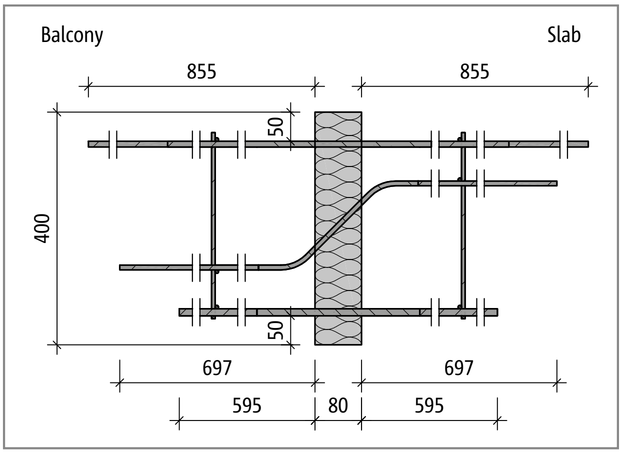
Expansion joints

- The expansion joint spacings can be enlarged, if there is no fixed connection between balcony slabs and downstand beams, e. g. through laying of a sliding foil.

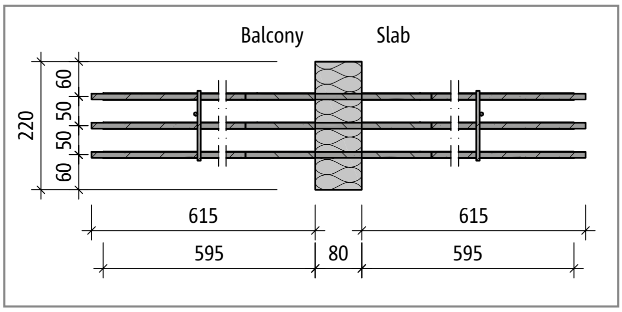
Product description



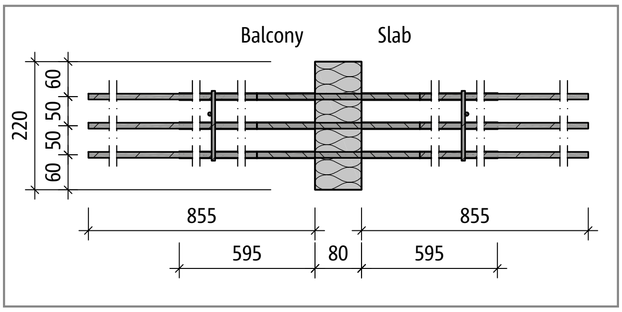
Schöck Isokorb® type S1-VB1: Product section



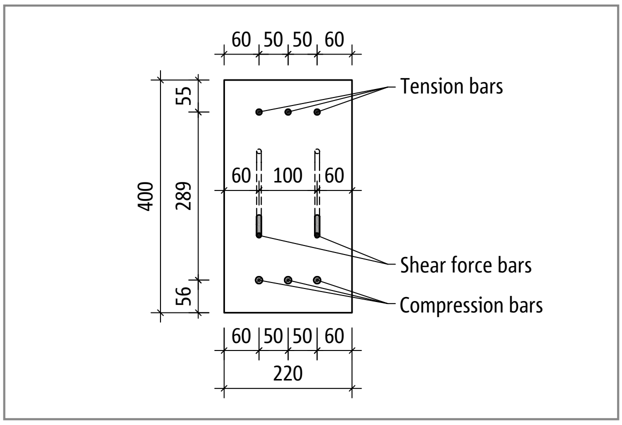
Schöck Isokorb® type S1-VB2: Product section



Schöck Isokorb® type S1-VB1: Product layout



Schöck Isokorb® type S1-VB2: Product layout

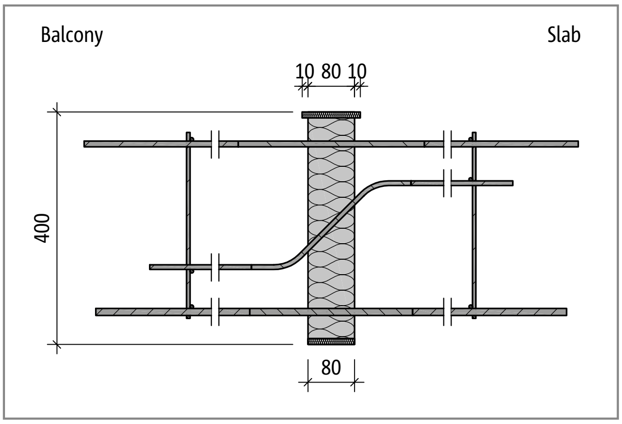


Schöck Isokorb® type S1: Product layout

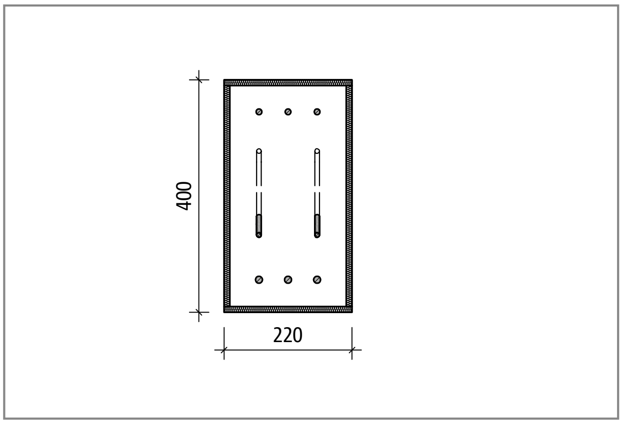
Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download

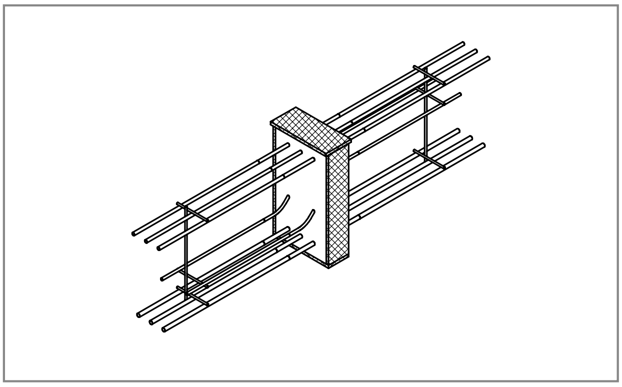
Fire protection configuration



Schöck Isokorb® type S with R90: Product section; fire protection board top and bottom

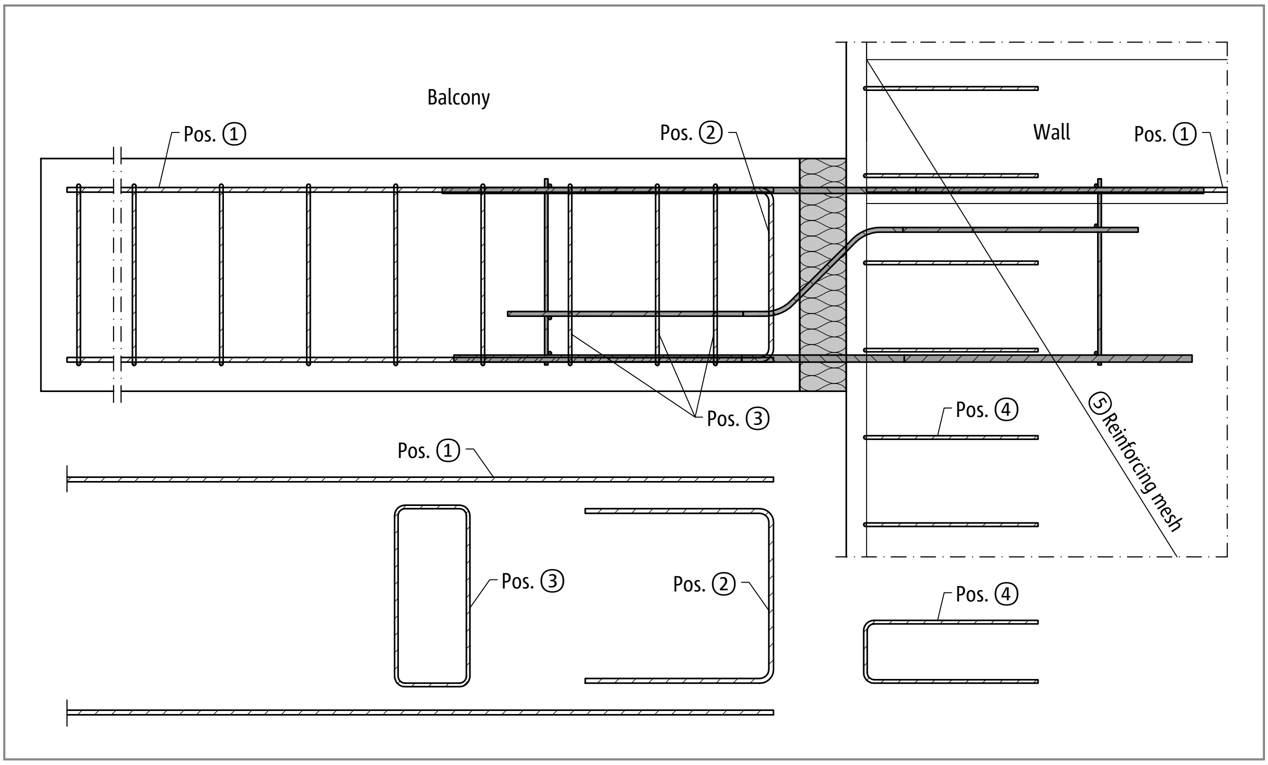


Schöck Isokorb® type S withi R90: Product section; perimeter fire protection boards



Schöck Isokorb® type S withi R90: Perimeter fire protection boards

On-site reinforcement



Schöck Isokorb® type S: On-site reinforcement (section)

Recommendation for the on-site connection reinforcement

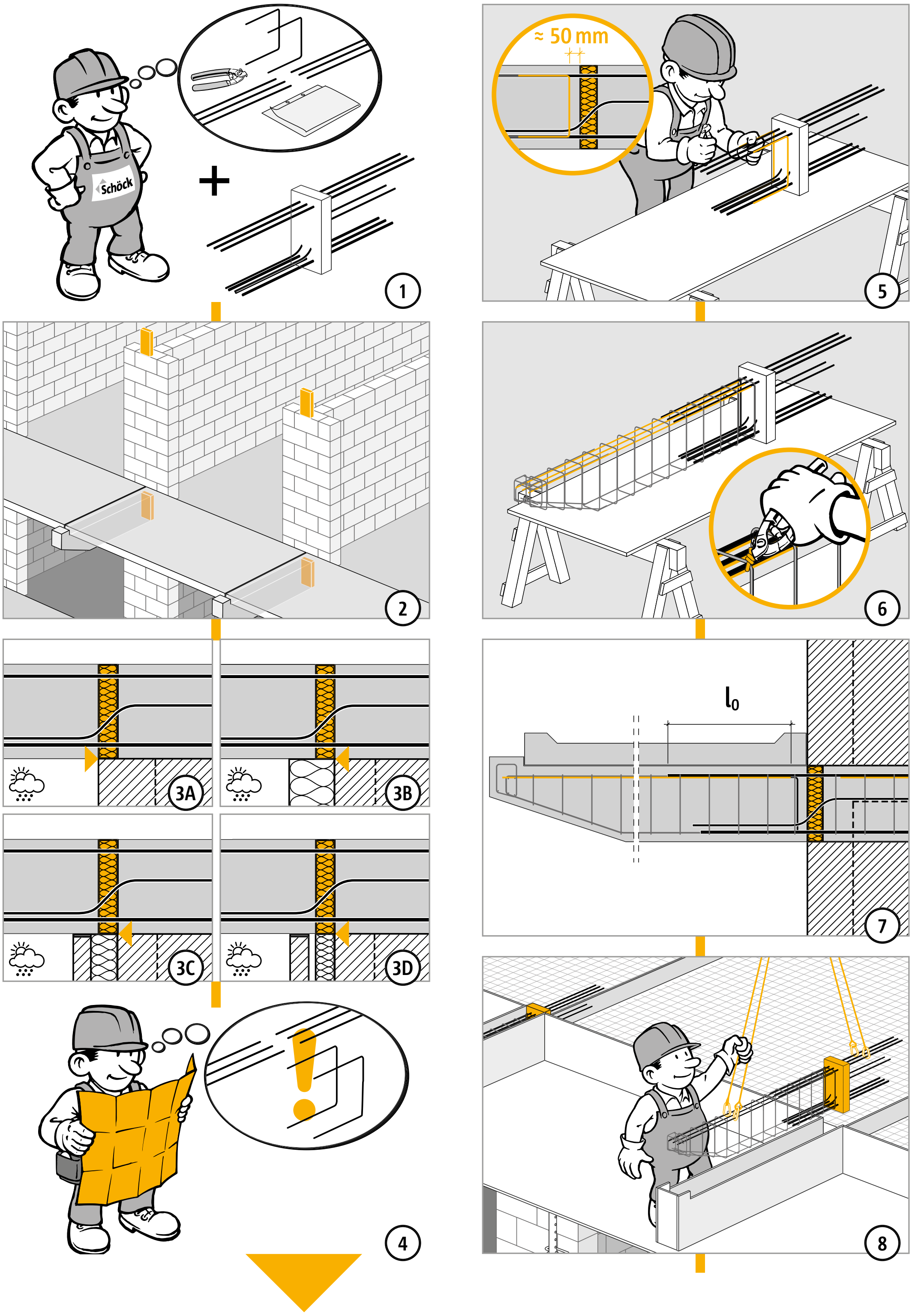
Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars/compression members.

Schöck Isokorb® type	S1	S2	S3	S4
On-site reinforcement	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement				
Pos. 1	3 • H10	3 • H12	3 • H16	3 • H16
Lap length VB1 (good)	564	624	713	1239
Lap length VB2 (poor)	801	886	1014	1761
Pos. 2 Suspension reinforcement				
Pos. 2 [mm²]	71	111	160	218
Pos. 3 Stirrup				
Pos. 3	acc. to the specifications of the structural engineer			
Pos. 4 Side reinforcement at the free edge				
Pos. 4	acc. to BS EN 1992-1-1 (EC2), 9.3.1.4			
Pos. 5 Wall reinforement and lapping reinforcement shear force bar				
Pos. 5	acc. to the specifications of the structural engineer			

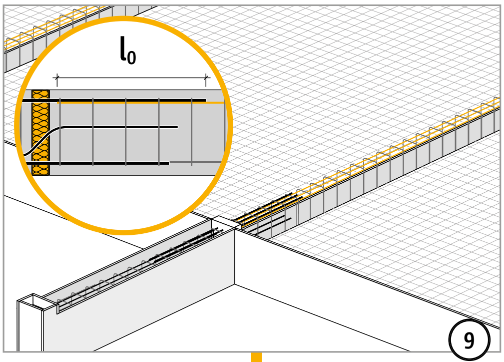
i Information about on-site reinforcement

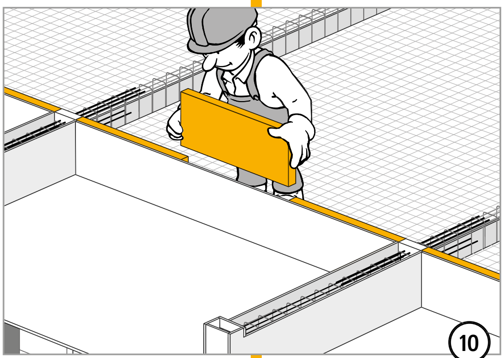
- Alternative connection reinforcement is possible. For the determination of the lap length the rules according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA apply. A reduction of the required lap length using m_{Ed}/m_{Rd} is permitted.
- The indicative minimum concrete strength class of the external structural component is C32/40.

Installation instructions



Installation instructions

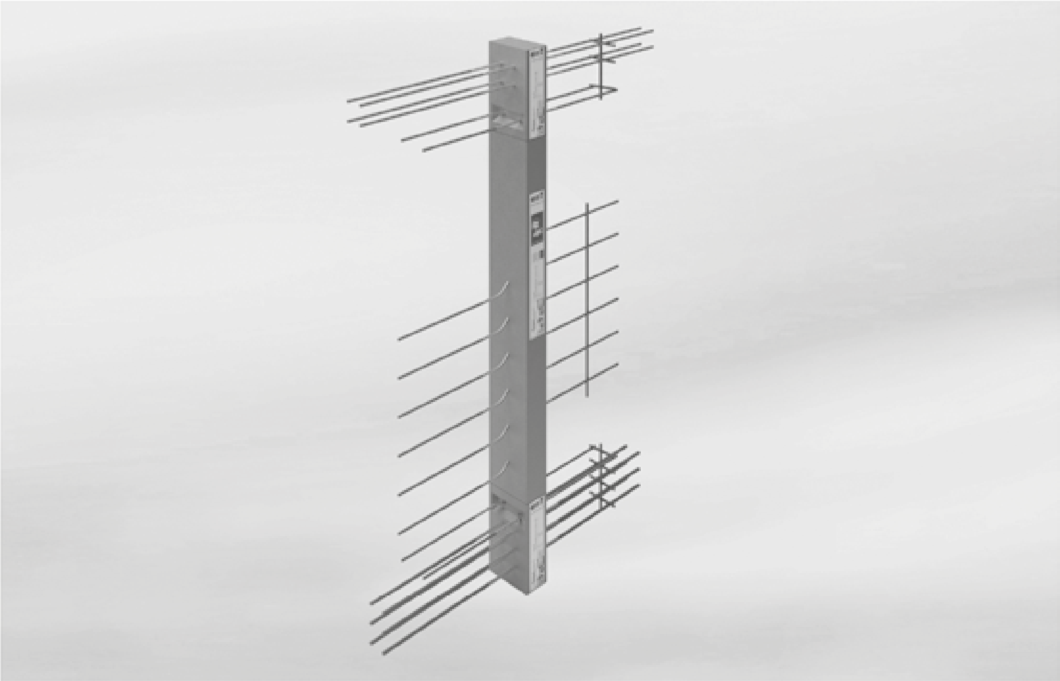




Check list

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?
- ☐ Has the bonding range (good - VB1; poor - VB2) been defined and given in the type designation?

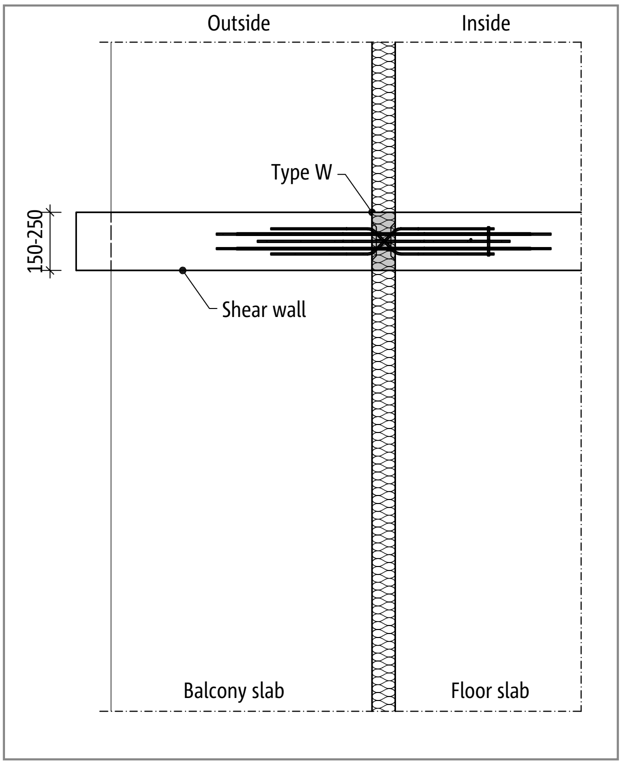
Schöck Isokorb® type W



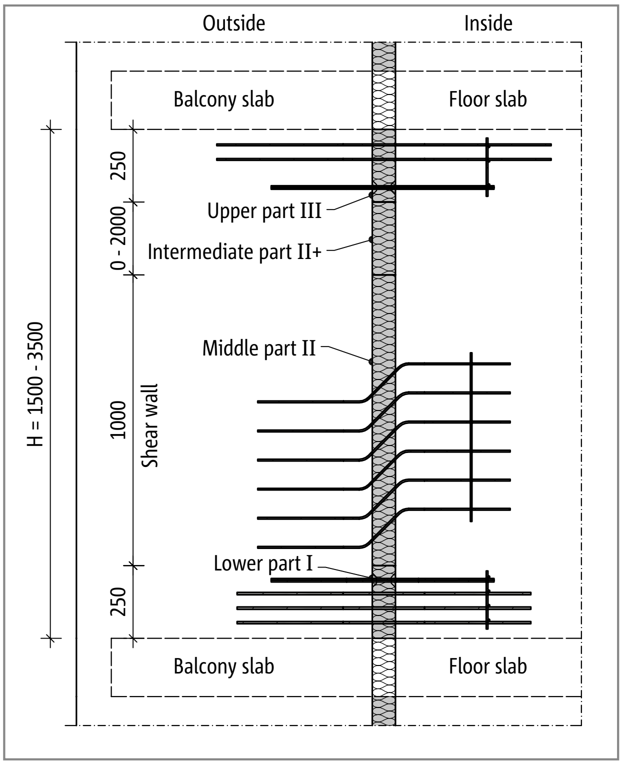
Schöck Isokorb® type W

Schöck Isokorb® type W
Suitable for projecting shear walls. It transfers negative moments and positive shear forces. In addition horizontal shear forces are transferred.

Element arrangement | Installation cross section | Product selection | Type designations | Special designs



Schöck Isokorb® type W:Layout; Balcony structure with thermal insulated load-bearing shear walls



Schöck Isokorb® type W: Balcony structure with thermal insulated load-bearing shear walls

Element arrangement

- The Schöck Isokorb® type W consists of at least 3 parts: Bottom section I, middle section II, top section III. Depending on height an insulation spacer II+ is additionally required.

Schöck Isokorb® type W variants

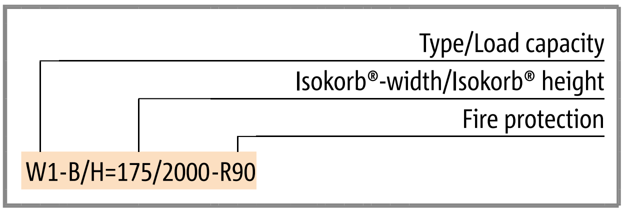
The configuration of the Schöck Isokorb® type W can be varied as follows:

- Load-bearing level: W1 to W4
- Width: B = 150 - 250 mm
- Height: H = 1500 - 3500 mm
- Fire resistance class:
  R0: Standard
  R90: Top fire protection board projects on both sides by 10 mm

Variants

- State desired dimensions when ordering.

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).

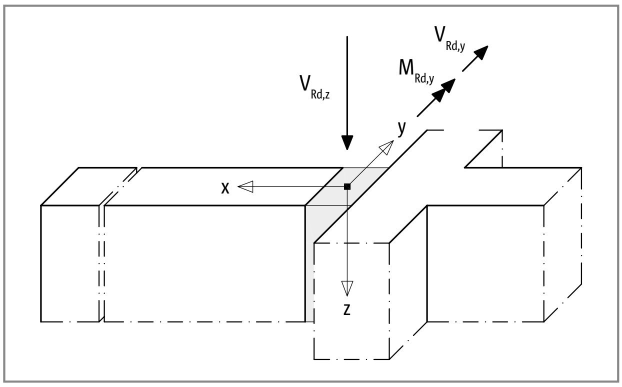
W

Reinforced concrete/reinforced concrete

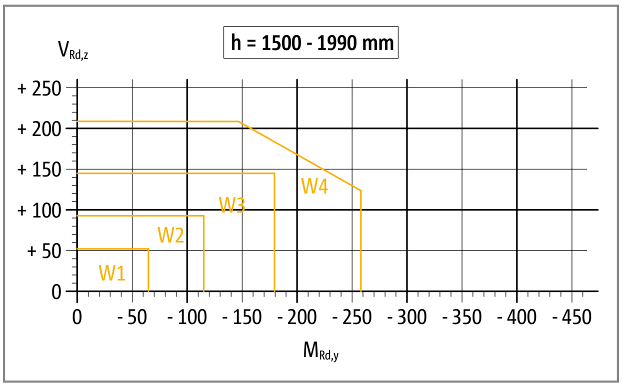
C25/30 design

Schöck Isokorb® type		W1	W2	W3	W4
Design values with		Concrete strength class ≥ C25/30			
		$M_{Rd,y}$ [kNm/element]			
Isokorb® height H [mm]	1500 - 1990	-64.8	-115.0	-179.5	-146.7
	2000 - 2490	-89.4	-158.8	-247.8	-202.5
	2500 - 3500	-114.0	-202.5	-316.1	-258.4
Isokorb® height H [mm]		$V_{Rd,z}$ [kN/element]			
	1500 - 3500	52.2	92.7	144.9	208.6
		$V_{Rd,y}$ [kN/element]			
	1500 - 3500	±17.4	±17.4	±17.4	±17.4

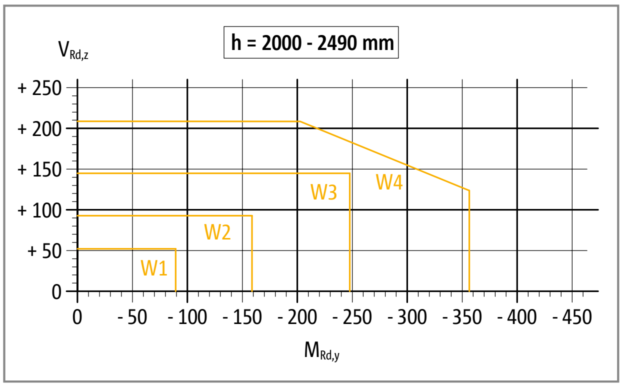
Schöck Isokorb® type	W1	W2	W3	W4
Tension bars	4 ⌀ 6	4 ⌀ 8	4 ⌀ 10	4 ⌀ 12
Compression bars	6 ⌀ 8	6 ⌀ 10	6 ⌀ 12	6 ⌀ 14
Shear force bars vertical	6 ⌀ 6	6 ⌀ 8	6 ⌀ 10	6 ⌀ 12
Shear force bars horizontal	2 × 2 ⌀ 6	2 × 2 ⌀ 6	2 × 2 ⌀ 6	2 × 2 ⌀ 6
B_{min} with R0 [mm]	150	150	150	150
B_{min} with R90 [mm]	150	150	150	150



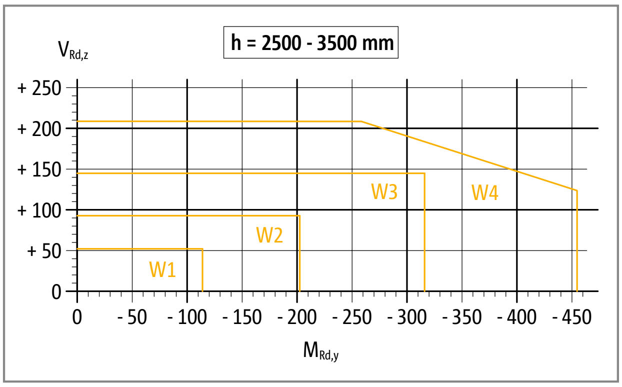
Schöck Isokorb® type W: Sign rule for the design



Schöck Isokorb® type W: Interaction diagram C25/30 H = 1500 - 1990



Schöck Isokorb® type W: Interaction diagram C25/30 H = 2000 - 2490



Schöck Isokorb® type W: Interaction diagram C25/30 H = 2500 - 3500

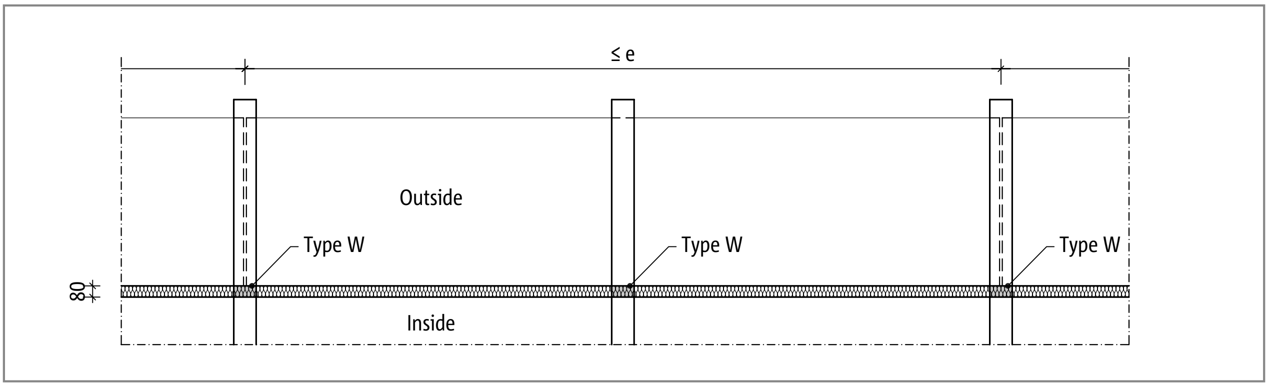
Notes on design

- Moments from wind loading are to be absorbed by the stiffening effect of the balcony slabs. If this is not possible then M_{Edz} can be transferred by the additional arrangement of a Schöck Isokorb® type D. The type D in this case is installed in a vertical position in place of the insulation spacer.
- Poor bonding conditions (bonding range II) are the basis for the determination of the tension bar anchoring lengths.
- The indicative minimum concrete strength class of the external structural component is C32/40.

Expansion joint spacing

Maximum expansion joint spacing

If the structural component length exceeds the maximum expansion joint spacing e, expansion joints must be installed in the exterior concrete structural components at right angles to the insulation plane, in order to limit the effect as a result of temperature changes.



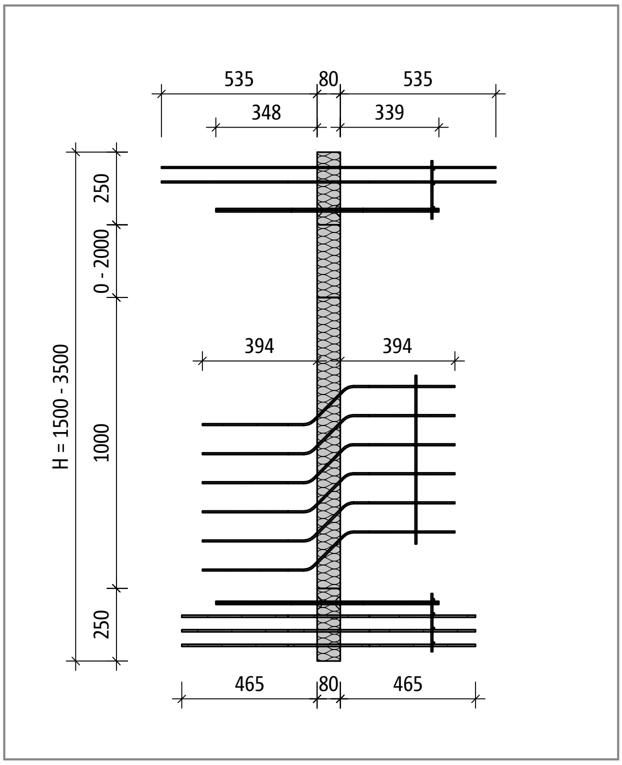
Schöck Isokorb® type W: Expansion joint spacing

Schöck Isokorb® type		W1	W2	W3	W4
Maximum expansion joint spacing e		e [m]			
Insulating element thickness [mm]	80	13.5	13.0	11.7	10.1

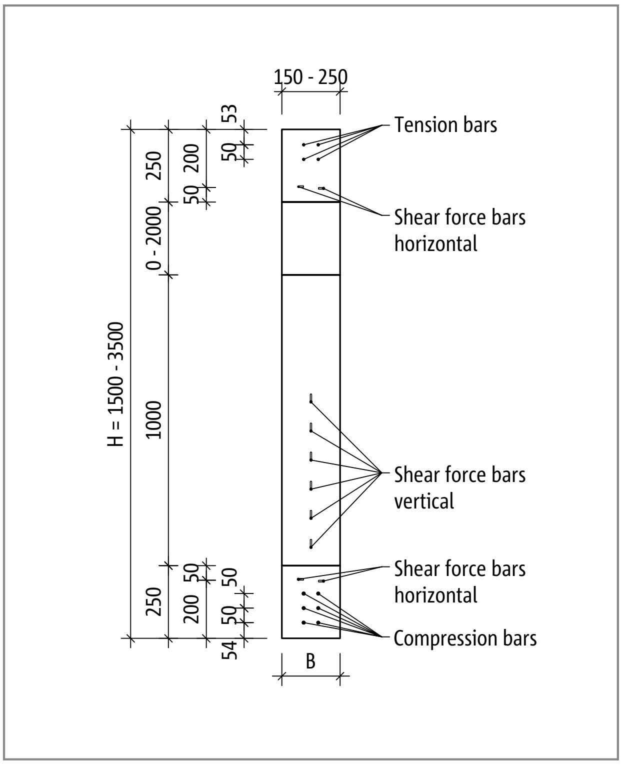
Expansion joints

- The expansion joint spacings can be enlarged, if there is no fixed connection between balcony slabs and shear walls, e. g. through laying of a sliding foil.

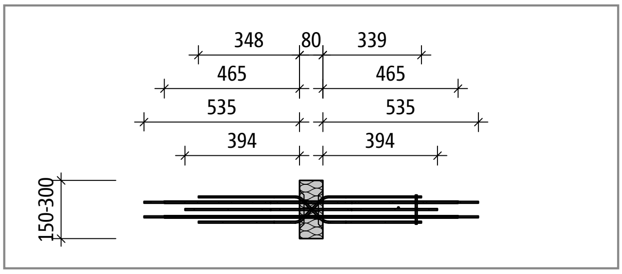
Product description



Schöck Isokorb® type W1: Product section



Schöck Isokorb® type W1: Product section

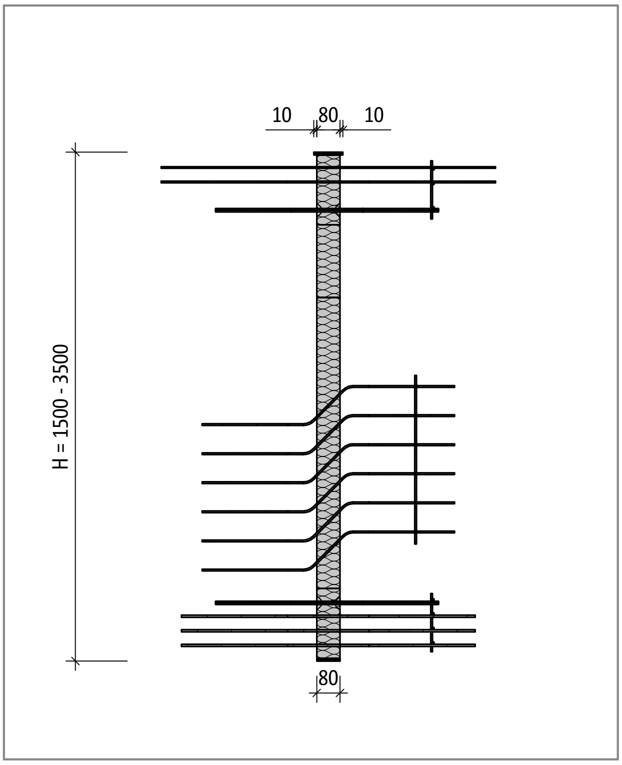


Schöck Isokorb® type W1: Product layout

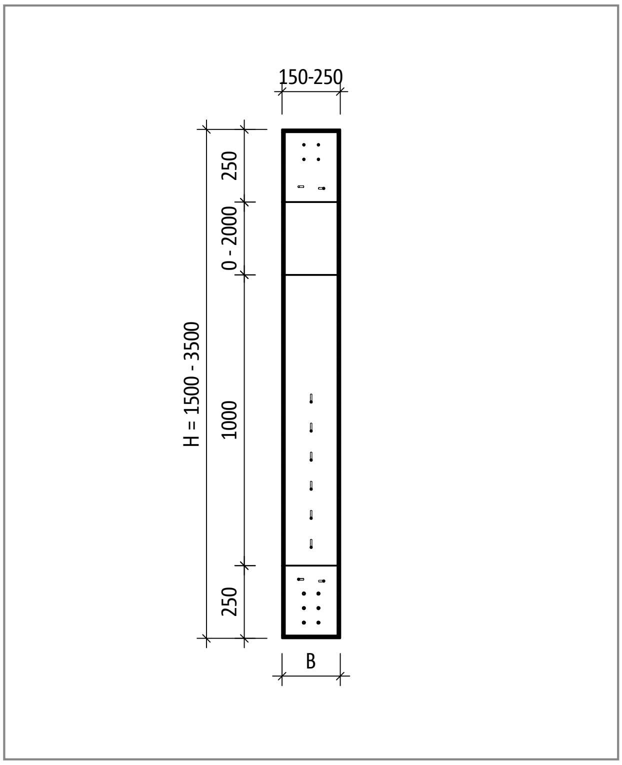
Product information

- Download further product plan views and cross-sections at www.schoeck.co.uk/download

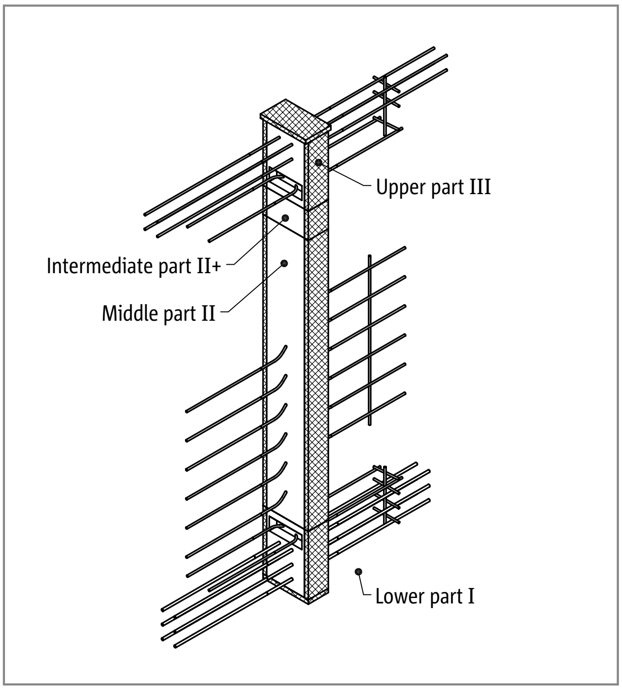
Fire protection configuration



Schöck Isokorb® type W with R90: Product section; fire protection board top and bottom



Schöck Isokorb® type W with R90: Product view; fire protection boards perimeter

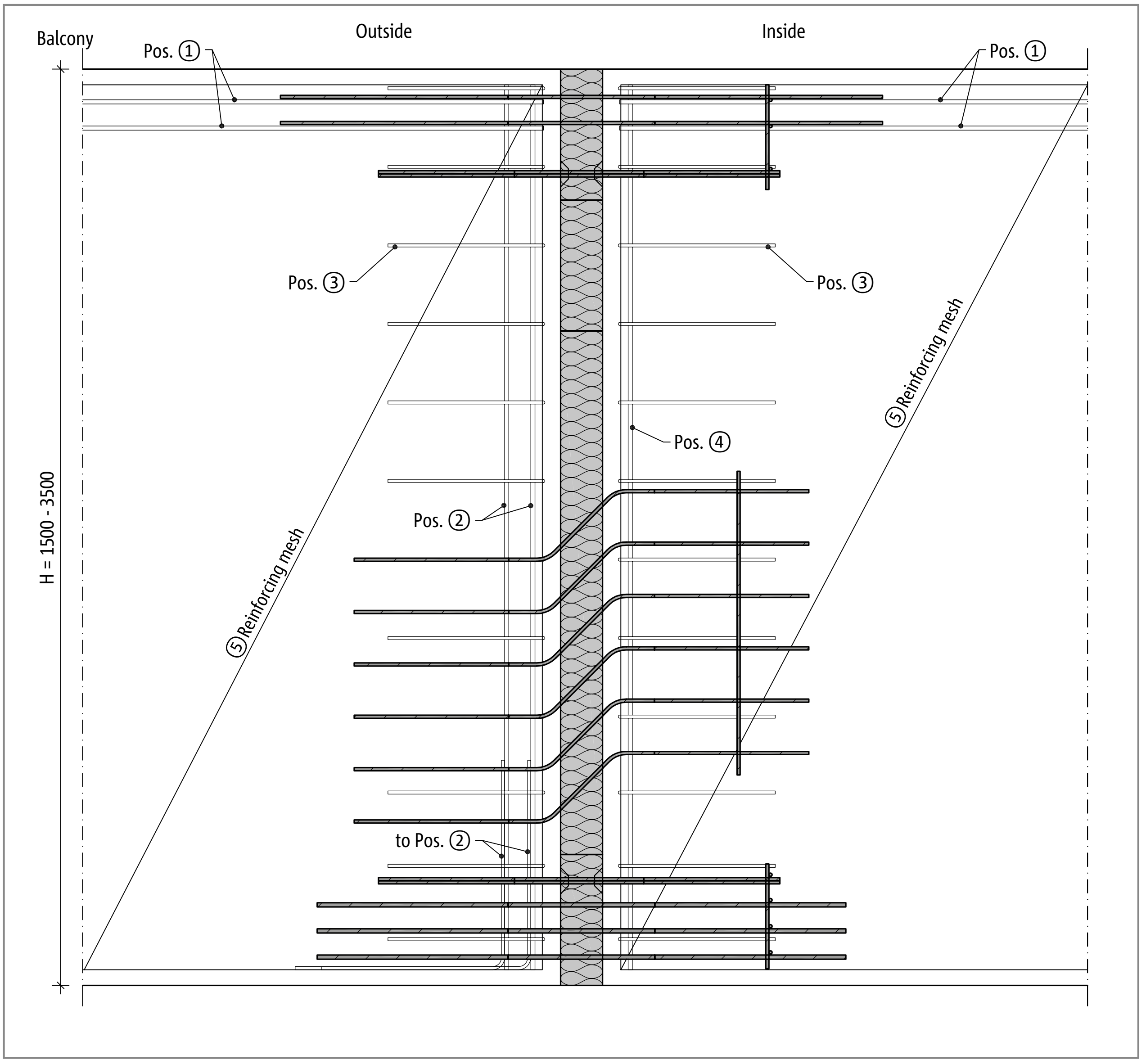


Schöck Isokorb® type W with R90: Fire protection boards perimeter

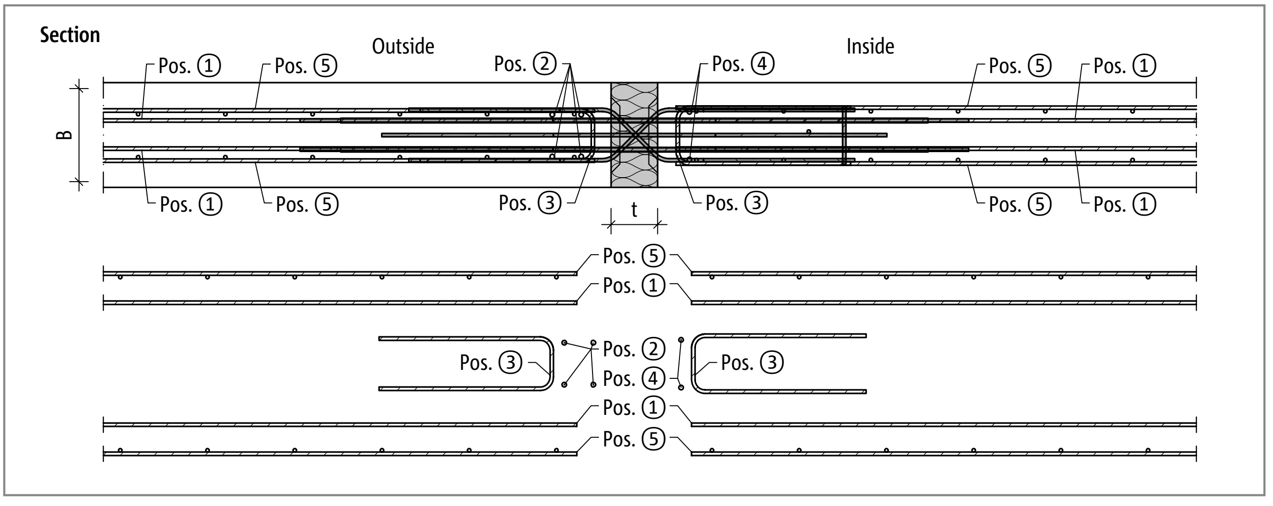
W

Reinforced concrete/reinforced concrete

On-site reinforcement



Schöck Isokorb® type W: On-site reinforcement (section)



Schöck Isokorb® type W: On-site reinforcement (layout)

On-site reinforcement

Recommendation for the on-site connection reinforcement

Details of the lapping reinforcement for Schöck Isokorb® with a loading of 100 % of the maximum design moment with C25/30; positively selected: a_s lapping reinforcement ≥ a_s Isokorb® tension bars/compression members.

Schöck Isokorb® type	W1	W2	W3	W4
On-site reinforcement	Concrete strength class ≥ C25/30			
Pos. 1 Lapping reinforcement				
Pos. 1	4 • H8	4 • H8	4 • H10	4 • H12
Lap length l0 [mm]	481	641	801	961
Pos. 2 Suspension reinforcement (anchoring with stirrup or L)				
Pos. 2	2 • 2 • H8	2 • 2 • H10	2 • 2 • H12	2 • 2 • H16
Pos. 3 and Pos. 4 Side reinforcement				
Pos. 3 and 4	acc. to the specifications of the structural engineer			
Pos. 5 Wall reinforement and lapping reinforcement shear force bar				
Pos. 5	acc. to the specifications of the structural engineer			

Information about on-site reinforcement

- Alternative connection reinforcement is possible. For the determination of the lap length the rules according to BS EN 1992-1-1 (EC2) and BS EN 1992-1-1/NA apply. A reduction of the required lap length using m_{Ed}/m_{Rd} is permitted.
- The indicative minimum concrete strength class of the external structural component is C32/40.

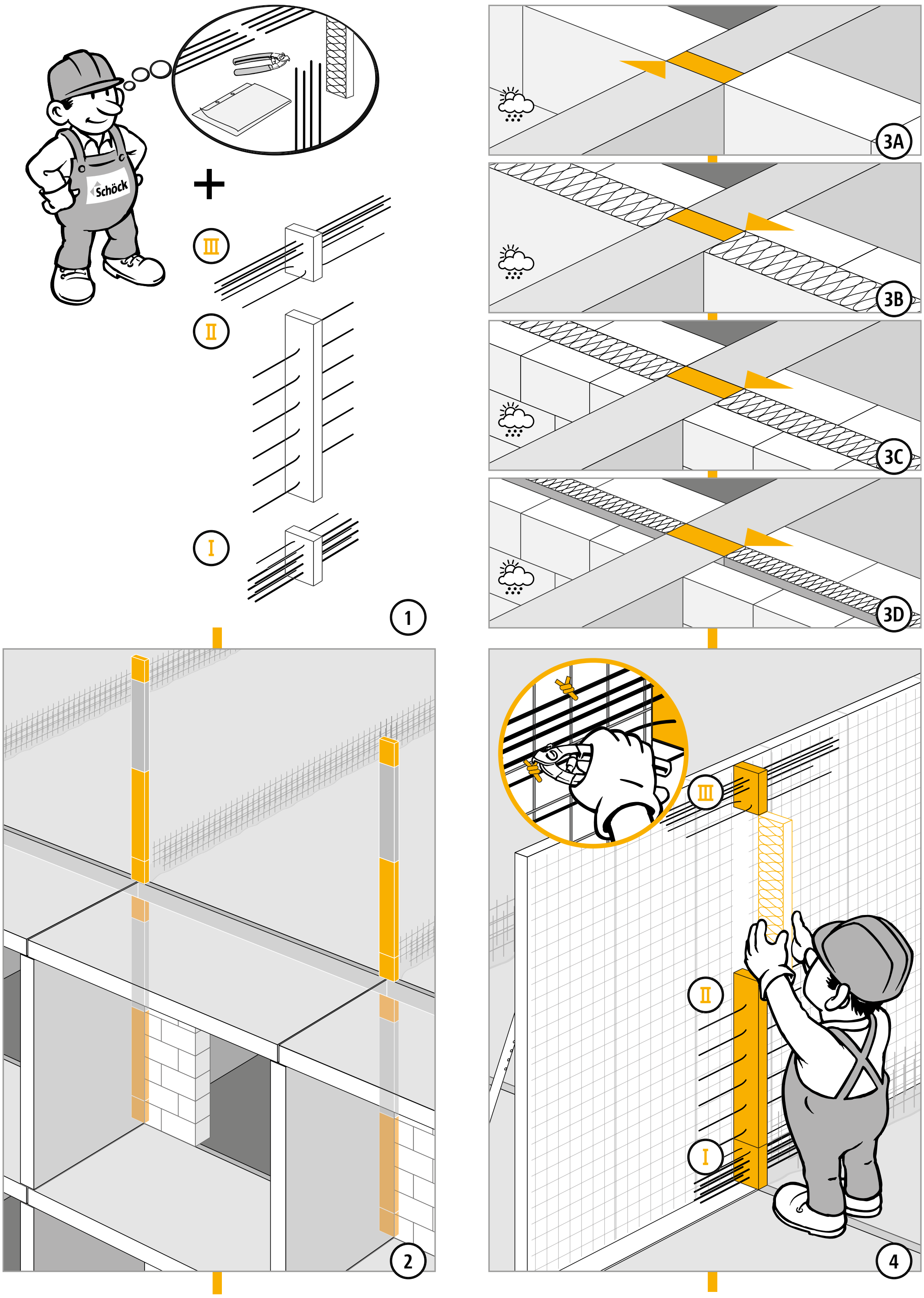
Installation

Installation

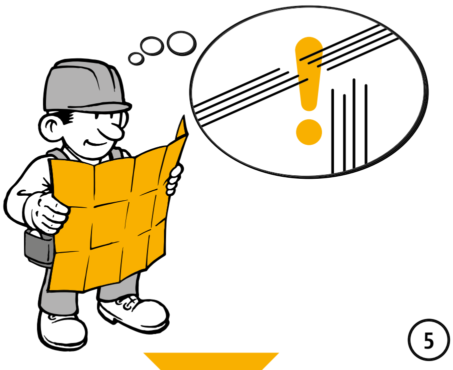
The Schöck Isokorb® type W is supplied in various components (bottom section, middle section, spacer, top section).

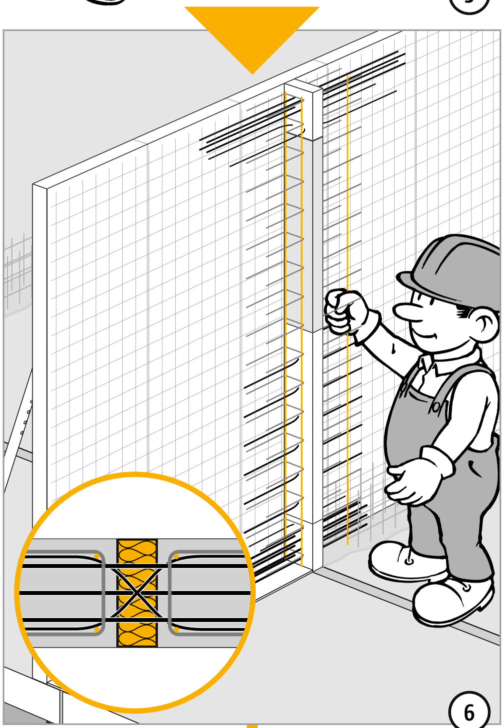
- Depending on quantity ordered , like components on one pallet for transportation.
- The arrangement of components takes place on the building site in accordance with installation instructions see page 221.

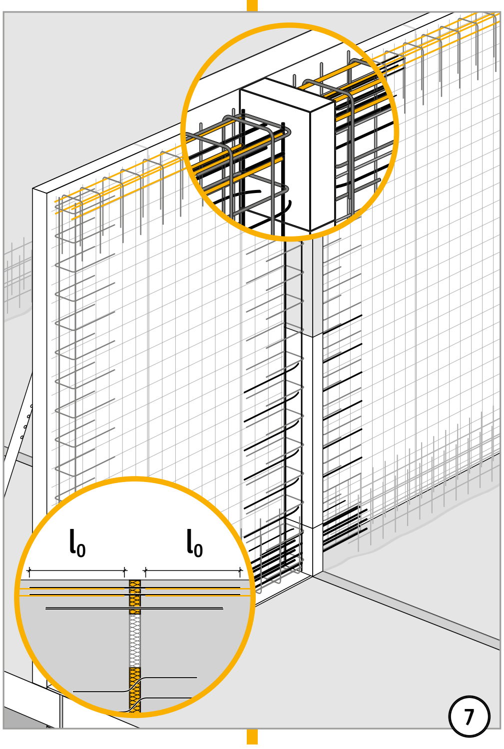
Installation instructions

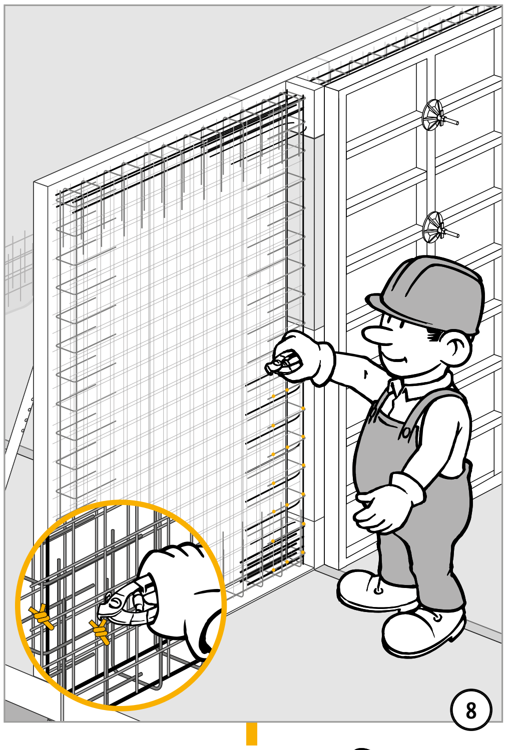


Installation instructions









Check list

- ☐ Have the loads on the Schöck Isokorb® connection been specified at design level?
- ☐ Has the cantilevered system length or the system support width been taken as a basis?
- ☐ With the selection of the design table is the relevant concrete cover taken into account?
- ☐ Are the maximum allowable expansion joint spacings taken into account?
- ☐ Are the requirements with regard to fire protection explained and is the appropriate addendum entered in the Isokorb® type description in the implementation plans?
- ☐ Have the requirements for on-site reinforcement of connections been defined in each case?

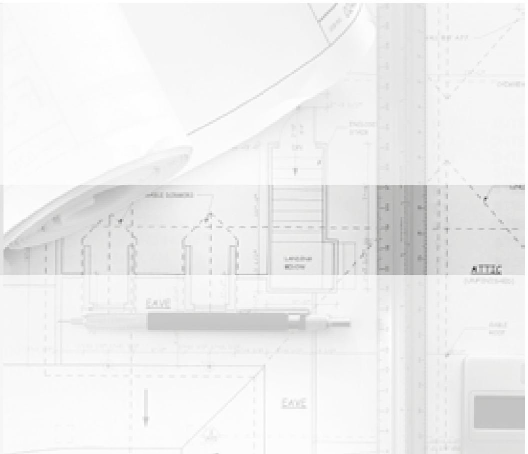
Building physics

Reinforced concrete/reinforced concrete

Steel/reinforced concrete

Timber/reinforced concrete

Steel/steel



Construction materials | Corrosion protection

Schöck Isokorb® construction materials

Reinforcing steel	B500B as per BS 4449, BSt 500 NR as per general technical approval
Pressure bearing pads in the concrete	S 235 JRG2 for the pressure plates
Stainless steel	Grade: 1.4401, 1.4404, 1.4362, 1.4462 and 1.4571, S 460 as per approval no.: Z-30.3-6 Components and connecting devices made of stainless steel or BSt 500 NR
Pressure plate	Grade: 1.4404, 1.4362 and 1.4571 or higher, e.g. 1.4462
Spacer shims	Grade: 1.4401 S 235, thickness: 2 mm and 3 mm
Insulating material	Neopor® - this polystyrene hard foam is a registered trademark of BASF, λ = 0.031 W/m·K, building material classification B1 (flame retardant)

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® types KS and QS 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® types KS and QS 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 2.1.6.4). As far as the connections of Schöck Isokorb® types KS or QS 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.

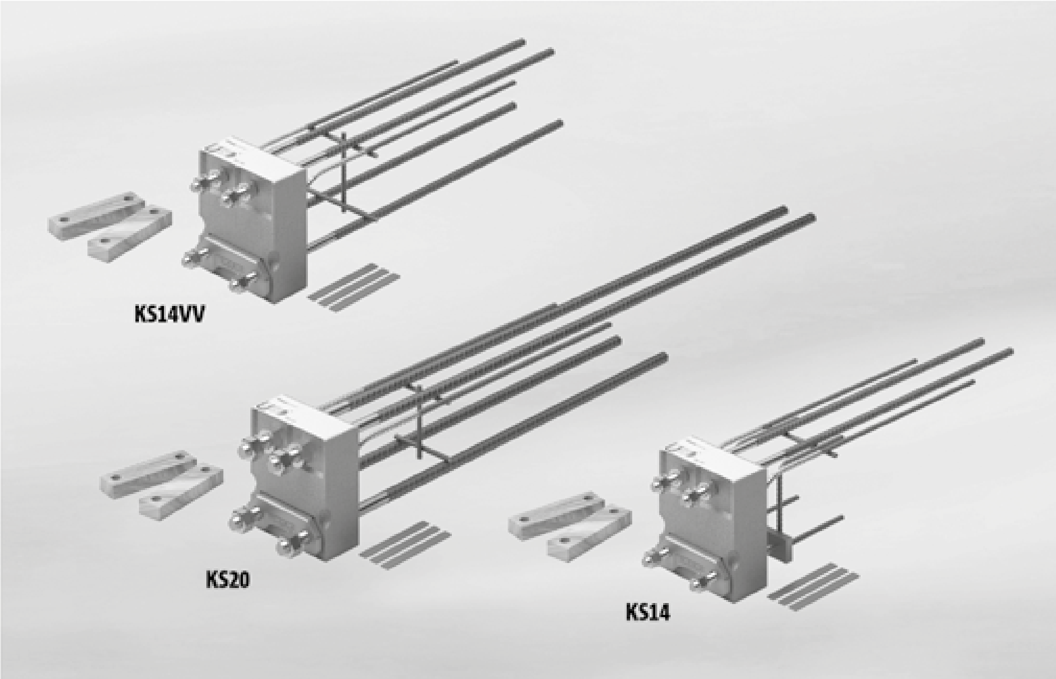
i Note on shortening threaded rods

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.

i Characteristic physical values

- The characteristic physical values for all products are listed in the appropriate table in the “Building physics” section.

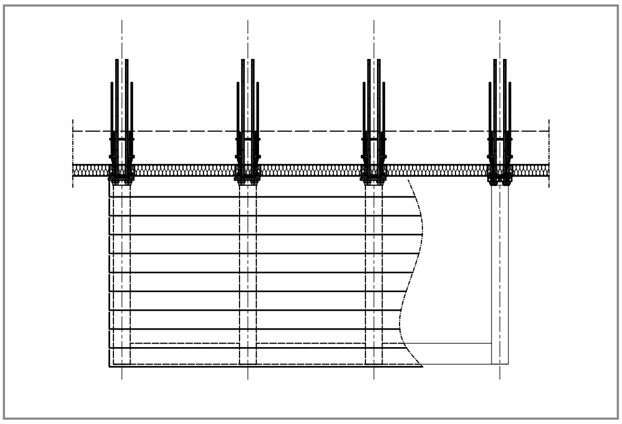
Schöck Isokorb® type KS



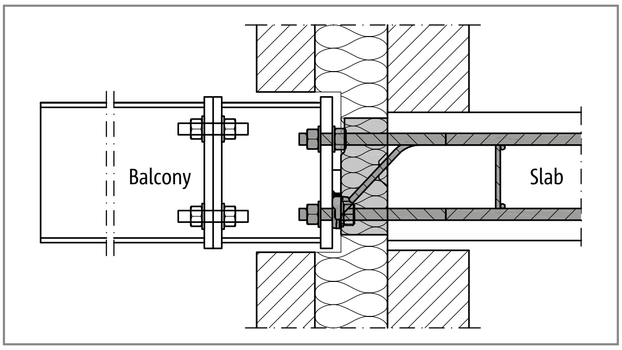
Schöck Isokorb® type KS

Schöck Isokorb® type KS
Suitable for cantilevered steel balconies and canopies. It transfers negative moments and positive shear forces. Schöck Isokorb® types KS20 and KS14-VV transfer positive or negative moments and shear forces.

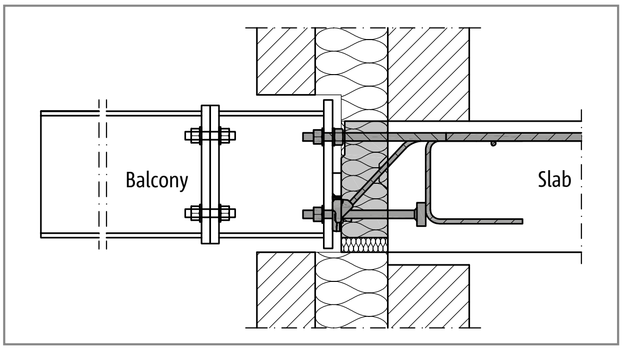
Element arrangement | Installation cross sections



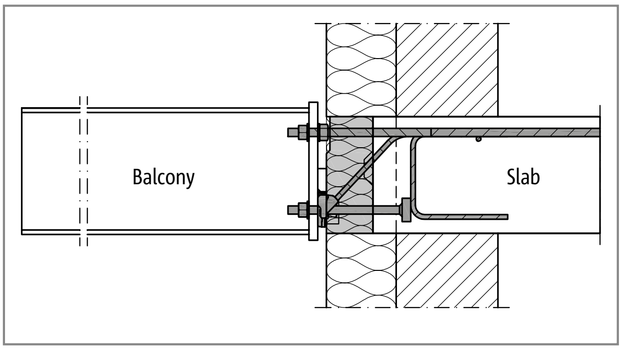
Schöck Isokorb® type KS: Cantilever balcony



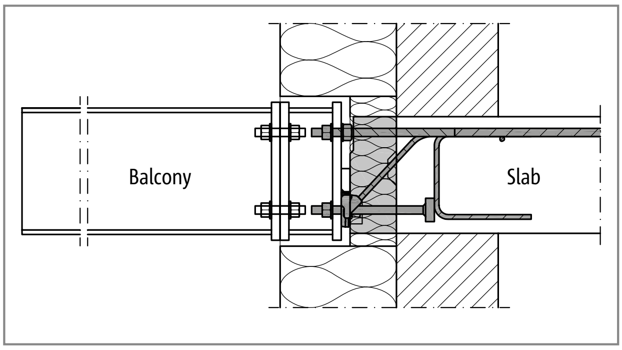
Schöck Isokorb® type KS: Insulating element inside the core insulation; on-site adapter between the Isokorb® and the balcony to enable flexible installation.



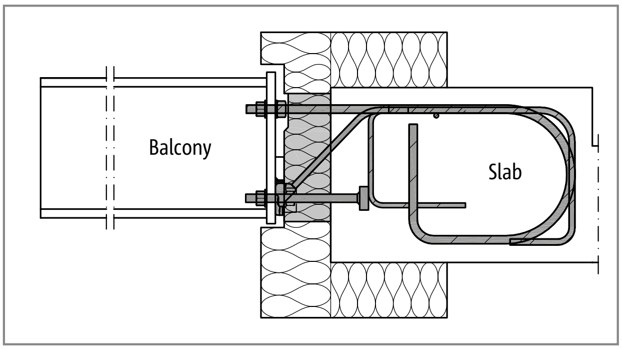
Schöck Isokorb® type KS: Connecting the cantilever fin with on-site adapter; Isokorb® insulating element with optional additional insulating strip



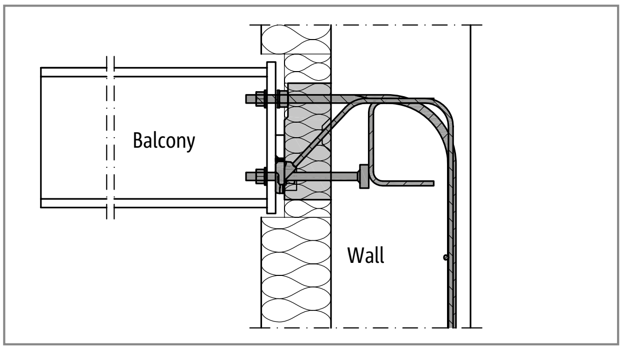
Schöck Isokorb® type KS: With the aid of the floor extension, the insulating element ends flush with the wall insulation; the spacing at the edges must be taken into consideration.



Schöck Isokorb® type KS: Connection of the steel member to an adapter that equalises the thickness of the outer insulation



Schöck Isokorb® type KS14: Special design based on the lateral force load ranges -V8 or -V10



Schöck Isokorb® type KS14: Special construction for wall connection on the basis of the shear force bearing levels -V8 or -V10 for wall thicknesses from 200 mm

KS

Steel/reinforced concrete

Product selection | Type designations | Special designs | Design force direction

Schöck Isokorb® type KS: Variants

The design of the Schöck Isokorb® type KS can vary as follows:

- Load capacity:
  KS14 or KS20
- Lateral force load range:
  Diameter of the V8 or V10 shear force rods on KS14, V10 or V12 on KS20 (e.g.: KS20-V10),
  KS14 with lateral force load range VV is available for absorbing negative (uplifting) shear forces
- Height:
  H = 180 mm to H = 280 mm, in 10 mm increments
  The heights are shown in 20 mm increments in this Technical Information to aid clear presentation. Please contact the design support department at Schöck for details of the other heights (H) in which the Isokorb® type KS is available.
- Additional insulating strips (optional):
  +10 or +25
  The additional insulating strip is available optionally in a height of 10 mm or 25 mm and is designated +10 or +25, respectively. It is applied beneath the insulating element of the Isokorb® at the factory.

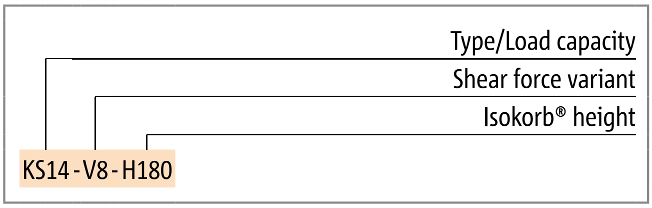
KS installation aid variants

The design of the Schöck KS installation aid can vary as follows:

- Load capacity:
  KS14 or KS20

The KS14 H180-220 or KS20 H180-220 installation aids are only available in installation height h = 200 mm, see page 239for representation. It can be used to aid installation of H180 to H220 versions of the Schöck Isokorb® type KS.

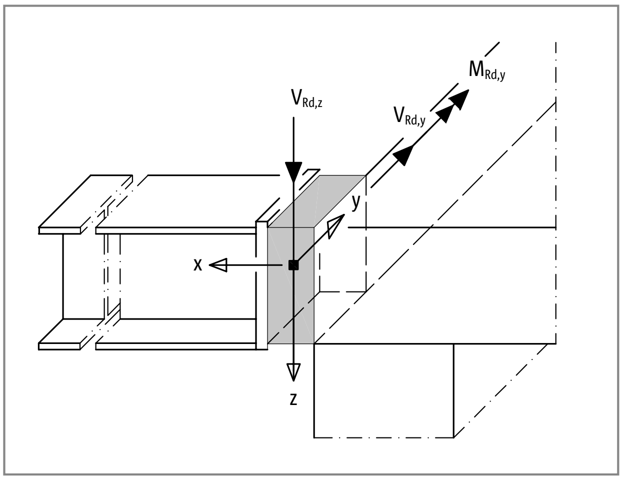
Type designations in planning documents



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).

Direction of forces

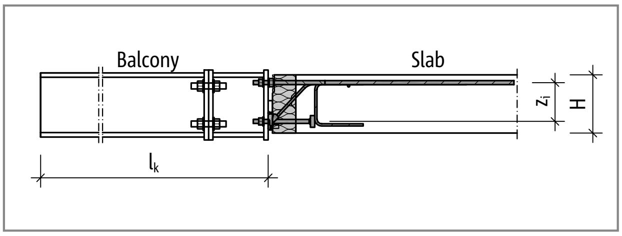


Schöck Isokorb® type KS: Direction of internal forces and moments

Design

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 Isokorbs® type KS 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 Isokorbs® type KS are unable to transfer any torsion (i.e. any moment $M_{Ed,x}$).
- When using an indirect bearing solution for the Schöck Isokorb® type KS, 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 EN 1992-1-1 (EC2), 4.4.1 and EN 1992-1-1/NA is 20 mm for internal areas.
- All Isokorb® type KS variants can transfer positive shear forces. Types KS14-VV, KS20-V10 or KS20-V12 must be selected for negative (uplifting) shear forces.
- When addressing the uplifting forces on steel balconies or canopies, two type KS-VV Isokorbs® are often sufficient, even if the overall design requires further type KSs.



Schöck Isokorb® type KS: Static system; design values relate to the cantilevered length l_k

Inner lever arm

Schöck Isokorb® type		KS14	KS20
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® type		KS14-V8, KS14-VV			KS14-V10		
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® type		KS14-VV
Design values with		Concrete strength class ≥ C25/30
		$M_{Rd,y}$ [kNm/element]
Isokorb® height H [mm]	180	9.0
	200	10.6
	220	12.2
	240	13.8
	260	15.4
	280	17.0
		$V_{Rd,z}$ [kN/element]
	180 - 280	-12.0
		$V_{Rd,y}$ [kN/element]
	180 - 280	±2.5

Schöck Isokorb® type	KS14-V8, KS14-VV	KS14-V10
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
Gewinde	M16	M16

Notes on design

The absorbable 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 or as described below. Extrapolation in the range of smaller shear force is not permissible.

- Type KS14:
  $M_{Rd,y} = -[\min (98.2 \cdot z_i \cdot 10^{-3}; (106.5 - \cos 20° \cdot V_{Rd,z}) \cdot z_i \cdot 10^{-3}; (106.5 - \cos 20°/ \sin 20° \cdot |V_{Rd,y}|) \cdot z_i \cdot 10^{-3})]$ [kNm/element]
- z_i = Internal lever arm [mm], see table on page 231; absorbable shear forces $V_{Rd,z}$, $V_{Rd,y}$ [kN]
- The maximum design values for the individual lateral force load ranges must be observed:
  V8, VV:max. $V_{Rd,z}$ = 30.9 kN, max. $V_{Rd,y}$ = ±2.5 kN
  V10:max. $V_{Rd,z}$ = 48.3 kN, max. $V_{Rd,y}$ = ±4.0 kN

Design

Design with positive shear force and negative moment

Schöck Isokorb® type		KS20-V10			KS20-V12		
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® type		KS20-V10	KS20-V12
Design values with		Concrete strength class ≥ C25/30	
		$M_{Rd,y}$ [kNm/element]	
Isokorb® height H [mm]	180	11.2	
	200	13.3	
	220	15.4	
	240	17.4	
	260	19.5	
	280	21.6	
		$V_{Rd,z}$ [kN/element]	
	180 - 280	-12.0	
		$V_{Rd,y}$ [kN/element]	
	180 - 280	±4.0	±6.5

Schöck Isokorb® type	KS20-V10	KS20-V12
Isokorb® length [mm]	180	180
Tension bars	2 ⌀ 20	2 ⌀ 20
Shear force bars	2 ⌀ 10	2 ⌀ 12
Compression bars	2 ⌀ 20	2 ⌀ 20
Gewinde	M22	M22

Notes on design

The absorbable 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 or as described below. Extrapolation in the range of smaller shear force is not permissible.

- Type KS20:
  $M_{Rd,y} = -[\min (210.2 \cdot z_i \cdot 10^{-3}; (232.9 - \cos 20° \cdot V_{Rd,z}) \cdot z_i \cdot 10^{-3}; (232.9 - \cos 20°/ \sin 20° \cdot |V_{Rd,y}|) \cdot z_i \cdot 10^{-3})]$ [kNm/element]
- z_i = Internal lever arm [mm], see table on page 231; absorbable shear forces $V_{Rd,z}$, $V_{Rd,y}$ [kN]
- The maximum design values for the individual lateral force load ranges must be observed:
  V10:max. $V_{Rd,z}$ = 48.3 kN, max. $V_{Rd,y}$ = ±4.0 kN
  V12:max. $V_{Rd,z}$ = 69.6 kN, max. $V_{Rd,y}$ = ±6.5 kN

Deflection/Camber | Torsional spring stiffness

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:

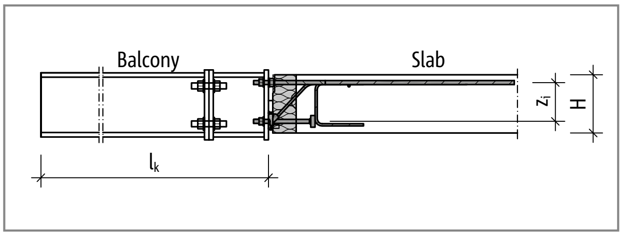
$\tan\alpha$ = Insert value from table

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 251



Schöck Isokorb® type KS: Static system; design values relate to the cantilevered length l_k

Schöck Isokorb® type		KS14-V8	KS14-V10	KS14-VV	KS20-V10	KS20-V12
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

Spring values

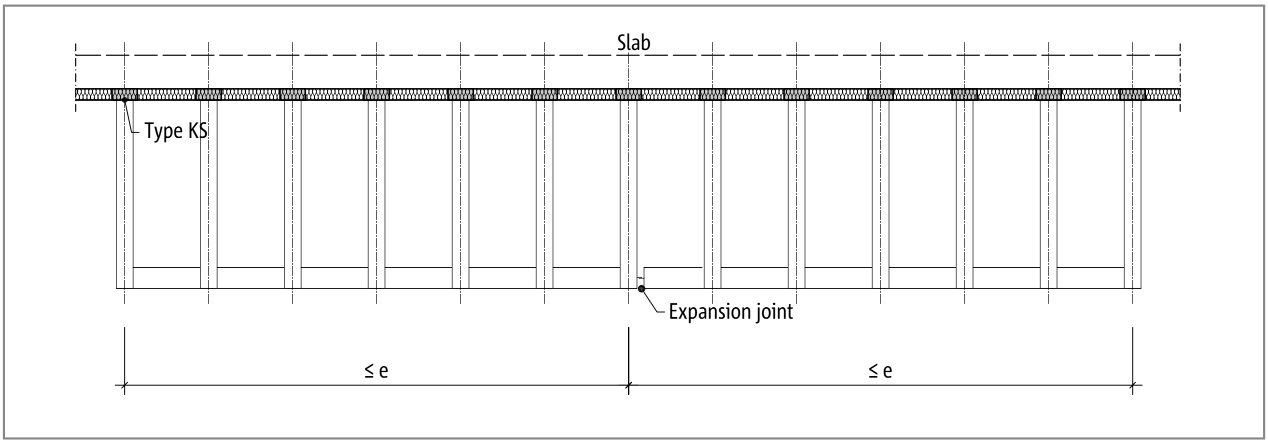
The spring values of the Schöck Isokorb® must be considered for verifications in serviceability limit state. To the extent that an examination of the vibration behaviour of the steel structure to be connected is necessary, the additional deformation resulting from the Schöck Isokorb® must be taken into consideration.

Schöck Isokorb® type		KS14-V8	KS14-V10	KS14-VV	KS20-V10	KS20-V12
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

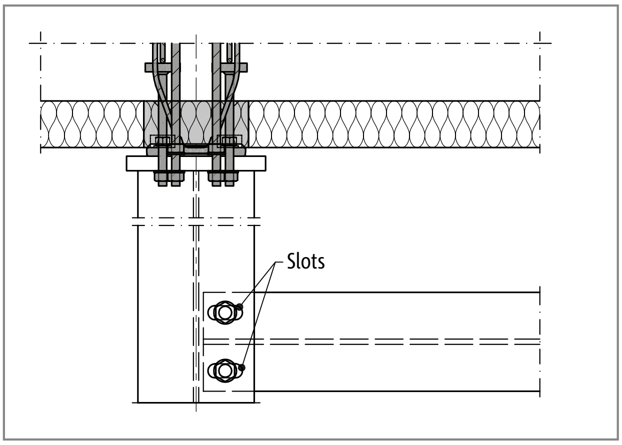
Expansion joint spacing

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® type KS. 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.



Schöck Isokorb® type KS: Maximum expansion joint spacing e



Schöck Isokorb® type KS: Expansion joint detail to ensure movement during temperature expansion

Schöck Isokorb® type		KS14	KS20
Maximum expansion joint spacing when		e [m]	
Insulating element thickness [mm]	80	5.7	3.5

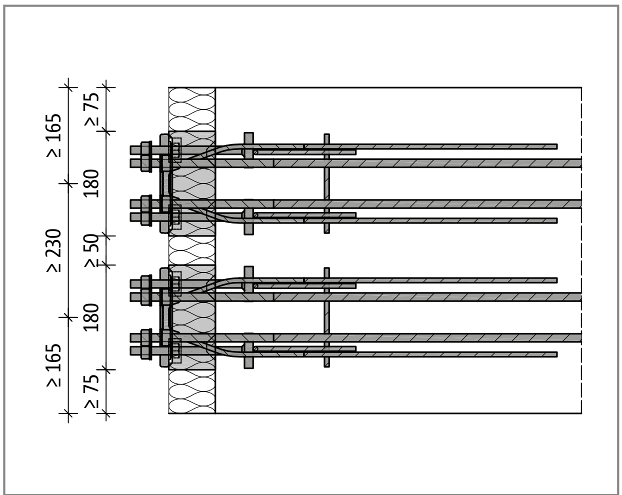
KS

Steel/reinforced concrete

Edge spacing | Outer corner

Edge and axis spacing

The positioning of the Schöck Isokorb® type KS must ensure compliance with minimum edge spaces relating to the inner reinforced concrete component and minimum axis spacing from one Isokorb® to the next:



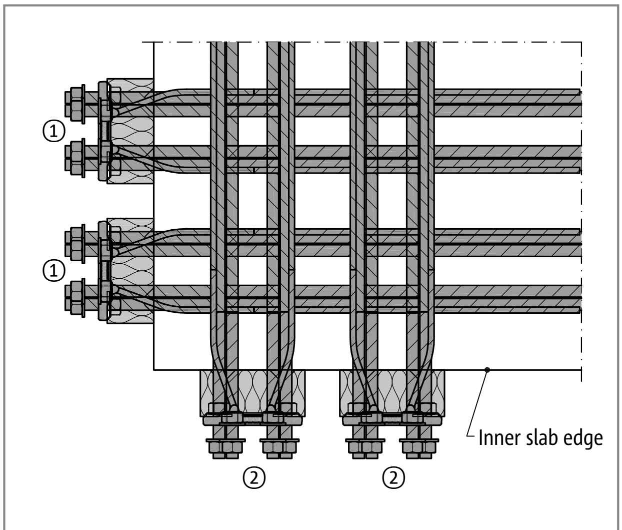
Schöck Isokorb® type KS: Axis spacing between elements and edges

Edge and axis spacing

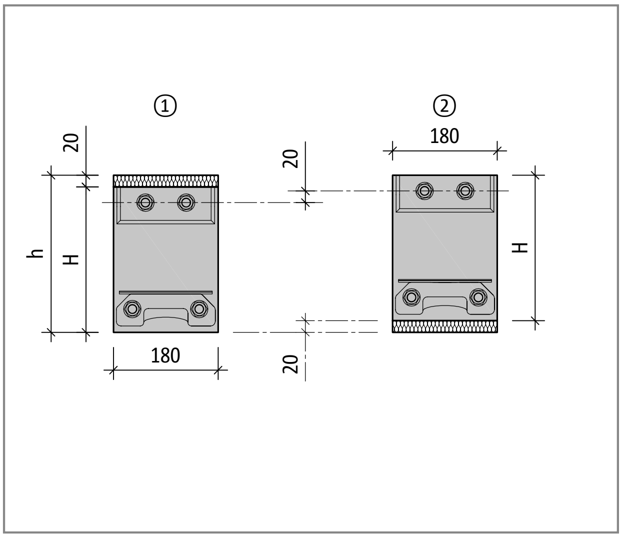
- Please contact the design support department if you have connections that are not possible with the edge and axis spacing shown in this information (contact details on page 3).
- The load bearing capacity of type KS is reduced if the edge spaces or axis spacing are less than the minimum specification.
- Please contact the design support department at Schöck for the reduced design values.

Height offset on outer corner

On an outer corner, the Schöck Isokorbs® type KS 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® type KS on site.



Schöck Isokorb® type KS: Outer corner

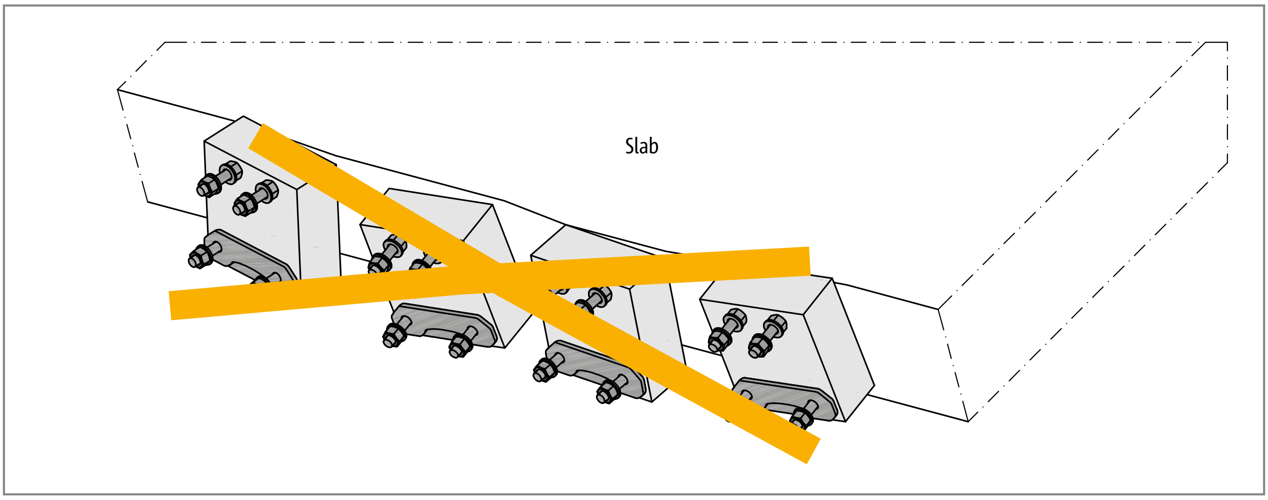


Schöck Isokorb® type KS: Layout with offset heights

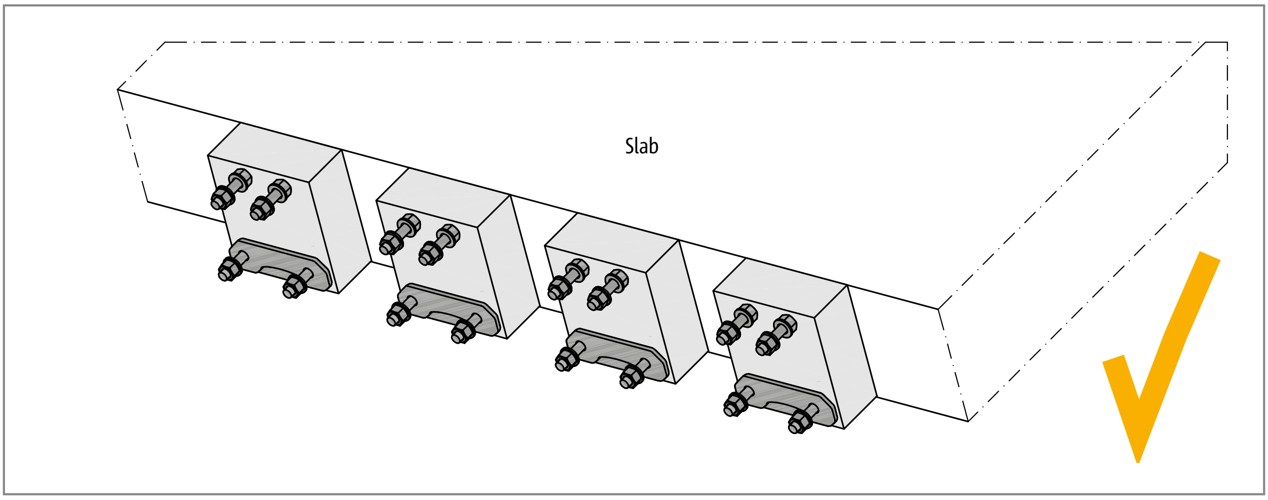
Outer corner

- The corner solution using type KS 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!
- Compliance with the axis spacing between elements and edges as specified for the Schöck Isokorb® type KS must be assured.

Installation accuracy



Schöck Isokorb® type KS: Twisted and displaced elements that were poorly secured while the concrete was being poured

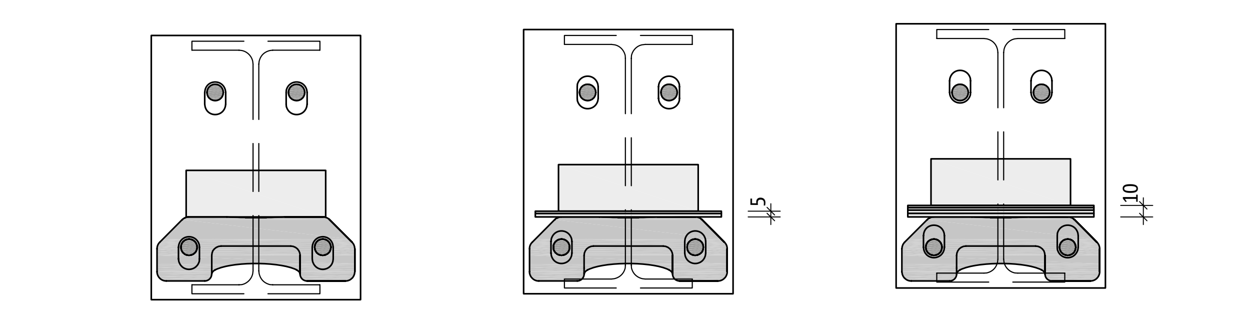


Schöck Isokorb® type KS: Reliable and correct setting while pouring the concrete ensures the tolerance accuracy is maintained.

Since the Schöck Isokorb® type KS creates an interface between a steel component and a reinforced concrete component, the issue of tolerance is particularly important when installing type KS. DIN 18202:2013-04 "Tolerances in building construction" must be observed in this respect! It specifies the crucial inclusion of limit deviations relating to the necessary installation position of the Schöck Isokorb® type KS. A method of work must be agreed between project engineer, concrete contractor and steel fabricator to ensure acceptable tolerances are met. Consideration should be given to the limitations of the steel fabricator's ability to overcome excessive dimensional differances, without undertaking extra work.

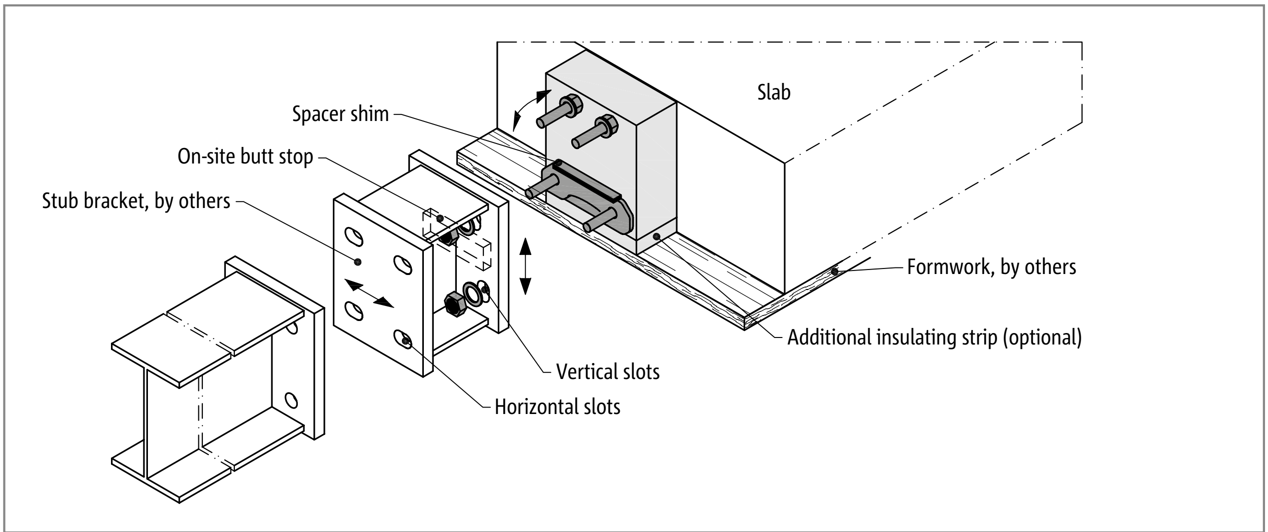
Installation accuracy

Adjusting the height of the steel member:



Schöck Isokorb® type KS: 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 type KS; using this as a starting level will allow vertical tolerance of ±5 mm

Connection with on-site adapter



Schöck Isokorb® type KS: Cantilever fin connection with on-site adapter enables tolerances in vertical and horizontal directions to help overcome dimensional deviations of the reinforced concrete structure; spacer shims are included with the Isokorb®

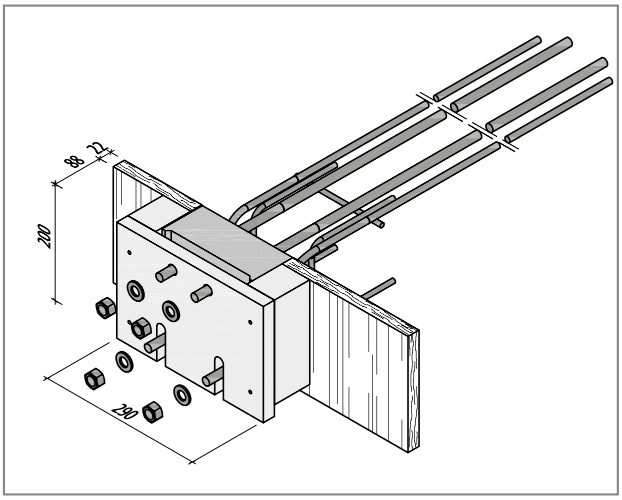
i Information on installation accuracy

- Design constraints allow a vertical tolerance of 10 mm with the Schöck Isokorb® type KS. The requisite spacer shims are included with the product.
- Horizontal limit deviations for the separation of the type KS 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 KS during the concrete pouring process.
- The construction supervisor is responsible for checking the agreed installation accuracy of the KS types in good time!

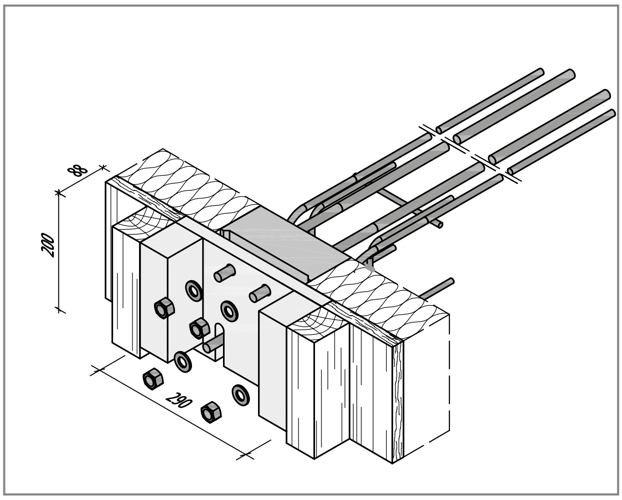
Installation accuracy

Installation aid (optional)

An installation aid is optionally available from Schöck to improve installation accuracy.



Schöck Isokorb® type KS: Representation with installation aid



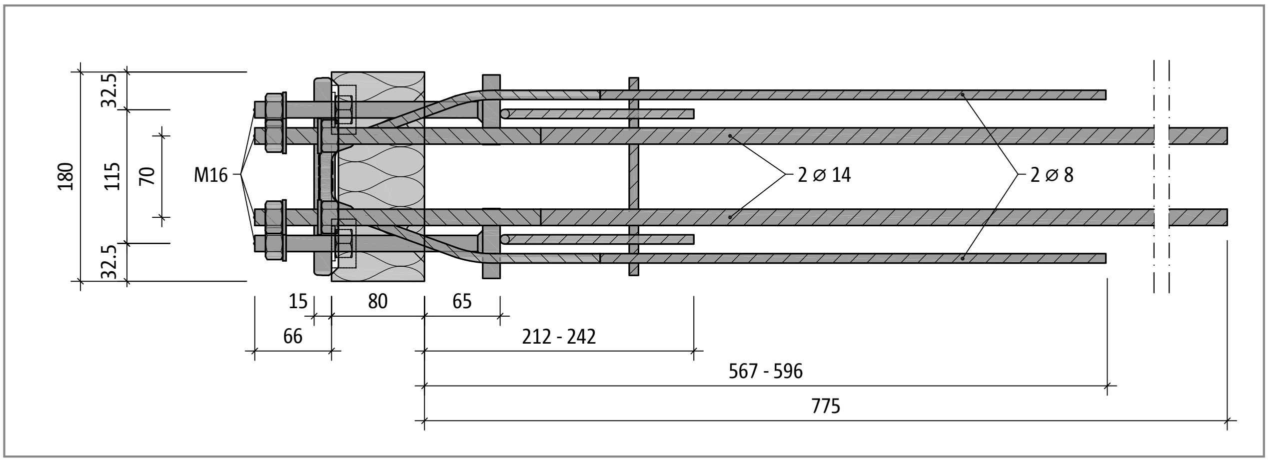
Schöck Isokorb® type KS: Installation aid installed in reverse to enable gap-less insulation of the slab edge on monolithic walls.

The optional installation aid for the Schöck Isokorb® type KS is factory assembled from a timber board and two square timbers. It holds the Isokorb® securely in place before and while pouring the concrete. When using the aid in “positive position” (see Fig. above left), it is matched to standard 22 mm formwork. If using formwork of a different thickness, the installation aid needs to be modified on site.

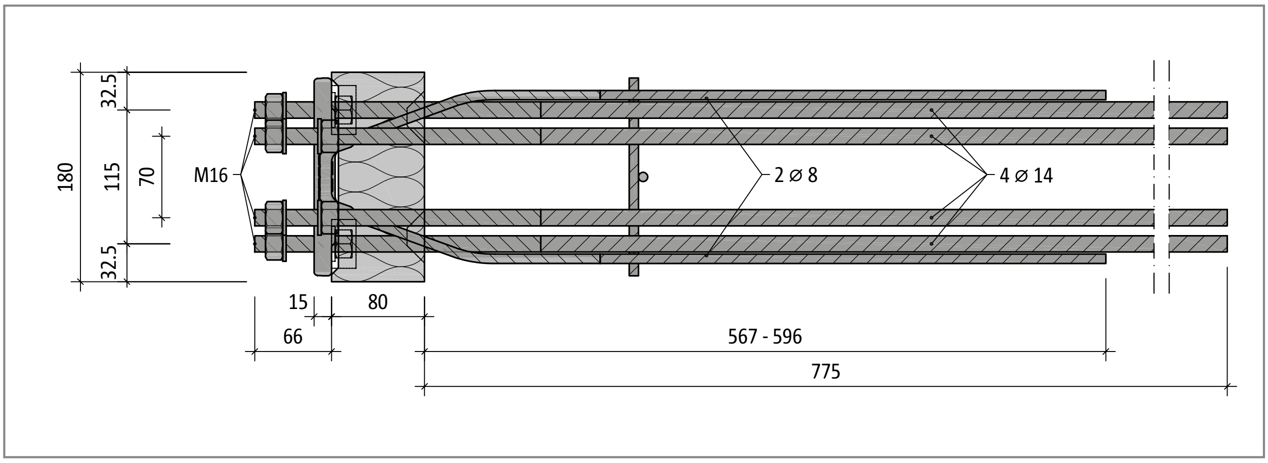
Notes on the installation aid

- The installation aid is available in two different versions. A 200 mm high installation aid is available for each type KS14 and KS20 for installing H180 to H220 versions of the Isokorb®.
- Please contact your regional manager if you have questions regarding the installation of the Schöck Isokorb®. They can also help directly on site if the installation conditions are difficult (contact: www.schoeck.co.uk/en_gb/regional-sales-manager).
- The Schöck installation aid and the on-site formwork can be combined to form templates that ensure the dimensionally accurate installation of the Isokorb® type KS.

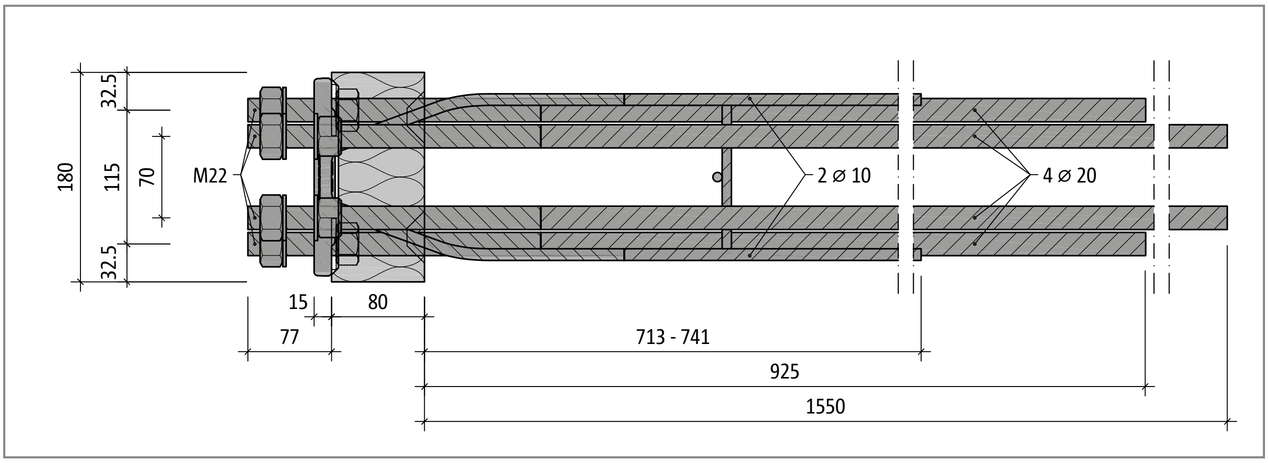
Product description



Schöck Isokorb® type KS14-V8: Plan view



Schöck Isokorb® type KS14-VV: Plan view

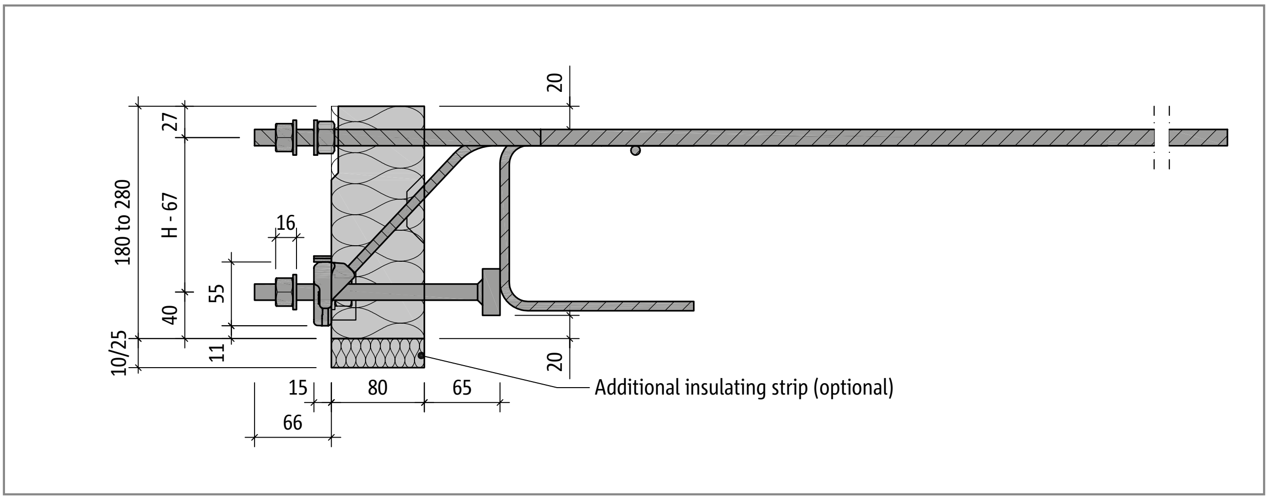


Schöck Isokorb® type KS20-V10: Plan view

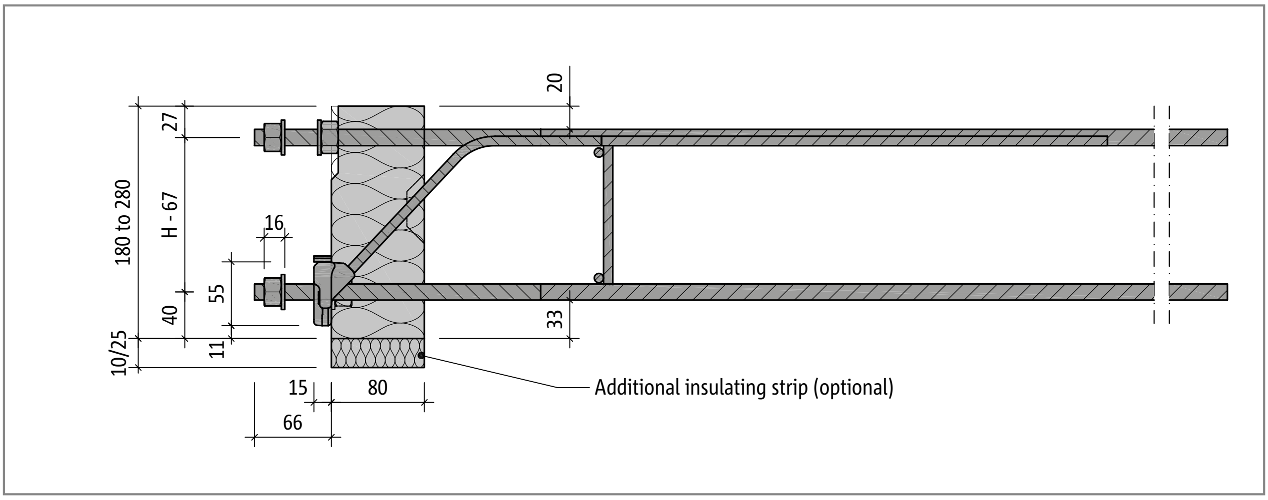
Product information

- The clamping distance is 30 mm on type KS14 and 35 mm on type KS20.

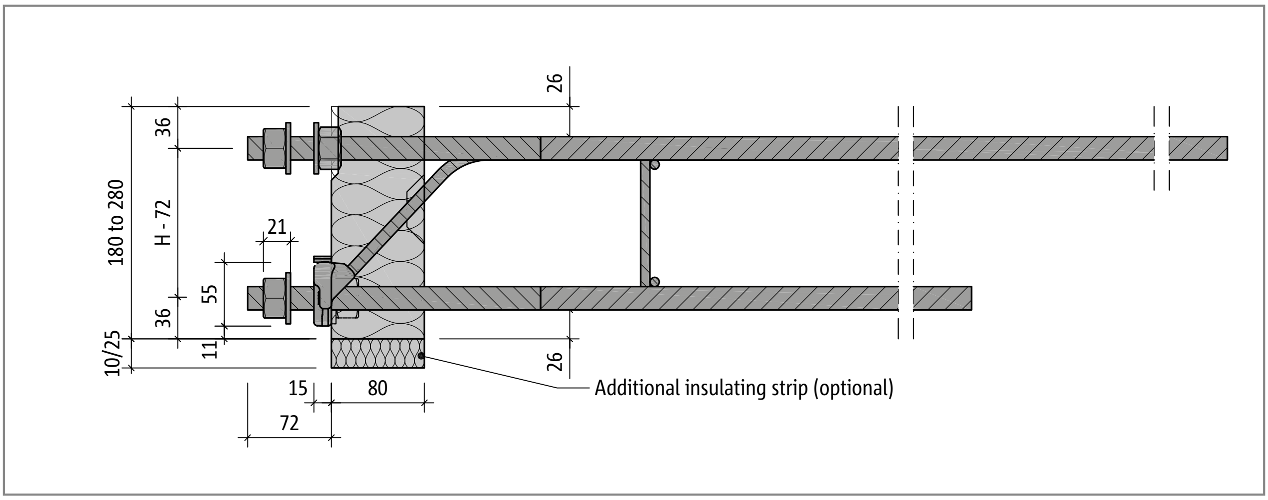
Product description



Schöck Isokorb® type KS14: Product cross section; 10 mm or 25 mm additional insulating strip is optional



Schöck Isokorb® type KS14-VV: Product cross section; 10 mm or 25 mm additional insulating strip is optional



Schöck Isokorb® type KS20: Product cross section; 10 mm or 25 mm additional insulating strip is optional

Product information

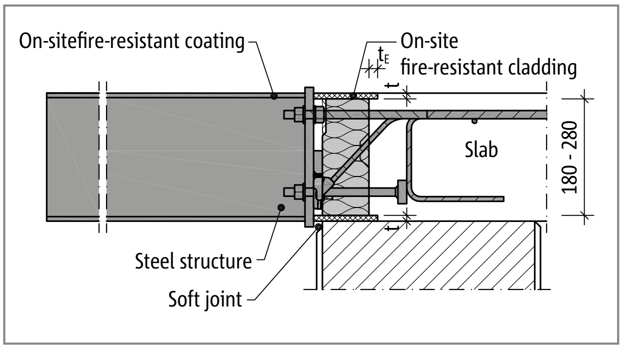
- The clamping distance is 30 mm on type KS14 and 35 mm on type KS20.

KS

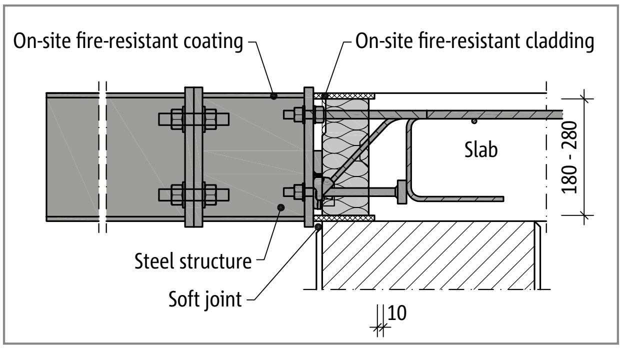
Steel/reinforced concrete

On-site fire resistance

Fire protection



Schöck Isokorb® type KS: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant coating: Cross section



Schöck Isokorb® type KS: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant coating

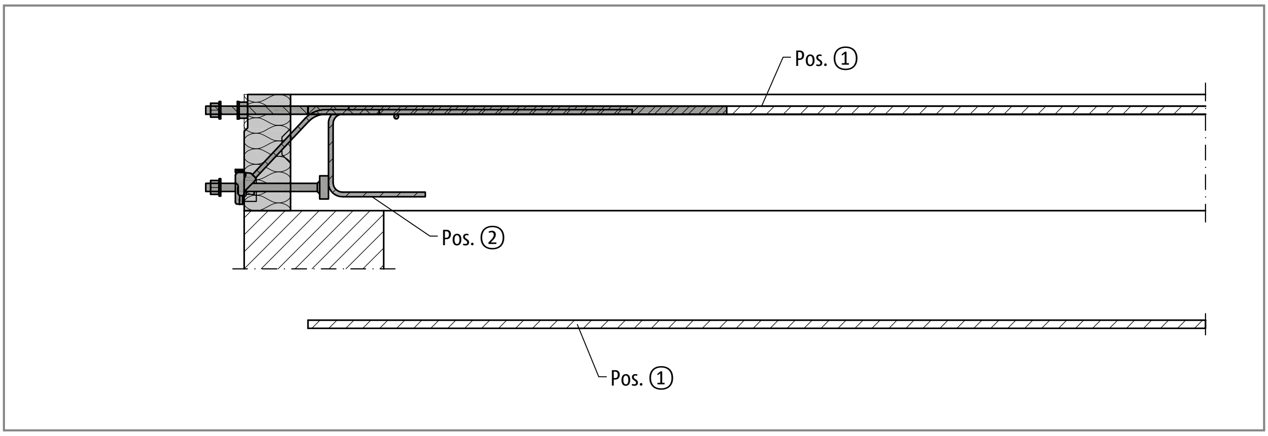
Fire-resistant cladding of the Schöck Isokorb® must be planned and installed on site. The same on-site fire safety measures apply as for the overall load-bearing structure.

KS

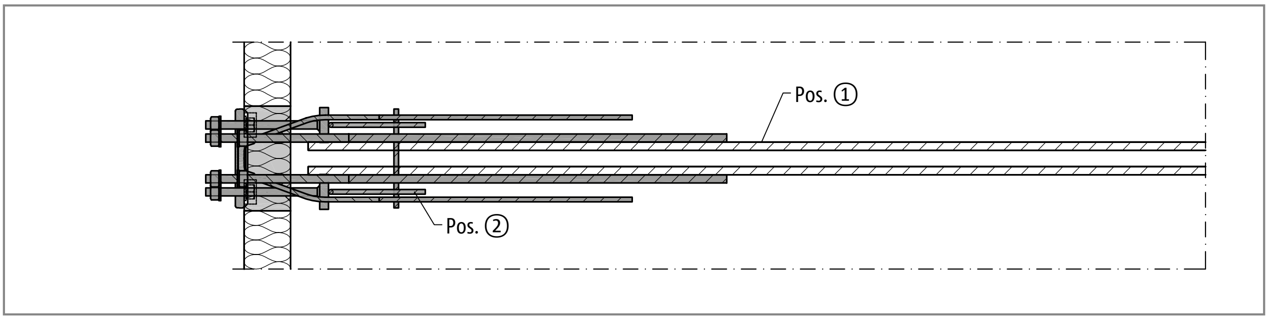
Steel/reinforced concrete

On-site reinforcement - In-situ concrete construction

Schöck Isokorb® type KS14



Schöck Isokorb® type KS14: On-site reinforcement: Cross section



Schöck Isokorb® type KS14: On-site reinforcement: Plan view

Schöck Isokorb® type			KS14
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

Information about on-site reinforcement

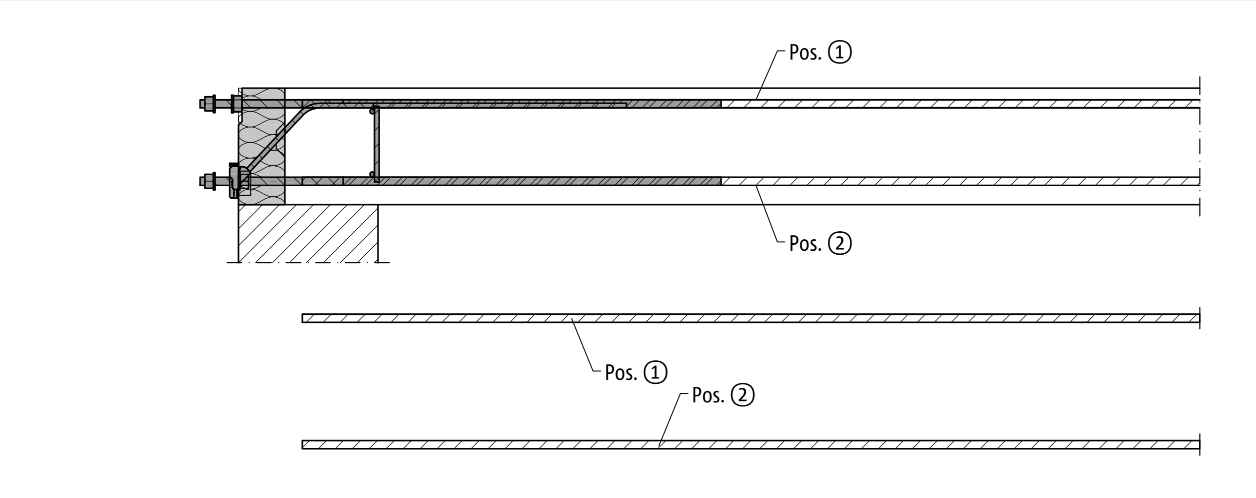
- Lapping of the reinforcement in the connecting reinforced concrete components must be applied as close as possible to the insulating element of the Schöck Isokorb®, the required concrete cover must be observed.
- Overlapping joints as per EN 1992-1-1 (EC2) and EN 1992-1-1/NA.
- Type KS14 requires installation of transverse reinforcement as per EN 1992-1-1 (EC2) and EN 1992-1-1/NA.

KS

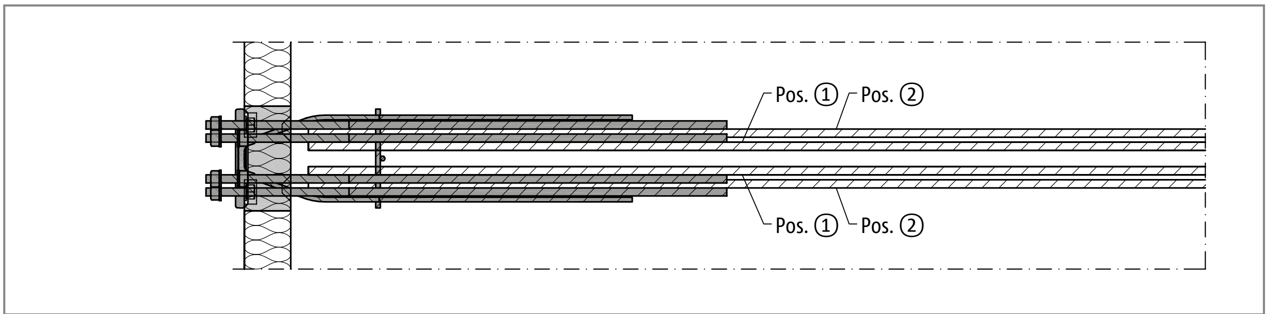
Steel/reinforced concrete

On-site reinforcement - In-situ concrete construction

Schöck Isokorb® type KS14-VV



Schöck Isokorb® type KS14-VV: On-site reinforcement: Cross section



Schöck Isokorb® type KS14-VV: On-site reinforcement: Plan view

Schöck Isokorb® type			KS14-VV
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

i Information about on-site reinforcement

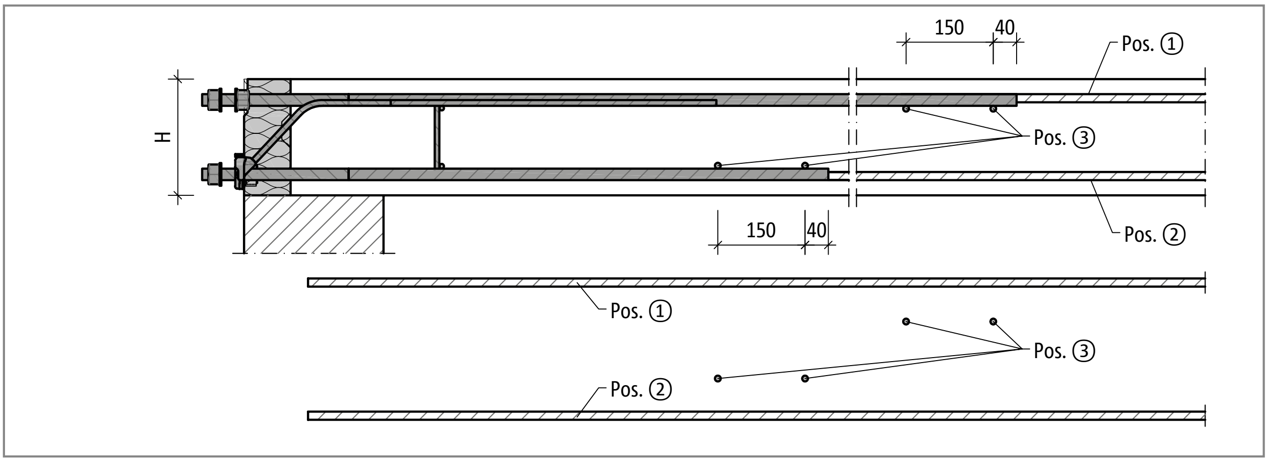
- Type KS14-VV: In the case of exposure to uplifting loads (+M_{Ed}), as planned, an overlapping joint with the lower Isokorb® reinforcement may be necessary to cover the tensile force curve. The structural engineer must indicate whether this overlapping reinforcement is required.

KS

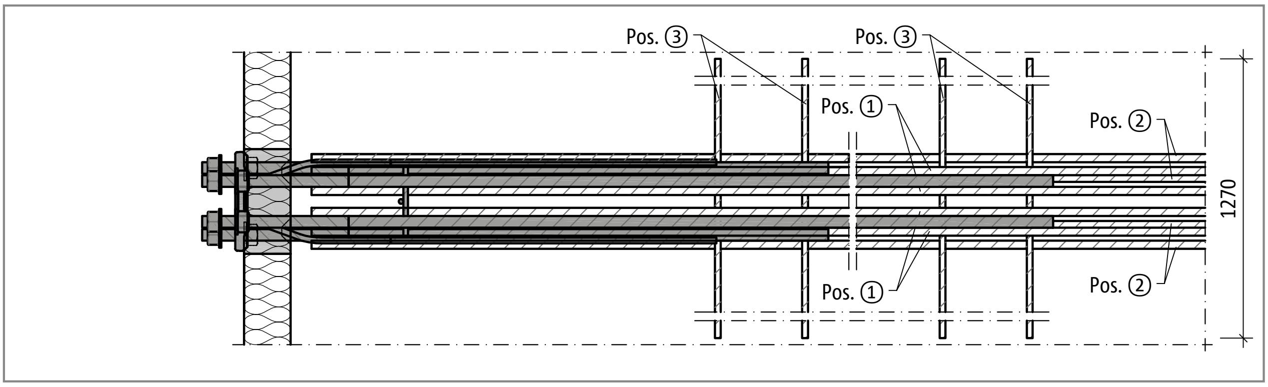
Steel/reinforced concrete

On-site reinforcement - In-situ concrete construction

Schöck Isokorb® type KS20



Schöck Isokorb® type KS20: On-site reinforcement; section



Schöck Isokorb® type KS20: On-site reinforcement: Plan view

Schöck Isokorb® type			KS20
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

Information about on-site reinforcement

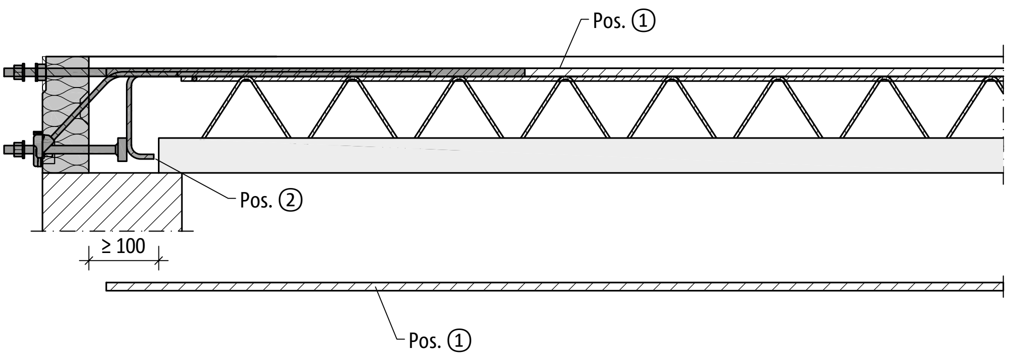
- Type KS20: In the case of exposure to uplifting loads (+M_{Ed}), as planned, an overlapping joint with the lower Isokorb® reinforcement may be necessary to cover the tensile force curve. The structural engineer must indicate whether this overlapping reinforcement is required.
- Pos. 3: The location and the given centre distance of the reinforcement must be assured. Transverse reinforcement provided for other reasons can be taken into account.

KS

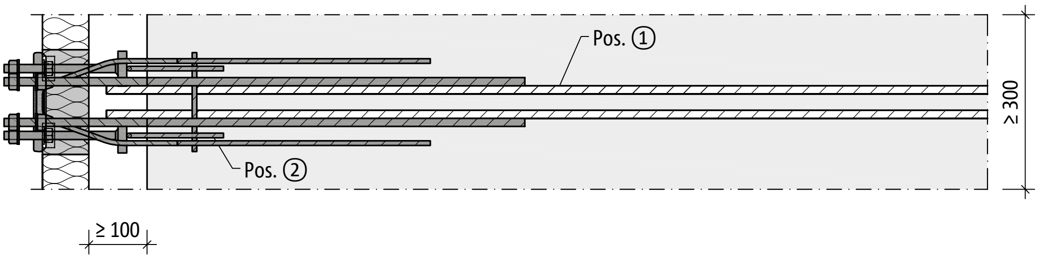
Steel/reinforced concrete

On-site reinforcement - Precast construction

Schöck Isokorb® type KS14



Schöck Isokorb® type KS14: On-site reinforcement for semi-precast construction: Cross section



Schöck Isokorb® type KS14: On-site reinforcement for semi-precast construction: Plan view

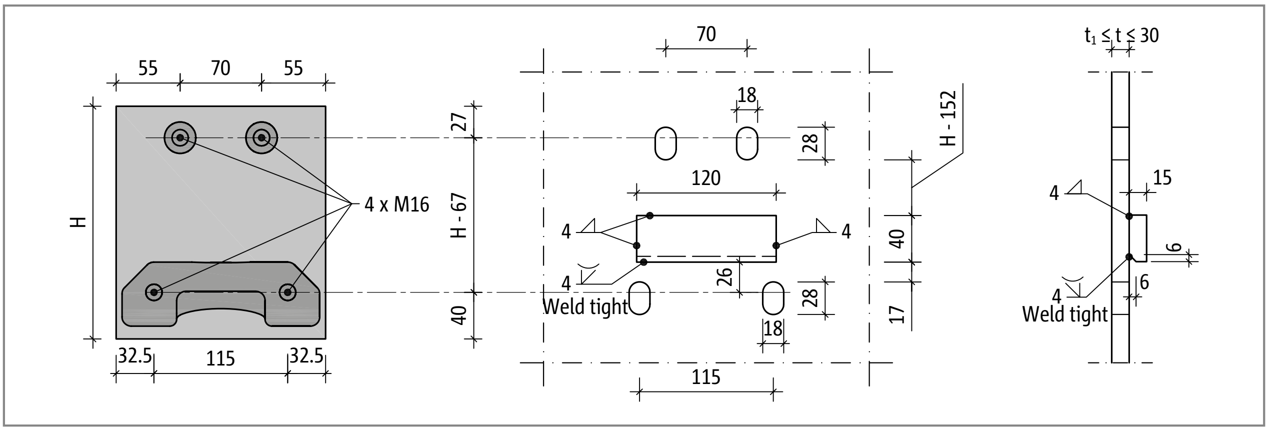
Schöck Isokorb® type			KS14
On-site reinforce-ment	**Type of bearing**	**Height H [mm]**	**Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure**
Pos. 1 Lapping reinforcement			
Pos. 1	direct/indirect	180 - 280	2 • H16
Pos. 2 Edge and splitting tension reinforcement			
Pos. 2	direct/indirect	180 - 280	included with the product, alternative version with on-site stirrups 2 • H8

Information about on-site reinforcement

- Type KS14 requires installation of transverse reinforcement as per EN 1992-1-1 (EC2) and 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 re-placed with two suitable ⌀8 stirrups.

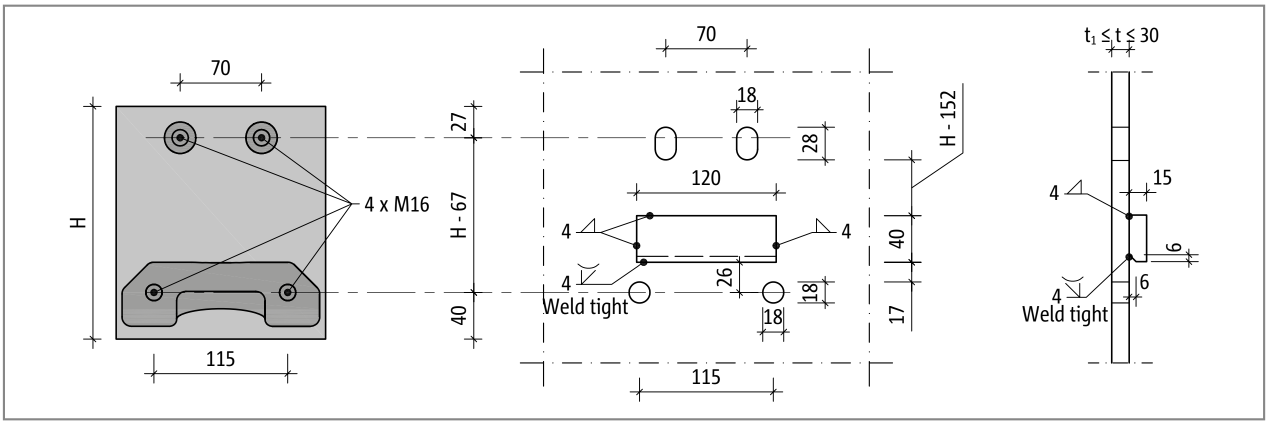
Fixing Plate

KS14 for transferring moment and positive shear force



Schöck Isokorb® type KS14: Design of the fixing plate connection

KS14-VV for transferring moment and positive or negative shear force



Schöck Isokorb® type KS14-VV: Design of the front slab connection; round holes for transferring 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® type KS.

Fixing Plate

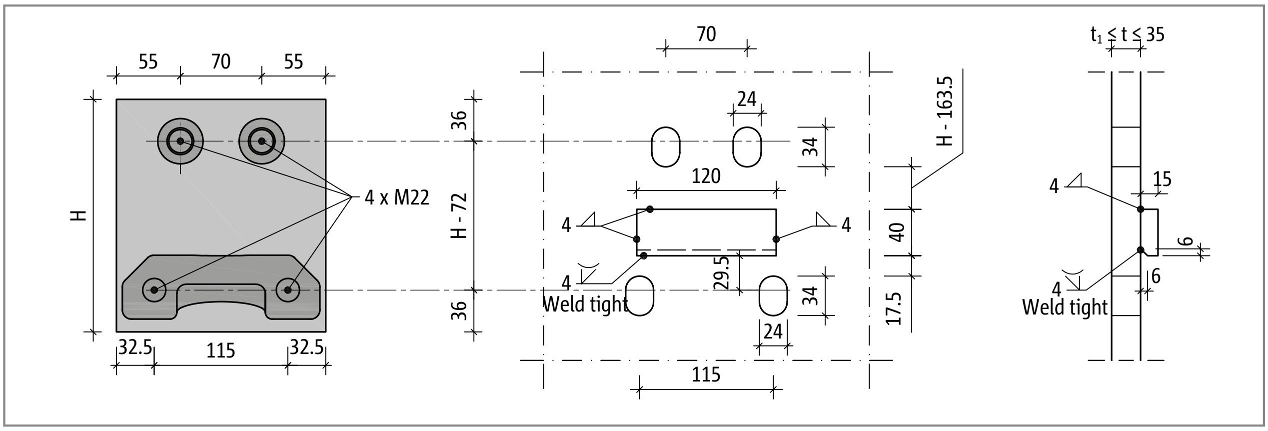
- The slots on the diagram can be used to raise the fixing plate by up to 10 mm.If this tolerance is not sufficient, larger slots could be used; this must be examined on a case by case basis.
- If uplifting loads occur as planned, the lower section of the fixing plate must have round holes (rather than 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:
  KS14 (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.

KS

Steel/reinforced concrete

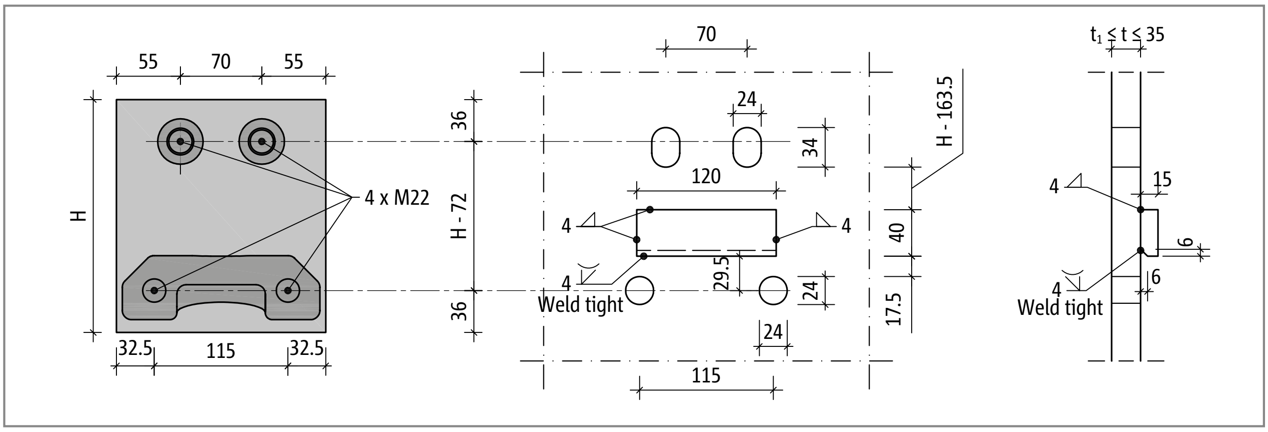
Fixing Plate

KS20 for transferring moment and positive shear force



Schöck Isokorb® type KS20: Design of the fixing plate connection

KS20 for transferring moment and positive or negative shear force



Schöck Isokorb® type KS20: Design of the fixing plate connection; round holes for transferring 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® type KS.

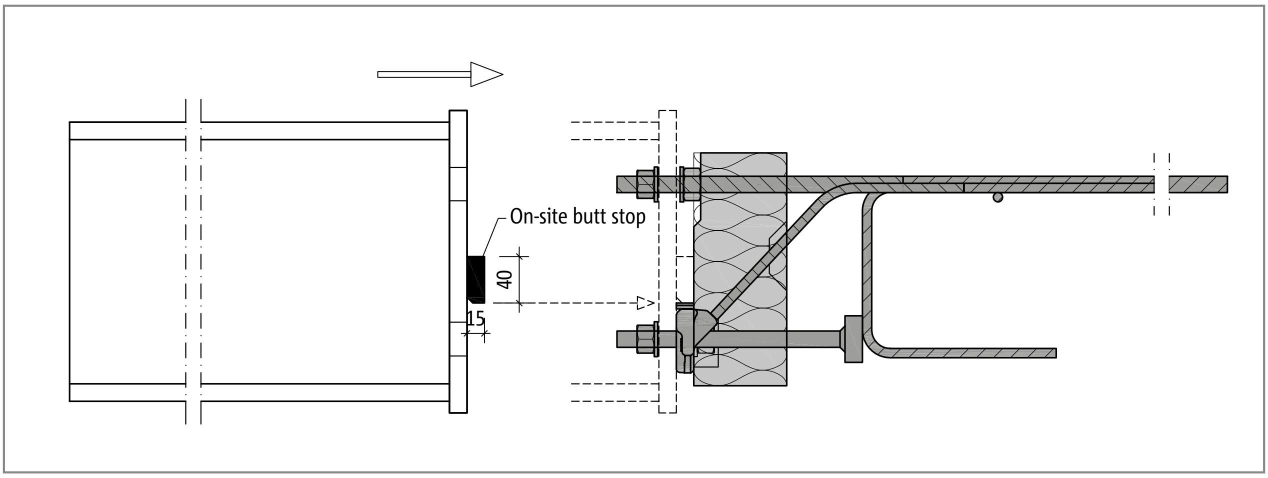
i Fixing Plate

- The slots on the diagram can be used to raise the fixing plate by up to 10 mm.If this tolerance is not sufficient, larger slots could be used; this must be examined on a case by case basis.
- 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:
  KS20 (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.

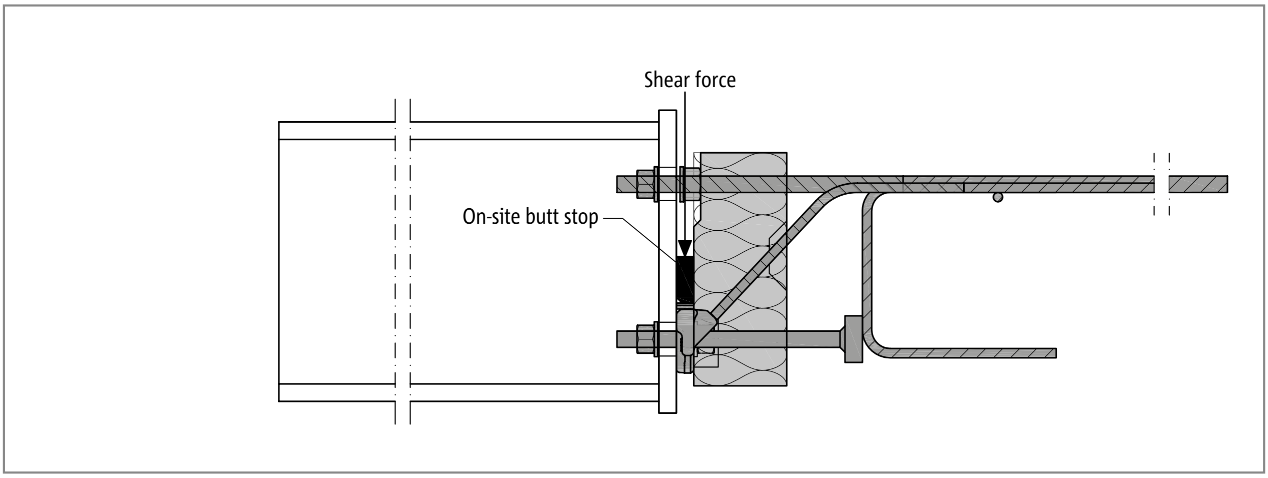
On-site butt stop

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® type KS! The spacer shims supplied by Schöck are used for vertical adjustment between butt stop and Schöck Isokorb®.



Schöck Isokorb® type KS: Mounting the steel member



Schöck Isokorb® type KS: On-site butt stop for transferring shear forces

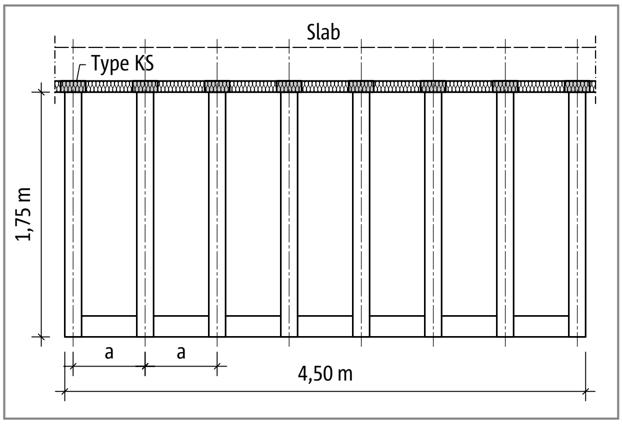
i On-site butt stop

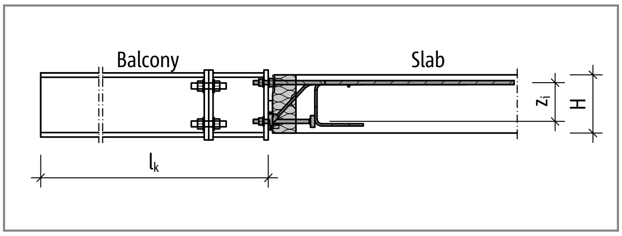
- Type of steel to match static requirements.
- Apply corrosion protection after welding.
- Steel construction: Checking for dimensional inaccuracy of the structure prior to fabrication is absolutely essential!

KS

Steel/reinforced concrete

Design example





Static system and load assumptions

Geometry:	Cantilever length	l_k = 1.5 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 C20/25 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 type KS

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

Member forces:

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

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

$= -8.9$ 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® type KS14-V8-H200**

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

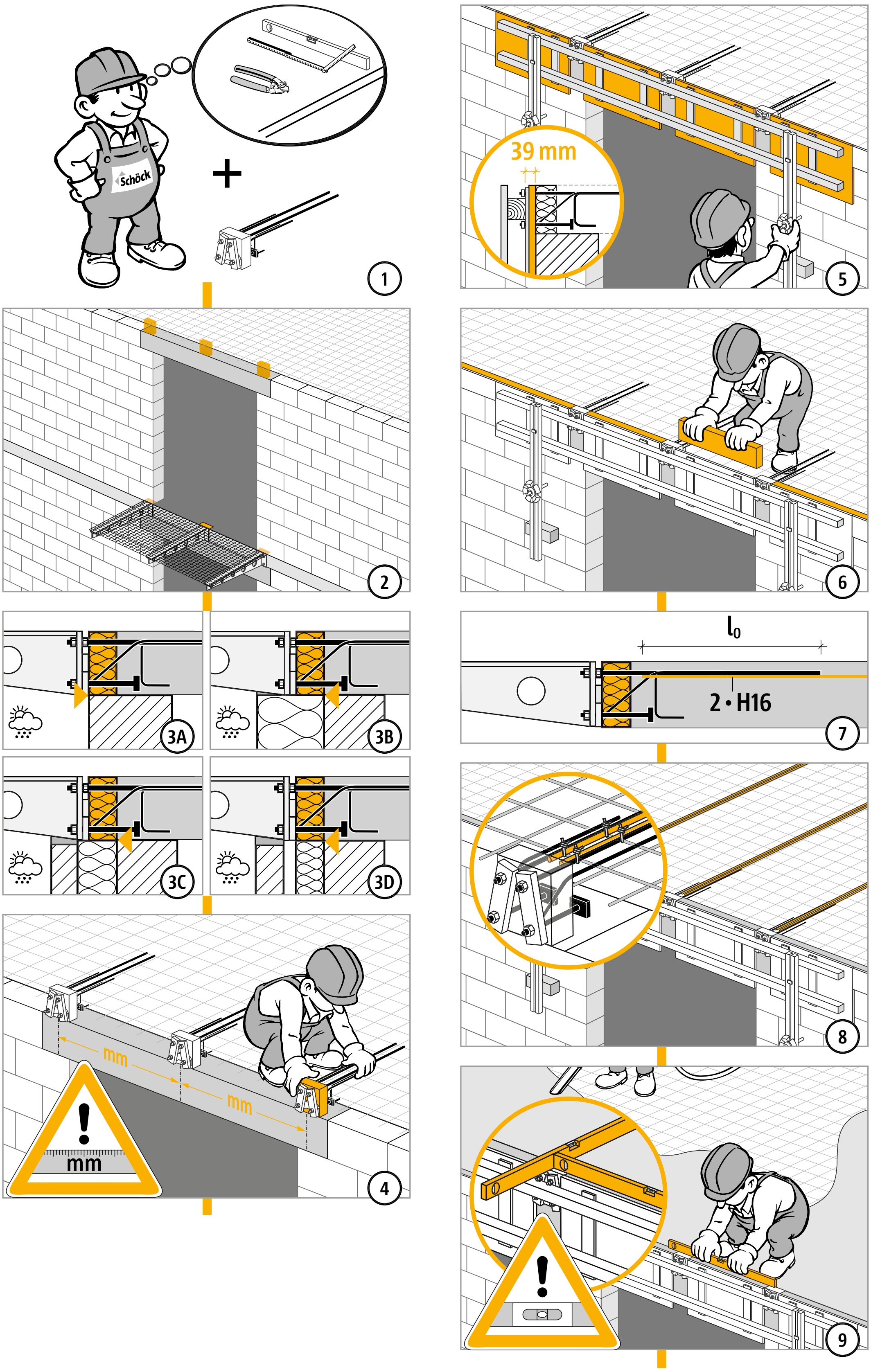
232 V_{Rd} = +10.0 kN (see page 232) > V_{Ed} = +9.1 kN

Design example

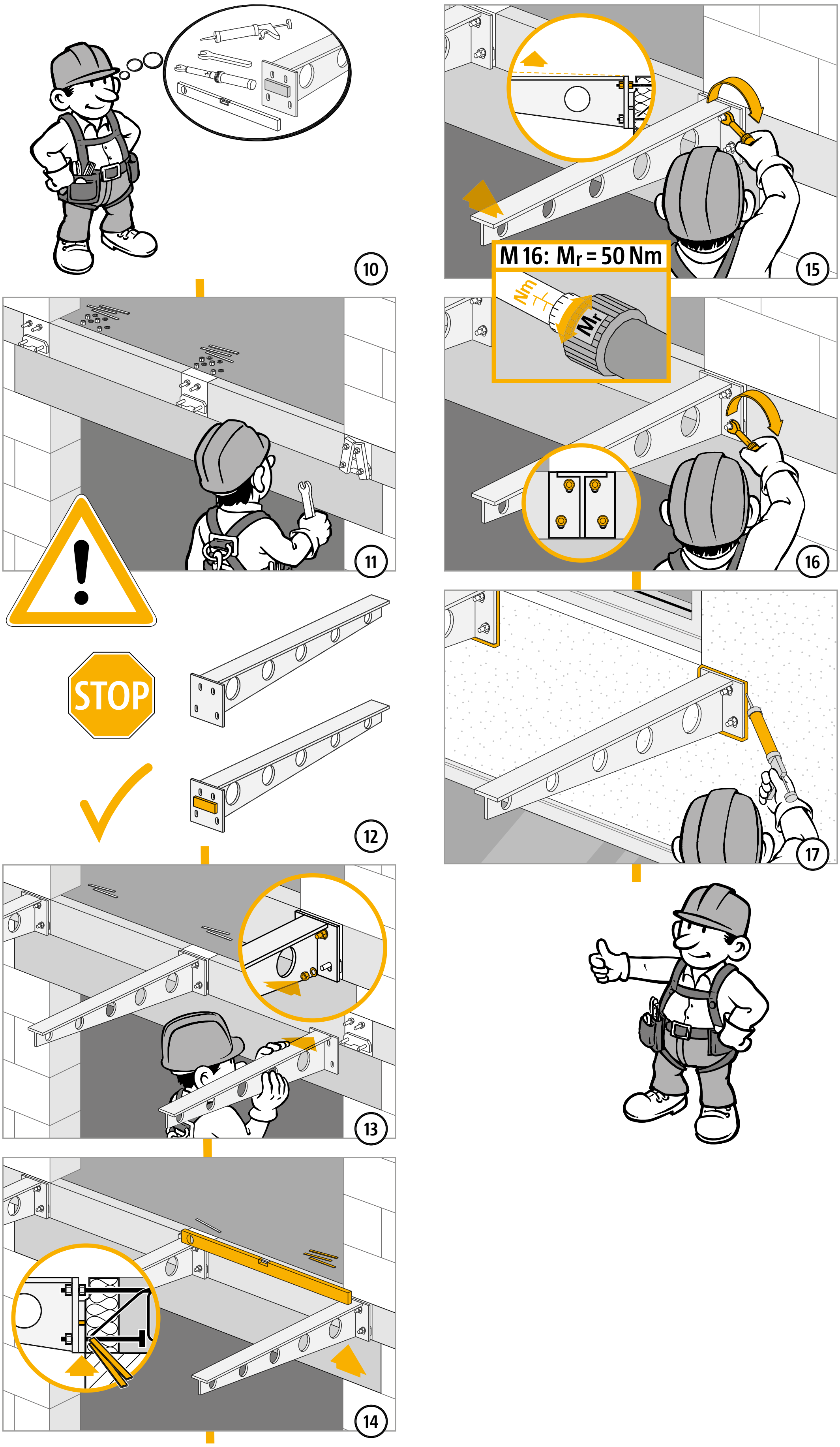
Proof in serviceability limit state (deformation/camber)

Deformation factor:	tan α	= 0.7 (from table, see page 234)	
chosen load combination:	$g + 0.3 \cdot q$		
	(Recommendation for calculating the Schöck Isokorb® camber)		
	Calculate $M_{Ed,GZG}$ in 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	
Expansion joint layout	Balcony length:		4.50 m < 5.70 m
	=> no expansion joints needed		

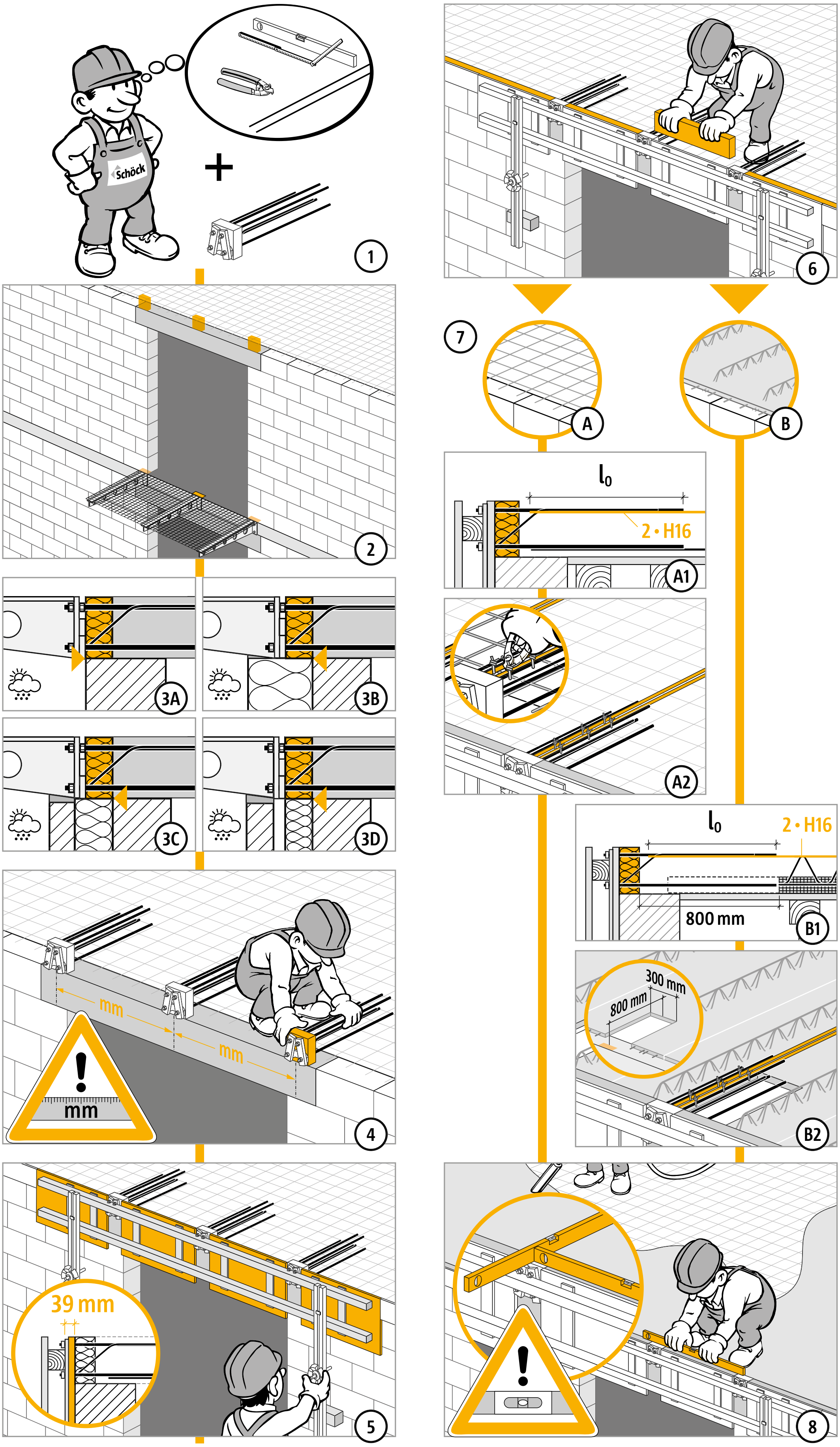
Method statement type KS14, KSXT14 for concrete frame contractor



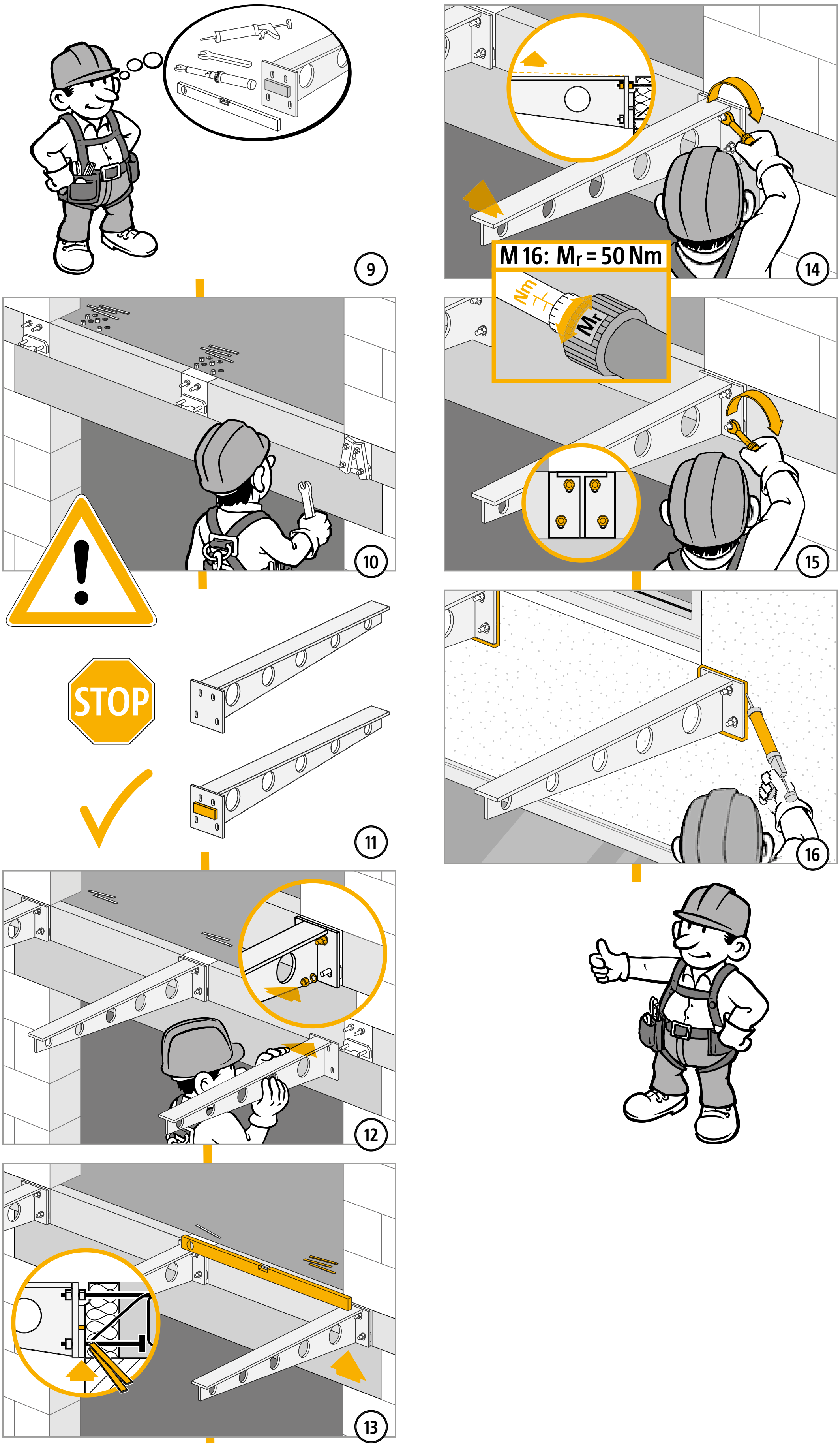
Method statement type KS14, KSXT14 for steel fabricator



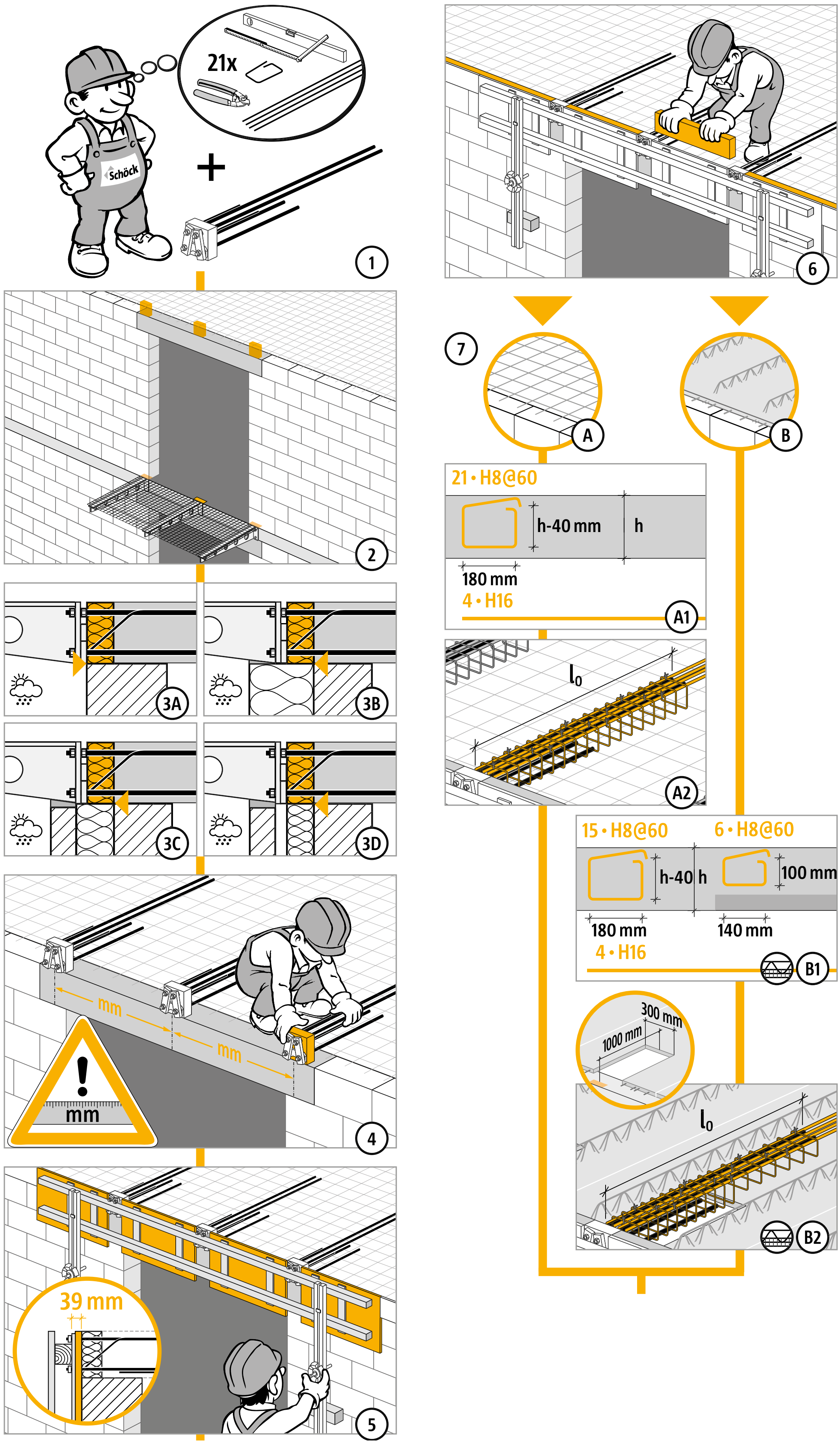
Method statement type KS14-VV, KSXT14-VV for concrete frame contractor



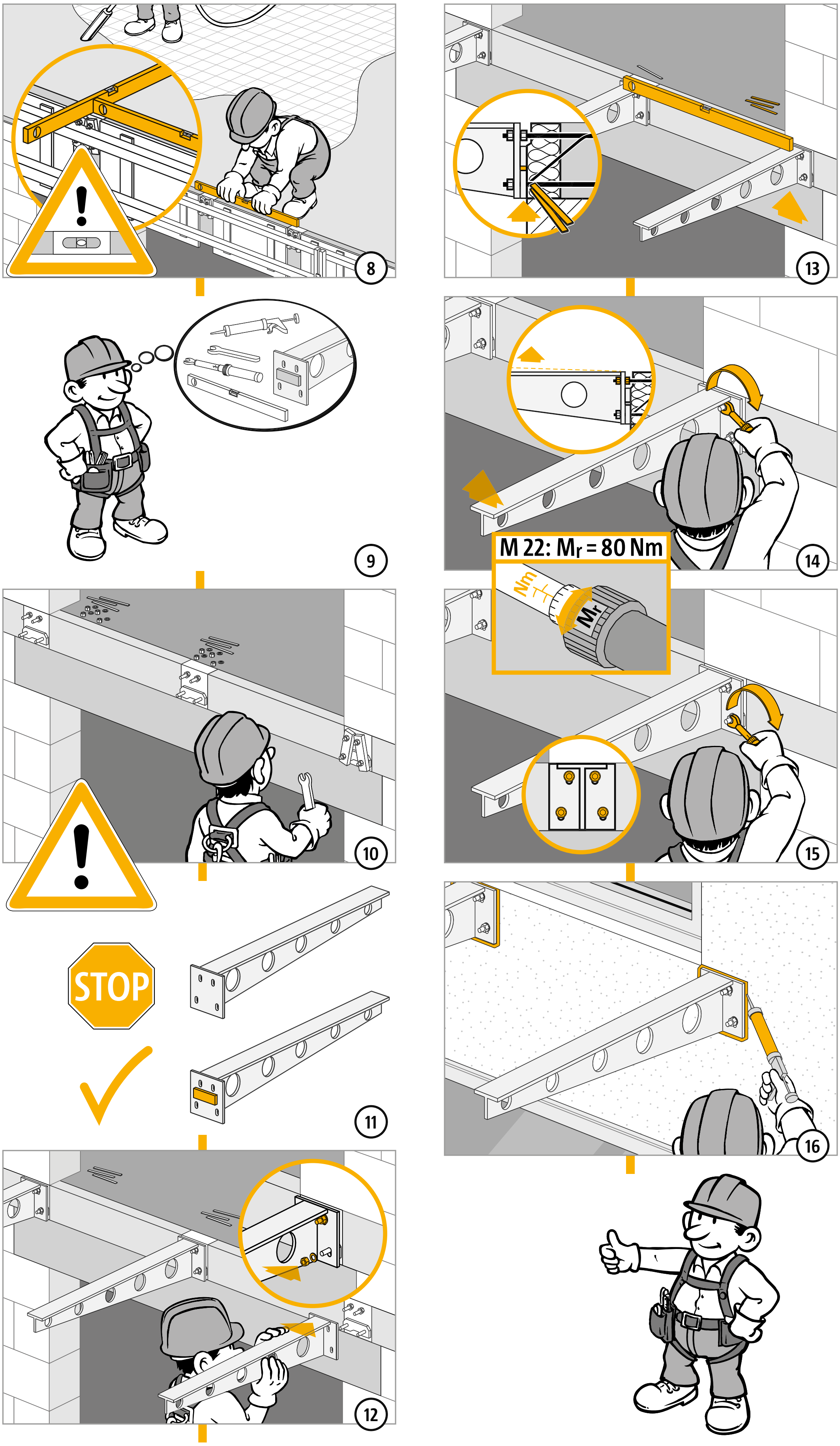
Method statement type KS14-VV, KSXT14-VV for steel fabricator



Method statement type KS20, KSXT20 for concrete frame contractor



Method statement type KS20, KSXT20 for steel fabricator



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?
- ☐ Does a connection to a wall or with height offset necessitate the use of Isokorb® type KS-WU instead of type KS (see page 229) or another special design?
- ☐ 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® type KS 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?

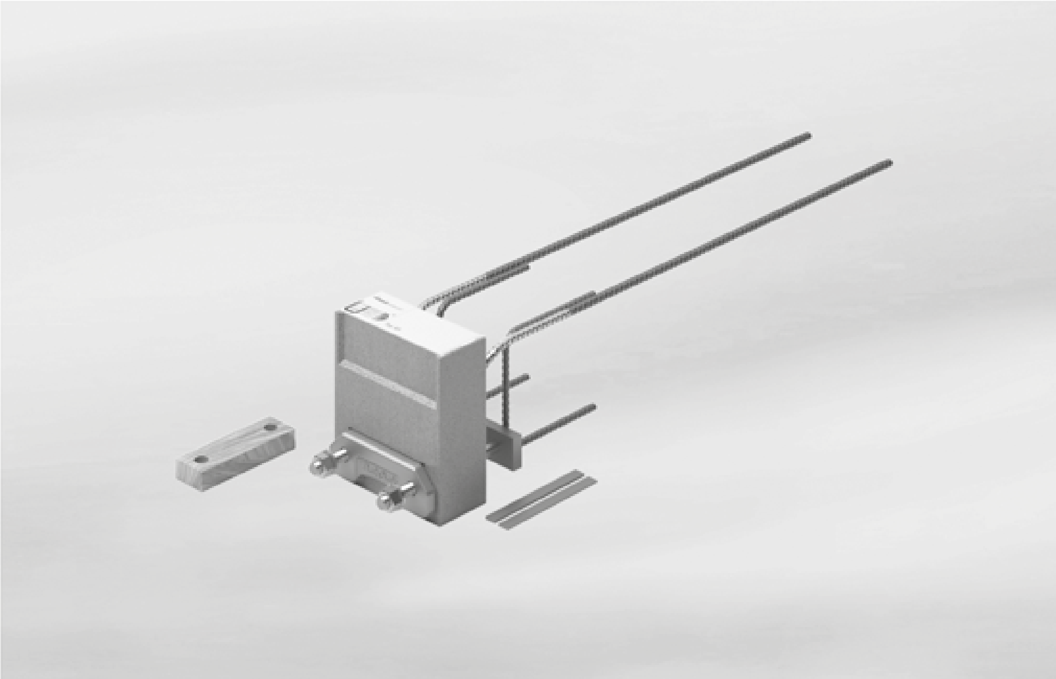
Check list for concrete contractor

- ☐ 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 fabricator 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 fabricators

- ☐ 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?
  KS14 (M16 thread): Mr = 50 Nm
  KS20 (M22 thread): Mr = 80 Nm

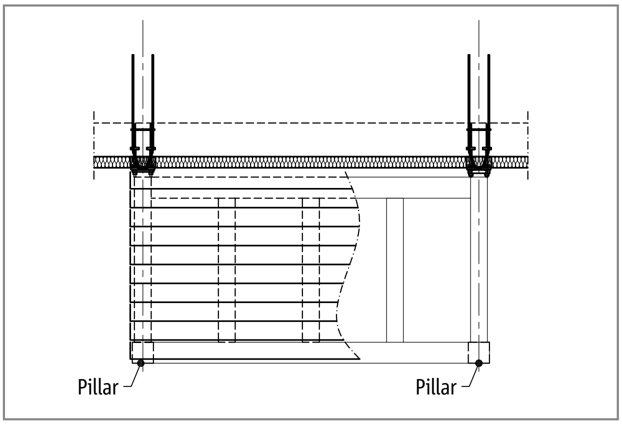
Schöck Isokorb® type QS



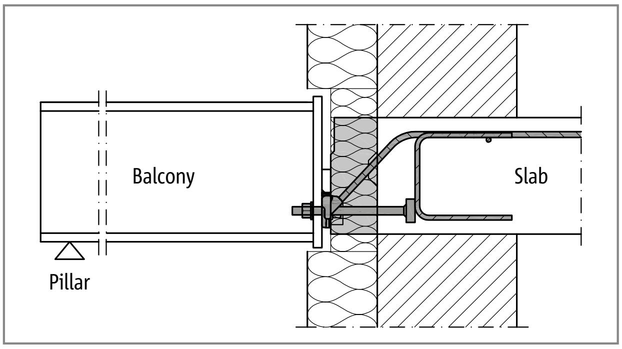
Schöck Isokorb® type QS

Schöck Isokorb® type QS
Suitable for supported steel balconies and canopies. It transfers positive shear forces.

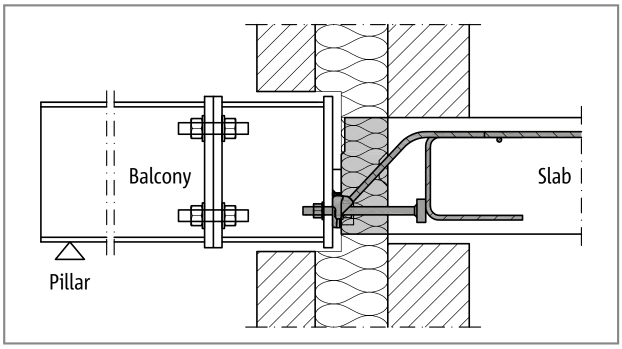
Element arrangement | Installation cross sections



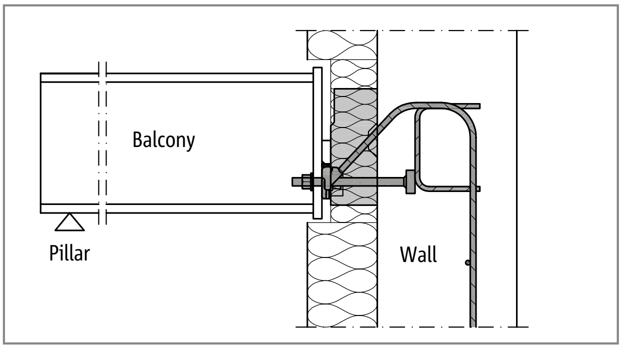
Schöck Isokorb® type QS: Pillar supported balcony



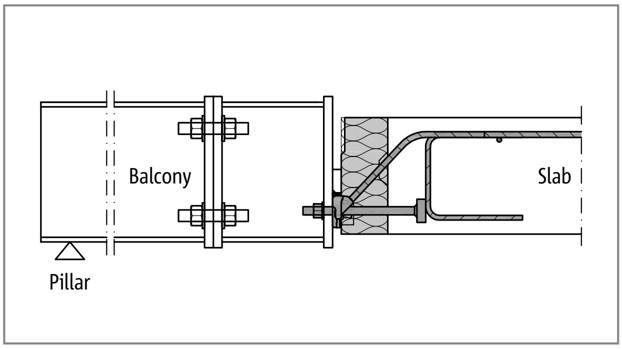
Schöck Isokorb® type QS: Connection to reinforced concrete inner slab; insulating element within the core insulation zone.



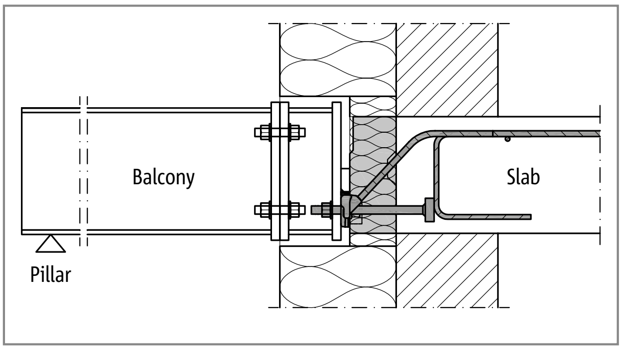
Schöck Isokorb® type QS: Insulating element within the core insulation zone; steel stub adjuster between the Isokorb® and the balcony for flexible construction workflows



Schöck Isokorb® type QS: Special design; needed when connecting to a reinforced concrete wall



Schöck Isokorb® type QS: Steel stub adjuster between the Isokorb® and the balcony supports flexible construction workflows



Schöck Isokorb® type QS: Connection of the steel member to an adapter that equalises the thickness of the outer insulation

QS

Steel/reinforced concrete

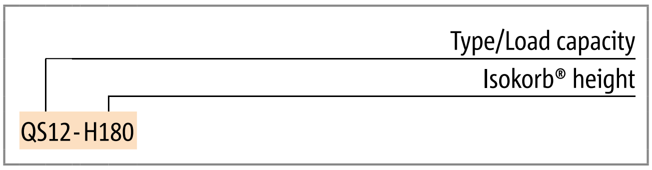
Product selection | Type designations | Special designs | Design force direction

Schöck Isokorb® type QS: Variants

The design of the Schöck Isokorb® type QS can vary as follows:

- Load capacity:
  QS10 or QS12
- Height:
  As per approval: H = 180 mm to H = 280 mm, in 10 mm increments
  The heights are shown in 20 mm increments in this Technical Information to aid clear presentation. Please contact the design support department at Schöck for details of the other heights (H) in which the Isokorb® type QS is available.

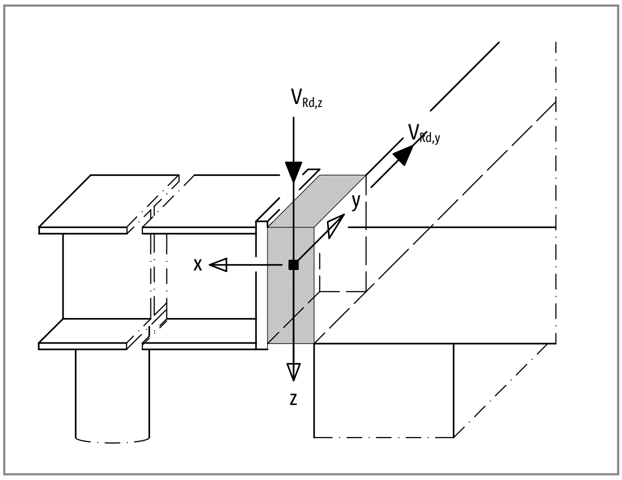
Type designations in planning documents



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).

Direction of forces



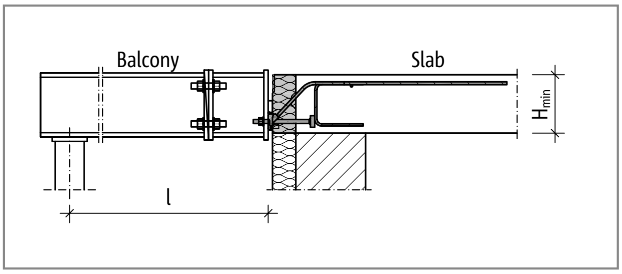
Schöck Isokorb® type QS: Direction of internal forces and moments

Design

Schöck Isokorb® type QS: Design

Area of application of the Schöck Isokorb® type QS covers floor and balcony slab structures with predominantly static, evenly distributed live loads according to BS EN 1991-1-1/NA2 or NA 3. Static verification is to be produced for the components connecting to both sides of the Isokorb®. All Isokorb® type QS variants can transfer positive shear forces parallel to the z axis. The Isokorb® type KS offers solutions for negative (lifting) shear forces.

Schöck Isokorb® type		QS10	QS12
Design values with		Concrete strength class ≥ C25/30	
		$V_{Rd,z}$ [kN/element]	
Isokorb® height H [mm]	180 - 280	48.3	69.6
		$V_{Rd,y}$ [kN/element]	
	180 - 280	±4.0	±6.5



Schöck Isokorb® type QS: 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® type QS, 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 EN 1992-1-1 (EC2), 4.4.1 and EN 1992-1-1/NA is 20 mm for internal areas.

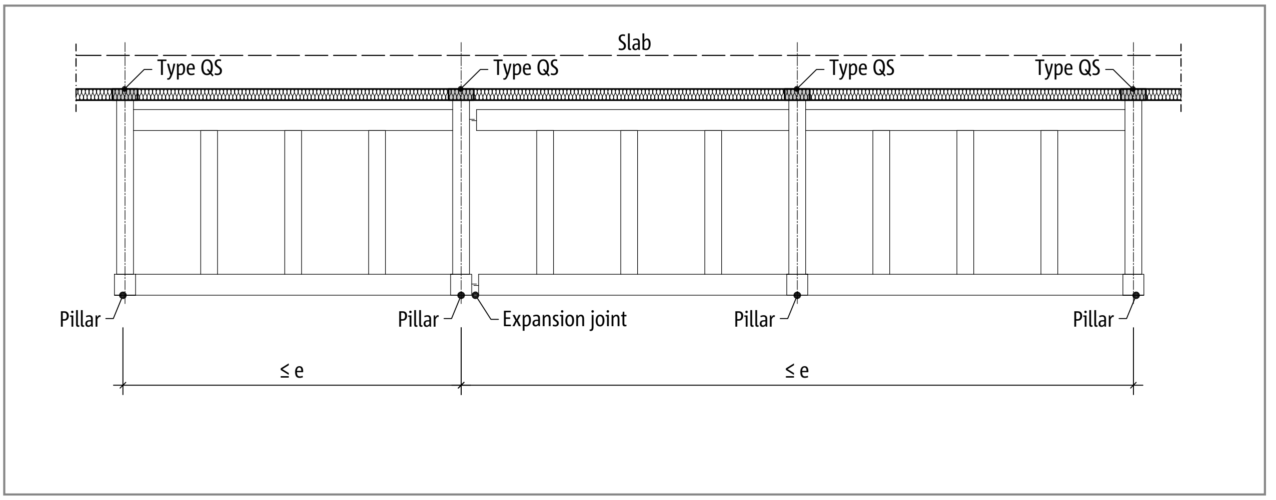
QS

Steel/reinforced concrete

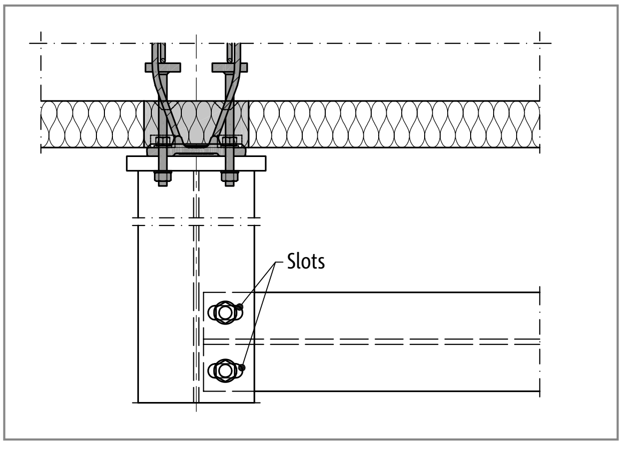
Expansion joint spacing

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® type QS. 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.



Schöck Isokorb® type QS: Maximum expansion joint spacing e



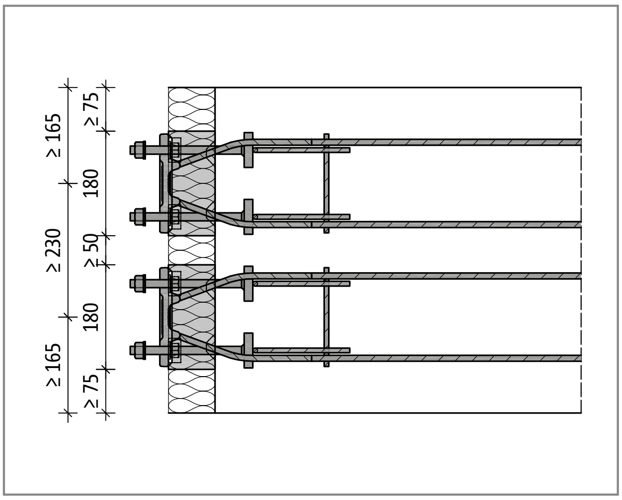
Schöck Isokorb® type QS: Expansion joint detail to ensure movement during temperature expansion

Schöck Isokorb® type		QS
Maximum expansion joint spacing e		e [m]
Insulating element thickness [mm]	80	5.7

Edge spacing

Edge and axis spacing

The positioning of the Schöck Isokorb® type QS must ensure compliance with minimum edge spaces relating to the inner reinforced concrete component and minimum axis spacing from one Isokorb® to the next:

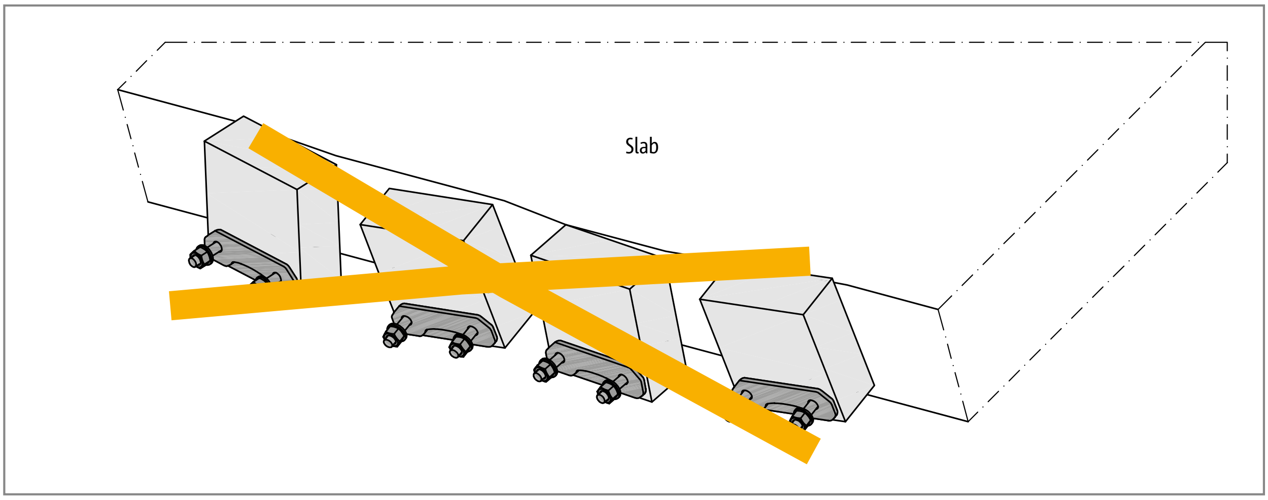


Schöck Isokorb® type QS: Axis spacing between elements and edges

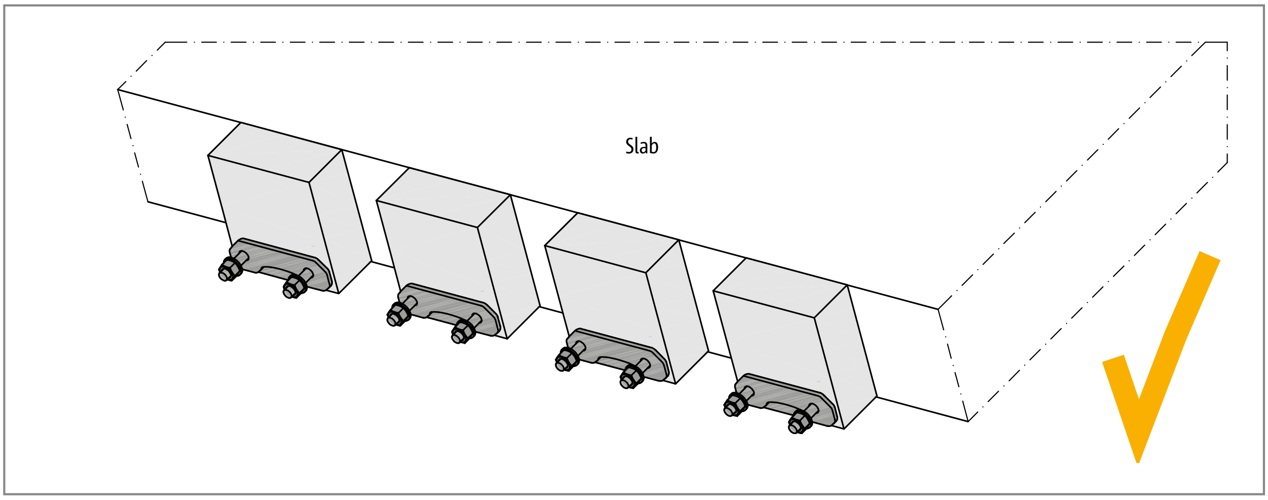
Edge and axis spacing

- Please contact the design support department if you have connections that are not possible with the edge and axis spacing shown in this information (contact details on page 3).
- With the exceeding of the edge or axis spacing the load-bearing capacity of the type QS is to be reduced.
- Please contact the design support department at Schöck for the reduced design values.

Installation accuracy



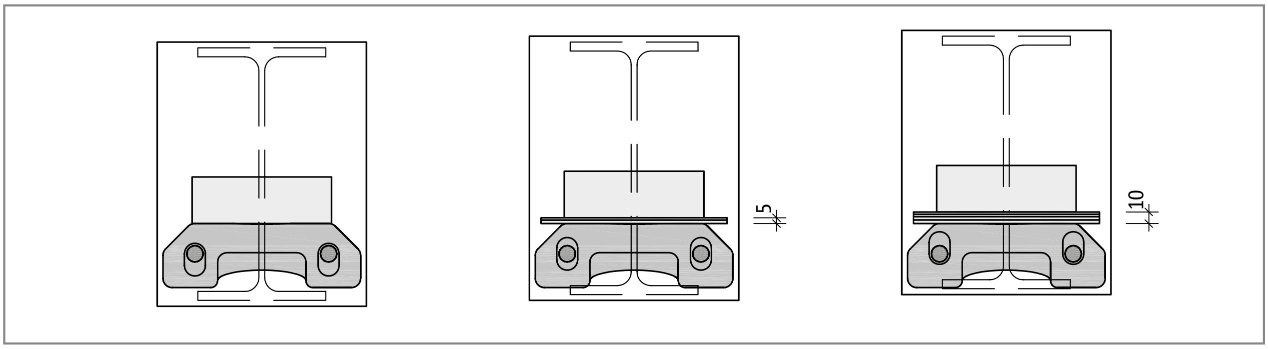
Schöck Isokorb® type QS: Twisted and displaced elements that were poorly secured while the concrete was being poured



Schöck Isokorb® type QS: Reliable and correct setting while pouring the concrete ensures the tolerance accuracy is maintained.

Since the Schöck Isokorb® type QS creates an interface between a steel component and a reinforced concrete component, the issue of tolerance is particularly important when installing type QS. DIN 18202:2013-04 "Tolerances in building construction" must be observed in this respect! It specifies the crucial inclusion of limit deviations relating to the necessary installation position of the Schöck Isokorb® type QS. A method of work must be agreed between project engineer, concrete contractor and steel fabricator to ensure acceptable tolerances are met. Special consideration should be given to the limitations of the steel fabricator's ability to overcome excessive dimensional differances without undertaking additional work.

Adjusting the height of the steel member:



Schöck Isokorb® type KS: 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 type KS; using this as a starting level will allow vertical tolerance of ±5 mm

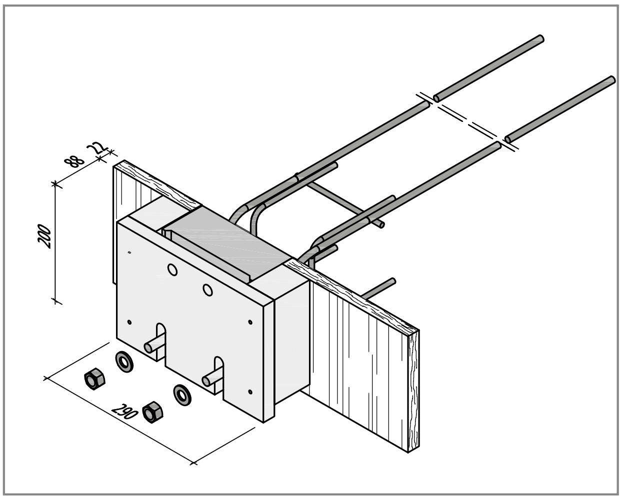
Installation accuracy

Information on installation accuracy

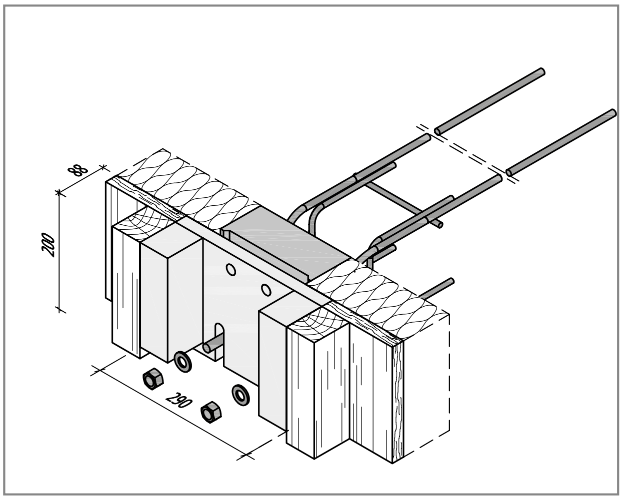
- Design constraints limit the vertical tolerance to 10 mm with the Schöck Isokorb® type QS.
- Horizontal limit deviations for the separation of the type QS axes must be specified, as must the limit deviations from the alignment. Torsional limits must also be specified.
- The use of a template developed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

Installation aid (optional)

An installation aid is optionally available from Schöck to improve installation accuracy.



Schöck Isokorb® type QS: Representation with installation aid



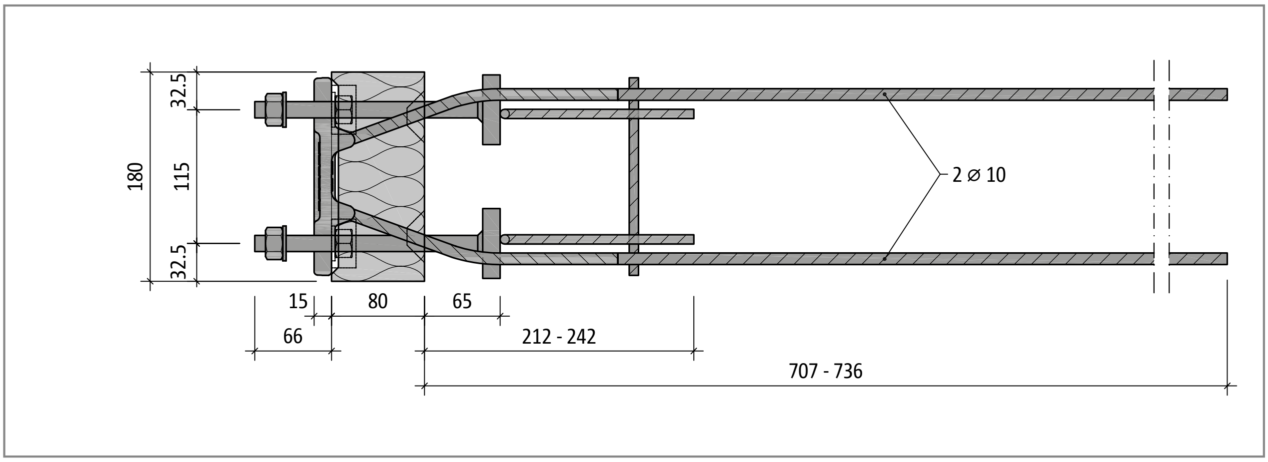
Schöck Isokorb® type QS: Installation aid installed in reverse to enable gap-less insulation of the slab edge on monolithic walls.

The optional installation aid for the Schöck Isokorb® type QS is factory assembled from a timber board and two square timbers. It holds the Isokorb® securely in place before and while pouring the concrete. When using the aid in "positive position" (see Fig. above left), it is matched to standard 22 mm formwork. If using formwork of a different thickness, the installation aid needs to be modified on site.

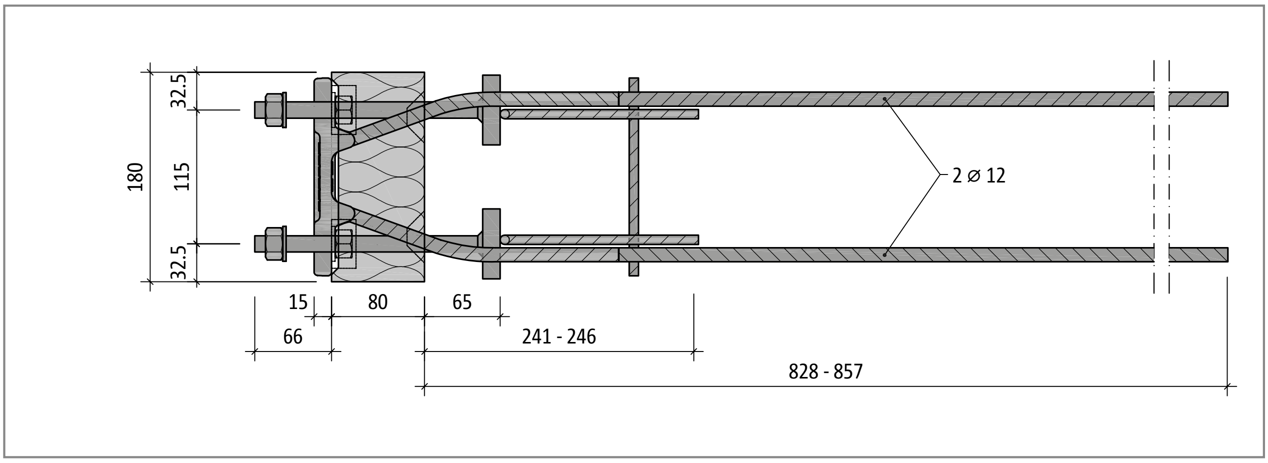
Notes on the installation aid

- Please contact your regional manager if you have questions regarding the installation of the Schöck Isokorb®. They can also help directly on site if the installation conditions are difficult (contact: www.schoeck.co.uk/en_gb/regional-sales-manager).
- The KS14 H180-220 installation aid is 200 mm high. It is suitable for versions H180 to H220 of the Schöck Isokorb® types QS10 and QS12.
- The Schöck installation aid and the on-site formwork can be combined to form templates that ensure the dimensionally accurate installation of the Isokorb® type QS.

Product description



Schöck Isokorb® type QS10: Plan view

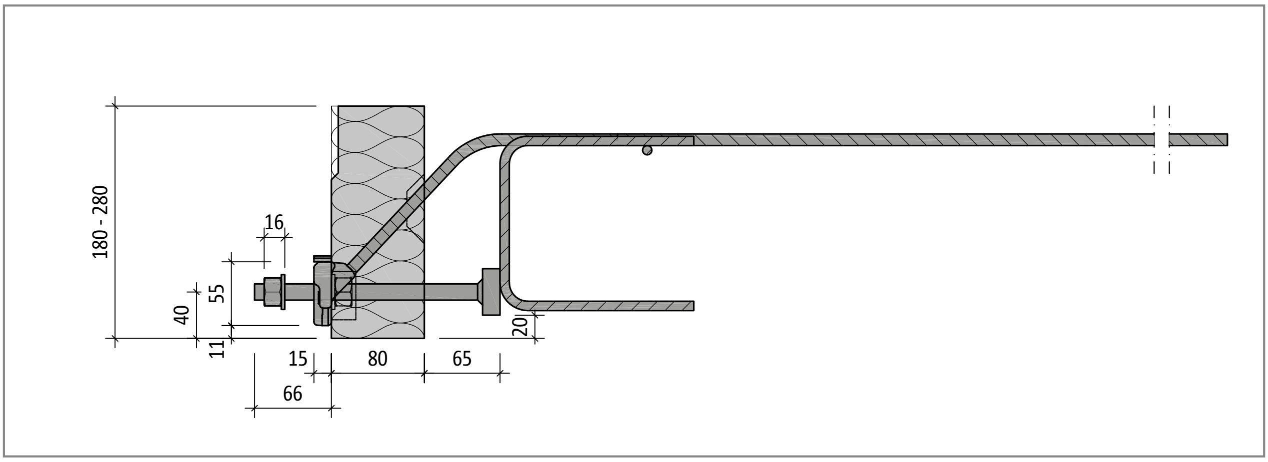


Schöck Isokorb® type QS12: Plan view

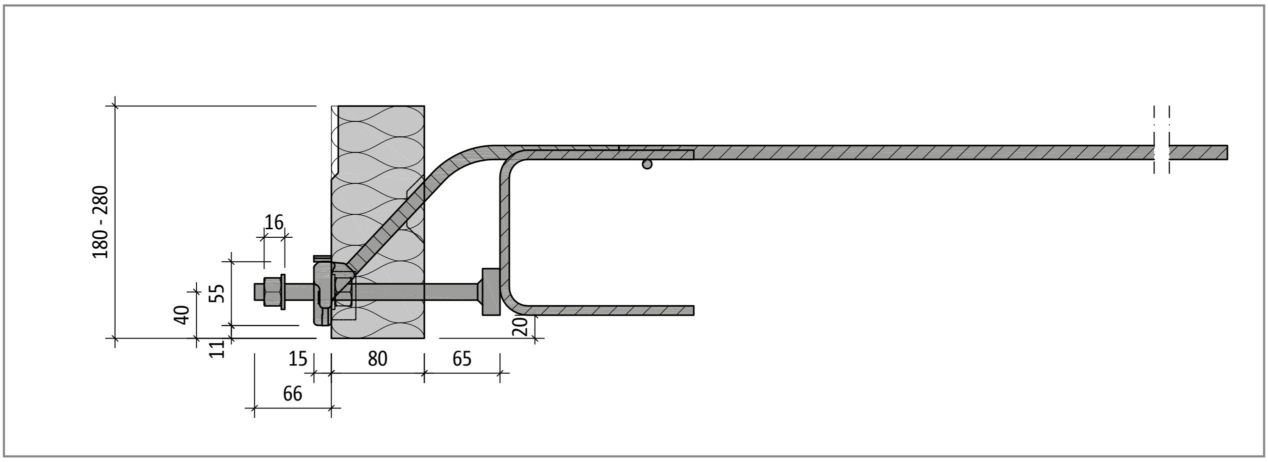
Product information

- The free clamping distance on type QS is 30 mm.

Product description | On-site fire resistance



Schöck Isokorb® type QS10: Cross section of the product

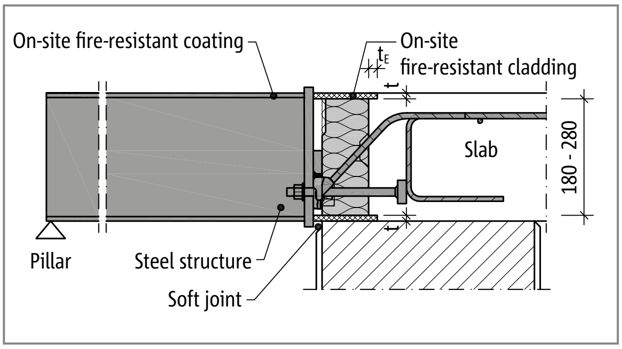


Schöck Isokorb® type QS12: Cross section of the product

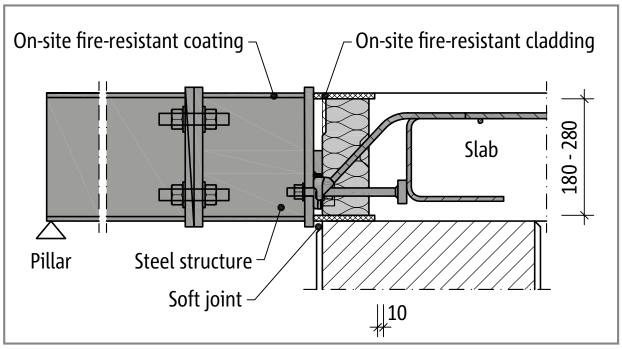
Product information

- The free clamping distance on type QS is 30 mm.

Fire protection



Schöck Isokorb® type QS: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant coating; section

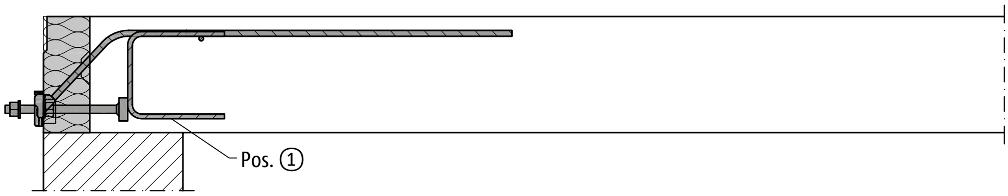


Schöck Isokorb® type QS: On-site fire-resistant cladding of the connection when using steel structures with fire-resistant coating; section

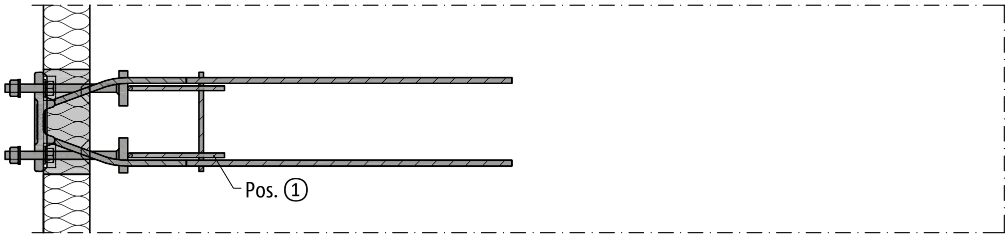
Fire-resistant cladding of the Schöck Isokorb® must be planned and installed on site. The same on-site fire safety measures apply as for the overall load-bearing structure.

On-site reinforcement - In-situ concrete construction

Schöck Isokorb® type QS



Schöck Isokorb® type QS: On-site reinforcement: Cross section



Schöck Isokorb® type QS: On-site reinforcement: Plan view

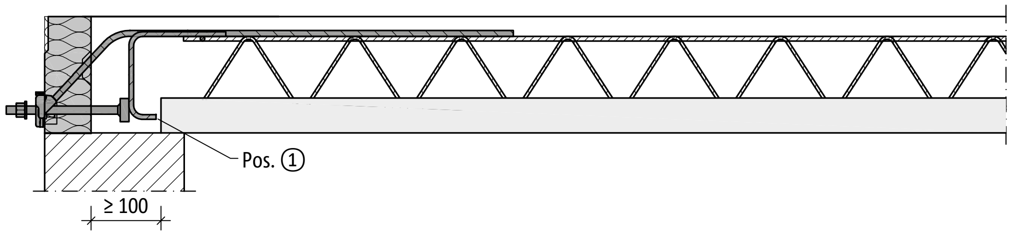
Schöck Isokorb® type			QS
On-site reinforcement	Type of bearing	Height H [mm]	Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure
Pos. 1 Edge and splitting tension reinforcement			
Pos. 1	direct/indirect	180 - 280	included with the product

Information about on-site reinforcement

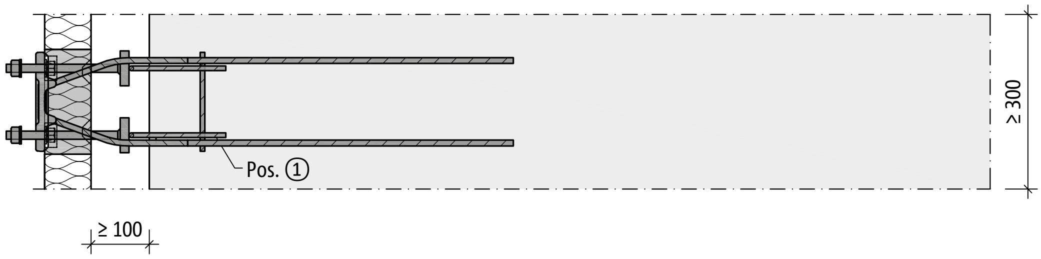
- The straight legs of the shear force rods must be lapped to the reinforced concrete slab reinforcement. The lap lengths must comply with EN 1992-1-1 (EC2), Section 8.4.

On-site reinforcement - Precast construction

Schöck Isokorb® type QS



Schöck Isokorb® type QS: On-site reinforcement for semi-precast construction: Cross section



Schöck Isokorb® type QS: On-site reinforcement for semi-precast construction: Plan view

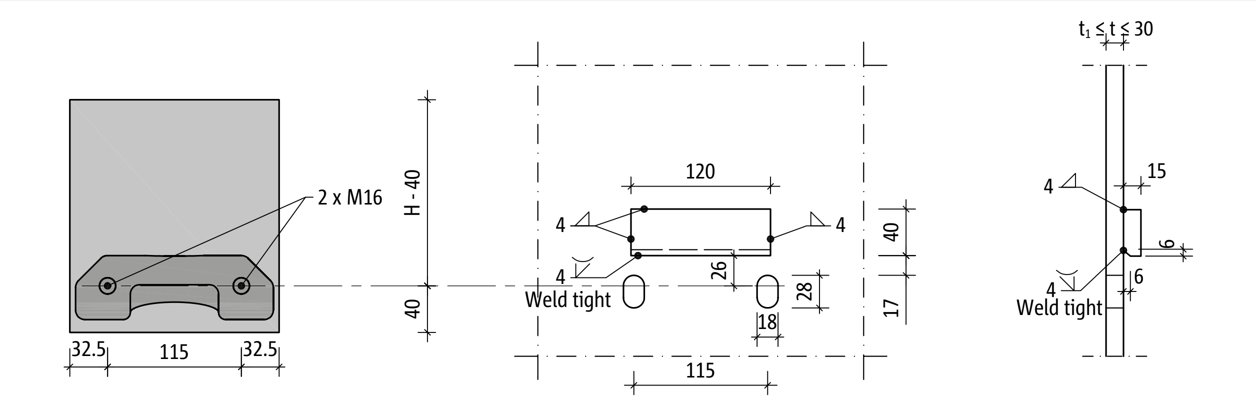
Schöck Isokorb® type			QS
On-site reinforcement	**Type of bearing**	**Height H [mm]**	**Floor slab (XC1) concrete grade ≥ C25/30 Balcony steel structure**
Pos. 1 Edge and splitting tension reinforcement			
Pos. 1	direct/indirect	180 - 280	included with the product, alternative version with on-site stirrups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

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 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.

Fixing Plate

Type QS for transferring positive shear forces



Schöck Isokorb® type QS: 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® type QS, which is 30 mm.

Fixing Plate

- The slots on the diagram can be used to raise the fixing plate by up to 10 mm.If this tolerance is not sufficient, larger slots could be used; this must be examined on a case by case basis.
- If horizontal forces $V_{Ed,y} > 0{,}342 \cdot \text{min. } V_{Ed,z}$ parallel to the insulation joint occur, the front slab must be modified with ⌀18 mm 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: QS10, QS12 (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.

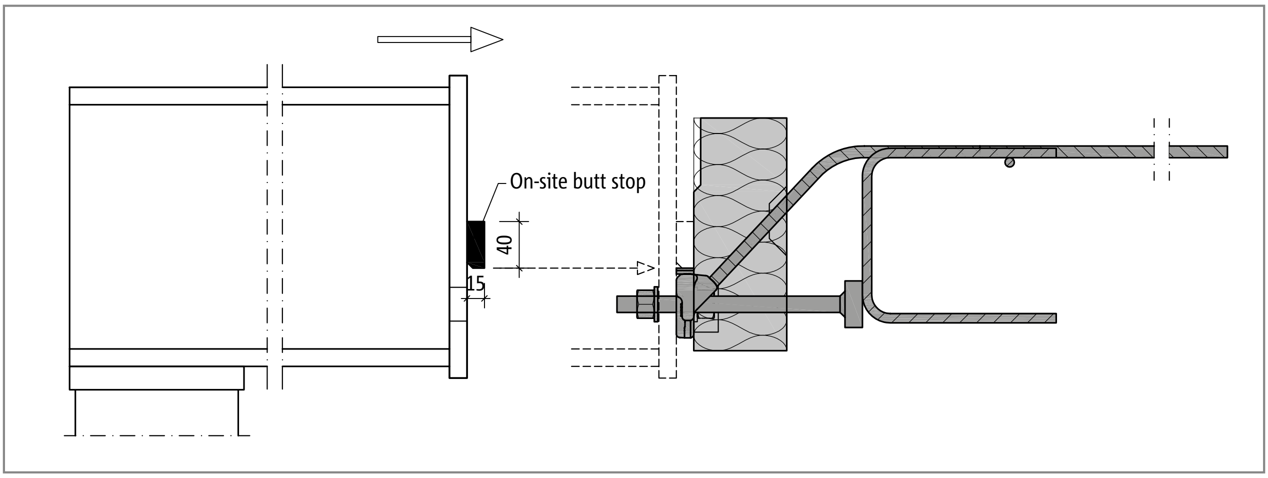
QS

Steel/reinforced concrete

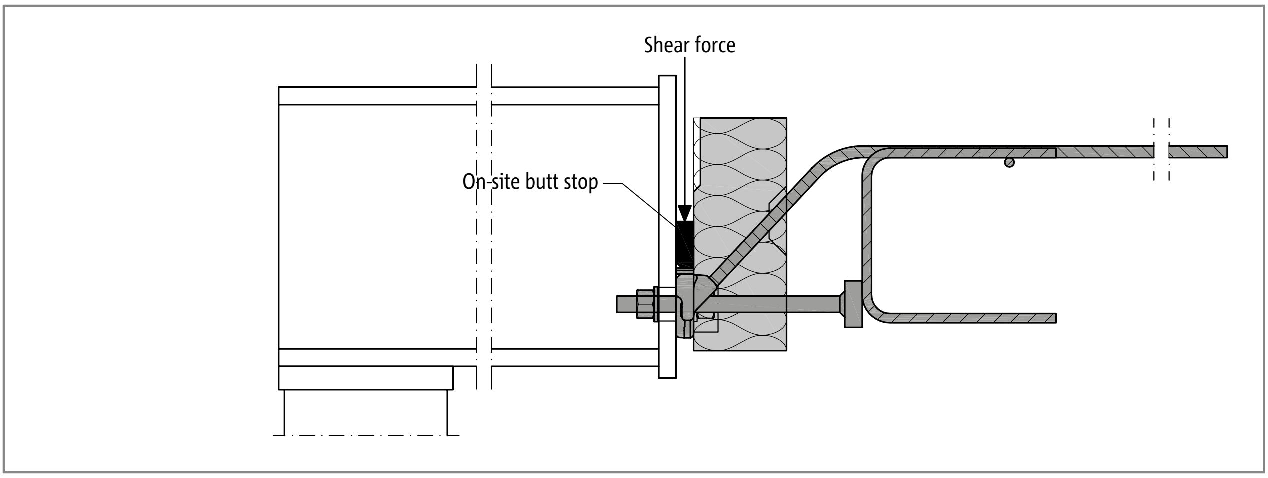
On-site butt stop

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® type QS! The spacer shims supplied by Schöck are used for vertical adjustment between butt stop and Schöck Isokorb®.



Schöck Isokorb® type QS: Mounting the steel member

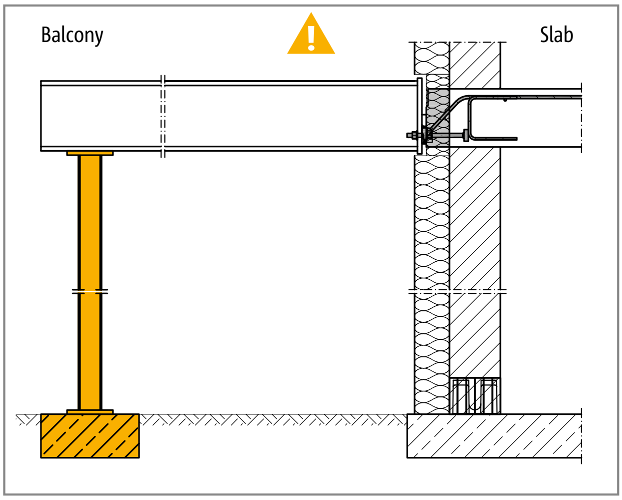


Schöck Isokorb® type QS: On-site butt stop for transferring shear forces

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!

Type of bearing: supported



Schöck Isokorb® type QS: Continuous support needed

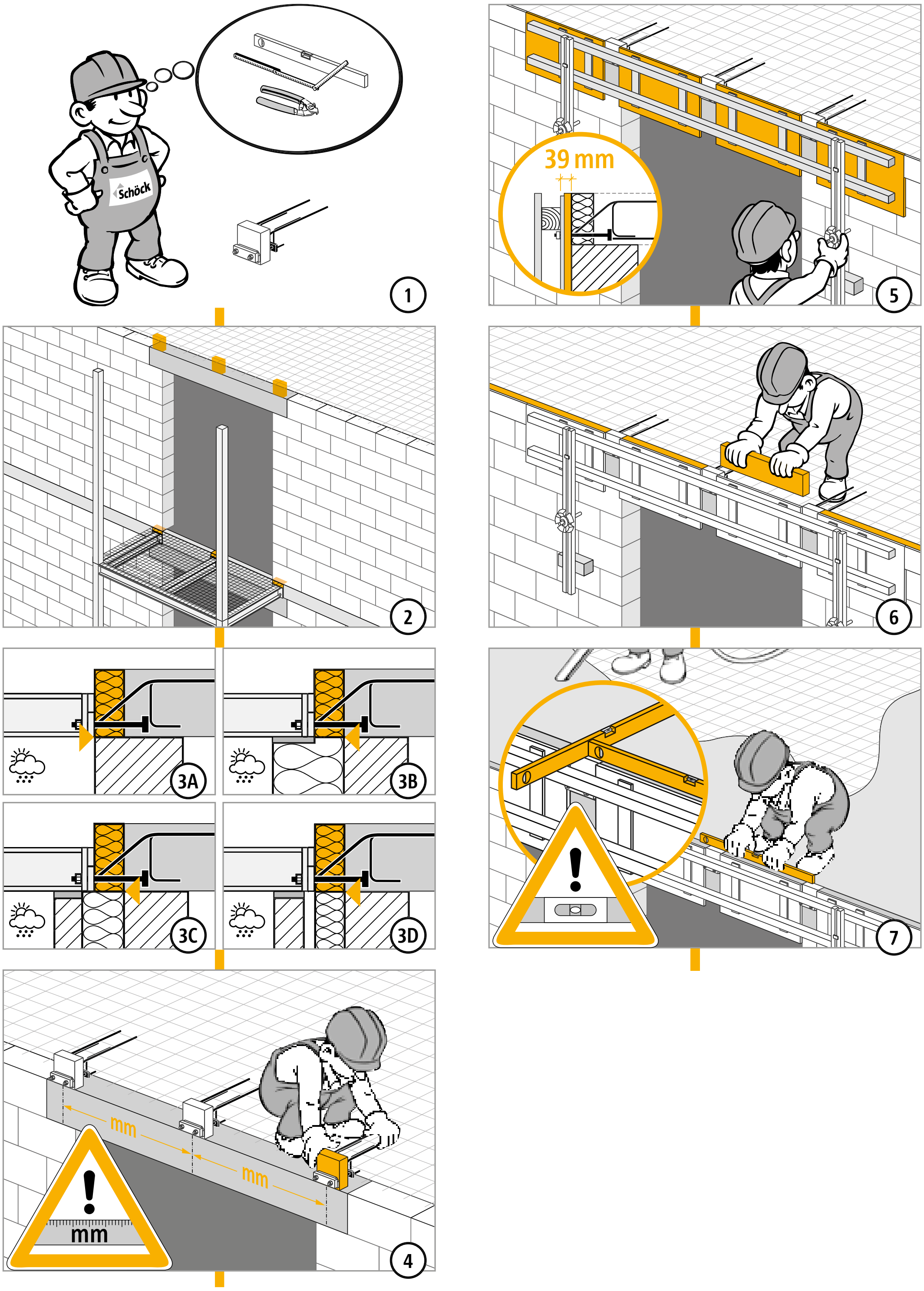
Supported balcony

Schöck Isokorb type QS was developed for supported balconies. It only transfers shear forces, no bending moments.

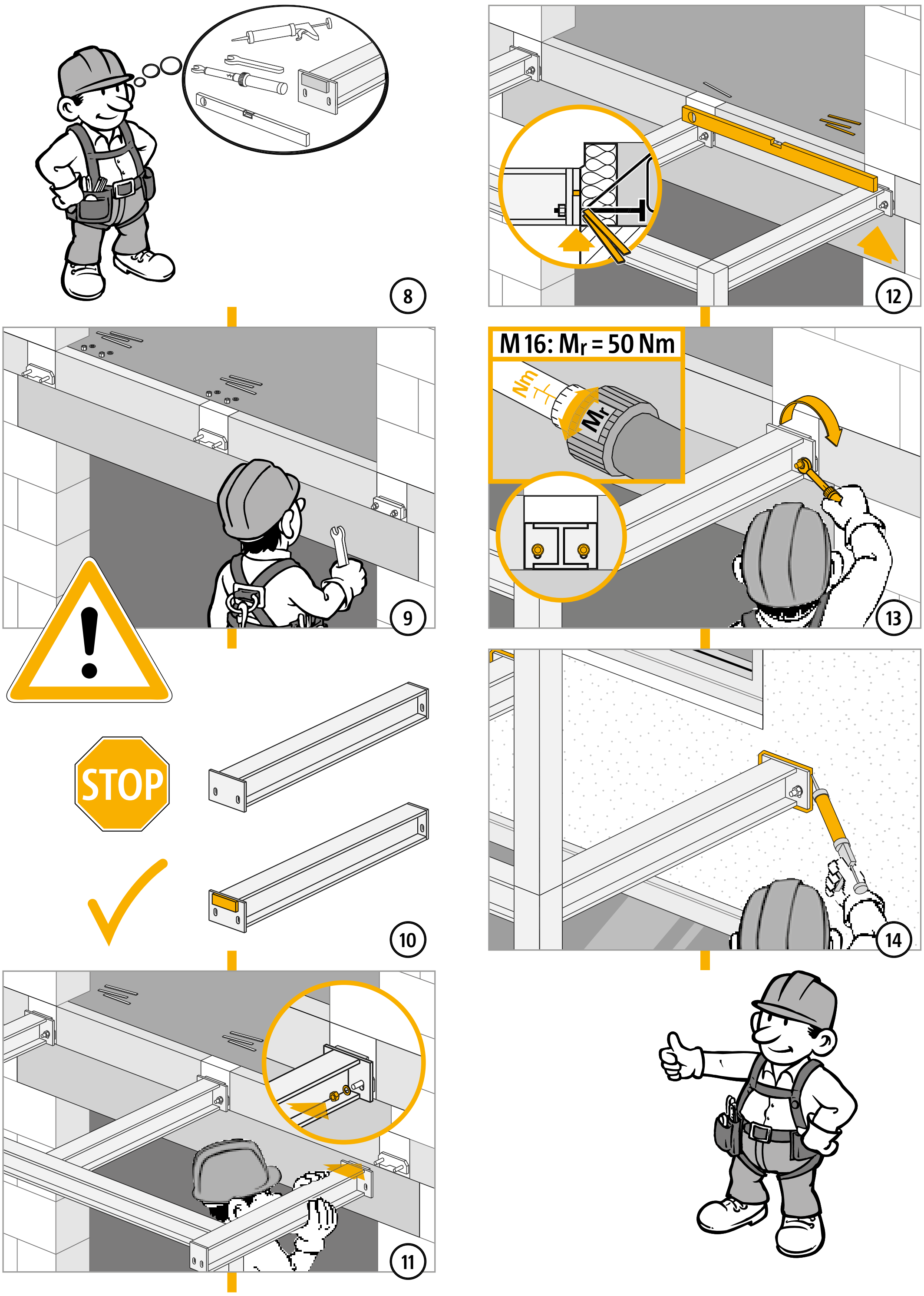
Warning - omitting the pillars

- The balcony will collapse if not supported.
- At all stages of construction, the balcony must be supported with statically suitable pillars or supports.
- Even when completed, the balcony must be supported with statically suitable pillars or supports.
- The temporary supports must not be removed until the final support structure has been put in place.

Method statement for concrete frame contractor



Method statement for steel fabricator



Check list

Check list for structural engineers

- ☐ Has the right type of Schöck Isokorb® been selected for the static system? Type QS is a connection purely for shear forces (moment joint).
- ☐ 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?
- ☐ Does a connection to a wall or with height offset necessitate the use of Isokorb® type QS-WU instead of type QS (see page 261) 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® type QS in precast element slabs?
- ☐ Has reasonable agreement been reached between the concrete contractor and steel fabricator with regard to the accuracy of installation of the Isokorb® type QS?
- ☐ 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 fabricator to discuss the required accuracy of the Isokorb® installation?

Check list for steel fabricators

- ☐ 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?
  QS10, QS12 (M16 thread): Mr = 50 Nm

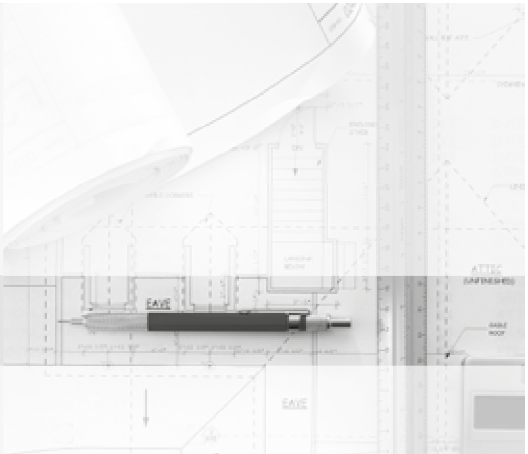
Building physics

Reinforced concrete/reinforced concrete

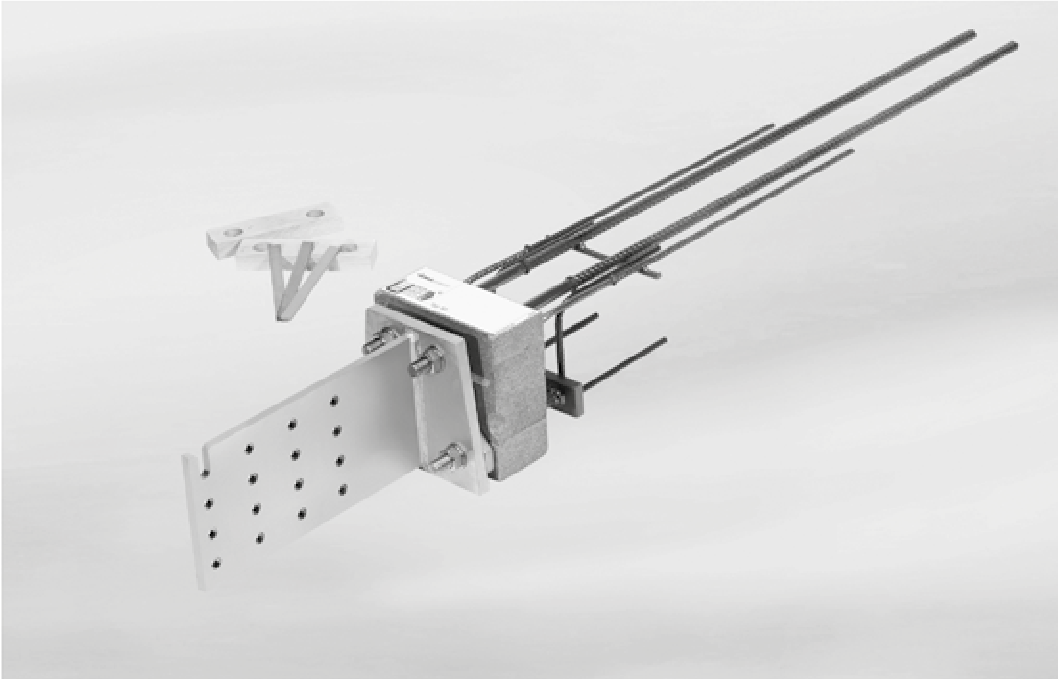
Steel/reinforced concrete

Timber/reinforced concrete

Steel/steel



Schöck Isokorb® type KSH



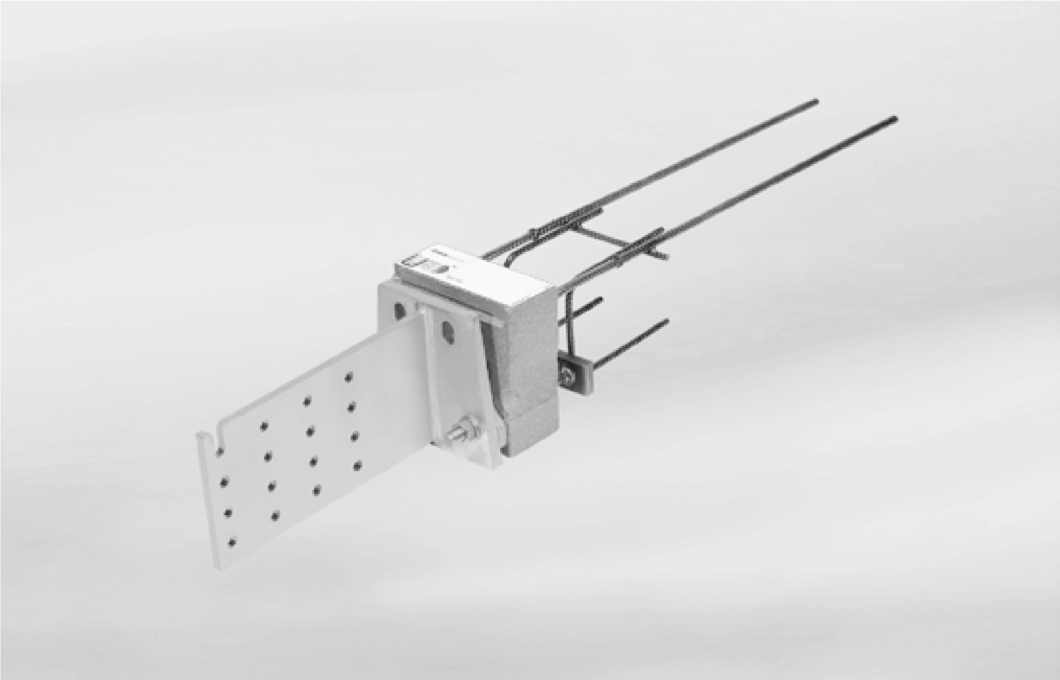
Schöck Isokorb® type KSH

Schöck Isokorb® type KSH
Suitable for cantilevered timber balconies. It transmits negative moments and positive shear forces.

Type KSH

- Further information on the Schöck Isokorb® type KSH can be requested from the application engineering dept. (Contact see page 3).

Schöck Isokorb® type QSH



Schöck Isokorb® type QSH

Schöck Isokorb® type QSH
Suitable for supported timber balconies. It transmits positive shear forces.

Type QSH

- Further information on the Schöck Isokorb® type QSH can be requested from the application engineering dept. (Contact see page 3).

Schöck Isokorb® type KST
Materials/Anti-corrosion protection/Fire protection

Schöck Isokorb® type KST - materials

Plates and sections

Chemical composition Mo-Cr-Ni-austenitic stainless steel compliant with any of BS EN 10088 grades 1.4401, 1.4404 and 1.4571 (Choice of Grade at Manufacturer's Discretion).

Mechanical properties In accordance with BS EN 10088 – except for the following components where Schöck only accept material with mechanical properties in excess of those required for compliance with BS EN 10088.

Component	Required minimum 0.2 % proof stress (N/mm²)	Required ultimate tensile stress (N/mm²)	Required minimum elongation after fracture (%)
Rectangular hollow section	355	600	30
12 mm pressure plate (QST module)	275	550	40

Threaded fasteners

Grade A4-70 to BS EN ISO 3506 (corrosion resistance equivalent to BS EN 10088 Grade 1.4401)
Grade A5-70 to BS EN ISO 3506 (corrosion resistance equivalent to BS EN 10088 Grade 1.4571)

Insulation material

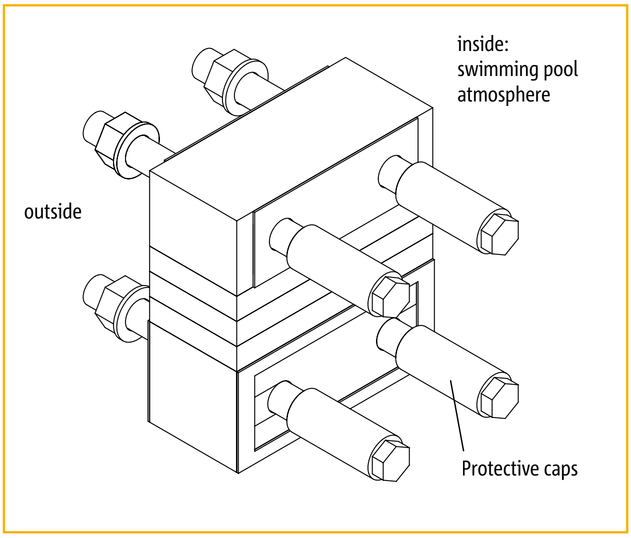
Polystyrene hard foam (Neopor ®) λ = 0.031 W/(m × K)

Anti-corrosion protection

- The stainless steel used for Schöck Isokorb® type KST corresponds to the material no.: 1.4401, 1.4404 or 1.4571. So the KST unit componenets will have a typical corrosion resistance expected for Mo-Cr-Ni austenitic stainless steels. This can be more accurately quantified by reference to specialist literature such as SCI Publication P291 – Structrural Design of Stainless Steel.

- Bimetallic corrosion
  Using Schöck Isokorb® type KST in conjunction with a galvanised or paint treated front plate there is no concern regarding bimetallic corrosion. Since in this application the area of the galvanised steel is greater than the area of the stainless steel (bolts, washer and butt stop) bimetallic corrosion that could lead to failure can be excluded as far as Schöck products are concerned.

- Stress corrosion cracking
  An appropriate Schöck protection system needs to be provided in environments with a high chlorine content (e.g. inside indoor swimming pools, ...). For further information about atmospheric application see Steel Construction Institute Publication P291 – Structural design of stainless steel, table 2.6. For more information please contact our design department telephone 0845 241 3390.



Schöck system-solution for protection in high chlorine environments

Fire protection

The same on-site fire safety measures that apply to the overall load-bearing structure also apply to any freely accessible components of the Schöck Isokorb® type KST or to any components situated inside the insulating layer.
For more information please contact our design department telephone 0845 241 3390.

Schöck Isokorb® type KST

Schöck Isokorb® type KST

Contents **Page**

Schöck Isokorb® type KST

Element arrangements/Connection layouts

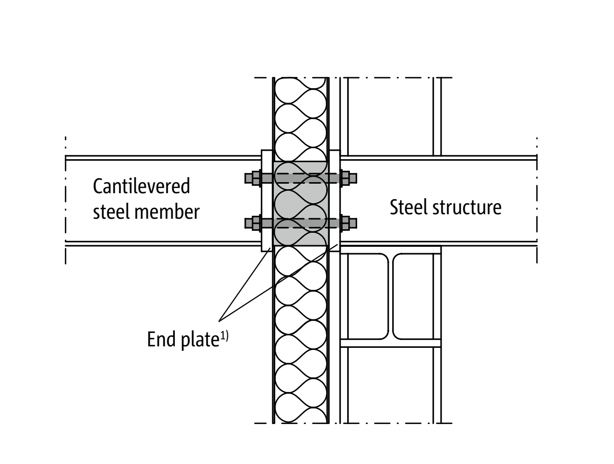


Figure 1: Schöck Isokorb® type KST for cantilevered steel structures

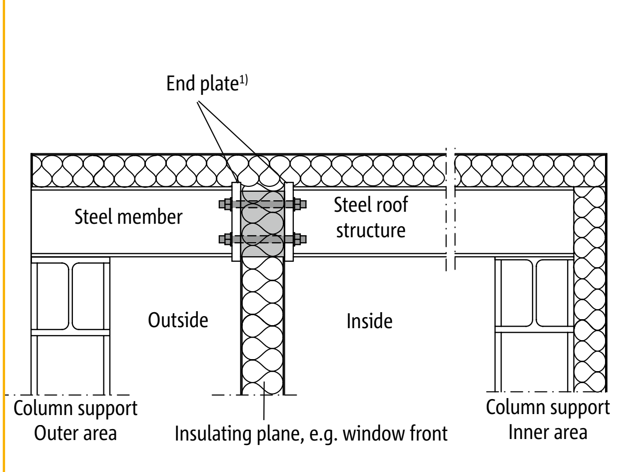


Figure 2: Schöck Isokorb® type KST for separation within the structural system

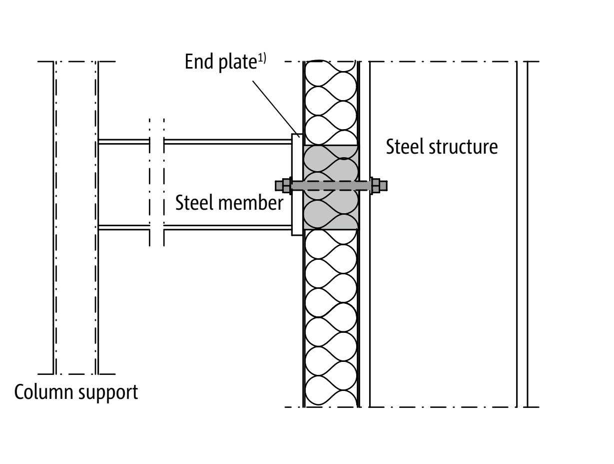


Figure 3: Schöck Isokorb® module, type KST-QST/KST-ZQST for supported steel structures

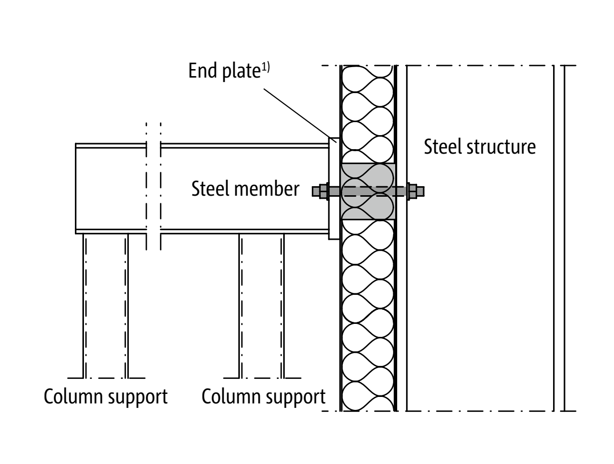


Figure 4: Schöck Isokorb® KST-ZST module for restrained steel structures

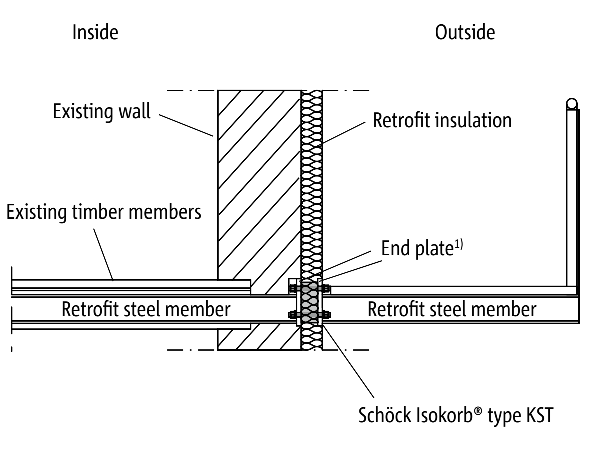
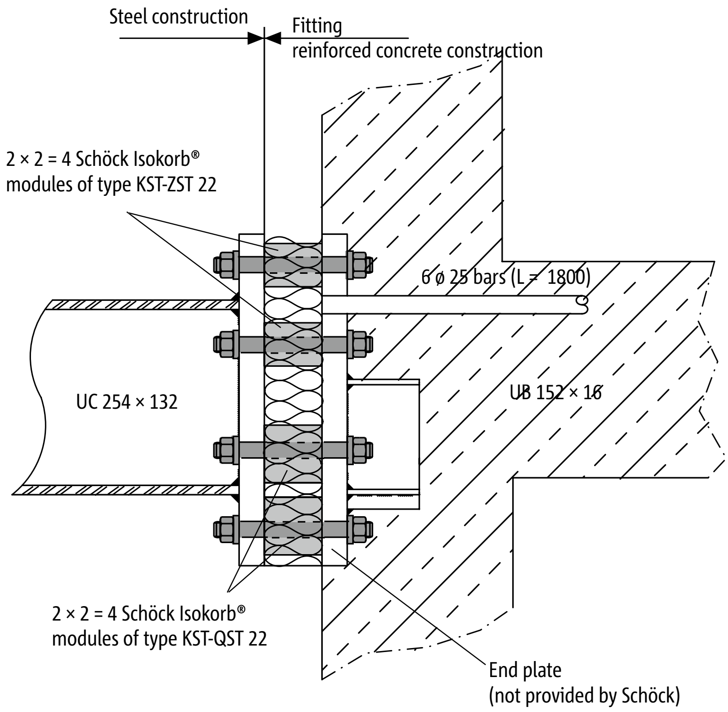


Figure 5: Schöck Isokorb® type KST for a renovation/retrofit balcony installation

[1] End plate not provided by Schöck

Schöck Isokorb® type KST

Element arrangements/Connection layout



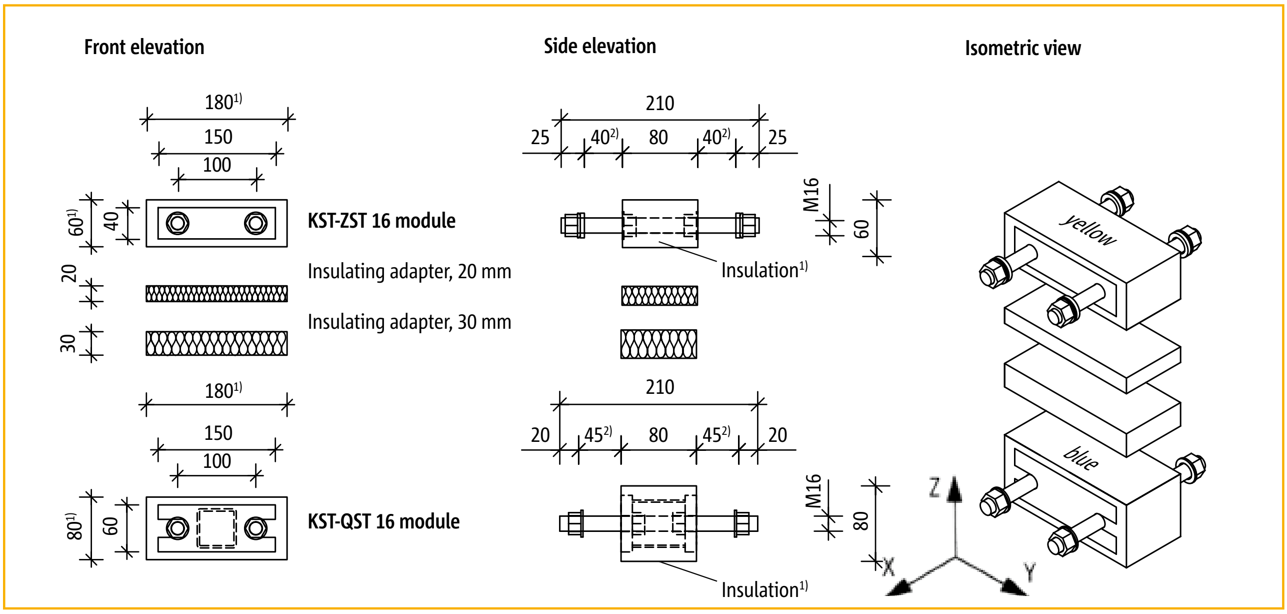
The KST type can also be used for connections between reinforced concrete and steel. This variant can be used if the member forces are too great for the Schöck Isokorb® type KS.
However, it must be ensured that the forces in the steel member are reliably transferred into the concrete via the reinforcement bars which are welded on to the on-site end plate. The engineer responsible for the design of the load bearing structure shall ensure that this is satisfied.

Schöck Isokorb® type KST
Views/Dimensions

Schöck Isokorb® type KST – basic type

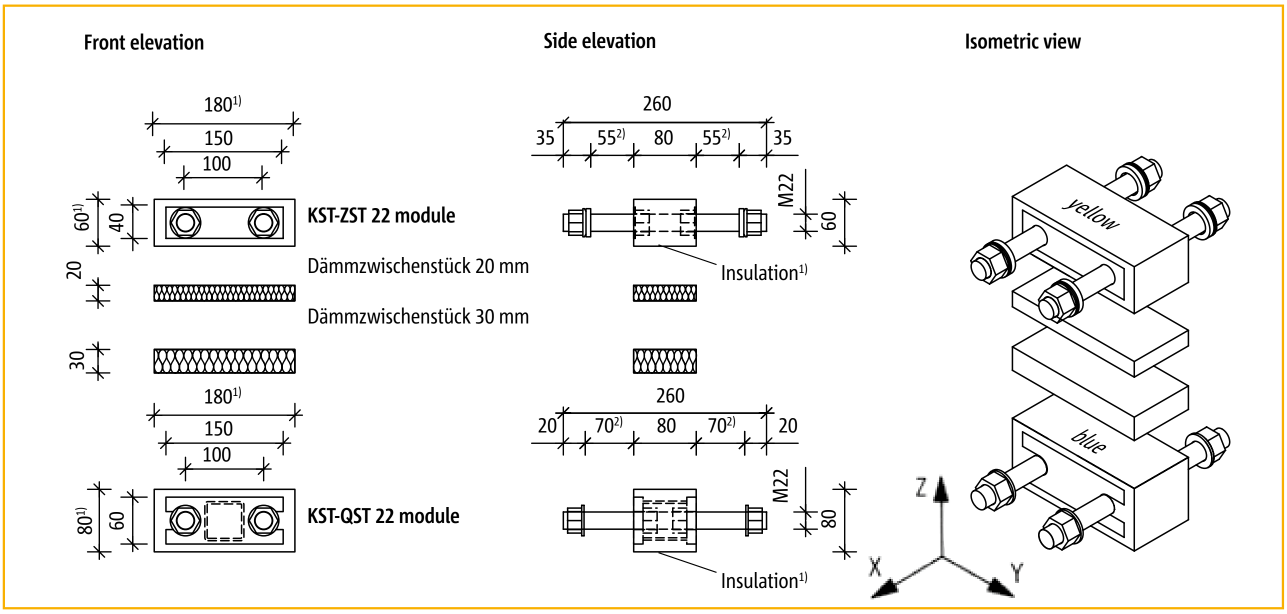
The basic KST type consists of one ZST module, one QST module, one insulating adapter with a thickness of 20 mm and one insulating adapter with a thickness of 30 mm. With these modules it is possible to achieve a vertical bolt separation of up to 120 mm (60/2 + 20 + 30 + 80/2). If your application requires a greater distance between the bolts, this can be achieved by inserting further insulating adapters or a corresponding insulating block. The main load on the basic KST type is a shear force in the z-direction and a moment around the y-axis.

Schöck Isokorb® type KST 16



Views - Schöck Isokorb® type KST 16

Schöck Isokorb® type KST 22



Views - Schöck Isokorb® type KST 22

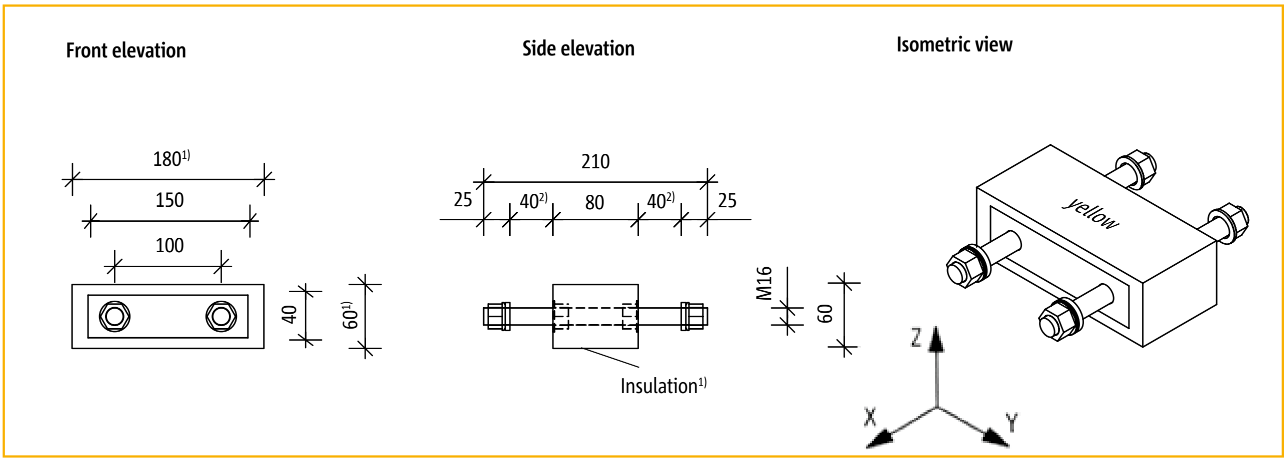
[1)] If required, the insulating element can be cut off up to the steel plates (150 × 40 for the KST-ZST module, 150 × 60 for the KST-QST module and KST-ZQST module). The minimum distance is therefore 50 mm (40/2 + 60/2).
[2)] Available fixing length

Schöck Isokorb® type KST
Views/Dimensions

Schöck Isokorb® module, type KST-ZST

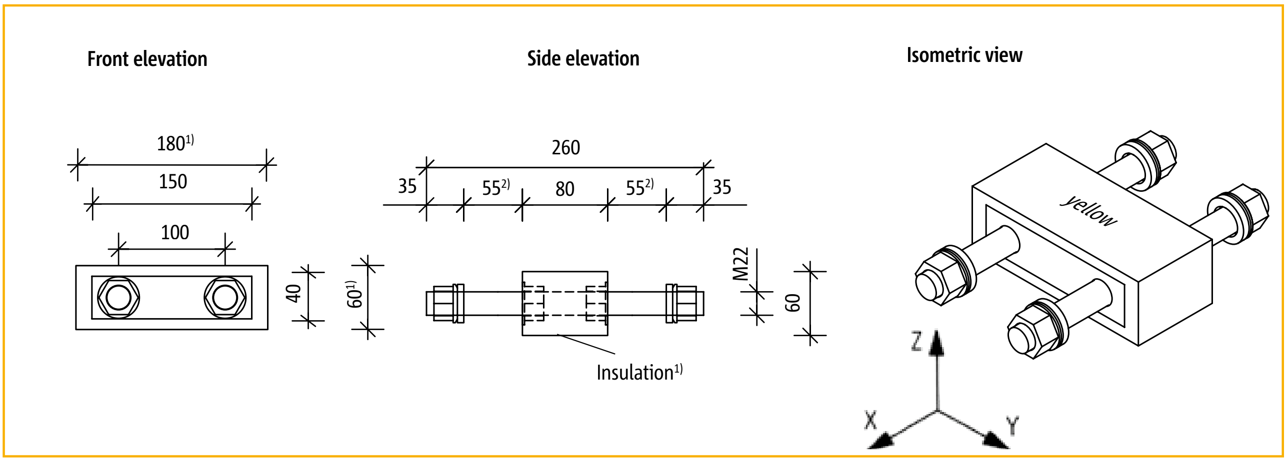
The KST-ZST module is used to absorb tensile forces. It comprises one insulating element (180/60/80 mm) and two stainless threaded bars with the corresponding nuts. The outer washers take the form of a ball socket and a conical disc. This offers advantages in terms of fatigue resistance. Refer also to the section about expansion joints on pages 296 - 297. In combination with a KST-QST module, it is also possible to absorb compressive forces, although this is limited to one third of the tensile force.

Schöck Isokorb® module, type KST-ZST 16



Views - Schöck Isokorb® module, type KST-ZST 16

Schöck Isokorb® module, type KST-ZST 22



Views - Schöck Isokorb® module, type KST-ZST 22

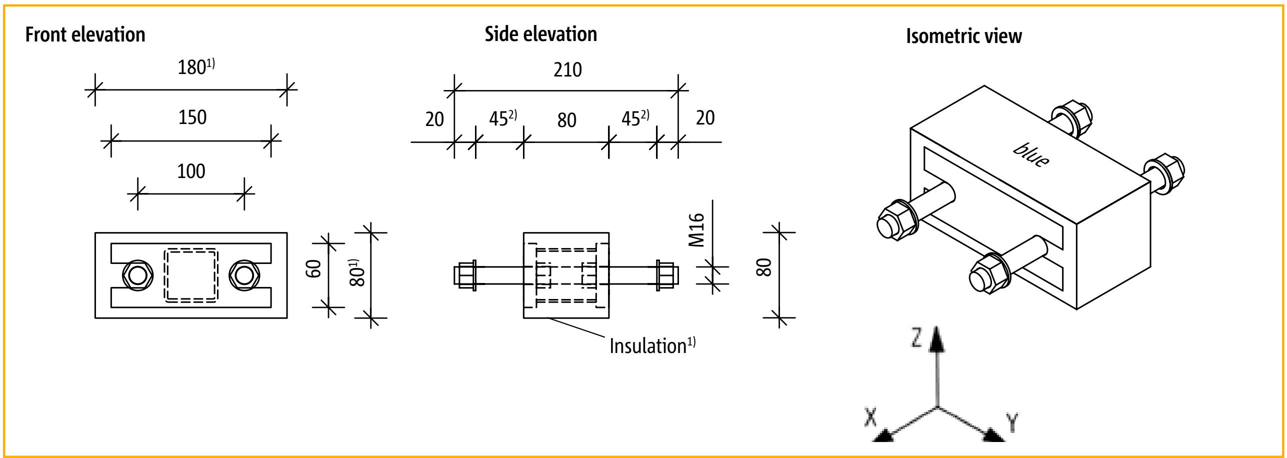
1) If required, the insulating element can be cut off up to the steel plates (150 × 40 for the KST-ZST module).
2) Available fixing length

Schöck Isokorb® type KST
Views/Dimensions

Schöck Isokorb® module, type KST-QST

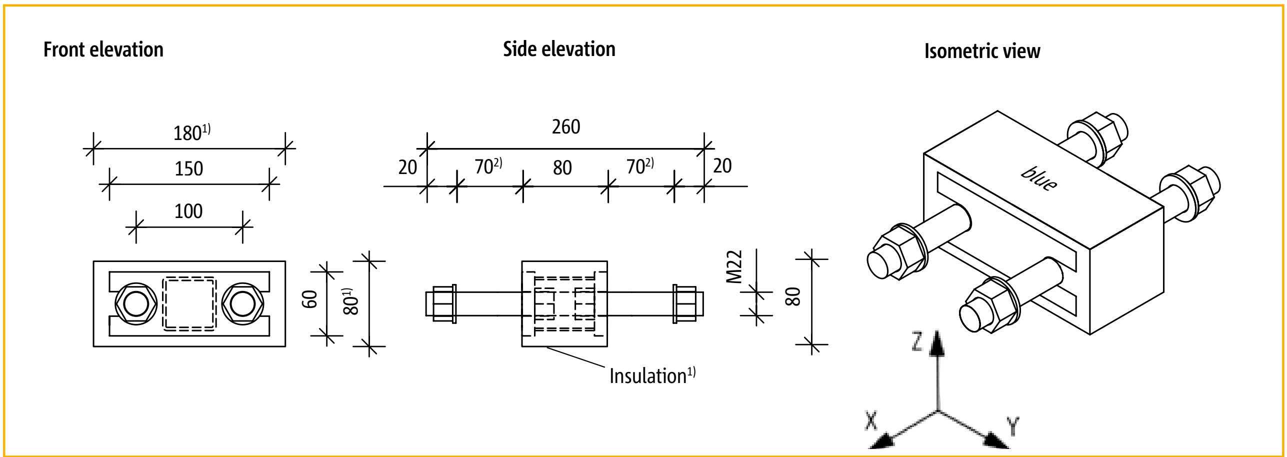
The KST-QST module is used to absorb compressive forces and shear forces. It consists of an insulating element (180/80/80 mm), two stainless threaded bars with corresponding nuts and a rectangular hollow section which is welded into the module. The rectangular hollow section transmits the shear forces. The element can transmit forces in the x, y and z-direction. Within a KST connection, the KST-QST module is located in the area in which pressure is exerted due to the self weight. Different load combina-tions, including tensile forces, within a KST connection, can be carried by the KST-QST module, although the interaction condition
$3V_d + 2\,H_d + F_{t,d} = \max F_{t,d} \leq F_{t,Rd}$ must be satisfied.

Schöck Isokorb® module, type KST-QST 16



Views - Schöck Isokorb® module, type KST-QST 16

Schöck Isokorb® module, type KST-QST 22



Views - Schöck Isokorb® module, type KST-QST 22

KST

Steel/steel

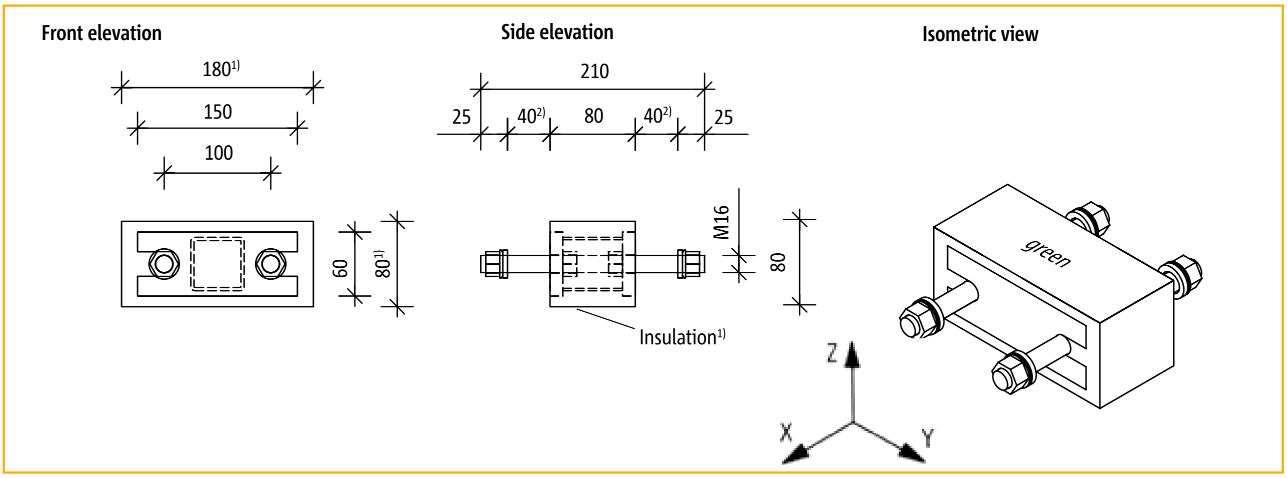
[1)] If required, the insulating element can be cut off up to the steel plates (150 × 60 for the KST-QST module and the KST-ZQST module).
[2)] Available fixing length

Schöck Isokorb® type KST
Views/Dimensions

Schöck Isokorb® module, type KST-ZQST

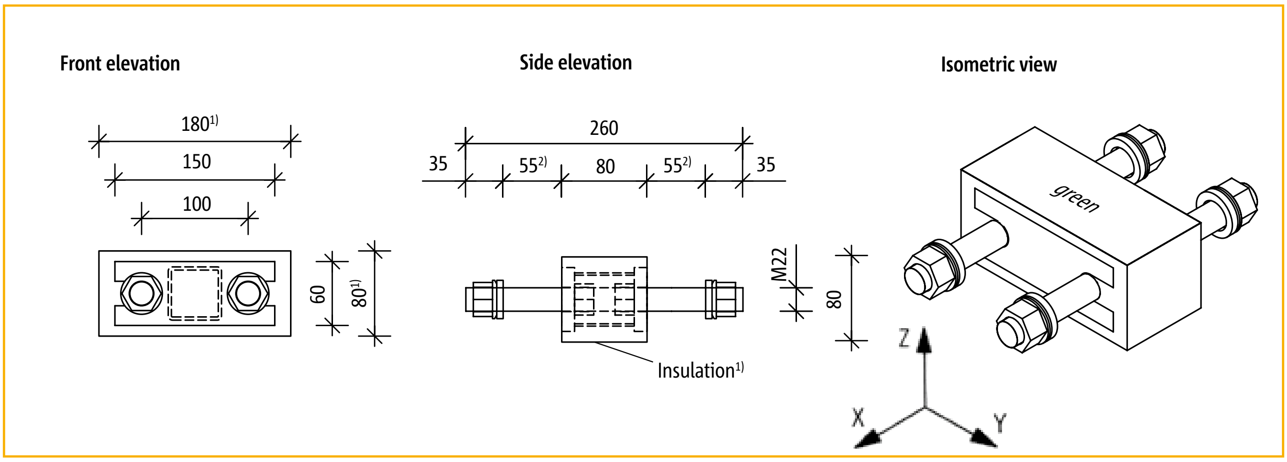
The KST-ZQST module combines the technical features of the KST-ZST module with those of the KST-QST module. It should be used for applications in which tensile forces are continuously transmitted and, at the same time, horizontal forces resulting from temperature deformations are transferred from the outer steel structure into the connection. Special two-part washers provide fatigue resistance.

Schöck Isokorb® module, type KST-ZQST 16



Views - Schöck Isokorb® module, type KST-ZQST 16

Schöck Isokorb® module, type KST-ZQST 22



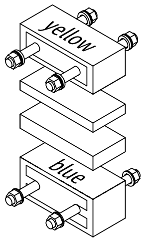
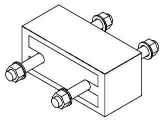
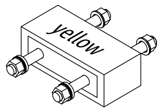
Views - Schöck Isokorb® module, type KST-ZQST 22

KST

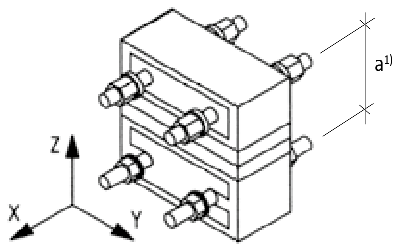
Steel/steel

[1)] If required, the insulating element can be cut off up to the steel plates (150 × 60 for the KST-QST module and the KST-ZQST module).
[2)] Available fixing length

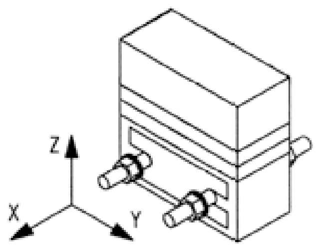
Schöck Isokorb® type KST
Design and capacity table

Schöck Isokorb® type			 KST-QST: blue KST-ZQST: green			
	KST 16	KST 22	KST-QST 16 module KST-ZQST 16 module	KST-QST 22 module KST-ZQST 22 module	KST-ZST 16 module	KST-ZST 22 module
$H_{y,Rd}$	±6 kN[5]	±6 kN[5]	±6 kN[3,5]	±6 kN[3,5]	0 kN	0 kN
$V_{z,Rd}$	30 kN	36 kN	30 kN[3]	36 kN[3]	0 kN	0 kN
$F_{x,t,Rd}$ $F_{x,c,Rd}$	116.8 kN[6]	225.4 kN[6]	116.8 kN[3]	225.4 kN[3]	F_t = 116.8 kN F_c = 0 kN	F_t = 225.4 kN F_c = 0 kN
$M_{y,Rd}$	$a \times F_{x,t,Rd}$[1]	$a \times F_{x,t,Rd}$[1]	0 kNm[4]	0 kNm[4]	0 kNm	0 kNm
$M_{z,Rd}$	[2,5]	[2,5]	[2,5]	[2,5]	0 kNm	0 kNm

F_{Rd}	resistance design [per module]
$F_{t,Rd}$	for the tensile loading capacity of the bolts
$F_{c,Rd}$	for the compression loading capacity of the bolts



Schöck Isokorb® type KST

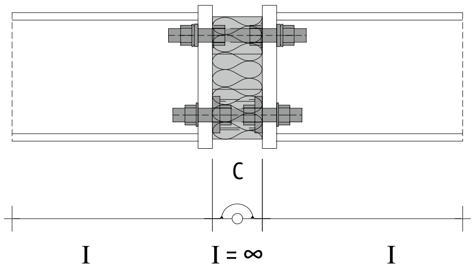


Schöck Isokorb® module, type KST-QST/KST-ZQST

1) a = distance between the tension bars and compression bars of the Isokorb® element (inner lever arm), minimum possible axis separation between tension bars and compression bars = 50 mm (without insulating adapters after processing of the polystyrene – see pages 290 - 293[1]).
2) We recommend that you discuss the static system and calculations with the Schöck design department, tel. 0845 241 3390.
3) The interaction $3\ V_z + 2\ H_y + F_{x,t} = \max F_{x,t,d} \leq F_{x,t,Rd}$ needs to be taken into account in the event of simultaneous tensile force and shear force loads.
4) When using at least two modules arranged one above the other, it is possible to transfer both positive and negative forces (moments and shear forces) in accordance with the design variants on pages 299 - 310.
5) Please make sure that you read the notes on expansion joints/fatigue resistance on pages 296 - 297 below.
6) If the KST-ZST module is subjected to pressure loads within a KST connection (e.g. wind loads generating slight lift-off), then the KST-ZST module can absorb a maximum of 1/3 $F_{x,t,Rd}$ as a compressive force. The interaction (footnote 3) must also be noted in this load scenario.

Schöck Isokorb® type KST
Torsion spring strength/Notes on calculations

Estimation of deformation variables due to M_K in the Schöck Isokorb® connection

Torsion spring strength/buckling angle resulting from bending moment			
Design variants	**Torsion spring strength c [kNcm/rad]**	**Buckling angle φ [rad]**	**Static model for the estimation of flexural stiffness**
No. 3 - see page 299	$3\,700 \times a^2$	$\varphi = \frac{M_K}{C}$	
No. 4 - see page 300	$6\,000 \times a^2$		
No. 5 - see page 302	$5\,200 \times a^2$		
No. 6 - see page 302	$12\,000 \times a^2$		
No. 7 - see page 303	$24\,000 \times a^2$		
No. 8 - see page 304	$6\,000 \times a^2$		
No. 9 - see page 306	$12\,000 \times a^2$		
No. 10 - see page 308	$24\,000 \times a^2$		

a [cm] = refer to the design variants on pages 298 - 310.
M_K = bending moment from characteristic values for the effects around the (existing M).
Deformations resulting from normal forces and shear forces can be ignored.
Values in table above assume average secant modulus of stainless steel under working load of 17 900 kN/cm²

Possible modular combinations of the basic types are shown on the next pages.

Notes on calculations

- Basis:
  Type certification (LGA Nürnberg S-N 010415)
  The Schöck Isokorb® type KST has been classified by the DIBt (German Institute for Construction Technology) as the subject of structural standards with type certification. Approval is not required as it is a modular system.
  The design capacities of the Schöck Isokorb® type KST have been independently checked and approved as compliant to BS 5950:2000 in conjunction with SCI Publication P291 – Structural Design of Stainless Steel.

- Certification:
  The static calculations to Eurocode 3 for Schöck Isokorb type KST, when used in conjunction with BS 5950-1:2000 and Steel Construction Institute Publication P291, have been approved by the Flint & Neill Partnership, London.

- End plate thickness:
  In the case of the connection of I-profiles in accordance with the design variants below, the indicated end plate thicknesses, using mild steel S235, can be adopted without further verification or proof. Smaller end plate thicknesses can be obtained with more accurate verification or proof.
  If the geometry is different then the end plates will need to be verified separately (e.g. connection of a U-profile, flat sheet metal, ...).

- Adjacent web thickness:
  If webs of adjacent girders are less than 3.5 mm or considered to be "slender" or "non-compact" classification to BS 5950, web to be checked for local compression effects induced by QST module.

- Dynamic loads:
  The Schöck Isokorb® type KST is only intended for use with primarily static loads.

Schöck Isokorb® type KST
Expansion joints/Fatigue resistance

Changing temperatures cause changes in length of the steel members and thus cause fluctuating stresses to arise in the Isokorb® elements which are only passed on in part through the thermal separation.
Loads on the Isokorb® connections due to temperature deformations of the external steel construction should therefore generally be avoided.

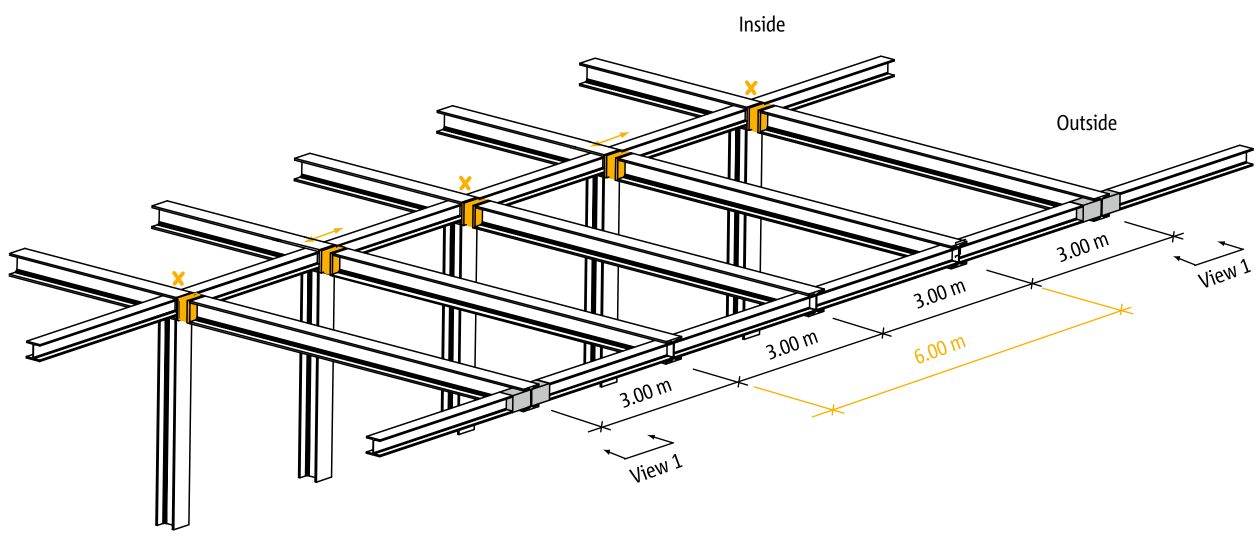
If, nonetheless, temperature deformations are assigned directly to the Isokorb® connection, then the Isokorb® type KST construction will be fatigue-resistant up to a construction length of 6 m by virtue of its special components (KST-QST module, KST-ZQST module: sliding film on the pressure plate; KST-ZST module, KST-ZQST module: 2-part special washer). At greater lengths an expansion joint should be positioned after no more than 6 m.

Horizontal slots are needed in the on-site end plate for the KST-QST module and KST-ZQST module used in the compression zone if horizontal temperature deformations are to be introduced. These must permit horizontal movements of ±2 mm. In this case, horizontal shear forces can only be absorbed non-structurally via friction.

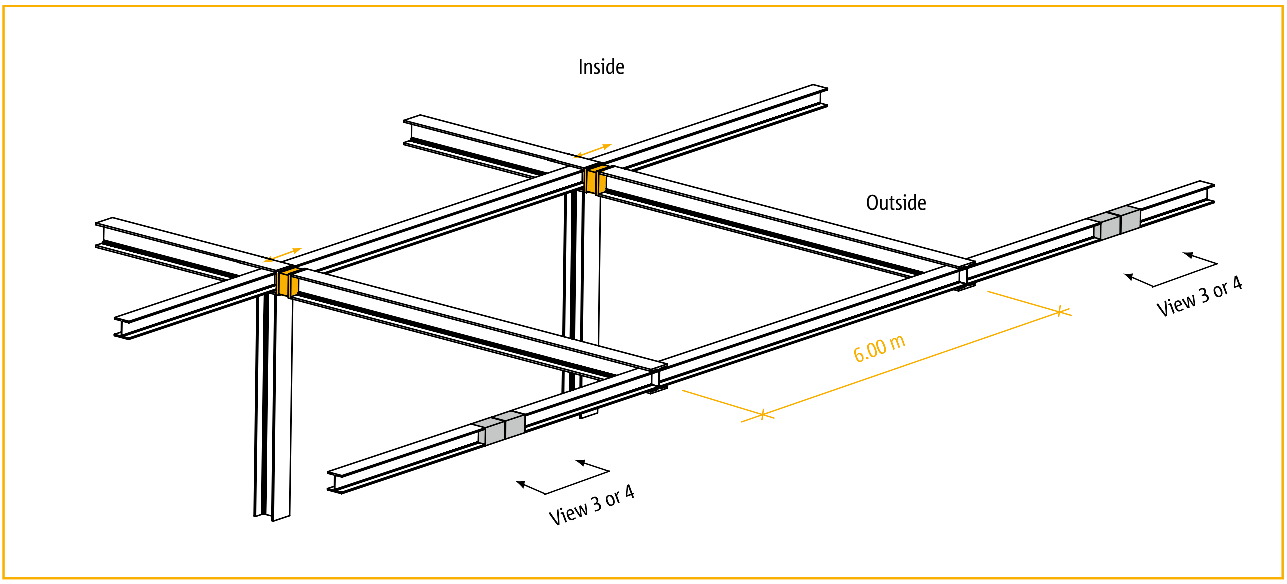
Examples of the arrangement and design of expansion joints:

Key:

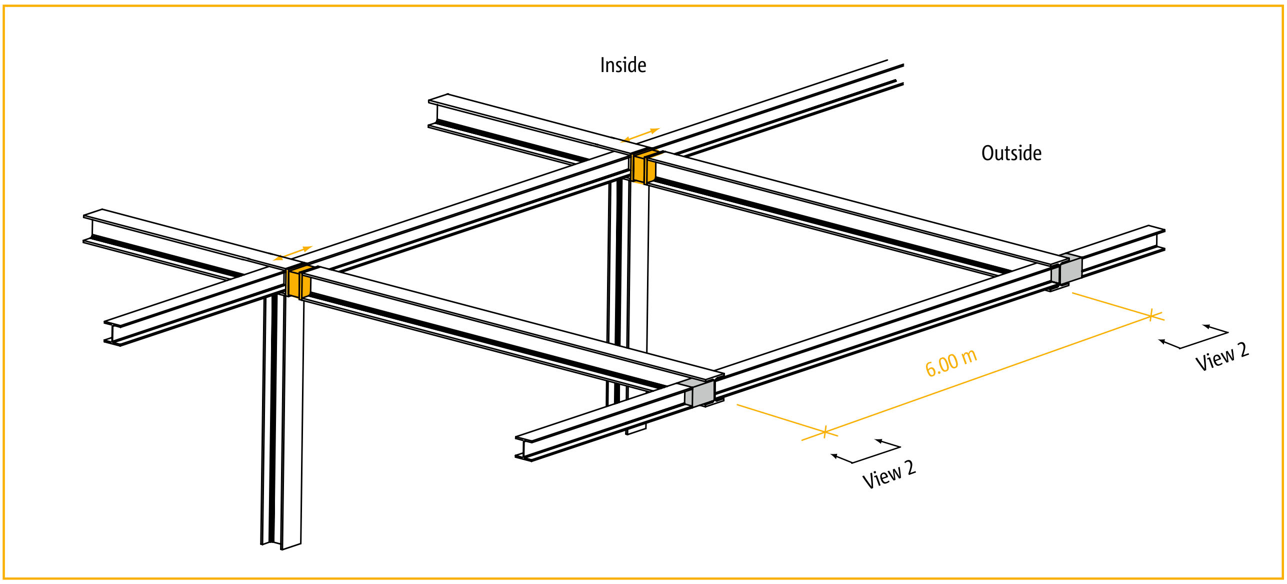
- Schöck Isokorb®
- Expansion joint
- FIXED: No slots required
- MOVEABLE: Horizontal slots in the on-site front plate for KST-QST module, KST-ZQST module (compression zone)



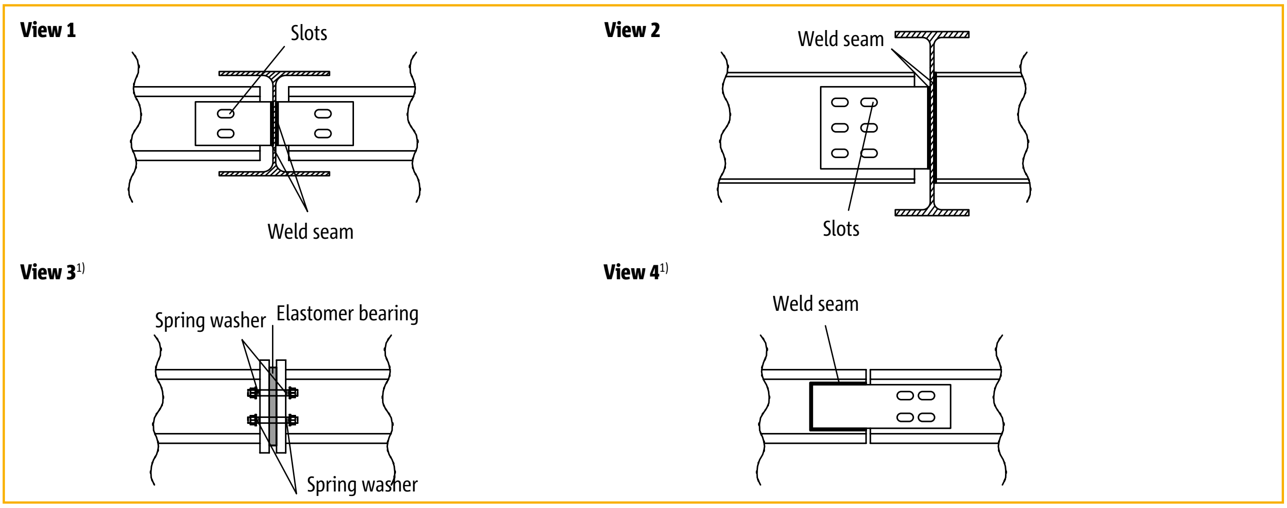
Example showing the arrangement of expansion joints, variant 1



Example showing the arrangement of expansion joints, variant 2



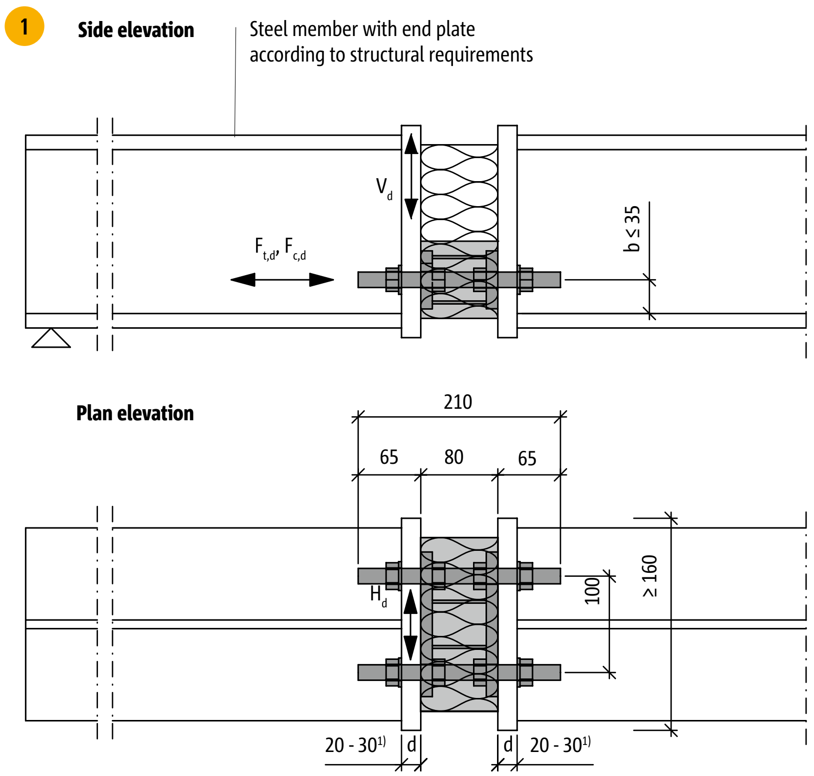
Example showing the arrangement of expansion joints, variant 3



[1)] Only partial moment transfer possible.

Schöck Isokorb® type KST-QST 16 module, KST-ZQST 16 module

Design configuration and example



KST-QST 16 module, KST-ZQST 16[2)] module	
H_{Rd}	6 kN[3)]
V_{Rd}	30 kN
$F_{t,Rd}$, $F_{c,Rd}$	116.8 kN

Interaction between V_d, H_d, $F_{t,d}$:

$3\,V_d + 2\,H_d + F_{t,d} = \max F_{t,d} \leq F_{t,Rd}$

[1)] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

$$\frac{\max F_{t,d}}{F_{t,Rd}} = \frac{F_{c,d}}{F_{c,Rd}} \quad \begin{array}{ll} \leq 1.0 & : 30\text{ mm} \\ \leq 0.75 & : 25\text{ mm} \\ \leq 0.5 & : 20\text{ mm} \end{array}$$

[2)] The Schöck Isokorb® type KST-ZQST 16 module should be used for applications in which tensile forces need to be transferred continuously into the connection and in which, at the same time, horizontal forces resulting from temperature deformation of the external steel structure are transferred into the connection. Special two-part washers provide fatigue resistance.
Refer to pages 296 - 297 for the expansion joint spacings.

[3)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® modules, type KST-QST 16, KST-ZQST 16[2)]

Example showing a supported connection of an UB 152 × 89 with a KST-QST 16 module

Loads: $V_{z,d} = 25$ kN $\quad H_d = \pm 3$ kN (from wind loads) $\quad F_{t,d} = 30$ kN or $F_{c,d} = 80$ kN

Verifications for KST-QST 16 module

Shear force

$\dfrac{V_{z,d}}{V_{z,Rd}} < 1.0 \qquad \dfrac{H_d}{H_{Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,QST16} = 25\text{ kN}/30\text{ kN} = 0.83 \quad < 1.0$

$H_d/H_{Rd,QST16} = 3\text{ kN}/6\text{ kN} = 0.5 \quad < 1.0$

Compression

$\dfrac{F_{c,d}}{F_{c,Rd}} < 1.0$

$F_{c,d}/F_{c,Rd,QST16} = 80\text{ kN}/116.8\text{ kN} = 0.68 \quad < 1.0$

Tensile force (see note on page 294)

Interaction condition: $3V_{z,d} + 2H_d + F_{t,d} = \max F_{t,d}$

$\dfrac{\max F_{t,d}}{F_{t,Rd}} < 1.0$

$\max F_{t,d} = 3V_{z,d} + 2H_d + F_{t,d} = 3 \times 25\text{ kN} + 2 \times 3\text{ kN} + 30\text{ kN} = 111\text{ kN}$

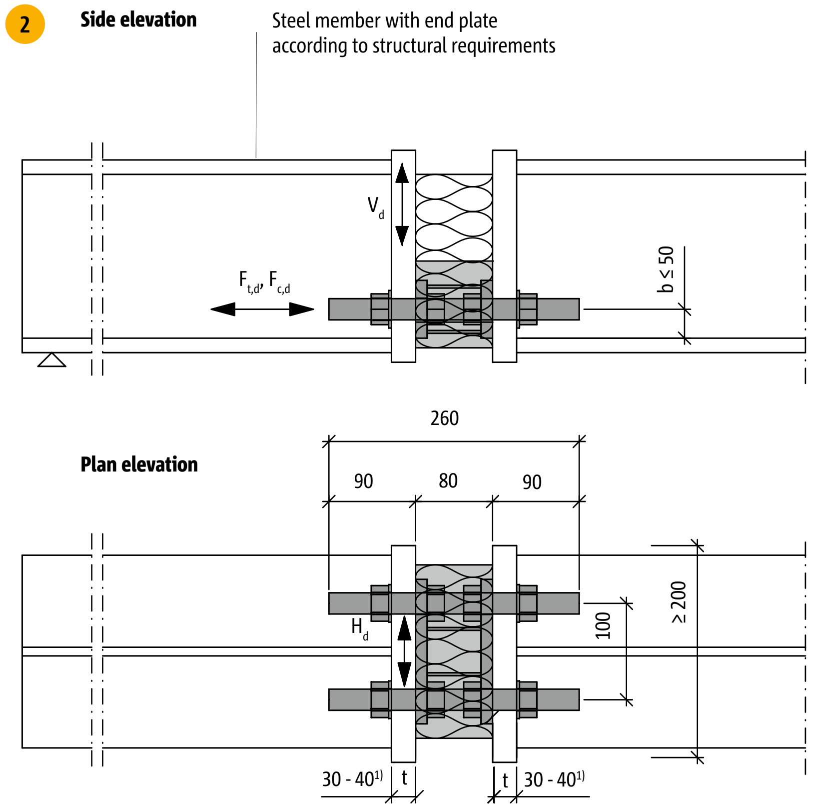
$\max F_{t,d}/F_{t,Rd,QST16} = 111\text{ kN}/116.8\text{ kN} = 0.95 < 1.0$

Minimum end plate thickness [d] without detailed verification, using mild steel S235: Distance b ≤ 35mm

$$\frac{F_{c,d}}{F_{c,Rd,QST16}} \text{ or } \frac{\max F_{t,d}}{F_{t,Rd,QST16}} \left\{ \begin{array}{ll} \leq 1.0 & : 30\text{ mm} \\ \leq 0.75 & : 25\text{ mm} \\ \leq 0.5 & : 20\text{ mm} \end{array} \right.$$

$\dfrac{\max F_{t,d}}{F_{t,Rd,QST16}} = 0.95 < 1.0 \rightarrow d = 25\text{ mm}$

Design configurations, type KST-QST 22 module, KST-ZQST 22 module, KST 16



KST-QST 22 module, KST-ZQST 22[2)] module	
H_{Rd}	6 kN[3)]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

Interaction between V_d, H_d, $F_{t,d}$:

$3\,V_d + 2\,H_d + F_{t,d} = \max F_{t,d} \le F_{t,Rd}$

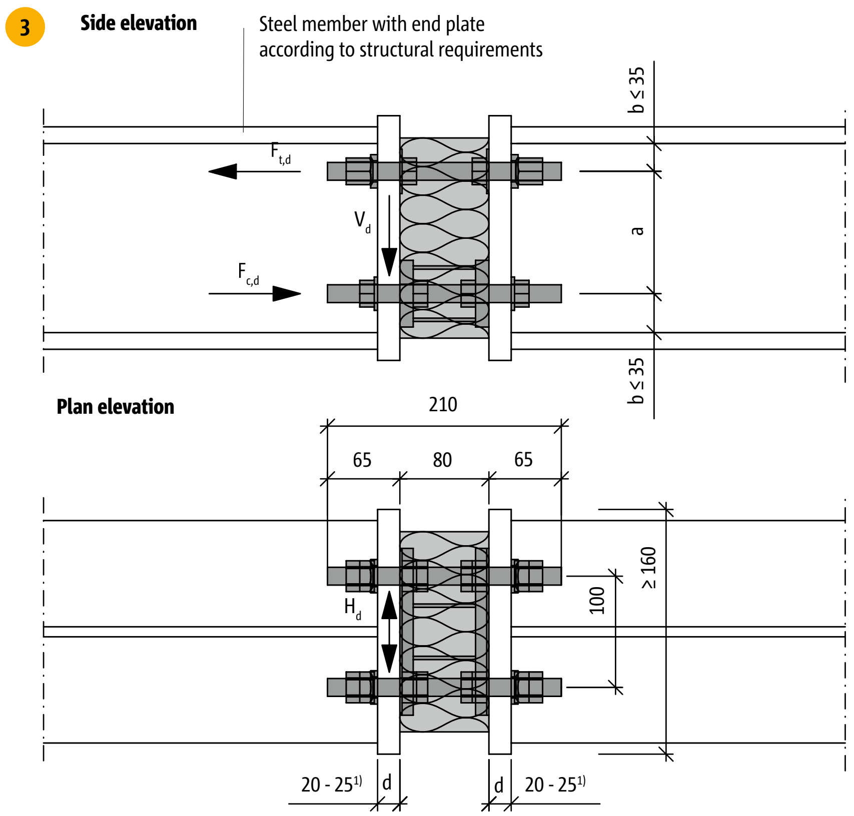
[1)] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

$$\frac{\max F_{t,d}}{F_{t,Rd}} = \frac{F_{c,d}}{F_{c,Rd}} \quad \begin{array}{ll} \le 1.0 & : 40\text{ mm} \\ \le 0.75 & : 35\text{ mm} \\ \le 0.5 & : 30\text{ mm} \end{array}$$

[2)] The Schöck Isokorb® type KST-ZQST 22 module should be used for applications in which tensile forces need to be transferred continuously into the connection and in which, at the same time, horizontal forces resulting from temperature deformation of the external steel structure are transferred into the connection. Special two-part washers provide fatigue resistance.
Refer to pages 296 - 297 for the expansion joint gaps.

[3)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® modules, type KST-QST 22, KST-ZQST 22[2)]



KST 16	
H_{Rd}	6 kN[2)]
V_{Rd}	30 kN
$F_{t,Rd}$, $F_{c,Rd}$	116.8 kN

[1)] Minimum end plate thicknesses [d] without more specific verification (Fkl.: S 235):

a ≤ 150: $\frac{F_{t,d}}{F_{t,Rd}}$ ≤ 1.0 : 25 mm; ≤ 0.9 : 20 mm

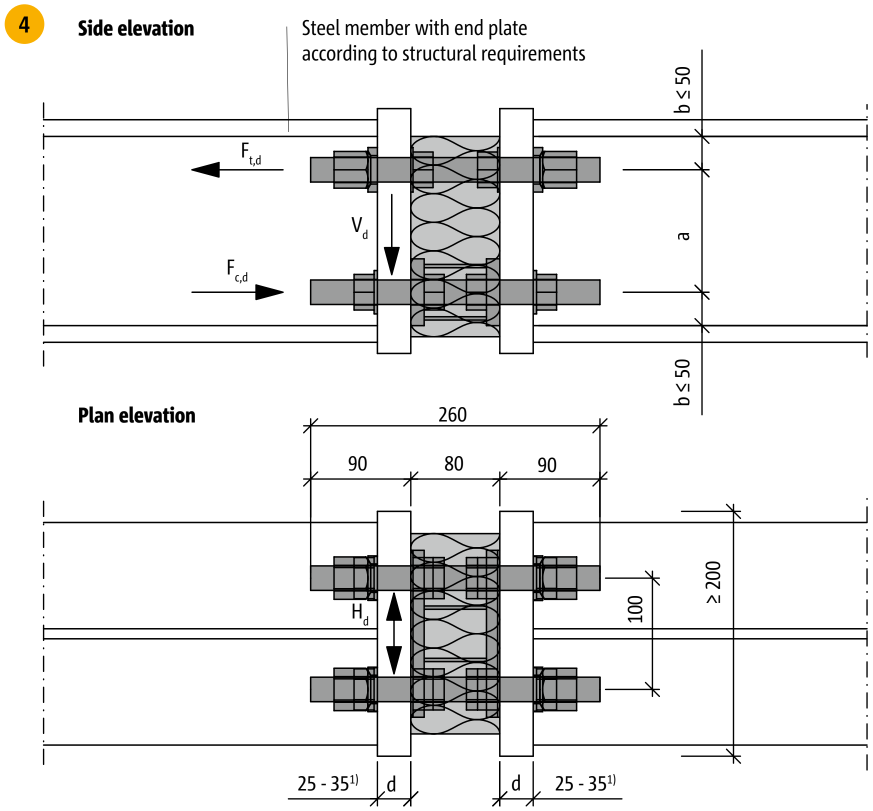
a < 150: 30 mm

[2)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® type KST 16

Schöck Isokorb® type KST 22

Design configuration and example



KST 22	
H_{Rd}	6 kN[2)]
V_{Rd}	36 kN
Z_{Rd}, D_{Rd}	225.4 kN

[1)] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

a ≤ 150: $\frac{F_{t,d}}{F_{t,Rd}}$ ≤ 1.0 : 35 mm; ≤ 0.8 : 30 mm; ≤ 0.5 : 25 mm

a < 150: 40 mm

[2)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® type KST 22

Example of moment connections for UB 203 × 23 with KST 22

Loads:	Load case 1:	$V_{z,d}$ = 32 kN	H_d = ±4 kN	$M_{y,d}$ = –18 kNm
	Load case 2:	$V_{z,d}$ = –16 kN	H_d = ±4 kN	$M_{y,d}$ = 5 kNm
	a = 0.12 m			

Verifications for KST

Shear force and horizontal force

$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$ $\frac{H_d}{H_{Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,QST22}$ = 32 kN/36 kN = 0.89 < 1.0
$H_d/H_{Rd,QST22}$ = 4 kN/6 kN = 0.67 < 1.0

Moment at load case 1

$\frac{N_{c,d}}{N_{c,Rd}} < 1.0$ $\frac{N_{t,d}}{N_{t,Rd}} < 1.0$

$F_{c,d} = F_{t,d} = M_{y,d}/a$ = 18 kNm/0.12 m = 150 kN
$F_{c,d}/F_{c,Rd,QST22}$ = 150 kN/225.4 kN = 0.67 < 1.0
$F_{t,d}/F_{t,Rd,ZST22}$ = 150 kN/225.4 kN = 0.67 < 1.0

Moment at load case 2 (lifting off)

max $N_{t,d} < N_{t,Rd}$

$F_{c,d} = F_{t,d} = M_{y,d}/a$ = 5 kNm/0.12 m = 41.67 kN
max $F_{t,d}$ = 41.67 kN < 225.4 kN = $F_{t,Rd,QST22}$

KST-ZST module under compressive load
(see note on page 294)
max $F_{c,d} < F_{t,Rd}/3$

max $F_{c,d} = M_{y,d}/a$ = 5 kNm/0.12 m = 41.67 kN
$F_{t,Rd,ZST22}/3$ = 225.4 kN/3 = 75.13 kN
max $F_{c,d,ZST22}$ = 41.67 kN < 75.13 kN = $F_{t,Rd,ZST22}/3$

Schöck Isokorb® type KST 22

Example

KST-QST module under tensile load (see note on page 294)

Interaction condition:

$3V_{z,d} + 2H_d + F_{t,d} = \max F_{t,d}$

$\max F_{t,d} = 3V_{z,d} + 2H_d + F_{t,d} = 3 \times 16 + 2 \times 4 + 41.67 = 97.67$ kN

$\frac{\max F_{t,d}}{F_{t,Rd}} < 1.0$

$\max F_{t,d}/F_{t,Rd,ZST22} = 97.67/225.4 = 0.43 < 1.0$

Minimum end plate thickness [d] without detailed verfification, using mild steel S235: Distance b ≤ 50 mm

$a \leq 150: \quad \frac{F_{t,d}}{F_{t,Rd}} \begin{cases} \leq 1.0 & : 35 \text{ mm} \\ \leq 0.8 & : 30 \text{ mm} \\ \leq 0.5 & : 25 \text{ mm} \end{cases}$

a > 150: 40 mm

$F_{t,d}/F_{t,Rd} = 150 \text{ kN}/225.4 \text{ kN} = 0.67$

$a \leq 150: \quad \frac{F_{t,d}}{F_{t,Rd}} = 0.67 < 0.8 \rightarrow d = 30$ mm

Deformation due to $M_{y,d}$ (see page 295)

Buckling angle

$\varphi = \frac{M_k}{c}$ [rad]

$c = 6000 \times a^2$ [cm]

$\varphi = \frac{18/1.45^{1)} \times 100}{864000} = 1.4368 \times 10^{-3}$ [rad]

$c = 6000 \times 12^2 = 864000$ [KNcm/rad]

[1] Conversion of M_{yd} into M_K
(with global safety factor $\gamma_f = 1.45$)

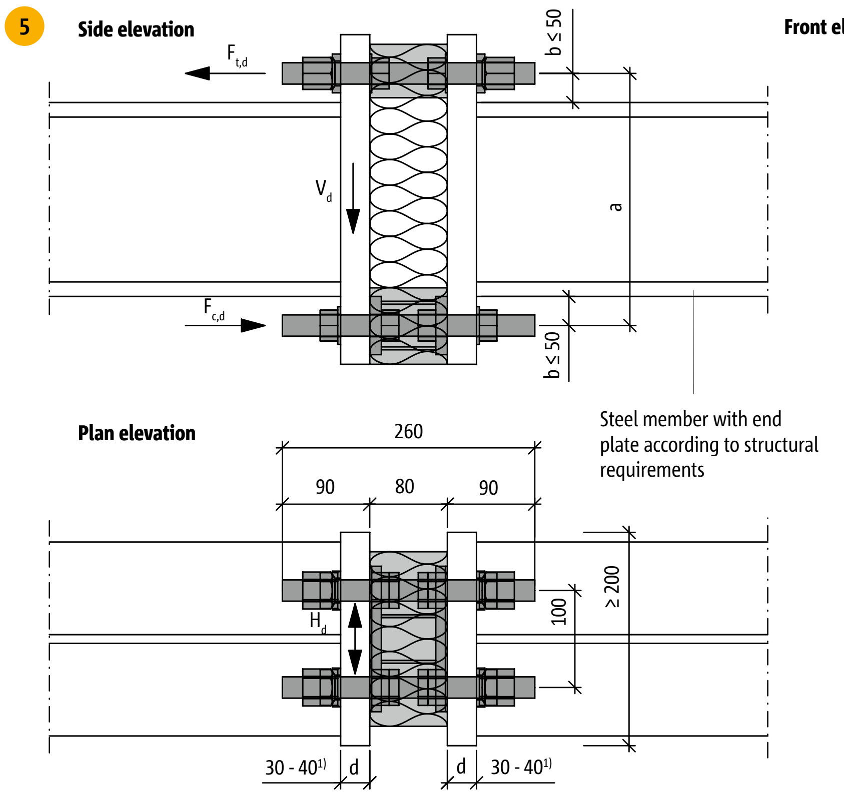
Notes on the example

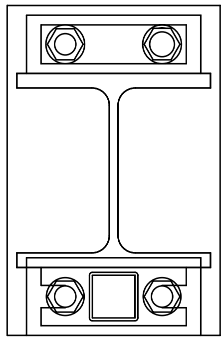
- The information relating to the fatigue resistance of expansion joints on pages 296 - 297 must be followed.
- In the event of a short-term tensile load (e.g. from wind suction) a KST-QST module can be used instead of the KST-ZQST module in the lower connection, even if horizontal forces are introduced from temperature deformation H_d.
- The KST-ZST module can also be subjected to compressive loads of up to 1/3 $F_{t,Rd}$ (see footnote 6 on page 294). If $F_{c,d} > 1/3\ F_{t,Rd}$ then a KST-ZQST module must be used for the KST-ZST module.
- Greater stiffness can also be achieved with the arrangement no. 5.

Schöck Isokorb® type KST 22

Design configurations

5





KST 22	
H_{Rd}	6 kN[2)]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

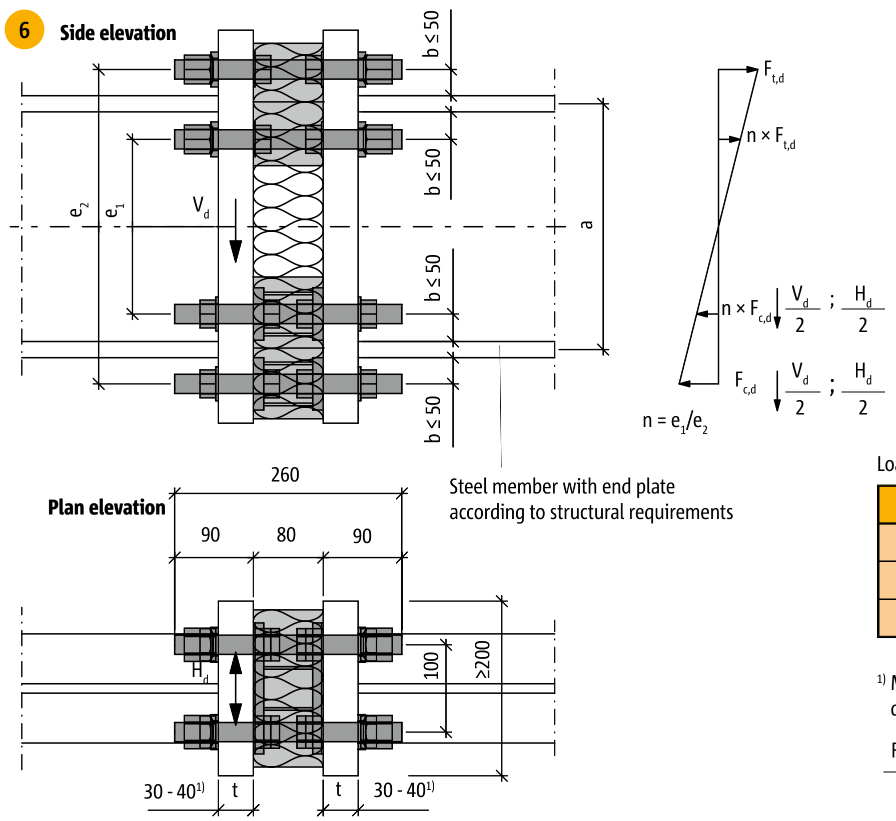
[1)] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

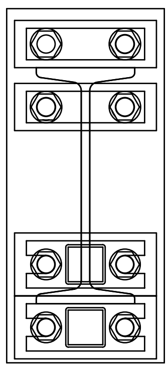
$\frac{F_{t,d}}{F_{t,Rd}}$ ≤ 1.0 : 40 mm
≤ 0.75 : 35 mm
≤ 0.5 : 30 mm

[2)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® type KST 22

6





Load-bearing capacity of the individual module:

KST 22 per module	
H_{Rd}	6 kN[2)]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

[1)] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

$\frac{F_{t,d} \text{ per module}}{F_{t,Rd}}$ ≤ 1.0 : 40 mm
≤ 0.75 : 35 mm
≤ 0.5 : 30 mm

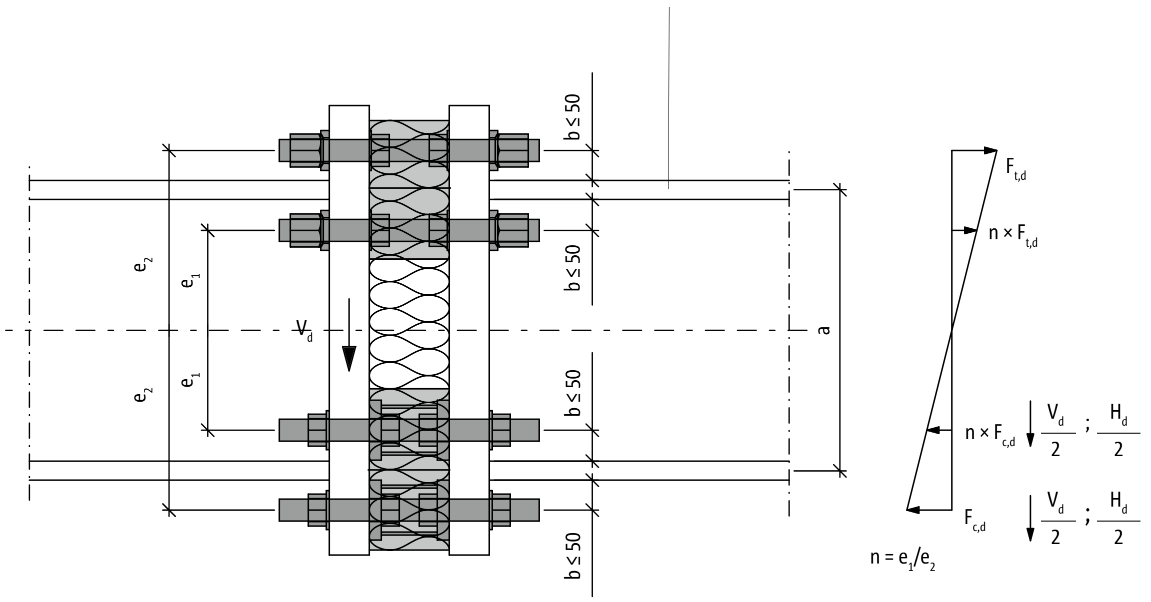
[2)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® for connection of members with 2 × KST 22 (2 tensile and 2 compressive shear force modules)

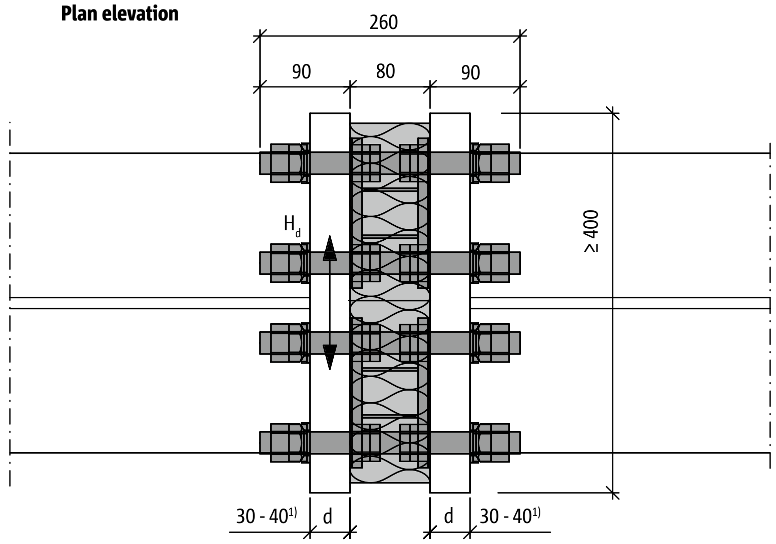
Schöck Isokorb® type KST 22
Design configurations

7 **Side elevation**

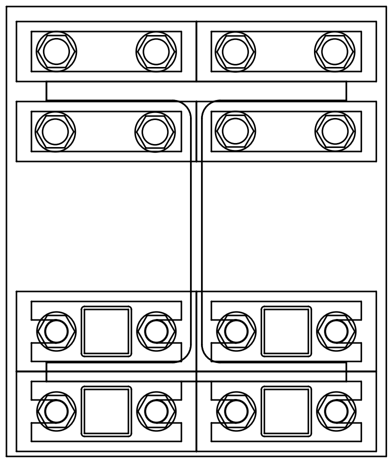
Steel member with end plate
according to structural requirements



Plan elevation



Front elevation



[1)] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

$F_{t,d}$ per module / $F_{t,Rd}$	≤ 1.0	: 40 mm
	≤ 0.75	: 35 mm
	≤ 0.5	: 30 mm

[2)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Load-bearing capacity of the individual module:

KST 22per module	
H_{Rd}	6 kN[2)]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

Schöck Isokorb® for connection of members with 4 × KST 22 (4 tensile and 4 compressive shear force modules)

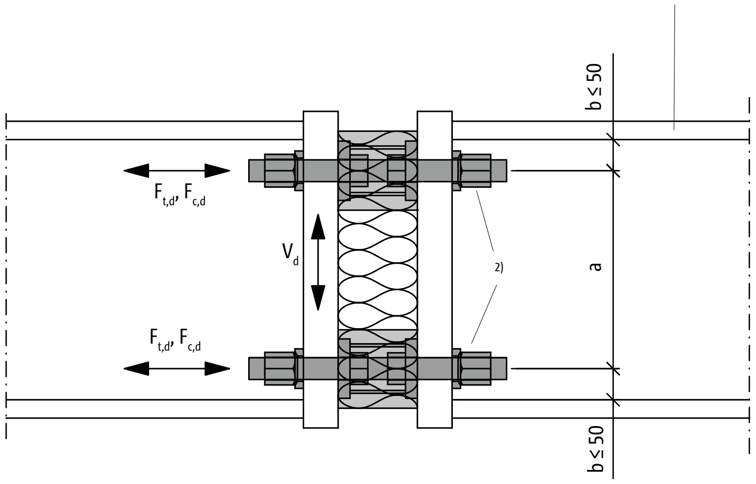
KST

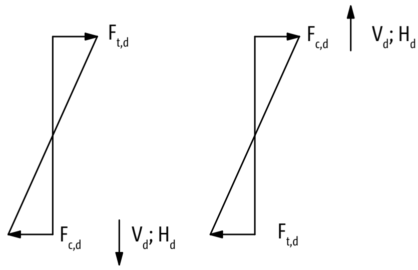
Steel/steel

Schöck Isokorb® type KST-QST 22 module, KST-ZQST 22 module

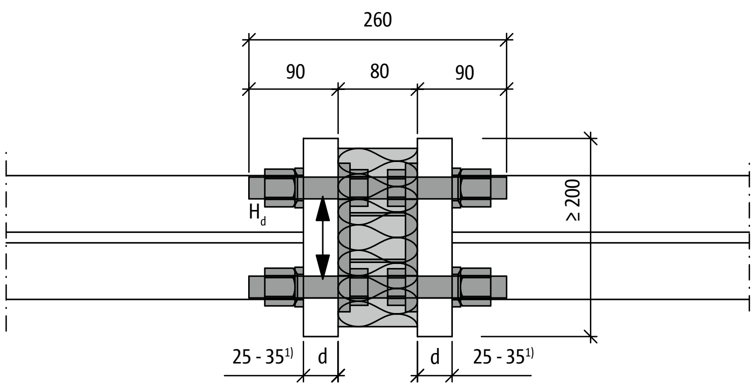
Design configuration

8 **Side elevation**

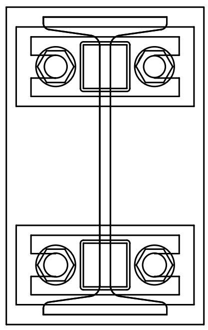




Plan elevation



Front elevation



Load-bearing capacity of the individual module:

KST-QST 22 module, KST-ZQST 22[2] module	
H_{Rd}	6 kN[3]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

[1] Minimum end plate thicknesses without detailed verification, using mild steel S235:

$\frac{F_{t,d} \text{ per module}}{F_{t,Rd}}$	≤ 1.0 : 35 mm ≤ 0.8 : 30 mm ≤ 0.5 : 25 mm

[2] This variant should be used if the system needs to absorb large forces which act on alternating sides (e.g. wind loads from below onto the cantilever). The KST-ZQST module should be used in accordance with page 293 wherever primarily tensile forces (resulting from permanent loads) are transferred. The element, which is subjected only temporarily to a tensile load, can be used as a KST-QST 22 module.

[3] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® for connection of members with 2 KST-QST 22 modules/KST-ZQST 22 modules[2]

Example: type KST-QST 22 module, KST-ZQST 22 module

Example of moment connections for UB 203 × 23 for lifting-off forces with 2 × KST-ZQST 22 modules

Loads:	Load case 1:	$V_{z,d}$ = 32 kN	H_d = ±5 kN	$M_{y,d}$ = −18 kNm
	Load case 2:	$V_{z,d}$ = −34 kN	H_d = ±5 kN	$M_{y,d}$ = 20 kNm
	a = 0.12 m			

Verifications for KST-ZQST 22 module

Shear force and horizontal force

$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$ $\frac{H_d}{H_{Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,ZQST22}$ = 32 kN/36 kN = 0.89 < 1.0
$H_d/H_{Rd,ZQST22}$ = 5 kN/6 kN = 0.83 < 1.0

Moment at load case 1

$\frac{F_{c,d}}{F_{c,Rd}} < 1.0$ $\frac{F_{t,d}}{F_{t,Rd}} < 1.0$

$F_{c,d} = F_{t,d} = M_{y,d}/a$ = 18 kNm/0.12 m = 150 kN
$F_{c,d}/F_{c,Rd,ZQST22}$ = 150 kN/225.4 kN = 0.67 < 1.0
$F_{t,d}/F_{t,Rd,ZQST22}$ = 150 kN/225.4 kN = 0.67 < 1.0

Shear force and moment at load case 2 (lifting off)

$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,ZQST22}$ = 34 kN/36 kN = 0.94 < 1.0

$\frac{F_{c,d}}{F_{c,Rd}} < 1.0$ $\frac{F_{t,d}}{F_{t,Rd}} < 1.0$

$F_{c,d} = F_{t,d} = M_{y,d}/a$ = 20 kNm/0.12 m = 166.67 kN

$F_{c,d}/F_{c,Rd,ZQST22}$ = 166.67 kN/225.4 kN = 0.74 < 1.0
$F_{t,d}/F_{t,Rd,ZQST22}$ = 166.67 kN/225.4 kN = 0.74 < 1.0

Minimum end plate thickness [d] without detailed verification, using mild steel S235: Distance b ≤ 50 mm

$$\frac{\max F_{t,d}}{F_{t,Rd,QST22}} \begin{cases} \leq 1.0 & : 35\text{ mm} \\ \leq 0.8 & : 30\text{ mm} \\ \leq 0.5 & : 25\text{ mm} \end{cases}$$

$\frac{F_{t,d}}{F_{t,Rd}}$ = 0,74 < 0.8 → d = 30 mm

Deformation due to $M_{y,d}$ see page 295

Notes

- As the compressive force for the KST-ZQST module will exceed 1/3 of the permitted tensile force, one KST-ZST 22 module in the upper tensile area structurally is not sufficient; furthermore, the interaction cannot be satisfied for the KST-QST module under tensile loads.

  $(F_{c,d} = 166.67 \geq \frac{225.4}{3} = F_{t,Rd})$

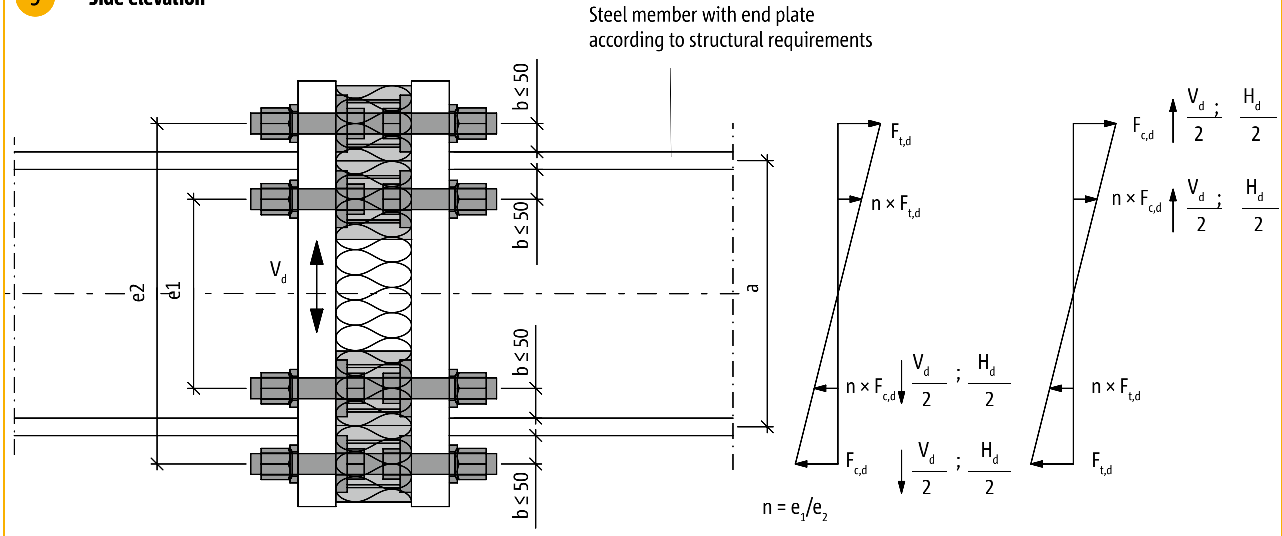
- In the lower area, tensile forces due to the wind will only occur for a limited time. Accordingly, a single KST-QST module would offer sufficient fatigue resistance. However, in order to prevent mix-ups, a symmetrical connection with 2 × KST-ZQST modules is recommended.

- As it cannot be ensured that the KST-QST modules/KST-ZQST modules establish a similarly large resistance to the dissipation of shear forces at the same time, only the module which is located in the compressive area must be used to dissipate shear forces.

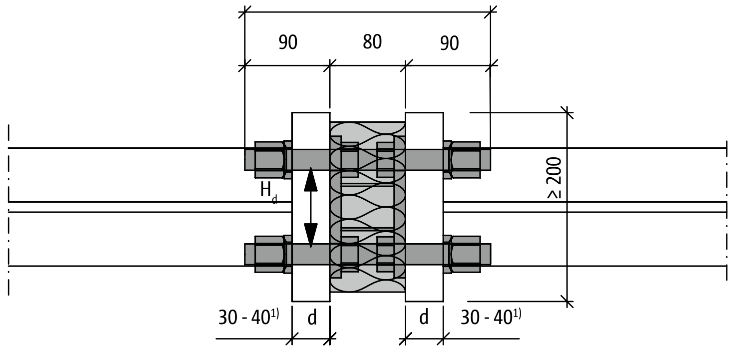
Schöck Isokorb® type KST-QST 22 module, KST-ZQST 22 module

Design configuration

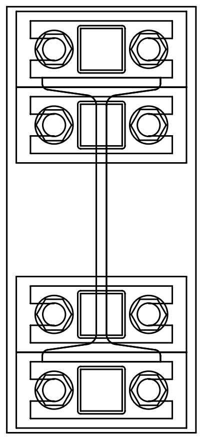
9 **Side elevation**



Plan elevation



Front elevation



Load-bearing capacity of the individual module:

per KST-QST 22 module, KST-ZQST 22[2)] module	
H_{Rd}	6 kN[3)]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

1) Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

$$\frac{F_{t,d} \text{ per module}}{F_{t,Rd}} \quad \begin{array}{ll} \leq 1.0 & : 40 \text{ mm} \\ \leq 0.75 & : 35 \text{ mm} \\ \leq 0{,}5 & : 30 \text{ mm} \end{array}$$

2) This variant should be used if the system needs to absorb large forces which act on alternating sides (e.g. wind loads from below onto the cantilever). The KST-ZQST module should be used in accordance with page 293 wherever primarily tensile forces (resulting from permanent loads) are transferred. The element, which is subjected only temporarily to a tensile load, can be used as a KST-QST 22 module.

3) Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® for connection of members with 4 KST-QST 22 modules/KST-ZQST 22 modules[2)]

Example: type KST-QST 22 module, KST-ZQST 22 module

Example of moment connections for UB 356 × 33 for lifting-off forces with 4 × KST-ZQST 22 modules

Loads:	Load case 1:	$V_{z,d}$ = 55 kN	$M_{y,d}$ = –130 kNm	e_1 = 0.25 m
	Load case 2:	$V_{z,d}$ = –40 kN	$M_{y,d}$ = 80 kNm	e_2 = 0.45 m

Verifications for KST-ZQST 22 module

Shear force

$$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$$

$V_{z,Rd,ZQST22}$ = 2 × 36 kN = 72 kN
$V_{z,d}/V_{z,Rd,ZQST22}$ = 55 kN/72 kN = 0.76 < 1.0

Moment at load case 1

$$F_{c,d} = F_{t,d} = M_{y,d}/e_2 + \left(\frac{e_1}{e_2} \times e_1\right)$$

$F_{c,d} = F_{t,d}$ = 130 kNm/(0.45 m + (0.25 m/0.45 m × 0.25m))
$F_{c,d} = F_{t,d}$ = 220.8 kN

$$\frac{F_{c,d}}{F_{c,Rd}} < 1.0 \qquad \frac{F_{t,d}}{F_{t,Rd}} < 1.0$$

$F_{c,d}/F_{c,Rd,ZQST22}$ = 220.8 kN/225.4 kN = 0.98 < 1.0
$F_{t,d}/F_{t,Rd,ZQST22}$ = 220.8 kN/225.4 kN = 0.98 < 1.0

Shear force and moment at load case 2 (lifting off)

$$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$$

$V_{z,Rd,ZQST22}$ = 2 × 36 kN = 72 kN
$V_{z,d}/V_{z,Rd,ZQST22}$ = 40 kN/72 kN = 0.55 < 1.0

$$F_{c,d} = F_{t,d} = M_{y,d}/e_2 + \left(\frac{e_1}{e_2} \times e_1\right)$$

$F_{c,d} = F_{t,d}$ = 80 kNm/(0.45 m + (0.25 m/0.45 m × 0.25m))
$F_{c,d} = F_{t,d}$ = 135.8 kN

$$\frac{F_{c,d}}{F_{c,Rd}} < 1.0 \qquad \frac{F_{t,d}}{F_{t,Rd}} < 1.0$$

$F_{c,d}/F_{c,Rd,ZQST22}$ = 135.8 kN/225.4 kN = 0.6 < 1.0
$F_{t,d}/F_{t,Rd,ZQST22}$ = 135.8 kN/225.4 kN = 0.6 < 1.0

Minimum end plate thickness [d] without detailed verification, using mild steel S235: Distance b ≤ 50 mm

$$\frac{\max F_{t,d}}{F_{t,Rd,QST22}} \begin{cases} \leq 1.0 & : 40 \text{ mm} \\ \leq 0.8 & : 35 \text{ mm} \\ \leq 0.5 & : 30 \text{ mm} \end{cases}$$

$$\frac{F_{t,d}}{F_{t,Rd}} = 0.98 \leq 1.0 \rightarrow d = 40 \text{ mm}$$

Deformation due to $M_{y,d}$ see page 295

Notes

- As the compressive force for the KST-ZQST module will exceed 1/3 of the permitted tensile force, one KST-ZST 22 module in the upper tensile area structurally is not sufficient; furthermore, the interaction cannot be satisfied for the KST-QST module under tensile loads.

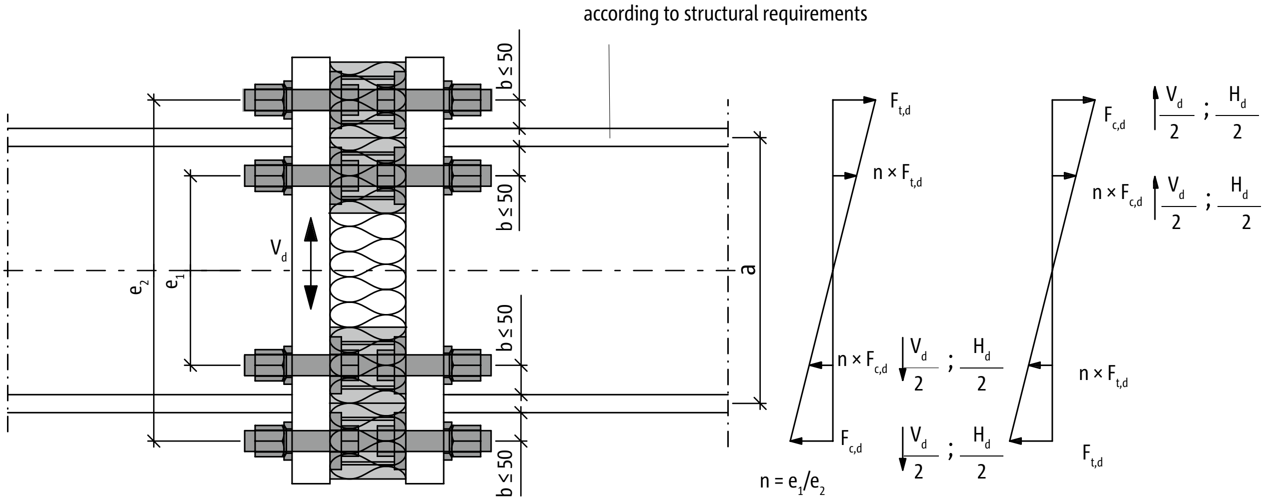
  $$\left(F_{c,d} = 166.67 \geq \frac{225.4}{8} = F_{t,Rd}\right)$$

- In the lower area, tensile forces due to the wind will only occur for a limited time. Accordingly, a single KST-QST module would offer sufficient fatigue resistance. However, in order to prevent mix-ups, we recommend a symmetrical connection with 4 × KST-ZQST modules.
- As it cannot be ensured that the KST-QST modules/KST-ZQST modules establish a similarly large resistance to the dissipation of shear forces at the same time, only the module which is located in the compressive area must be used to dissipate shear forces.

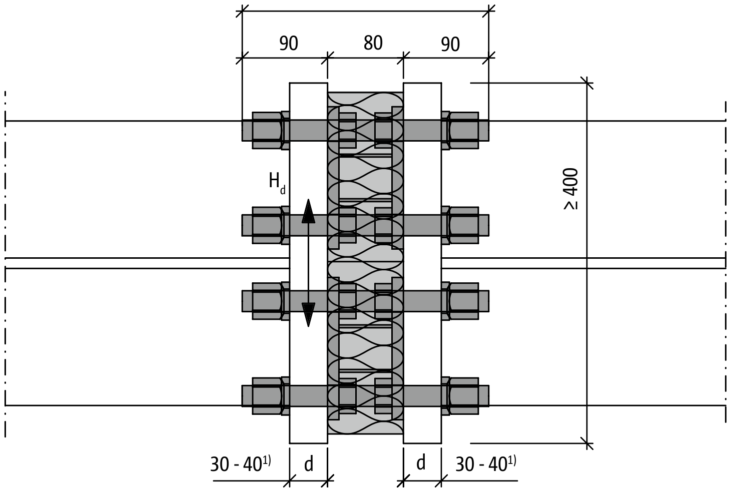
Schöck Isokorb® type KST-QST 22 module, KST-ZQST 22 module

Design configuration

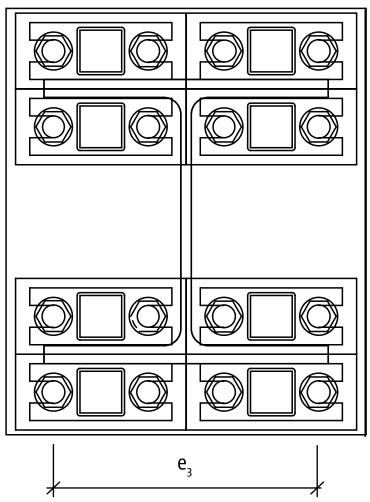
10 **Side elevation**



Plan elevation



Front elevation



Load-bearing capacity of the individual module:

per KST-QST 22 module, KST-ZQST 22[2)] module	
H_{Rd}	6 kN[3)]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

[1)] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

$$\frac{F_{t,d} \text{ per module}}{F_{t,Rd}} \quad \begin{array}{ll} \le 1.0 & : 40 \text{ mm} \\ \le 0.75 & : 35 \text{ mm} \\ \le 0.5 & : 30 \text{ mm} \end{array}$$

[2)] This variant should be used if the system needs to absorb large forces which act on alternating sides (e.g. wind loads from below onto the cantilever). The KST-ZQST module should be used in accordance with page 293 wherever primarily tensile forces (resulting from permanent loads) are transferred. The element, which is subjected only temporarily to a tensile load, can be used as a KST-QST 22 module.

[3)] Always refer to the information about expansion joints/fatigue resistance on pages 296 - 297.

Schöck Isokorb® for connection of members with 8 KST-QST 22 modules/KST-ZQST 22 modules[2)]

Example: Moment connection for HEA 360 with 4 × KST-ZQST 22 modules

Loads:

Load case 1 (status during usage): $V_{z,d}$ = 126 kN H_d = ±20 kN $M_{y,d}$ = –236 kNm

Load case 2 (assembly): $V_{z,d}$ = –96 kN $M_{y,d}$ = 166 kNm $M_{z,d}$ = ±22 kNm $F_{x,c,d}$ = 160 kNm

e_1 = 0,215 m
e_2 = 0,450 m
e_3 = 0.280 m (axis separation of the outer row of bolts)

Verification of the load case "status during usage":

Shear force and horizontal force at load case 1

$$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$$

$V_{z,Rd,QST22}$ = 4 × 36 kN = 144 kN
$V_{z,d}/V_{z,Rd,QST22}$ = 126 kN/144 kN = 0.88 < 1.0

$H_{Rd,QST22}$ = 4 × 6 kN = 24 kN
$H_d/H_{Rd,QST22}$ = 20 kN/24 kN = 0.83 < 1.0

Moment at load case 1

$$M_{y,d} = 2 \times F_{t,Rd} \times e_2 + 2 \times \frac{e_1}{e_2} \times N_{t,Rd} \times e_1$$

$$F_{t,Rd,QST22} = \frac{M_{y,d}}{2 \times e_2 + 2 \times \frac{e_1}{e_2} e_1}$$

$$\frac{236 \text{ KNm}}{2 \times 0.45 \text{ m} + 2 \times \frac{0.215 \text{ m}}{0.45 \text{ m}} 0.215 \text{ m}} = 213.5 \text{ KN}$$

$$\frac{F_{c,d}}{F_{c,Rd}} < 1.0 \qquad \frac{F_{t,d}}{F_{t,Rd}} < 1.0$$

$F_{c,d}/F_{c,Rd,QST22}$ = 213.5 KN/225.4 KN = 0.95 < 1.0
$F_{t,d}/F_{t,Rd,QST22}$ = 213.5 KN/225.4 KN = 0.95 < 1.0

Minimum end plate thickness without detailed verification, using mild steel S235: Distance b ≤ 50mm

$$\frac{\max F_{t,d}}{F_{t,Rd,QST22}} \begin{cases} \leq 1.0 & : 40 \text{ mm} \\ \leq 0.8 & : 35 \text{ mm} \\ \leq 0.5 & : 30 \text{ mm} \end{cases}$$

$$\frac{F_{t,d}}{F_{t,Rd}} = 0.95 < 1.0 \rightarrow d = 40 \text{ mm}$$

Deformation due to $M_{y,d}$ (see page 295)

Buckling angle

$$\varphi = \frac{M_k}{c} \text{ [rad]}$$

$$\varphi = \frac{236/1.45 \times 100}{25.5336^{06}} \text{ [rad]}$$

$$c = 24\,000 \times a^2$$

$$c = 24\,000 \times \left(\frac{(21.5 \text{ cm} + 45 \text{ cm})}{2}\right)^2 = 26.5335 \times 10^6 \text{ [kNcm/rad]}$$

Schöck Isokorb®

Example type KST-QST 22 module, KST-ZQST 22 module

Loading combination during assembly:

Shear force at load case 2

$$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$$

$V_{z,Rd,QST22} = 4 \times 36\ kN = 144\ kN$
$V_{z,d}/V_{z,Rd,QST22} = 96\ kN/144\ kN = 0.66 < 1.0$

Moment at load case 2 (lifting off)

$$M_{y,d} = 2 \times D_d \times e_2 + 2 \times \frac{e_1}{e_2} \times D_d \times e_1$$

$$M_{Zd} = 2 \times D_d \times e_3$$

Verification of the bolts under the highest loads for compressive loads from bi-axial bending[1)]

$$\frac{F_{c,d}}{F_{c,Rd}} < 1.0$$

$$F_{c,d} = \frac{M_{y,d}}{2 \times e_2 + 2 \times \frac{e_1}{e_2} \times e_1} + \frac{M_{z,d}}{2^{1)} \times e_3} + \frac{F_{c,d}}{8^{2)}}$$

$$F_{c,d} = \frac{166\ KNm}{2 \times 0.45\ m + 2 \times \frac{0.215\ m}{0.450\ m} \times 0.215\ m} + \frac{22\ KNm}{2 \times 0.28\ m} + \frac{160\ KNm}{8}$$

$$F_{c,d} = 150.17\ KN + 39.29\ KN + 20\ KN$$

$$F_{c,d}/F_{c,Rd,QST22} = 209.46\ KN/225.4\ KN = 0.93 < 1.0$$

KST

Steel/steel

[1)] Conserevatively, only the external bolts are considered as being load-bearing. The calculations are performed with just 2 bolts, as $F_{c,d}$ relates to 1 module.
[2)] Number of modules subjected to a compressive load due to normal force $F_{x,c,d}$.

Schöck Isokorb® type KST
End plate dimensioning

Example - end plate protruding

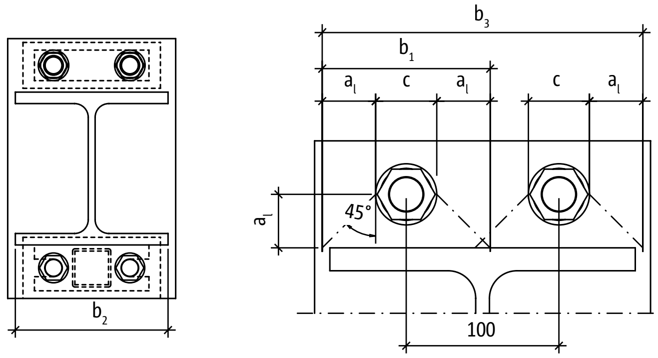
Calculation of max. bolt force: $\frac{F_{t,max,d}}{2} = F_{t,max,d}$ per bolt

Max. moment in the end plate:
$M_d = F_{t,\,max,d,bolt} \times a_l$ = [kNmm]
$W = d^2 \times b_{ef}/6$ = [mm²] with

b_{ef} = min (b_1; $b_2/2$; $b_3/2$)
d = thickness of end plate
c = diameter of U-washer
c (KST 16) = 30 mm,
c (KST 22) = 39 mm

b_1 = 2 × a_l + c [mm]
b_2 = member width or width of end plate [mm]
b_3 = 2 × a_l + c + 100 [mm]

$M_{R,d} = W \times f_{y,k}/1.1$ = [kNmm]
$M_d/M_{R,d} = \leq 1.0$



Schöck Isokorb® type KST 22 dimensioning of the end plate

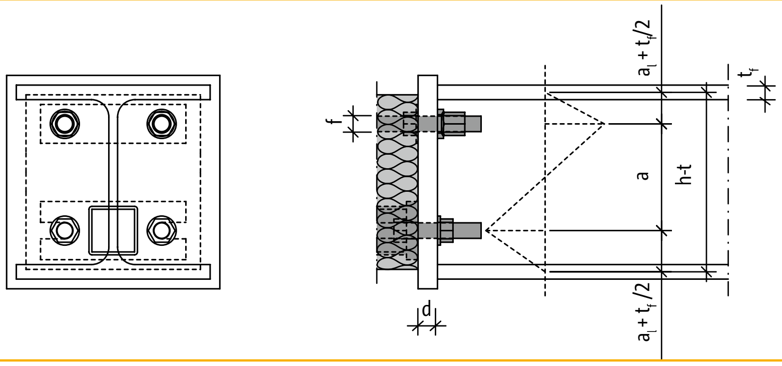
Example - end plate flush

Max. tensile or compressive force per module: $F_{t,d} = F_{c,d}$
Max. moment in the end plate: $M_d = F_{t,d} \times (a_l + \frac{t}{2})$

$W = d^2 \times b_{ef}/6$ with

$b_{ef} = b - 2 \times f$
d = thickness of end plate
f = diameter of bore
f (KST 16) = 18 mm
f (KST 22) = 24 mm
b = width of end plate

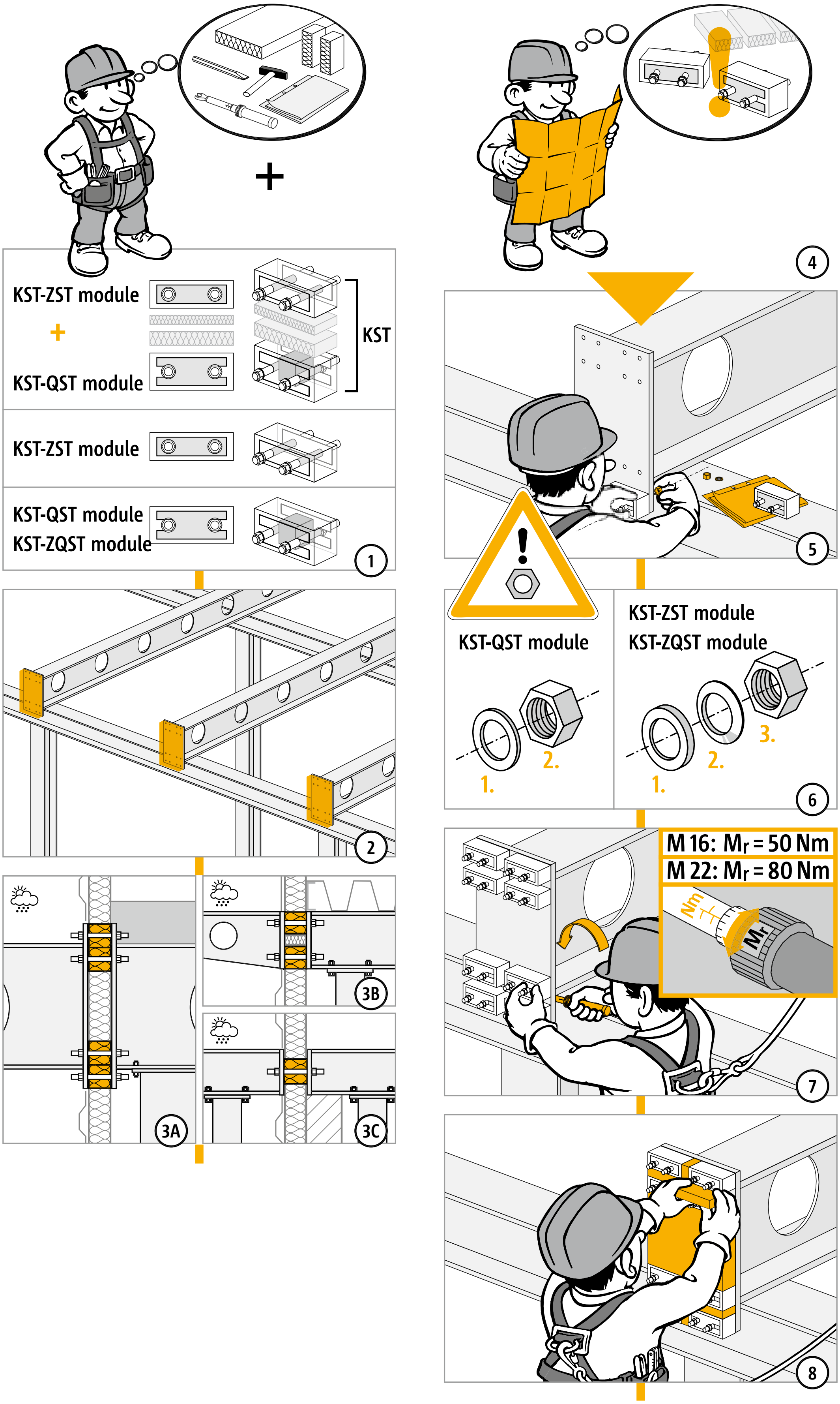
$M_{R,d} = W \times f_{y,k}/1.1$
$M_d/M_{R,d} = \leq 1.0$



Schöck Isokorb® type KST 16 dimensioning of the end plate

Schöck Isokorb® type KST

Method statement

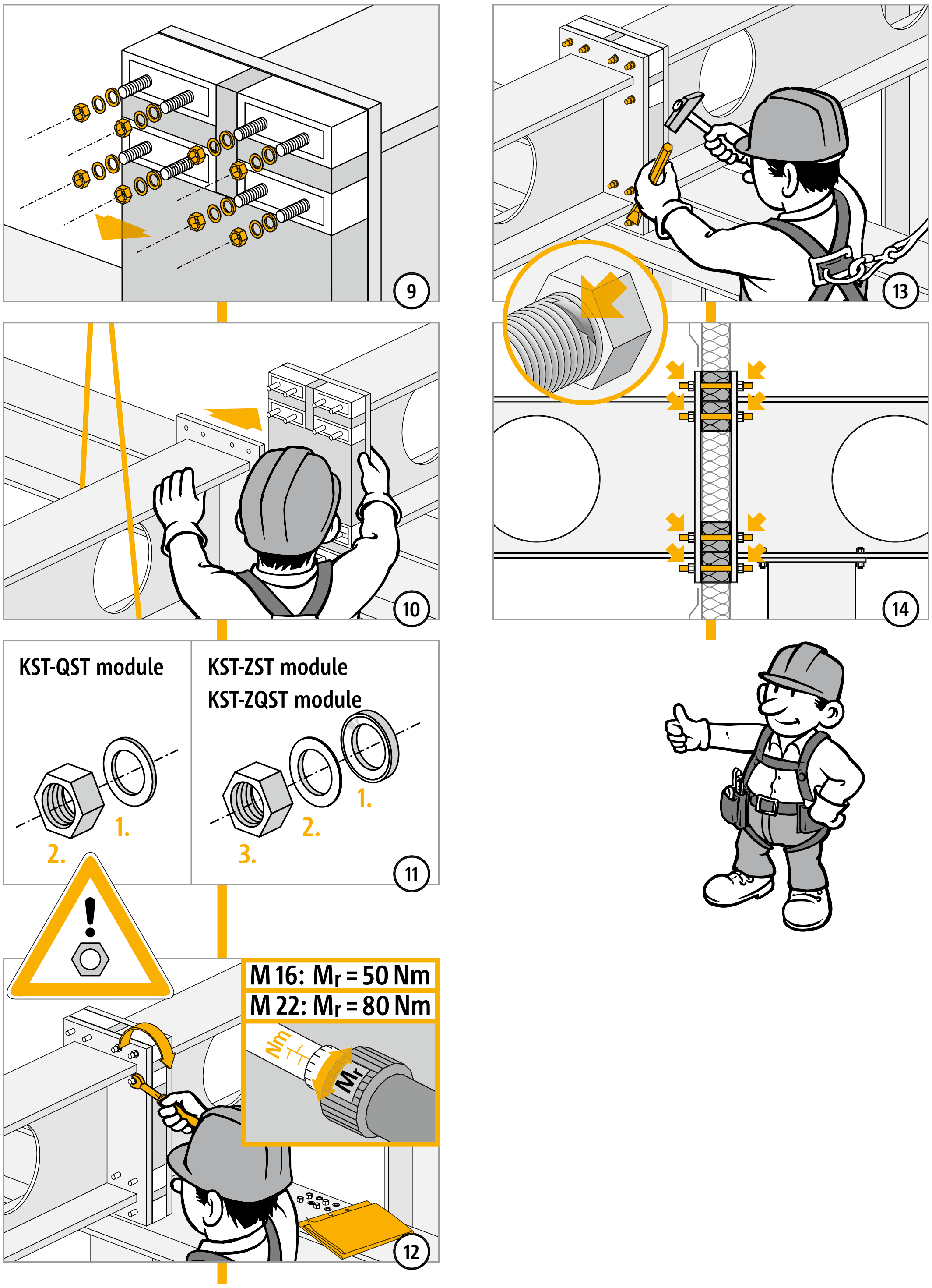


KST

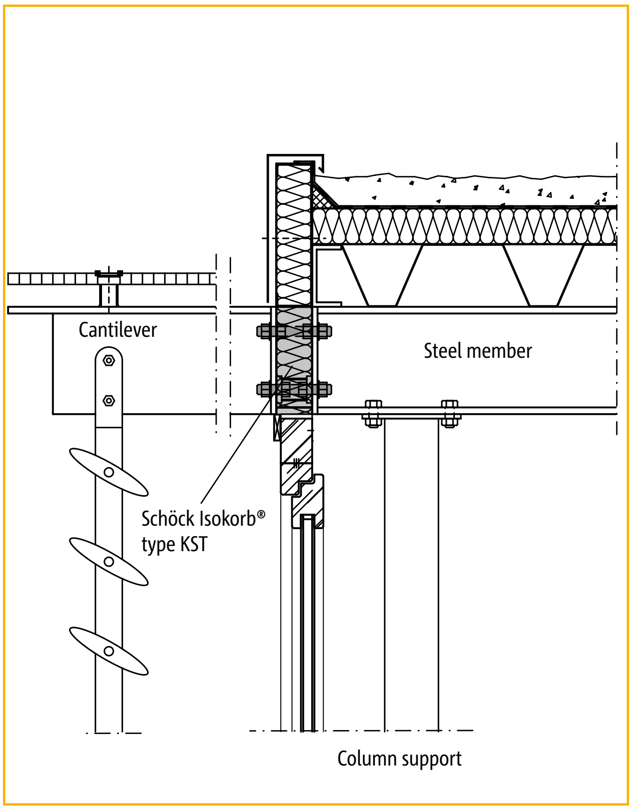
Steel/steel

Schöck Isokorb® type KST

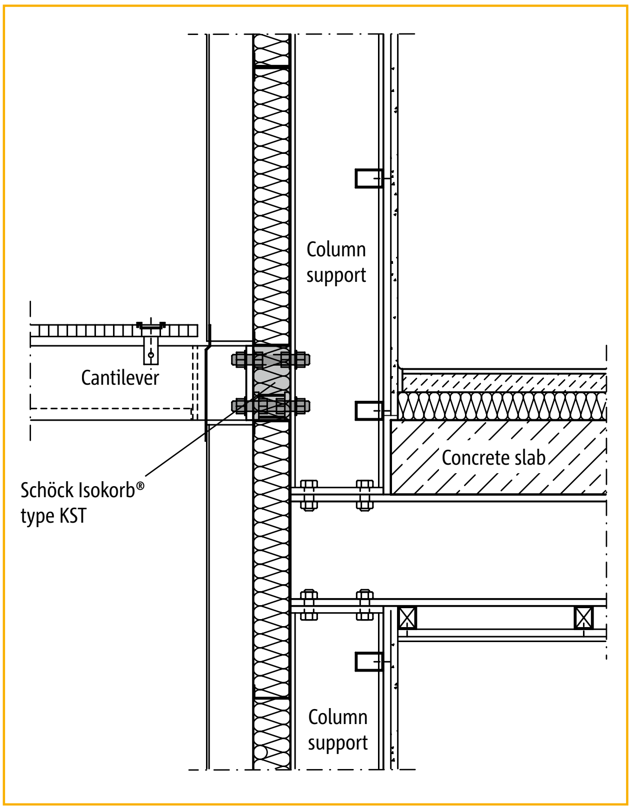
Method statement



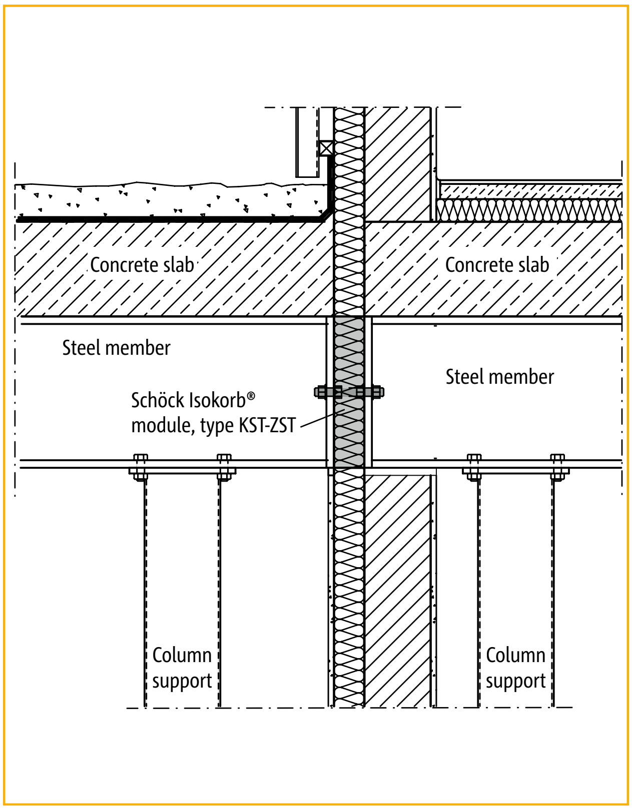
Schöck Isokorb® type KST
Constructions details



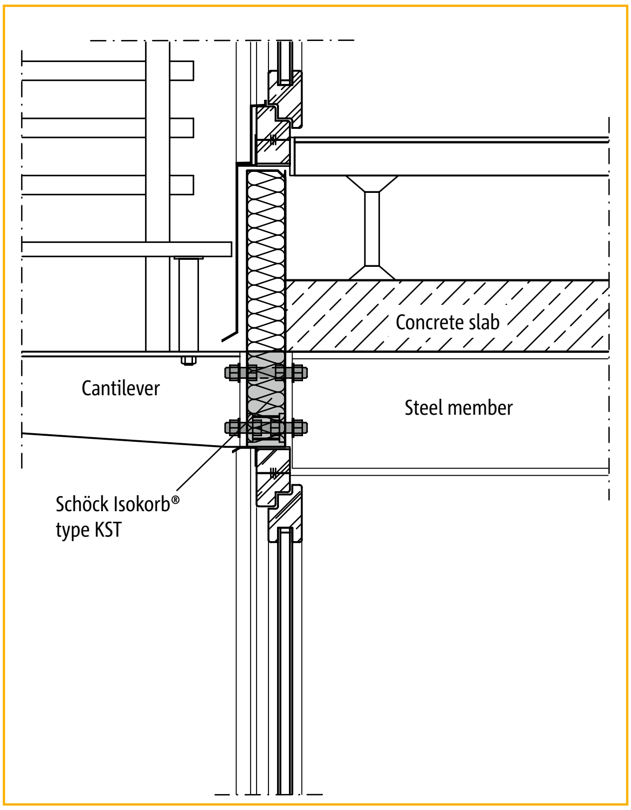
Provision of adjustable shading



Cantilevered canopy construction to column



Thermally insulated building transition



Façade balcony connection

KST

Steel/steel

Schöck Isokorb® KST, QST, ZST, ZQST module
Check list

- ☐ Have the member forces on the Isokorb® connection been determined at the design level?
- ☐ Will the Isokorb® element be used under primarily static loads (see page 295)?
- ☐ Are temperature deformations assigned directly to the Isokorb® connection? Expansion joint spacing (see pages 296 - 297)?
- ☐ Will the Isokorb® connection be exposed to an environement with a high chlorine content (e.g. inside indoor swimming pools) (see page 286)?
- ☐ Is there a fire safety requirement for the overall load-bearing structure/Isokorb® (see page 286)?
- ☐ Selection and calculation of the Isokorb® elements (refer also to pages 290 - 293 and the examples on pages 298 - 310)
  - Are the selected modules adequately dimensioned - refer to the “Design and calculation table” on page 294?
  - Have wind loads with a slight lift-off effect been assigned to the KST connection (see page 294[6)])?
  - Is the interaction relationship $3 \times V_z + 2 \times H_y + Z_x = \max Z_d \leq Z_{x,Rd}$ satisfied for the KST-QST module and KST-ZQST module under tensile loads with simultaneous shear loads (see page 294[3)])?
  - Have the KST-QST modules and KST-ZQST modules been located in the compression area in order to transfer shear forces (refer to example 8 on pages 304 - 305)?
- ☐ End plate calculation without more detailed verification (see pages 298 - 308):
  Are the requirements in terms of maximum bolt distances to the flange and minimum head plate width satisfied (refer to examples 1 - 10 on pages 298 - 310)?
  Front plate calculation with detailed verification: see page 311
- ☐ Did the deformation calculations for the overall structure take into account the deformation due to M_K in the Isokorb® connection (see page 295)?
- ☐ Are the individual modules clearly marked in the implementation plan and works plan so that there is no risk of their being interchanged.
- ☐ Have the tightening torques for the screwed connections been marked in the implementation plan (refer to page 312 - 313)? The nuts should be tightened spanner-tight without planned preload; the following tightening torques apply:

  KST 16 (bolt ø 16): M_r = 50 Nm
  KST 22 (bolt ø 22): M_r = 80 Nm

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