Schöck Isokorb®

Technical Information

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Schöck Isokorb®

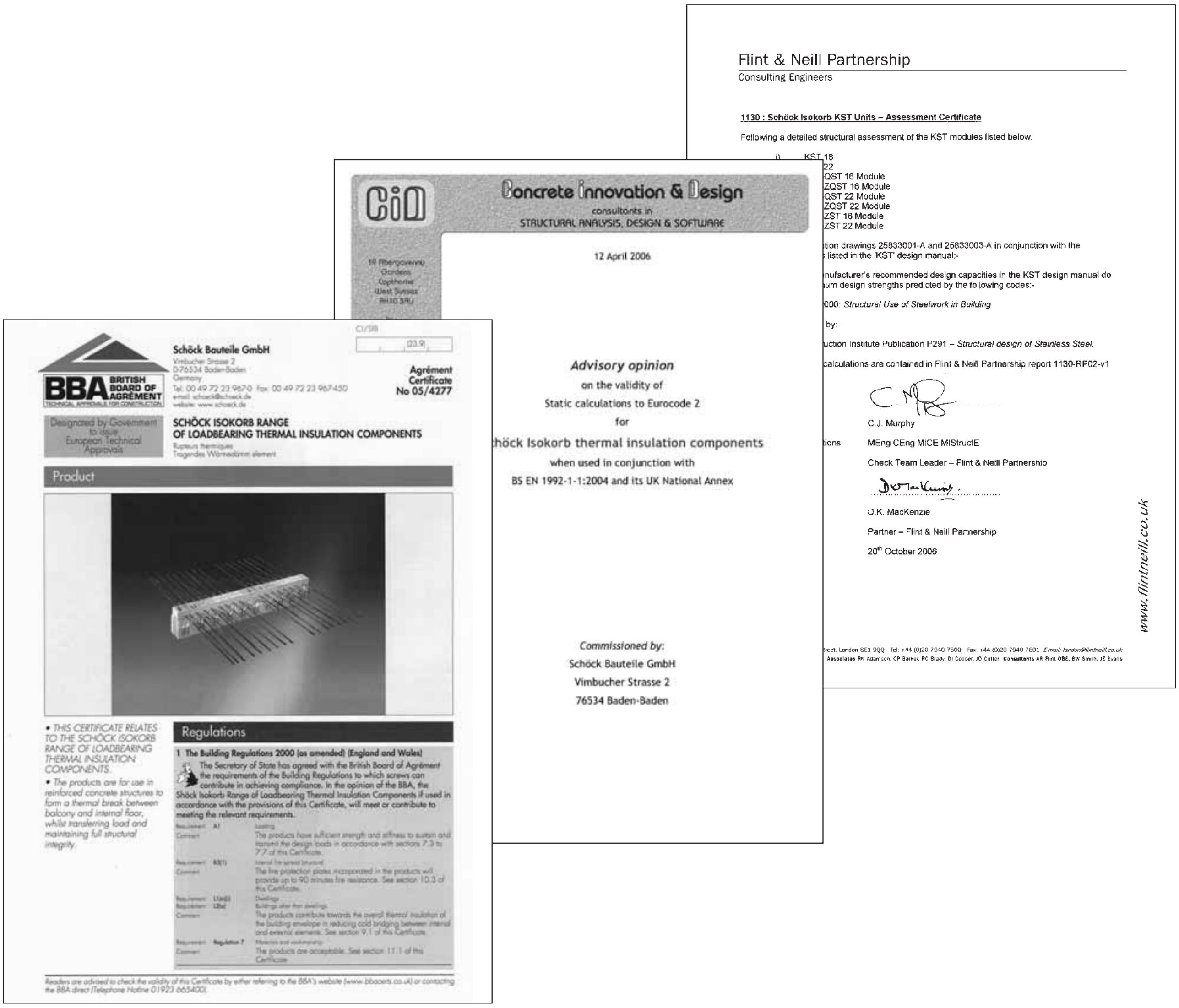
Certificates

Schöck Isokorb® range of load-bearing thermal insulation components, if used in accordance with the provisions of the BBA Approval, Agreement Certificate No 05/4277, will meet the relevant requirements.

The static calculations to Eurocode 2 for the Schöck Isokorb®, when used in conjunction with BS EN 1992-1-1:2004 and its UK National Annex, have been approved by Mr. Rod Webster, the Concrete Innovation & Design, West Sussex.

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 Mr. David MacKenzie, the Flint & Neill Partnership, London.

These documents can be downloaded from www.schoeck.co.uk.

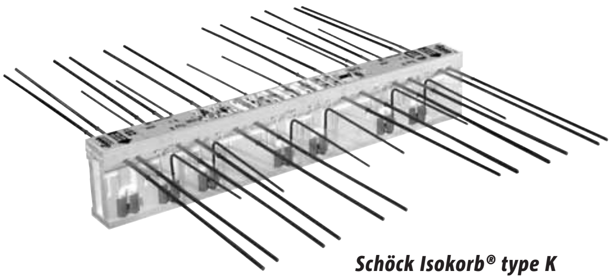


Schöck Isokorb®
Contents

Schöck Isokorb®
Features

Schöck Isokorb® for thermally efficient load-bearing connection between concrete-to-concrete

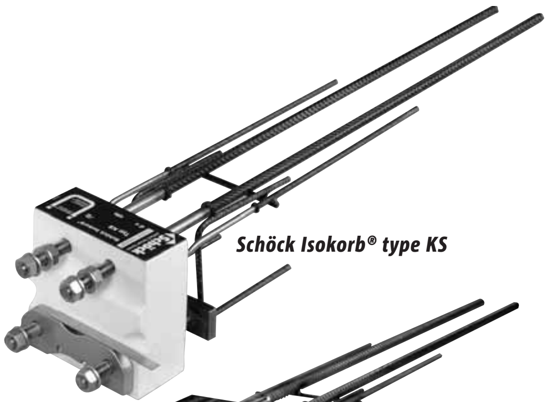
- provides a thermal break between external reinforced concrete components and the building
- reduces thermal losses to a minimum by virtue of innovative technology (HTE module compression bearings)
- plastic jackets on the concrete pressure bearings provide trouble-free movement
- thus helps to save heating bills, reduce CO_2 emissions and conserve natural energy resources
- eliminates the risk of condensation
- flush-mounted pressure bearings (HTE modules) facilitate installation on the construction site and in prefabricating plants



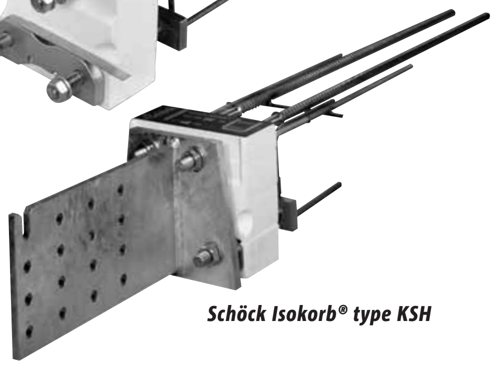
Schöck Isokorb® type K

Schöck Isokorb® for thermally efficient load-bearing connection between concrete-to-steel and concrete-to-wood

- allows thermally insulated connections between steel and wood to concrete components
- enables a high level of prefabrication
- minimises on-site assembly time
- components exposed to the weather are made of non-rusting steel, thus offering protection against corrosion



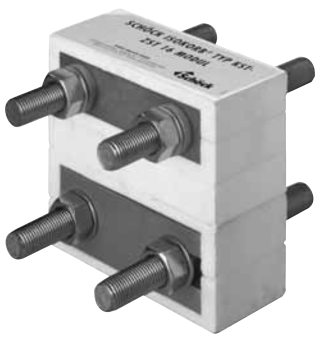
Schöck Isokorb® type KS



Schöck Isokorb® type KSH

Schöck Isokorb® for thermally efficient load-bearing connection between steel-to-steel

- allows thermal breaks to be incorporated in steel structures, whilst simultaneously being capable of transmitting high loads
- state-of-the-art components for the avoidance of thermal bridges in steel construction in accordance with the BRE IP 1/06
- enables a high level of prefabrication
- modular layout means that the system can be used for connections with all profile sizes and structural loads
- guarantees shortest planning and assembly times



Schöck Isokorb® type KST

Building physics
Thermal bridges

Definition of thermal bridges

Thermal bridges are localised regions in building envelope details which display increased thermal losses. The increased thermal losses can be caused by the component geometry ("geometric thermal bridge") or by the localised inclusion of materials with a higher thermal conductivity in the affected component ("material-based thermal bridge").

Effects of thermal bridges

In the area of a thermal bridge, the local increase in thermal losses causes the temperature of inside surfaces to drop. Mould will form as soon as the surface temperature drops below the so-called "mould temperature" θ_S. If the surface temperature drops even further – to below the dewpoint temperature θ_τ – the moisture present in the room air will condense on the cold surfaces in the form of droplets.

Once mould has formed in the area of a thermal bridge, the spores released by it into the room can represent a serious health hazard to anybody living in the room. Mould spores are allergens which can cause severe allergic reactions in humans, such as sinusitis, rhinitis and asthma. As exposure inside the house or apartment is usually prolonged, there is a high risk that these allergic reactions can develop into chronic conditions.

In summary, the effects of thermal bridges are therefore:

- Risk of mould formation
- Risk of health damage (allergies etc.)
- Risk of condensation
- Increased wastage of heating energy

Dewpoint temperature

The dewpoint temperature θ_τ of a room is the temperature at which the moisture present in the air in the room can no longer be supported by the air and condenses in the form of water droplets. At this point the relative humidity is then 100 %.

Room air which is in direct contact with the surfaces of colder areas take the temperature of the cold surface as a result of this direct contact. If the minimum surface temperature of a thermal bridge is below the dewpoint temperature, then the temperature of the air directly adjacent to this surface will also be below the dewpoint temperature. As a consequence, the moisture contained in this layer of room air condenses on the cold surface.

The dewpoint temperature only depends on the temperature and the humidity of the air in the room (see figure 1, page 8). The higher the humidity and temperature of the air in the room, the higher the dewpoint temperature – i.e. the sooner condensation forms on colder surfaces.

On average, standard climatic conditions in a room are around 20 °C with a relative humidity of approximately 50 %. This results in a dewpoint temperature of 9.3 °C. In rooms where the humidity is higher, e.g. in a bathroom, the humidity may also reach a value of 60 % or higher. The dewpoint temperature is correspondingly higher, and the risk of condensation forming increases. For example, if the humidity of the room air is 60 % the dewpoint temperature is already 12.0 °C (see figure 1, page 6). The steeply ascending curve in Figure 1 gives a very clear indication of how closely the dewpoint temperature depends on the humidity of the room air: even slight increases in the humidity of the room air lead to a significant increase in the dewpoint temperature of the room air. This results in a significant increase in the risk of condensation forming on the cold component surfaces.

Building physics
Thermal bridges

Mould temperature

At room air relative humidity values of 80 % or higher the surface moisture on components is sufficient for mould to grow, i.e. mould will grow on the surface of cold components if the component surface is cold enough to generate a humidity of 80 % in the layer of air directly adjacent to the component. The temperature at which this occurs is referred to as the socalled “mould temperature” θ_S.

This means that mould growth already takes place at temperatures above the dewpoint temperature. At a room climate of 20 °C/50 % the mould temperature is 12.6 °C, i.e. 3.3 °C higher than the dewpoint temperature. As a result, from the point of view of avoiding building damage (i.e. mould formation), the mould temperature is therefore more important than the dewpoint temperature. It is not sufficient for the inside surfaces to be warmer than the dewpoint temperature of the room air – the surface temperatures must also be above the mould temperature.

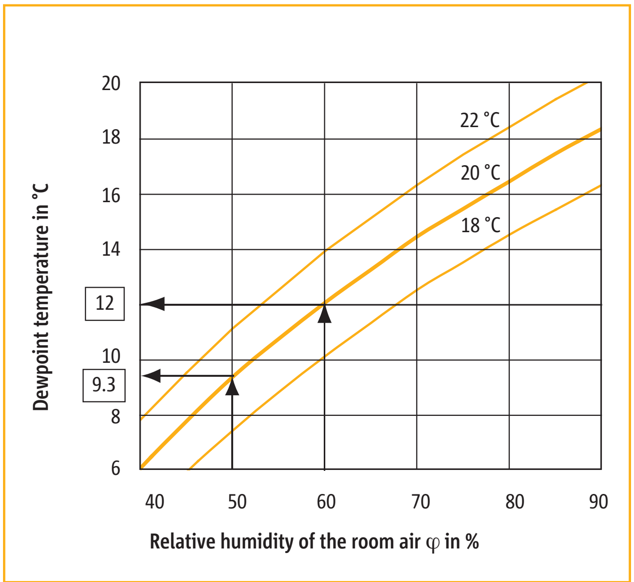


Figure 1: Dependency of the dewpoint temperature on the room air humidity and temperature

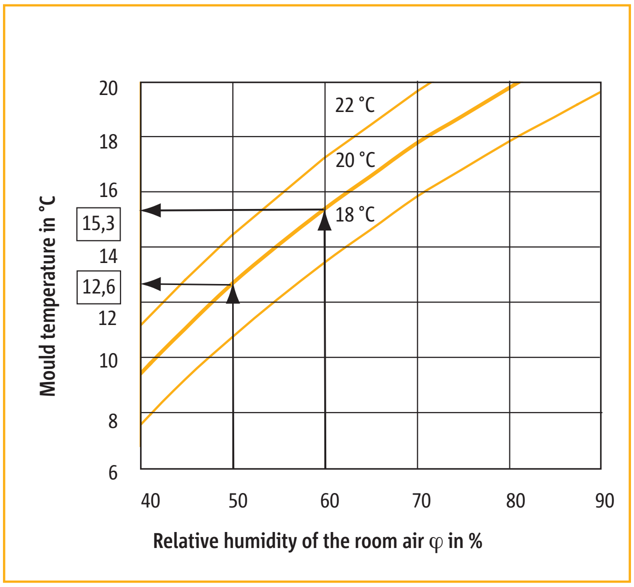


Figure 2: Dependency of the mould temperature on the room air humidity and temperature

Building physics
Thermal bridges

Thermal characteristics of thermal bridges

The thermal effects of thermal bridges are described by the following thermal characteristics:

Thermal effects	Characteristic values	
	Qualitative representation	Quantitative single value representation
Formation of mould Formation of condensation	Isothermals	Minimum surface temperature θ_{min} Temperature factor f_{Rsi}
Thermal loss	Heat flow lines	ψ value χ value

These characteristic values can only be determined by means of a thermal FE calculation of the thermal bridge. To do this, the geometric layout of the structure in the area of the thermal bridge is modelled on a computer together with the thermal conductivity values of the materials used. The boundary conditions which should be applied to the calculations and to the models are governed by BS EN ISO 10211-1:1996 and BS EN ISO 10211-2:2001.

In addition to the quantitative characteristic values, the FE calculation also yields a representation of the temperature distribution within the structure (representation of “isothermals”) and the layout of the heat flow lines. The heat flow line representation shows the paths on which heat is lost through the structure and offers good insight into the weak spots of the thermal bridge. The “isothermals” are lines or areas of the same temperature. They show the temperature distribution within the analysed component. Isothermals are often graded with a temperature increment of 1 °C. Heat flow lines and isothermals are always perpendicular to each other (see Figures 3 and 4).

The thermal transmission coefficients ψ and χ

The linear thermal transmission coefficient ψ (“psi value”) describes the additional thermal losses per meter of a linear thermal bridge. Correspondingly, the thermal transmission coefficient χ (“chi value”) describes the additional thermal losses through a point-shaped thermal bridge.

Depending on whether the surfaces used to determine the ψ value relate to external or internal dimensions, a distinction is made between ψ values which relate to external and internal dimensions. The thermal insulation calculations in accordance with the Energy Saving directive must be based on ψ values which relate to external dimensions. Unless specified otherwise, all of the ψ values in this technical information document relate to external dimensions.

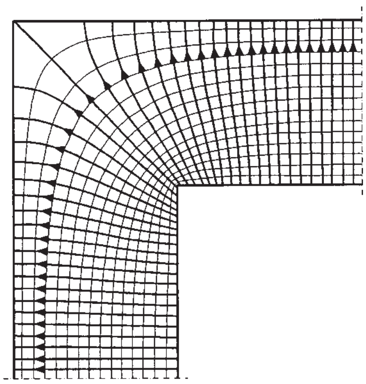


Figure 3: Example of a thermal bridge which is caused purely by the geometry of the component (“geometric thermal bridge”). Representation of the isothermals and heat flow lines (arrows).

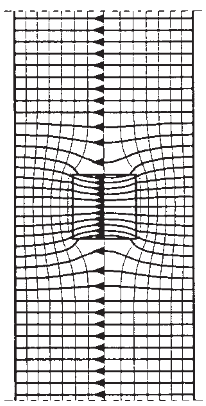


Figure 4: Example of a thermal bridge which is caused purely by the choice of materials (“material-based thermal bridge”). Representation of the isothermals and heat flow lines (arrows).

Building physics

Thermal bridges

Building physics

The minimum surface temperature θ_{min} and the temperature factor f_{Rsi}

The minimum surface temperature θ_{min} is the lowest inside surface temperature occurring in the region of a thermal bridge. The value of the minimum surface temperature is the deciding factor which determines whether condensation forms at a thermal bridge or whether mould starts to grow there. Accordingly, the minimum surface temperature is an indicator of the effects of a thermal bridge in terms of dampness.

The characteristic values θ_{min} and the ψ value depend on the layout and structure of the thermal bridge (geometry and thermal conductivity of the materials which form the thermal bridge). In addition, the minimum surface temperature also depends on the prevailing outside temperature. The lower the outside air temperature, the lower the minimum surface temperature (see Figure 5).

As an alternative to the minimum surface temperature, the temperature factor f_{Rsi} can also be used as a dampness indicator. The temperature factor f_{Rsi} is the temperature difference between the minimum surface temperature and the outside air temperature ($\theta_{min} - \theta_e$) divided by the temperature difference between the inside temperature and outside temperature ($\theta_i - \theta_e$):

$$f_{Rsi} = \frac{\theta_{min} - \theta_e}{\theta_i - \theta_e}$$

As the f_{Rsi} value is a relative value, it offers the advantage that it only depends on the construction of the thermal bridge, and not on the prevailing inside and outside temperatures like θ_{min}. If the f_{Rsi} value of a thermal bridge is known, the minimum surface temperature can be calculated for specific inside and outside air temperatures:

$$\theta_{min} = \theta_e + f_{Rsi} \times (\theta_i - \theta_e)$$

Figure 5 shows the dependency of the minimum surface temperature on the adjacent outside temperature as a function of different f_{Rsi} values with a constant inside temperature of 20 °C.

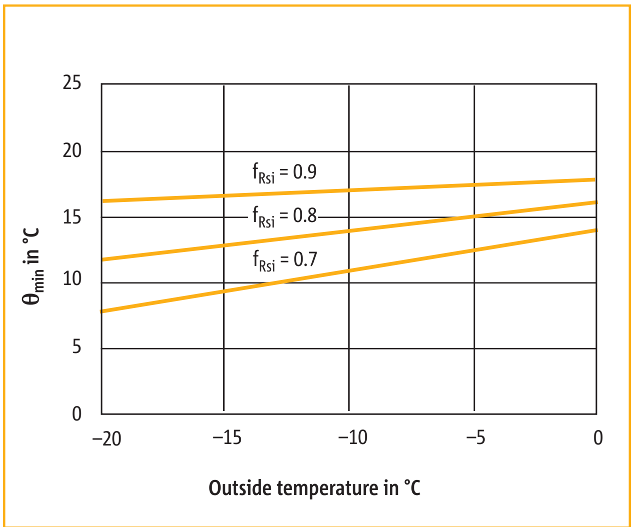


Figure 5: Dependency of the minimum surface temperature on the adjacent outside temperature (Inside temperature at a constant value of 20 °C).

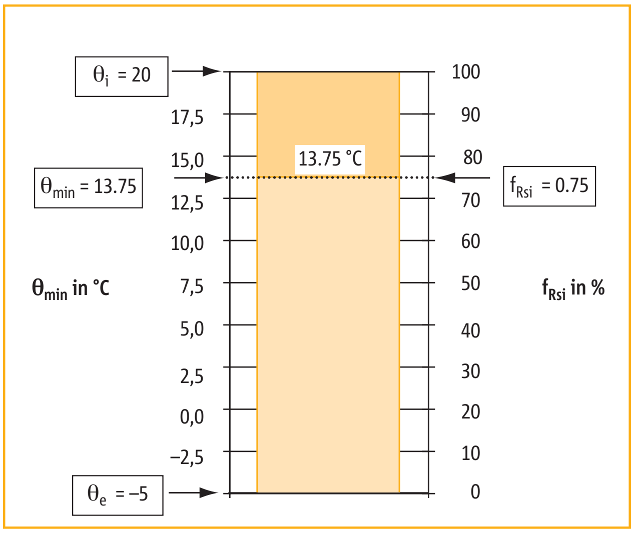


Figure 6: Definition of the f_{Rsi} value

Building physics
Thermal bridges

Requirements in terms of thermal bridges

Requirements relating to minimum surface temperature

In the UK, Building Regulation Approved Document Part L1 (ADL1) and Part L2 (ADL2) cites BRE IP1/06[1] for guidance. The critical temperature factor (f_{CRsi}) is introduced as a means of avoiding mould growth on absorbent surfaces and limiting the risk of surface condensation.

For avoiding mould growth:

Type of building	f_{CRsi}
Dwellings, residential buildings, schools	0.75

For limiting the risk of surface condensation:

Type of building	f_{CRsi}
Offices, retail premises	0.5

f_{Rsi} must be calculated using numerical modelling if the detail does not comply with “Accredited Construction Details“[2].

Requirements in terms of thermal losses

In the UK, both ADL1 (Dwellings) and ADL2 (Buildings other than dwellings) require use of whole building models to prove energy compliance, as required by the EU Energy Performance of Buildings Directive.

ADL1 (Dwellings) uses the Government Standard Assessment Procedure SAP 2005 to determine overall carbon dioxide emissions from operating the building. Heat loss through non-repeating thermal bridges (H_{TB}) is calculated using one of two methods:

- If details of the thermal bridges are not known: $H_{TB} = y \times \sum_i A_{exp,i}$ where $\sum_i A_{exp,i}$ is the summed area of exposed elements in m².

  If only Accredited Construction Details are used, y = 0.08. Otherwise, if specific ψ values are not known, a default value of y = 0.15 applies.

- If ψ values are known, either through complying with Accredited Construction Details, from manufacturer’s technical data or from the results of numerical modelling: $H_{TB} = \sum_i (L_i \times \psi_i)$ where L_i = length of thermal bridge i in m.

  Default values for ψ for junctions in wall constructions are given in Accredited Construction Details and in BRE IP1/06.

  If details are as recommended in Accredited Construction Details, the default ψ values quoted in this publication or in BRE IP1/06 can be used.

  Otherwise, the ψ values and temperature factors for each type of junction must be obtained from numerical modelling.

[1] “Assessing the effects of thermal bridging at junctions and around openings“, BRE IP1/06, Building Research Establishment, 2006
[2] “Accredited construction details for limiting thermal bridging and air leakage“

Building physics
Thermal bridges

Non-insulated balcony connections

In the case of non-insulated balcony slab connections, the combination of the geometric thermal bridge ("cooling fin" effect of the balcony slab) and the thermal bridge which arises as a result of the material used (reinforced concrete slab with good thermal conductivity) results in a high outward flow of heat, which means that the non-insulated balcony connection is one of the most critical thermal bridges in the building envelope. The consequence is a large decrease in surface temperatures in the connection area and significant wastage of heating energy. It also means that there is a significant risk of mould growth in the connection area of a non-insulated balcony.

Effective thermal insulation with Schöck Isokorb®

Thanks to its thermally and structurally optimised design (minimised reinforcement cross-sections, use of materials with particularly low thermal conductivity), the Schöck Isokorb® represents a highly effective means of insulating balcony connections.

Schöck Isokorb® for reinforced concrete balconies
In the area of the balcony connection, the use of Schöck Isokorb® elements replaces concrete (high thermal conductivity of $\lambda = 1.65$ W/m · K) and steel reinforcement (very high thermal conductivity of $\lambda = 50$ W/m · K) with insulating material ($\lambda = 0.035$ W/m · K), stainless steel, which has a thermal conductivity of $\lambda = 15$ W/m · K and therefore conducts significantly less heat than reinforced concrete, and high-strength fine concrete ($\lambda = 1.52$ W/m · K) (see Table 2). As a result, e.g. Schöck Isokorb® type K50 elements reduce average thermal conductivity by around 91 % in comparison to a reinforced concrete slab which is concreted through (see Figure 8).

Schöck Isokorb® for steel balconies
For steel balcony connections, the use of Schöck Isokorb® elements replaces structural steel (very high thermal conductivity of $\lambda = 50$ W/m · K) with insulating material ($\lambda = 0.035$ W/m · K) and stainless steel, which has a thermal conductivity of $\lambda = 15$ W/m · K and therefore conducts significantly less heat than structural steel (see Table 2).

Schöck Isokorb® for steel member connections in steel construction
For other steel connections the use of Schöck Isokorb® elements replaces structural steel (very high thermal conductivity of $\lambda = 50$ W/m · K with insulating material ($\lambda = 0.035$ W/m · K) and stainless steel, which has a thermal conductivity of ($\lambda = 15$ W/m · K) and therefore conducts significantly less heat than structural steel (see Table 2). As a result, e.g. Schöck Isokorb® KST 16 elements reduce average thermal conductivity by around 78 % in comparison to continuous steel members (see Figure 8)

	Non-insulated balcony connection	Balcony connection with Schöck Isokorb®	Reduction of thermal conductivity in comparison to non-insulated design by
Materials Balcony connection	Concrete/structural steel $\lambda = 50$ W/m x K	Stainless steel (material no. 1.4362) $\lambda = 15$ W/m x K	70 %
		High-strength fine concrete $\lambda = 1.52$ W/m x K	97 %
	Concrete $\lambda = 1.65$ W/m x K	Polystyrene $\lambda = 0.035$ W/m x K	98 %

Table 2: Comparison of the thermal conductivity values of different materials in use for balcony connections

In accordance with the BBA certificate no. 05/74277 and OISD Report 0608/4SCH thermal break connection with Schöck Isokorb® types K, KS and KST meet the requirements of ADL1 and ADL2.

Building physics

The balcony as a thermal bridge

The equivalent thermal conductivity λ_{eq}

The equivalent thermal conductivity λ_{eq} is the overall thermal conductivity of the Isokorb® insulating element averaged over the contributions of the different surface proportions. Given the same insulating element thickness it is an indicator of the thermal insulation effect of the connection. The smaller λ_{eq}, the higher the thermal insulation of the balcony connection. As the equivalent thermal conductivity takes into account the contributions from the different surface proportions of the materials used, λ_{eq} depends on the load capacity of the Schöck Isokorb®.

In comparison to a connection which is not insulated, the Schöck Isokorb® types K, KS and KST can achieve a reduction in thermal conductivity in the connection area of between up to 90 % and 94 % for the standard load range.

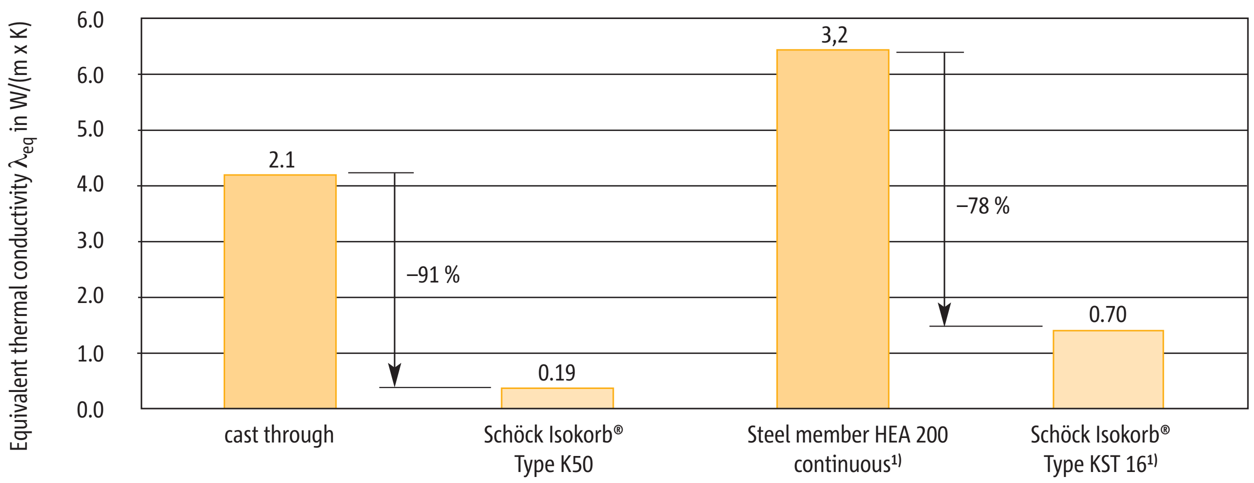


Figure 8: A comparison of equivalent thermal conductivity values λ_{eq} for different balcony slab connections.

Difference between the ψ value and λ_{eq}

The equivalent thermal conductivity λ_{eq} of the insulating element of the Schöck Isokorb® is a measure of the thermal insulation effect of the element, whereas the ψ value indicates the thermal insulation of the balcony as an overall structure. The ψ will always vary according to the design, even if the connection element is unchanged.

Conversely, if the design of the structure is fixed then the ψ value will depend on the equivalent thermal conductivity λ_{eq} of the connection element: the lower λ_{eq}, the lower the ψ value (and the higher the minimum surface temperature).

[1] Reference area: 180 x 180 mm²

Building physics
The balcony as a thermal bridge

Thermal bridge characteristic values for balcony connections with Schöck Isokorb®

The thermal bridge characteristic values resulting from a typical construction type and different Isokorb® types are shown in Table 3 below. The underlying construction types are shown in Figures 11a, 12a and 13a. Other construction types which do not match the ones shown here will have different thermal bridge characteristic values.

Schöck Isokorb® type	Equivalent thermal conductivity (3-dim.) W/(m x K)	Thermal transmission coefficient ψ in W/(m x K) (in relation to external dimensions) or χ in W/K	Temperature factor f_{Rsi}
K50	λ_{eq} = 0.19	ψ = 0.21	f_{Rsi} = 0.91
KS 14	λ_{eq} = 0.31[2)]	χ = 0.097	f_{Rsi} = 0.93
KST 16[1)]	λ_{eq} = 0.70[3)]	χ = 0.26	f_{Rsi} = 0.82
The characteristic values were determined on the basis of the construction types shown in Figures 11a, 12a and 13a with the following thermal boundary conditions: Heat transfer resistance outside: R_{Si} = 0.04 Km²/W, heat transfer resistance inside: R_{Si} = 0.13 Km²/W			

Table 3: Typical thermal bridge characteristic values that can be achieved with Schöck Isokorb® elements.

[1)] Values from Report 060814SCH, Oxford Institute of Sustainable Development, Oxford Brookes University
[2)] Reference area: 180 x 180 mm²
[3)] Reference area: 250 x 180 mm²

The balcony as a thermal bridge

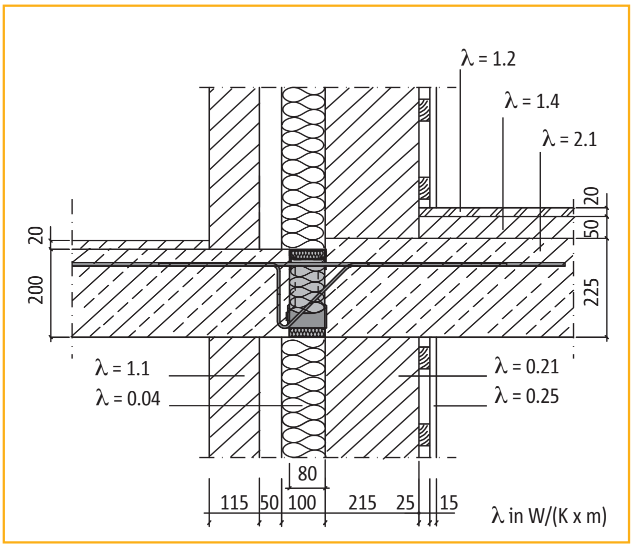


Figure 11a: Balcony slab connection with Schöck Isokorb® type K50-CV30 and a composite thermal insulation system

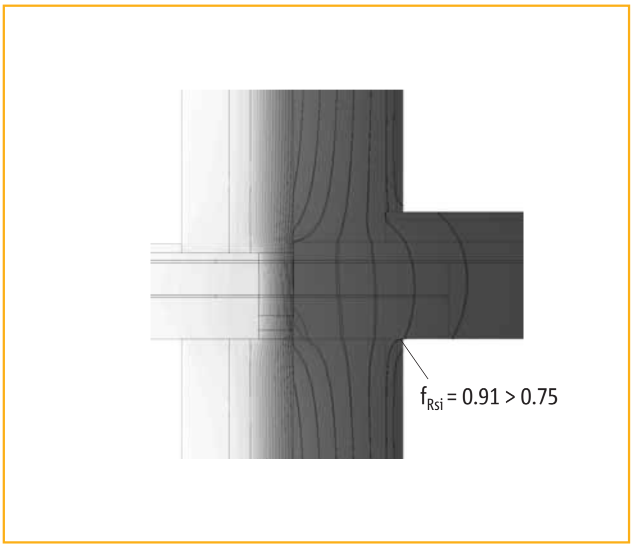


Figure 11b: Isothermals for connection 11a

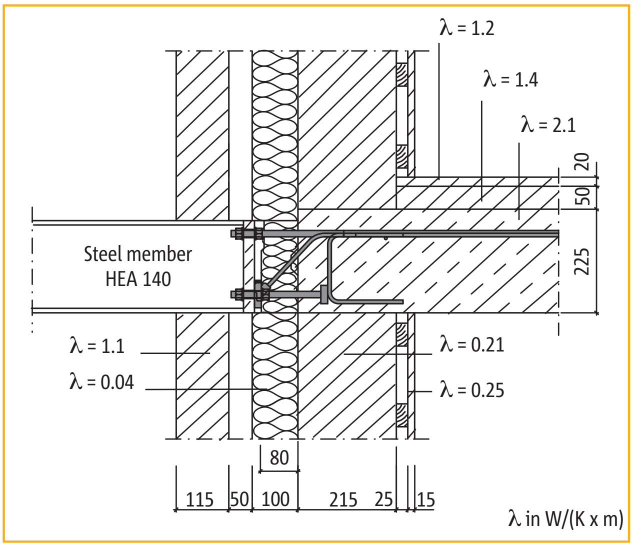


Figure 12a: Connection of steel member HEA 140 with Schöck Isokorb® type KS14 and a composite thermal insulation system

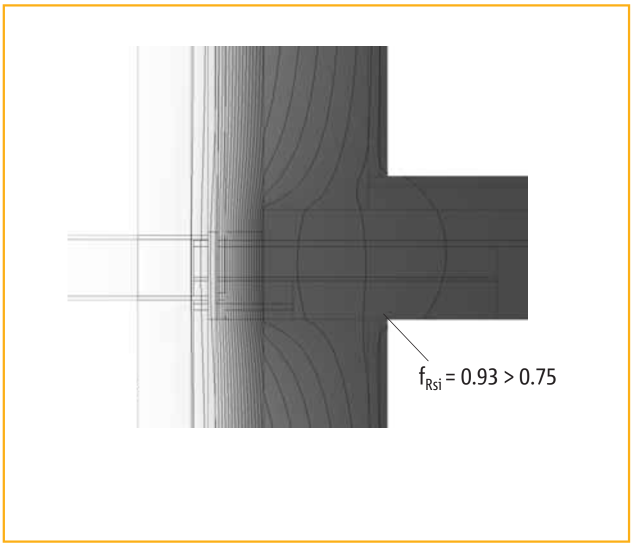


Figure 12b: Isothermals for connection 12a

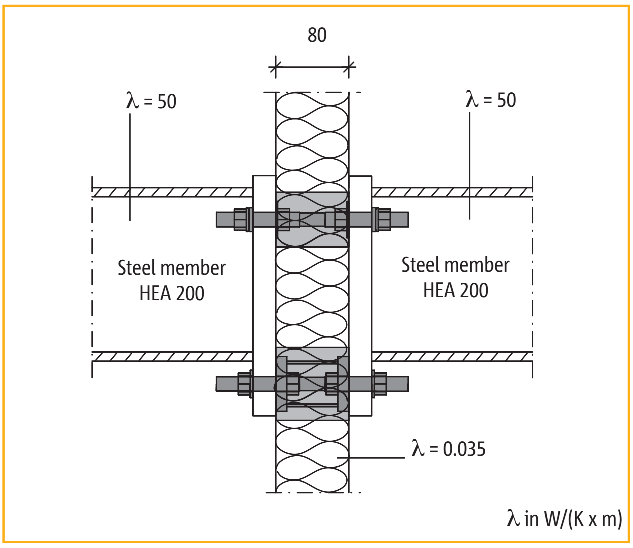


Figure 13a: Connection of steel member HEA 200 with Schöck Isokorb® type KST16

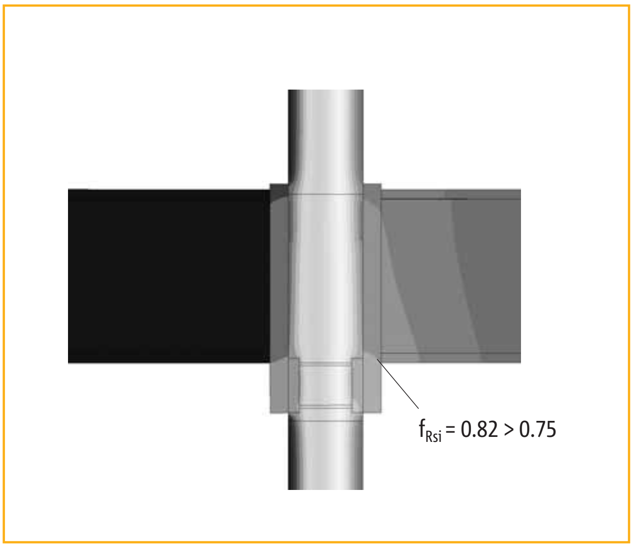


Figure 13b: Isothermals for connection 13a

Building Physics

Equivalent thermal conductivity λ_{eq}

λ_{eq} (1-dim.) in W/(m · K) for Schöck Isokorb® type K

Schöck Isokorb® type[1]	Heigth of Isokorb H [mm]									
	160		170		180		190		200	
	F 0	F 90	F 0	F 90	F 0	F 90	F 0	F 90	F 0	F 90
K10-CV35	0.099	0.119	0.095	0.114	0.092	0.110	0.089	0.106	0.086	0.102
K10-CV35-V8	0.107	0.127	0.103	0.122	0.099	0.117	0.096	0.113	0.093	0.109
K20-CV35	0.126	0.146	0.121	0.140	0.116	0.134	0.112	0.129	0.108	0.124
K20-CV35-V8	0.134	0.155	0.128	0.148	0.123	0.141	0.119	0.136	0.114	0.131
K30-CV35	0.167	0.188	0.160	0.179	0.153	0.171	0.146	0.163	0.141	0.157
K30-CV35-V8	0.180	0.200	0.171	0.190	0.164	0.182	0.157	0.174	0.151	0.167
K30-CV35-V10	0.198	0.218	0.188	0.207	0.180	0.198	0.172	0.189	0.165	0.181
K40-CV35	0.181	0.201	0.172	0.191	0.164	0.182	0.158	0.175	0.151	0.168
K40-CV35-V8	0.193	0.213	0.184	0.203	0.175	0.193	0.168	0.185	0.161	0.178
K40-CV35-V10	0.202	0.223	0.192	0.212	0.184	0.202	0.176	0.193	0.169	0.185
K40-CV35-VV	0.202	0.223	0.192	0.212	0.184	0.202	0.176	0.193	0.169	0.185
K50-CV35	0.212	0.232	0.201	0.221	0.192	0.210	0.184	0.201	0.176	0.193
K50-CV35-V8	0.224	0.244	0.213	0.232	0.203	0.221	0.194	0.211	0.186	0.203
K50-CV35-V10	0.234	0.254	0.222	0.241	0.212	0.230	0.202	0.219	0.194	0.210
K50-CV35-VV	0.234	0.254	0.222	0.241	0.212	0.230	0.202	0.219	0.194	0.210
K60-CV35	0.298	0.318	0.282	0.301	0.268	0.286	0.256	0.273	0.245	0.261
K60-CV35-V8	0.298	0.318	0.282	0.301	0.268	0.286	0.256	0.273	0.245	0.261
K60-CV35-V10	0.307	0.327	0.291	0.310	0.277	0.295	0.264	0.281	0.253	0.269
K60-CV35-VV	0.315	0.336	0.299	0.318	0.284	0.302	0.271	0.288	0.259	0.275
K70-CV35	0.321	0.342	0.305	0.324	0.290	0.308	0.276	0.293	0.264	0.280
K70-CV35-V8	0.322	0.342	0.305	0.324	0.290	0.308	0.276	0.293	0.264	0.280
K70-CV35-V10	0.326	0.346	0.309	0.328	0.294	0.312	0.280	0.297	0.268	0.284
K70-CV35-VV	0.334	0.355	0.317	0.336	0.301	0.319	0.287	0.304	0.275	0.291
K80-CV35-V8	0.345	0.365	0.327	0.346	0.311	0.329	0.296	0.313	0.283	0.299
K80-CV35-V10	0.350	0.370	0.332	0.351	0.315	0.333	0.300	0.317	0.287	0.303
K80-CV35-VV	0.354	0.374	0.335	0.354	0.318	0.336	0.303	0.320	0.290	0.306
K90-CV35-V8	0.364	0.385	0.345	0.364	0.328	0.346	0.312	0.329	0.298	0.315
K90-CV35-V10	0.369	0.390	0.350	0.369	0.332	0.350	0.316	0.334	0.302	0.319
K90-CV35-VV	0.373	0.393	0.353	0.372	0.335	0.353	0.319	0.336	0.305	0.321
K100-CV35-V8	0.375	0.395	0.355	0.374	0.337	0.355	0.321	0.338	0.307	0.323
K100-CV35-V10	0.380	0.400	0.360	0.379	0.342	0.360	0.325	0.342	0.311	0.327
K100-CV35-VV	0.383	0.404	0.363	0.382	0.345	0.363	0.328	0.345	0.314	0.330

Further λ_{eq} values for other types can be found at: www.schoeck.co.uk

[1] same λ_{eq} values for CV30 and CV50, CV50 available from H = 180 mm

Building Physics

Equivalent thermal conductivity λ_{eq}

λ_{eq} (1-dim.) in W/(m · K) for Schöck Isokorb® type K

Schöck Isokorb® type[1)]	Heigth of Isokorb H [mm]									
	210		220		230		240		250	
	F 0	F 90	F 0	F 90	F 0	F 90	F 0	F 90	F 0	F 90
K10-CV35	0.084	0.099	0.081	0.096	0.079	0.093	0.077	0.091	0.076	0.089
K10-CV35-V8	0.090	0.105	0.087	0.102	0.085	0.099	0.083	0.096	0.081	0.094
K20-CV35	0.104	0.120	0.101	0.116	0.098	0.112	0.096	0.109	0.093	0.106
K20-CV35-V8	0.111	0.126	0.107	0.122	0.104	0.118	0.101	0.115	0.099	0.112
K30-CV35	0.136	0.151	0.131	0.146	0.127	0.141	0.123	0.137	0.120	0.133
K30-CV35-V8	0.145	0.161	0.140	0.155	0.136	0.150	0.131	0.145	0.128	0.141
K30-CV35-V10	0.159	0.174	0.153	0.168	0.148	0.162	0.143	0.157	0.139	0.152
K40-CV35	0.146	0.161	0.141	0.156	0.136	0.150	0.132	0.146	0.128	0.141
K40-CV35-V8	0.155	0.171	0.150	0.165	0.145	0.159	0.140	0.154	0.136	0.149
K40-CV35-V10	0.162	0.178	0.157	0.171	0.151	0.165	0.147	0.160	0.142	0.155
K40-CV35-VV	0.162	0.178	0.157	0.171	0.151	0.165	0.147	0.160	0.142	0.155
K50-CV35	0.170	0.185	0.164	0.178	0.158	0.172	0.153	0.166	0.148	0.161
K50-CV35-V8	0.179	0.195	0.173	0.187	0.167	0.181	0.161	0.175	0.156	0.169
K50-CV35-V10	0.186	0.202	0.179	0.194	0.173	0.187	0.167	0.181	0.162	0.175
K50-CV35-VV	0.186	0.202	0.179	0.194	0.173	0.187	0.167	0.181	0.162	0.175
K60-CV35	0.235	0.250	0.226	0.241	0.218	0.232	0.210	0.224	0.203	0.216
K60-CV35-V8	0.235	0.251	0.226	0.241	0.218	0.232	0.210	0.224	0.203	0.216
K60-CV35-V10	0.242	0.258	0.233	0.248	0.224	0.238	0.216	0.230	0.209	0.222
K60-CV35-VV	0.249	0.264	0.239	0.254	0.230	0.244	0.222	0.235	0.214	0.227
K70-CV35	0.253	0.269	0.243	0.258	0.234	0.248	0.226	0.239	0.218	0.231
K70-CV35-V8	0.253	0.269	0.243	0.258	0.234	0.248	0.226	0.240	0.218	0.231
K70-CV35-V10	0.257	0.272	0.247	0.262	0.238	0.252	0.229	0.243	0.221	0.234
K70-CV35-VV	0.263	0.279	0.253	0.267	0.243	0.257	0.235	0.248	0.227	0.240
K80-CV35-V8	0.271	0.287	0.261	0.275	0.251	0.265	0.242	0.255	0.233	0.246
K80-CV35-V10	0.275	0.291	0.264	0.279	0.254	0.268	0.245	0.259	0.237	0.250
K80-CV35-VV	0.278	0.293	0.267	0.281	0.257	0.271	0.247	0.261	0.239	0.252
K90-CV35-V8	0.286	0.301	0.274	0.289	0.264	0.278	0.255	0.268	0.246	0.259
K90-CV35-V10	0.290	0.305	0.278	0.293	0.268	0.282	0.258	0.271	0.249	0.262
K90-CV35-VV	0.292	0.308	0.281	0.295	0.270	0.284	0.260	0.274	0.251	0.264
K100-CV35-V8	0.294	0.309	0.282	0.297	0.271	0.286	0.262	0.275	0.253	0.265
K100-CV35-V10	0.298	0.313	0.286	0.301	0.275	0.289	0.265	0.278	0.256	0.269
K100-CV35-VV	0.300	0.316	0.288	0.303	0.277	0.291	0.267	0.281	0.258	0.271

1) same λ_{eq} values for CV30 and CV50, CV50 available from H = 180 mm

Schöck Isokorb®

Fire resistance class F 90

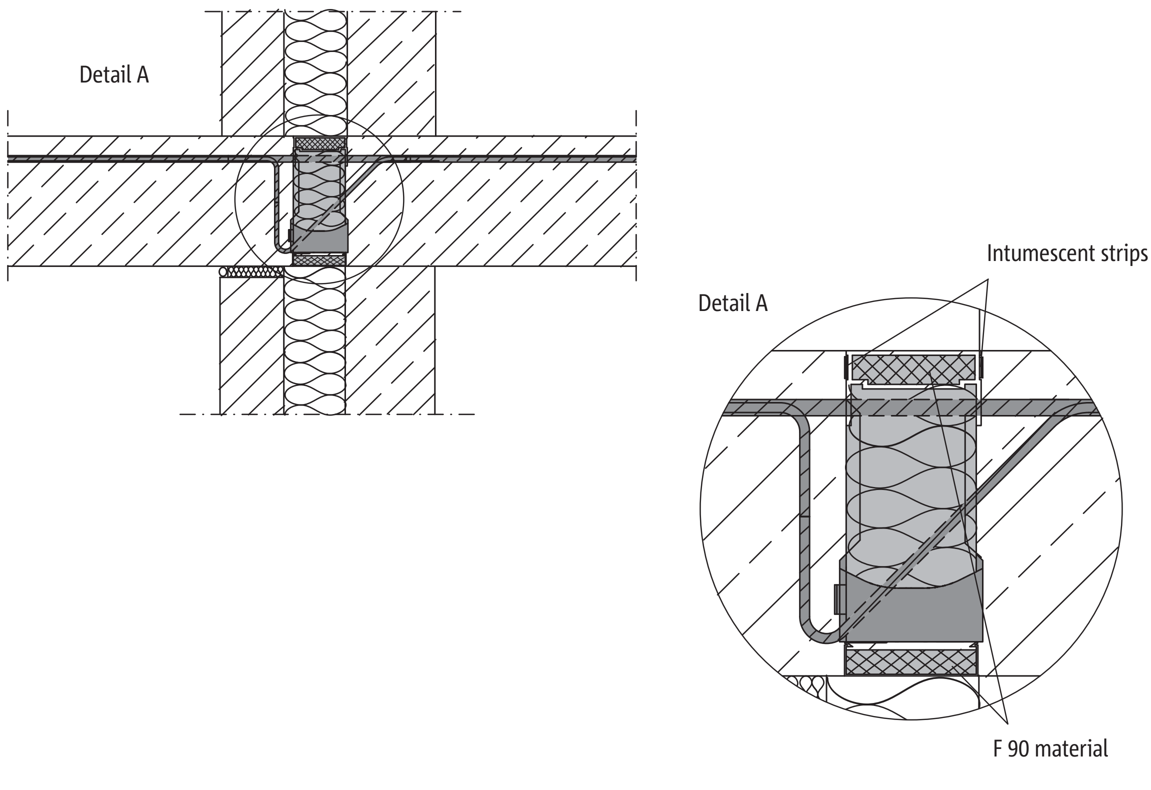
The definitive regulations regarding fire protection are laid out in the local building regulations, such as Department of the Environment, Transport and the Regions: The Building Regulations 1991, Approved Document B, Fire safety DETR 2000, BS 5588 Fire precautions in the design, construction and use of buildings, BS 7974 Application of the safety engineering principles to the design of buildings, Irish Building Regulations 2006 from the Department of the Environment, Heritage and local Government: Technical Guidance Document B, Fire safety, BS 8110-1, BS 8110-2, and National Annex to BS EN 1992-1-2:2004 Part 1-2: General rules - Structural fire design.

All Schöck Isokorb® types for concrete connections (reinforced concrete-to-reinforced concrete) are available as F 90-compliant versions.

Fire resistance class F 90

For cases with special fire safety requirements in terms of the fire resistance class of balconies, Schöck Isokorb® can also be supplied for fire resistance class F 90[1)] (designation: e.g. Schöck Isokorb® type K50-CV35-H180-F90). Thereto suitable F 90 materials are attached at the factory to the upper side and the underside of the Schöck Isokorb® (see illustration). However, in order for the balcony connection area to be classified as F 90-compliant, it is a further requirement that the balcony slab and the inner slab of the intermediate floor also satisfy the requirements in terms of fire resistance class F 90 according to the local building regulations.

Integrated fire protection strips made of materials which form an insulating layer, or the fire safety boards on the upper side of the Schöck Isokorb® which protrude by 10 mm, guarantee that the joints which open up under the effects of a fire are effectively sealed, so that no hot gases can reach the reinforcing rods of the Schöck Isokorb® (see illustration). This arrangement is essential if the design is to be classified as compliant with fire resistance class F 90 even without additional onsite fire safety measures (e.g. mineral-based coating or finish).

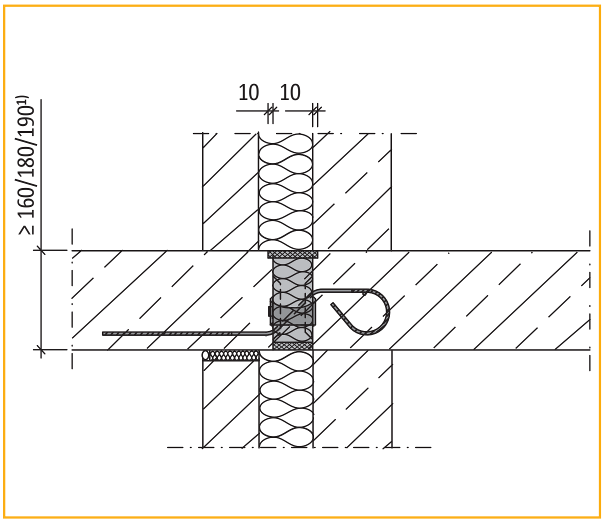


e.g.: Schöck Isokorb® type K50-CV35-H180-F90

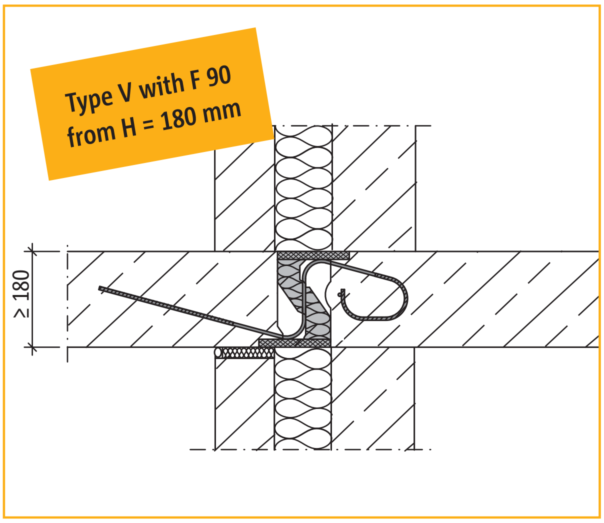
[1)] Advisory opinion of the iBMB Institute for Building Materials, Solid Construction and Fire Protection at the Technical University of Brunswick

Schöck Isokorb®

Notes/Fire resistance class F 90



e.g.: Schöck Isokorb® type Q10-H180-F90



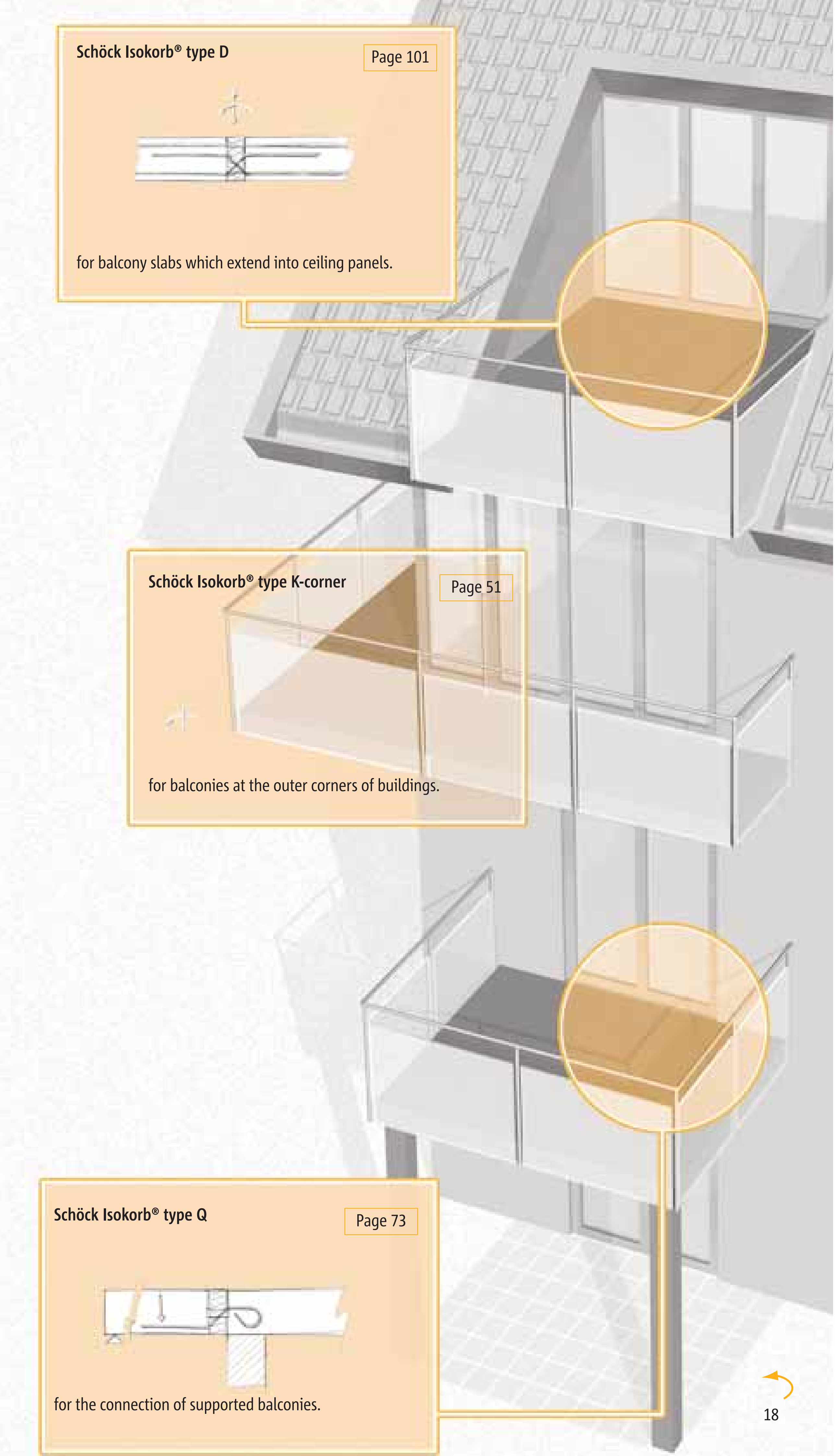
e.g.: Schöck Isokorb® type V6/4-H180-F90

Notes

- Components which are adjacent to the Schöck Isokorb® element must not be connected to the lower Isokorb® fire protection plate by using bolts, screws, nails or similar.

- If the F 90 version of the Schöck Isokorb® is partially installed in space-enclosing walls (e.g. of type W) or inner slabs (e.g. of type K), the insulation which is to be added must be provided on-site using mineral wool with a melting point > 1000 °C (e.g. Rockwool).

[1)] min H for F 90 acc. to pages 75 - 76 depending on the selected load range



Schöck Isokorb® type D

Page 101

for balcony slabs which extend into ceiling panels.

Schöck Isokorb® type K-corner

Page 51

for balconies at the outer corners of buildings.

Schöck Isokorb® type Q

Page 73

for the connection of supported balconies.

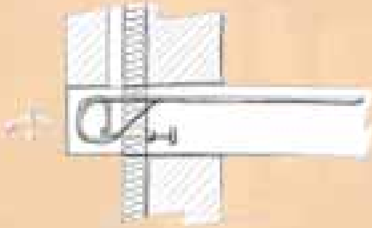
Information about further solutions can be obtained from our Technical Design Department.
Tel.: 0845 241 3390

Schöck Isokorb® t

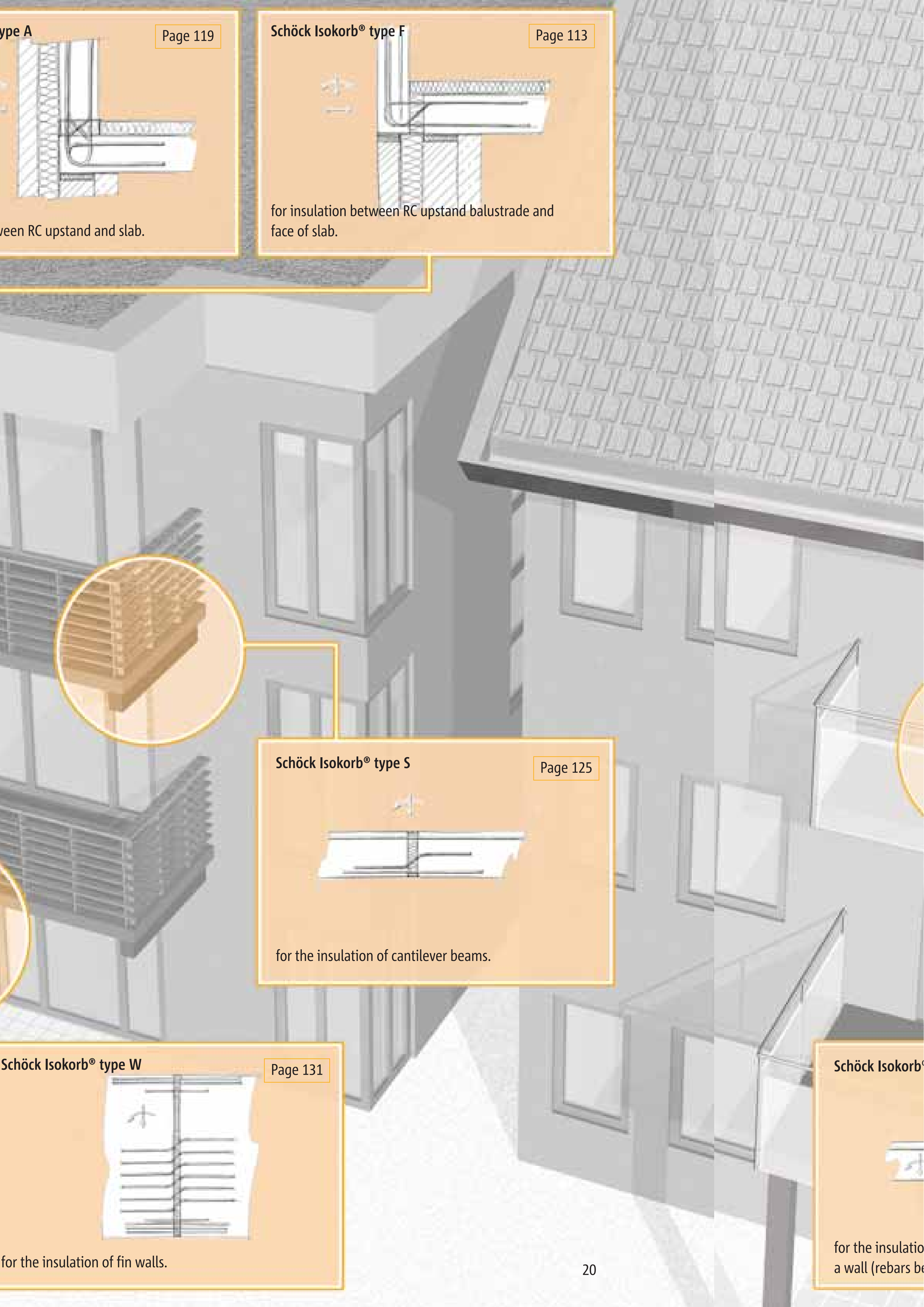
for insulation betw

Schöck Isokorb® type O

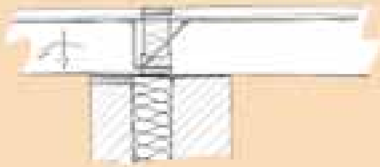
Page 109



for the insulation of corbels as support for frost-resistant masonry.

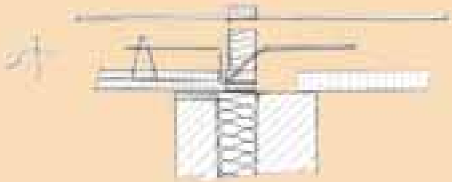

ype A
Page 119
een RC upstand and slab.
Schöck Isokorb® type F
Page 113
for insulation between RC upstand balustrade and
face of slab.
Schöck Isokorb® type S
Page 125
for the insulation of cantilever beams.
Schöck Isokorb® type W
Page 131
for the insulation of fin walls.
Schöck Isokorb
for the insulatio
a wall (rebars be

Schöck Isokorb® type K Page 31



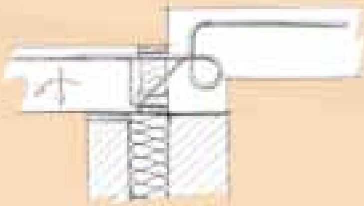
for the insulation of cantilever balconies.

Schöck Isokorb® type KF on request



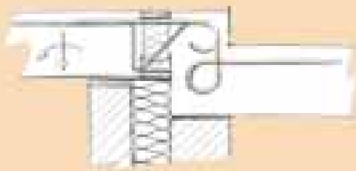
for the insulation of semi pre-cast cantilever balconies.

Schöck Isokorb® type K-HV Page 62



for the insulation of step down cantilever balconies.

Schöck Isokorb® type K-BH Page 63

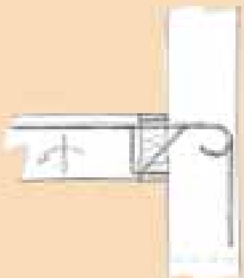


for the insulation of step up cantilever balconies.

® type K-WO Page 64

n of cantilever balconies connected to
ent upwards).

Schöck Isokorb® type K-WU Page 64



for the insulation of cantilever balconies connected to
a wall (rebars bent downwards).

Reinforced concrete-to-reinforced concrete

Schöck Isokorb®
Basic information

With the publication of this new and comprehensive Technical Information all technical specifications, structural analysis and figures about the Schöck Isokorb® systems (except for type KSH and QSH) are based on British Standards, especially on Eurocode 2 with UK National Annex. On this basis a BBA Approval and several certificates established by United Kingdom experts have been obtained (see page 3).

The new range of load-bearing thermal insulation components for Isokorb® units type K (previously designed as type KX) enables the structural engineer to choose amongst various dimensions of concrete cover. The tension rods of type K units and of type D units are available with c_{nom} = 30 mm, or 35 mm, or 50 mm. Therefore the selection of the concrete cover has to be considered as a basic part of the type designation (e.g. type K50-CV35 signifies a concrete cover c_{nom} = 35 mm for the Schöck Isokorb® tension rods).

To avoid confusion with the correct and complete designations for type K and type D the load range codes have been changed (see comparison of the previous designations to the new ones on page 26 and 27).

Concrete cover

Assuming exposure grades of XC3 and XC4 with XF1, the nominal cover to reinforcement called for by BS 8500 and UK National Annex to Eurocode 2 is 25 mm + Δc_{dev}, for a grade C32/40 concrete. Additionally assuming the standard value of 10 mm for Δc_{dev}, this corresponds to the 35 mm nominal cover to which the standard Isokorb units (CV35) are manufactured.

The range of units with 30 mm nominal cover (CV30) will be suitable where a grade C32/40 mix is used in conjunction with a Δc_{dev} of 5 mm, or C40/50 with a Δc_{dev} of 10 mm.

The range of units with 50 mm nominal cover (CV50) will be suitable e.g. where tension rods have to be in the second layer, because of a balcony with “inside corner layout” (see plan view at bottom of page 38).

Concrete grades

For the relevant exposure grades XC3 and XC4 with XF1, the minimum grade of concrete employed for compliance with BS 8500 and UK National Annex will normally be C32/40. Because of cover considerations (see above), the use of grade C25/30 would only be feasible where the appointment of an accredited frame contractor allows the use of a reduced Δc_{dev} of 5 mm.

For compliance with BBA Approval, Agreement Certificate No 05/4277, the minimum grade of concrete used in the supporting floor must be at least C25/30.

Therefore in the Isokorb® calculations, the assumed grade for concrete cast in areas adjoining the units is taken as C25/30, except for type K100. With this type the minimum concrete must be at least C32/40 for the balcony and for the inner slab.

Schöck Isokorb®

Concrete cover/Concrete grades

To meet durability requirements, depending on conditions of exposure, concrete cover and concrete grades should be chosen according to local regulations, such as BS 8500 or EC2 and its UK National Annex

Most relevant exposure grades					part of type designation
XC3, XF1	– minimum concrete grade ≥ C32/40	→	c_{nom} = 35 mm	→	**CV35**
XC4, XF1	– minimum concrete grade ≥ C32/40	→	c_{nom} = 35 mm	→	**CV35**
	– when reduced Δc_{dev} of 5 mm allowed	→	c_{nom} = 30 mm	→	**CV30**
XD1, XS1	– minimum concrete grade ≥ C32/40	→	c_{nom} = 50 mm	→	**CV50**

Example

Choice:
- exposure grades XC4, XF for balcony
- minimum concrete grade C32/40
- concrete cover Schöck Isokorb® CV35

- exposure grade XC1 for inner slab
- minimum concrete grade C25/30 (acc. to approval) is critical in terms of Schöck Isokorb® calculation

Notes

- Type K, K-corner, K-HV, K-BH, K-WO and K-WU: CV30, CV35 and CV50 refers to the concrete cover of the tensile rebars.
- Type D: CV30 and CV35 refers to the concrete cover of the upper tensile rebars. The concrete cover of the lower tensile rebars is 30 mm in both cases (normally less exposure than the upper surface of balcony).
- Type D: CV50 refers to the concrete cover of the upper and the lower tensile rebars.
- Type Q, QP and QPZ: The concrete cover of the Isokorb-rebars at the lower balcony surface is 30 mm in general (normally less exposure than the upper surface of balcony).
- In case of special requests referring the concrete cover please ask our design support services.

Order reference example
(to be issued in structural design, construction drawings, submission, order), e.g. for H = 180 mm

Schöck Isokorb® type **K50-CV35-V8-H180-F90**

Type + load range
Concrete cover in mm
Transverse reinforcement
Height of Isokorb in mm
Fire protection class

Schöck Isokorb®

Overview of old and new type designations

General changes:

- Balcony thickness d changed to h (applies to all types)
- Lateral force version Q8, Q10, Q+Q changed to V8, V10, VV
- 2nd layer changed to CV50
- mm used as the unit of measurement instead of cm (applies to all types)

Old designation with concrete cover CV = 30 mm		**New designation** with concrete cover CV = 30 mm
KX 6/7	↔	K10-CV30
KX 6/7 Q8	↔	K10-CV30-V8
KX 10/7	↔	K20-CV30
KX 10/7 Q8	↔	K20-CV30-V8
KX 12/7	↔	K30-CV30
KX 12/7 Q8	↔	K30-CV30-V8
KX 12/7 Q10	↔	K30-CV30-V10
KX 12/8	↔	K40-CV30
KX 12/8 Q8	↔	K40-CV30-V8
KX 12/8 Q10	↔	K40-CV30-V10
KX 12/8 Q+Q	↔	K40-CV30-VV
KX 12/10	↔	K50-CV30
KX 12/10 Q8	↔	K50-CV30-V8
KX 12/10 Q10	↔	K50-CV30-V10
KX 12/10 Q+Q	↔	K50-CV30-VV
KX 12/12	↔	K60-CV30
KX 12/12 Q8	↔	K60-CV30-V8
KX 12/12 Q10	↔	K60-CV30-V10
KX 12/12 Q+Q	↔	K60-CV30-VV
KX 14/10	↔	K70-CV30
KX 14/10 Q8	↔	K70-CV30-V8
KX 14/10 Q10	↔	K70-CV30-V10
KX 14/10 Q+Q	↔	K70-CV30-VV
KX 14/12 Q8	↔	K80-CV30-V8
KX 14/12 Q10	↔	K80-CV30-V10
KX 14/12 Q+Q	↔	K80-CV30-VV
NEW addition to the range		K90-CV30-V8
NEW addition to the range		K90-CV30-V10
NEW addition to the range		K90-CV30-VV
NEW addition to the range		K100-CV30-V8[1)]
NEW addition to the range		K100-CV30-V10[1)]
NEW addition to the range		K100-CV30-VV[1)]

Minimum grade of concrete outside ≥ C32/40
Minimum grade of concrete inside ≥ C25/30
[1)] Minimum grade of concrete outside + inside ≥ C32/40

General: Minimum grade of concrete outside according to BS 8500 and EC2 National Annex

Old designation with concrete cover CV = 30 mm		**New designation** with concrete cover CV = 30 mm
KX 10/7-corner	↔	K20-corner-CV30
KX 12/7-corner	↔	K30-corner-CV30
KX 12/10-corner	↔	K50-corner-CV30

Specification example:

KX 10/7-corner d=18	=	K20-corner-CV30-H180

KX 10/7 HV10	↔	K20-HV10-CV30
KX 12/7 HV10	↔	K30-HV10-CV30
KX 12/10 HV10	↔	K50-HV10-CV30
KX 12/12 HV10	↔	K60-HV10-CV30
KX 10/7 BH10	↔	K20-BH10-CV30
KX 12/7 BH10	↔	K30-BH10-CV30
KX 12/10 BH10	↔	K50-BH10-CV30
KX 12/12 BH10	↔	K60-BH10-CV30
KX 10/7 WO	↔	K20-WO-CV30
KX 12/7 WO	↔	K30-WO-CV30
KX 12/10 WO	↔	K50-WO-CV30
KX 12/12 WO	↔	K60-WO-CV30
KX 10/7 WU	↔	K20-WU-CV30
KX 12/7 WU	↔	K30-WU-CV30
KX 12/10 WU	↔	K50-WU-CV30
KX 12/12 WU	↔	K60-WU-CV30

Specification example:

KX 10/7 d=16	=	K20-CV30-H160
KX 14/10 d=20 2nd layer	=	K70-CV50-H200
KX 12/10 Q8 d=18 F90	=	K50-CV30-V8-H180-F90

Type + load range
Concrete cover in mm
Transverse reinforcement
Height of Isokorb in mm
Fire protection class

Schöck Isokorb®

Overview of old and new type designations

General changes:

- Balcony thickness d changed to h (applies to all types)
- Lateral force version Q8, Q10, Q+Q changed to V8, V10, VV
- 2nd layer changed to CV50
- mm used as the unit of measurement instead of cm (applies to all types)

Old designation		**New designation**
with concrete cover CV = 30 mm		with concrete cover CV = 30 mm
QP 8/2	↔	QP10
QP 8/3	↔	QP20
QP 8/4	↔	QP30
QP 10/2	↔	QP40
QP 10/3	↔	QP50
QP 12/2	↔	QP60
QP 12/3	↔	QP70
QP 14/2	↔	QP80
QP 14/3	↔	QP90
QP 8/2+QP 8/2	↔	QP10+QP10
QP 10/2+QP 10/2	↔	QP40+QP40
QP 12/2+QP 12/2	↔	QP60+QP60
NEW addition to the range		QPZ10
NEW addition to the range		QPZ40
NEW addition to the range		QPZ60
NEW addition to the range		QPZ80
NEW addition to the range		HP-A
NEW addition to the range		HP-B
NEW addition to the range		HP-C
D 12/7	↔	D30-CV30-VV6
D 12/7 Q8+Q8	↔	D30-CV30-VV8
D 12/7 Q10+Q10	↔	D30-CV30-VV10
D 12/10	↔	D50-CV30-VV6
D 12/10 Q8+Q8	↔	D50-CV30-VV8
D 12/10 Q10+Q10	↔	D50-CV30-VV10
D 14/10	↔	D70-CV30-VV6
D 14/10 Q8+Q8	↔	D70-CV30-VV8
D 14/10 Q10+Q10	↔	D70-CV30-VV10

Specification example:

D 12/7 Q8+Q8 d=20 F90 = D30-CV30-VV8-H200-F90

Type + load range
Concrete cover in mm
Transverse reinforcement
Height of Isokorb in mm
Fire protection class

Old designation		**New designation**
Q 6/4	↔	Q10
Q 6/5	↔	Q20
Q 6/6	↔	Q30
NEW addition to the range	↔	Q40
Q 6/10	↔	Q50
Q 8/6	↔	Q70
NEW addition to the range	↔	Q80
Q 10/6	↔	Q90
NEW addition to the range	↔	Q100
Q 12/6	↔	Q110
Q 6/4 + Q 6/4	↔	Q10+Q10
Q 6/6 + Q 6/6	↔	Q30+Q30
Q 6/10 + Q 6/10	↔	Q50+Q50

Specification types with unchanged designations:

V 6/4
V 6/6
V 6/8
V 6/10

O

F

A

S1 to S4

W1 to W4

KS

QS

Specification examples:

Q 6/4 d=16 F90	=	Q10-H160-F90
O d=18 L=35	=	O-H180-L350
F d=18 L=35	=	F-H180-L350
A b=16 L=35	=	A-H160-L350
S B/H=22/40	=	S-B220-H400
W B/H=15/250	=	W-B150-H2.5

Specification example:

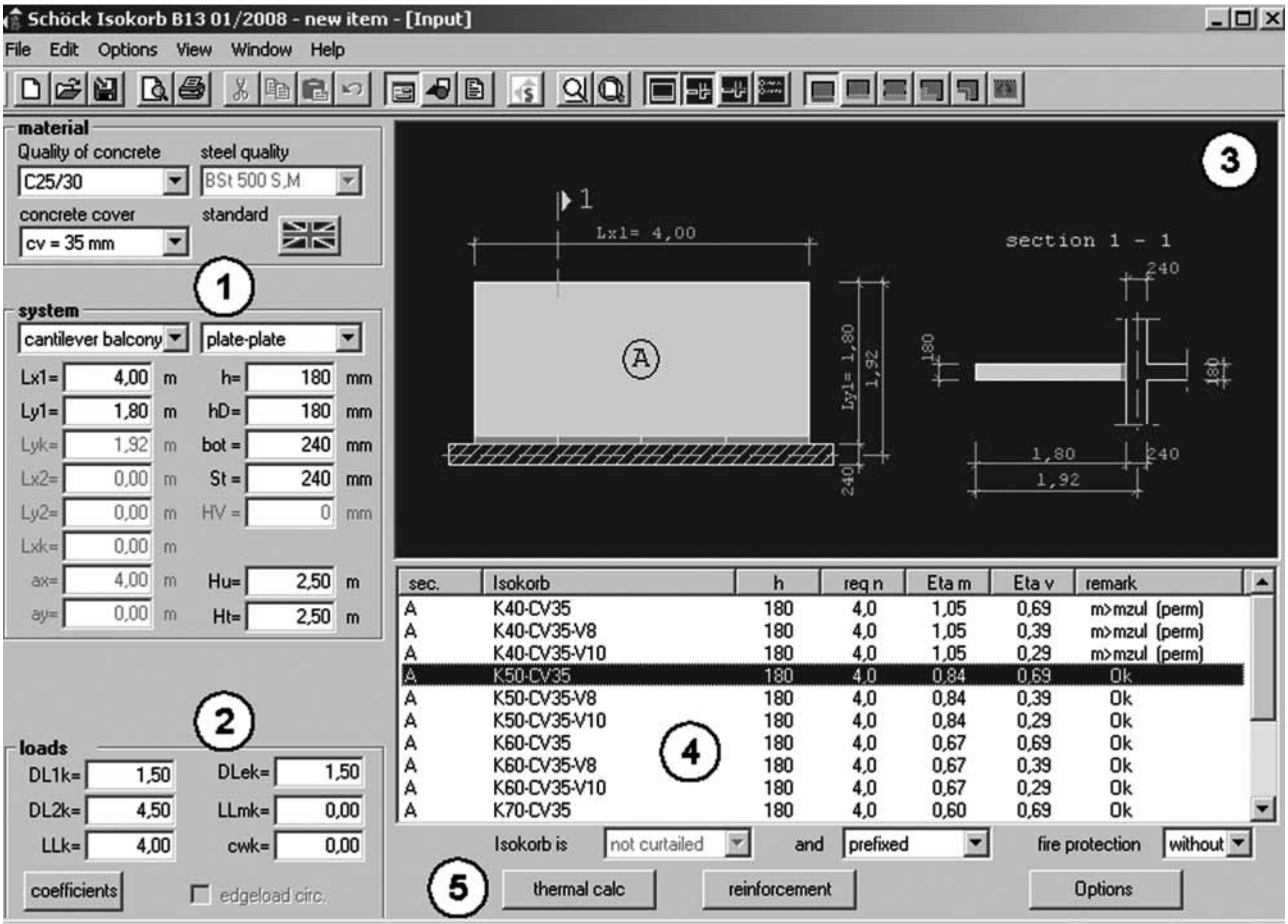
V 6/4 d=18 F90 = V6/4-H180-F90

Type + load range
Height of Isokorb in mm
Fire protection class

Schöck Isokorb®

Structural design and calculation program

The structural design and calculation software helps you to perform fast and easy calculations of thermally insulated connections with the Isokorb® types K, K-corner, KF, Q and D for the most commonly encountered balcony geometries and bearing conditions. The calculations are based on BS 8500, EC 2 and the BBA Approval.
Once the system (e.g. cantilever balcony) and the geometry of the connection (e.g. balcony slab with floor slab) have been chosen in the input area ①, the required geometric data is entered. If any of the entries conflict with the geometric and construction boundary conditions for the Isokorb® connection, prompts are displayed automatically to warn the user, or the system automatically makes the necessary corrections.
Existing load data is entered in the input area ②. In the case of calculations according to EC 2, the characteristic loads are automati-cally incorporated as γ-multiple values in the calculations of internal forces.



In the graphic window ③ you can visually check whether the selected Isokorb® will fit in the entered connection geometry. In the output window ④, Isokorb® types are recommended in accordance with the calculations. The recommendations also take into account which types offer the most economical degree of utilisation. It is possible to select a higher load capacity. The selected Isokorb® load capacity is transferred into the text part of the verification and into the parts list.
The “thermal calculation” button ⑤ can be used to display the λ value of the selected Isokorb® for thermal comparison purposes.

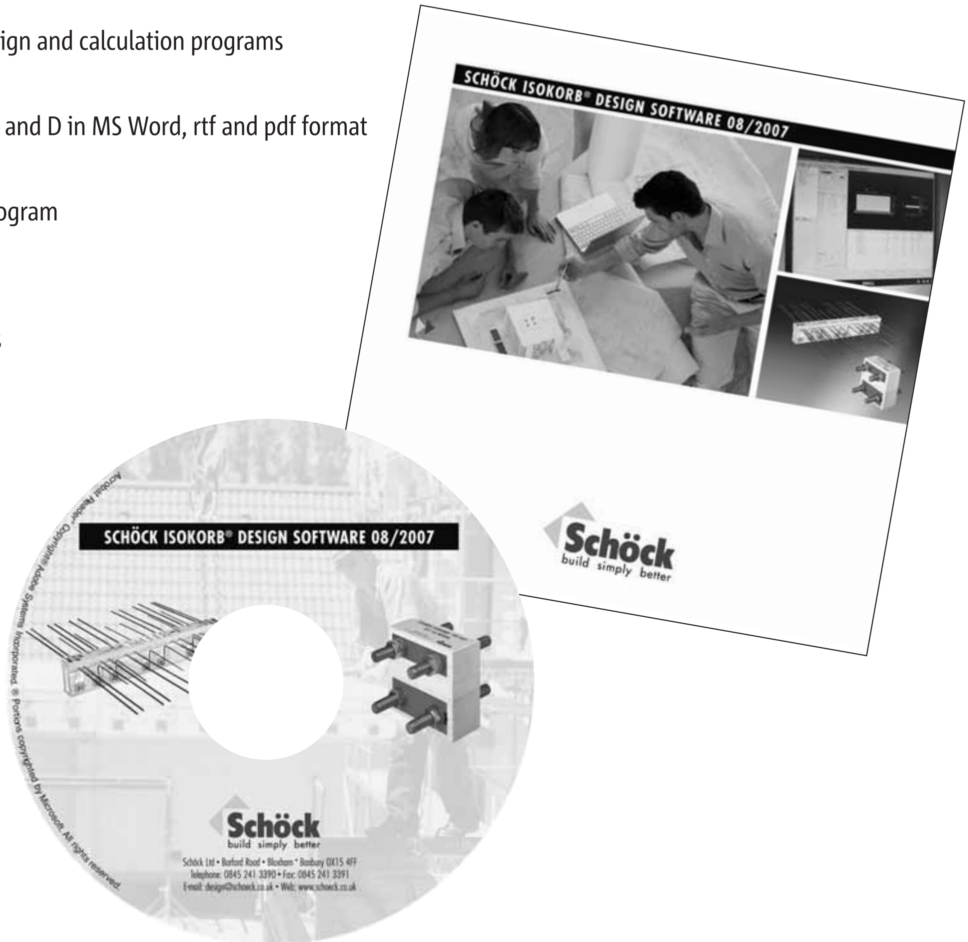
Schöck Isokorb®

Structural design and calculation program

We are pleased to provide you with a copy of our planning CD to help you optimise your Schöck Isokorb® calculations and to achieve the most cost-effective solution.

Contents:

- Schöck Isokorb® structural design and calculation programs
- CAD files in dxf/dwg format
- Text for specification of type K and D in MS Word, rtf and pdf format
- Acrobat Reader
- Brief information about the program
- BBA Approval
- Certificates
- Technical information bulletins

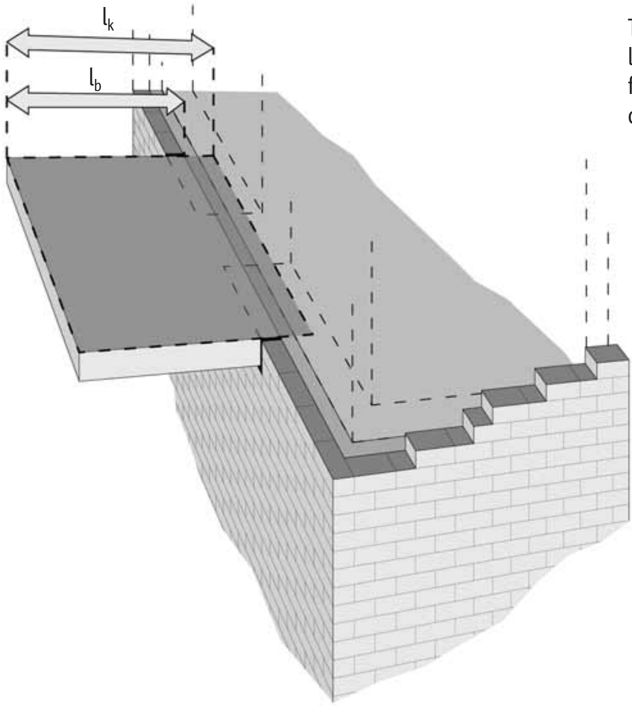


Downloads and queries

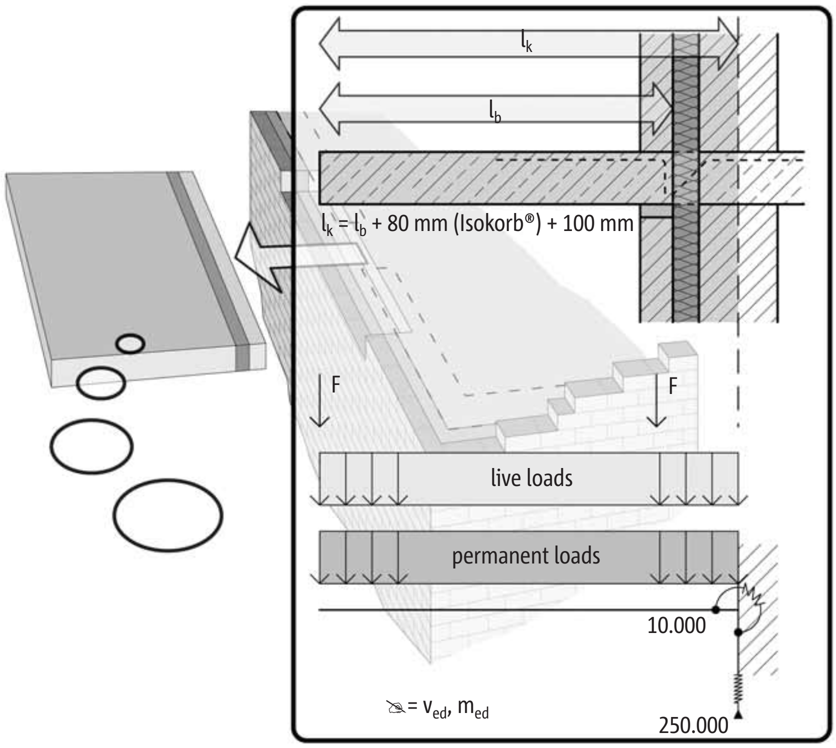
Tel.: 0845 241 3390
Fax: 0845 241 3391
E-mail: design@schoeck.co.uk
Web: www.schoeck.co.uk

Schöck Isokorb®

FEM guidelines



To get the most realistic results for the aligment and loadtransfer of our Schöck Isokorb®, we recommend the following steps to be considered using FEM in conjunction with the Schöck Isokorb®.

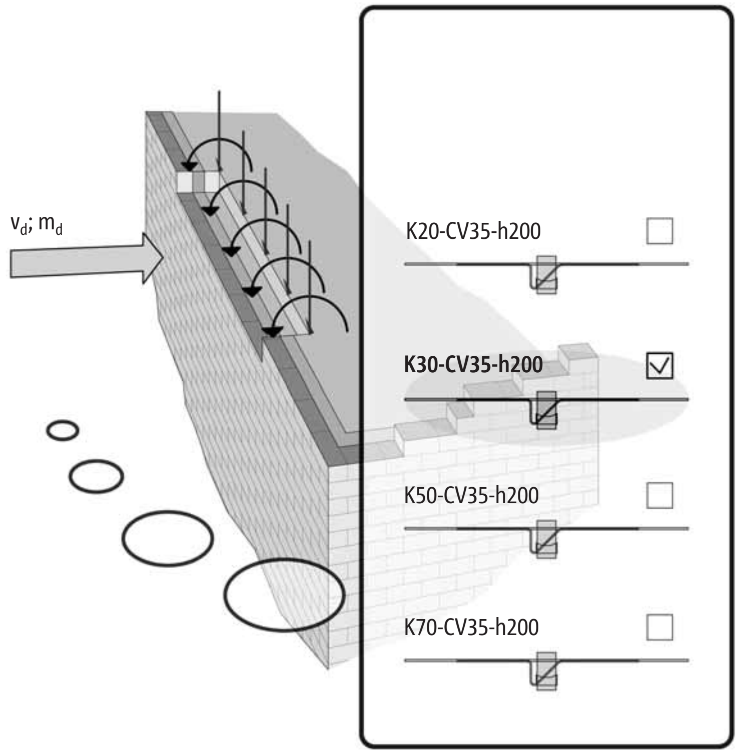


- Seperate the balcony from the internal structure
- Locate the Isokorb®-“bearing“ in areas were you would like to transfer loads into the internal structure. To simulate the Schöck Isokorb® perfomance please use the following spring tiffness: 10.000 kNm/rad/m (rotation), 250.000 kN/m² (vertical).

Reinforced concrete-to-reinforced concrete

Schöck Isokorb®

FEM guidelines



Consider the colculated results as external loads which have to be transmitted into the internal structure.

Note

- Our Schöck Isokorb®, if it is a type to fix cantilevered balconies, is able to bear bending moments, but no torsional moments. Therefore, concerning FEM-modelling of the entire structure, the balconies are not to be modelled as a plate which is fixed monolithic to the internal structure. Instead of that its stress resultants have to be considered as external line loads (bending moments and shear forces) towards the edges of the RC floor slabs.

Schöck Isokorb®
Materials for concrete-to-concrete applications

Schöck Isokorb®

Reinforcing steel	BSt 500 S acc. to EC 2 National Annex
Structural steel	S 235 JRG1
Stainless steel	Material no. 1.4571, hardening level S 460, ribbed reinforcing steel BSt 500 NR, material no. 1.4362 or no. 1.4571
Pressure bearings	HTE module (pressure bearings made of microfibre-reinforced high-performance fine concrete) PE-HD plastic jackets
Insulating material	Polystyrene hard foam, $\lambda = 0{,}035$ W/(m · K)
Fire protection boards	Lightweight building boards, materials class A1, cement-bound fire safety boards, mineral wool: $\rho \geq 150$ kg/m³, Melting point T ≥ 1000 °C with integrated fire protection strips

Connecting components

Reinforcing steel	B500A, B500B or B500C acc. to BS 4449 or BS 4483
Concrete	Standard concrete acc. to BS EN 206-1 with a dry apparent density of 2000 kg/m³ to 2600 kg/m³ (lightweight concrete is not permissible) Concrete strength class for outside components: At least C32/40, plus according to the environmental classification acc. to BS 8500 or acc. to EC 2 National Annex Concrete strength class for inside components: At least C25/30, plus according to the environmental classification acc. to BS 8500 or acc. to EC 2 National Annex

Schöck Isokorb® type K


Schöck Isokorb® type K30-CV35

Contents

Schöck Isokorb® type K HTE MODULE

Examples of element arrangements/Cross-sections

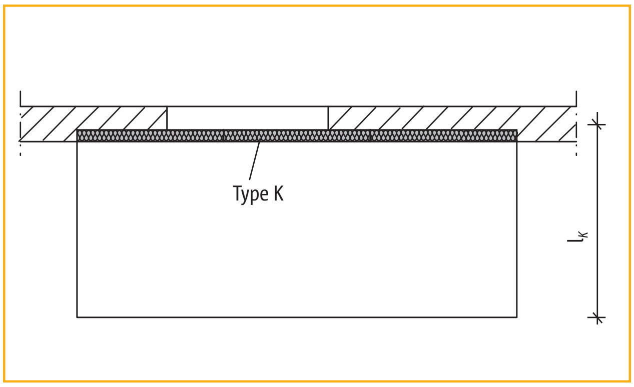


Figure 1: Free cantilever balcony

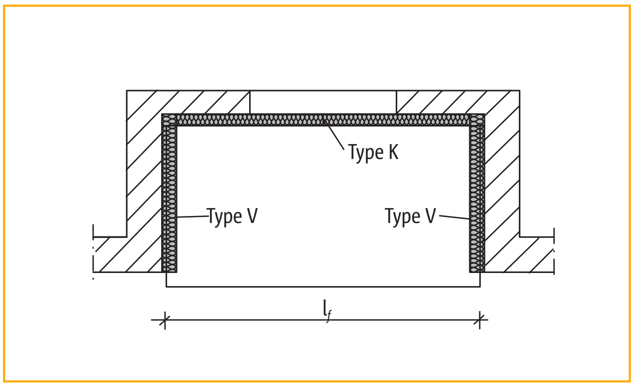


Figure 2: Balcony supported on three sides

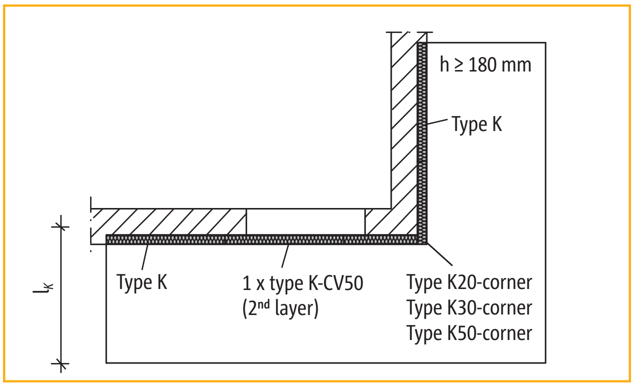


Figure 3: Balcony on an outside corner

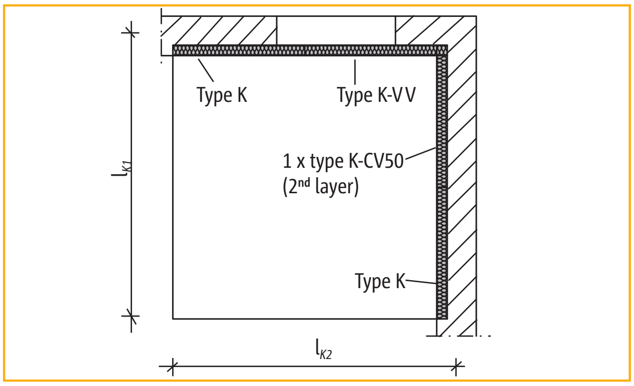


Figure 4: Balcony supported on two sides

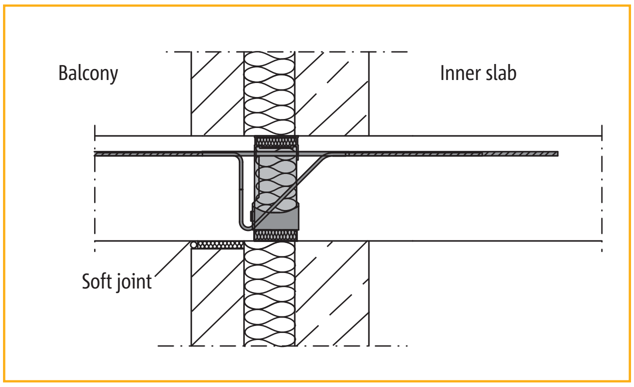


Figure 5: Cavity wall with a balcony at inner slab level

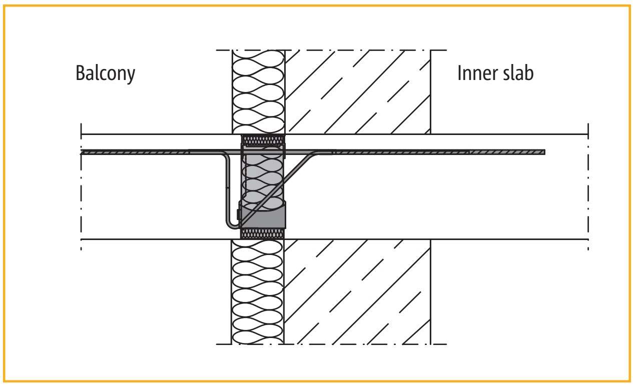


Figure 6: Brickwork with external insulation and a balcony at inner slab level

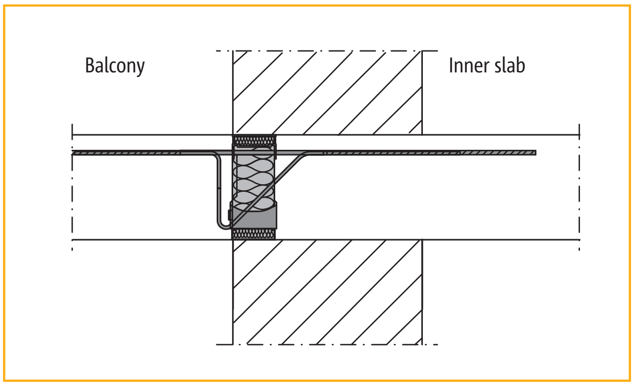


Figure 7: Single-leaf brickwork with a balcony at inner slab level

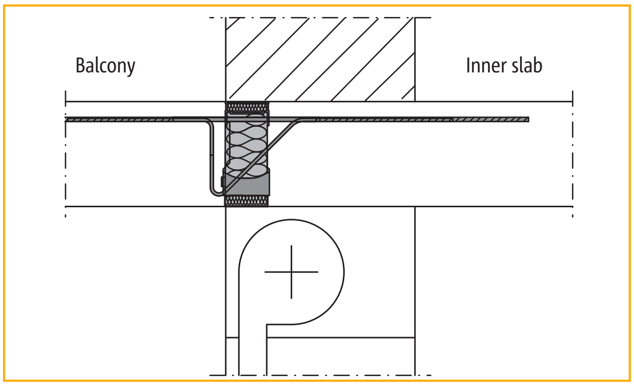
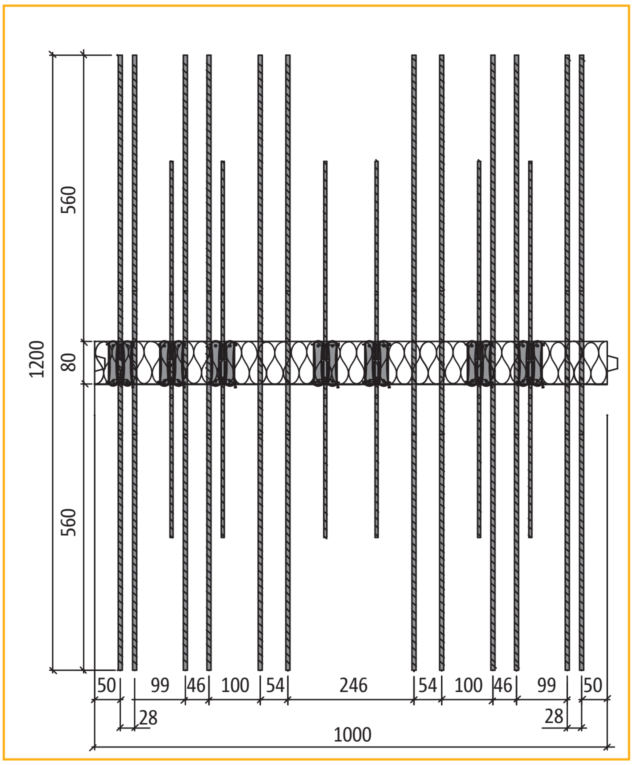


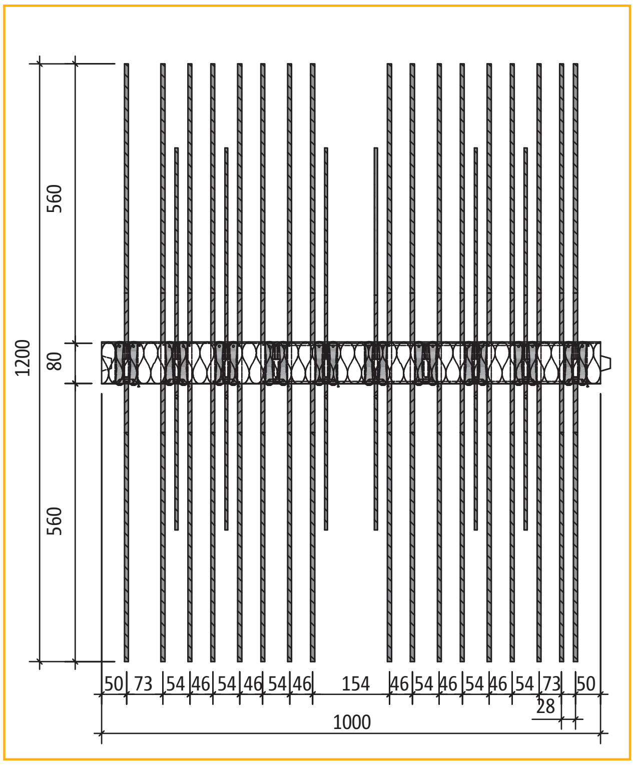
Figure 8: Single-leaf brickwork with blind box and a balcony at inner slab level

Schöck Isokorb® type K

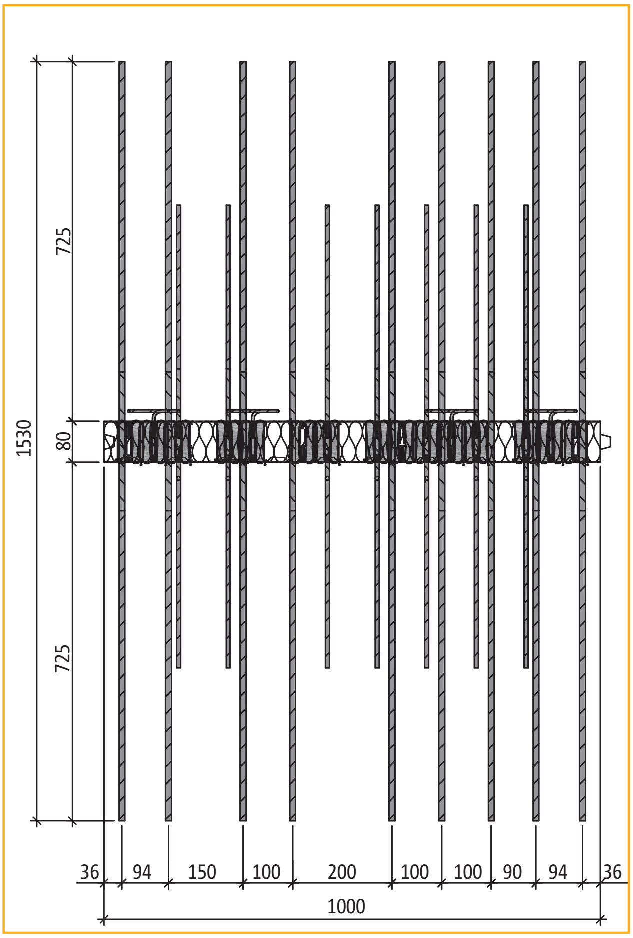
Plan views



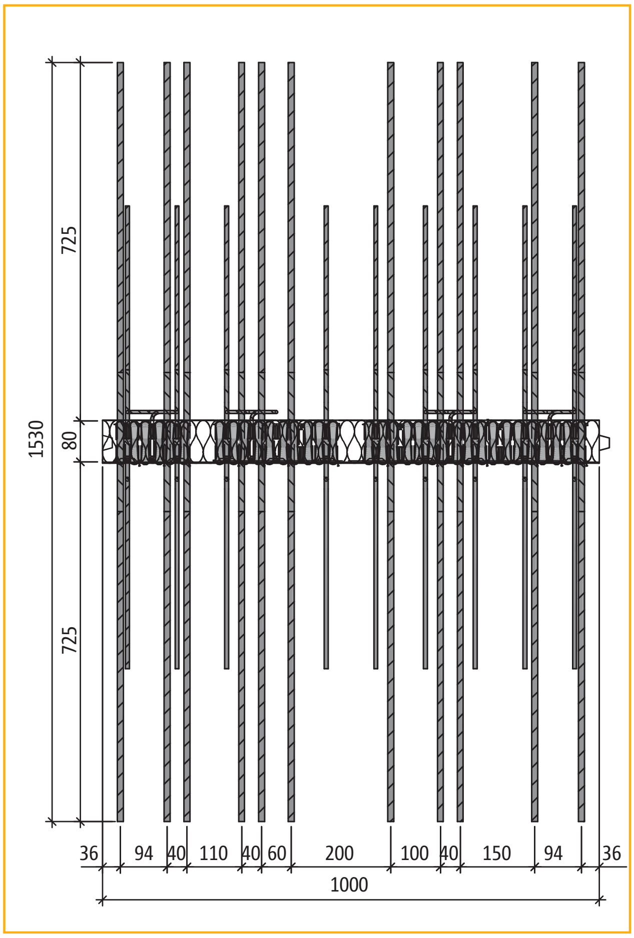
Plan view of Schöck Isokorb® type K30-CV35



Plan view of Schöck Isokorb® type K50-CV35



Plan view of Schöck Isokorb® type K60-CV35



Plan view of Schöck Isokorb® type K80-CV35-V8

Schöck Isokorb® type K HTE MODULE

Product variants/Designations

Product selection

Basic type

Lateral force level V6 ≙ standard equipment, does not need to be listed in the type designation.

e.g.: K50-CV35-... available for a balcony slab thickness of h = 160 - 250 mm

Variants:

Shear force load range

e.g.:	K50-CV35-V8...	(= shear force rods 7 ø 8)
	K50-CV35-V10...	(= shear force rods 9 ø 8)
	K50-CV35-VV...	(= shear force rods 4 ø 8 positive + 4 ø 8 negative)

Concrete cover

e.g.:	K50-CV30...	(= installation dimensions for the tension rods CV = 30 mm)
	K50-CV35..	(= installation dimensions for the tension rods CV = 35 mm)
	K50-CV50...(≙ 2nd layer)	(= installation dimensions for the tension rods CV = 50 mm)

Fire protection

e.g.: K50-CV35-...-F90

Designations used in planning documents

(structural calculations, specification documents, implementation plans, orders), e.g. for h = 180 mm

K50-CV35-H180

Type+load range
Concrete cover
Height of Isokorb®

K50-CV35-V8-H180-F90

Type+load range
Concrete cover
Shear force variant
Height of Isokorb®
Fire protection class

Special designs – Bending reinforcing steels

Some connection layouts cannot be implemented with the standard product options shown in this information document. In such cases, special designs can be requested from the Design Support Department (see p. 3 for contact details). This also applies e.g. to additional requirements due to prefabricated constructions (restrictions due to manufacturing or transport constraints) which may be met using coupler bars.

Individual reinforcing steel bars are bent in the precast plant as required. The Schöck Isokorb components are then assembled. This ensures compliance with regulations of the technical approval and DIN 1045-1 w.r.t. bending of reinforcing steel.

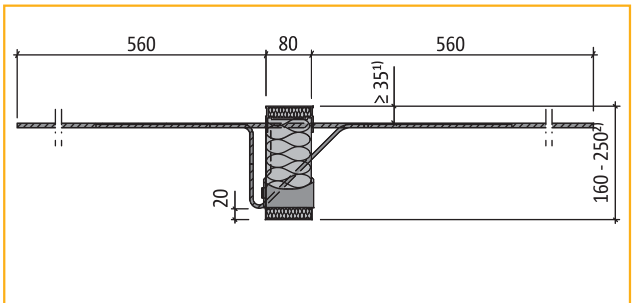
If Isokorb reinforcing steel is later bent or bent and straightened again on site in contravention of this, then compliance and monitoring of the relevant conditions lies outwith the responsibility of Schöck Bauteile GmbH. In such cases our warranty expires.

Schöck Isokorb® type K

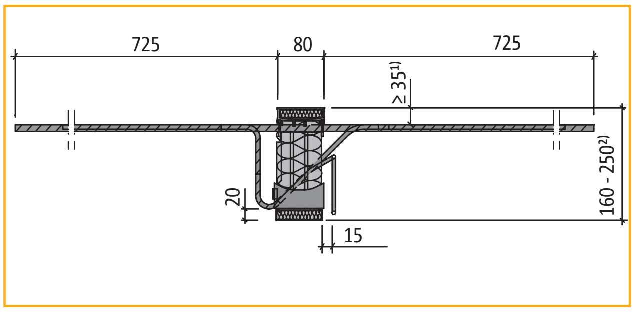
Product description

Schöck Isokorb® type	K10	K20	K30	K40	K50
Element length [m]	1.00	1.00	1.00	1.00	1.00
Tension rods	4 ø 8	8 ø 8	12 ø 8	13 ø 8	16 ø 8
Shear force rods V6	4 ø 6	4 ø 6	6 ø 6	6 ø 6	6 ø 6
Shear force rods V8	5 ø 8	5 ø 8	7 ø 8	7 ø 8	7 ø 8
Shear force rods V10	–	–	9 ø 8	9 ø 8	9 ø 8
Shear force rods VV	–	–	–	5 ø 8 + 4 ø 8	5 ø 8 + 4 ø 8
Pressure bearings (qty)	4 (5atV8)	5	7 (10atV10)	8 (11atV10)	10 (14atV10)

Schöck Isokorb® type	K60	K70	K80	K90	K100
Element length [m]	1.00	1.00	1.00	1.00	1.00
Tension rods	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12
Shear force rods V6	7 ø 8	8 ø 8	–	–	–
Shear force rods V8	7 ø 8	8 ø 8	9 ø 8	9 ø 8	10 ø 8
Shear force rods V10	9 ø 8	9 ø 8	9 ø 8	9 ø 8	10 ø 8
Shear force rods VV	9 ø 8 + 4 ø 8	9 ø 8 + 4 ø 8	9 ø 8 + 4 ø 8	9 ø 8 + 4 ø 8	10 ø 8 + 4 ø 8
Pressure bearings (qty)	15 (17atVV)	16 (17atVV)	17	18	18
Special hoops (qty)	4	4	4	4	4



Schöck Isokorb® type K10 to K50



Schöck Isokorb® type K60 to K100

K

Reinforced concrete-to-reinforced concrete

[1)] 50 mm for CV50
[2)] 180 - 250 mm for CV50

Schöck Isokorb® type K

Capacity tables

Concrete strength ≥ C25/30
Concrete cover CV 35

For the purposes of the calculations, the member forces should be taken in relation to the internal support (see page 46).

K10-CV35-...

Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	V 8 v_{Rd} [kN/m]	V 10 v_{Rd} [kN/m]	VV v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–7.3	+28.0	+49.8	–	–	0.9
170	–8.1	+28.0	+49.8	–	–	0.8
180	–9.0	+28.0	+49.8	–	–	0.7
190	–9.9	+28.0	+49.8	–	–	0.7
200	–10.8	+28.0	+49.8	–	–	0.6
210	–11.6	+28.0	+49.8	–	–	0.6
220	–12.5	+28.0	+49.8	–	–	0.5
230	–13.4	+28.0	+49.8	–	–	0.5
240	–14.3	+28.0	+49.8	–	–	0.5
250	–15.1	+28.0	+49.8	–	–	0.4

K20-CV35-...

Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	V 8 v_{Rd} [kN/m]	V 10 v_{Rd} [kN/m]	VV v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–14.3	+28.0	+49.8	–	–	0.9
170	–16.0	+28.0	+49.8	–	–	0.8
180	–17.7	+28.0	+49.8	–	–	0.8
190	–19.4	+28.0	+49.8	–	–	0.7
200	–21.2	+28.0	+49.8	–	–	0.6
210	–22.9	+28.0	+49.8	–	–	0.6
220	–24.6	+28.0	+49.8	–	–	0.6
230	–26.3	+28.0	+49.8	–	–	0.5
240	–28.0	+28.0	+49.8	–	–	0.5
250	–29.8	+28.0	+49.8	–	–	0.5

K30-CV35-...

Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	V 8 v_{Rd} [kN/m]	V 10 v_{Rd} [kN/m]	VV v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–20.0	+42.0	+74.6	+99.5	–	0.9
170	–22.4	+42.0	+74.6	+99.5	–	0.8
180	–24.8	+42.0	+74.6	+99.5	–	0.8
190	–27.2	+42.0	+74.6	+99.5	–	0.7
200	–29.6	+42.0	+74.6	+99.5	–	0.6
210	–32.0	+42.0	+74.6	+99.5	–	0.6
220	–34.4	+42.0	+74.6	+99.5	–	0.6
230	–36.8	+42.0	+74.6	+99.5	–	0.5
240	–39.3	+42.0	+74.6	+99.5	–	0.5
250	–41.7	+42.0	+74.6	+99.5	–	0.5

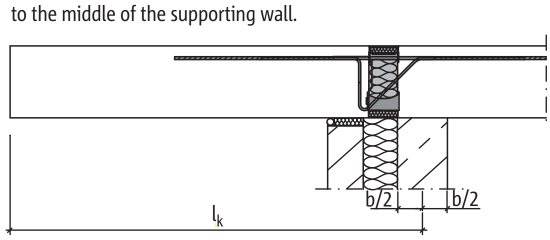
K40-CV35-...

Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	V 8 v_{Rd} [kN/m]	V 10 v_{Rd} [kN/m]	VV v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–22.8	+42.0	+74.6	+99.5	±49.8	0.9
170	–25.6	+42.0	+74.6	+99.5	±49.8	0.8
180	–28.4	+42.0	+74.6	+99.5	±49.8	0.8
190	–31.1	+42.0	+74.6	+99.5	±49.8	0.7
200	–33.9	+42.0	+74.6	+99.5	±49.8	0.6
210	–36.6	+42.0	+74.6	+99.5	±49.8	0.6
220	–39.4	+42.0	+74.6	+99.5	±49.8	0.6
230	–42.1	+42.0	+74.6	+99.5	±49.8	0.5
240	–44.9	+42.0	+74.6	+99.5	±49.8	0.5
250	–47.6	+42.0	+74.6	+99.5	±49.8	0.5

Schöck Isokorb® type K-CV50 (2nd layer)
Refer to pages 40 - 42 for the design values.

Concrete strength class for outside components at least C32/40 (see page 30).

Member forces to be taken in relation to the middle of the supporting wall.



[1)] Deflection factor to be applied in accordance with page 47.

Schöck Isokorb® type K

Capacity tables

Concrete strength ≥ C25/30
Concrete cover CV 35

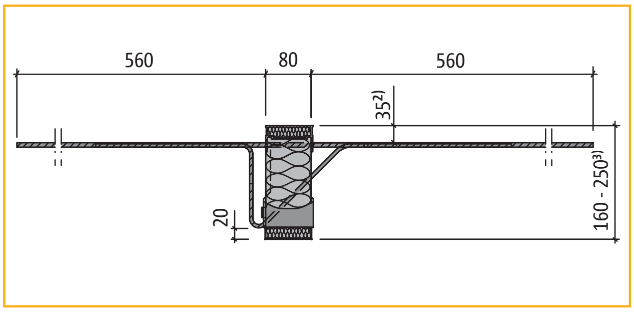
For the purposes of the calculations, the member forces should be taken in relation to the internal support (see page 46).

K50-CV35-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	−28.6	+42.0	+74.6	+99.5	±49.8	0.9
170	−32.0	+42.0	+74.6	+99.5	±49.8	0.8
180	−35.4	+42.0	+74.6	+99.5	±49.8	0.8
190	−38.9	+42.0	+74.6	+99.5	±49.8	0.7
200	−42.3	+42.0	+74.6	+99.5	±49.8	0.6
210	−45.8	+42.0	+74.6	+99.5	±49.8	0.6
220	−49.2	+42.0	+74.6	+99.5	±49.8	0.6
230	−52.6	+42.0	+74.6	+99.5	±49.8	0.5
240	−56.1	+42.0	+74.6	+99.5	±49.8	0.5
250	−59.5	+42.0	+74.6	+99.5	±49.8	0.5

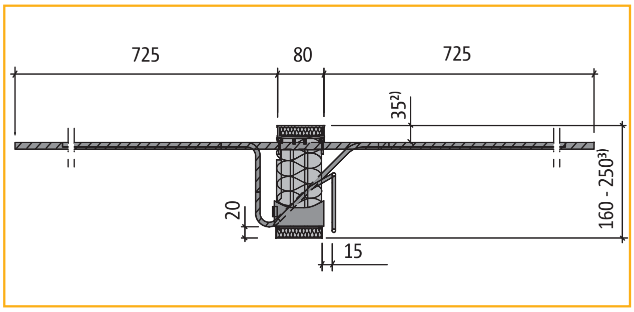
K60-CV35-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	−35.9	+42.0	+74.6	+99.5	+99.5 −49.8	1.1
170	−40.3	+42.0	+74.6	+99.5	+99.5 −49.8	1.0
180	−44.7	+42.0	+74.6	+99.5	+99.5 −49.8	0.9
190	−49.1	+42.0	+74.6	+99.5	+99.5 −49.8	0.8
200	−53.6	+42.0	+74.6	+99.5	+99.5 −49.8	0.7
210	−58.0	+42.0	+74.6	+99.5	+99.5 −49.8	0.7
220	−62.4	+42.0	+74.6	+99.5	+99.5 −49.8	0.6
230	−66.8	+42.0	+74.6	+99.5	+99.5 −49.8	0.6
240	−71.3	+42.0	+74.6	+99.5	+99.5 −49.8	0.6
250	−75.7	+42.0	+74.6	+99.5	+99.5 −49.8	0.5

K70-CV35-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	−39.8	+42.0	+74.6	+99.5	+99.5 −49.8	1.1
170	−44.8	+42.0	+74.6	+99.5	+99.5 −49.8	1.0
180	−49.7	+42.0	+74.6	+99.5	+99.5 −49.8	0.9
190	−54.6	+42.0	+74.6	+99.5	+99.5 −49.8	0.8
200	−59.5	+42.0	+74.6	+99.5	+99.5 −49.8	0.7
210	−64.4	+42.0	+74.6	+99.5	+99.5 −49.8	0.7
220	−69.3	+42.0	+74.6	+99.5	+99.5 −49.8	0.7
230	−74.3	+42.0	+74.6	+99.5	+99.5 −49.8	0.6
240	−79.2	+42.0	+74.6	+99.5	+99.5 −49.8	0.6
250	−84.1	+42.0	+74.6	+99.5	+99.5 −49.8	0.5

K80-CV35-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	−43.8	–	+74.6	+99.5	+99.5 −49.8	1.1
170	−49.2	–	+74.6	+99.5	+99.5 −49.8	1.0
180	−54.6	–	+74.6	+99.5	+99.5 −49.8	0.9
190	−60.0	–	+74.6	+99.5	+99.5 −49.8	0.8
200	−65.4	–	+74.6	+99.5	+99.5 −49.8	0.7
210	−70.8	–	+74.6	+99.5	+99.5 −49.8	0.7
220	−76.2	–	+74.6	+99.5	+99.5 −49.8	0.7
230	−81.6	–	+74.6	+99.5	+99.5 −49.8	0.6
240	−87.0	–	+74.6	+99.5	+99.5 −49.8	0.6
250	−92.4	–	+74.6	+99.5	+99.5 −49.8	0.5



Schöck Isokorb® type K10-CV35 to K50-CV35



Schöck Isokorb® type K60-CV35 to K80-CV35

[1)] Deflection factor to be applied in accordance with page 47. [2)] 50 mm for CV50 [3)] 180 - 250 mm for CV50

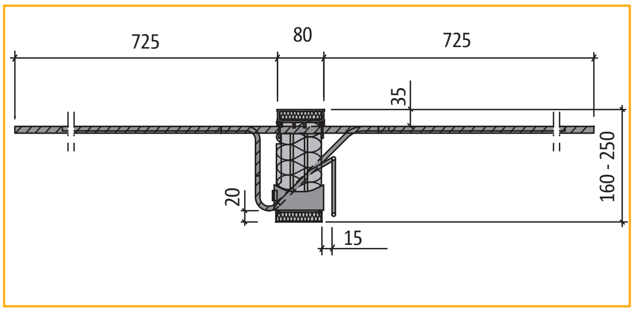
Schöck Isokorb® type K

Capacity tables

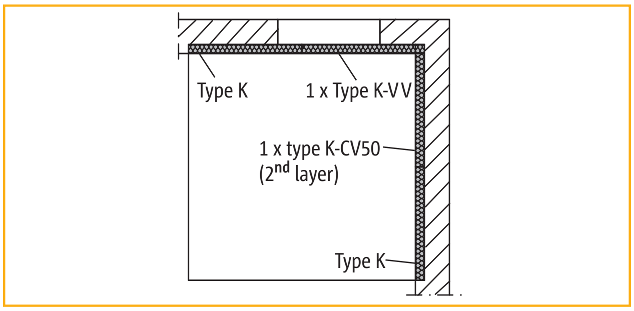
For the purposes of the calculations, the member forces should be taken in relation to the internal support (see page 46).

Concrete strength ≥ C25/30
Concrete cover CV 35

K90-CV35-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–46.4	–	+74.6	+99.5	+99.5 –49.8	1.1
170	–52.1	–	+74.6	+99.5	+99.5 –49.8	1.0
180	–57.8	–	+74.6	+99.5	+99.5 –49.8	0.9
190	–63.5	–	+74.6	+99.5	+99.5 –49.8	0.8
200	–69.3	–	+74.6	+99.5	+99.5 –49.8	0.7
210	–75.0	–	+74.6	+99.5	+99.5 –49.8	0.7
220	–80.7	–	+74.6	+99.5	+99.5 –49.8	0.6
230	–86.4	–	+74.6	+99.5	+99.5 –49.8	0.6
240	–92.2	–	+74.6	+99.5	+99.5 –49.8	0.6
250	–97.9	–	+74.6	+99.5	+99.5 –49.8	0.5



Schöck Isokorb® type K90-CV35 to K100-CV35



Inside corner layout

Schöck Isokorb® type K-CV50 (2nd layer)
Refer to pages 40 - 42 for the design values.

Concrete strength ≥ C32/40
Concrete cover CV 35

K100-CV35-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–50.2	–	+74.6	+99.5	+99.5 -49.8	1.1
170	–56.4	–	+74.6	+99.5	+99.5 -49.8	1.0
180	–62.5	–	+74.6	+99.5	+99.5 -49.8	0.9
190	–68.7	–	+74.6	+99.5	+99.5 -49.8	0.8
200	–74.9	–	+74.6	+99.5	+99.5 -49.8	0.7
210	–81.1	–	+74.6	+99.5	+99.5 -49.8	0.7
220	–87.3	–	+74.6	+99.5	+99.5 -49.8	0.6
230	–93.5	–	+74.6	+99.5	+99.5 -49.8	0.6
240	–99.7	–	+74.6	+99.5	+99.5 -49.8	0.6
250	–105.9	–	+74.6	+99.5	+99.5 -49.8	0.5

[1)] Deflection factor to be applied in accordance with page 47.

K

Reinforced concrete-to-reinforced concrete

Schöck Isokorb® type K

Capacity tables

Concrete strength ≥ C25/30
Concrete cover CV 50

For the purposes of the calculations, the member forces should be taken in relation to the internal support (see page 46).

K10-CV50-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–	–	–	–	–	–
170	–	–	–	–	–	–
180	−7.7	+28.0	+49.8	–	–	0.9
190	−8.6	+28.0	+49.8	–	–	0.8
200	−9.4	+28.0	+49.8	–	–	0.7
210	−10.3	+28.0	+49.8	–	–	0.7
220	−11.2	+28.0	+49.8	–	–	0.6
230	−12.1	+28.0	+49.8	–	–	0.6
240	−12.9	+28.0	+49.8	–	–	0.5
250	−13.8	+28.0	+49.8	–	–	0.5

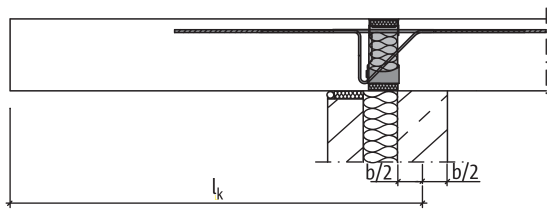
K20-CV50-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–	–	–	–	–	–
170	–	–	–	–	–	–
180	−15.1	+28,0	+49.8	–	–	0.9
190	−16.9	+28,0	+49.8	–	–	0.8
200	−18.6	+28,0	+49.8	–	–	0.8
210	−20.3	+28,0	+49.8	–	–	0.7
220	−22.0	+28,0	+49.8	–	–	0.6
230	−23.7	+28,0	+49.8	–	–	0.6
240	−25.5	+28,0	+49.8	–	–	0.6
250	−27.2	+28,0	+49.8	–	–	0.5

K30-CV50-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–	–	–	–	–	–
170	–	–	–	–	–	–
180	−21.2	+42.0	+74.6	+99.5	–	0.9
190	−23.6	+42.0	+74.6	+99.5	–	0.8
200	−26.0	+42.0	+74.6	+99.5	–	0.8
210	−28.4	+42.0	+74.6	+99.5	–	0.7
220	−30.8	+42.0	+74.6	+99.5	–	0.6
230	−33.2	+42.0	+74.6	+99.5	–	0.6
240	−35.6	+42.0	+74.6	+99.5	–	0.6
250	−38.1	+42.0	+74.6	+99.5	–	0.5

K40-CV50-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–	–	–	–	–	–
170	–	–	–	–	–	–
180	−24.2	+42.0	+74.6	+99.5	±49.8	0.9
190	−27.0	+42.0	+74.6	+99.5	±49.8	0.8
200	−29.7	+42.0	+74.6	+99.5	±49.8	0.8
210	−32.5	+42.0	+74.6	+99.5	±49.8	0.7
220	−35.2	+42.0	+74.6	+99.5	±49.8	0.6
230	−38.0	+42.0	+74.6	+99.5	±49.8	0.6
240	−40.7	+42.0	+74.6	+99.5	±49.8	0.6
250	−43.5	+42.0	+74.6	+99.5	±49.8	0.5

Concrete strength class for outside components at least C32/40 (see page 30).

Member forces to be taken in relation to the middle of the supporting wall.



[1)] Deflection factor to be applied in accordance with page 47.

Schöck Isokorb® type K

Capacity tables

Concrete strength ≥ C25/30
Concrete cover CV 35

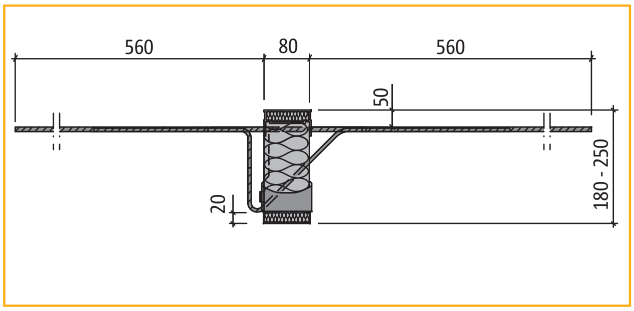
For the purposes of the calculations, the member forces should be taken in relation to the internal support (see page 46).

K50-CV50-...						
			V 8	V 10	VV	Deflection factor
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	tan α 1) [–]
160	–	–	–	–	–	–
170	–	–	–	–	–	–
180	−30.3	+42.0	+74.6	+99.5	±49.8	0.9
190	−33.7	+42.0	+74.6	+99.5	±49.8	0.8
200	−37.2	+42.0	+74.6	+99.5	±49.8	0.8
210	−40.6	+42.0	+74.6	+99.5	±49.8	0.7
220	−44.0	+42.0	+74.6	+99.5	±49.8	0.6
230	−47.5	+42.0	+74.6	+99.5	±49.8	0.6
240	−50.9	+42.0	+74.6	+99.5	±49.8	0.6
250	−54.4	+42.0	+74.6	+99.5	±49.8	0.5

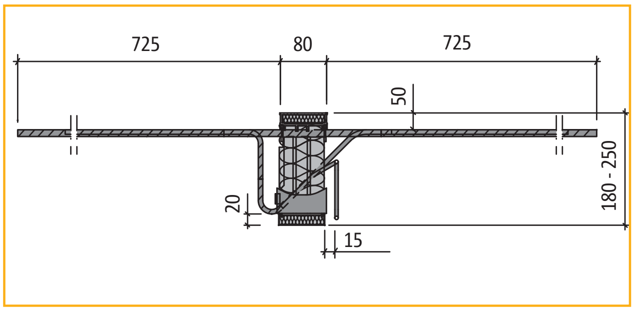
K60-CV50-...						
			V 8	V 10	VV	Deflection factor
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	tan α 1) [–]
160	–	–	–	–	–	–
170	–	–	–	–	– +99.5	–
180	−38.1	+42.0	+74.6	+99.5	−49.8 +99.5	1.1
190	−42.5	+42.0	+74.6	+99.5	−49.8 +99.5	1.0
200	−46.9	+42.0	+74.6	+99.5	−49.8 +99.5	0.9
210	−51.3	+42.0	+74.6	+99.5	−49.8 +99.5	0.8
220	−55.8	+42.0	+74.6	+99.5	−49.8 +99.5	0.7
230	−60.2	+42.0	+74.6	+99.5	−49.8 +99.5	0.7
240	−64.6	+42.0	+74.6	+99.5	−49.8 +99.5	0.6
250	−69.0	+42.0	+74.6	+99.5	−49.8	0.6

K70-CV50-...						
			V 8	V 10	VV	Deflection factor
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	tan α 1) [–]
160	–	–	–	–	–	–
170	–	–	–	–	– +99.5	–
180	−42.3	+42.0	+74.6	+99.5	−49.8 +99.5	1.1
190	−47.2	+42.0	+74.6	+99.5	−49.8 +99.5	1.0
200	−52.1	+42.0	+74.6	+99.5	−49.8 +99.5	0.9
210	−57.0	+42.0	+74.6	+99.5	−49.8 +99.5	0.8
220	−62.0	+42.0	+74.6	+99.5	−49.8 +99.5	0.7
230	−66.9	+42.0	+74.6	+99.5	−49.8 +99.5	0.7
240	−71.8	+42.0	+74.6	+99.5	−49.8 +99.5	0.6
250	−76.7	+42.0	+74.6	+99.5	−49.8	0.6

K80-CV50-...						
			V 8	V 10	VV	Deflection factor
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	tan α 1) [–]
160	–	–	–	–	–	–
170	–	–	–	–	– +99.5	–
180	−46.5	–	+74.6	+99.5	−49.8 +99.5	1.1
190	−51.9	–	+74.6	+99.5	−49.8 +99.5	1.0
200	−57.3	–	+74.6	+99.5	−49.8 +99.5	0.9
210	−62.7	–	+74.6	+99.5	−49.8 +99.5	0.8
220	−68.1	–	+74.6	+99.5	−49.8 +99.5	0.7
230	−73.5	–	+74.6	+99.5	−49.8 +99.5	0.7
240	−78.9	–	+74.6	+99.5	−49.8 +99.5	0.6
250	−84.3	–	+74.6	+99.5	−49.8	0.6



Schöck Isokorb® type K10-CV50 to K50-CV50



Schöck Isokorb® type K60-CV50 to K80-CV50

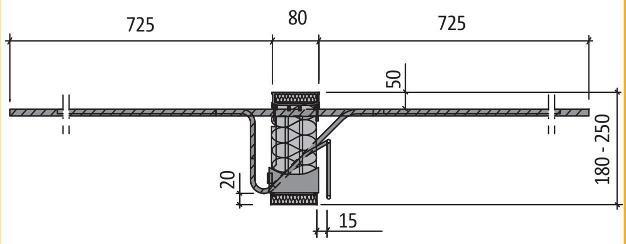
1) Deflection factor to be applied in accordance with page 47.

Schöck Isokorb® type K HTE MODULE
Capacity tables

For the purposes of the calculations, the member forces should be taken in relation to the internal support (see page 46).

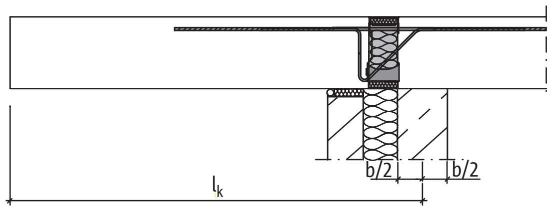
Concrete strengath ≥ C25/30
Concrete cover CV 50

K90-CV50-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–	–	–	–	–	–
170	–	–	–	–	– +99.5	–
180	–49.2	–	+74.6	+99.5	–49.8 +99.5	1.1
190	–55.0	–	+74.6	+99.5	–49.8 +99.5	1.0
200	–60.7	–	+74.6	+99.5	–49.8 +99.5	0.9
210	–66.4	–	+74.6	+99.5	–49.8 +99.5	0.8
220	–72.1	–	+74.6	+99.5	–49.8 +99.5	0.7
230	–77.9	–	+74.6	+99.5	–49.8 +99.5	0.7
240	–83.6	–	+74.6	+99.5	–49.8 +99.5	0.6
250	–89.3	–	+74.6	+99.5	–49.8	0.6



Schöck Isokorb® type K90-CV50 to K100-CV50

Member forces to be taken in relation to the middle of the supporting wall.



Concrete strength ≥ C32/40
Concrete cover CV 50

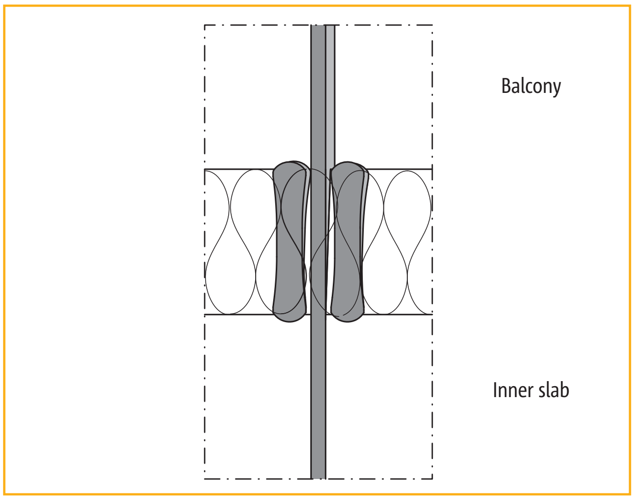
K100-CV50-...						
			V 8	V 10	VV	
Height of Isokorb® H [mm]	m_{Rd} [kNm/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	v_{Rd} [kN/m]	Deflection factor tan α[1)] [–]
160	–	–	–	–	–	–
170	–	–	–	–	– +99.5	–
180	–53.3	–	+74.6	+99.5	–49.8 +99.5	1.1
190	–59.4	–	+74.6	+99.5	–49.8 +99.5	1.0
200	–65.6	–	+74.6	+99.5	–49.8 +99.5	0.9
210	–71.8	–	+74.6	+99.5	–49.8 +99.5	0.8
220	–78.0	–	+74.6	+99.5	–49.8 +99.5	0.7
230	–84.2	–	+74.6	+99.5	–49.8 +99.5	0.7
240	–90.4	–	+74.6	+99.5	–49.8 +99.5	0.6
250	–96.6	–	+74.6	+99.5	–49.8	0.6

[1)] Deflection factor to be applied in accordance with page 47.

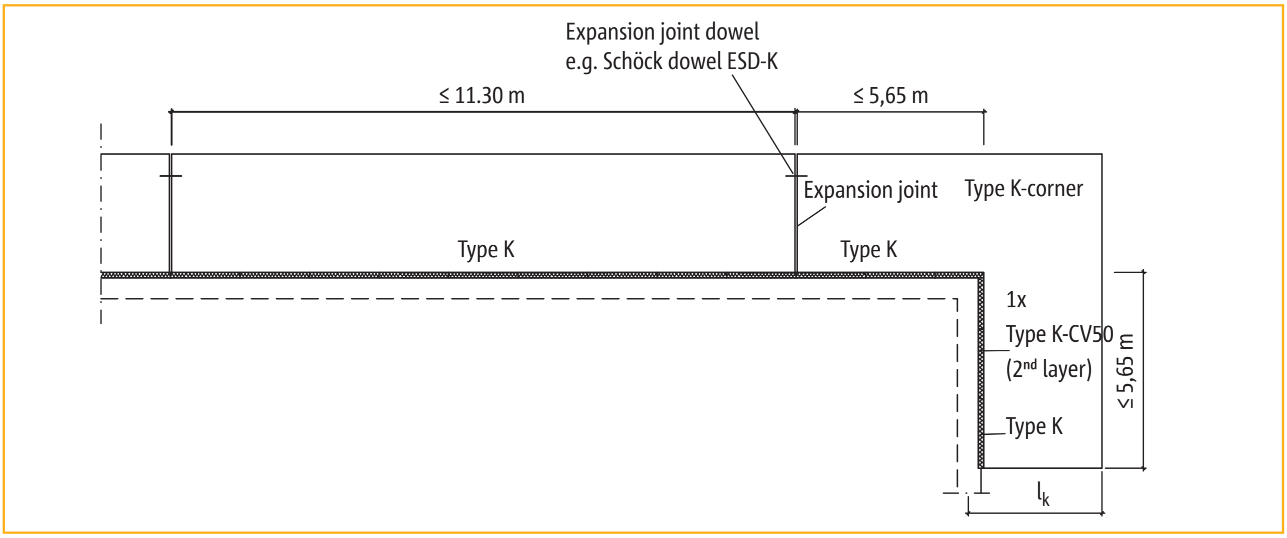
Schöck Isokorb® type K HTE MODULE

Expansion joint/Example showing joint detail

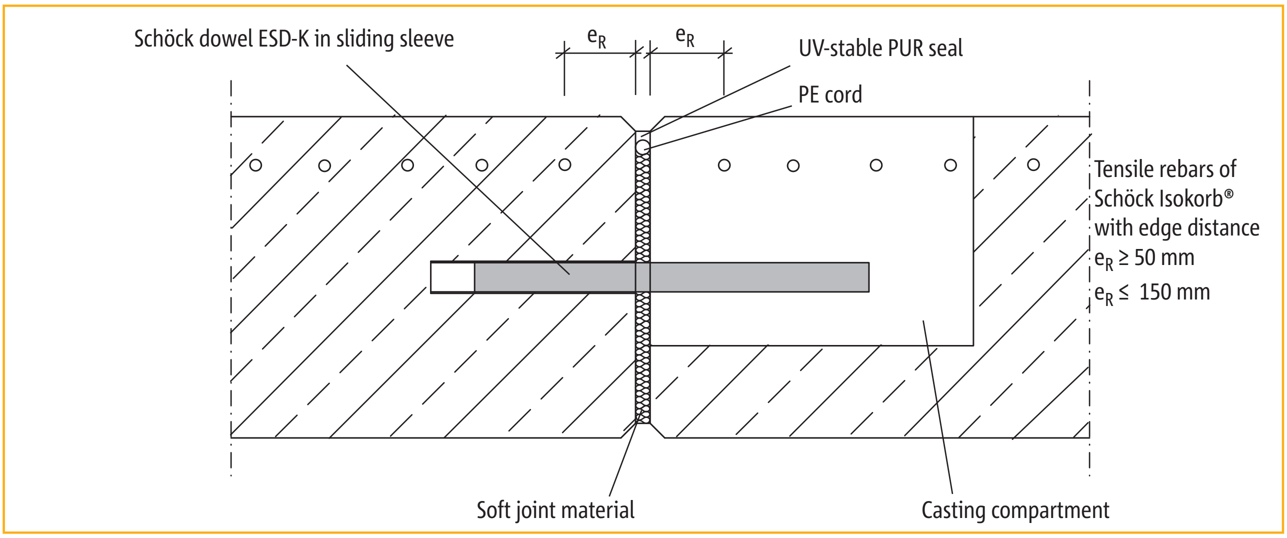
External balcony slabs are subject to changes in length as a result of temperature fluctuations. Due to the lengthening and shortening of the balcony slabs, the load-bearing elements which run through the thermal insulation may be shifted by up to several millimetres. To insure that the rods can survive many thousands of temperature changes, the edge bending stresses determined in tests must not be exceeded. The HTE module compensates for the movements by individually inclining each separate pressure element.



Deflection due to temperature difference



Expansion joint spacing

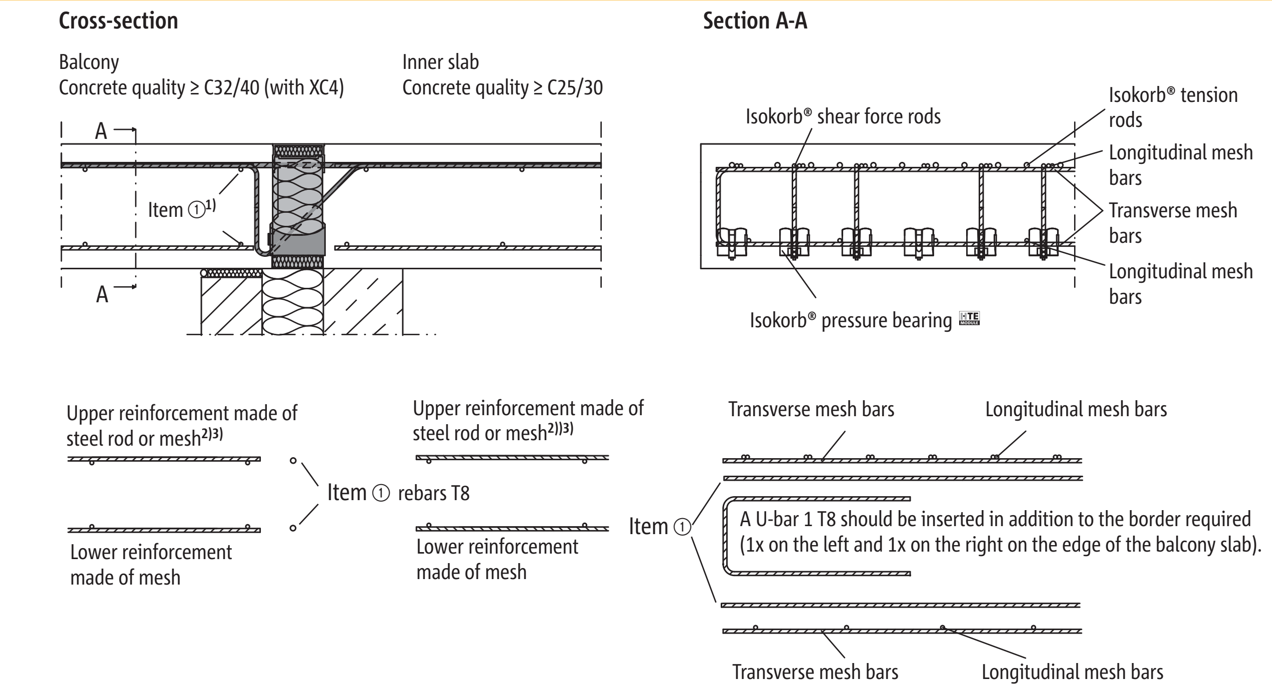


Example showing joint detail

Schöck Isokorb® type K

Lap splice design

Direct mounting



On-site additional reinforcement - direct mounting of inner slab border

Recommendations for lap splice design

Option A: Connections with reinforcing steel mesh to BS 4483

Option B: Connections with steel rod to BS 4449

Option C: Combined reinforcement of connections with reinforcing steel mesh to BS 4483 and steel rod to BS 4449.
The transverse reinforcement of the chosen reinforcing steel mesh covers 1/5 of the longitudinal reinforcement.

Recommendations for the reinforcement of connections with Schöck Isokorb® at a load of 100 % of the maximum rated moment with C25/30, CV = 35 mm or CV = 50 mm

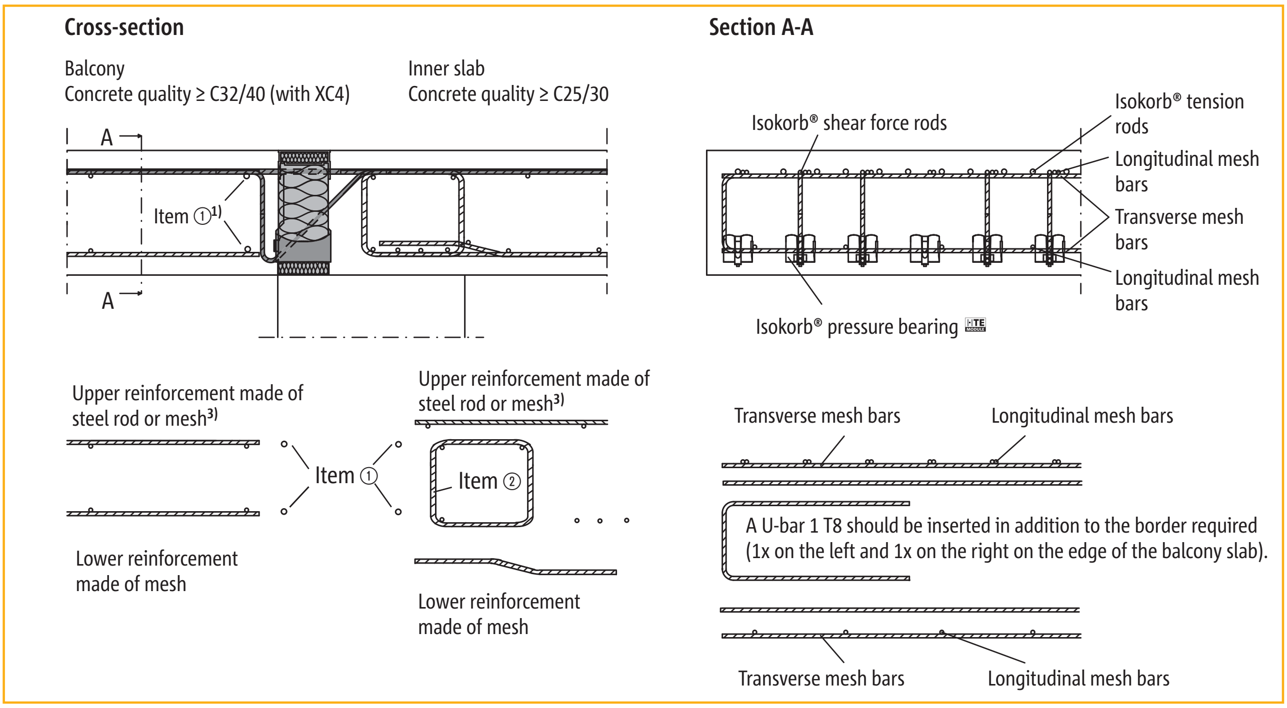
Schöck Isokorb® type	Reinforcement options for design of tension laps3)		
	Option A	Option B	Option C
K10	A193	T8@150 mm c/c	–
K20	B385	T10@150 mm c/c	A193 + T8@150 mm c/c
K30	B503	T10@125 mm c/c	A193 + T8@125 mm c/c
K40	B785	T10@100 mm c/c	A193 + T8@100 mm c/c
K50	B785	T10@90 mm c/c	A193 + T10@100 mm c/c
K60	–	T12@110 mm c/c	A252 + T10@90 mm c/c
K70	–	T12@100 mm c/c	A252 + T10@90 mm c/c
K80	–	T12@90 mm c/c	A252 + T12@100 mm c/c
K90	–	T12@80 mm c/c	A252 + T12@100 mm c/c
K100	–	T12@75 mm c/c	A385 + T12@100 mm c/c

1) The last transverse bar of the steel mesh must be positioned as closely as possible to the pressure bearing. Otherwise an T8 mm steel rod is required there.
2) The calculations of the upper reinforcement layer are performed according to the standard calculation methods for reinforced steel construction.
3) Alternative tension laps are also possible. The rules according to EC 2 apply to the determination of the lap length. It is permissible to reduce the required lap length with $A_{s,req}/A_{s/prov}$. For lapping (l_s) with the Schöck Isokorb®, a tension rod length of 530 mm can be used in the calculations for the types K10 to K50 and a tension rod length of 695 mm for the types K60 to K100.

Schöck Isokorb® type K

Lap splice design

Indirect mounting



On-site additional reinforcement - indirect mounting of inner slab border

Recommendations for lap splice design

Option A: Connections with reinforcing steel mesh to BS 4483

Option B: Connections with steel rod to BS 4449

Option C: Combined reinforcement of connections with reinforcing steel mesh to BS 4483 and steel rod to BS 4449. The transverse reinforcement of the chosen reinforcing steel mesh covers 1/5 of the longitudinal reinforcement.

Recommendations for the reinforcement of connections with Schöck Isokorb® at a load of 100 % of the maximum rated moment with C25/30, CV = 30 mm or CV = 35 mm

<table>
<tr><th rowspan="3">Schöck Isokorb® type</th><th colspan="10">Required hanger-reinforcement (Item. ②) [mm²/m]</th></tr>
<tr><th colspan="10">H [mm]</th></tr>
<tr><th>160</th><th>170</th><th>180</th><th>190</th><th>200</th><th>210</th><th>220</th><th>230</th><th>240</th><th>250</th></tr>
<tr><td>K10</td><td colspan="10">113</td></tr>
<tr><td>K20</td><td colspan="10">113</td></tr>
<tr><td>K30</td><td colspan="10">113</td></tr>
<tr><td>K40</td><td colspan="10">115</td></tr>
<tr><td>K50</td><td colspan="10">143</td></tr>
<tr><td>K60</td><td>251</td><td>266</td><td>278</td><td>290</td><td>300</td><td>309</td><td>317</td><td>325</td><td>332</td><td>338</td></tr>
<tr><td>K70</td><td>279</td><td>295</td><td>309</td><td>322</td><td>333</td><td>343</td><td>353</td><td>361</td><td>369</td><td>376</td></tr>
<tr><td>K80</td><td>307</td><td>325</td><td>340</td><td>354</td><td>366</td><td>377</td><td>388</td><td>397</td><td>406</td><td>413</td></tr>
<tr><td>K90</td><td>325</td><td>344</td><td>360</td><td>375</td><td>388</td><td>400</td><td>410</td><td>420</td><td>429</td><td>438</td></tr>
<tr><td>K100</td><td>352</td><td>372</td><td>389</td><td>405</td><td>419</td><td>432</td><td>444</td><td>455</td><td>464</td><td>474</td></tr>
</table>

1) The last transverse bar of the steel mesh must be positioned as closely as possible to the pressure bearing. Otherwise an T8 mm steel rod is required there.

2) The calculations of the upper reinforcement layer are performed according to the standard calculation methods for reinforced steel construction.

3) Alternative tension laps are also possible. The rules according to EC 2 apply to the determination of the lap length. It is permissible to reduce the required lap length with $A_{s,req}/A_{s/prov}$. For lapping (l_s) with the Schöck Isokorb®, a tension rod length of 530 mm can be used in the calculations for the types K10 to K50 and a tension rod length of 695 mm for the types K60 to K100.

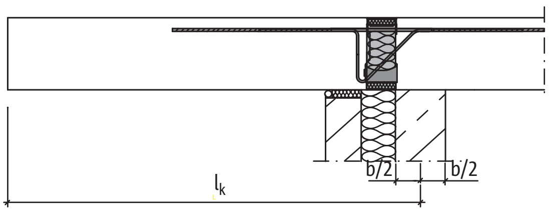
Schöck Isokorb® type K

Example calculation/Notes

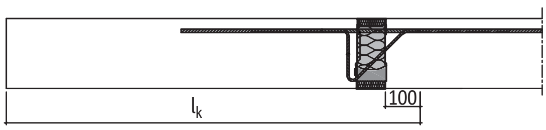
Example calculation

preset: Cantilever balcony

Direct mounting:
Member forces to be taken in relation to the middle of the internal support (rigid slab edge, beam, wall).



Indirect mounting:
Member forces to be taken 100 mm off the slab edge.



Geometry:	Length of projection	l_k	= 1.90 m
	Balcony slab thickness	h	= 180 mm
Load assumptions:	Balcony slab and coating	g	= 5.7 kN/m²
	Live load	q	= 4.0 kN/m²
	Edge load (balustrade)	g_R	= 1.5 kN/m

Exposure grade: outside XC 4
inside XC 1

Choice: Concrete grade C25/30 for balcony, C32/40 for inner slab
Concrete cover CV = 35 mm for Isokorb®-tensile bars[1)]

Member forces:
$m_{Ed} = -[(\gamma_G \times g + \gamma_q \times q) \times l_k^2/2 + \gamma_G \times g_R \times l_k)]$
$m_{Ed} = -[(1.35 \times 5.7 + 1.5 \times 4.0) \times 1.9^2/2 + 1.35 \times 1.5 \times 1.9)] = -28.6$ kNm/m
$v_{Ed} = +(\gamma_G \times g + \gamma_q \times q) \times l_k + \gamma_G \times g_R$
$v_{Ed} = +(1.35 \times 5.7 + 1.5 \times 4.0) \times 1.9 + 1.35 \times 1.5 = +28.1$ kN/m

Choice: **Schöck Isokorb® type K50-CV35-H180**

m_{Rd}	= −35.4 kNm/m	(see page 37) > m_{Ed}
v_{Rd}	= +42.0 kN/m	(see page 37) > v_{Ed}
tan α	= 0.8	(see page 37)

Notes

- In the case of a combination of different concrete qualities (e.g. balcony C32/40, inner slab C25/30), the weaker concrete is critical in terms of the Isokorb® calculations.
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd, max}$, whereby $V_{Rd, max}$ should be determined for θ = 45° and α = 90°.
- Concrete strength class for outside components at least C32/40 (see page 30).

Schöck Isokorb® type K

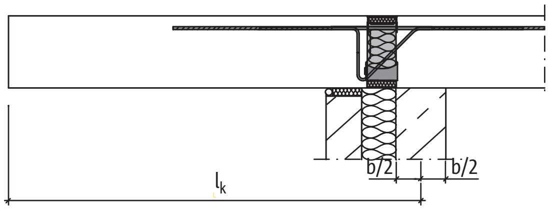
Deflection/Flexural slenderness

Deflection

The deflection values shown in the calculation tables (p. 36 - 42) result solely from the deformation of the Schöck Isokorb® element under 100 % exploitation of the steel stress of f_{yd} = 435 N/mm². The final precamber of the balcony slab formwork 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 formwork to be specified by the engineer in charge. Note that deflection calculations, or precamber design respectively, should be taken inot account while designing the drainage of the balcony.

Deflection (p) due to Schöck Isokorb®
$p = [\tan\alpha \text{ Table value} \times l_k \times (m_{pd} / m_{Rd})] \times 10$ [mm]

l_k	Length of projection [m]
m_{pd}	Critical bending moment for calculation of the deflection p due to Schöck Isokorb®. The load combination to be applied here can be determined by the structural analysis engineer.
m_{Rd}	Maximum rated moment of the Schöck Isokorb® type K (see pages 36 - 42).



K

Reinforced concrete-to-reinforced concrete

Example calculation

Choice:	Concrete quality C32/40 for balcony		
	Concrete quality C25/30 for for inner slab		
	Concrete cover CV = 35 mm		
Geometry:	Length of projection	l_k	= 1.90 m
	Concrete slab thickness	h	= 180 mm
Load assumptions:	Balcony slab and coating	g	= 5.7 kN/m²
	Live load	q	= 4.0 kN/m²
	Edge load (balustrade)	g_R	= 1.5 kN/m
Member forces:	Bending moment	m_{Ed}	= –28.6 kNm/m
	Lateral force	v_{Ed}	= +28.1 kN/m

Choice: **Schöck Isokorb® type K50-CV35-H180**

m_{Rd}	= –35.4 kNm/m	(see page 37) > m_{Ed}
v_{Rd}	= +42.0 kN/m	(see page 37) > v_{Ed}
$\tan\alpha$	= 0.8	(see page 37)

Chosen load combination for deflection due to Schöck Isokorb®: g + q/2

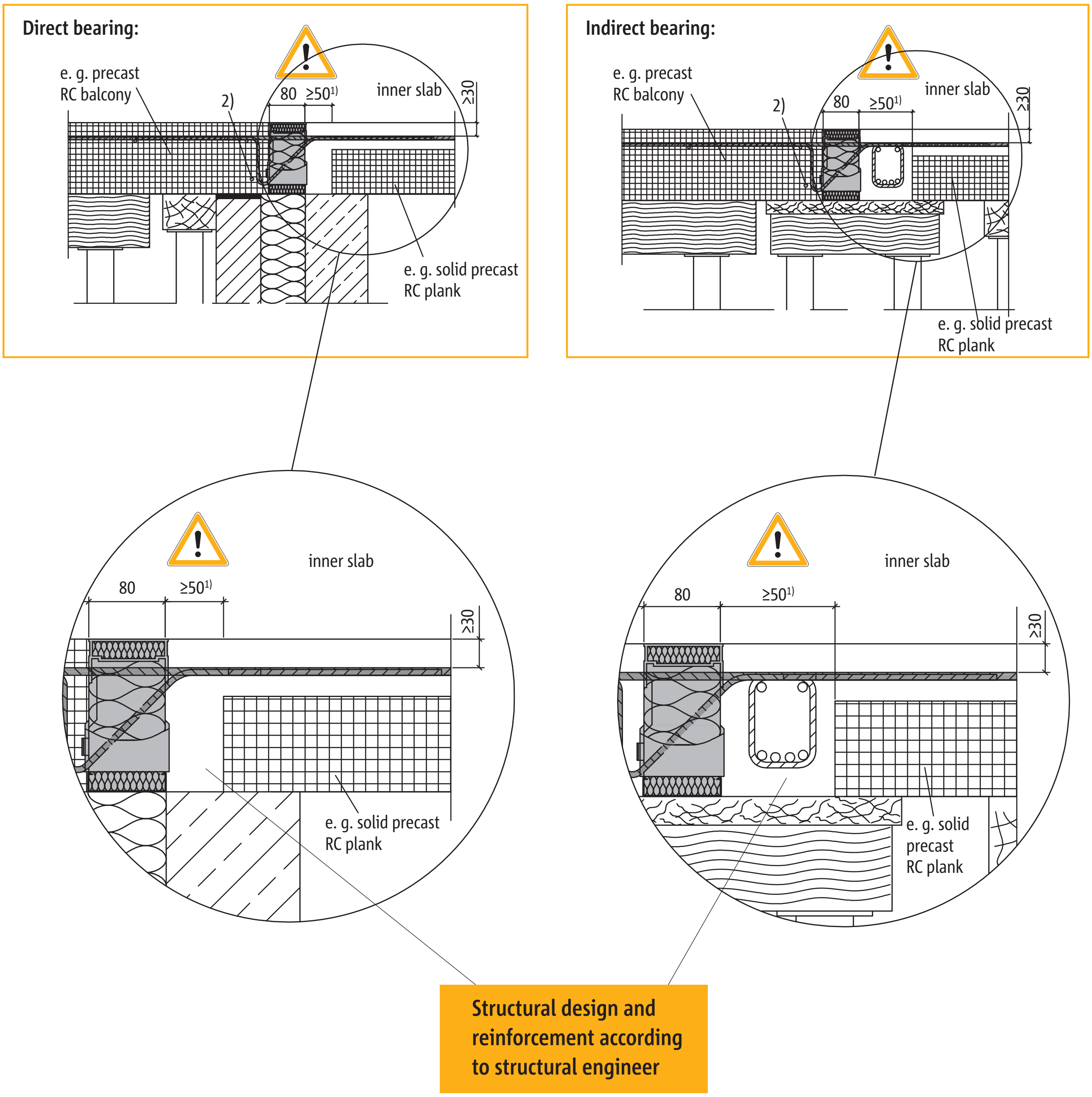
$m_{pd} = -[(\gamma_G \times g + \gamma_Q \times q/2) \times l_k^2/2 + \gamma_G \times g_R \times l_k]$
$m_{pd} = -[(1.35 \times 5.7 + 1.5 \times 4/2) \times 1.9^2/2 + 1.35 \times 1.5 \times 1.9]$
$= -23.2$ kNm/m
$p = [\tan\alpha \times l_k \times (m_{pd} / m_{Rd})] \times 10$
$p = [0.8 \times 1.9 \times (23.2/35.4)] \times 10 = 10$ mm

For the limitation of flexable slenderness, we advise the following maximum cantilivered lengths max l_k [m]:

	Height of Isokorb H [mm]				
Concrete cover	**160**	**180**	**200**	**220**	**240**
CV = 30 mm	1.75	2.00	2.25	2.50	2.70
CV = 35 mm	1.65	1.90	2.10	2.40	2.60
CV = 50 mm	1.45	1.70	1.90	2.10	2.40

Schöck Isokorb® type K

Installation in conjunction with precast planks



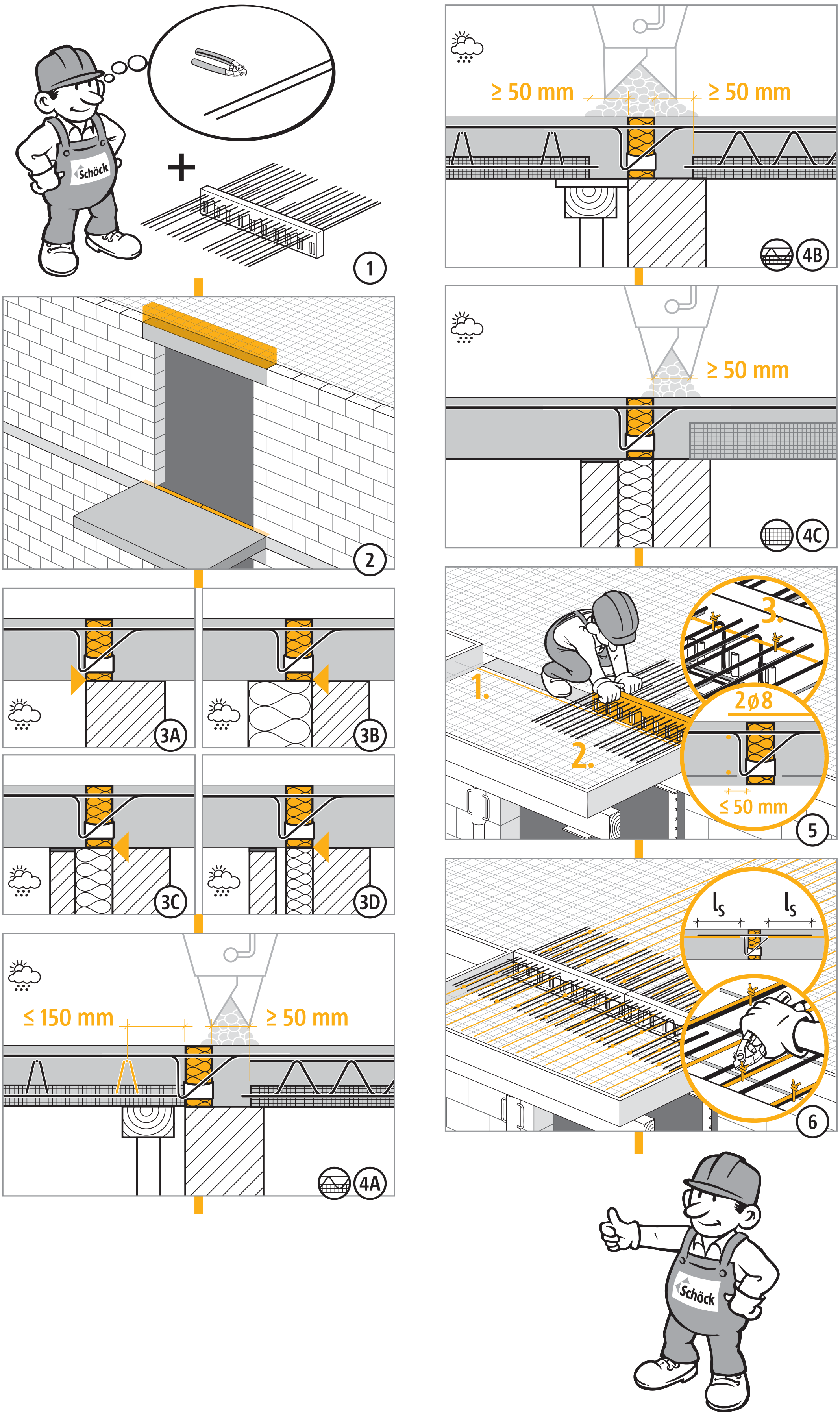
Notes

- A cast-in-place strip of concrete between precast planks and Schöck Isokorb® is essential for structural reasons!
- **Sufficient bond action between reinforced structural screed and precast planks has to be guaranteed!**

[1] A cast-in-place strip of concrete is essential for structural reasons.
[2] Steel rod T8 along the pressure bearings

Schöck Isokorb® type K HTE MODULE

Method statement

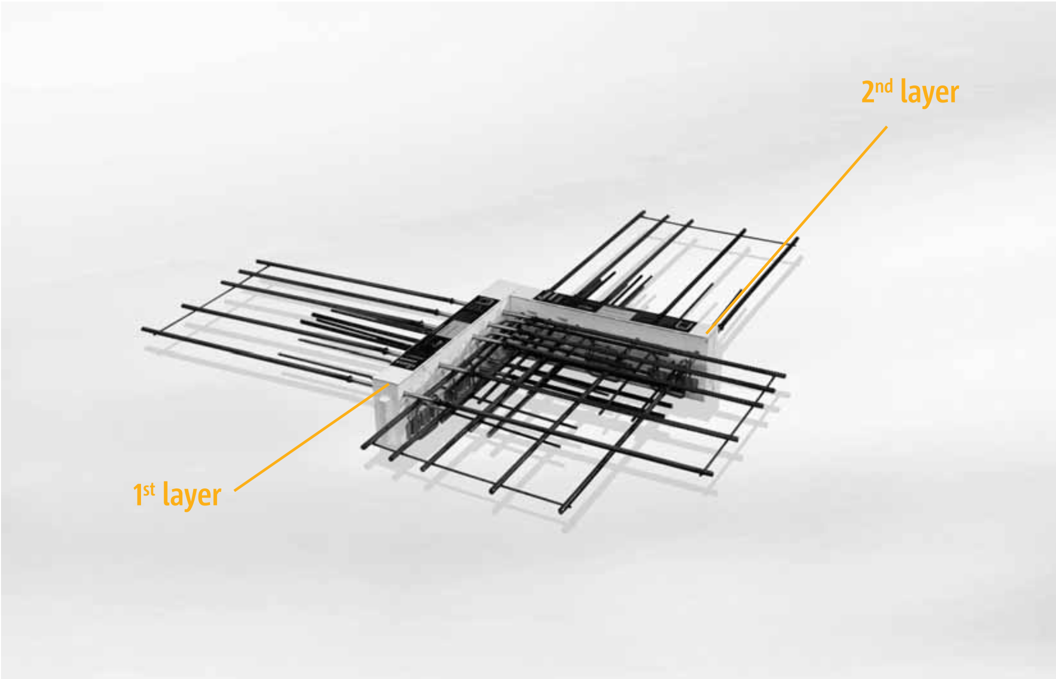


Schöck Isokorb®

Check list

- [ ] Have the member forces on the Isokorb® connection been determined at the design level?
- [ ] Was the cantilevered system length used in the process (member forces taken in relation to the middle of the internal suport)?
- [ ] Have the concrete cover and the appropriate concrete grade been taken into consideration according to the building regulations (see page 30)
- [ ] In case of precast planks will be used, is sufficient bond action between structural screed and precast planks guaranteed?
- [ ] Have the maximum permitted distances between expansion joints (= expansion joint spacing) been taken into account?
- [ ] Has the required lap splice reinforcement been designed for balcony side and for inner slab side?
- [ ] Do the calculations of the deformation of the overall structure take into account the additional deformation due to the Schöck Isokorb®?
- [ ] Has the drainage direction been taken into account in the resulting precamber specification for the balcony formwork?
- [ ] Has the relevant bearing limit of the slab been checked for V_{Rd}?
- [ ] In case of a corner balcony, have the minimum slab thickness (≥ 180 mm) and the required 2nd layer (CV50) been taken into account?
- [ ] Have the fire safety requirements been clarified, and are they reflected in the chosen type designation (-F90)?
- [ ] In the case of F90 elements, has the increased minimum slab thickness been taken into account (type Q, type V)?

Schöck Isokorb® type K-corner



Schöck Isokorb® type K30-corner-CV35

Contents

Schöck Isokorb® type K-corner

Arrangement of elements/Note

As an addition to the Schöck Isokorb® type K, for balconies with outside corners the corresponding Schöck Isokorb® type K-corner is used:

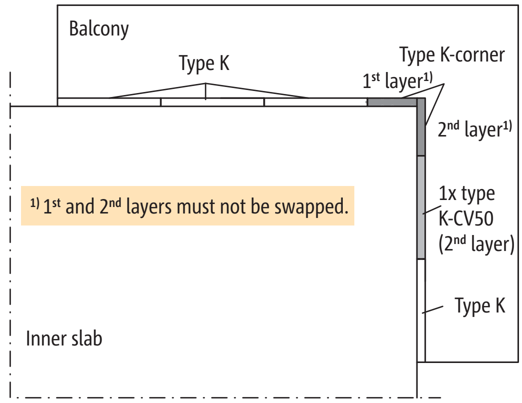
Type K20-CV35 → Type K20-corner-CV35
Type K30-CV35 → Type K30-corner-CV35
Type K50-CV35 → Type K50-corner-CV35

Each corner element comprises 2 parts:
The partial element for the 1st layer and the partial element for the 2nd layer.

Next to the partial element for the 2nd layer, a Schöck Isokorb® type K-CV50 (2nd layer) element is always required.

Refer to page 43 for details of the expansion joint spacing.

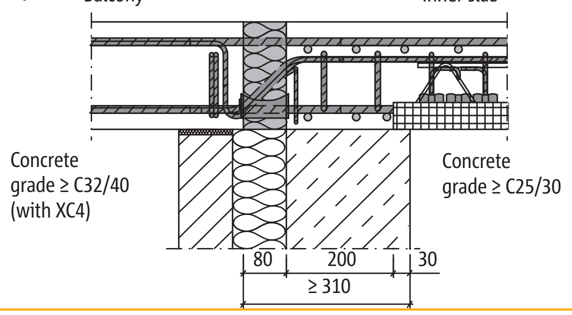
Balcony slab thickness h ≥ 180 mm



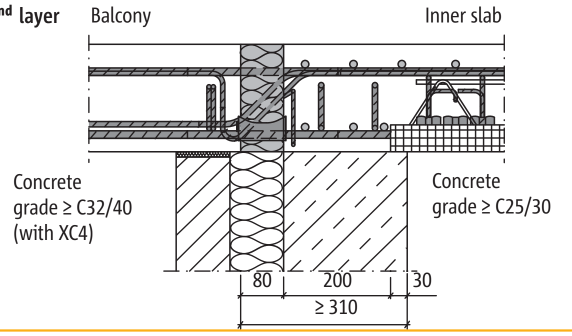
1) 1st and 2nd layers must not be swapped.

The mounting reinforcement and edge border on the balcony side are integrated at the factory.
Calculations are performed following F. Leonhardt, “Vorlesungen über Massivbau” (Lectures on solid construction), part 3, paragraph 8.3.4.

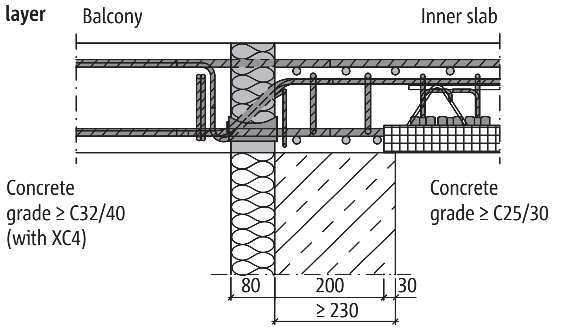
Isokorb® arrangement e. g. with precast lattice girder floor slabs



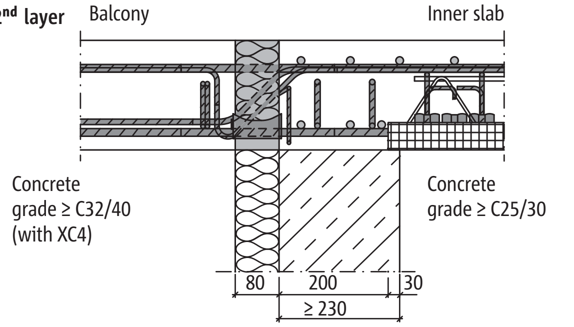
Section through partial element, 1st layer with cavity wall



Section through partial element, 2nd layer with cavity wall



Section through partial element, 1st layer, brickwork with external insulation



Section through partial element, 2nd layer, brickwork with external insulation

Note

- When installing Schöck Isokorb® type K30-corner-CV35 and type K50-corner-CV35 elements, a clear gap of at least 200 mm is required between the insulating body and the precast plank on the inner slab side for anchoring of the compression bars ø 14 mm which are located at the bottom. This is not required for the Schöck Isokorb® type K20-corner-CV35.

Schöck Isokorb® type K-corner

Capacity table/Note

Schöck Isokorb® type	K20-corner-CV35		K30-corner-CV35		K50-corner-CV35	
	1st layer	2nd layer	1st layer	2nd layer	1st layer	2nd layer
Element length [mm]	500	500 + 80	620 + 80	620 + 80	620 + 80	620 + 80
Tension rods	8 ø 8	8 ø 8	5 ø 14	5 ø 14	6 ø 14	6 ø 14
Compression bars	–	–	3 ø 14	3 ø 14	4 ø 14	4 ø 14
Pressure bearings	5	5	6	6	6	6
Shear force rods	3 ø 8	3 ø 8	3 ø 8 +2 ø 10	3 ø 8 +2 ø 10	4 ø 8 +2 ø 10	4 ø 8 +2 ø 10

Concrete strength ≥ C25/30
Concrete cover CV 35

K20-corner-CV35...			K30-corner-CV35...			K50-corner-CV35...		
Height of Isokorb® H [mm]	Internal forces M_{Rd} [kNm]	V_{Rd} [kN]	Height of Isokorb® H [mm]	Internal forces M_{Rd} [kNm]	V_{Rd} [kN]	Height of Isokorb® H [mm]	Internal forces M_{Rd} [kNm]	V_{Rd} [kN]
180	−14.3	+37.3	**180**	−31.8	+78.6	**180**	−36.9	+91.1
190	−16.0	+37.3	**190**	−35.3	+78.6	**190**	−41.0	+91.1
200	−17.7	+37.3	**200**	−38.8	+78.6	**200**	−45.0	+91.1
210	−19.4	+37.3	**210**	−42.3	+78.6	**210**	−49.1	+91.1
220	−21.2	+37.3	**220**	−45.8	+78.6	**220**	−53.1	+91.1
230	−22.9	+37.3	**230**	−49.3	+78.6	**230**	−57.2	+91.1
240	−24.6	+37.3	**240**	−52.8	+78.6	**240**	−61.2	+91.1
250	−26.3	+37.3	**250**	−56.4	+78.6	**250**	−65.3	+91.1

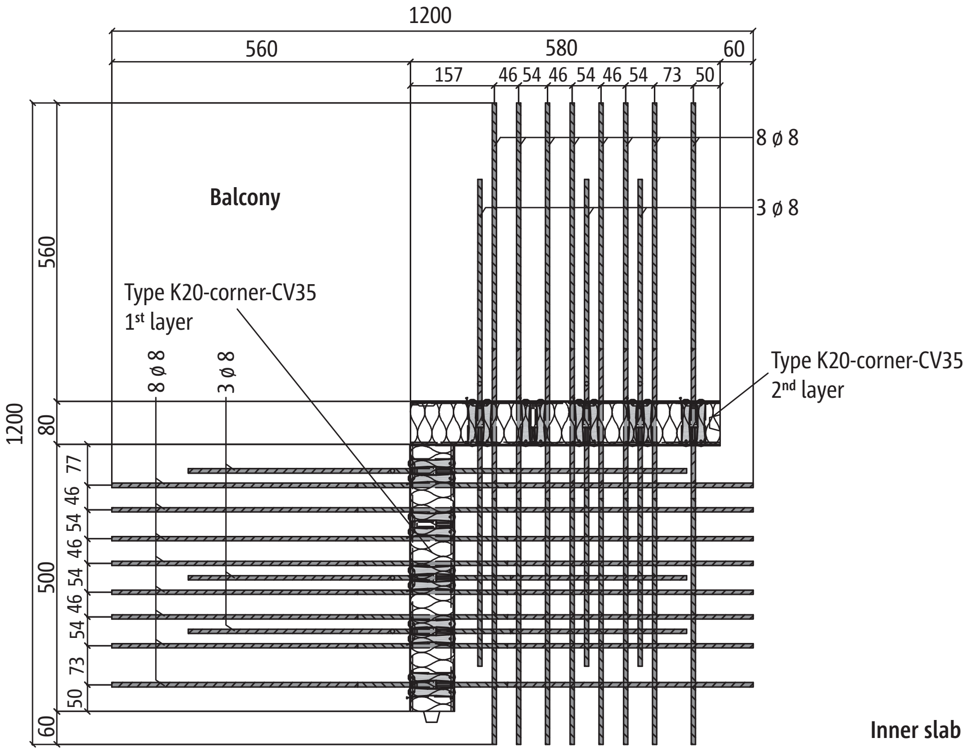
On request:
Concrete cover CV 30

Note

- Concrete grade for outside components at least C32/40 (see page 30).

Schöck Isokorb® type K20-corner-CV35

Reinforcement layout/Lap splice design



Plan view: Schöck Isokorb® type K20-corner-CV35

Part list

Upper layer, x-direction:

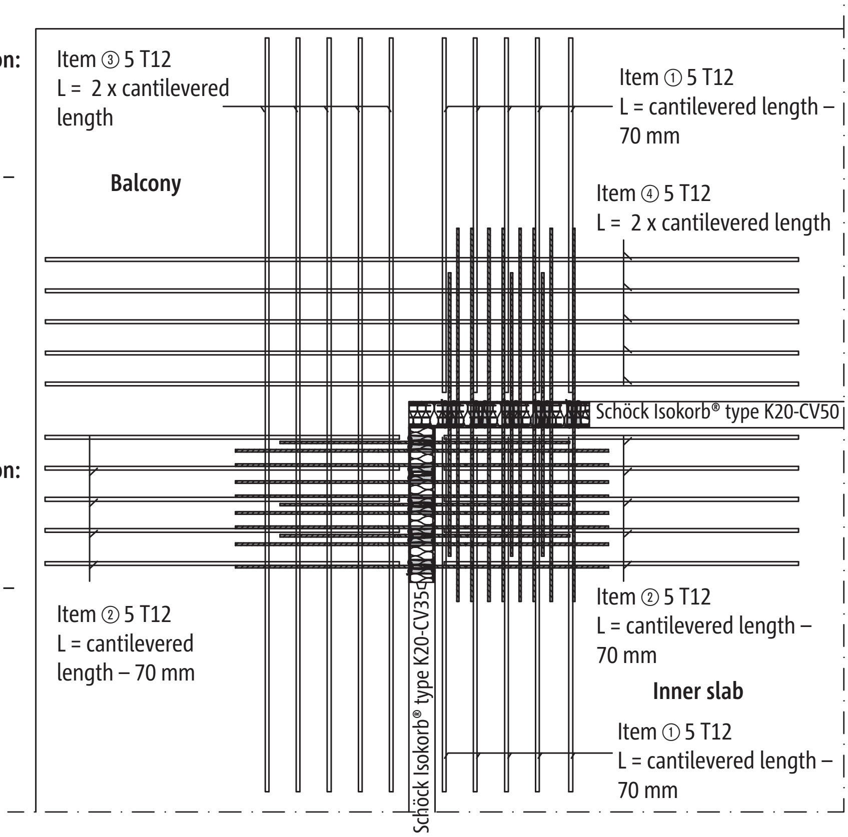
Item ②
2 x 5 T12@100 mm
L = cantilevered length – 70 mm

Item ④
5 T12@100 mm
L = 2 x cantilevered length

Upper layer, y-direction:

Item ①
2 x 5 T12@100 mm
L = cantilevered length – 70 mm

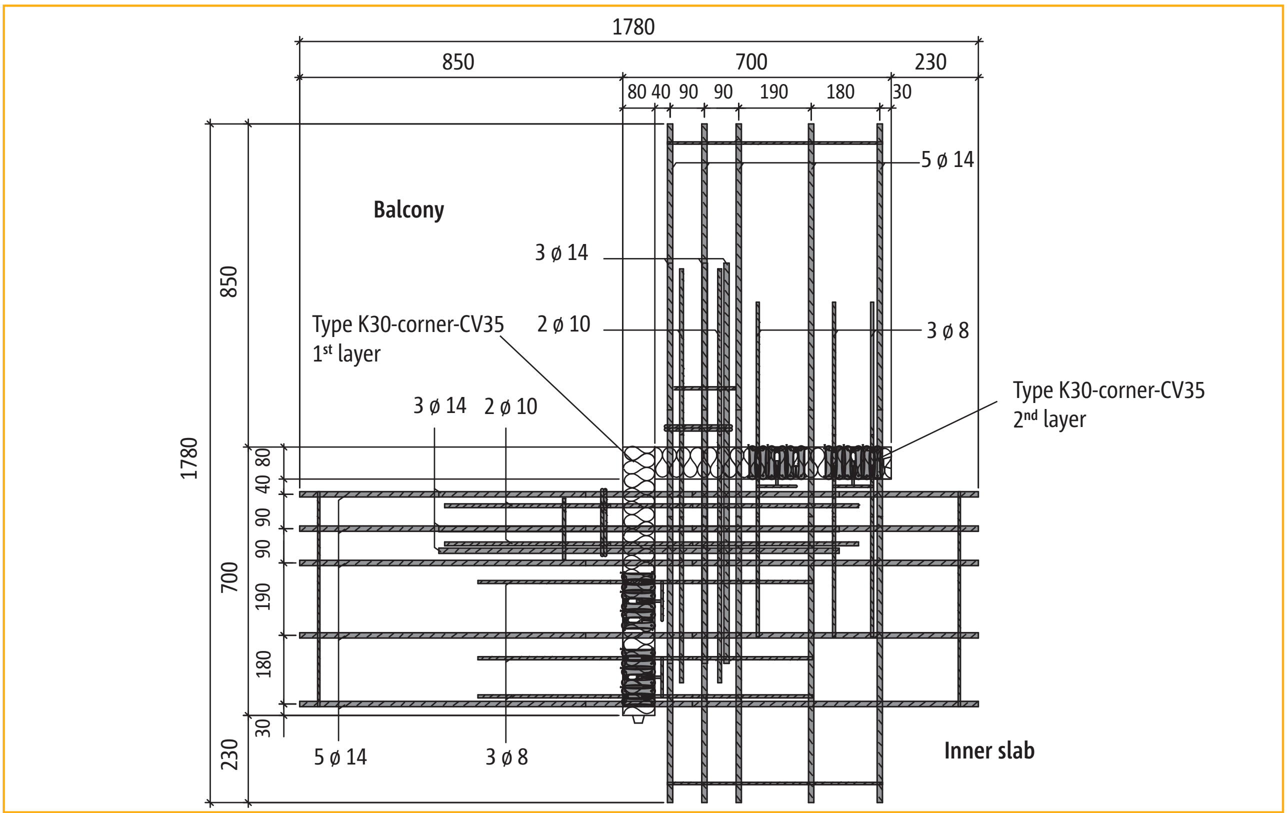
Item ③
5 T12@100 mm
L = 2 x cantilevered length



Lap slice design for on-site reinforcement (upper layer in the area of the Schöck Isokorb® type K20-corner-CV35)

Schöck Isokorb® type K30-corner-CV35

Reinforcement layout/Lap splice design



Plan view: Schöck Isokorb® type K30-corner-CV35

Part list

Upper layer, x-direction:

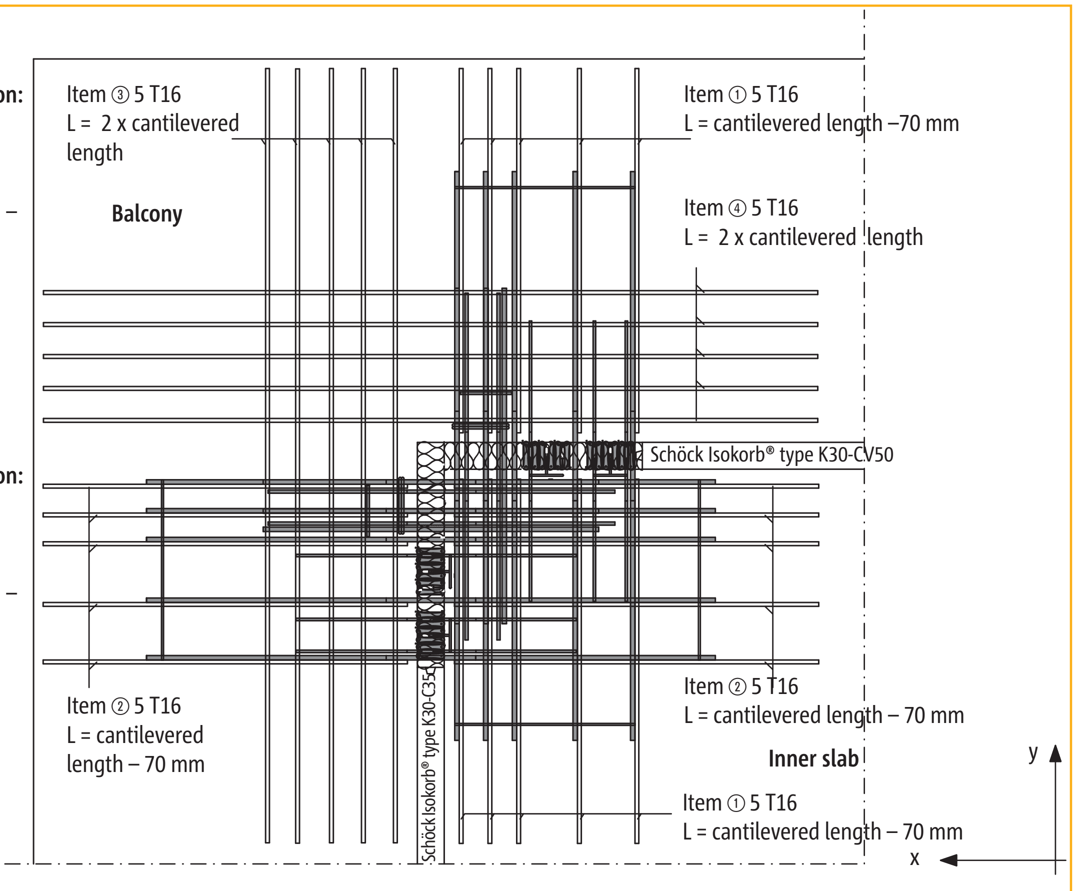
Item ②
2 x 5 T16@100 mm
L = cantilevered length – 70 mm

Item ④
5 T16@100 mm
L = 2 x cantilevered length

Upper layer, y-direction:

Item ①
2 x 5 T16@100 mm
L = cantilevered length – 70 mm

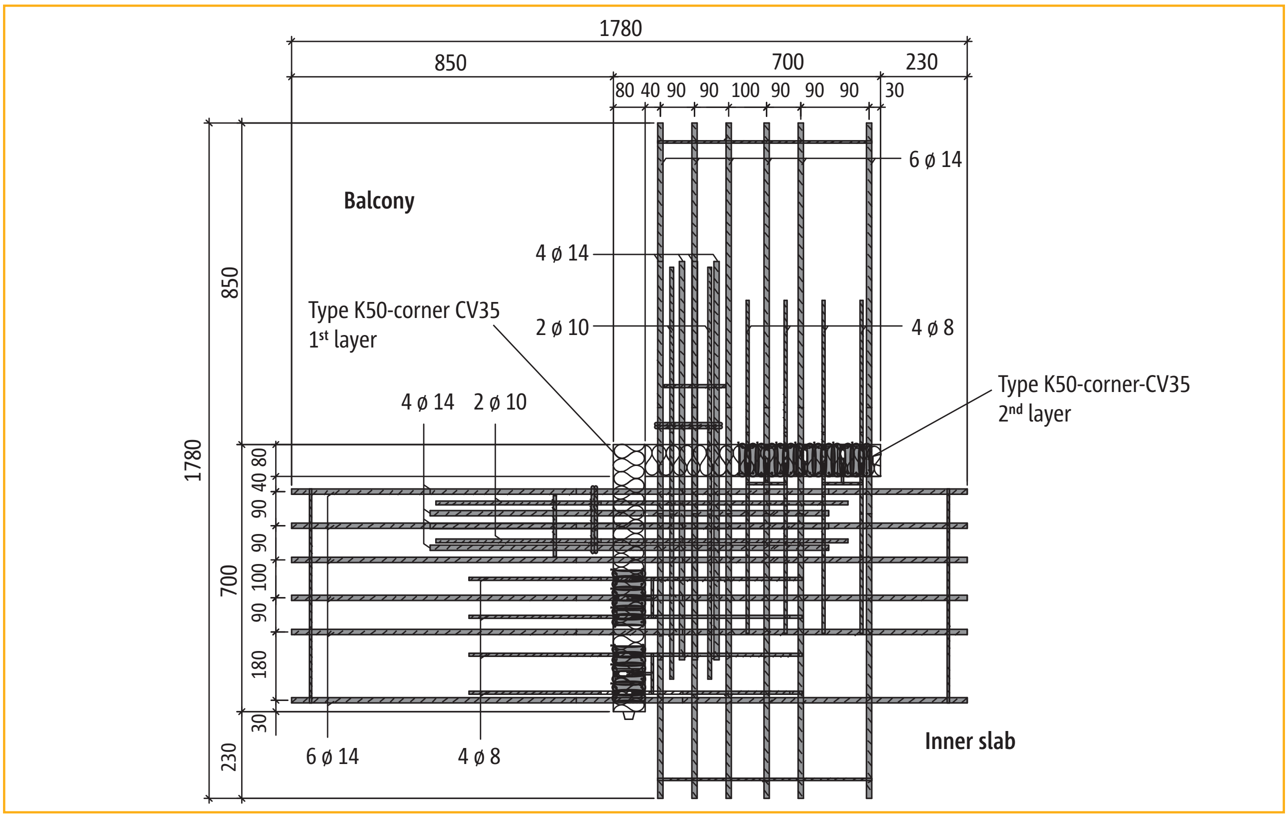
Item ③
5 T16@100 mm
L = 2 x cantilevered length



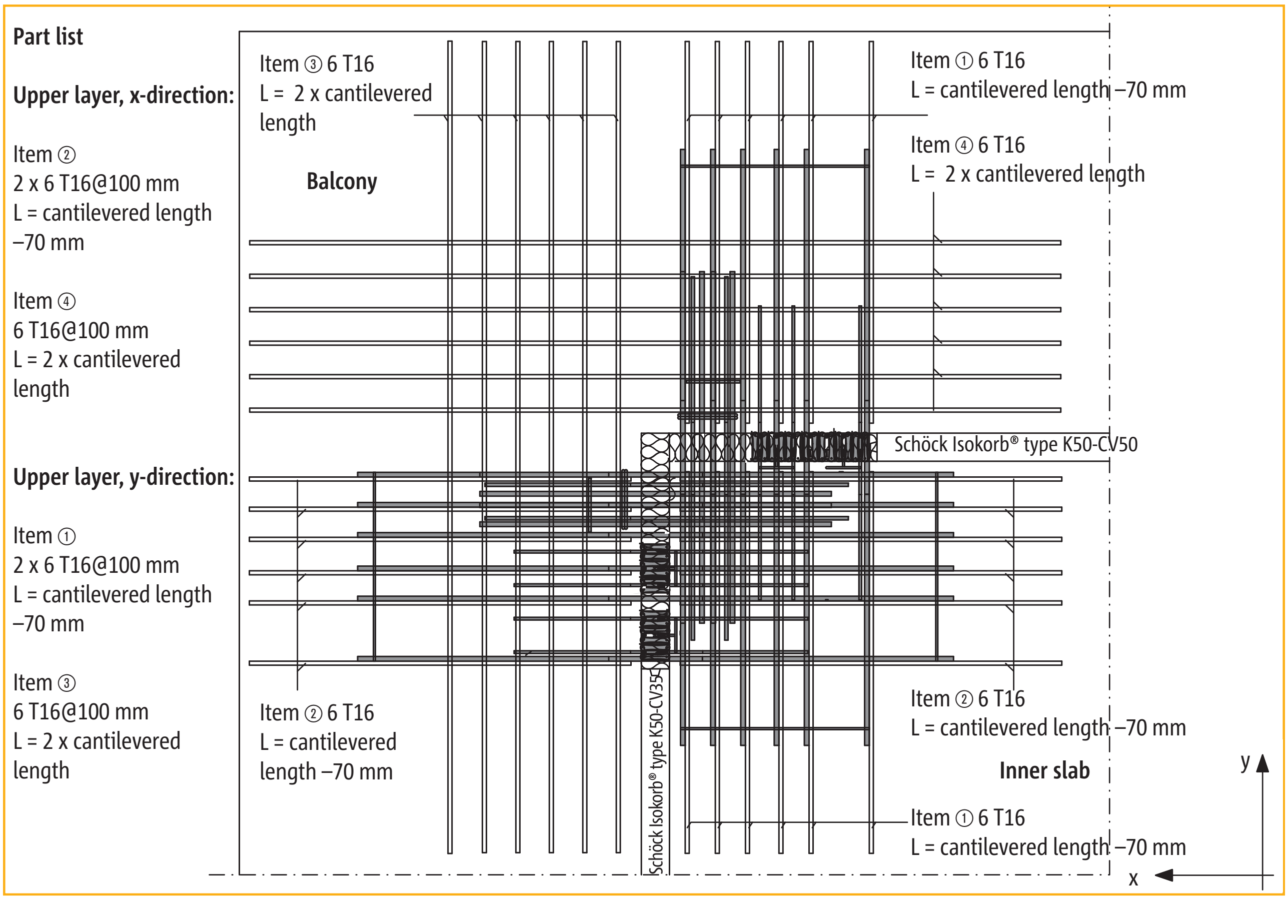
Lap slice design for on-site reinforcement (upper layer in the area of the Schöck Isokorb® type K30-corner-CV35)

Schöck Isokorb® type K50-corner-CV35 HTE MODULE

Reinforcement layout/Lap splice design



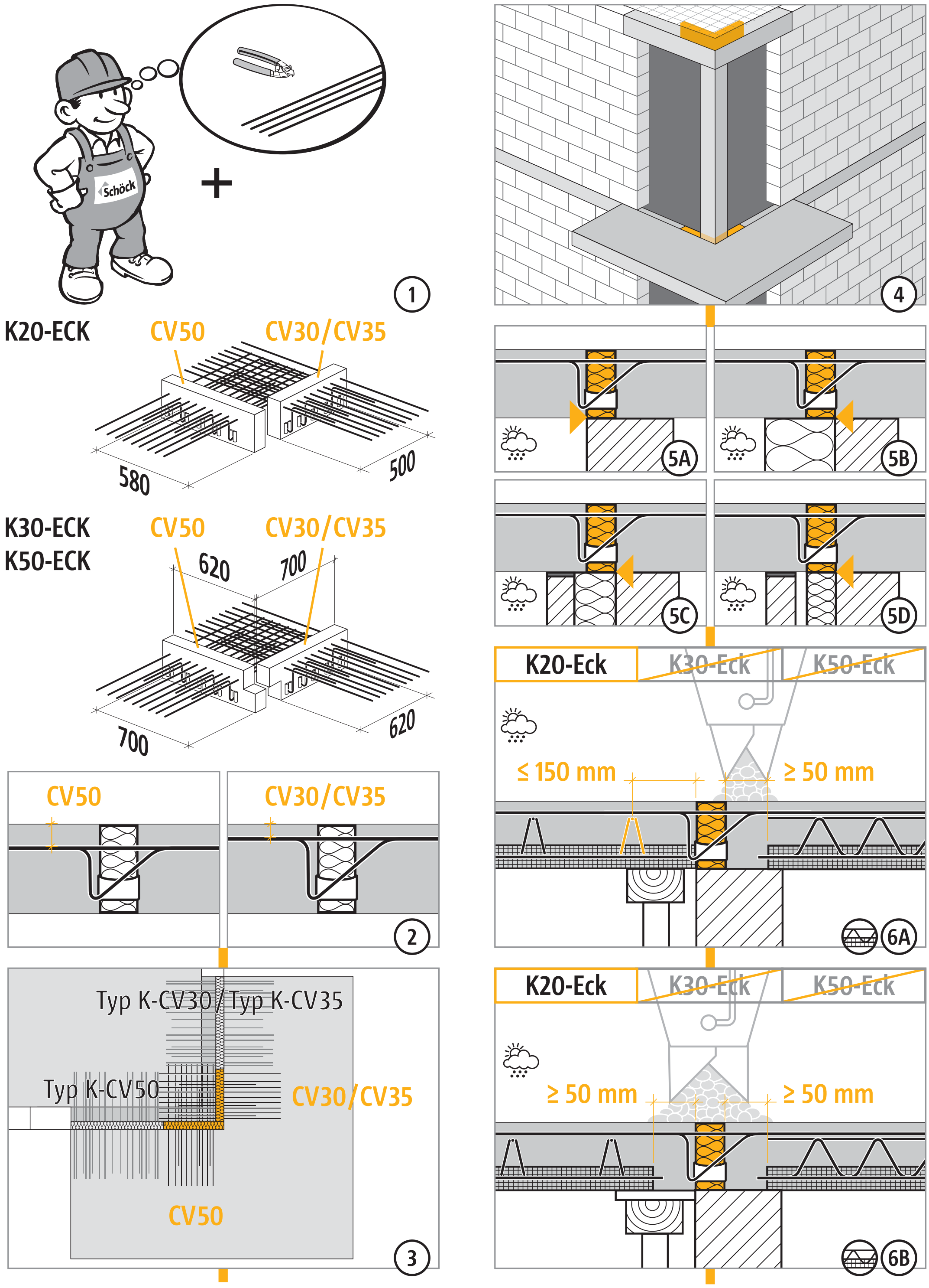
Plan view: Schöck Isokorb® type K50-corner-CV35



Lap slice design for on-site reinforcement (upper layer in the area of the Schöck Isokorb® type K50-corner-CV35)

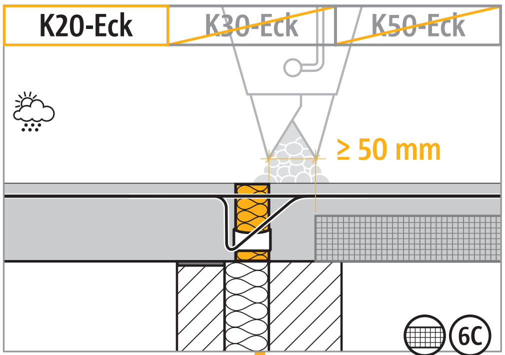
Schöck Isokorb® type K-corner

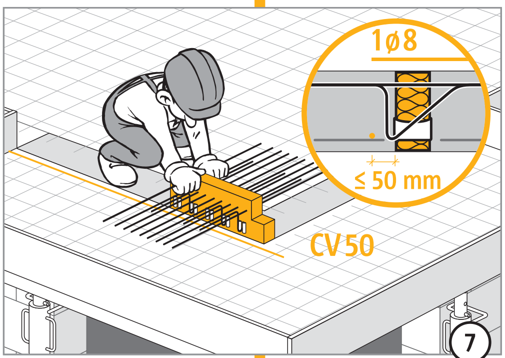
Method statement

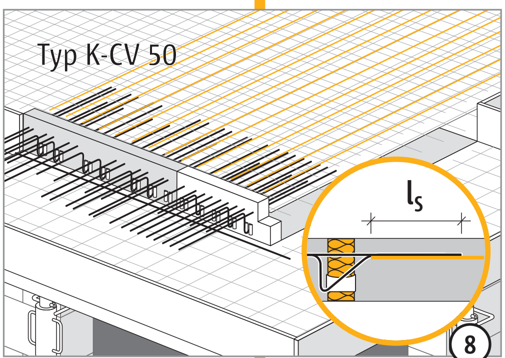


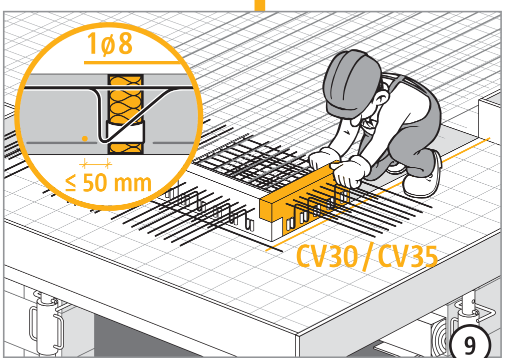
Schöck Isokorb® type K-corner

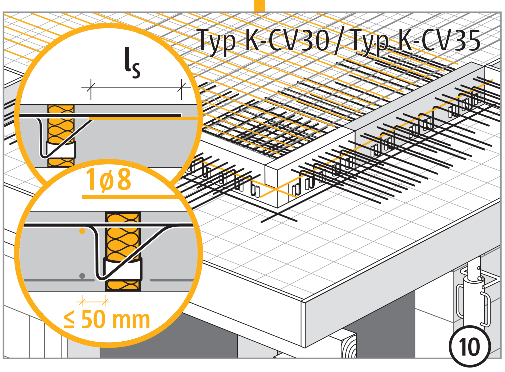
Method statement/Notes

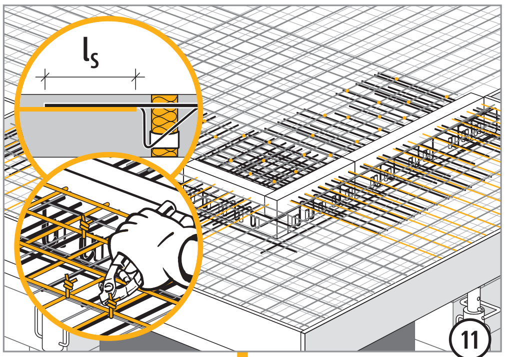












Notes

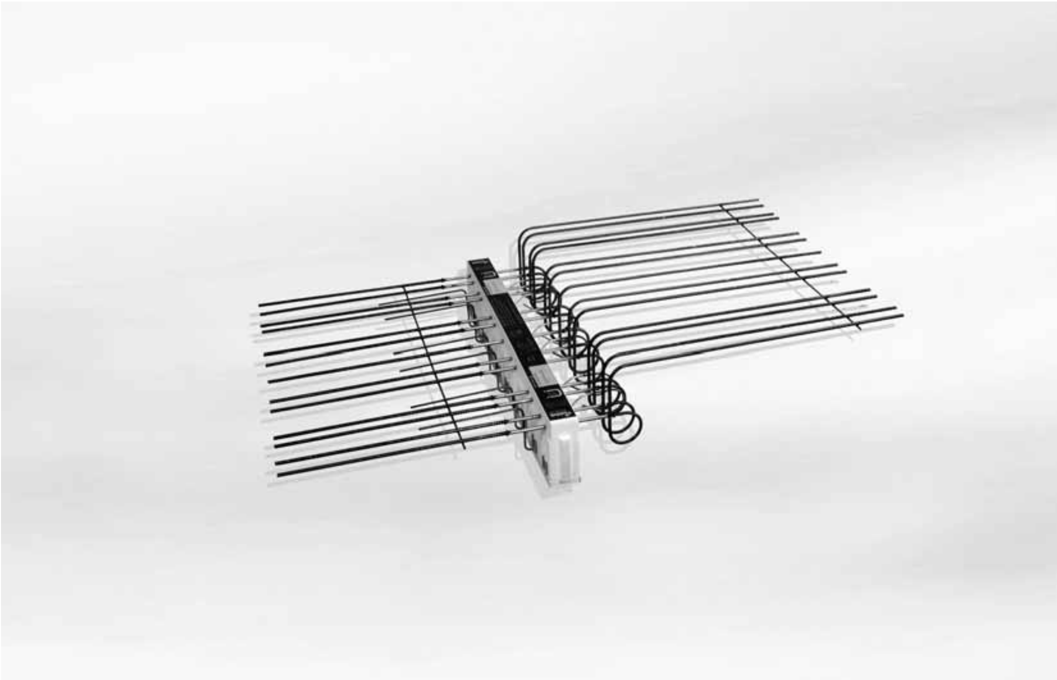
- Concrete strength class for outside components at least C32/40 (see page 30).
- Reinforcement joints according to the information provided by the structural design engineer.
- In order to secure the position of the Schöck Isokorb® during concreting, it is important that both sides are evenly filled and compacted.
- Precamber of the balcony slab and concrete cover in accordance with the information provided by the structural design engineer or the construction management.
- Refer to page 50 for details of the maximum expansion joint spacing.
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd,\,max}$, whereby $V_{Rd,\,max}$ should be determined according to BS EN 1992-1-1, equation (6.9), for $\theta = 45°$ and $\alpha = 90°$.

Schöck Isokorb®
Check list

- [ ] Have the member forces on the Isokorb® connection been determined at the design level?
- [ ] Was the cantilevered system length used in the process (member forcecs taken in relation to the middle of internal support)?
- [ ] Have the concrete cover and the appropriate concrete grade been taken into consideration according to the building regulations (see page 30)
- [ ] In case of precast planks will be used, is sufficient bond action between reinforced structural screed and precast planks guaranteed?
- [ ] Have the maximum permitted distances between expansion joints (= expansion joint spacing) been taken into account?
- [ ] Has the required lap slice reinforcement been designed?
- [ ] Do the calculations of the deformation of the overall structure take into account the additional deflection due to the Schöck Isokorb®?
- [ ] Has the drainage direction been taken into account in the resulting precamber specification of the balcony framework?
- [ ] Has the relevant bearing limit of the slab been checked for V_{Rd}?
- [ ] In case of corner a balcony, have the minimum slab thickness (≥ 180 mm) and the required 2nd layer (CV50) been taken into account?
- [ ] Have the fire safety requirements been clarified, and are they reflected in the chosen type designation (-F90)?
- [ ] In the case of F90 elements, has the increased minimum slab thickness been taken into account (type Q, type V)?

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

HTE MODULE



Schöck Isokorb® type K60-HV15-CV35

Contents

Schöck Isokorb® type K-HV

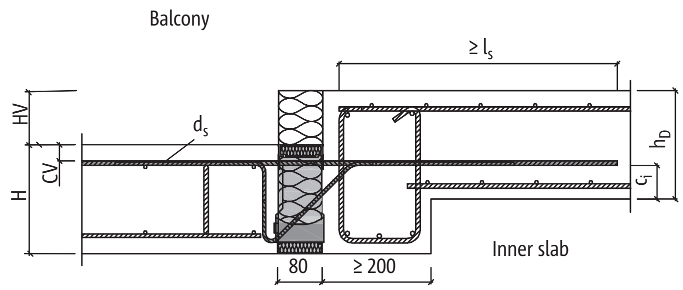
Connection to a step down balcony

Standard element Schöck Isokorb® type K-CV35

Condition: $HV \leq h_D - CV - d_s - c_i$

With:
- HV = downstand
- h_D = inner slab thickness
- CV = external concrete cover
- d_s = diameter of the Isokorb® tension rod
- c_i = internal concrete cover
- H = height of Isokorb®
- l_s = lap length

Example: Schöck Isokorb® type K50-CV35
h_D = 180 mm, CV = 35 mm, d_s = 8 mm,
c_i = 30 mm
max HV = 180 – 35 – 8 – 30 = 107 mm



If precast planks are installed on the inner slab side then the precast plank thickness + d_s should be used for c_i.

Schöck Isokorb® type K-CV35 (standard element)

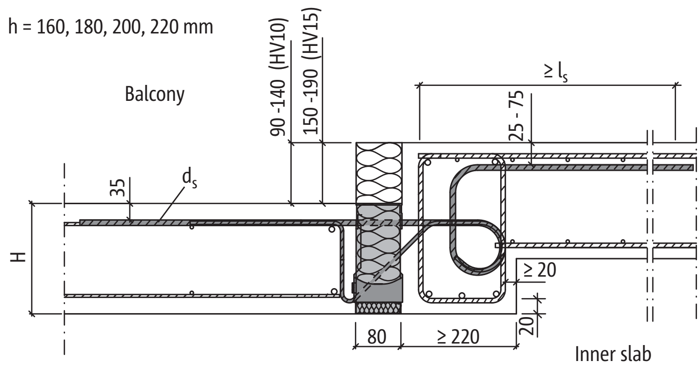
- Link reinforcement required for deflection of tensile forces on the inner slab side (upper element length l_s). Calculation of the link reinforcement for cantilever moment and transverse force of the balcony slab.
- Recommendation: Inner slab joist width ≥ 200 mm
- Lap splice design on the balcony side to be implemented in accordance with page 44.
- Information about deflection - see pages 47.
- Refer to pages 36 - 42 for the calculation table.

Downstand element Schöck Isokorb® type K-HV-CV35

If the condition $HV \leq h_D - CV - d_s - c_i$ is not met, then the connection can be implemented with the

Schöck Isokorb® types **K-HV10-CV35 for a vertical offset of 90 mm to 140 mm or**
K-HV15-CV35 for a vertical offset of 150 mm to 190 mm

Downstand beam width at least 220 mm



Schöck Isokorb® type K-HV-CV35

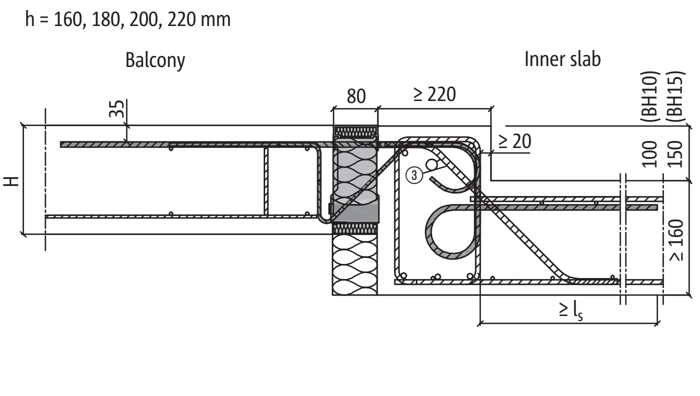
- Calculation of the link reinforcement for the cantilever moment and the shear force of the balcony slab.
- The lengths of the Schöck Isokorb® tension rods correspond to the required lap length l_s (acc. to EN 1992-1).
- Reinforcement of the connections to comply with page 67.
- The required transverse reinforcement in the overlapping area is to be calculated and verified in accordance with EN 1992-1, 8.7.2.
- Information about deflection and calculation table - see pages 65 - 66.

Schöck Isokorb® type K-BH
Connection to a step up balcony

Upstand element Schöck Isokorb® type K-BH-CV35

Schöck Isokorb® types **K-BH10-CV35**
K-BH15-CV35

Upstand beam width at least 220 mm



Schöck Isokorb® type K-BH-CV35

- Calculation of the link reinforcement for the cantilever moment and the shear force of the balcony slab.
- The lengths of the Schöck Isokorb® tension rods correspond to the required lap length l_s (acc. to EN 1992-1).
- Reinforcement of the connections to comply with page 68.
- The required transverse reinforcement in the overlapping area is to be calculated and verified in accordance with EN 1992-1, 8.7.2.
- Non-structural inclined reinforcement A_{ss} (item ④) - see page 68.
- Information about deflection and capacity table - see pages 65 - 66.

Installation information

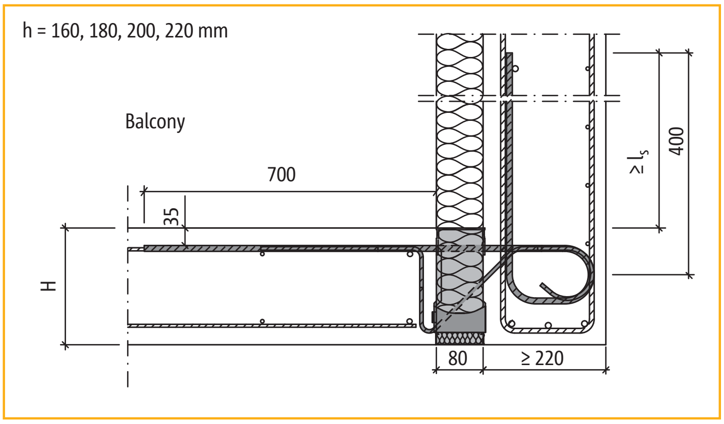
In the case of component geometries according to pages 62 and 63, it may be necessary to install the Schöck Isokorb® prior to installation of the inner slab joist reinforcement or the suspended beam reinforcement.

Schöck Isokorb® type K-WO and type K-WU

Connection to reinforced concrete walls

Connection with Schöck Isokorb® type K-WO-CV35 (rebars bent upwards)

Wall thickness minimum 220 mm

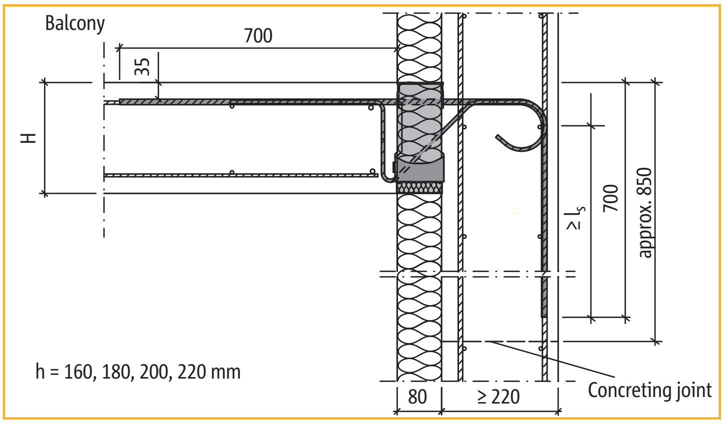


Schöck Isokorb® type K-WO-CV35

- The lengths of the Schöck Isokorb® tension rods correspond to the required lap length l_s (acc. to EN 1992-1).
- Lap splice design on the balcony side to be implemented in accordance with page 44.
- The required transverse reinforcement in the overlapping area is to be calculated and verified in accordance with EN 1992-1, 8.7.2.
- Elements for wall thicknesses < 220 mm available on request.
- Refer to page 65 for the capacity table.

Connection with Schöck Isokorb® type K-WU-CV35 (rebars bent downwards)

Wall thickness minimum 220 mm



Schöck Isokorb® type K-WU-CV35

- The lengths of the Schöck Isokorb® tension rods correspond to the required lap length l_s (acc. to EN 1992-1).
- Lap splice reinforcement on the balcony side to be implemented in accordance with page 44.
- The required transverse reinforcement in the overlapping area is to be calculated and verified in accordance with EN 1992-1, 8.7.2.
- Elements for wall thicknesses < 220 mm available on request.
- Refer to page 65 for the capacity table.

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

Product description/Capacity tables/Notes

Schöck Isokorb® type	K20-HV10/15-CV35 K20-BH10/15-CV35 K20-WO/WU-CV35	K30-HV10/15-CV35 K30-BH10/15-CV35 K30-WO/WU-CV35	K50-HV10/15-CV35 K50-BH10/15-CV35 K50-WO/WU-CV35	K60-HV10/15-CV35 K60-BH10/15-CV35 K60-WO/WU-CV35
Element length [m]	1.00	1.00	1.00	1.00
Tension rods	5 ø 10	7 ø 10	10 ø 10	13 ø 10
Shear force rods	4 ø 6	6 ø 6	6 ø 6	6 ø 6
Pressure bearings [qty.]	5	7	10	16
Special links	–	–	–	4
On-site additional reinforcement at inner slab side with a load of 100 % of the rated moment[1]				
item ①: U-bar	T8	T8	T8	T8
item ②: Link[2]	req a_s = T10@100 mm	req a_s = T12@100 mm	req a_s = T12@75 mm	req a_s = T12@60 mm
item ③: Rebars/mesh	req a_s = 393 mm²/m	req a_s = 550 mm²/m	req a_s = 785 mm²/m	req a_s = 1021 mm²/m

Concrete strength ≥ C25/30
Concrete cover CV 35

K20-HV10-CV35-... K20-BH10-CV35-... K20-WO-CV35-... / K20-HV15-CV35-... K20-BH15-CV35-... K20-WU-CV35-...			
Height of Isokorb® H [mm]	Internal forces m_{Rd} [kNm/m]	Internal forces v_{Rd} [kN/m]	Precamber factor tan α[3] [–]
160	−14.0	+28.0	1.0
180	−17.4	+28.0	0.8
200	−20.8	+28.0	0.7
220	−24.2	+28.0	0.6

K30-HV10-CV35-... K30-BH10-CV35-... K30-WO-CV35-... / K30-HV15-CV35-... K30-BH15-CV35-... K30-WU-CV35-...			
Height of Isokorb® H [mm]	Internal forces m_{Rd} [kNm/m]	Internal forces v_{Rd} [kN/m]	Precamber factor tan α[3] [–]
160	−19.6	+42.0	1.0
180	−24.4	+42.0	0.8
200	−29.2	+42.0	0.7
220	−33.9	+42.0	0.6

K50-HV10-CV35-... K50-BH10-CV35-... K50-WO-CV35-... / K50-HV15-CV35-... K50-BH15-CV35-... K50-WU-CV35-...			
Height of Isokorb® H [mm]	Internal forces m_{Rd} [kNm/m]	Internal forces v_{Rd} [kN/m]	Precamber factor tan α[3] [–]
160	−28.0	+42.0	1.0
180	−34.8	+42.0	0.8
200	−41.7	+42.0	0.7
220	−48.5	+42.0	0.6

K60-HV10-CV35-... K60-BH10-CV35-... K60-WO-CV35-... / K60-HV15-CV35-... K60-BH15-CV35-... K60-WU-CV35-...			
Height of Isokorb® H [mm]	Internal forces m_{Rd} [kNm/m]	Internal forces v_{Rd} [kN/m]	Precamber factor tan α[3] [–]
160	−36.4	+42.0	1.0
180	−45.3	+42.0	0.8
200	−54.2	+42.0	0.7
220	−63.0	+42.0	0.6

On request: Concrete cover CV30 and CV50

Notes

- Concrete strength class for outside components at least C32/40 (see page 32).
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd,\,max}$, whereby $V_{Rd,\,max}$ is to be determined in accordance with BS EN 1992-1-1, equation (6.9), for θ = 45 ° and α = 90 °.

[1] Lap splice reinforcement at balcony side in accordance with the structural design engineer's specifications or in accordance with page 44.
[2] Item ②: Link only required for K-HV types and K-BH types.
[3] Deflection factor to be applied in accordance with page 66.

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

Deflection/Example calculation/Notes

K-HV
K-BH
K-WO
K-WU

Reinforced concrete-to-reinforced concrete

Deflection

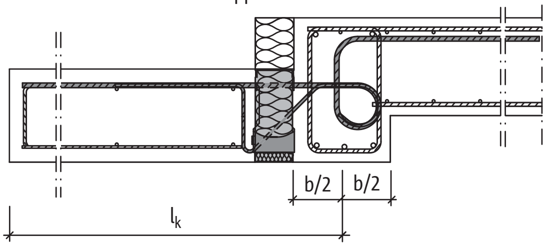
The deflection values shown in the calculation table (page 65) result solely from the deformation of the Schöck Isokorb® under 100 % exploitation of the steel stress of f_{yd} = 435 N/mm². The final up-lift of the balcony slab formwork results from the calculation according to BS 8500 or EC 2, plus the up-lift due to the Schöck Isokorb®.

Deflection (p) due to Schöck Isokorb®

p = [table value x l_k x (m_{pd} /m_{Rd})] x 10 [mm]

l_k	Length of projection [m]
m_{pd}	Appropriate bending moment for calculation of the deflection p due to Schöck Isokorb®. The load combination to be applied here can be determined by the structural analysis engineer.
m_{Rd}	Maximum rated moment of the Schöck Isokorb® type K (see page 65).

Member forces to be taken in relation to the middle of the internal support.



Example calculation for Schöck Isokorb® according to DIN 1045-1:

Choice: Concrete grade of the balcony slab: C32/40 (from exposure class XC4)
Concrete grade of the inner slab: C25/30 (critical for the calculations)
Concrete cover: CV = 35 mm
(installation dimension for the Isokorb® tension rods)

Length of projection	l_k	= 1.9 m
Concrete slab thickness	h	= 180 mm

Load assumptions	Balcony slab and finish	g	= 5.7 kN/m²
	Edge load (balustrade)	g_R	= 1.5 kN/m
	Live load	q	= 4.0 kN/m²

$m_{Ed} = -[(\gamma_G \times g + \gamma_Q \times q) \times l_k^2/2 + \gamma_G \times g_R \times l_k]$
$m_{Ed} = -[(1.35 \times 5.7 + 1.5 \times 4.0) \times 1.9^2/2 + 1.35 \times 1.5 \times 1.9]$
$= -28.6$ kNm/m
$v_{Ed} = (\gamma_G \times g + \gamma_q \times q) \times l_k + \gamma_G \times g_R$
$v_{Ed} = (1.35 \times 5.7 + 1.5 \times 4.0) \times 1.9 + 1.35 \times 1.5 = +28.1$ kN/m

Choice: Schöck Isokorb® type K50-HV10-CV35-H180

m_{Rd}	= –34.8 kNm/m	(see page 65) > m_{Ed}
v_{Rd}	= +42.0 kN/m	(see page 65) > v_{Ed}
tan α	= 0.8	(see page 65)

Chosen load combination for deflection due to Schöck Isokorb®: g + q/2

$m_{pd} = -[(\gamma_G \times g + \gamma_Q \times q/2) \times l_k^2/2 + \gamma_G \times g_R \times l_k]$
$m_{pd} = -[(1.35 \times 5.7 + 1.5 \times 4.0/2) \times 1.9^2/2 + 1.35 \times 1.5 \times 1.9]$
$= -23.2$ kNm/m

p = [tan α x l_k x (m_{pd}/ m_{Rd})] x 10 [mm]

p = [0.8 x 1.9 x (23.2/34.8)] x 10 = 10 mm

Notes

- In the case of a combination of different concrete grades (e.g. balcony C32/40, inner slab C25/30), the weaker concrete is critical in terms of the Isokorb® calculations.
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd, max}$, whereby $V_{Rd, max}$ should be determined according to BS EN 1992-1-1, equation (6.9), for θ = 45 ° and α = 90 °.

For the limitation of flexural slenderness, we advise the following maximum projection lengths max l_k [m]:

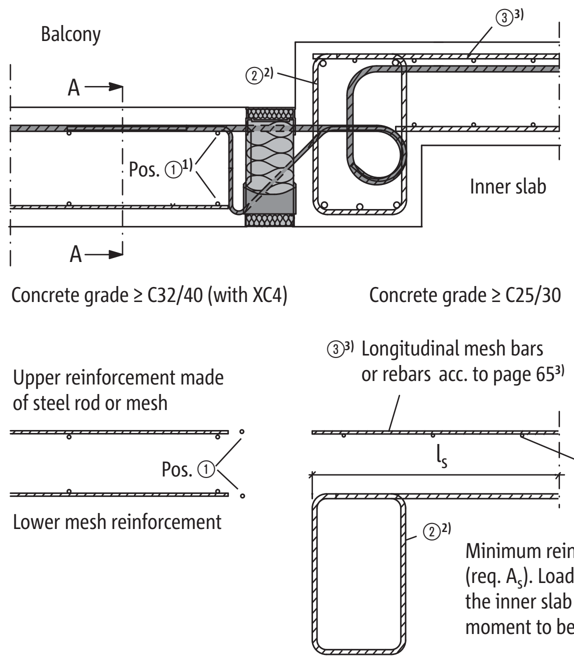
	Height of Schöck Isokorb® H [mm]				
Concrete cover	160	180	200	220	240
CV = 30 mm	1.75	2.00	2.25	2.50	2.70
CV = 35 mm	1.65	1.90	2.10	2.40	2.60
CV = 50 mm	1.45	1.70	1.90	2.10	2.40

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

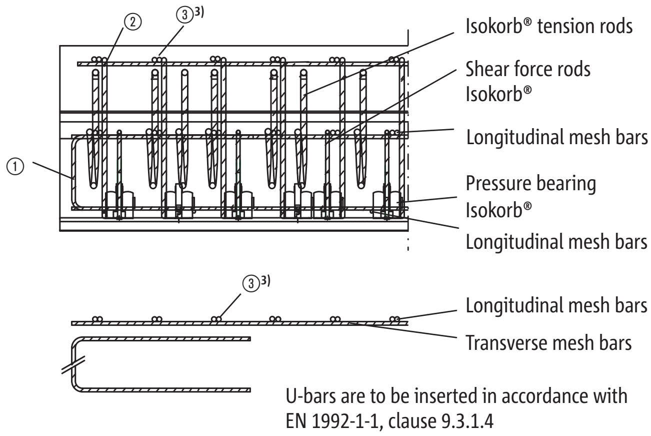
Lap splice design

On-site lap splice reinforcement for Schöck Isokorb® type K-HV

Cross-section:



Section A-A:

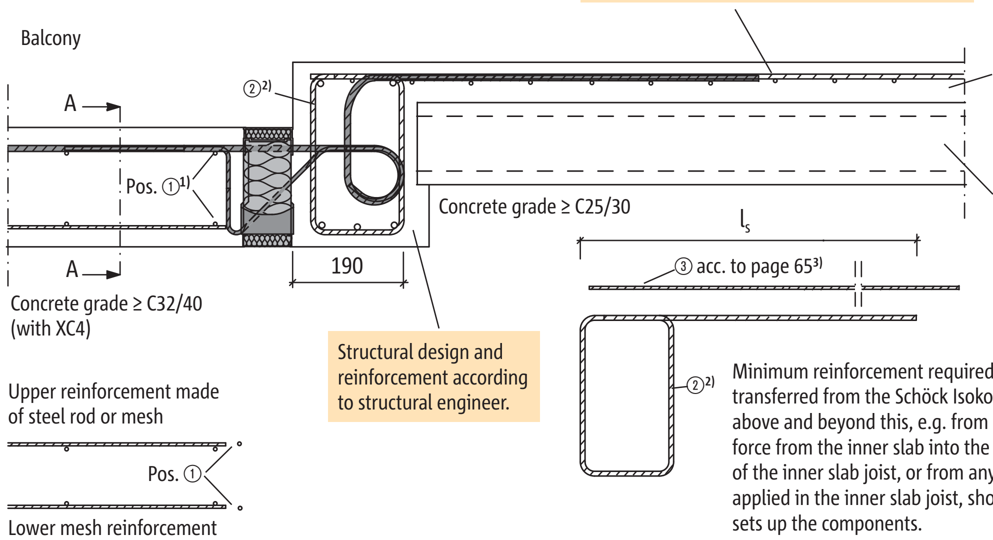


Minimum reinforcement required to ensure that the forces are transferred from the Schöck Isokorb® (req. A_s). Loads occurring above and beyond this, e.g. from a fixing moment/transverse force from the inner slab into the inner slab joist, from the span of the inner slab joist, or from any torsional moment to be applied in the inner slab joist, should be verified by whoever sets up the components.

– Additional lap splice reinforcement - see page 65

On-site lap splice reinforcement for Schöck Isokorb® type K-HV in conjunction with hollowcore slab

Cross-section:



Minimum reinforcement required to ensure that the forces are transferred from the Schöck Isokorb® (req. A_s).Loads occurring above and beyond this, e.g. from a fixing moment/transverse force from the inner slab into the inner slab joist, from the span of the inner slab joist, or from any torsional moment to be applied in the inner slab joist, should be verified by whoever sets up the components.

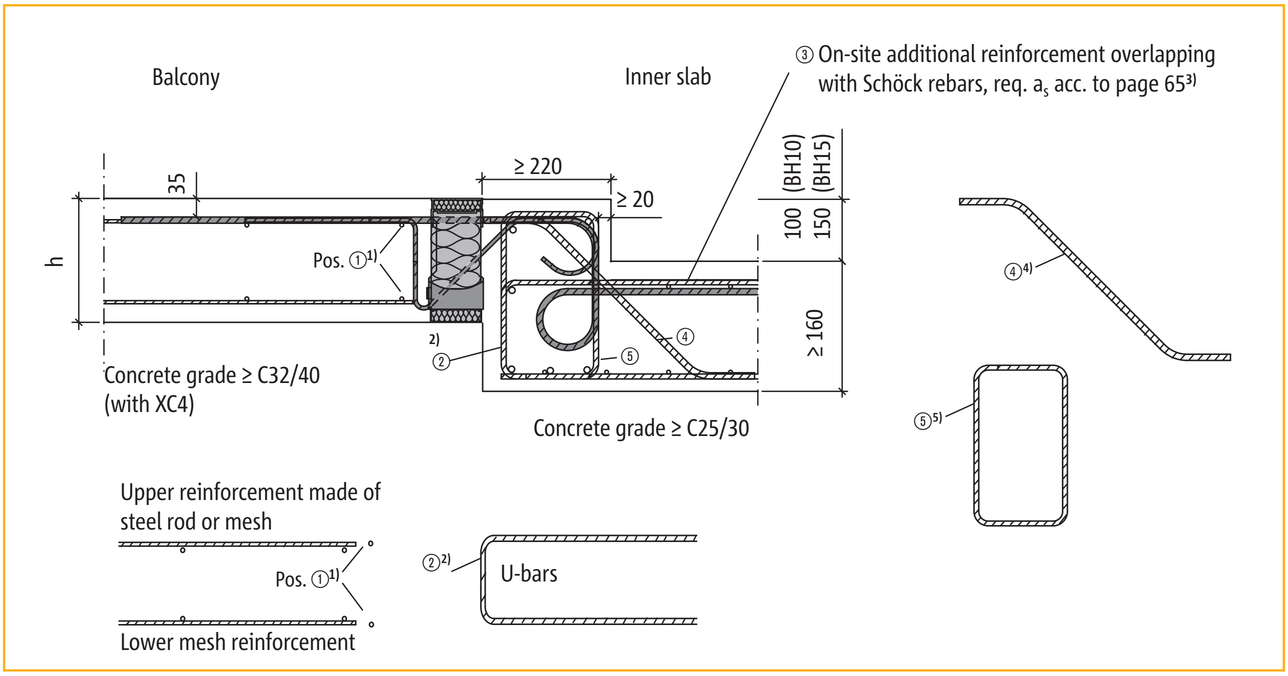
– Additional lap splice reinforcement - see page 65

[1] The last transverse bar of the mesh must be positioned as closely as possible to the pressure bearing. Otherwise T8 mm steel rebars should be fitted there.
[2] Links required in accordance with page 65 or according to structural engineer.
[3] Length of connective rebars item ③ has to be defined by the structural engineer. It depends on the bond action between structural screed and hollowcore units.

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

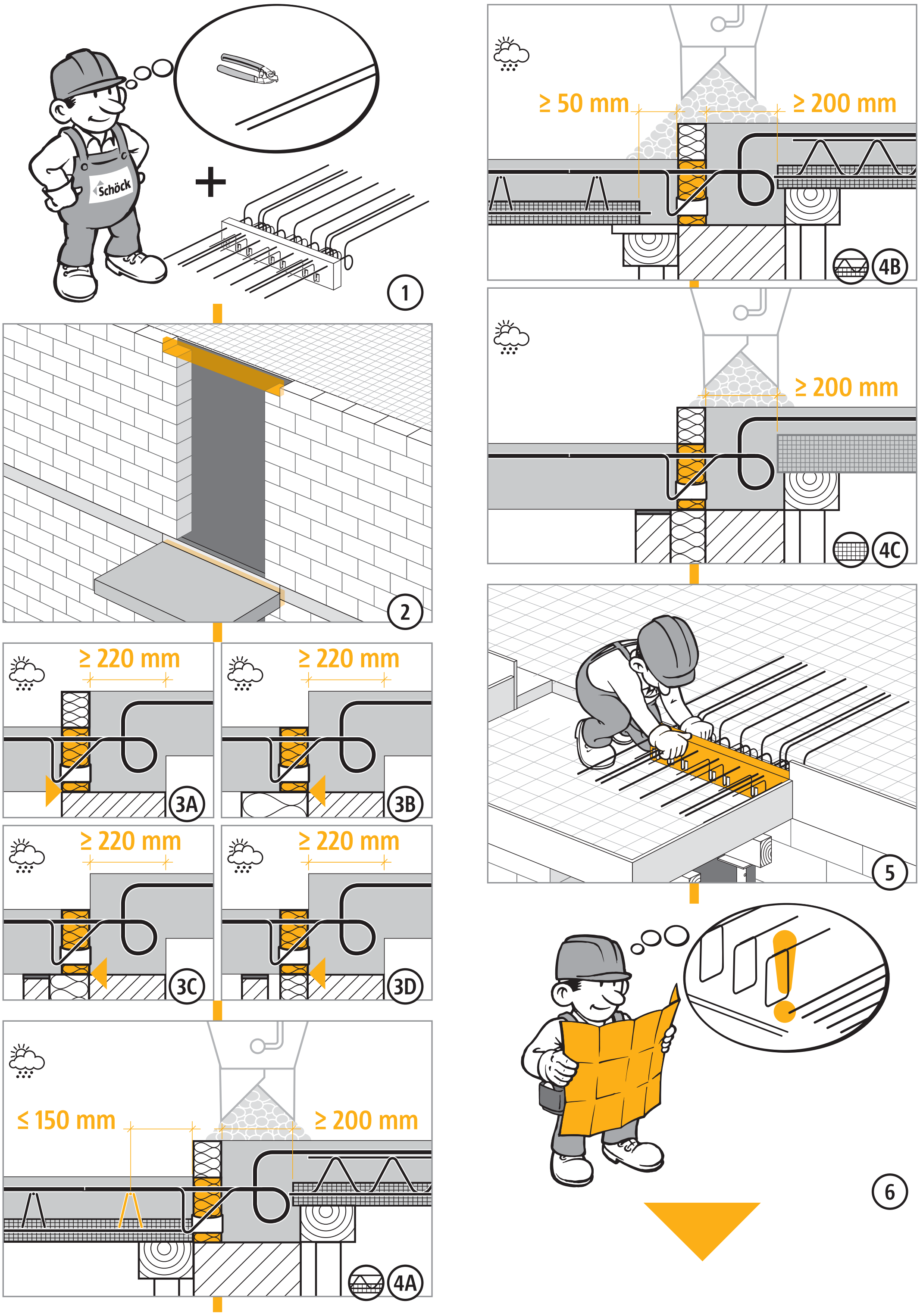
Lap splice design

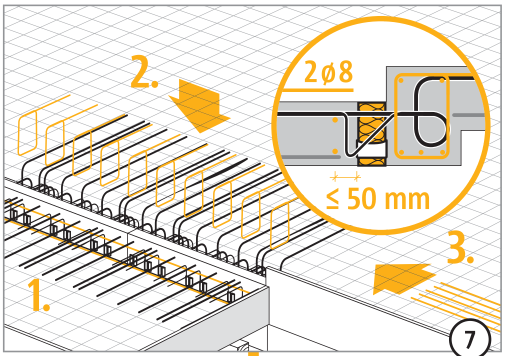
On-site lap splice reinforcement for Schöck Isokorb® type K-BH

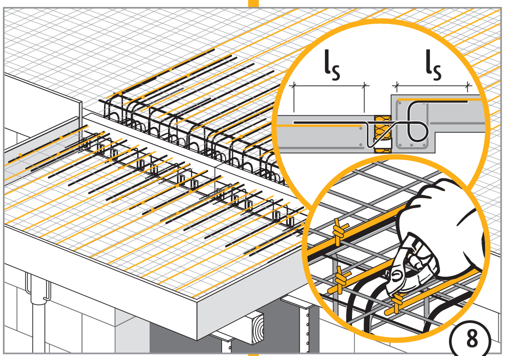


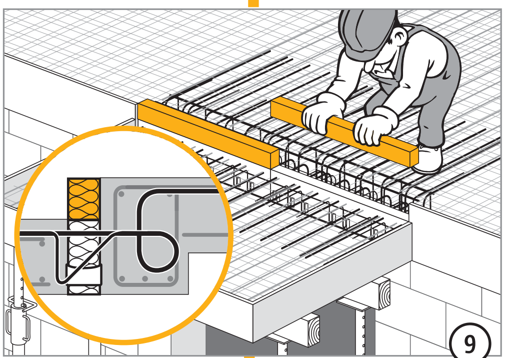
[1] The last transverse bar of the mesh must be positioned as closely as possible to the pressure bearing. Otherwise T8 mm steel rebars should be fitted there.
[2] U-bars/hooks required in accordance with page 65 if the upstand beam width is > 220 mm or if there is no overlap beween the Schöck tension rods and the upper reinforcement of the inner slab.
[3] Length of connective rebars item ③ has to be defined by the structural engineer.
[4] Non-structural inclined reinforcement A_{ss} item ④ according to structural engineer.
[5] Links item ⑤ according to structural engineer.

Method statement




2.
2 ø8
≤ 50 mm
3.
1.
7


l_s
l_s
8

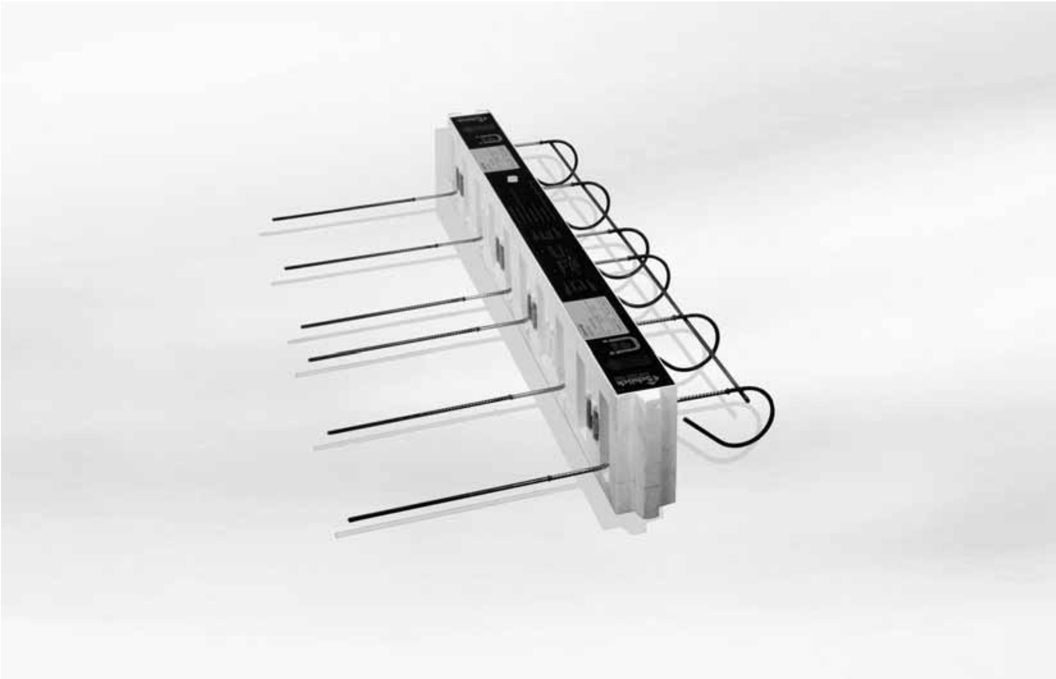

9


Schöck

Schöck Isokorb®
Check list

- [ ] Have the member forces on the Isokorb® connection been determined at the design level?
- [ ] Was the cantilevered system length used in the process (member forces to be taken in relation to the middle of the internal support)?
- [ ] Have the concrete cover and the appropriate concrete grade been taken into consideration according to the building regulations (see page 30)
- [ ] In case of precast planks will be used, is sufficient bond action between reinforced structural screed and precast planks guaranteed?
- [ ] Have the maximum permitted distances between expansion joints (= expansion joint spacing) been taken into account?
- [ ] Has the required on-site lap splice reinforcement been defined?
- [ ] Do the calculations of the deformation of the overall structure take into account the additional deflection due to the Schöck Isokorb®?
- [ ] Has the drainage direction been taken into account in the resulting precamber specification of the balcony framework?
- [ ] Has the relevant bearing limit of the slab been checked for V_{Rd}?
- [ ] In case of corner a balcony, have the minimum slab thickness (≥ 180 mm) and the required 2nd layer (CV50) been taken into account?
- [ ] In the case of a connection to an upstand or downstand beam, or a connection to a wall, is the required component geometry present?
- [ ] Have the fire safety requirements been clarified, and are they reflected in the chosen type designation (-F90)?
- [ ] In the case of F90 elements, has the increased minimum slab thickness been taken into account (type Q, type V)?

Schöck Isokorb® type Q



Schöck Isokorb® type Q30

Q

Reinforced concrete-to-reinforced concrete

Contents

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Schöck Isokorb® type Q

Examples of element arrangements and cross-sections

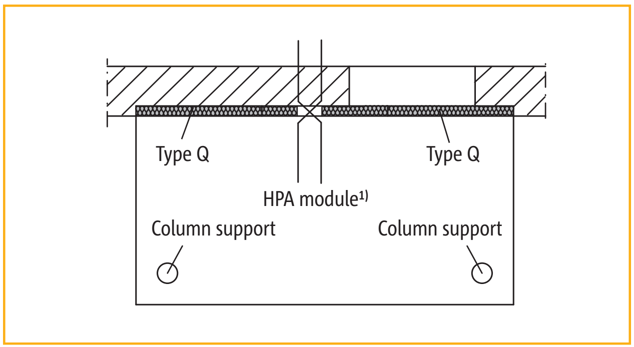


Figure 1: Balcony with column support

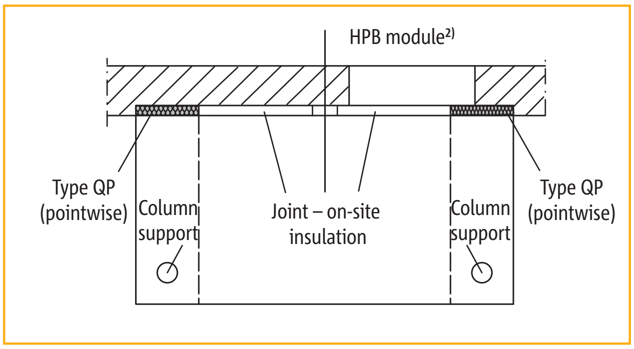


Figure 2: Balcony with column support, intermittently connected

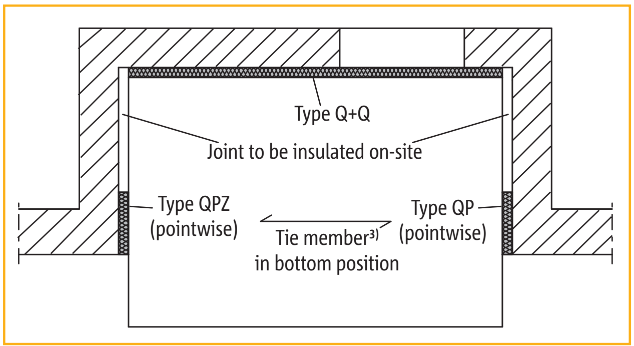


Figure 3: Loggia, mounted on three sides, with tie member3) and shear forces causing lift-up

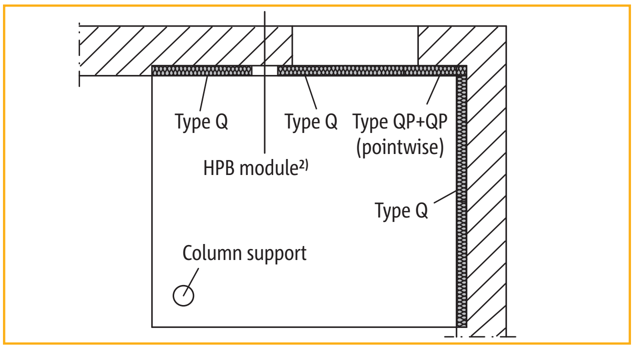


Figure 4: Balcony, supported on two sides, with column support, shear forces causing lift-up

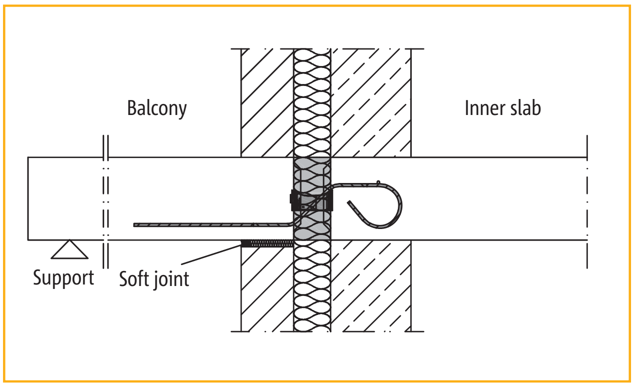


Figure 5: Cavity wall with a balcony at inner slab level

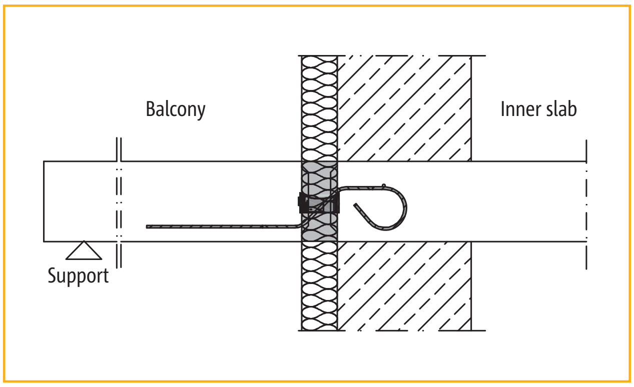


Figure 6: Brickwork with external insulation and a balcony at inner slab level

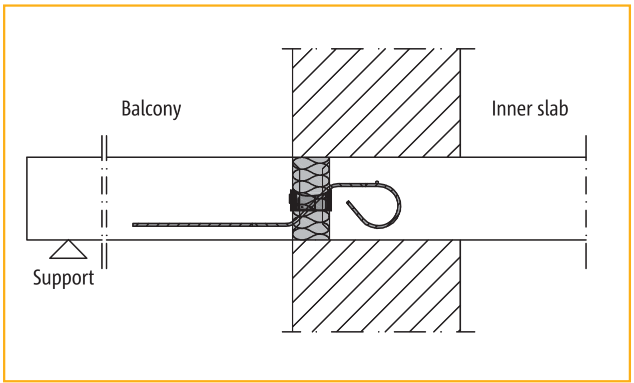


Figure 7: Single-leaf brickwork with a balcony at inner slab level

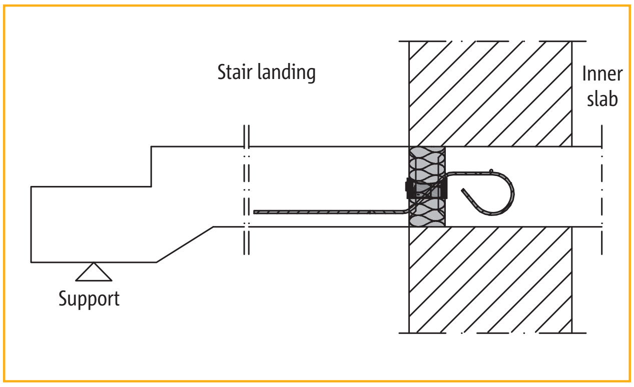


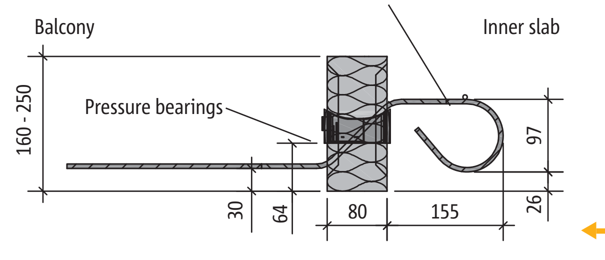
Figure 8: Single-leaf brickwork with stair landing

1) If horizontal forces occur parallel to the external wall, additional Schöck HP modules should be installed (see page 97 - 100).
2) In the case of horizontal tensile forces perpendicular to the external wall which are greater than the present shear forces, additional Schöck HP modules should be installed (see pages 97 - 100).
3) Loggia with tie member - see notes on page 79.

Schöck Isokorb® type Q, QP

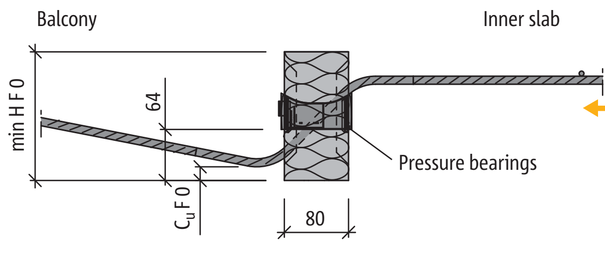
Capacity tables and cross-sections

Shear force rod ø 6 mm: end of rod bent back on itself on inner slab side



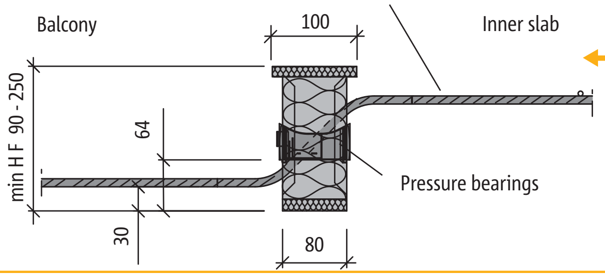
Cross-section: Schöck Isokorb® type Q10 to type Q50

Shear force rod ø 10, 12, 14 mm



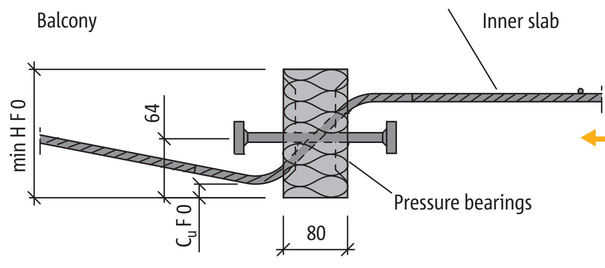
Cross-section: Bent form of shear force rods with ø 10, 12, 14 mm at min H

Shear force rod ø 8... ø 12 mm: Straight rod ends on the inner slab side



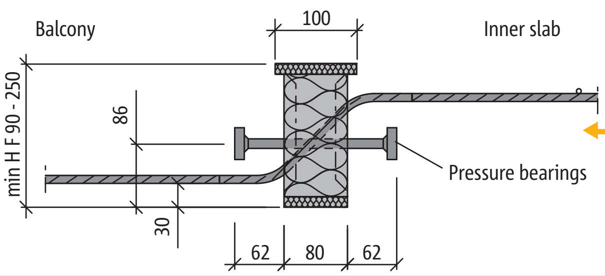
Cross-section: Schöck Isokorb® type Q70, type Q90, type Q110 with min H F 90

Shear force rod ø 8... ø 14 mm: Straight rod ends on the inner slab side



Cross-section: Bent form of shear force rods of type QP with ø 10, 12, 14 mm at min H

Shear force rod ø 8... ø 14 mm: Straight rod ends on the inner slab side



Cross-section: Schöck Isokorb® type QP10 up to type QP90 with min H F 90

Rated shear forces

For the transfer of positive shear forces - continuous bearing

Schöck Isokorb® type	Reinforcement Shear force rod	Reinforcement Pressure bearings	Element length [m]	min H F 0 [mm]	min H F 90 [mm]	C25/30 v_{Rd} [kN/m]
Q10	4 ø 6	4	1.00	160	160	+34.8
Q20	5 ø 6	4	1.00	160	160	+43.5
Q30	6 ø 6	4	1.00	160	160	+52.2
Q40	8 ø 6	4	1.00	160	160	+69.5
Q50	10 ø 6	4	1.00	160	160	+86.9
Q70	6 ø 8	4	1.00	160	160	+92.7
Q80	5 ø 10	4	1.00	160	180	+111.1
Q90	6 ø 10	4	1.00	160	180	+133.3
Q100	5 ø 12	6	1.00	160	190	+173.3
Q110	6 ø 12	6	1.00	160	190	+206.4

Schöck Isokorb® type	c_u 1) [mm] F 0	F 90
Q10 to Q70	30	30
Q90	17	30
Q110	14	30

Minimum concrete cover c_u for continuous bearing

1) for min H

For the transfer of positive shear forces - pointwise bearing

Schöck Isokorb® type	Reinforcement Shear force rod	Reinforcement Pressure bearings	Element length [mm]	min H F 0 [mm]	min H F 90 [mm]	C25/30 V_{Rd} [kN]
QP10-L300	2 ø 8	1 ø 12	300	160	160	+30.9
QP20-L400	3 ø 8	2 ø 12	400	160	160	+46.4
QP30-L500	4 ø 8	2 ø 12	500	160	160	+61.8
QP40-L300	2 ø 10	1 ø 14	300	160	180	+44.4
QP50-L400	3 ø 10	2 ø 12	400	160	180	+66.6
QP60-L300	2 ø 12	2 ø 12	300	160	190	+69.3
QP70-L400	3 ø 12	3 ø 12	400	160	190	+104.0
QP80-L300	2 ø 14	2 ø 14	300	180	200	+83.0
QP90-L400	3 ø 14	3 ø 14	400	180	200	+124.6

Schöck Isokorb® type	c_u 1) [mm] F 0	F 90
QP10-L300	30	30
QP20-L400	30	30
QP30-L500	30	30
QP40-L300	17	30
QP50-L400	17	30
QP60-L300	14	30

Schöck Isokorb® type	c_u 1) [mm] F 0	F 90
QP70	14	30
QP80	11	30
QP90	11	30

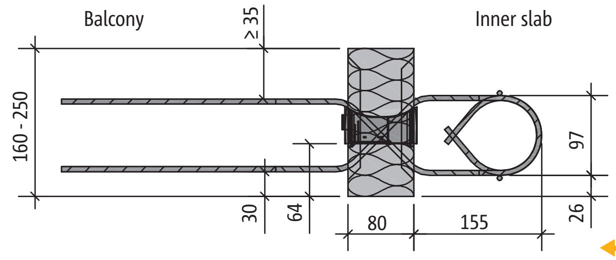
Minimum concrete cover c_u for pointwise bearing

1) for min H

Schöck Isokorb® type Q+Q, QP+QP, QPZ

Capacity tables and cross-sections

Shear force rods ø 6 mm: rod ends bent back on themselves on the inner slab side



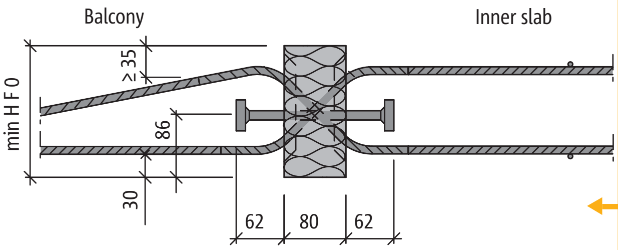
Cross-section: Schöck Isokorb® type Q10+Q10, type Q30+Q30 and type Q50+Q50

Rated shear forces

Schöck Isokorb® for the transfer of positive and negative shear forces for continuous bearing

Schöck Isokorb® type	Reinforcement Shear force rod	Reinforcement Pressure bearings	Element length [m]	min H F 0 [mm]	min H F 90 [mm]	C25/30 V_{Rd} [kN/m]
Q10+Q10	2 x 4 ø 6	4	1.00	160	160	±34.8
Q30+Q30	2 x 6 ø 6	4	1.00	160	160	±52.2
Q50+Q50	2 x 10 ø 6	4	1.00	160	160	±86.9

Shear force rods ø 8 - 12 mm: Straight rod ends on the inner slab side

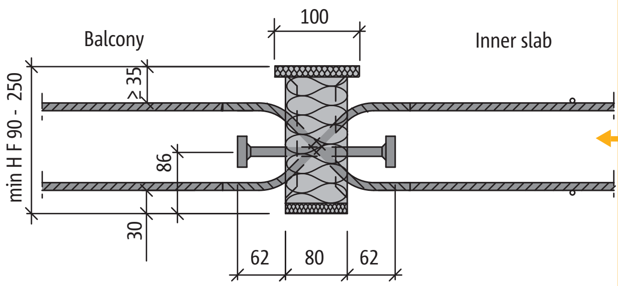


Cross-section: Schöck Isokorb® type QP10+QP10 to QP70+QP70 with min H F 0

Schöck Isokorb® for the transfer of positive and negative shear forces for pointwise bearing

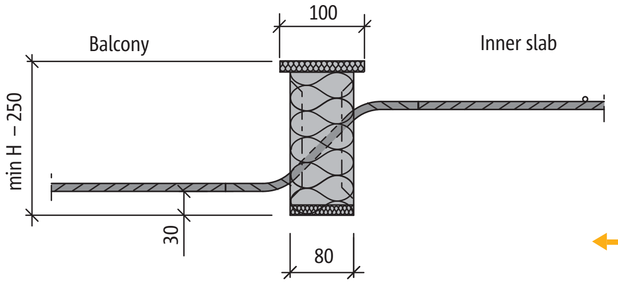
Schöck Isokorb® type	Reinforcement Shear force rod	Reinforcement Pressure bearings	Element length [mm]	min H F 0 [mm]	min H F 90 [mm]	C25/30 V_{Rd} [kN]
QP10+QP10	2 x 2 ø 8	1 ø 12	300	160	170	±30.9
QP40+QP40	2 x 2 ø 10	1 ø 14	300	170	180	±44.4
QP60+QP60	2 x 2 ø 12	2 ø 12	300	180	190	±69.3
QP70+QP70	2 x 3 ø 12	3 ø 12	400	180	190	±104.0

Shear force rods ø 8 - 12 mm: Straight rod ends on the inner slab side



Cross-section: Schöck Isokorb® type QP10+QP10 to QP70+QP70 with min H F 90

Shear force rods ø 8 .... ø 14 mm: Straight rod ends on the inner slab side



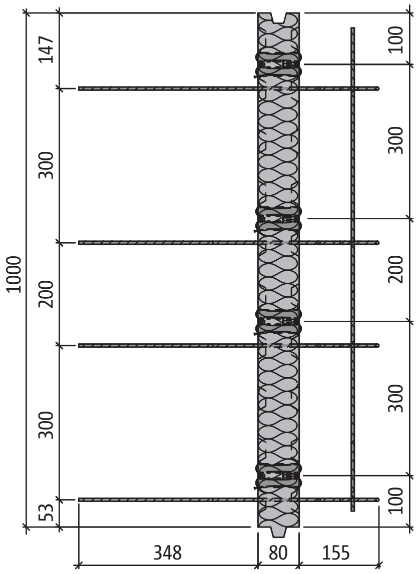
Cross-section: Schöck Isokorb® type QPZ10, type QPZ40, type QPZ60, type QPZ80

Schöck Isokorb® for the transfer of positive shear forces for pointwise bearing and restraint-free connections (see page 79)

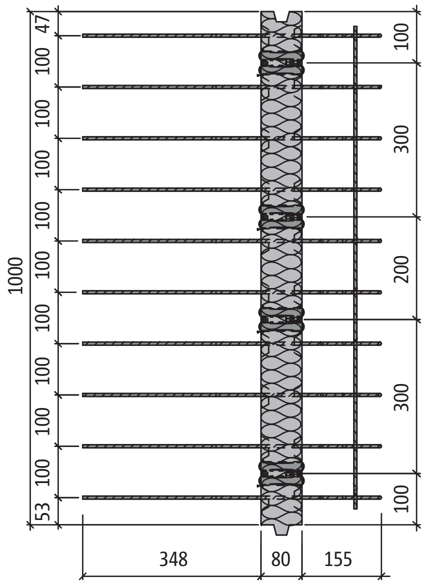
Schöck Isokorb® type	Reinforcement Shear force rod	Reinforcement Pressure bearings	Element length [mm]	min H F 0 [mm]	min H F 90 [mm]	C25/30 V_{Rd} [kN]
QPZ10	2 ø 8	–	300	160	160	+30.9
QPZ40	2 ø 10	–	300	160	180	+44.4
QPZ60	2 ø 12	–	300	160	190	+69.3
QPZ80	2 ø 14	–	300	180	200	+83.0

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

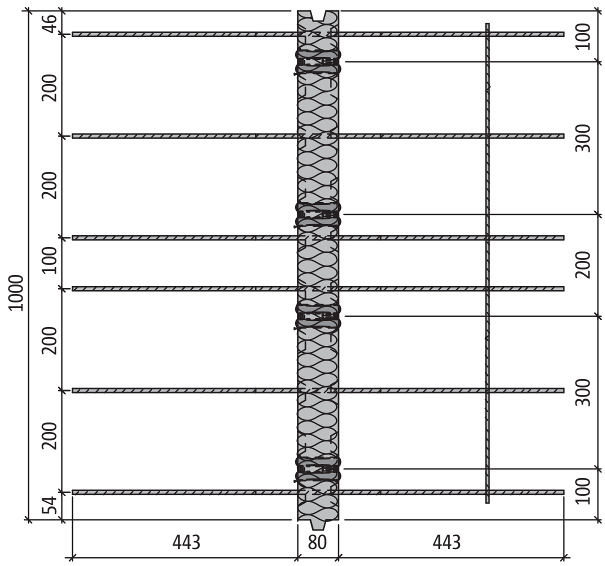
Plan views



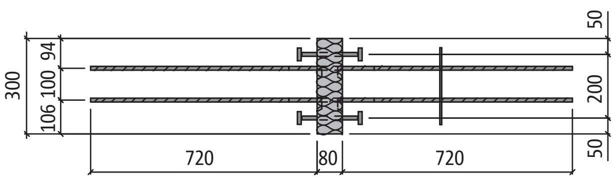
Plan view: Schöck Isokorb® type Q10



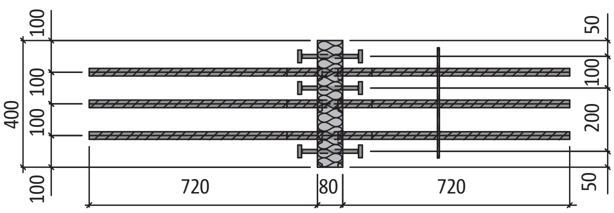
Plan view: Schöck Isokorb® type Q50



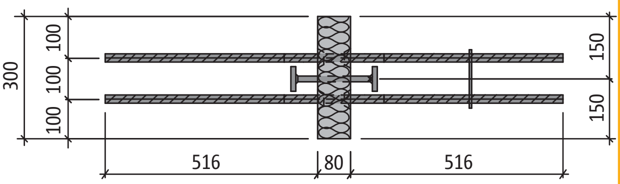
Plan view: Schöck Isokorb® type Q70



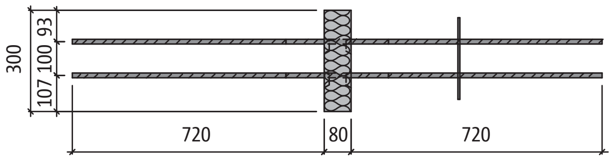
Plan view: Schöck Isokorb® type QP60



Plan view: Schöck Isokorb® type QP70+QP70



Plan view: Schöck Isokorb® type QP40+QP40



Plan view: Schöck Isokorb® type QPZ80 (Z= restraint-free)

Schöck Isokorb® type Q

Examples of application

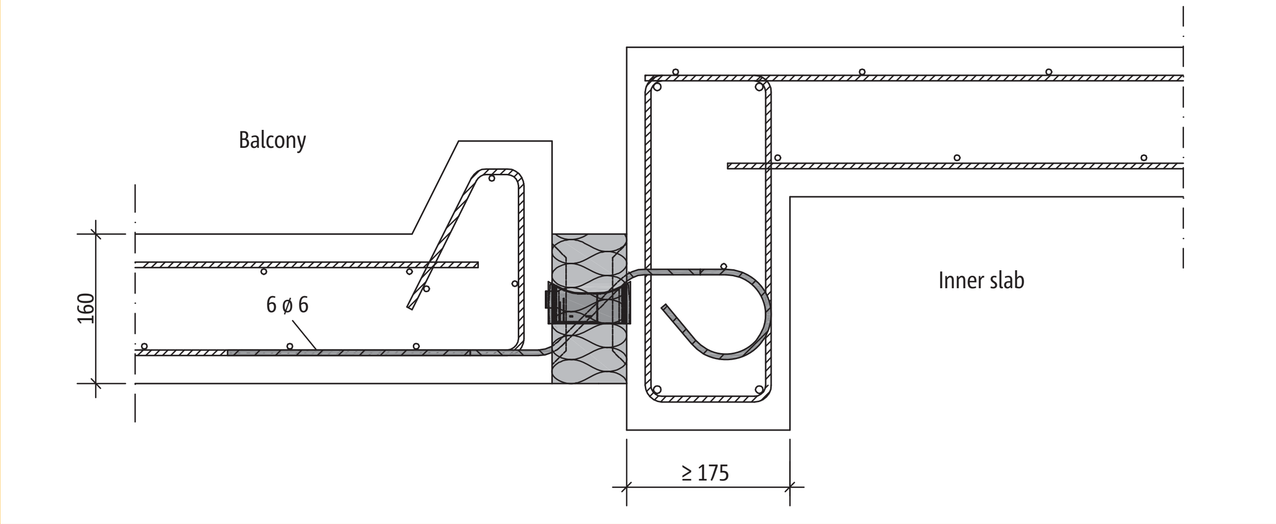


Figure 1: Cross-section of an "prefabricated balcony slab" installation with Schöck Isokorb® Typ Q30-h160

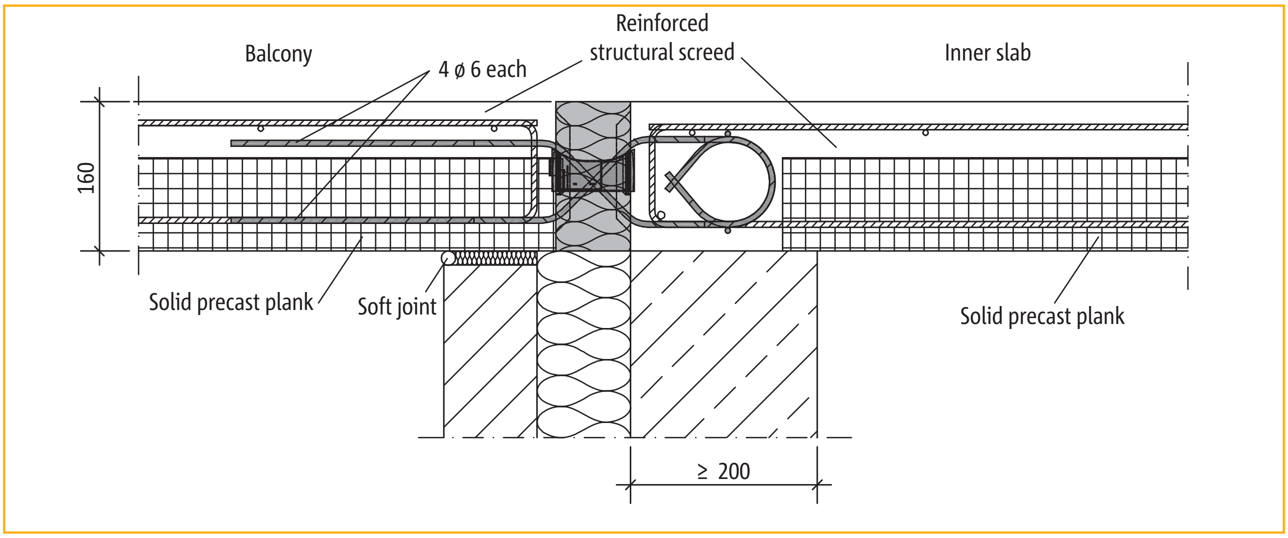


Figure 2: Cross-section of a "semi-precast balcony slab" installation with Schöck Isokorb® Typ Q10+Q10-h160

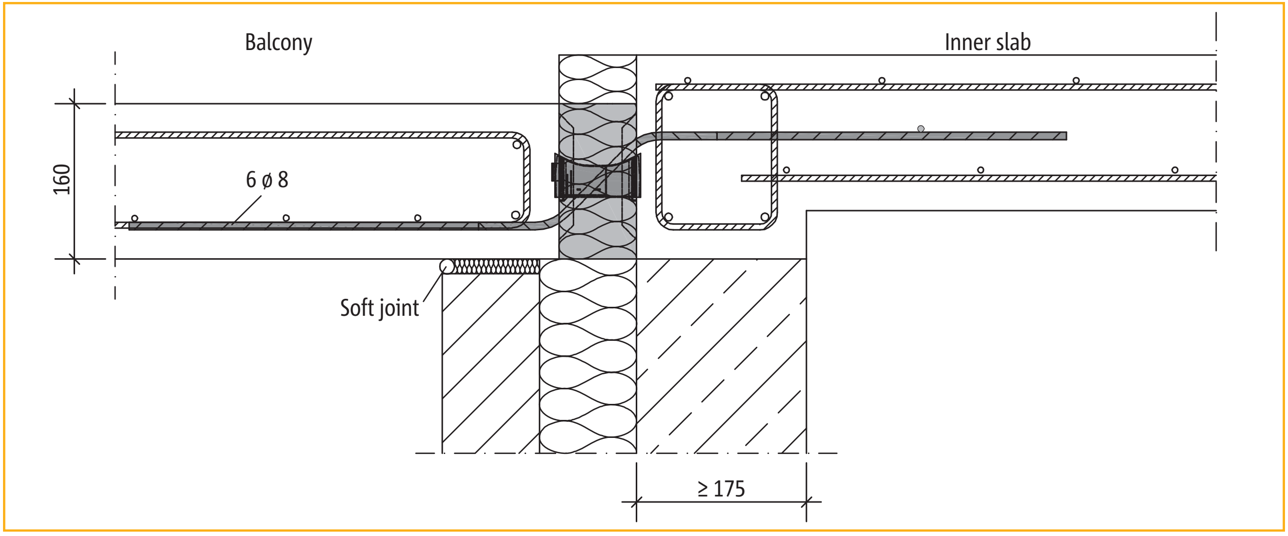
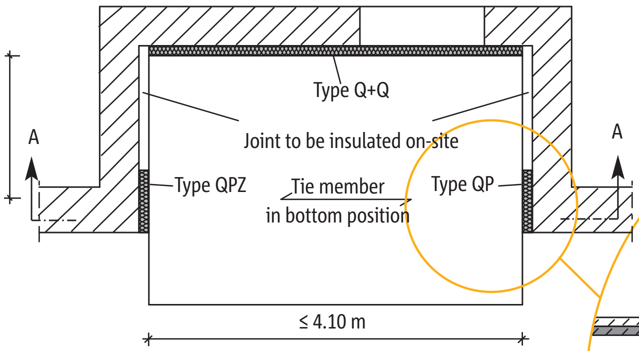
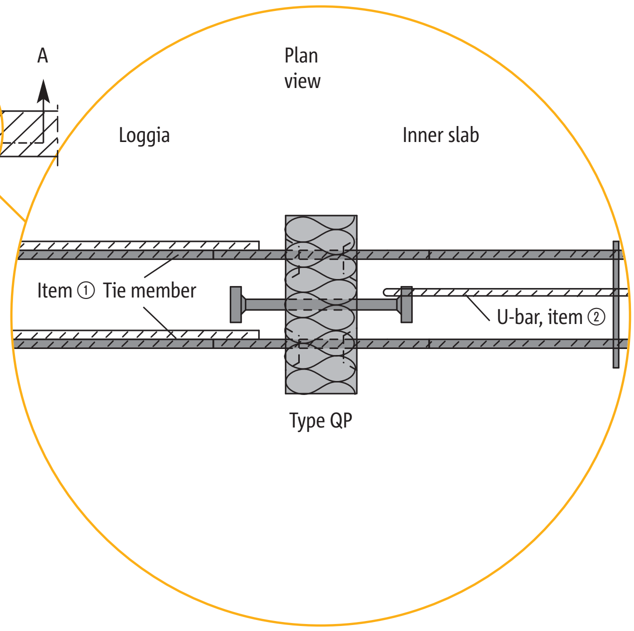


Figure 3: Cross-section of an installation with Schöck Isokorb® type Q70-H160

Schöck Isokorb® type Q

Examples of application

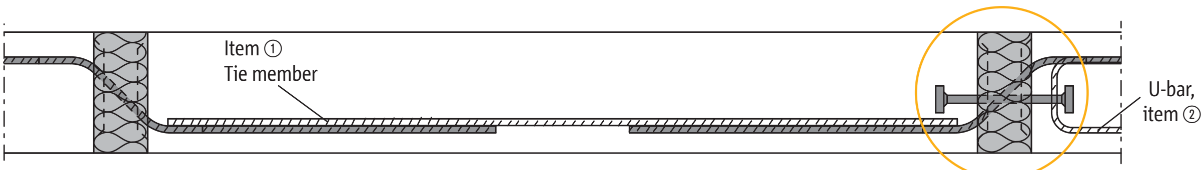


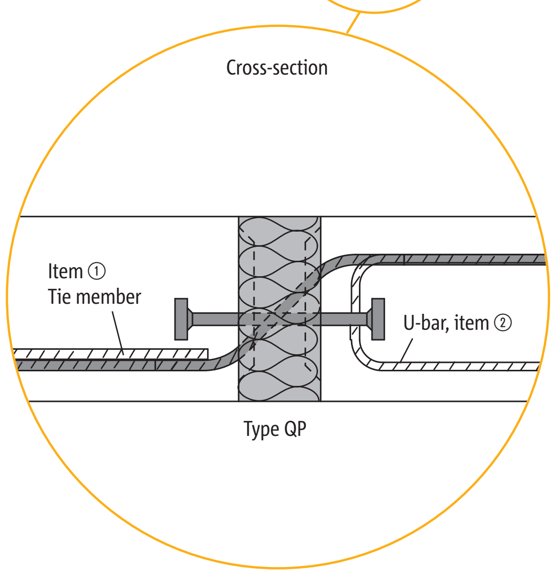


For restraint-free bearing, one type QPZ element without pressure bearing should be positioned on one side. A type QP element with pressure bearing is then required on the opposite side. In order to preserve the balance of forces, a reinforced tie member should be provided between the type QPZ element and the type QP element. This tie member should overlap with the Isokorb® rods which transmit the s hear forces.

Figure 4: Loggia with bearing on three sides and with tie member

- Details on this page only show the requirements for a restraint-free bearing. The in any case required additional on-site connection reinforcement is shown on page 80.





On-site U-bars are used for back anchoring of the tie member on the inner slab side. The U-bars are connected to the pressure bearings (see detailed illustrations).

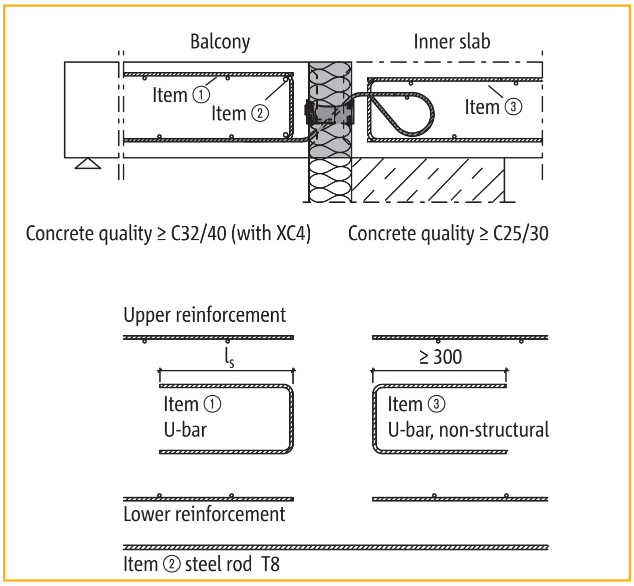
Schöck Isokorb type	Tie member req. A_s ①	U-bar req. A_s ②
QP10 or QPZ10	2 ø 8	1 ø 8
QP40 or QPZ40	2 ø 10	1 ø 10
QP60 or QPZ60	2 ø 12	2 ø 8
QP80 or QPZ80	2 ø 14	2 ø 10

Figure 5: A-A section through the loggia

Schöck Isokorb® type Q

On-site reinforcement

Connection with U-bars



Schöck Isokorb® type	U-bar (item ①) req. a_s [mm²/element]
Q10, Q10+Q10[1]	80
Q20	100
Q30, Q30+Q30[1]	120
Q40	160
Q50, Q50+Q50[1]	200
Q70	213
Q80	255
Q90	306
Q100	398
Q110	474
QP10, QP10+QP10[1], QPZ10[2]	71
QP20	107
QP30	142
QP40, QP40+QP40[1], QPZ40[2]	102
QP50	150
QP60, QP60+QP60[1], QPZ60	150
QP70	225
QP80, QPZ 80[2]	191
QP90	286

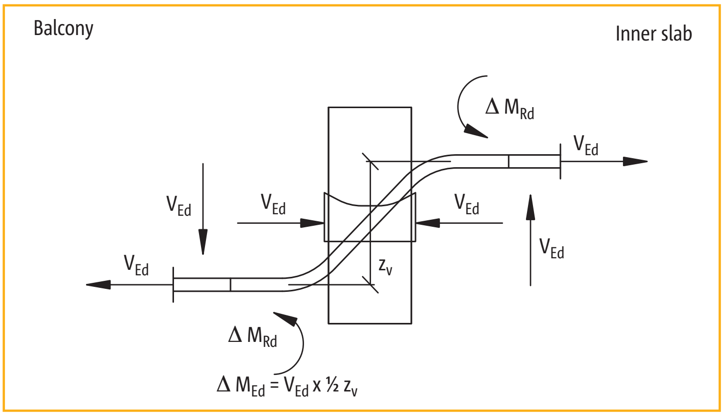
[1] Instead of with item ③, types Q+Q and QP +QP should also be connected with items ① and ② on the inner slab side.
[2] Types QPZ for restraint-free connections (see page 88, figure 3) require a reinforced tie member in the bottom position. The required $A_{s,Tensile}$ should be chosen in accordance with page 79, Figure 5.

Schöck Isokorb® type Q

Moments resulting from excentric connections

Moments from excentric connection

When calculating the connection reinforcement on both sides of the Schöck Isokorb® type Q, moments arising from excentric connections also need to be taken into account additionally. These moments should be added to the moments resulting from the planned load if both values have the same sign.



Schöck Isokorb® type	ΔM_{Rd} [1)] [kNm/element]
Q10, Q10+Q10	3.30
Q20	4.13
Q30, Q30+Q30	4.95
Q40	6.61
Q50, Q50+Q50	8.26
Q70	8.81
Q80	10.55
Q90	12.66
Q100	16.34
Q110	19.61
QP10, QP10+QP10, QPZ10	2.94
QP20	4.40
QP30	5.87
QP40, QP40+QP40, QPZ40	4.22
QP50	6.19
QP60, QP60+QP60, QPZ60	6.19
QP70	9.29
QP80, QPZ80	7.89
QP90	11.83

[1)] with max. z_v = 140 mm

Schöck Isokorb® type Q

Expansion joint spacing/Notes

Expansion joint spacing

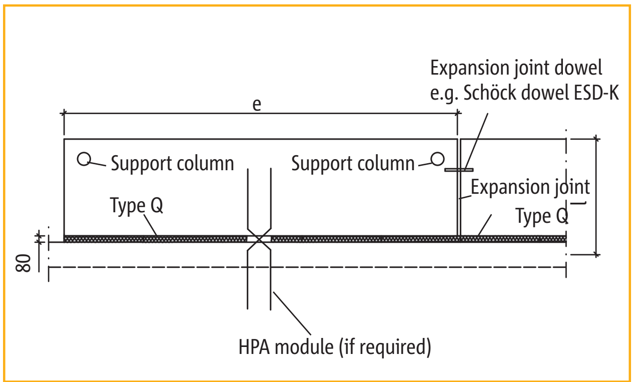


Figure 1: Layout of expansion joints for balcony slabs with a straight-edged connection

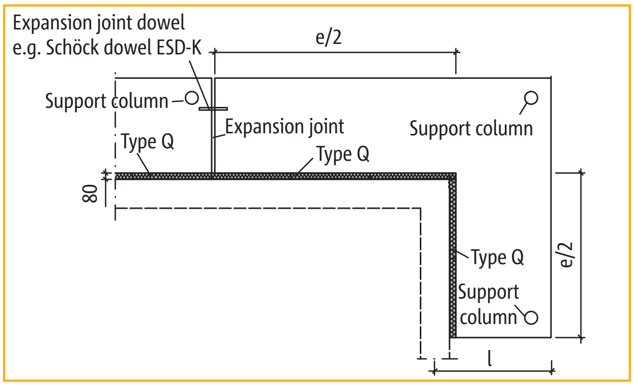


Figure 2: Layout of expansion joints for balcony slabs with a connection which goes around a corner

If standard elements are installed the maximum expansion joint spacing for balcony slabs connected with a straight edge is e = 10.10 m. In the case of balcony slabs where the connection goes around a corner, expansion joints should be installed with a maximum element length of e/2 = 5.05 m.

If HP modules are chosen to absorb horizontal forces which are perpendicular or parallel to the insulating plane (see pages 111 - 114), then care must be taken when planning the layout that no additional fixed points are created which would cause the maximum expansion joint spacing to be exceeded.

Maximum expansion joint spacing [m]

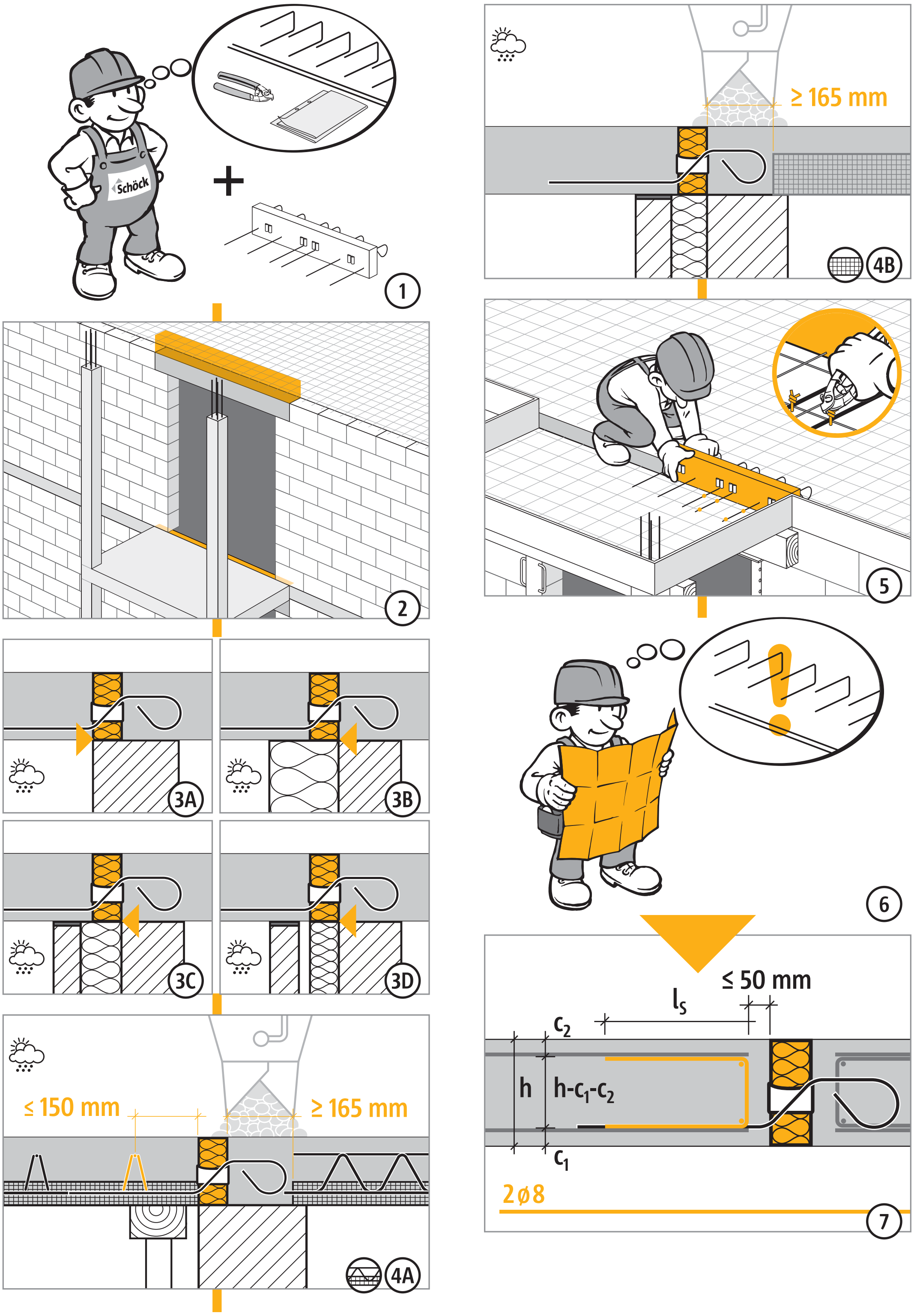
Insulation material thickness [mm]	Diameter of shear force rebars [mm]		
	≤10	12	14
80	10.40	9.10	8.20

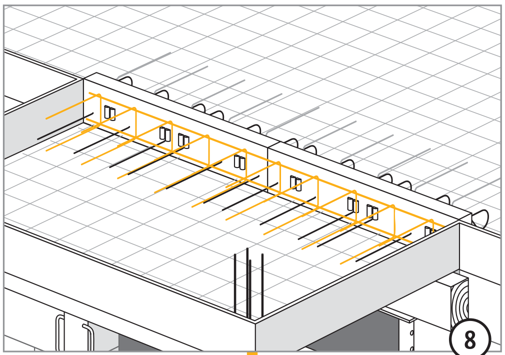
The axis-cenre of the pressure bearings to the free edge of the balcony slab or to the expansion joint has to be at least 50 mm, the axis-centre of the shear force rebars has to be at least 100 mm, the maximum 150 mm.

Notes

- Static proof must be presented for the adjacent slabs on both sides of the Schöck Isokorb®. Here, when calculating the reinforcement for the inner slab and balcony slabs which are adjacent to the Schöck Isokorb® element, it should be assumed that the bearing is free, as the Schöck Isokorb® type Q can only transmit shear forces.
- Minimum edge distance of 100 mm for the Schöck Isokorb® shear force bars has to be considered.
- The excentric connection results in an offset moment at the free edges of the Schöck Isokorb® type Q. It must be verified in each case that this moment is transmitted into the two adjacent slabs.
- The upper and lower reinforcement of the adjacent slabs should be located as close as possible to the thermal insulation layer on both sides of the Schöck Isokorb®, with appropriate allowances for the required concrete cover.
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd, max}$, whereby $V_{Rd, max.}$ should be determined in accordance with BS EN 1992-1-1, equation (6.9) for $\theta = 45°$ and $\alpha = 90°$.
- If it is planned for horizontal forces to be transmitted in the connection area of the Schöck Isokorb® type Q, additional intermittent horizontal force modules (HP modules, see pages 97 - 100) will be required for each slab. Page 100 shows a possible layout.

Schöck Isokorb® type Q
Method statement

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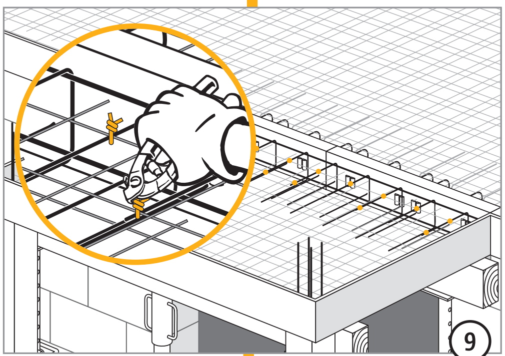

9

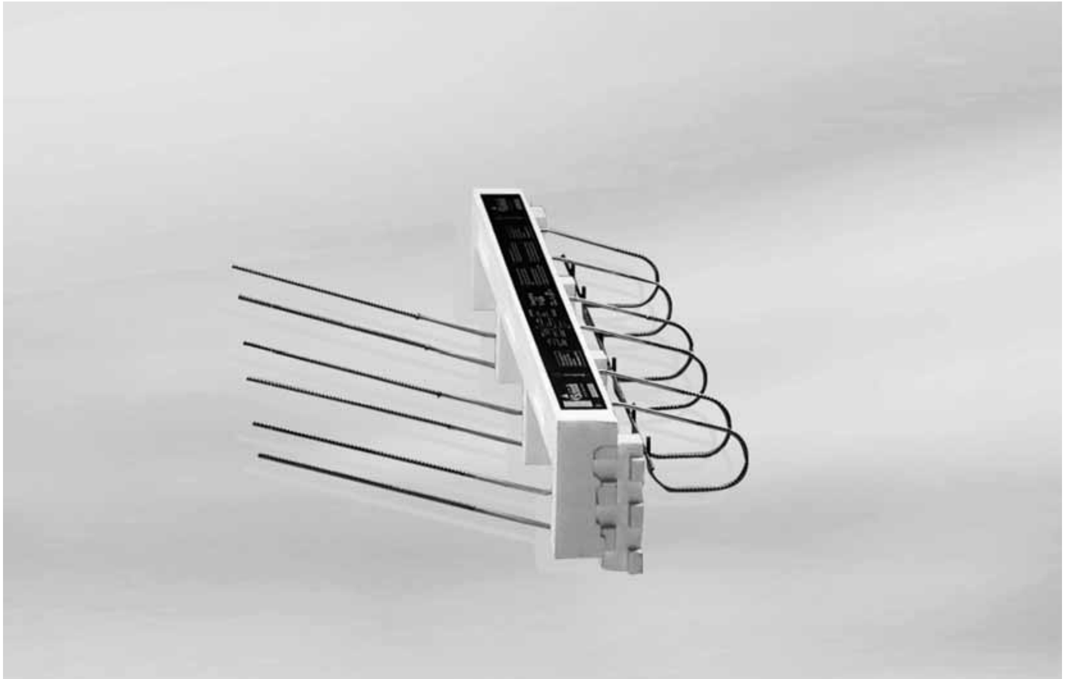

Schöck

Schöck Isokorb®

Check list

- [ ] Have the member forces on the Isokorb® connection been determined at the design level?
- [ ] Was the cantilevered system length used in the process?
- [ ] Have the concrete cover and the appropriate concrete grade been taken into consideration according to the building regulations (see page 30)
- [ ] In case of precast planks will be used, is sufficient bond action between reinforced structural screed and precast planks guaranteed?
- [ ] Have the maximum permitted distances between expansion joints (= expansion joint spacing) been taken into account?
- [ ] Has the required on-site connection reinforcement been defined?
- [ ] If the balcony is supported on 2 or 3 sides, has the right type for a tension-free connection been chosen (possibly type V or type QPZ)?
- [ ] Has the relevant bearing limit of the slab been checked for V_{Rd}?
- [ ] In the case of a connection to an upstand or downstand beam, or a connection to a wall, is the required component geometry present?
- [ ] Have the fire safety requirements been clarified, and are they reflected in the chosen type designation (-F90)?
- [ ] In the case of F90 elements, has the increased minimum slab thickness been taken into account (type Q, type V)?

Schöck Isokorb® type V



Schöck Isokorb® type V 6/6

Contents

Schöck Isokorb® type V

Examples of element arrangements/Cross-sections

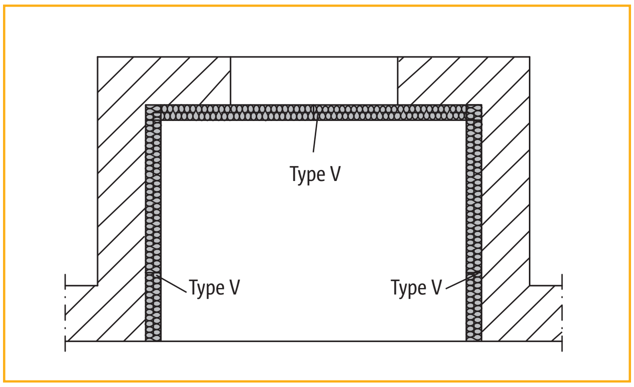


Figure 1: Balcony supported on three sides

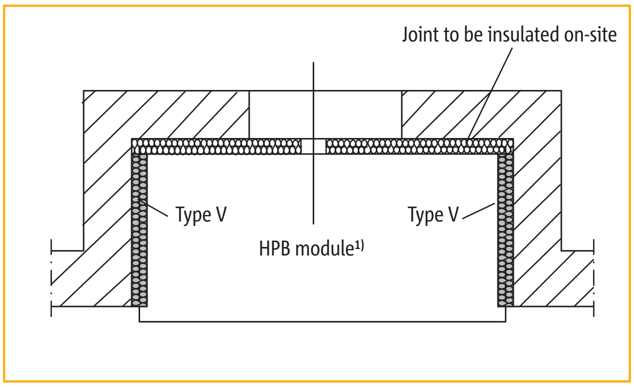


Figure 2: Balcony supported on two sides

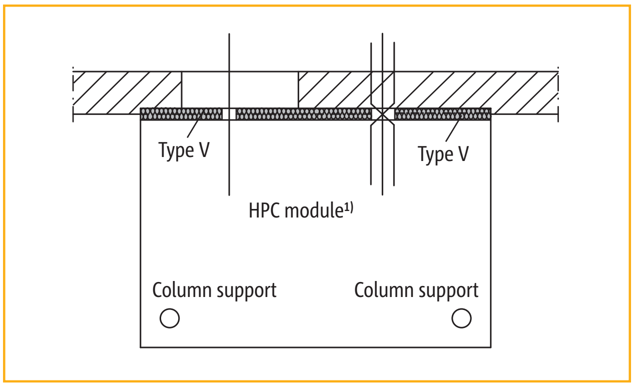


Figure 3: Balcony with column support

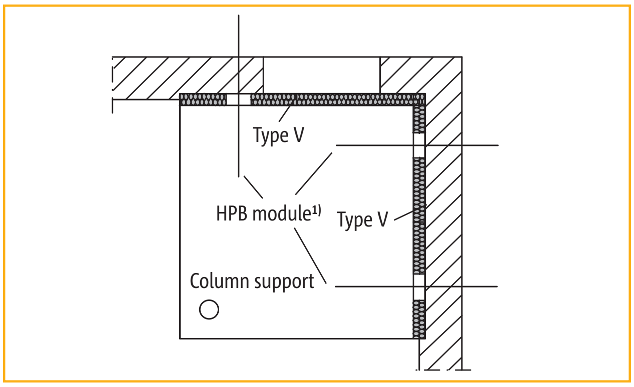


Figure 4: Balcony supported on two sides with column support

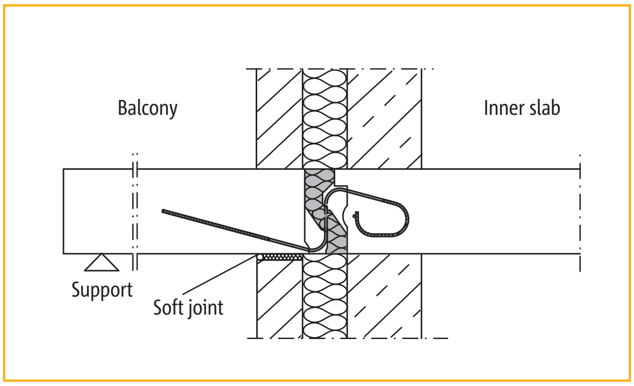


Figure 5: Cavity wall with a balcony at inner slab level

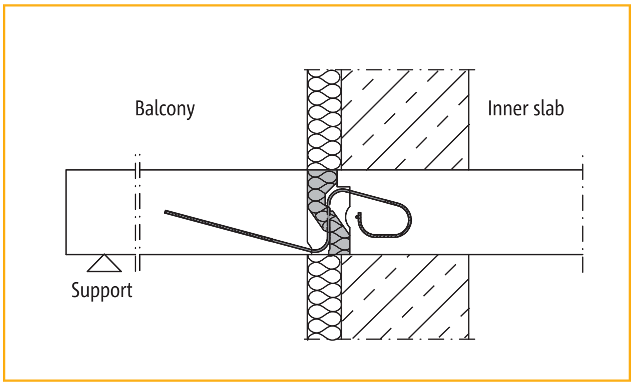


Figure 6: Brickwork with external insulation and a balcony at inner slab level

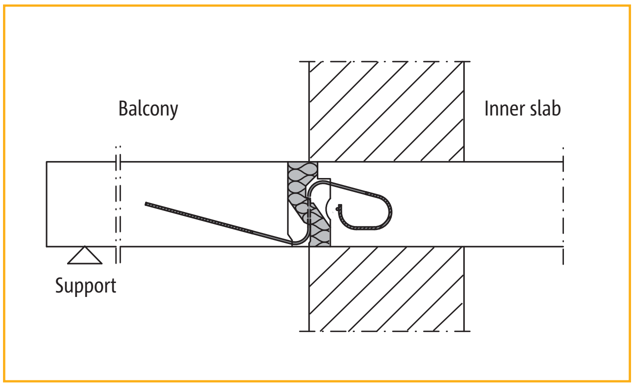


Figure 7: Single-leaf brickwork with a balcony at inner slab level

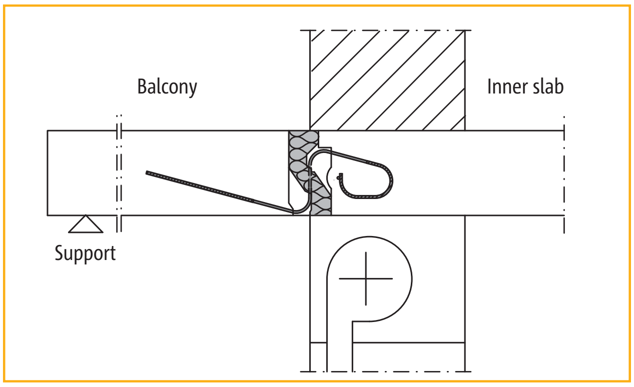


Figure 8: Single-leaf brickwork with blind box and a balcony at inner slab level

1) Only required if horizontal forces are present. Horizontal force modules HPA, HPB or HPC (see pages 97 - 100).

Schöck Isokorb® type V

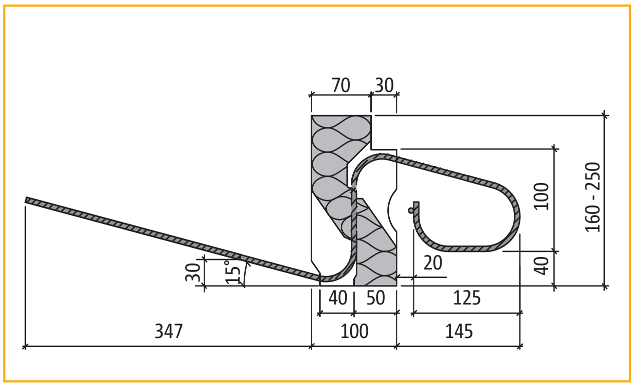
Capacity table/Plan views

Type V with F 90
from H = 180 mm

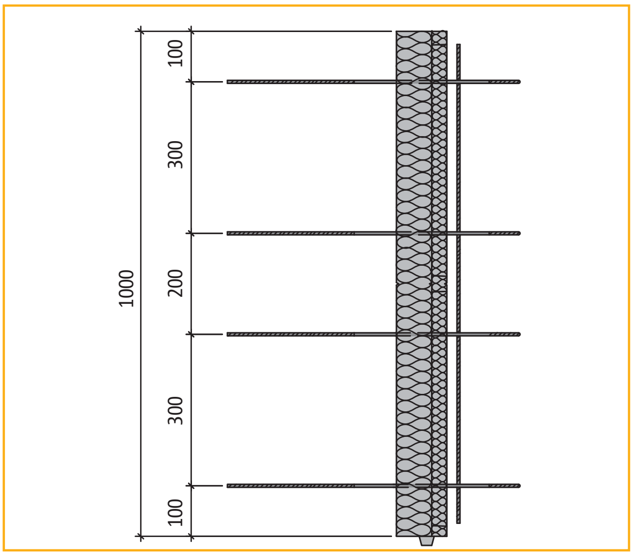
Table: Rated shear forces for height of Schöck Isokorb®: H = 160 - 250 mm

Schöck Isokorb® type	Reinforcement	Element length [m]	≥ C25/30 v_{Rd} [kN/m]
V6/4	4 ø 6	1.00	+47.3
V6/6	6 ø 6	1.00	+70.9
V6/8	8 ø 6	1.00	+94,6
V6/10	10 ø 6	1.00	+118.2

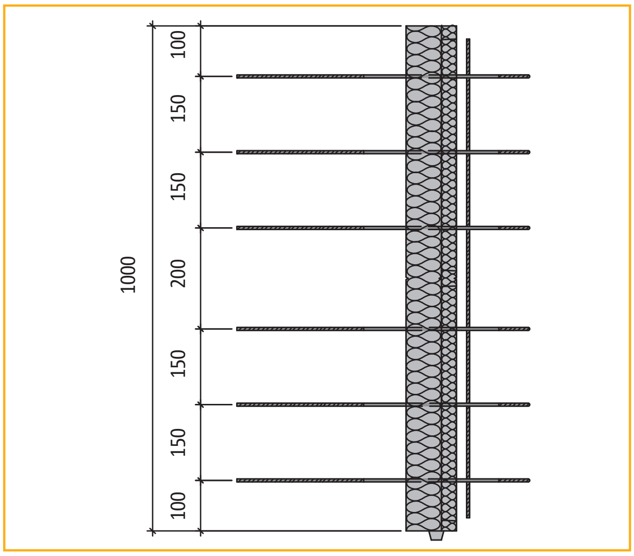
Conrete strength class for outside components at least C32/40 (see page 32).



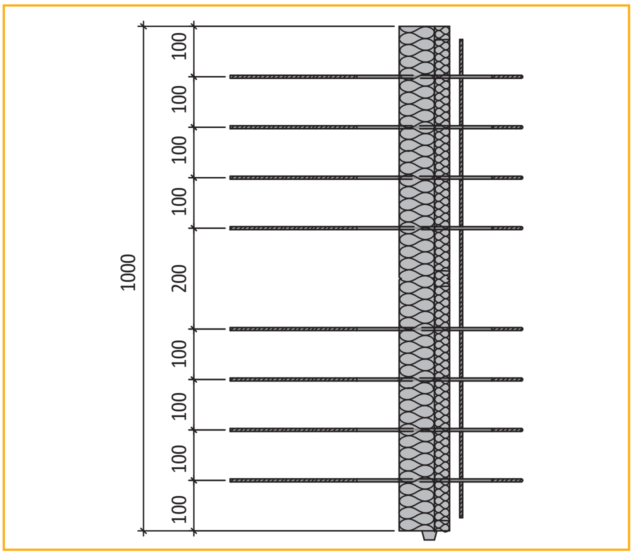
Cross-section: Schöck Isokorb® type V6/4 to V6/10



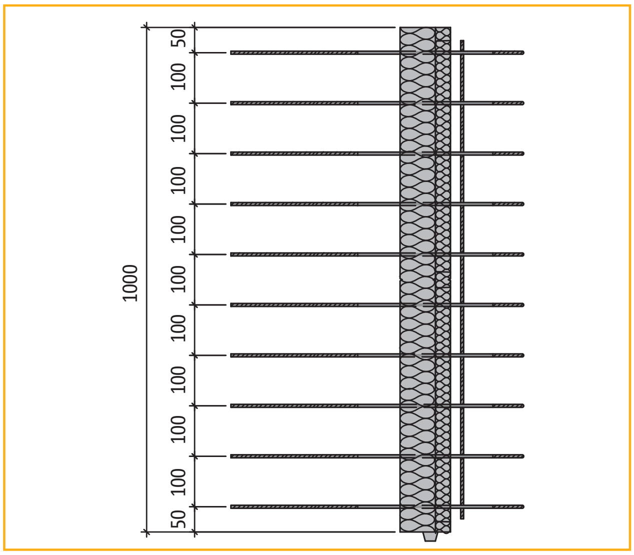
Plan view: Schöck Isokorb® type V6/4



Plan view: Schöck Isokorb® type V6/6



Plan view: Schöck Isokorb® type V6/8



Plan view: Schöck Isokorb® type V6/10

V

Reinforced concrete-to-reinforced concrete

Schöck Isokorb® type V
Application examples

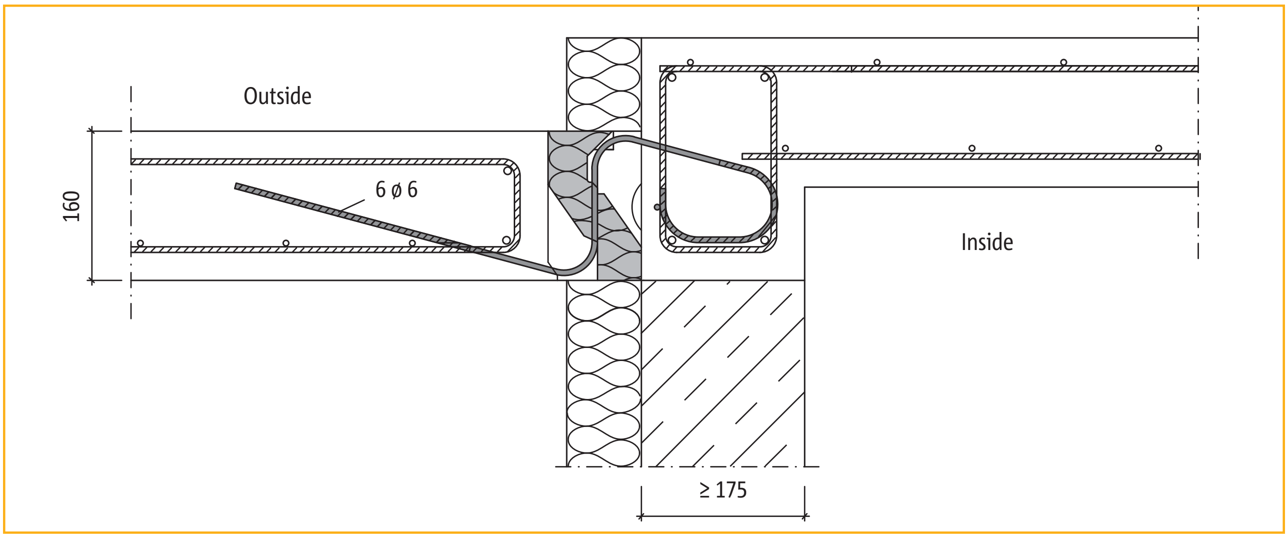


Figure 1: Cross-section of a "vertical offset" installation with Schöck Isokorb® type V6/6

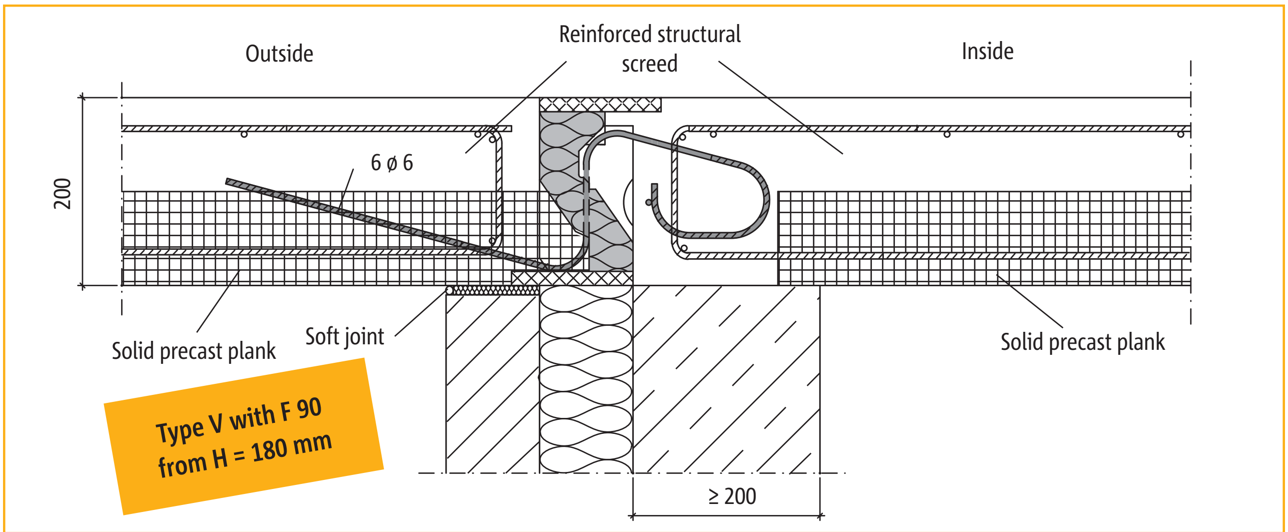


Figure 2: Cross-section of a "semi-precast balcony slab" installation with Schöck Isokorb® type V6/6-F90

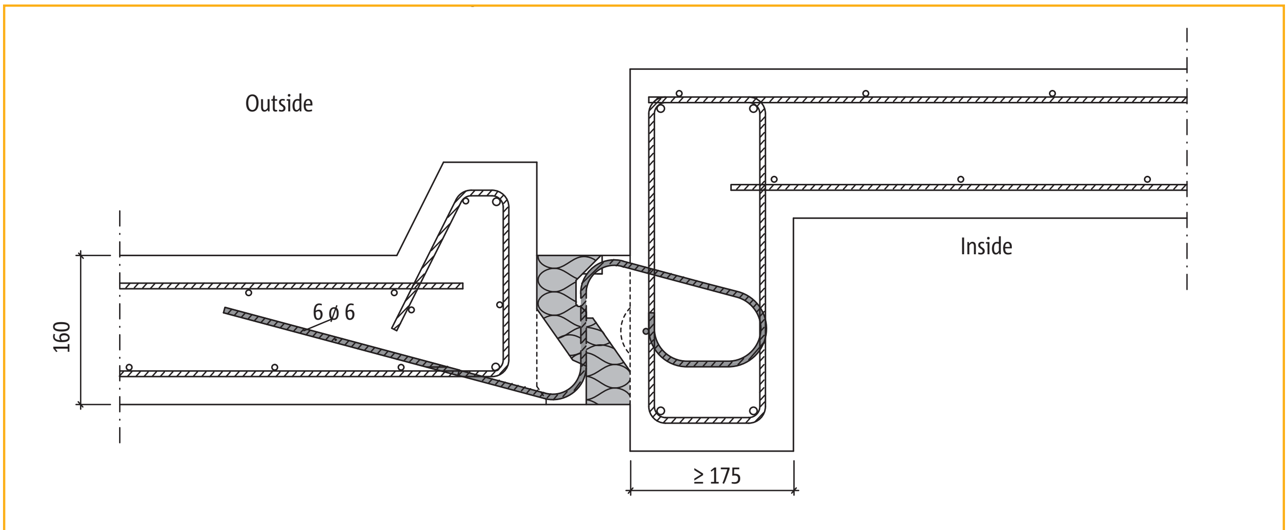
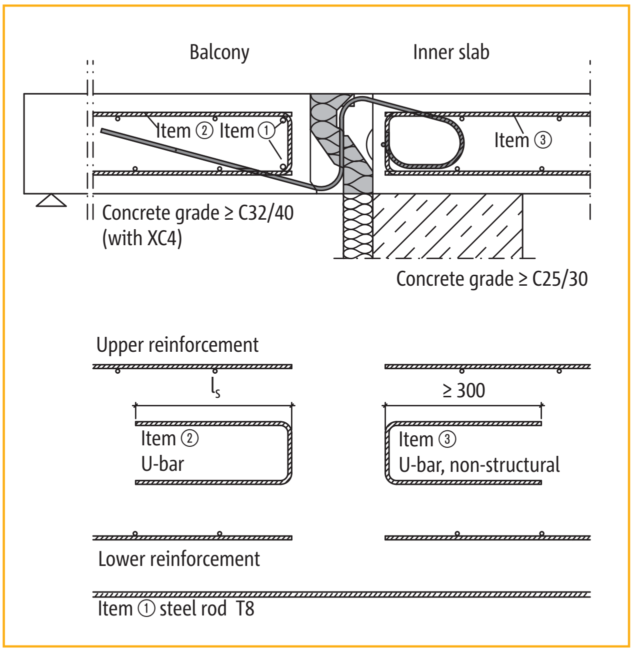


Figure 3: Cross-section of a "prefabricated balcony slab" installation with Schöck Isokorb® type V6/6

Schöck Isokorb® type V
On-site reinforcement/Notes

Connection with U-bars



Schöck Isokorb® type	U-bar (item ②) req. a_s [mm²/element]
V6/4	109
V6/6	163
V6/8	217
V6/10	272

V

Reinforced concrete-to-reinforced concrete

Notes

- Concrete grade for outside components ≥ C32/40.
- The range of potential applications for Schöck Isokorb® type V elements extends only to inner slab and balcony slabs with predominantly static and evenly distributed live loads.
- Static proof must be presented for the adjacent slabs on both sides of the Schöck Isokorb®. Here, when calculating the reinforce ment for the inner slab and balcony slabs which are adjacent to the Schöck Isokorb® element, it should be assumed that the baring is free, as the Schöck Isokorb® type V can only transmit shear forces.
- Minimum edge distance of 100 mm for the Schöck Isokorb® shear force bars has to be considered.
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd,\,max}$, whereby $V_{Rd,\,max}$ should be determined according to BS EN 1992-1-1, equation (6.9), for $\theta = 45°$ and $\alpha = 90°$.
- The upper and lower reinforcement of the adjacent slabs should be located as close as possible to the thermal insulation layer on both sides of the Schöck Isokorb®, with appropriate allowances for the required concrete cover.
- A bearing reinforcement which has been designed to accommodate the maximum occurring shear force is to be located on the edge of the slab at the connection of the concrete slab to the Schöck Isokorb®. Both U-bars and meshs can be used for this purpose.

Schöck Isokorb® type V
Expansion joint spacing/Notes

Expansion joint spacing

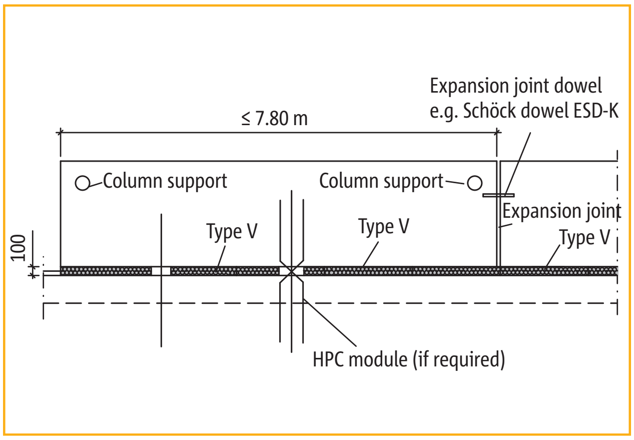


Figure 1: Plan view

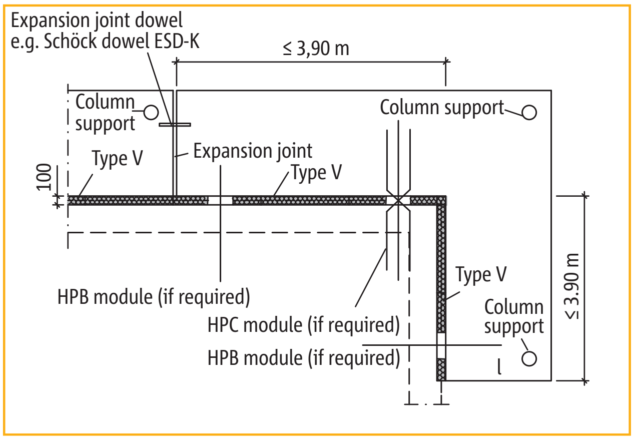


Figure 2: Plan view

The expansion joint spacing (e) is generally 7.80 m.
In the case of layouts which go around a corner the maximum element length is e/2 = 3.90 m.

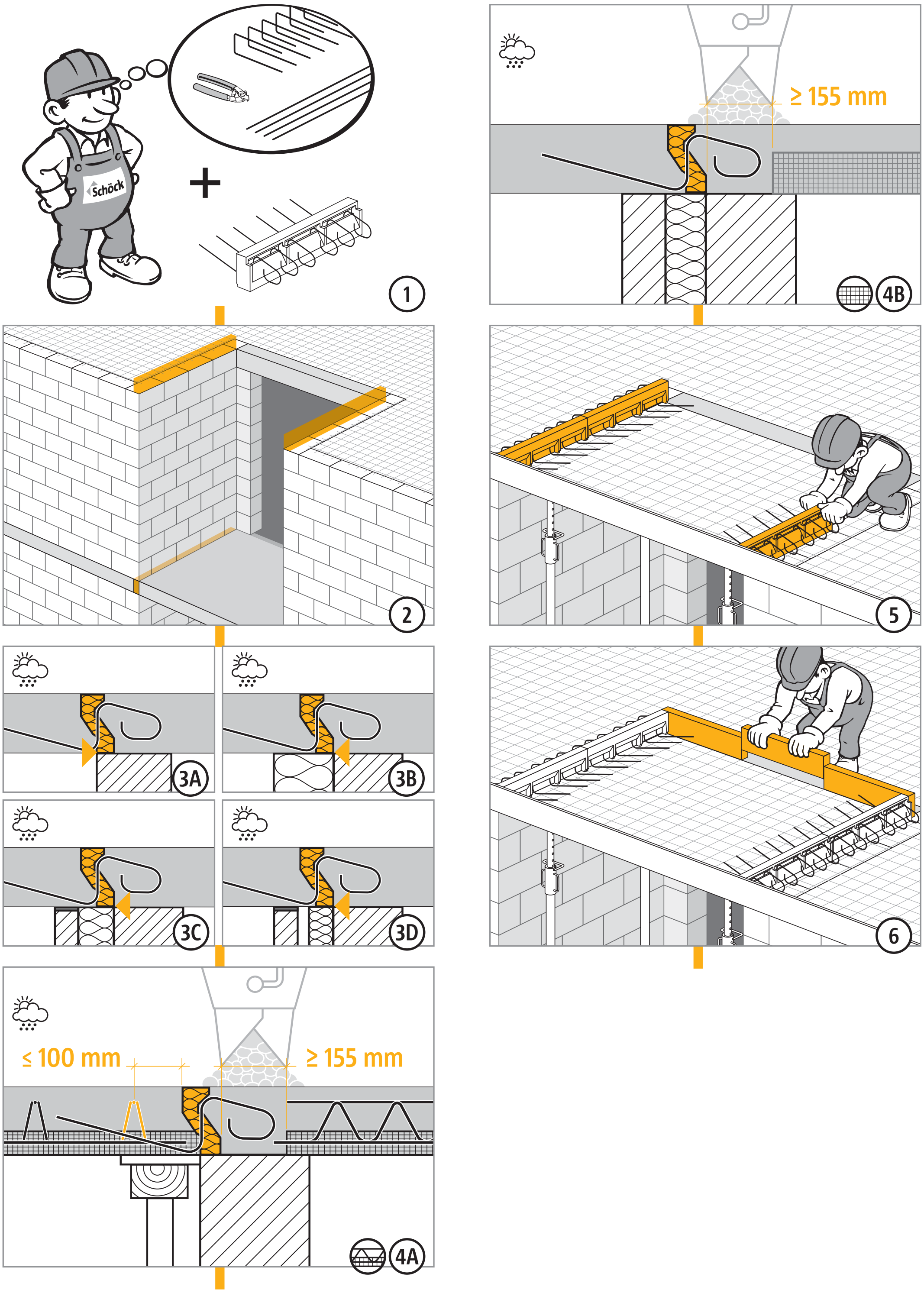
If HP modules are chosen to absorb horizontal forces which are perpendicular or parallel to the insulating layer (see pages 97 - 100), then care must be taken when planning the layout that no additional fixed points are created which would cause the maximum expansion joint spacing to be exceeded.

Notes

- If it is planned for horizontal forces to be transmitted in the connection area of the Schöck Isokorb® type V, additional intermittent horizontal force modules (HP modules, see pages 97 - 100) will be required for each balcony slab.

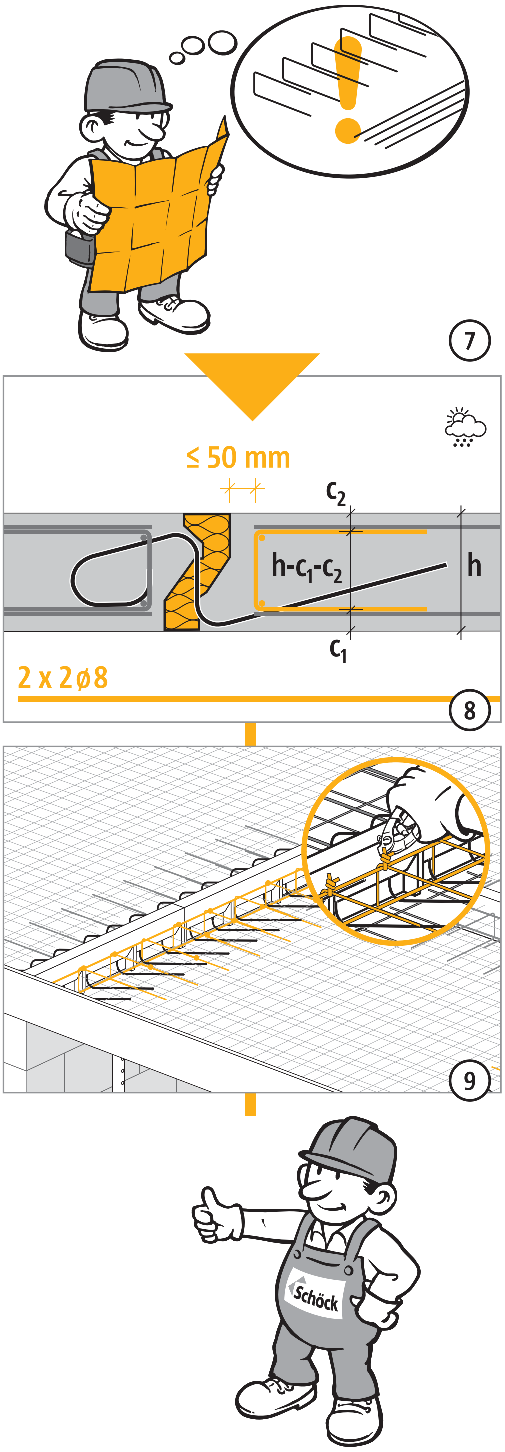
Schöck Isokorb® type V

Method statement



Schöck Isokorb® type V

Method statement

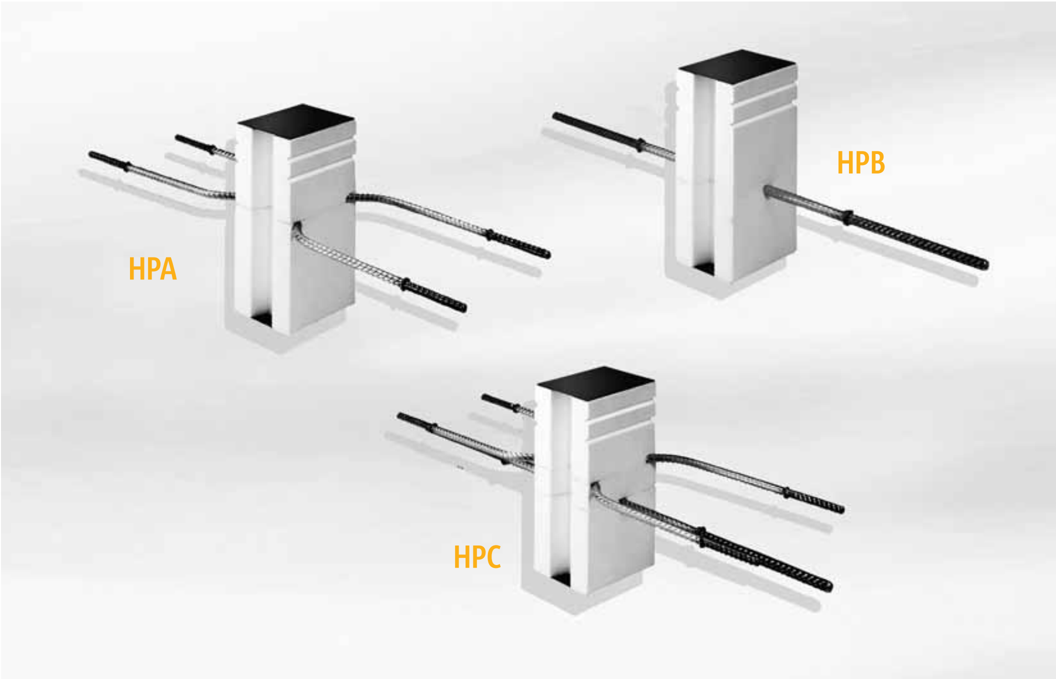


Schöck Isokorb®

Check list

- ☐ Have the member forces on the Isokorb® connection been determined at the design level?
- ☐ Was the cantilevered system length used in the process?
- ☐ Have the concrete cover and the appropriate concrete grade been taken into consideration according to the building regulations (see page 30)
- ☐ In case of precast planks will be used, is sufficient bond action between reinforced structural screed and precast planks guaranteed?
- ☐ Have the maximum permitted distances between expansion joints (= expansion joint spacing) been taken into account?
- ☐ Has the required on-site connection reinforcement been defined?
- ☐ Has the relevant bearing limit of the slab been checked for V_{Rd}?
- ☐ In the case of a connection to an upstand or downstand beam, or a connection to a wall, is the required component geometry present?
- ☐ Have the fire safety requirements been clarified, and are they reflected in the chosen type designation (-F90)?
- ☐ In the case of F90 elements, has the increased minimum slab thickness been taken into account (type Q, type V)?

Schöck Isokorb® type HP module



Schöck Isokorb® type HP module

HP Module

Reinforced concrete-to-reinforced concrete

Contents

Page

Schöck Isokorb® type HP module

Examples of element arrangements/Cross-sections

Only required in load cases with the H-forces parallel and/or perpendicular to the insulating plane.

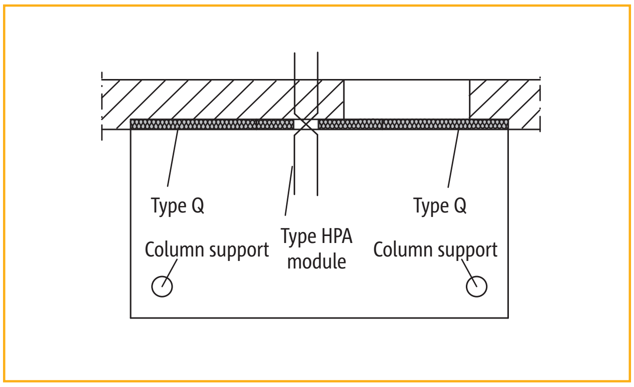


Figure 1: Balcony with column support + type Q + type HPA module

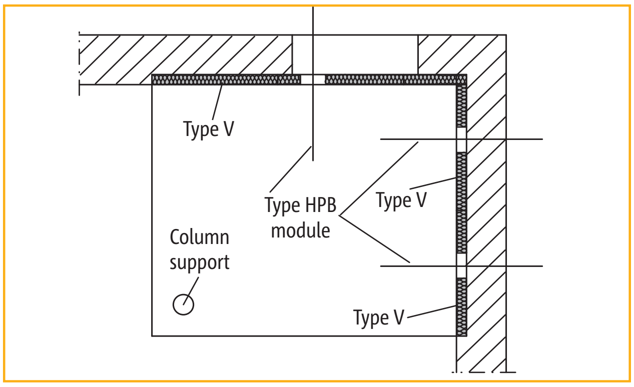


Figure 2: Balcony supported on two sides with column support + type V + type HPB module

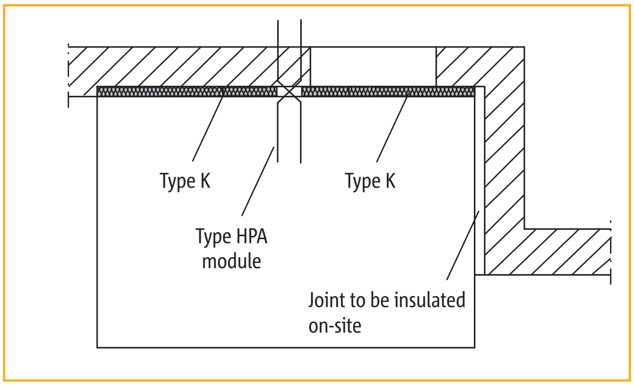


Figure 3: Free cantilever balcony + type K + type HPA module

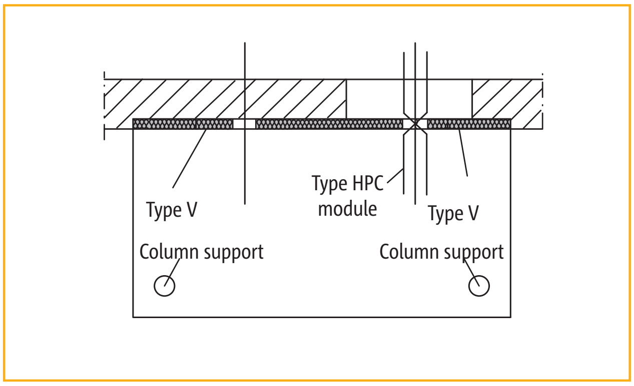


Figure 4: Balcony with column support + type V + type HPC module

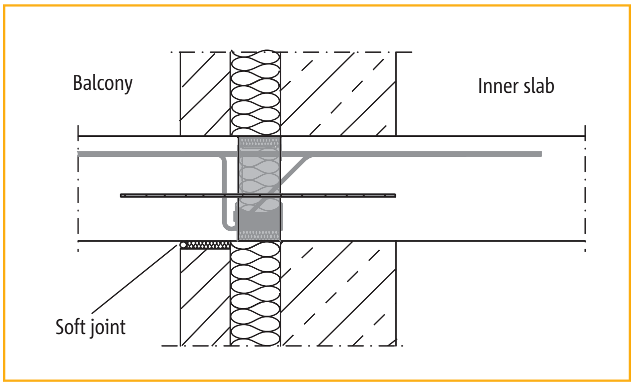


Figure 5: Cavity wall with a balcony at inner slab level + type K + type HPA module

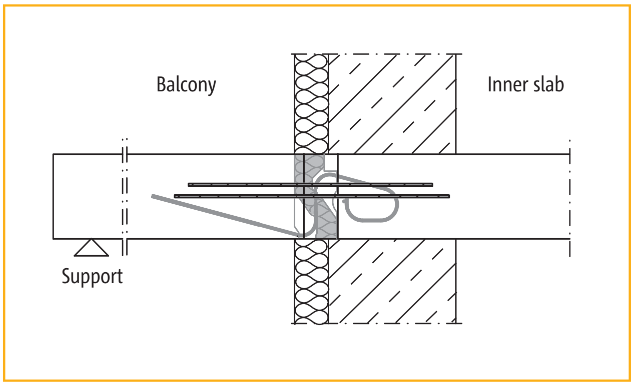


Figure 6: Brickwork with external insulation and a balcony at inner slab level + type V + type HPC module

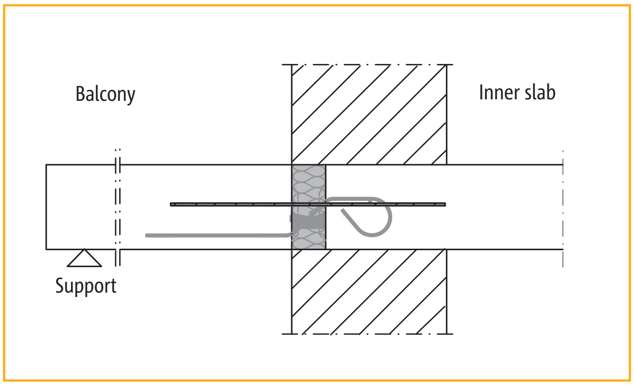


Figure 7: Single-leaf brickwork with a balcony at inner slab level + type Q + type HPA module

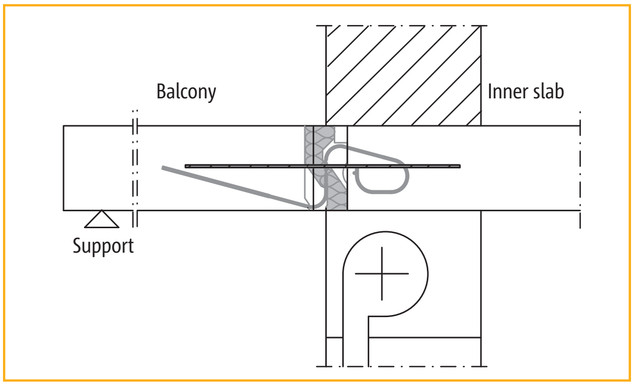
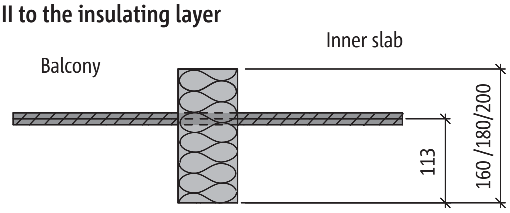


Figure 8: Single-leaf brickwork with blind box and a balcony at inner slab level + type V + type HPB module

Schöck Isokorb® type HP module

Capacity tables/Cross-sections/Plan views

H-forces II to the insulating layer



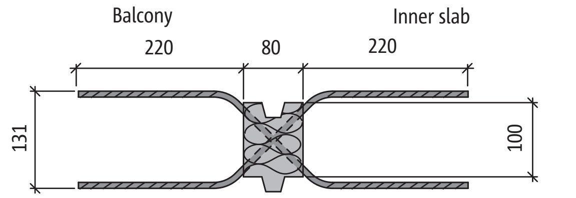
Cross-section: Schöck Isokorb® type HPA module

Member forces per element, taken parallel or perpendicular to the insulating layer

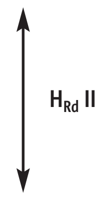
Schöck Isokorb® type	Reinforcement		Element length [mm]	≥ C25/30	
	Shear force	H-anchor		H_{Rd} II [kN]	H_{Rd} ⊥ [kN]
HPA module	2 x 1 ø 8	–	100	±8,6	0

Concrete quality for outside components ≥ C32/40.

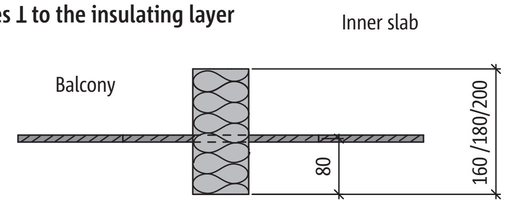
H-forces II to the insulating layer



Plan view: Schöck Isokorb® type HPA module



H-forces ⊥ to the insulating layer



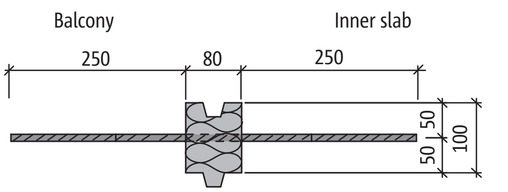
Cross-section: Schöck Isokorb® type HPB module

Member forces per element, taken parallel or perpendicular to the insulating layer

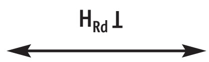
Schöck Isokorb® type	Reinforcement		Element length [mm]	≥ C25/30	
	Shear force	H-anchor		H_{Rd} II [kN]	H_{Rd} ⊥ [kN]
HPB module	–	1 ø 10	100	0	±20.9

Concrete quality for outside components ≥ C32/40.

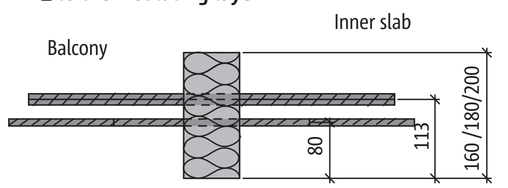
H-forces ⊥ to the insulating layer



Plan view: Schöck Isokorb® type HPB module



H-forces II + ⊥ to the insulating layer



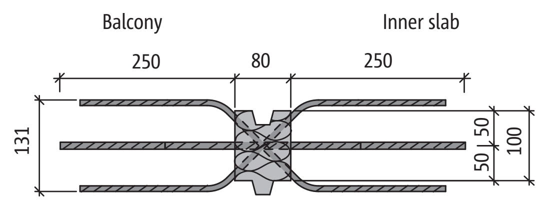
Cross-section: Schöck Isokorb® type HPC module

Member forces per element, taken parallel or perpendicular to the insulating layer

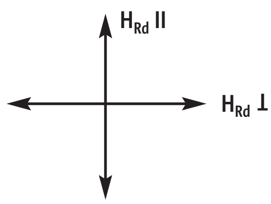
Schöck Isokorb® type	Reinforcement		Element length [mm]	≥ C25/30	
	Shear force	H-anchor		H_{Rd} II [kN]	H_{Rd} ⊥ [kN]
HPC module	2 x 1 ø 8	1 ø 10	100	±8.6	±20.9

Concrete quality for outside components ≥ C32/40.

H-forces II + ⊥ to the insulating layer



Plan view: Schöck Isokorb® type HPC module



Schöck Isokorb® type HP module

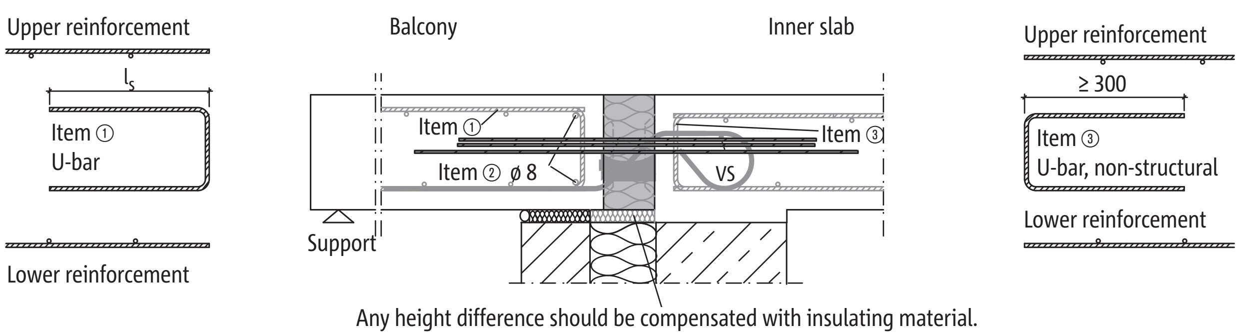
Notes/Method statement

Notes

- The type HP module is to be incorporated in your plans only if horizontal forces are present in the design, and then only in conjunction with a Schöck Isokorb® basic type for straight line or pointwise connections (e.g. type K, type Q, type QP, type V).
- When choosing the correct type (type HPA module, HPB module or HPC module) and its arrangement, care must be taken to ensure that no unnecessary fixed points are created and that the maximum expansion joint spacings (for e.g. type K, type Q, type V) are satisfied in the process.
- The required quantity of HP modules is determined by the engineer in charge of the planning of the structure in accordance with the static requirements.
- When calculating the straight line connection, it should be noted that the use of a module of type HP can lead to a reduction of the resistance member forces of the straight line connection (e.g. the use of a type V with L = 1.0 m and a type HP module with L = 0.1 m (alternating regularly) means a reducion of v_{Rd} of the straight line connection with type V by around 9 %).

Method statement

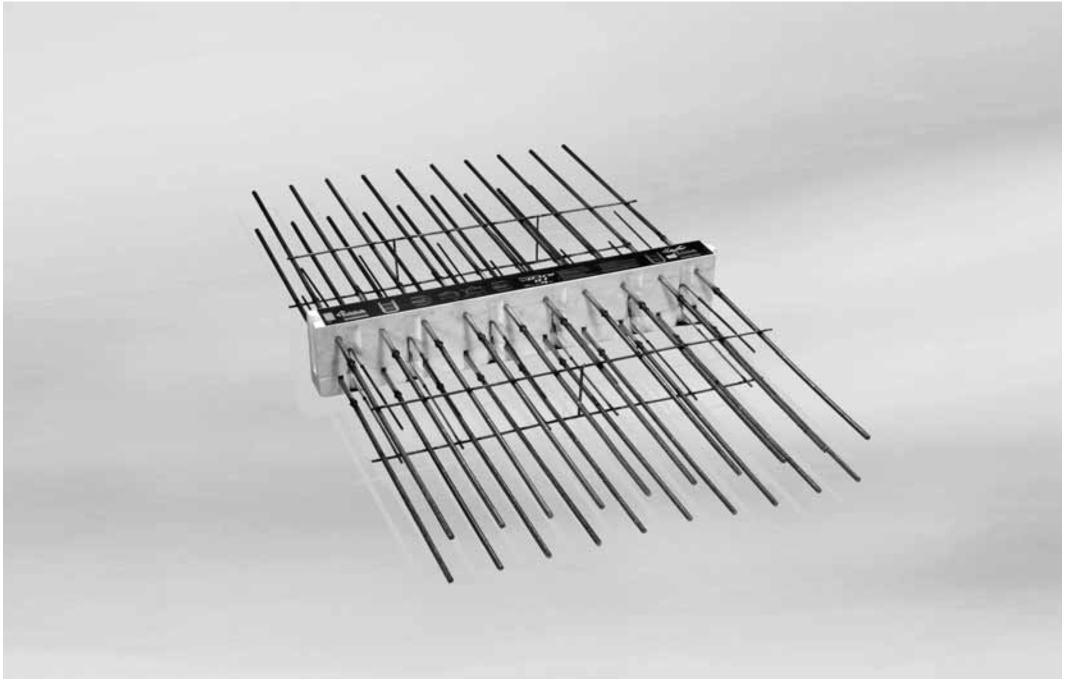
Example showing a combination of a straight line connection, type Q with an HP module



The HP modules are installed in the same way as the elements for a straight line connection.

1. Install the lower and upper inner slab reinforcement and the edge U-bars.
2. Install and align the Schöck Isokorb® elements for straight line connection (type K, type Q, type V, typ D), either alternating the elements with HP modules or arranging them in accordance with the layout plan. The minimum edge distance of 0.1 m for the HP module must be taken into account. Any distributor rods which are present can be cut through.
3. Install the lower balcony reinforcement.
4. Install the connection reinforcement required for the straight line installation of the Schöck Isokorb®.
5. Install the upper balcony reinforcement.
6. In order to secure the position of the Schöck Isokorb® during concreting, it is important that both sides are evenly filled and compacted.

Schöck Isokorb® type D



Schöck Isokorb® type D50-CV35

Contents

Schöck Isokorb® type D

Examples of element arrangements/Cross-sections

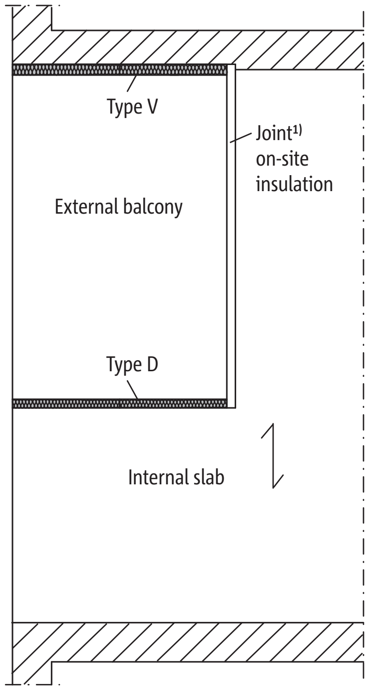


Figure 1: One-way spanning internal slab

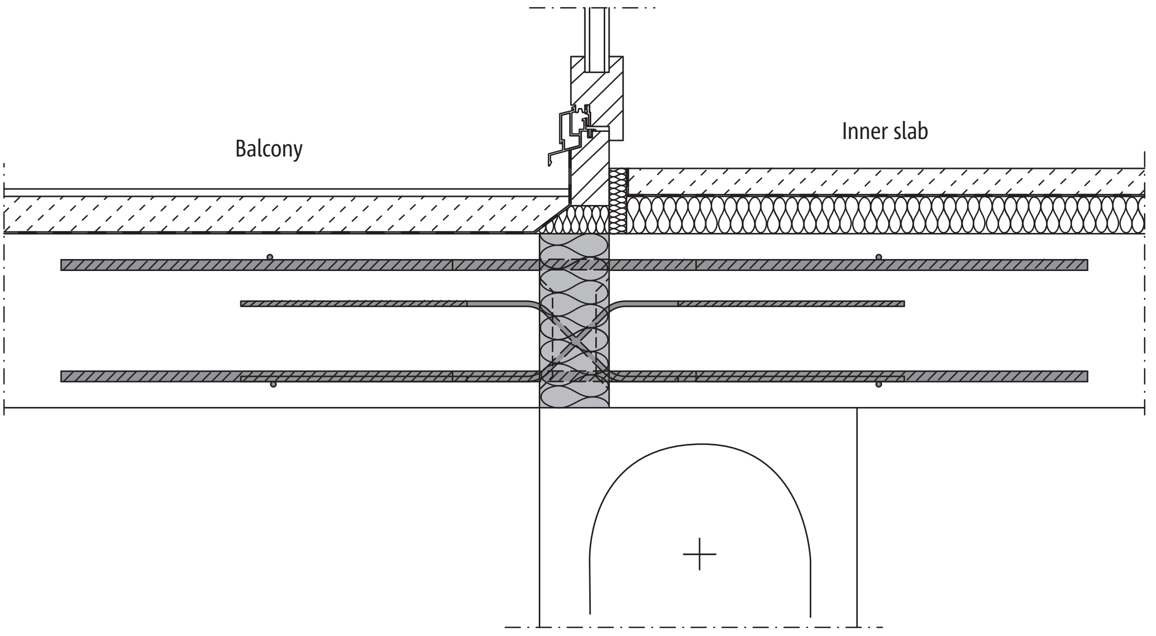


Figure 2: Cross-section through balcony and inner slab

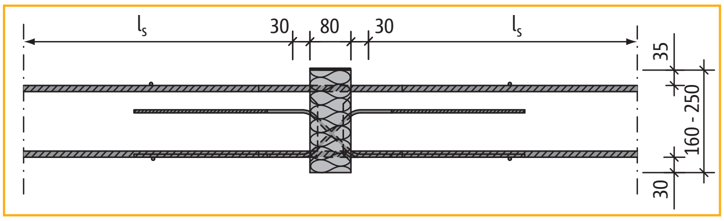
[1] A non-structural shear force connection should be provided if required, e.g. type Q+Q.

Schöck Isokorb® type D
Capacity tables

Member forces

L = element length
Z = tension rods
D = compression bars

Q = shear force rods
e = distance between the tension rods
H = height of Isokorb



Cross-section Schöck Isokorb® type D-CV35

Concrete strength ≥ C25/30
Concrete cover CV 35

Concrete quality for outside components ≥ C32/40

D

Reinforced concrete-to-reinforced concrete

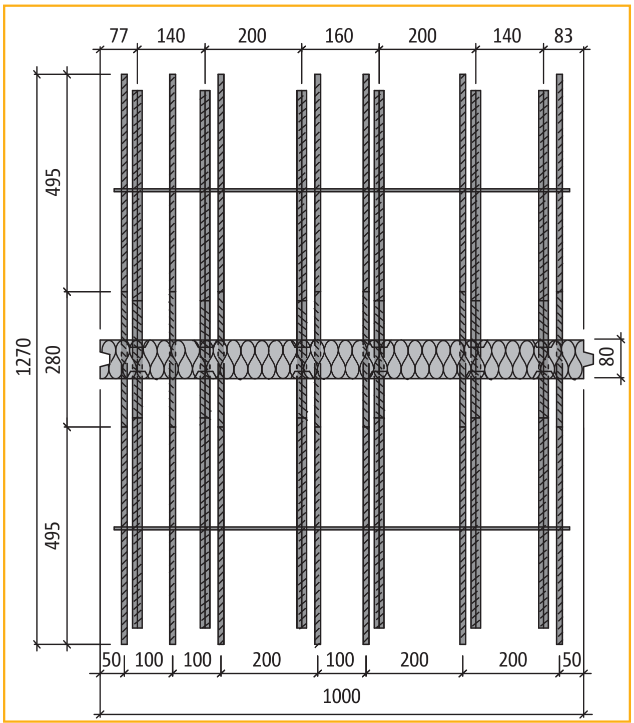
	D30-CV35	D30-CV35-VV8	D30-CV35-VV10	D50-CV35	D50-CV35-VV8	D50-CV35-VV10
L [m]	1.00			1.00		
Z/D	2 x 7 ø 12			2 x 10 ø 12		
Q	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10
e [mm]	100/200			100		
H [mm]	m_{Rd} [kNm/m]			m_{Rd} [kNm/m]		
160	±20.8	–	–	±30.5	–	–
170	±23.3	±21.8	–	±34.1	±32.6	–
180	±25.8	±24.1	±22.0	±37.8	±36.1	±34.0
190	±28.3	±26.5	±24.1	±41.5	±39.6	±37.3
200	±30.8	±28.8	±26.2	±45.1	±43.1	±40.5
210	±33.3	±31.2	±28.4	±48.8	±46.6	±43.3
220	±35.8	±33.5	±30.5	±52.5	±50.1	±47.1
230	±38.3	±35.8	±32.6	±56.2	±53.6	±50.4
240	±40.8	±38.2	±34.8	±59.8	±57,2	±53.7
250	±43.4	±40.5	±36.9	±63.5	±60.7	±57.0
v_{Rd} [kN/m]	**±42.0**	**±74.6**	**±116.6**	**±42.0**	**±74.6**	**±116.6**

	D70-CV35	D70-CV35-VV8	D70-CV35-VV10
L [m]	1.00		
Z/D	2 x 10 ø 14		
Q	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10
e [mm]	100		
H [mm]	m_{Rd} [kNm/m]		
160	±42.2	–	–
170	±47.4	±45.9	–
180	±52.6	±51.0	±48.8
190	±57.8	±56.0	±53.7
200	±63.0	±61.1	±58.5
210	±68.3	±66.1	±63.4
220	±73.4	±71.2	±68.2
230	±78.7	±76.2	±73.0
240	±83.9	±81.2	±77.9
250	±89.1	±86.3	±82.7
v_{Rd} [kN/m]	**±42.0**	**±74.6**	**±116.6**

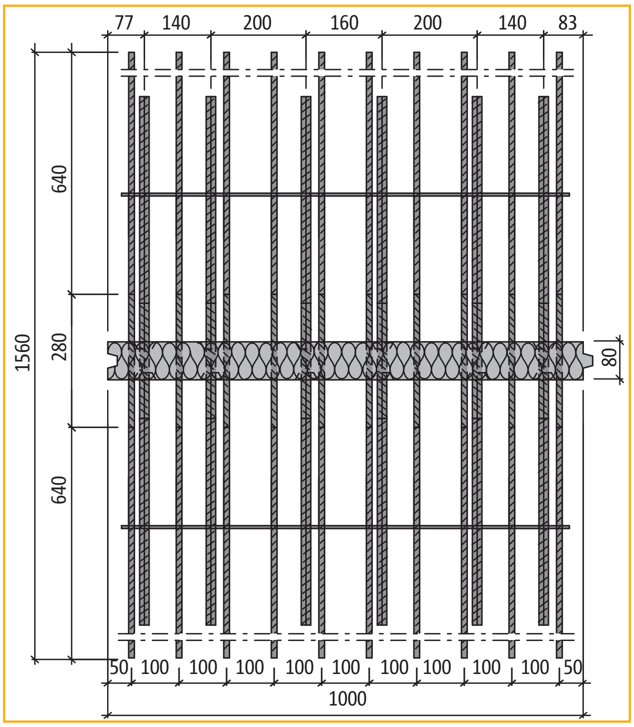
On request: Concrete cover CV30 and CV50

Schöck Isokorb® type D

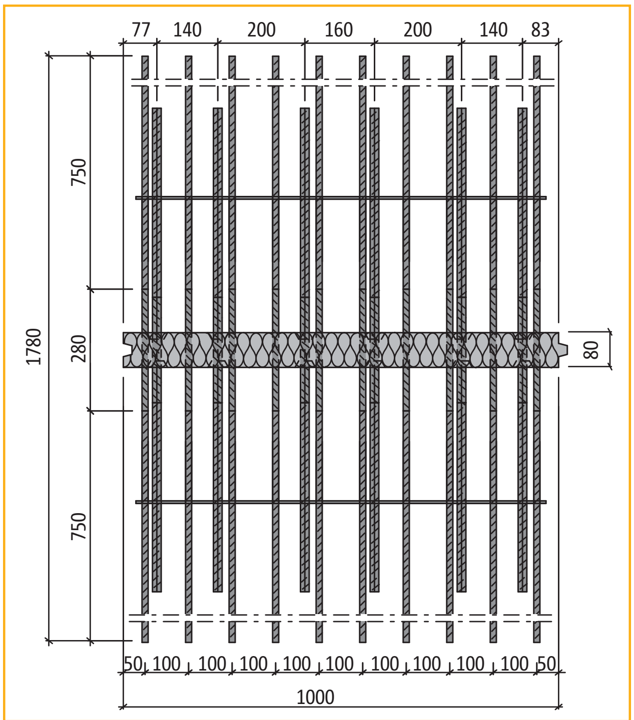
Plan views



Plan view: Schöck Isokorb® type D30-CV35



Plan view: Schöck Isokorb® type D50-CV35



Plan view: Schöck Isokorb® type D70-CV35

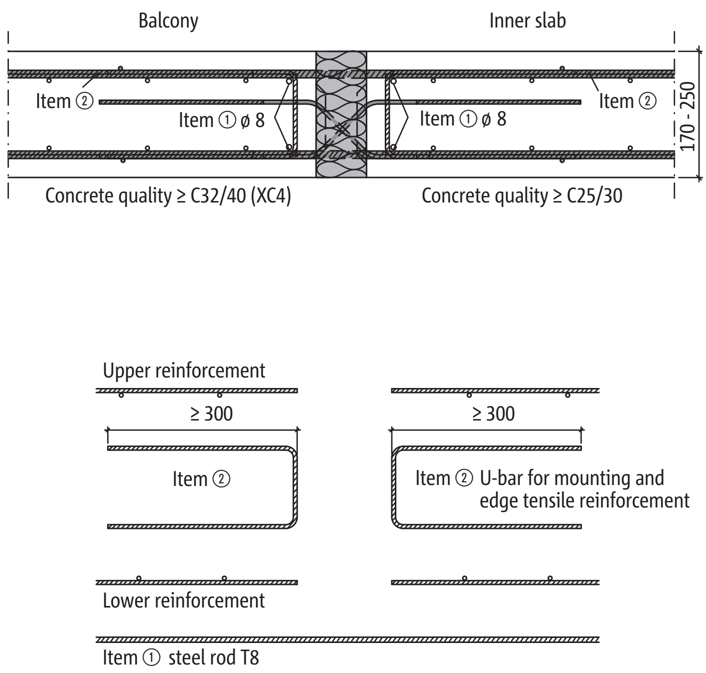
D

Reinforced concrete-to-reinforced concrete

Schöck Isokorb® type D

Lap splice design/Notes/Expansion joint spacing

Additional lap splice reinforcement



Schöck Isokorb® type	Reinforcement, item ②
D30-CV35-...	ø 8, e = 150 mm
D30-CV35-...-VV8	ø 8, e = 150 mm
D30-CV35-...-VV10	ø 8, e = 150 mm
D50-CV35-...	ø 8, e = 150 mm
D50-CV35-...-VV8	ø 8, e = 150 mm
D50-CV35-...-VV10	ø 8, e = 150 mm
D70-CV35-...	ø 8, e = 150 mm
D70-CV35-...-VV8	ø 8, e = 150 mm
D70-CV35-...-VV10	ø 8, e = 150 mm

Notes

- Concrete strength class for outside components at least C32/40 (see page 30).
- In the case of a combination of different concrete grades (e.g. balcony C32/40, inner slab C25/30), the weaker concrete is critical in terms of the Isokorb® calculations.
- Static proof must be presented for the adjacent slabs on both sides of the Schöck Isokorb®.
- The upper and lower lap splice reinforcement should be located as close as possible to the thermal insulation layer on both sides of the Schöck Isokorb®, with appropriate allowances for the required concrete cover.
- All free unsupported edges are to be bound with a non-structural reinforcement (U-bars).
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd,\,max}$, whereby $V_{Rd,\,max}$ is to be determined according to BS EN 1992-1-1, equation (6.9), for $\theta = 45°$ and $\alpha = 90°$.

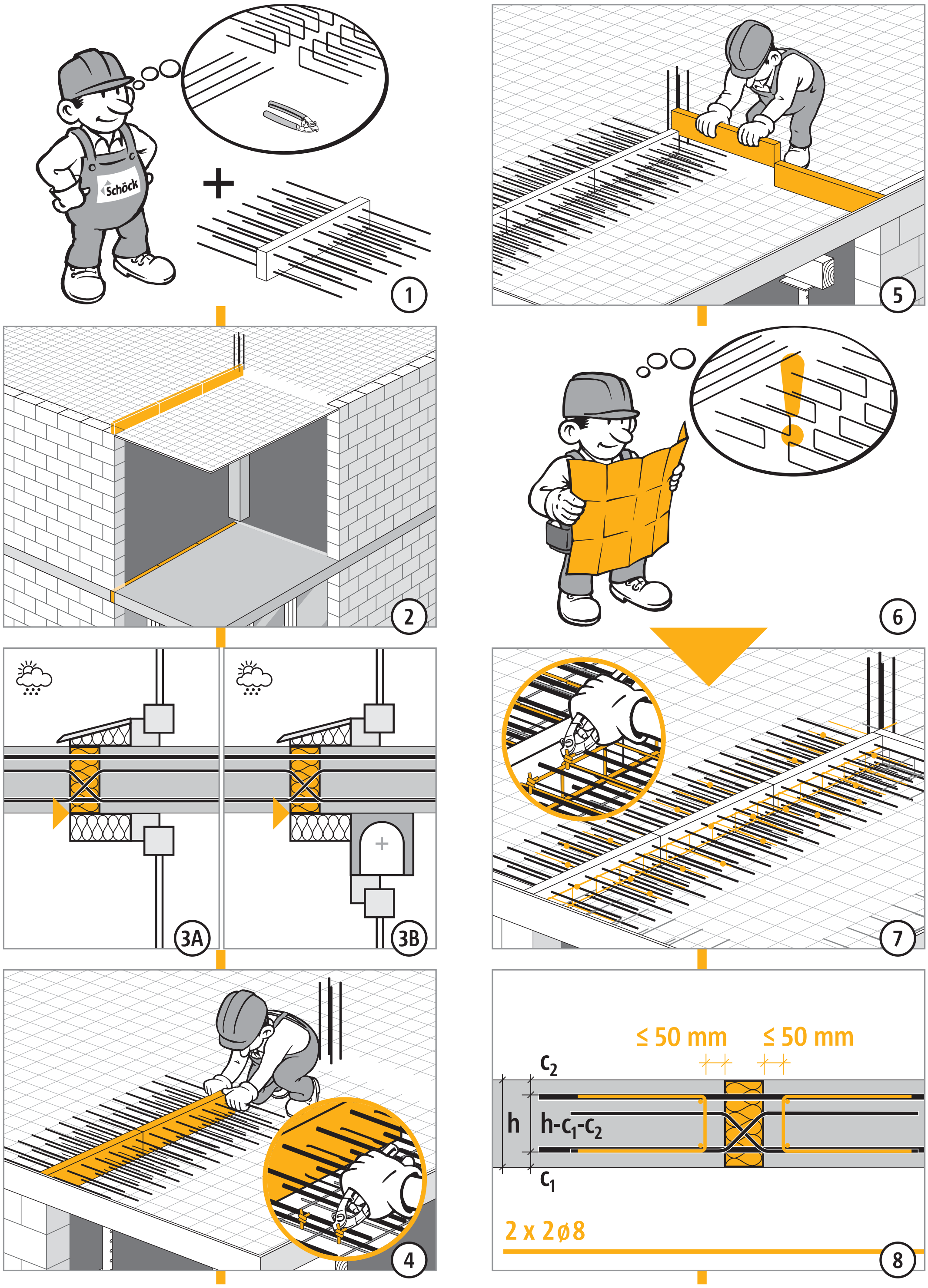
Expansion joint spacing

Maximum expansion joint spacing e [m]

Insulation material thickness [mm]	Schöck Isokorb® type	
	D30-CV35 and D50-CV35	D70-CV35
80	11.3 m	10.1 m

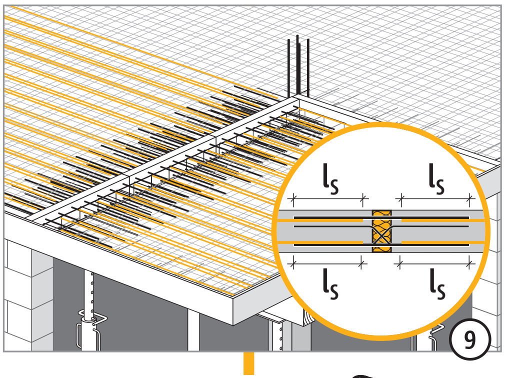
Schöck Isokorb® type D

Method statement



Schöck Isokorb® type D

Method statement



D

Reinforced concrete-to-reinforced concrete

Schöck Isokorb®

Check list

- [ ] Have the member forces on the Isokorb® connection been determined at the design level?
- [ ] Was the cantilevered system length used in the process?
- [ ] Have the concrete cover and the appropriate concrete grade been taken into consideration according to the building regulations (see page 30)
- [ ] In case of precast planks will be used, is sufficient bond action between reinforced structural screed and precast planks guaranteed?
- [ ] Have the maximum permitted distances between expansion joints (= expansion joint spacing) been taken into account?
- [ ] Has the required lap splice reinforcement been defined?
- [ ] Have the fire safety requirements been clarified, and are they reflected in the chosen type designation (-F90)?
- [ ] In the case of F90 elements, has the increased minimum slab thickness been taken into account (type Q, type V)?

Schöck Isokorb® type O

Schöck Isokorb® type O

Contents

Schöck Isokorb® type O

Element arrangement/Cross-section/Design values

Dimensions

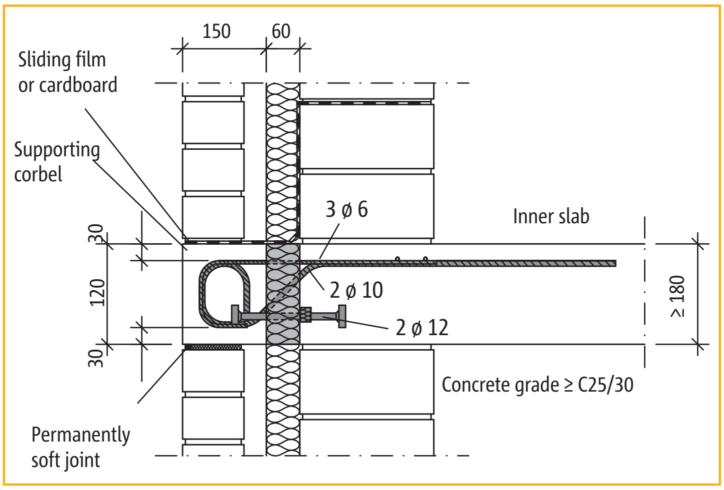
Element thickness	180 - 250 mm
Element length	350 mm
Insulating material thickness	60 mm

Reinforcement

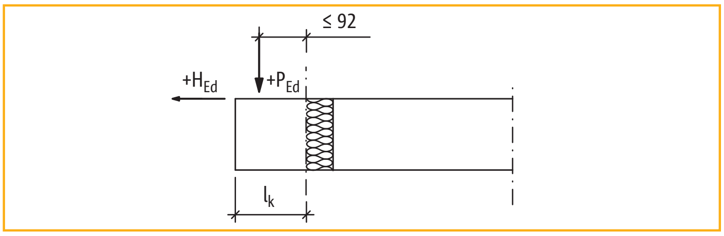
Tension rods	3 ø 6 mm
Pressure bearings	2 ø 12 mm
Shear force rods	2 ø 10 mm

Design values for C20/25		
for	[kN/element]	
Wind-pressure	$-2.50 \leq H_{Ed} \leq 0$	$P_{Rd} = 17.95$
		at $P_{Ed} \geq +2.06 \times H_{Ed}$
Wind-suction	$0 < H_{Ed} \leq 1.80$	$P_{Rd} = 0.38 \times (47.56 - H_{Ed})$
		at $P_{Ed} \geq 10 \times H_{Ed}$

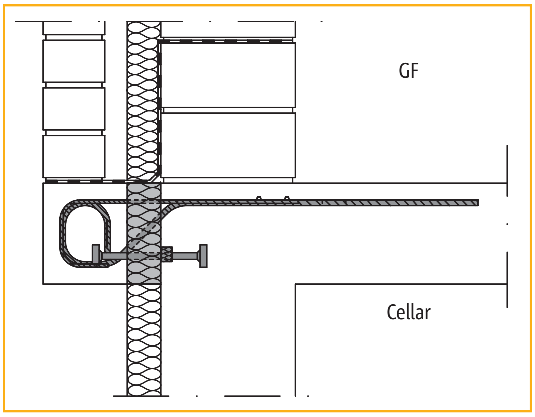
Design values for C20/25		
for	[kN/element]	
Wind-pressure	$-3.14 \leq H_{Ed} \leq 0$	$P_{Rd} = 22.56$
		at $P_{Ed} \geq +2.06 \times H_{Ed}$
Wind-suction	$0 < H_{Ed} \leq 2.26$	$P_{Rd} = 0.38 \times (59.77 - H_{Ed})$
		at $P_{Ed} \geq 10 \cdot H_{Ed}$



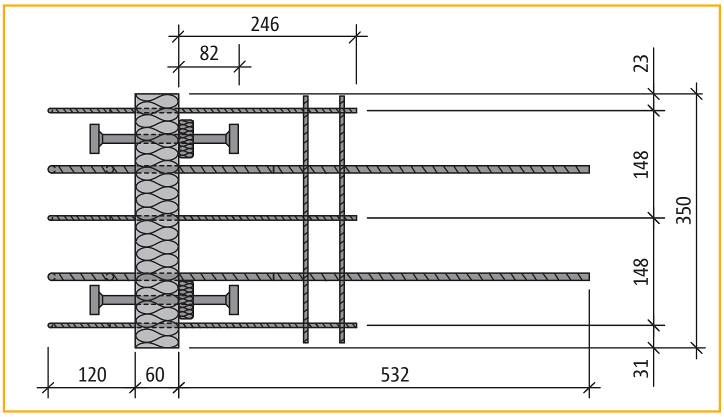
Cross-section through inner slab console and clinker mounting



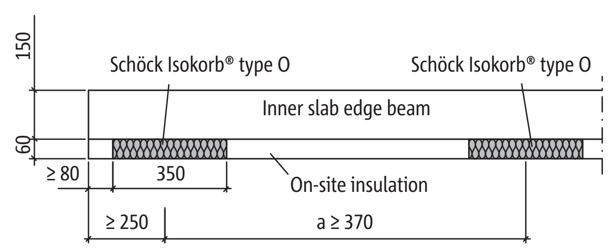
Static system

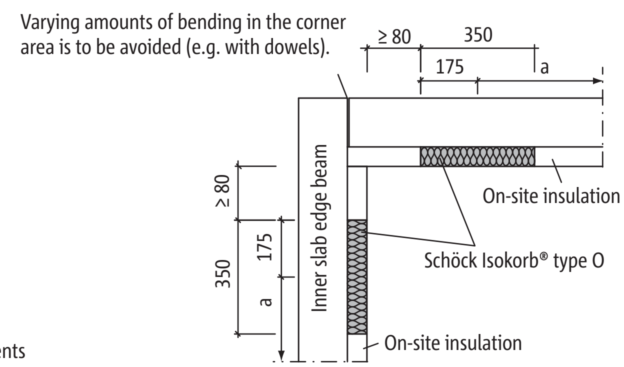


Cross-section between clinker mounting and cellar wall



Plan view: Schöck Isokorb® type O





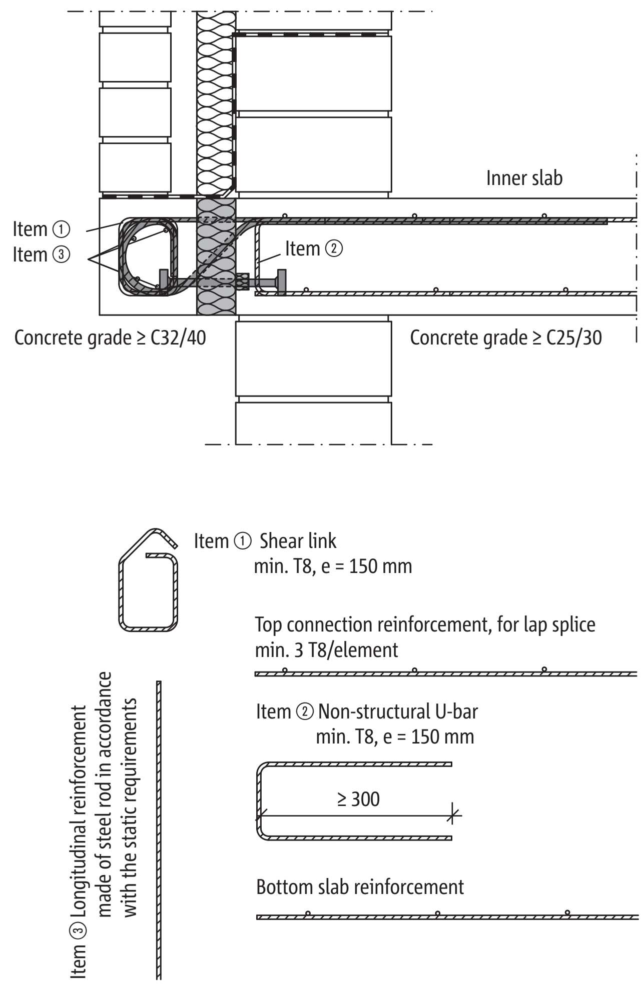
- The inner slab edge beam needs to be verified as a continuous beam.
- a = distance between elements in accordance with the static requirements

Distance between elements

Schöck Isokorb® type O

On-site reinforcement/Method statement/Expansion joint spacing/Notes

On-site reinforcement/Installation instructions



Operation procedure

1. Install the lower reinforcement of the inner slab with edge border item ②.
2. Install and align the Schöck Isokorb® type O. The distributor reinforcement of the Schöck Isokorb® type O can be cut through.
3. Install the upper reinforcement of the inner slab and connect it to the Schöck Isokorb® rods.
4. Position the on-site thermal insulation between the Schöck Isokorb® type O elements.
5. Install the beam reinforcement (items ① and ③).
6. During concreting it is important to ensure that the position of the Schöck Isokorb® elements is secure.

Sliding foil should be used for the bearing of the facing brickwork on the inner slab edge beam in order to prevent variations in stress.
In comparison to a purely monolithic layout of the console, much greater vertical deformation takes place. This should be taken into account as required in the design and calculations of the facing brickwork.

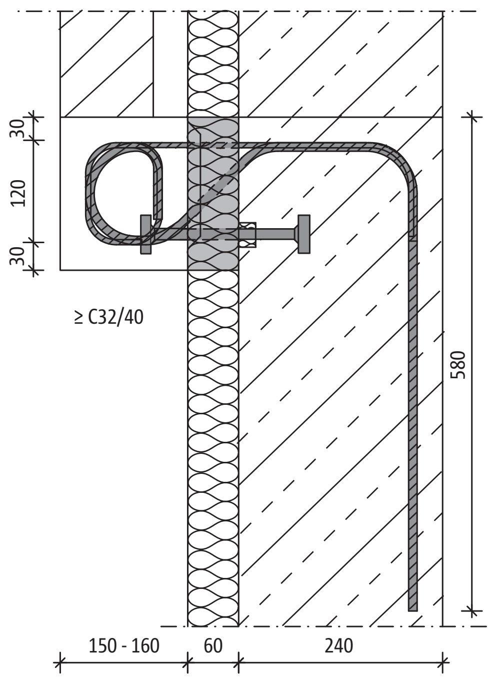
Expansion joint spacing

The expansion joint spacing e is generally 7.80 m.
In the case of layouts which go around a corner the max. element length is e/2 = 3.90 m.

Notes

- Concrete strength class for outside components at least C32/40 (see page 30).
- The inner slab edge beam needs to be verified as a continuous beam by the engineer in charge of the planning of the load-bearing structure.
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd,\,max}$, whereby $V_{Rd,\,max}$ is to be determined according BS EN 1992-1-1, equation (6.9), for $\theta = 45°$ and $\alpha = 90°$.

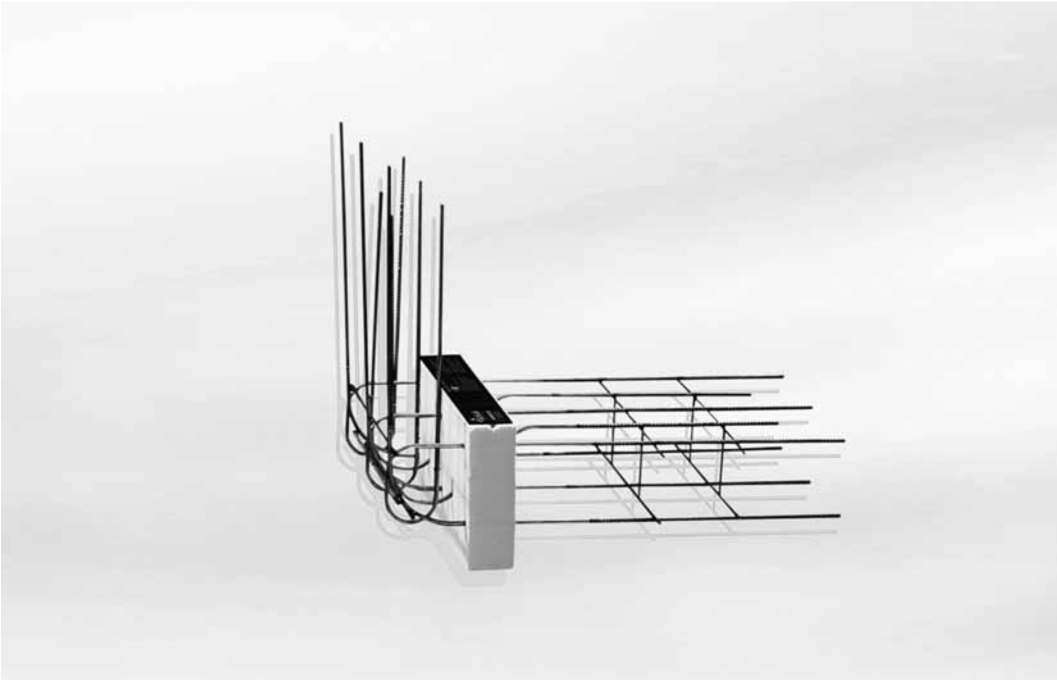
Schöck Isokorb® type O
Connection layout



Connection of Schöck Isokorb® type O-WU 24 in the wall area without adjacent inner slab - special design

Other special designs are available on request.
Please call us on 0845 241 3390.

Schöck Isokorb® type F



Schöck Isokorb® type F

F

Reinforced concrete-to-reinforced concrete

Contents

Page

Schöck Isokorb® type F

Element arrangement/Design values/Cross-section

F

Reinforced concrete-to-reinforced concrete

Dimensions

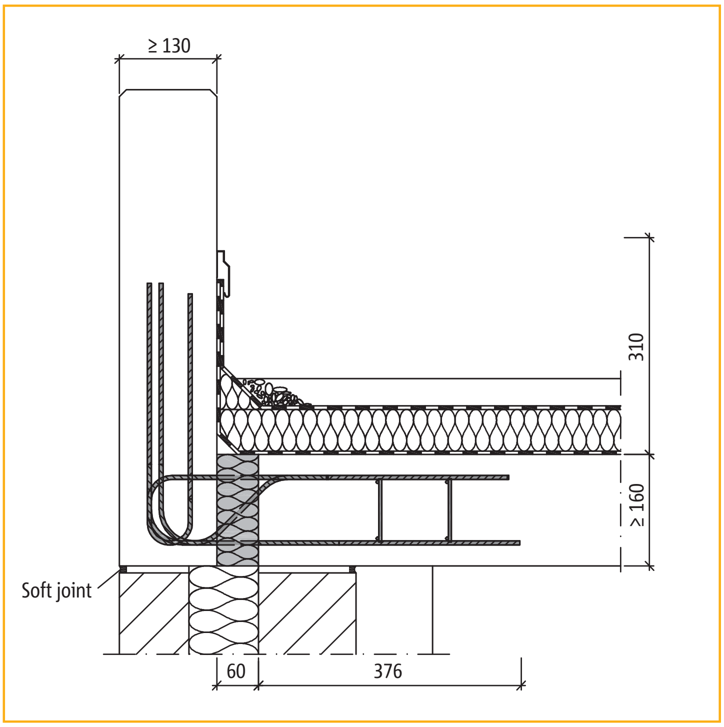
Element height	160 - 250 mm
Element length	350 mm
Insulation material thickness	60 mm

Reinforcement

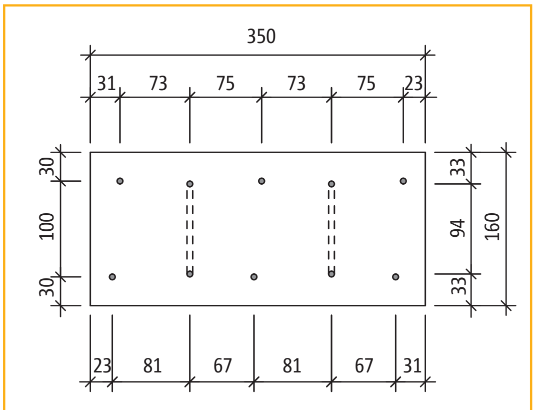
Tension rods	3 ø 6 mm
Compression bars	3 ø 6 mm
Shear force rods	2 ø 6 mm

Design values for ≥ C25/30

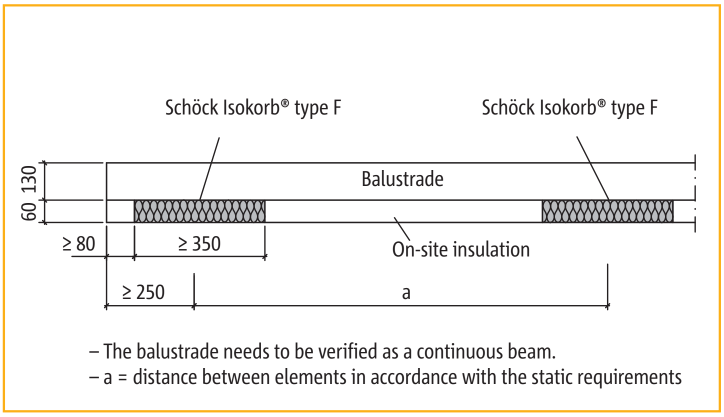
V_{Rd} = +16.0 kN per element
$M_{Rd} \leq \pm 2.0$ kNm per element



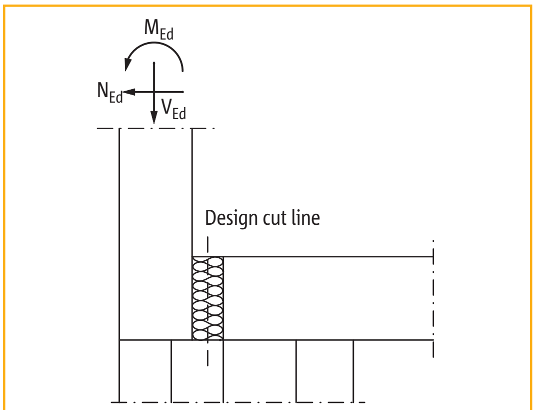
Cross-section through attic slab



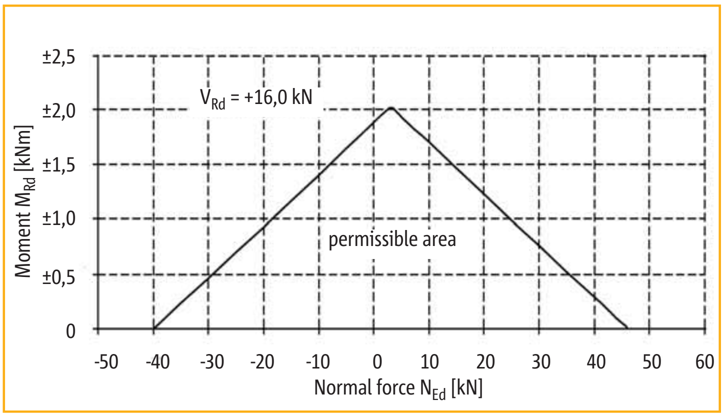
Section A - A



Distance between elements



Structural system

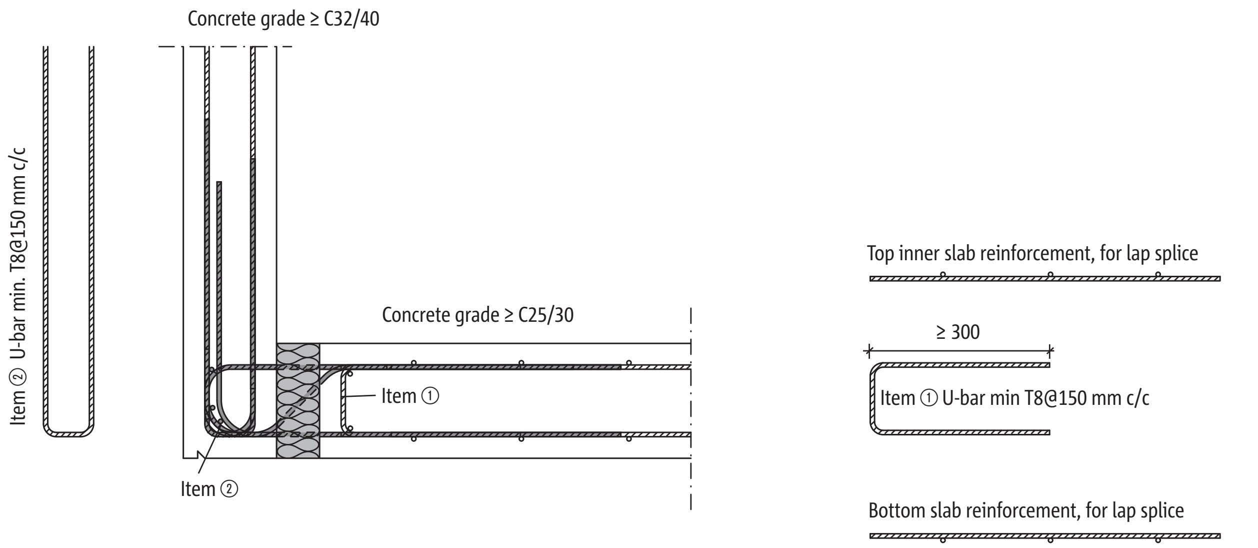


Interaction diagram for Schöck Isokorb® type F

Schöck Isokorb® type F

On-site reinforcement/Expansion joint spacing/Notes

Additional on-site reinforcement



Expansion joint spacing

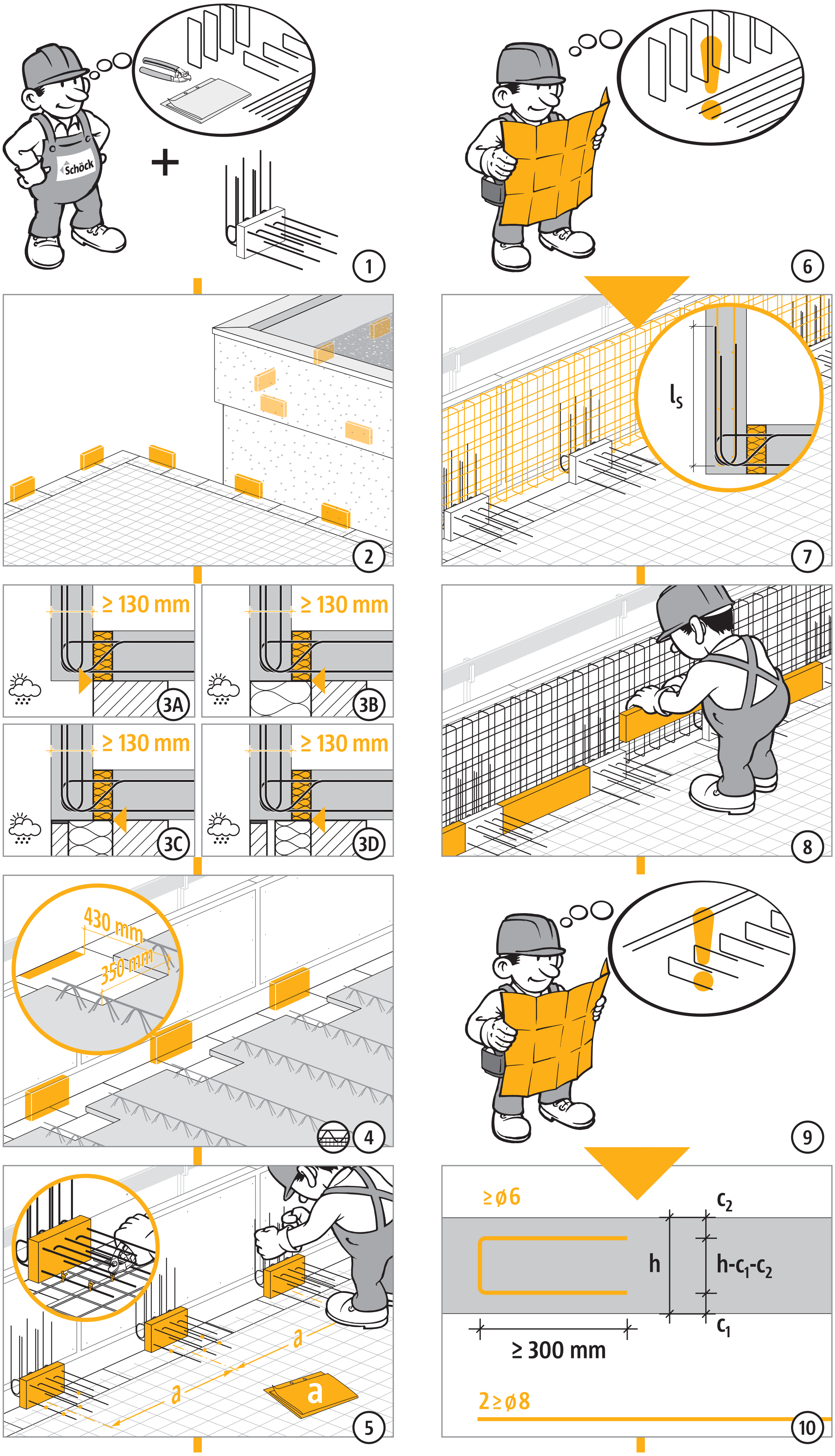
The expansion joint spacing e is generally 7.80 m.
In the case of layouts which go around a corner the max. element length is e/2 = 3.90 m.

Note

- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd,\,max}$, whereby $V_{Rd,\,max}$ is to be determined according to BS EN 1992-1-1, equation (6.9), for θ = 45° and α = 90°.

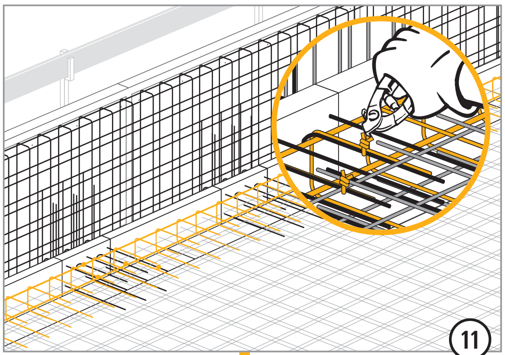
Schöck Isokorb® type F

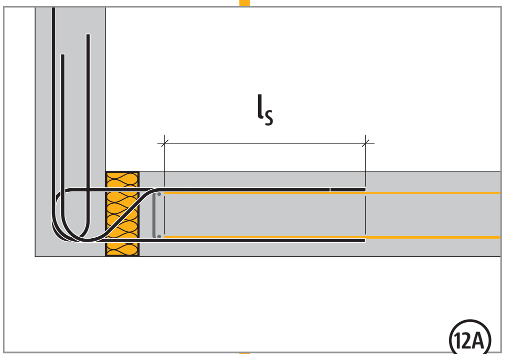
Method statement

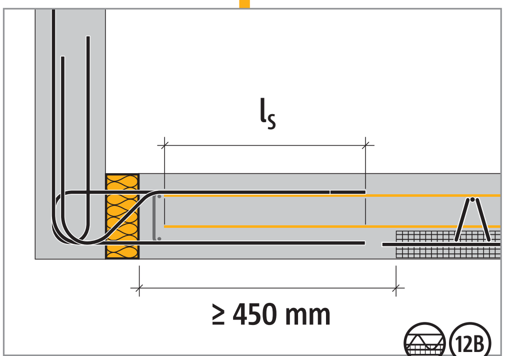


Schöck Isokorb® type F

Method statement







Schöck Isokorb® type A

Schöck Isokorb® type A

A

Reinforced concrete-to-reinforced concrete

Contents

Page

Schöck Isokorb® type A

Element arrangement/Design values/Cross-section

Dimensions

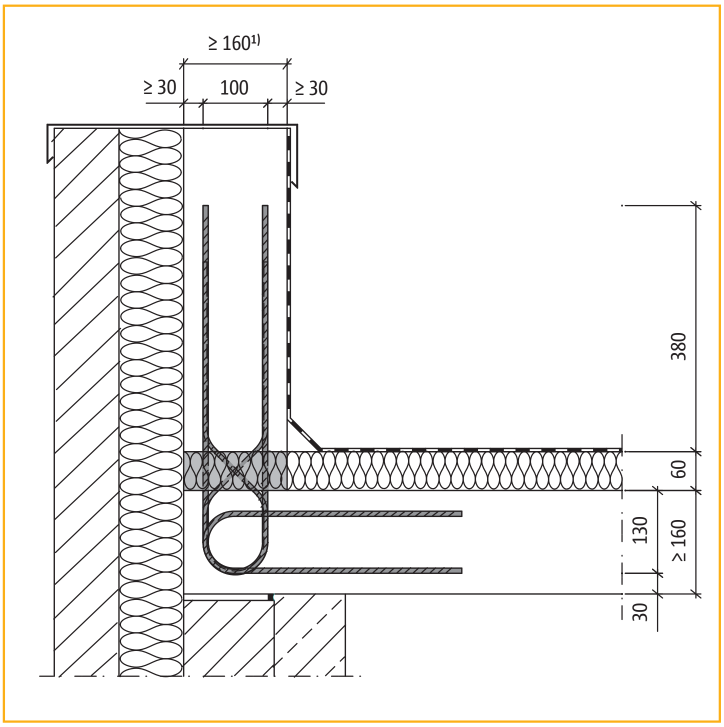
Element thickness	160 - 250 mm
Element length	350 mm
Insulation material thickness	60 mm

Reinforcement

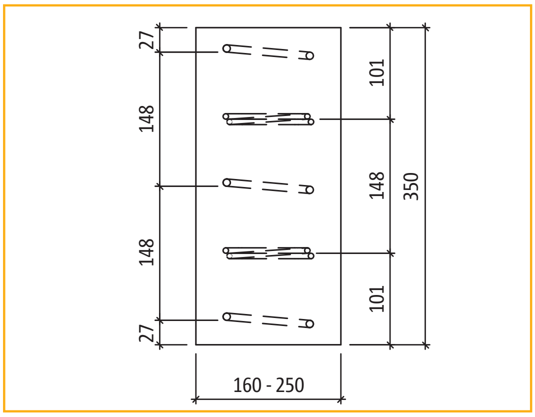
Tension rods BSt 500NR	2 x 3 ø 8 mm
Shear force rods BSt 500NR	2 x 2 ø 6 mm

Design values for ≥ C25/30

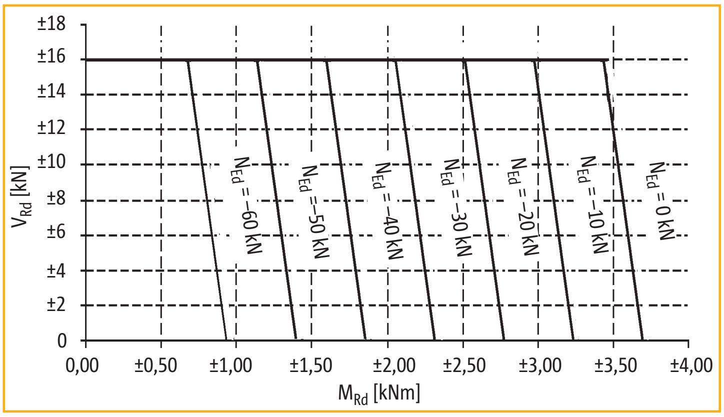
V_{Rd} = +16.0 kN per element
M_{Rd} see interaction diagram



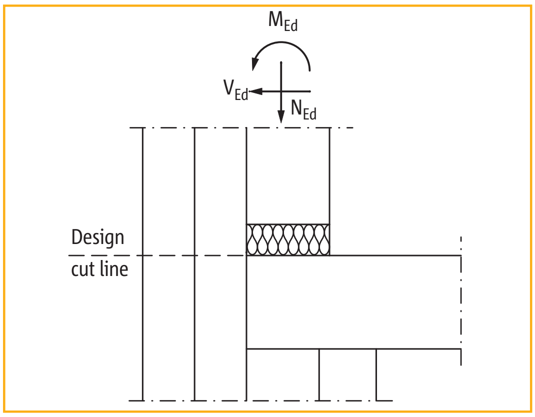
Cross-section through RC slab with RC upstand
[1)] *Minimum dimension for CV 30 mm on both sides*



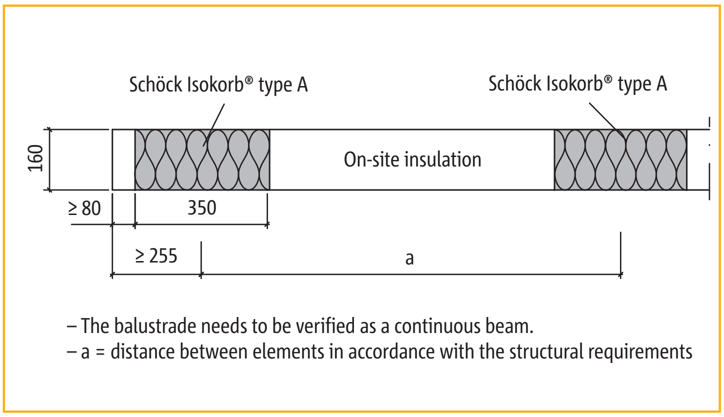
Plan view



Interaction diagram for Schöck Isokorb® type A



Structural system



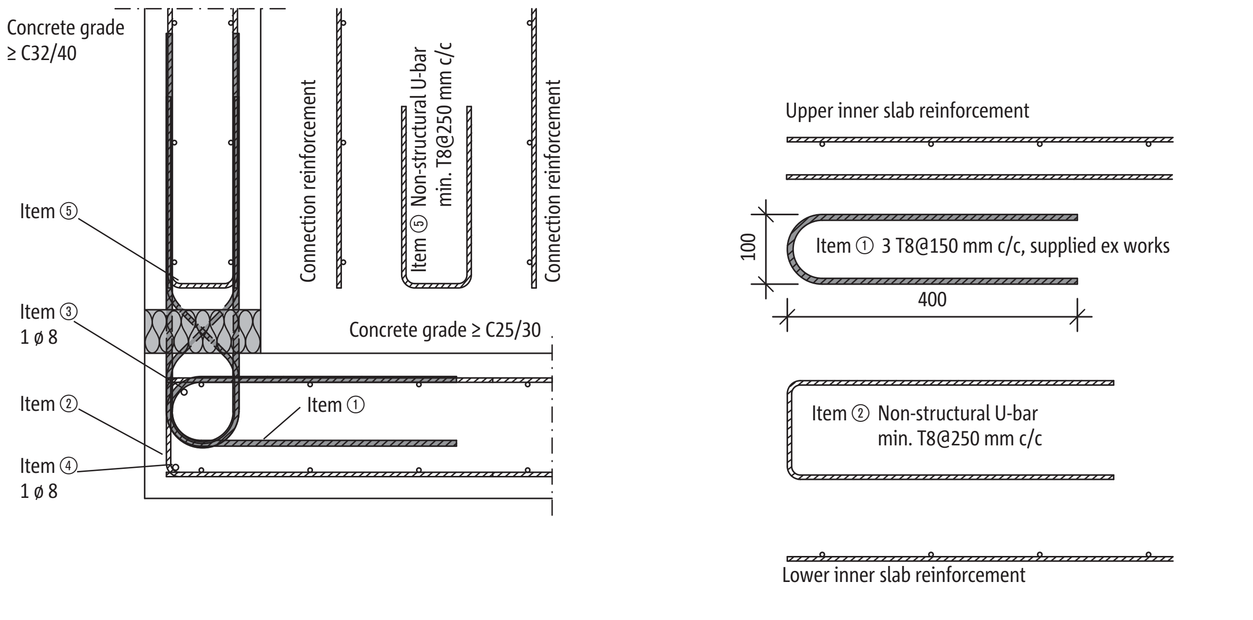
Distance between elements

A

Reinforced concrete-to-reinforced concrete

On-site reinforcement/Expansion joint spacing/Notes

Additional on-site reinforcement



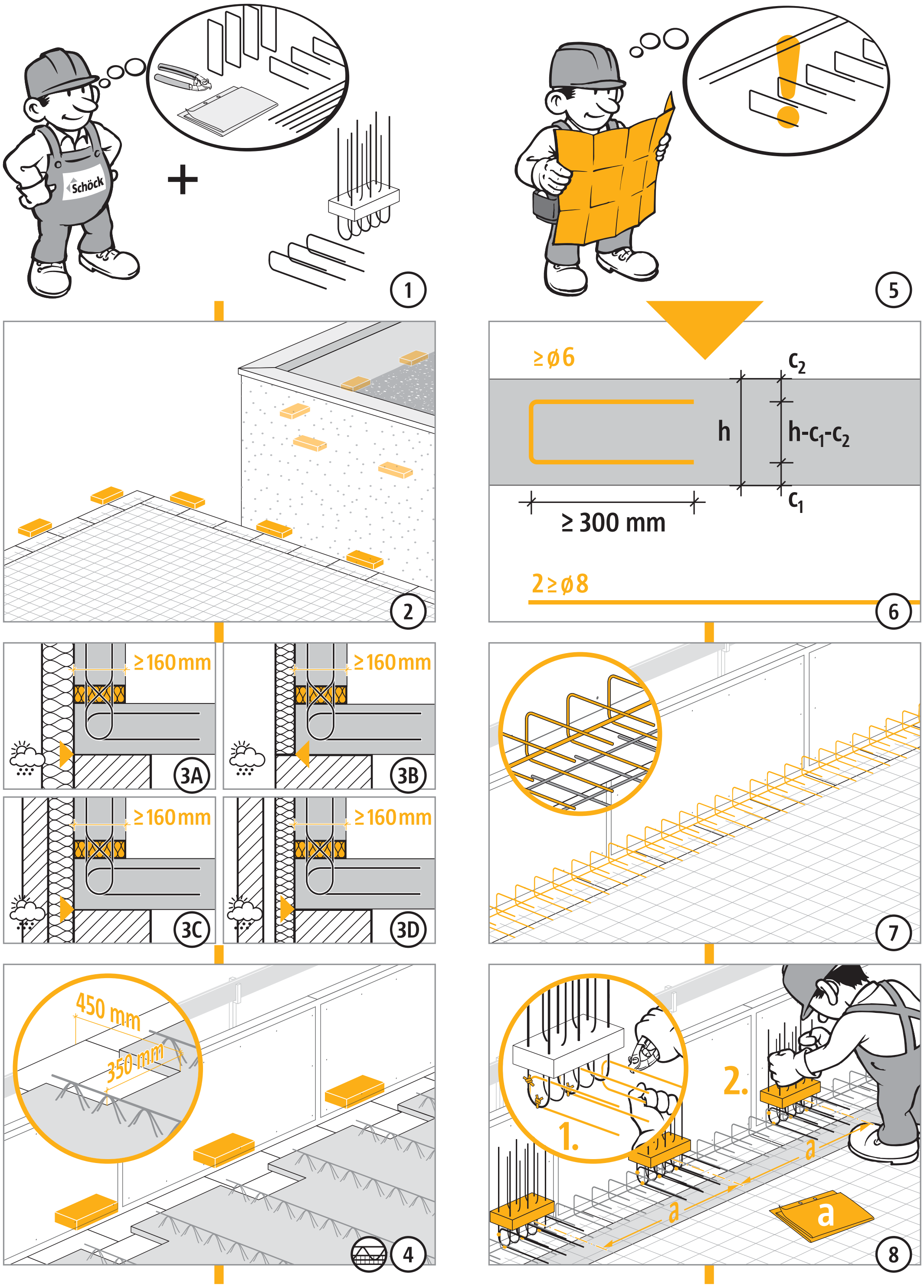
Expansion joint spacing

The expansion joint spacing e is generally 7.80 m.
In the case of layouts which go around a corner the max. element length is e/2 = 3.90 m.

Note

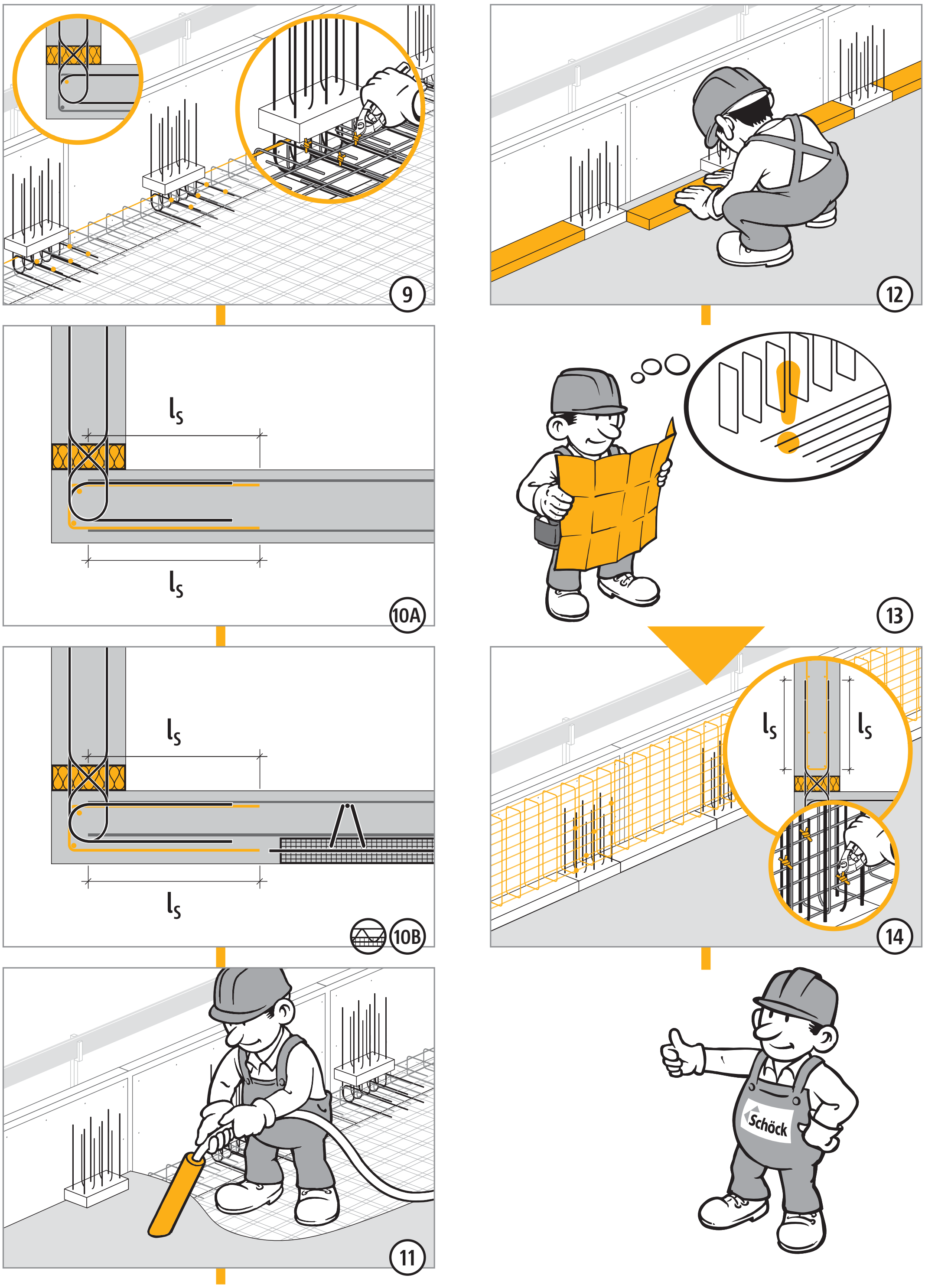
- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd, max}$, whereby $V_{Rd, max}$ is to be determined according to BS EN 1992-1-1, equation (6.9), for $\theta = 45°$ and $\alpha = 90°$.

Schöck Isokorb® type A
Method statement

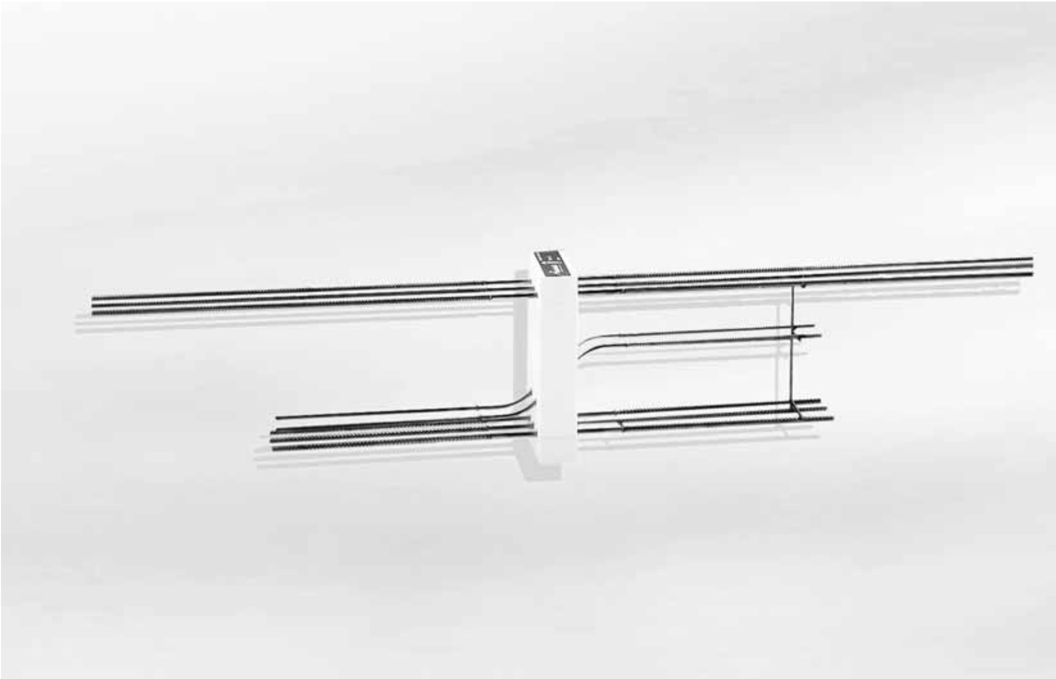


Schöck Isokorb® type A

Method statement



Schöck Isokorb® type S

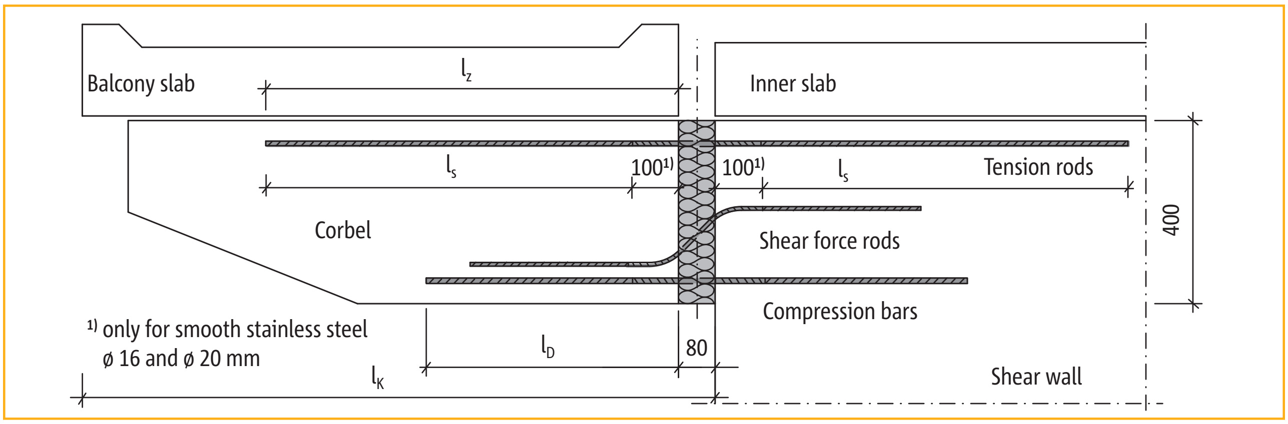


Schöck Isokorb® type S

Contents

Schöck Isokorb® type S

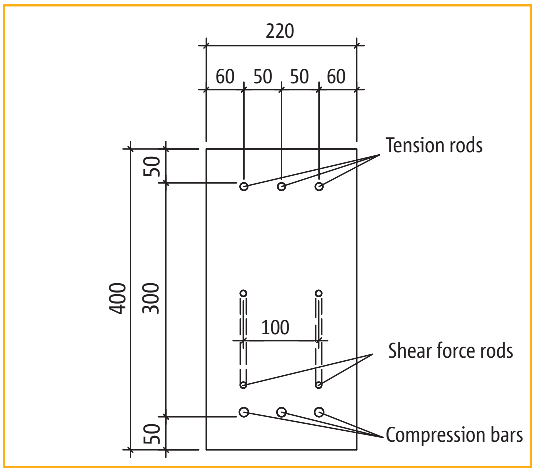
Cross-section/Element arrangement/Capacity table



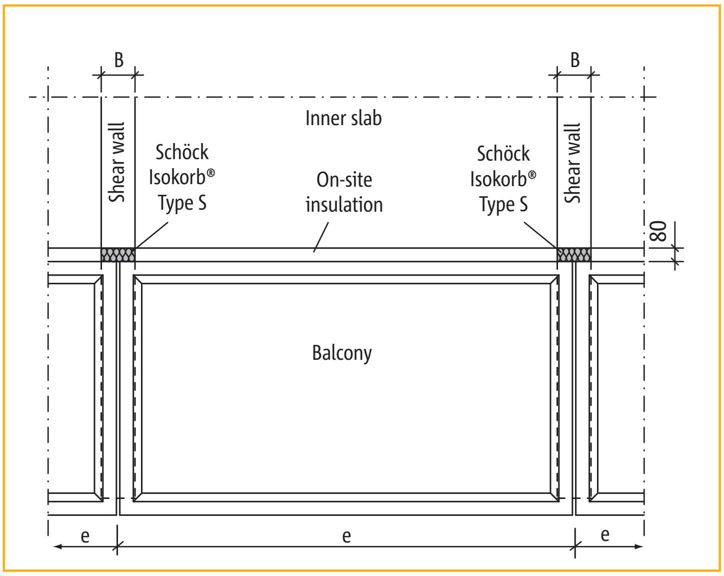
Cross-section

Dimensions

Element width	B = 220 mm
Element height	H = 400 mm
Insulation material thickness	T = 80 mm



View



Plan view: Element arrangement

Capacity table for ≥ C25/30. Concrete grade for outside components ≥ C32/40.

Schöck Isokorb® type	Reinforcement	High bond condition (standard version)		Low bond condition area II		M_{Rd} [kNm]	V_{Rd} [kN]	Mounting reinf. Item ③ req. A_s [mm²]
		l_z [mm]	l_D [mm]	l_z [mm]	l_D [mm]			
S1	3 ø 10 tension rods 2 ø 8 Q-rods 3 ø 12 compression bars	595	550	900	550	–27.5	+24.9	57
S2	3 ø 12 tension rods 2 ø 10 Q-rods 3 ø 14 compression bars	740	595	1060	565	–37.0	+38.9	89
S3	3 ø 14 tension rods 2 ø 12 Q-rods 3 ø 16 compression bars	850	650	1220	650	–48.1	+56.0	129
S4	3 ø 16 tension rods 2 ø 14 Q-rods 3 ø 20 compression bars	1340	875	1860	770	–75.7	+76.2	175

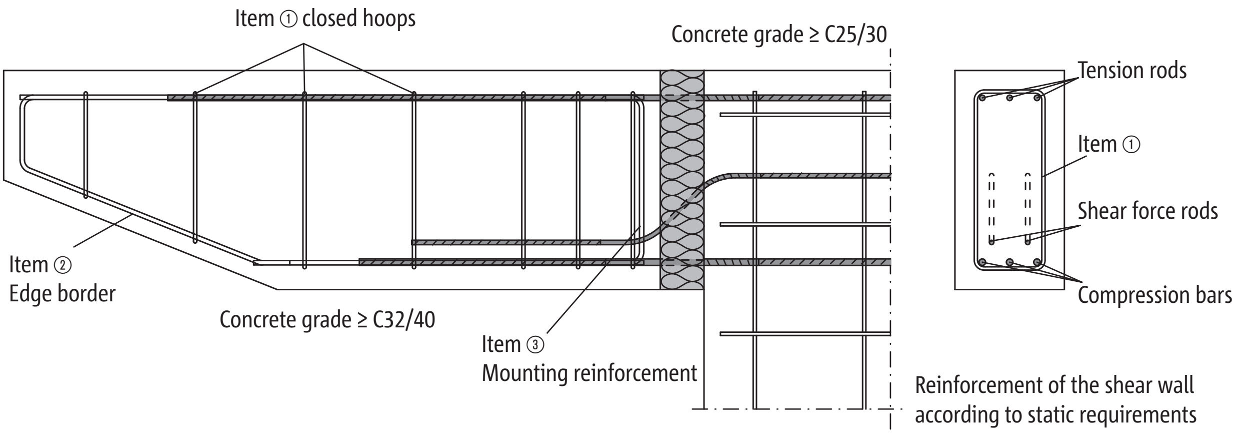
The determination of the anchoring lengths is based on bond area I. The reinforcing bars can also be designed according to bond area II on request.

Schöck Isokorb® type S Standard is used as an example for a potential application. For other solutions please contact our Technical Design Department on 0845 241 3390.

Schöck Isokorb® type S

On-site reinforcement/Expansion joint spacing/Note

Additional on-site reinforcement



Expansion joint spacing e in [m]

Insulation material thickness [mm]	Schöck Isokorb® type			
	S1	S2	S3	S4
80	11.3 m	10.1 m	9.2 m	8.0 m

In the case of layouts which go around a corner the max. element length is e/2.

The spacing between expansion joints can be increased if there is no fixed connection between balcony slab and cantilever beam, e.g. by inserting a sliding foil.

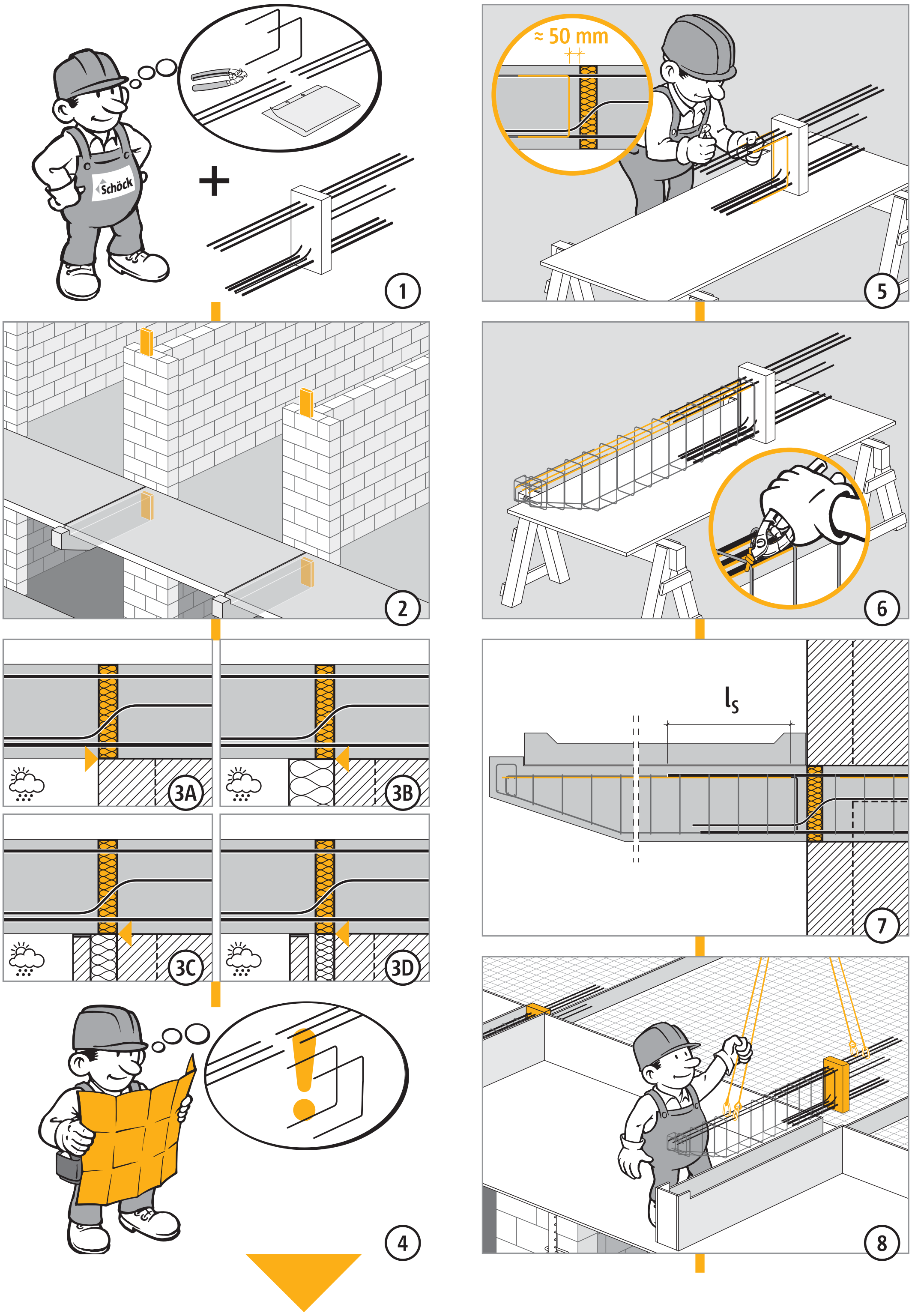
Note

- The lateral force load bearing capacity of the slabs at the limits of load-bearing capacity is to be limited to 0.3 $V_{Rd, max}$, whereby $V_{Rd, max}$ is to be determined according to BS EN 1992-1-1, equation (6.9), for θ = 45° and α = 90°.

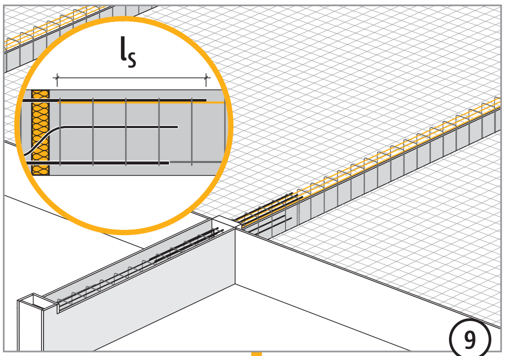
S

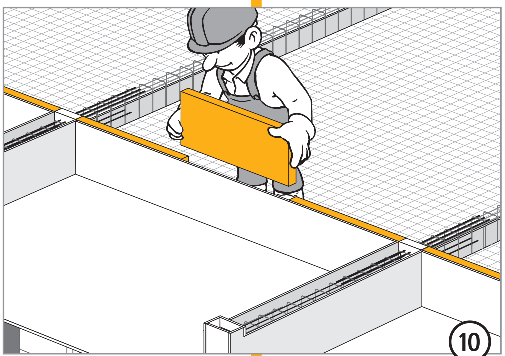
Reinforced concrete-to-reinforced concrete

Schöck Isokorb® type S
Method statement



Schöck Isokorb® type S
Method statement





Schöck Isokorb® type W

Schöck Isokorb® type W

W

Reinforced concrete-to-reinforced concrete

Contents

Schöck Isokorb® type W

Cross-section/Element arrangement/Capacity table

Dimensions

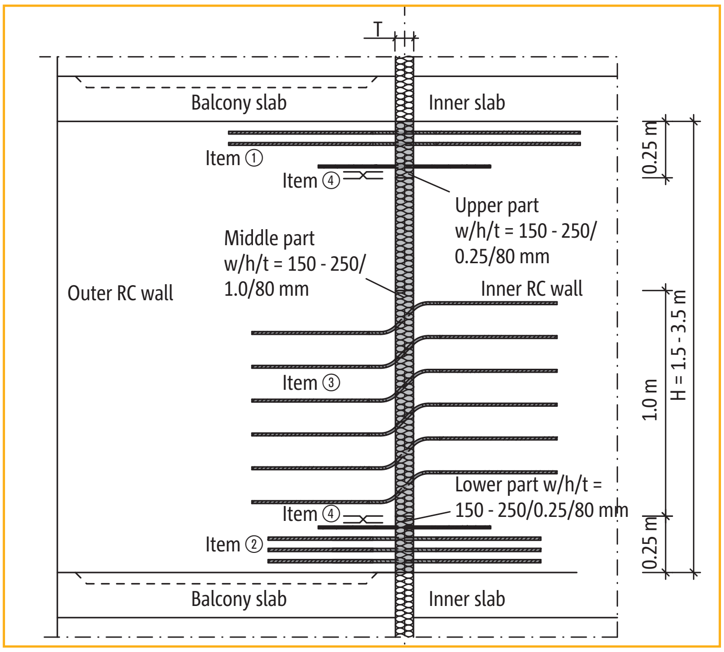
Element width, variable
B = 150 - 250 mm

Element height, variable
H = 1.5 - 3.5 m

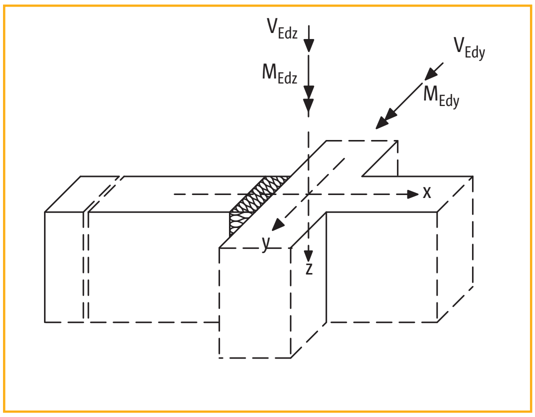
Insulation material thickness
T = 80 mm

Please specify your required dimensions when placing an order. Other dimensions available on request.

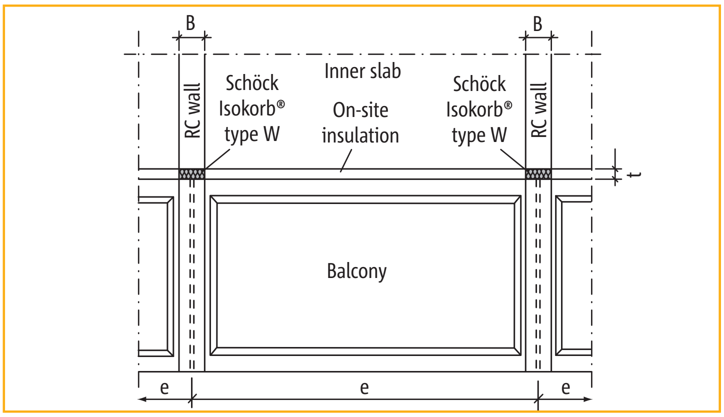
Schöck Isokorb® elements comprise at least three partial elements.
Depending on the static requirements you can choose from 4 standard elements (see table).



Cross-section



View



Plan view: Element arrangement

Capacity table for ≥ C25/30. Concrete grade for outside components ≥ C32/40.

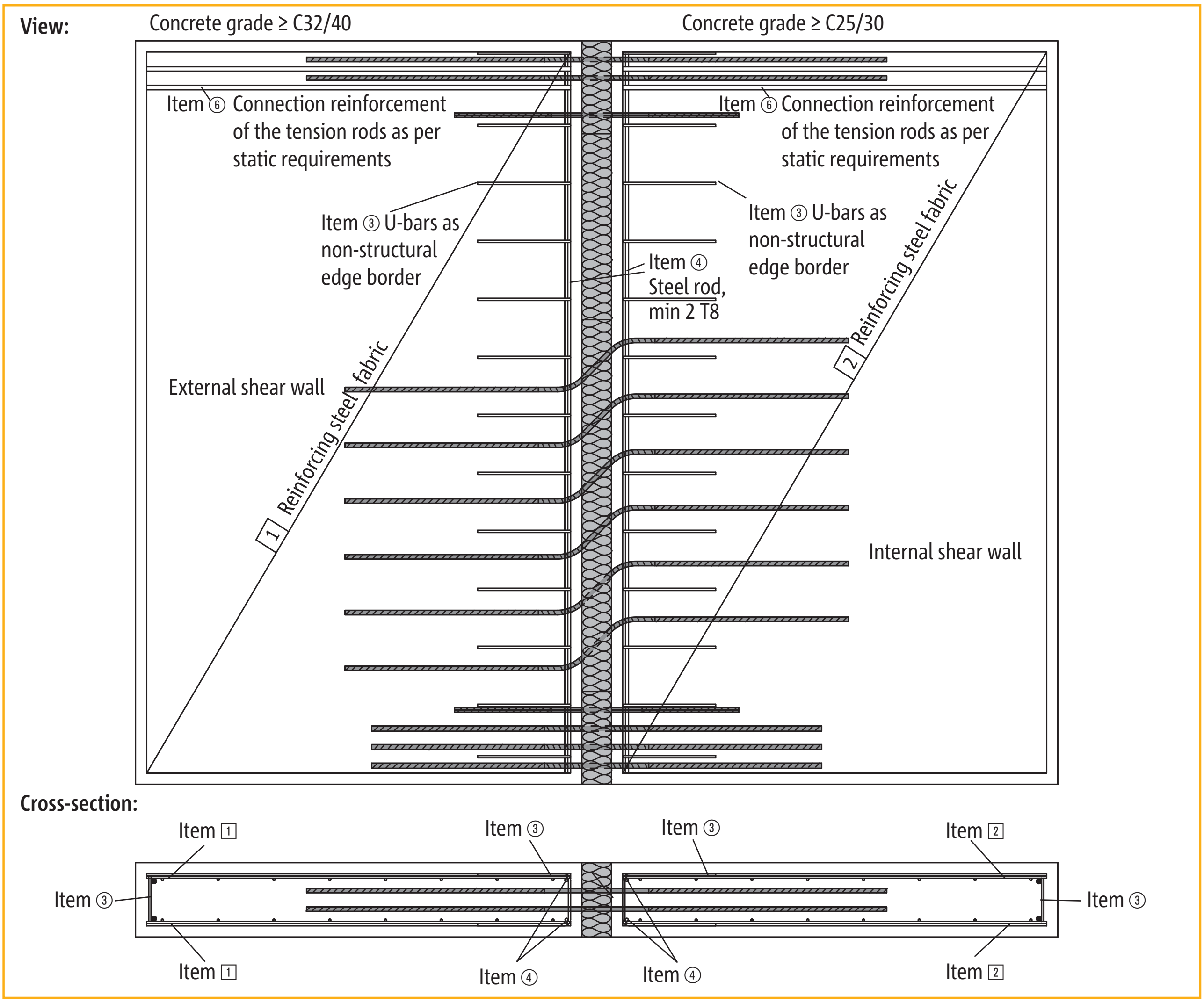
Schöck Isokorb® type	Reinforcement			Member forces				
	Tensile force	Compression	Shear force	M_{Rdy} [kNm]			V_{Rdz} [kN]	Mounting reinf. Item ④ req. A_s [mm²]
	Item ①	Item ②	Item ③+④	Height 1.5 - 2,0 m	Height 2.0 - 2.5 m	Height > 2.5 m		
W1	4 ø 6	6 ø 8	6 ø 6 2 x 2 ø 6	–62.7	–86.3	–110.0	+42.0	97
W2	4 ø 8	6 ø 10	6 ø 8 2 x 2 ø 6	–107.8	–148.5	–189.2	+74.6	172
W3	4 ø 10	6 ø 12	6 ø 10 2 x 2 ø 6	–153.9	–212.0	–270.1	+116.6	268
W4	4 ø 12	6 ø 14	6 ø 12 2 x 2 ø 6	–207.6	–285.9	–364.2	+143.1	386
				$M_{Rdz} = 0$	$V_{Rdy} = \pm 14.0$ kN (resulting e.g. from wind loads)			

Moments arising as a result of wind loads are absorbed by the stiffening effect of the balcony slabs. The determination of the anchoring lengths is based on bond area II. The reinforcing bars can also be designed according to bond area I on request.
Schöck Isokorb® type W Standard is used as an example for a potential application. For other solutions please contact our Technical Design Department on 0845 241 3390.

Schöck Isokorb® type W

On-site reinforcement/Expansion joint spacing/Note

Additional on-site reinforcement



Expansion joint spacing e in [m]

Insulation material thickness [mm]	Expansion joint spacing e [m]
80	10.1

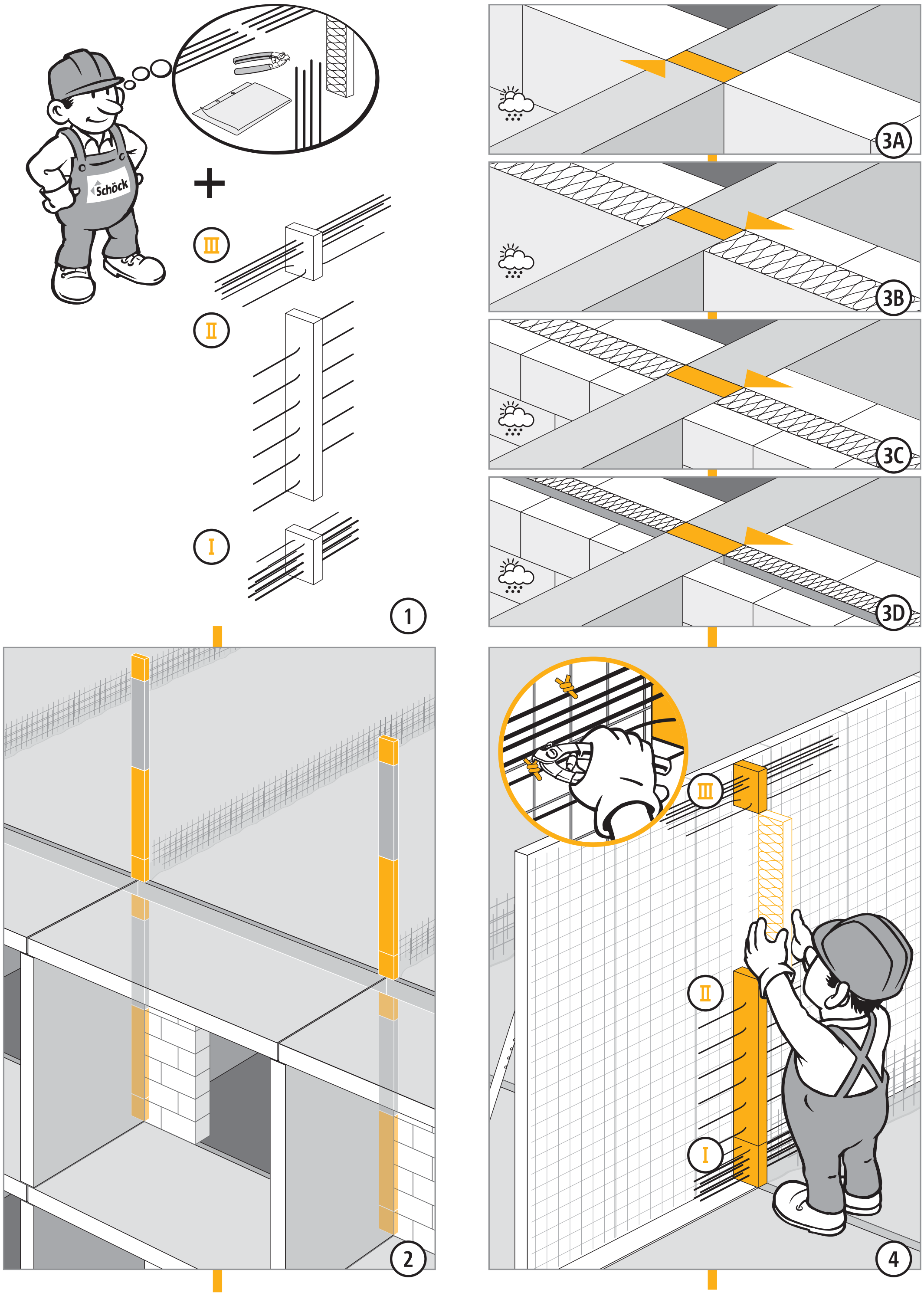
The spacing between expansion joints can be increased if there is no fixed connection between balcony slab and shear wall, e.g. by inserting a sliding foil.

Note

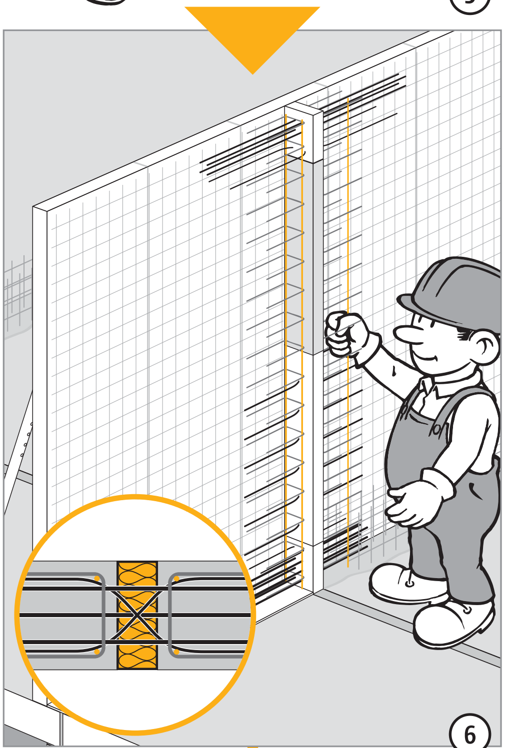
- Concrete strength class for outside components at least C32/40 (see page 30).

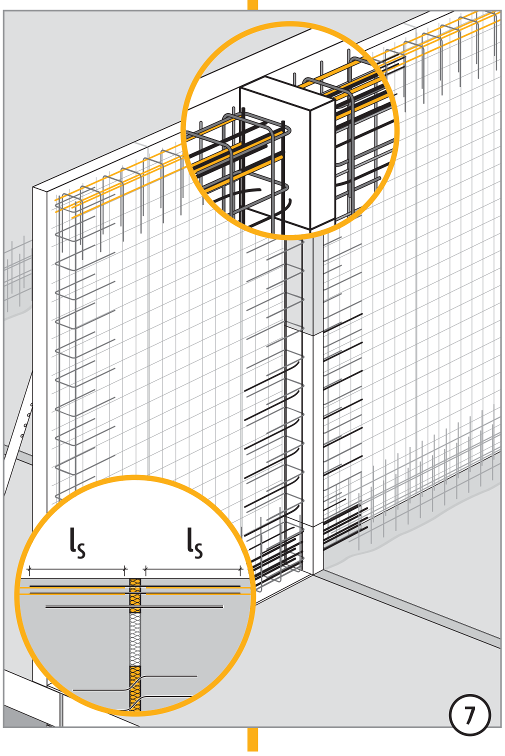
Schöck Isokorb® type W

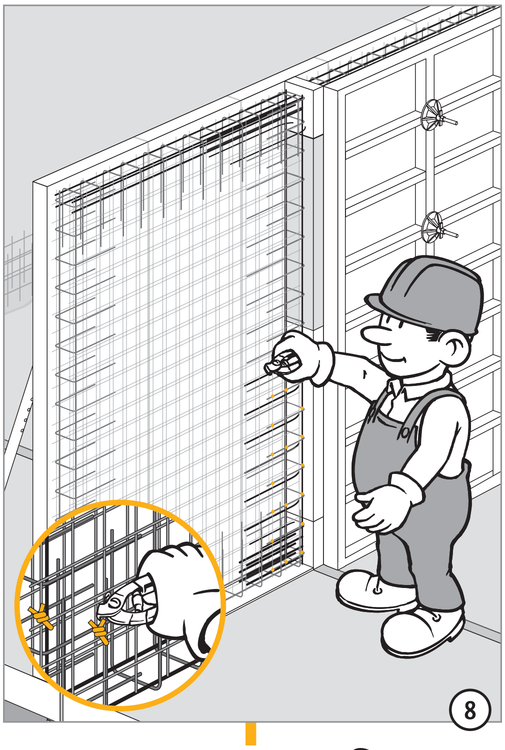
Method statement



Schöck Isokorb® type W
Method statement



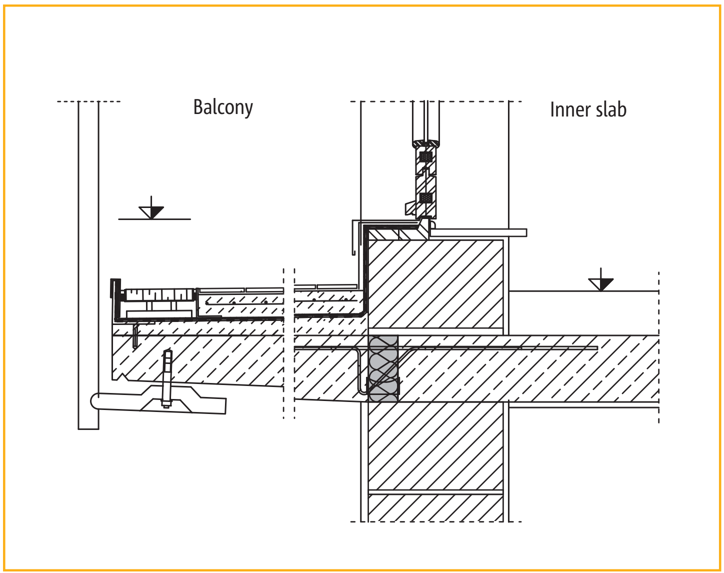




Schöck Isokorb®

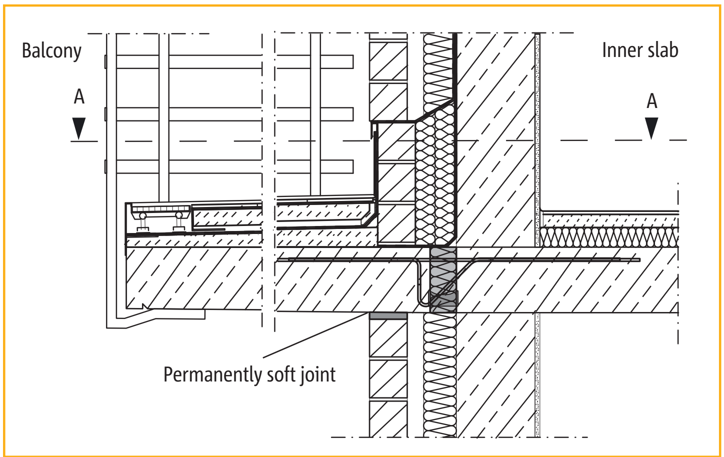
Construction details

Connection in the door area



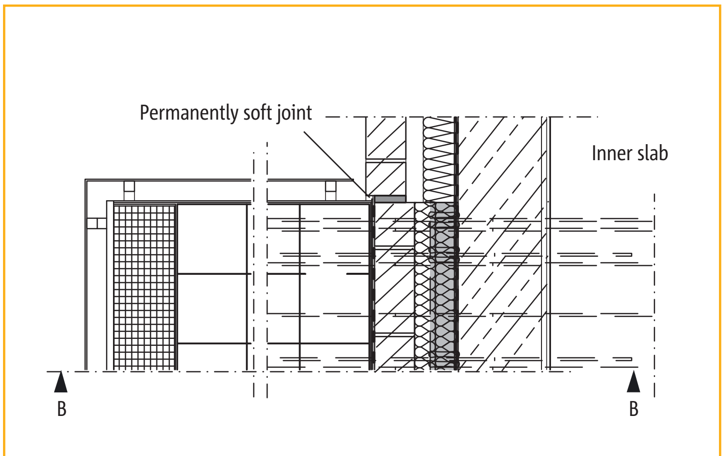
An additional insulating strip should be inserted in order to avoid thermal bridges in the area of the door.

Connection with a cavity wall structure

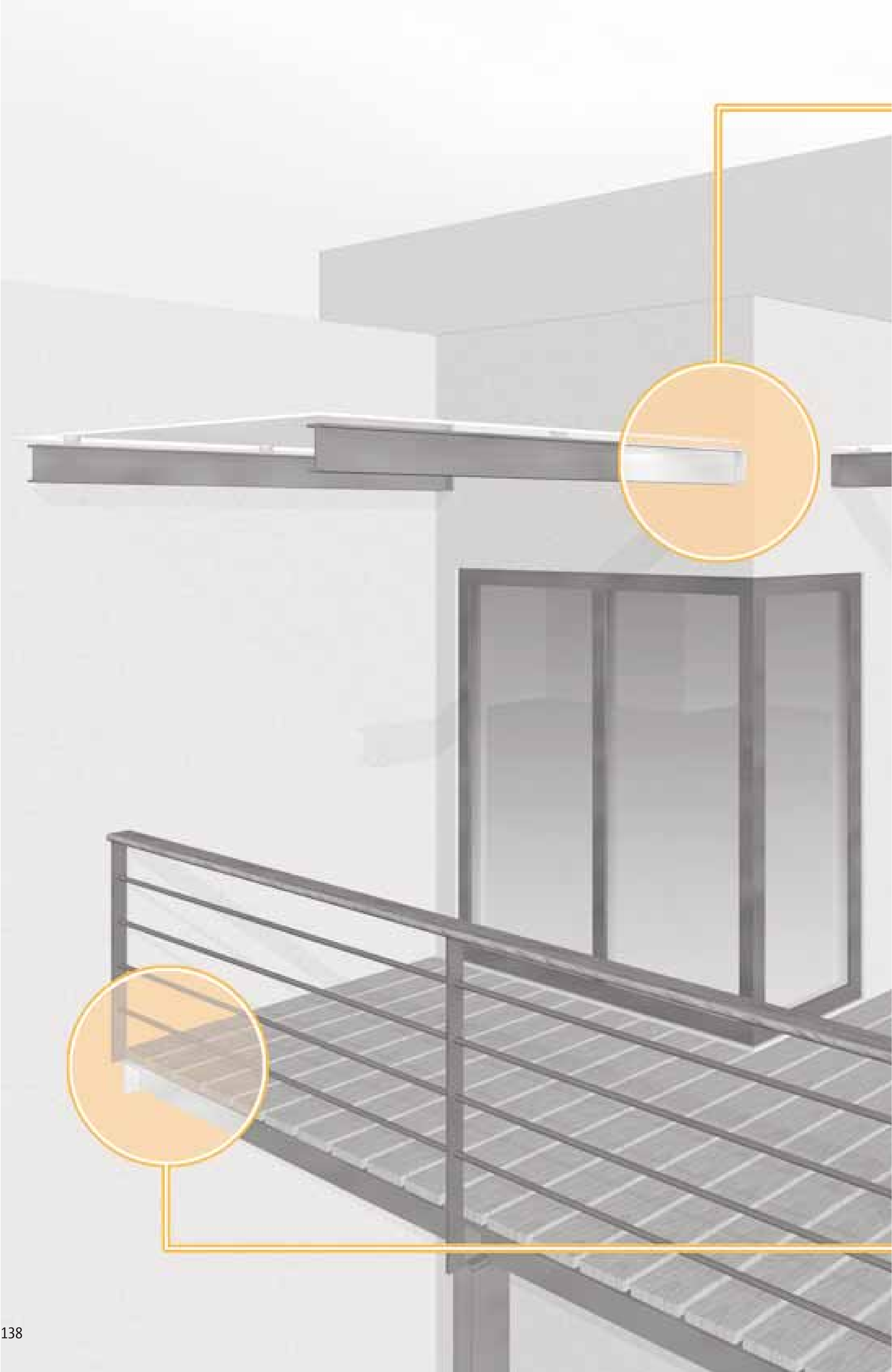


Cross-section B – B

Continuous expansion joints should be arranged in order to prevent cracks in the facing shell.



Cross-section A – A, plan view



Schöck Isokorb® type KS

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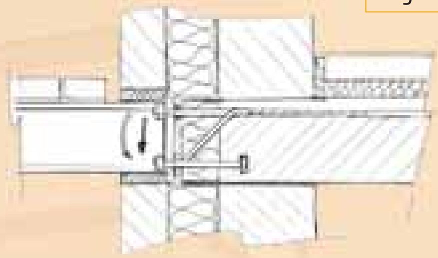

for the connection of cantilevered steel beams to reinforced concrete.

Schöck Isokorb® type QS

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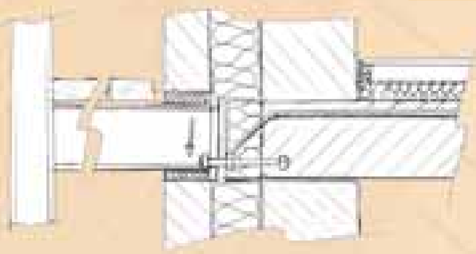


for the connection of supported steel beams to reinforced concrete.

Schöck Isokorb® type KS
Materials/Anti-corrosion protection/Fire protection/Designations

Schöck Isokorb® type KS - materials

Concrete	Minimum concrete strength class C25/30 on the inner slab side
Reinforcing steel	B 500 B acc. to BS 4449, and BSt 500 NR
Pressure bearings in the concrete	S 235 JRG 1, S 355 JO
Nonrusting steel	Material no.: 1.4401, 1.4404 and 1.4571 S 355 according to approval no.: Z-30.3-3 Components and connecting devices made of nonrusting steels
Pressure plate for external application	Material no.: 1.4404 and 1.4571 or higher grade, e.g. 1.4462
Spacer shims	S 235
Insulating material	Polystyrene hard foam, λ = 0,035 W/(m · K)

Anti-corrosion protection

- The nonrusting steel used for Schöck Isokorb® type KS corresponds to the material no.: 1.4401, 1.4404, 1.4571 or 1.4462. So the KS 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 KS in conjunction with a galvanised or paint treated end 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 this relates to the Schöck products.

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 KS or to any components situated inside the insulating layer.
For more information please contact our design department on 0845 241 3390.

Designations used in planning documents
(structural calculatios, specification documents, implementation, order), e.g. for H = 180 mm

Schöck Isokorb® type **KS14-H180**

Type + load range
Height of Isokorb

Schöck Isokorb® type KS

Schöck Isokorb® type KS 14 and KS 20

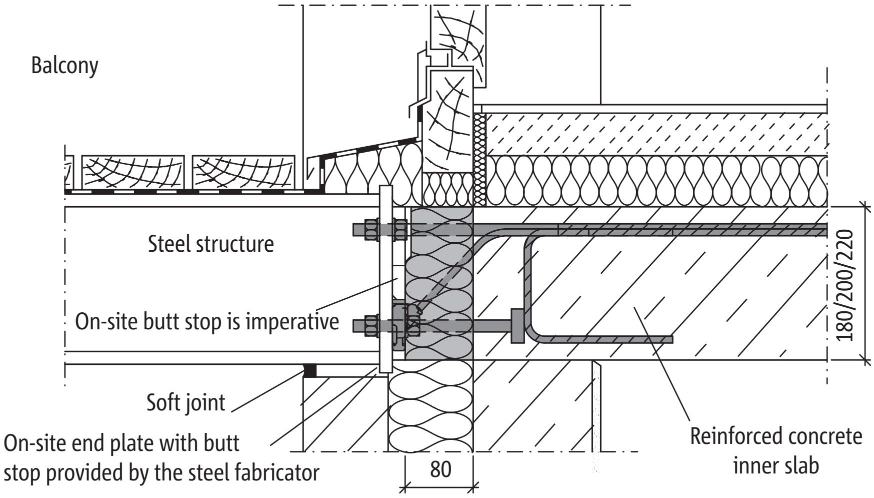
KS

Reinforced concrete-to-steel

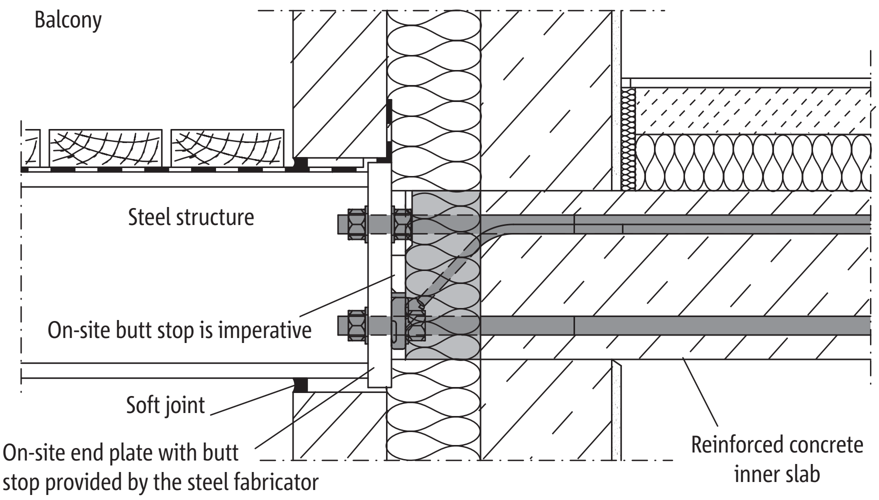
Contents

Schöck Isokorb® type KS

Connection layouts

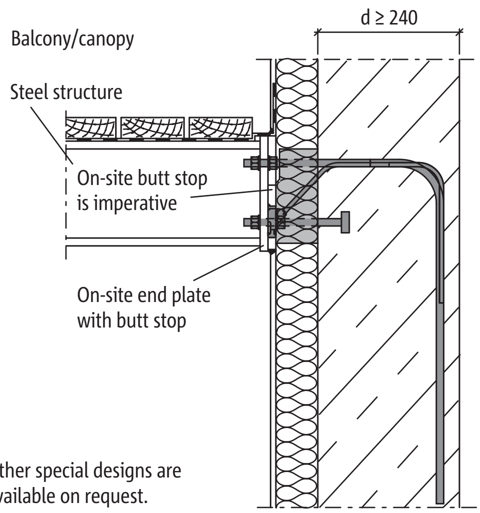


Connection with Schöck Isokorb® type KS 14 in a door area, cavity wall



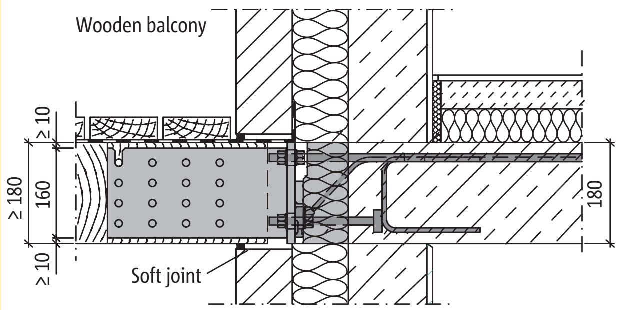
For designs with precast planks please note the special information at the bottom of page 149.

Connection with Schöck Isokorb® type KS 20 in a wall area, cavity wall



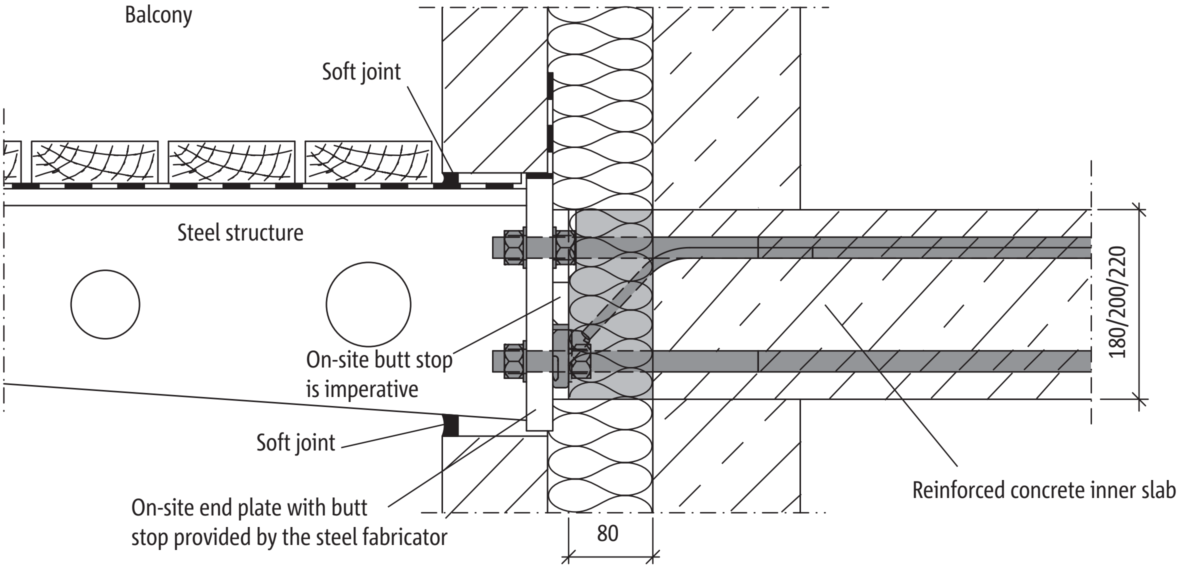
Other special designs are available on request.

Connection with Schöck Isokorb® type KS 14 in a wall area without adjacent inner slab - special design

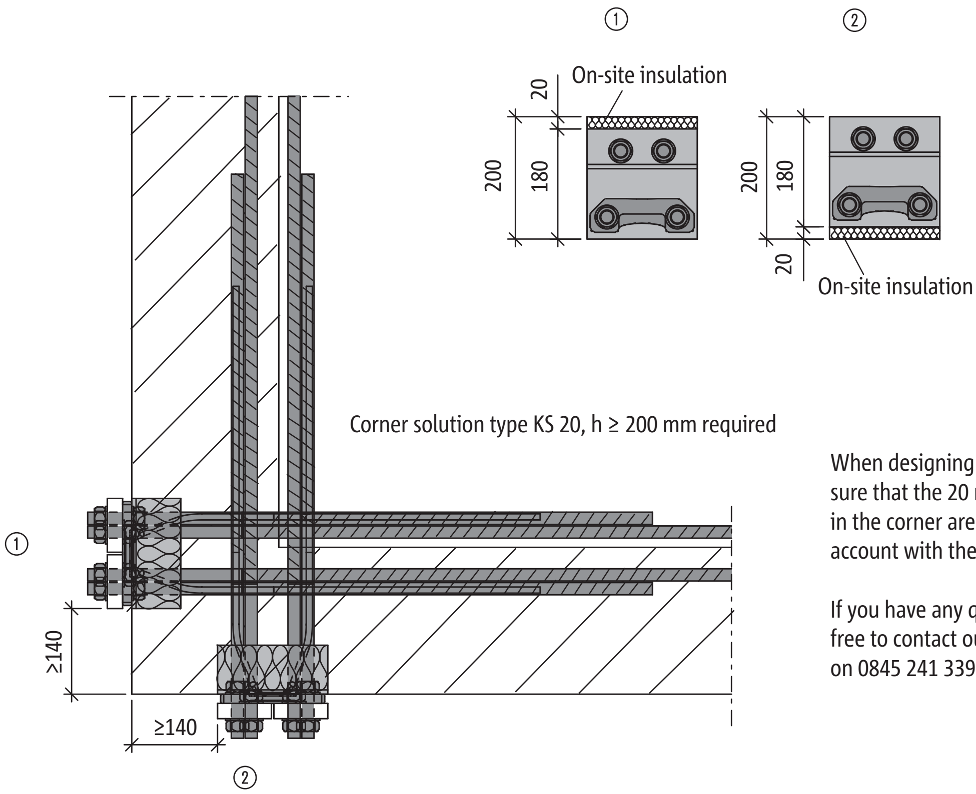


Connection with Schöck Isokorb® type KSH for thermal separation of wooden members from a reinforced concrete inner slab.

Schöck Isokorb® type KS
Connection layouts



Side view: Connection with Schöck Isokorb® type KS 20, cavity wall



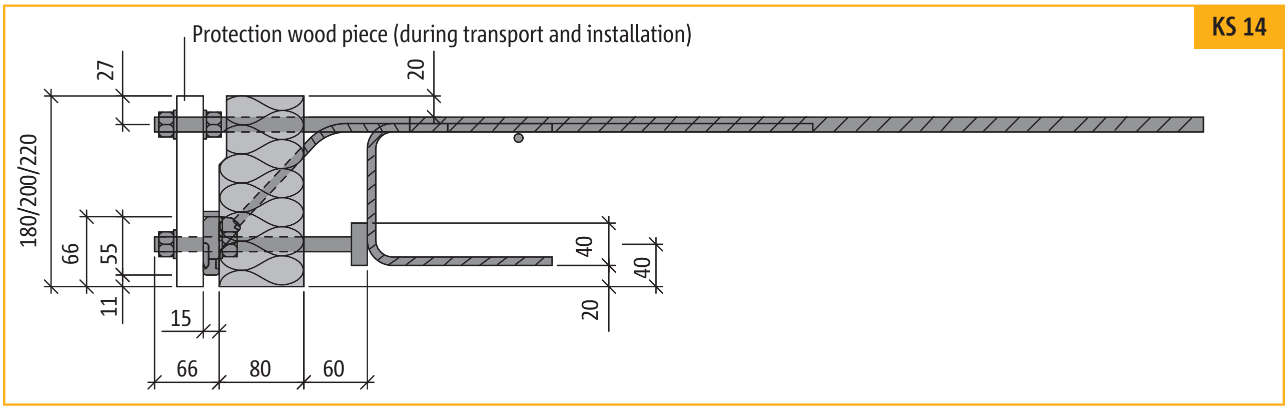
When designing a corner balcony, make sure that the 20 mm difference in height in the corner area is also taken into account with the on-site front plate.

If you have any questions, please feel free to contact our design department on 0845 241 3390.

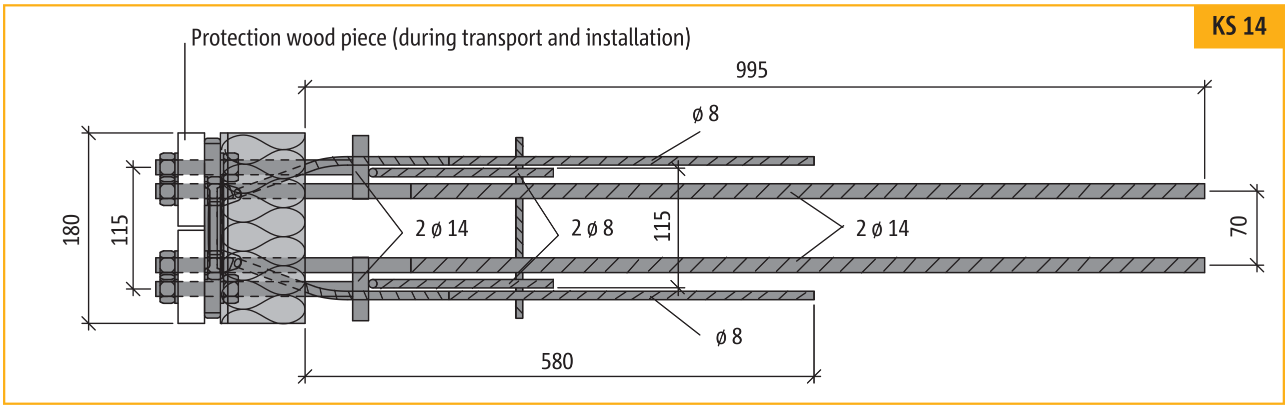
Plan view: Connection with Schöck Isokorb® type KS 20 in a corner area

Schöck Isokorb® type KS

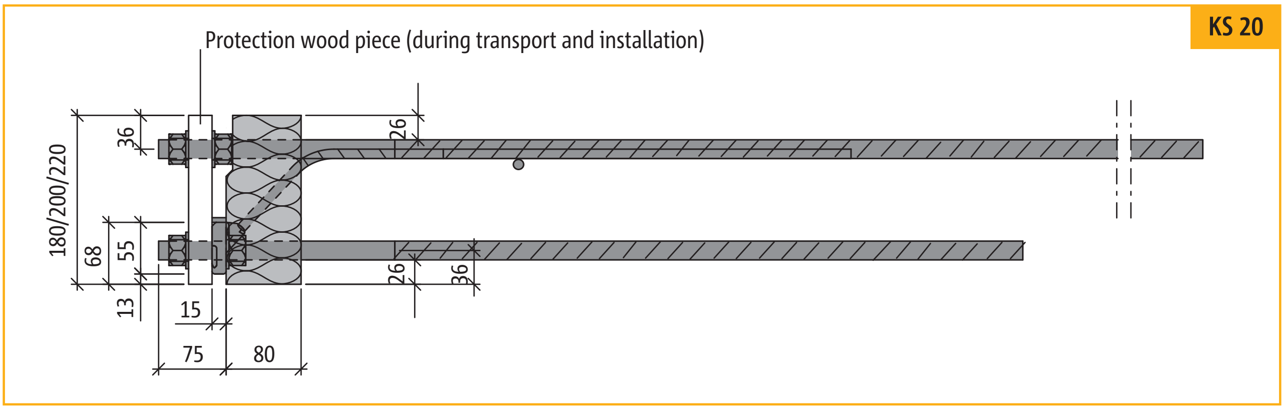
Dimensions



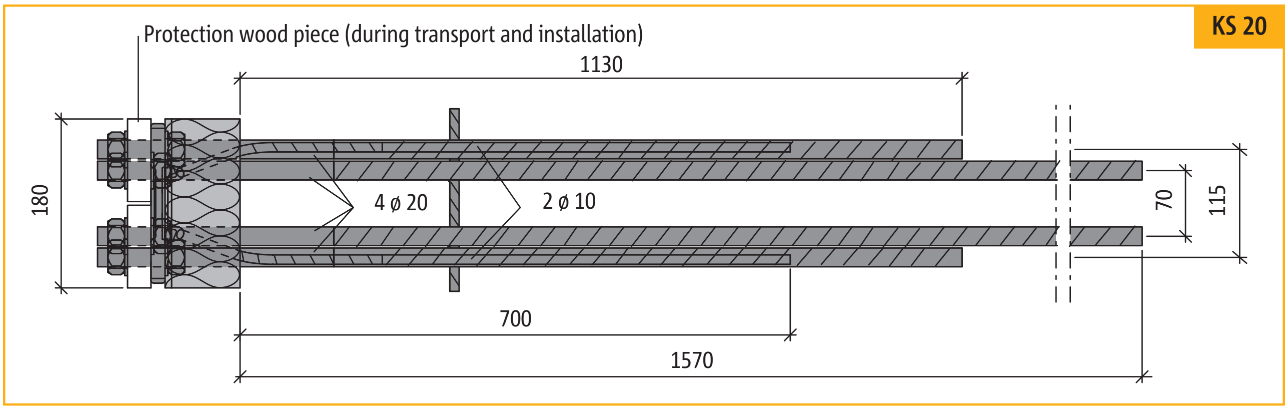
Side view: Schöck Isokorb® type KS 14



Plan view: Schöck Isokorb® type KS 14



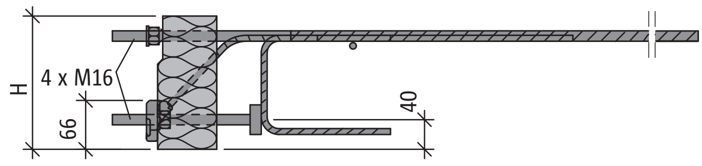
Side view: Schöck Isokorb® type KS 20



Plan view: Schöck Isokorb® type KS 20

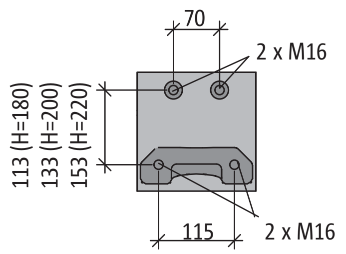
Schöck Isokorb® type KS

Views/On-site end plates

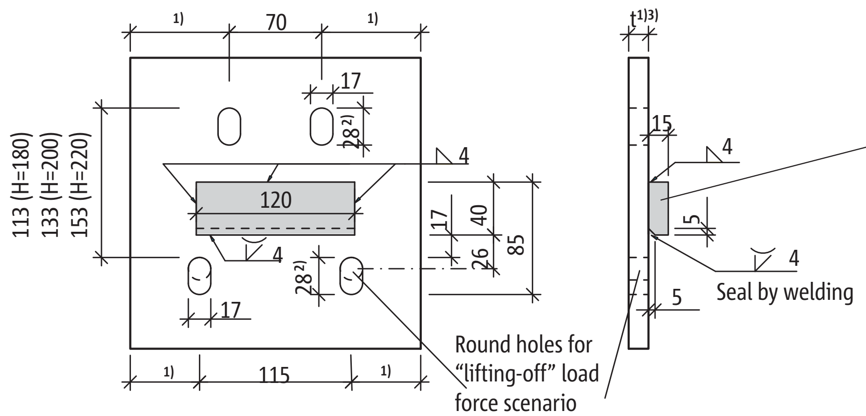


Free fixing length = 30 mm

Side view: Schöck Isokorb® type KS 14



Front view: Schöck Isokorb® type KS 14



Choice of steel type according to the structural requirements.
Anti-corrosion protection to be applied after welding.

Important note:
The butt stop is imperative in order to transfer shear forces – provided by the steel fabricator

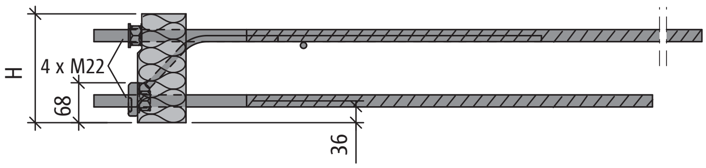
[1] According to the information provided by the structural design engineer.

[2] Hole size corresponds to a height adjustment of +10 mm. The scope for height adjustment can be increased by enlarging the hole size.

[3] Note the free fixing length.

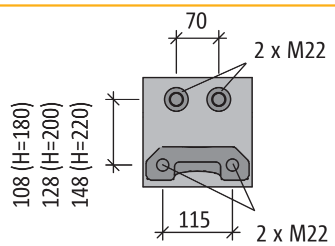
Steel construction: The tolerances of the internal structure must be checked in all cases.

On-site end plate for Schöck Isokorb® type KS 14

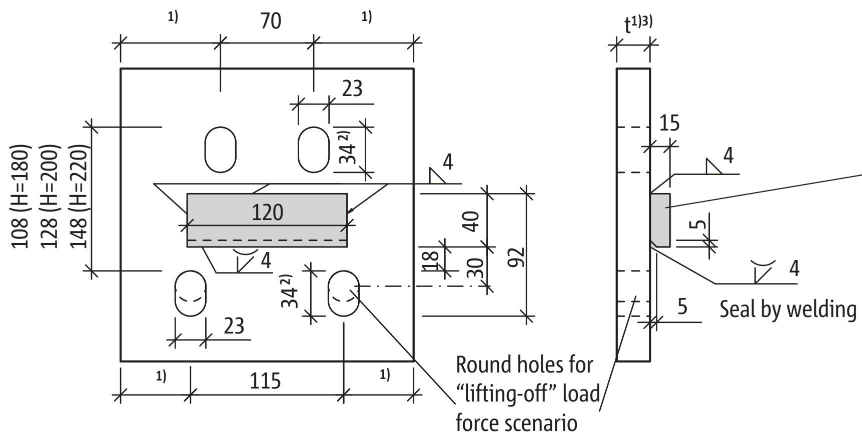


Free fixing length = 35 mm

Side view: Schöck Isokorb® type KS 20



Front view: Schöck Isokorb® type KS 20



Choice of steel type according to the structural requirements.
Anti-corrosion protection to be applied after welding.

Important note:
The butt stop is imperative in order to transfer shear forces – provided by the steel fabricator

[1] According to the information provided by the structural design engineer.

[2] Hole size corresponds to a height adjustment of +10 mm. The scope for height adjustment can be increased by enlarging the hole size.

[3] Note the free fixing length.

Steel construction: The tolerances of the internal structure must be checked in all cases.

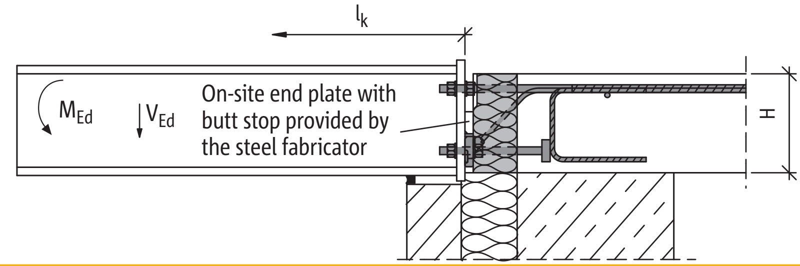
On-site end plate for Schöck Isokorb® type KS 20

Schöck Isokorb® type KS

Capacity tables/Deflection/Installation tolerances

Design and capacity tables

The member forces are taken in relation to the rear edge of the front plate.



▸ Check list on page 163 is to be observed!

KS

Schöck Isokorb® type KS 14

H [mm]	Member forces		
	M_{Rd} [kNm]	V_{Rd} [2] [kN]	H_{Rd} [1] [kN]
180	−8.35	+18.00	±2.50
200	−9.83		
220	−11.31		

Schöck Isokorb® type KS 20

H [mm]	Member forces		
	M_{Rd} [kNm]	V_{Rd} [2] [kN]	H_{Rd} [1] [kN]
180	−18.13	+30.00	±5.00
200	−21.48		
220	−24.84		

Reinforced concrete-to-steel

Deflection

The values indicated in the table result solely from the elastic steel elongation of the Schöck Isokorb® under 100 % exploitation of the bending moment. The final precamber of the balcony results from the deflection calculation of the connected balcony structure plus the deflection resulting from the Schöck Isokorb®.

Deflection values [%] for M_{Rd}

Schöck Isokorb® type	Height of Isokorb® [mm]		
	180	200	220
KS 14	0.60	0.50	0.50
KS 20	1.30	1.10	0.90

These data include the self weight and the live load of the cantilever slab.

Deflection: Table value x l_k/100 x M_{Ed}/M_{Rd} [m]
(Recommendation: M_{Ed} from DL + LL/2)

Installation tolerances

Due to its design, the Schöck Isokorb® type KS/QS **only allows compensation of tolerances in a vertical direction.** The vertical tolerance is +10 mm; the horizontal tolerance is ±0 mm. We recommend the use of an on-site template to secure the position. The planning engineer should inform the **concrete frame contractor** about these details in the implementation plans.

In order to ensure that the shell and the finishings join together properly without the need for modification or reworking, the **site management** must check that the tolerances are met and **take this into account in the design of the steel structure.** Dimension tolerances must be taken into account.

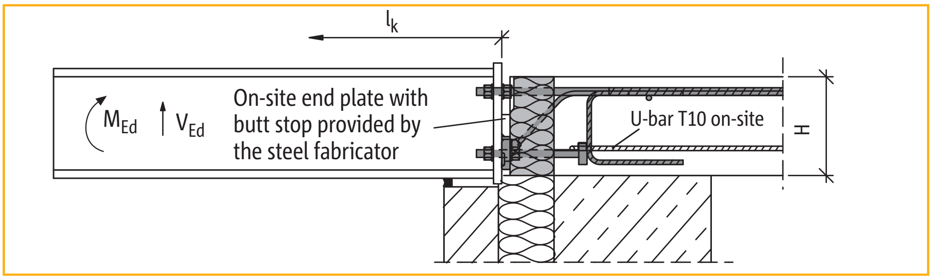
[1] In order to absorb the present horizontal force (H) parallel to the outside wall, a minimum shear force of 2.9 x H must be ensured.
[2] If absorption of a greater shear force is necessary, please contact our design department on 0845 241 3390.

Schöck Isokorb® type KS

Capacity tables (lifting-off forces)/Expansion joint spacing/Notes

Capacity tables for "lifting" load force scenario

The member forces are taken in relation to the rear edge of the front plate.



▸ Check list on page 163 is to be observed!

Structural standards for Schöck Isokorb® type KS have been added for the absorption of lifting shear forces in conjunction with positive connection moments. In the case of an unchanged standard element, the transfer of shear forces between the on-site front plate and the Schöck Isokorb® mounting plate is verified via the bearing pressure of the projected area.

Two conditions need to be met by the design of the construction.

1. The on-site end plate must have round holes (no slots) in its lower region (see page 145).
   As a consequence, vertical adjustment is no longer possible.
2. In the case of Schöck Isokorb® type KS 14, a T10 mm U-bar should be inserted horizontally in the area of the pressure bearings.
   In many cases it is sufficient to assign the lifting forces to just two of several elements per connection layout.

Schöck Isokorb® type KS 14

H [mm]	Member forces		
	M_{Rd} [kNm]	V_{Rd}[2] [kN]	H_{Rd}[1] [kN]
180	+6.45	−12.00	±2.50
200	+7.59		
220	+8.73		

Schöck Isokorb® type KS 20

H [mm]	Member forces		
	M_{Rd} [kNm]	V_{Rd}[2] [kN]	H_{Rd}[1] [kN]
180	+11.34	−12.00	±5.00
200	+13.44		
220	+15.53		

Expansion joint spacing

The determination of the permissible expansion joint spacing (= distances between expansion joints) is based on a balcony slab made of reinforced concrete, in case of it is fixed to the cantilevered steel profiles.

Schöck Isokorb® type	Permissible joint spacing [m]
KS 14	5.70
KS 20	3.50

If constructive measures are implemented to allow movement between the balcony slab and the individual steel profiles, then only the distances between the fixed connections are significant.

[1] In order to absorb the present horizontal force (H) parallel to the outside wall, a minimum shear force of 2.9 x H must be ensured.
[2] If absorption of a greater shear force is necessary, please contact our design department under 0845 241 3390.

Schöck Isokorb® type KS

Calculation example/Notes

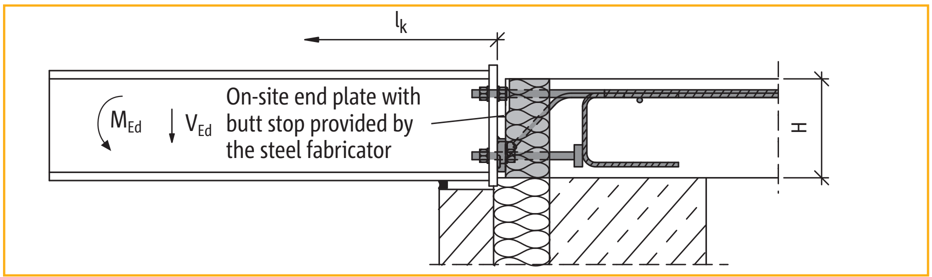
KS

Dimensions:

Length of projection: l_k = 1.75 m
Balcony width: b = 4,50 m
Inner slab slab thickness: h = 200 mm
Height of Isokorb®: H = 200 mm

Load assumptions:

Self weight with light coating:	g_B = 0.6 kN/m²
Live load:	q = 4,0 kN/m²
Self weight of railing:	F_G = 0.75 kN/m
Horizontal load on the railing at beam height 1.0 m:	H_G = 0.5 kN/m



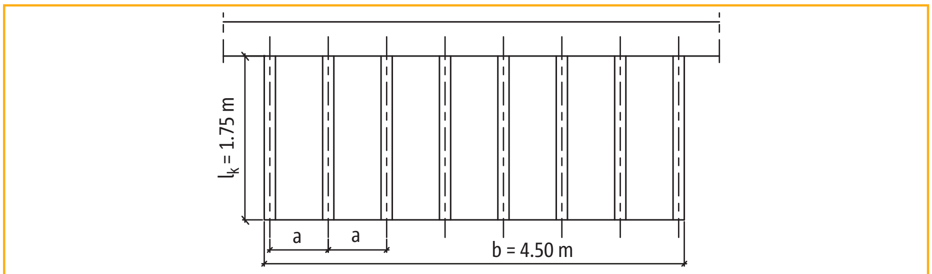
Chosen axis separation: a = 0.70 m

$M_{Ed} = -[(\gamma_G \times g_B + \gamma_Q \times q) \times l_k^2/2 \times a + \gamma_G \times F_G \times a \times l_k + \gamma_Q \times \psi_o \times H_G \times 1.0 \times a]$ [kNm]
$M_{Ed} = -[(1.35 \times 0.6 + 1.5 \times 4.0) \times 1.75^2 \times 0.7/2 + 1.35 \times 0.75 \times 0.7 \times 1.75 + 1.5 \times 0.7 \times 0.5 \times 1.0 \times 0.7]$ [kNm]
$M_{Ed} = -8.91$ KNm

$V_{Ed} = [(\gamma_G \times g_B + \gamma_Q \times q) \times a \times l_k] + \gamma_G \times F_G \times a$
$V_{Ed} = [(1.35 \times 0.6 + 1.5 \times 4.0) \times 0.70 \times 1.75] + 1.35 \times 0.75 \times 0.7$
$V_{Ed} = +9.05$ kN

Required number of connections: n = (4.50/0.7) + 1 = 7.4 = 8 connections
Axis separation between steel members: ((4.50 - 0.18)/7) = 0.617 m

Choice: **8 x Schöck Isokorb® type KS14-H200**
$M_{Rd} = -9.83$ kNm > $M_{Ed} = -8.91$ kNm
$V_{Rd} = +18.0$ kN > $V_{Ed} = +9.05$ kN



Notes

- The range of potential applications for Schöck Isokorb® type KS elements covers inner slab and balcony structures with predominantly static and evenly distributed live loads.
  Static proof must be presented for the adjacent components on both sides of the Schöck Isokorb® type KS.
- The upper and lower reinforcement of the inner slab should be located as close as possible to the thermal insulation layer, taking into account the required concrete cover.
- The nominal dimension c_{nom} for the upper concrete cover is 20 mm in the inside area.

Reinforced concrete-to-steel

Schöck Isokorb® type KS

Lap splice reinforcement

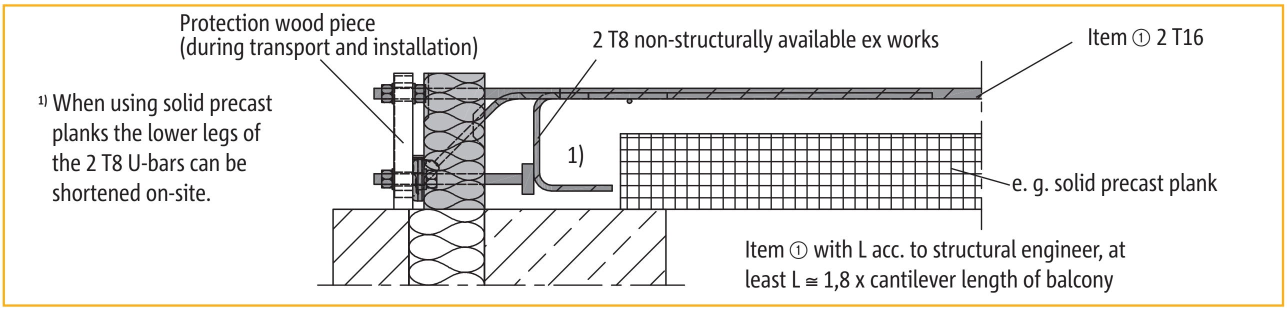
Schöck Isokorb® type KS 14

Lap splice: Design lap splice with 2 No. T16 rebars according to BS, L according to structural engineer, item ① (additional on-site reinforcement)

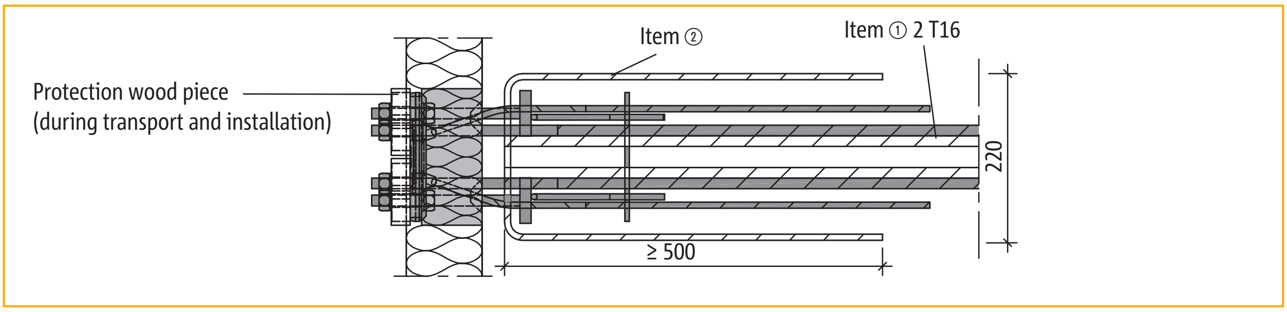
Transverse reinforcement: Non-structural transverse reinforcement according to BS

The non-structural 2 No. T8 U-bars, are provided as standard.

Only in the case of lifting-off forces: 1 U-bar T10 in the area of the pressure bearings, item ②



Side view: Schöck Isokorb® type KS 14 for designs with precast floor slabs

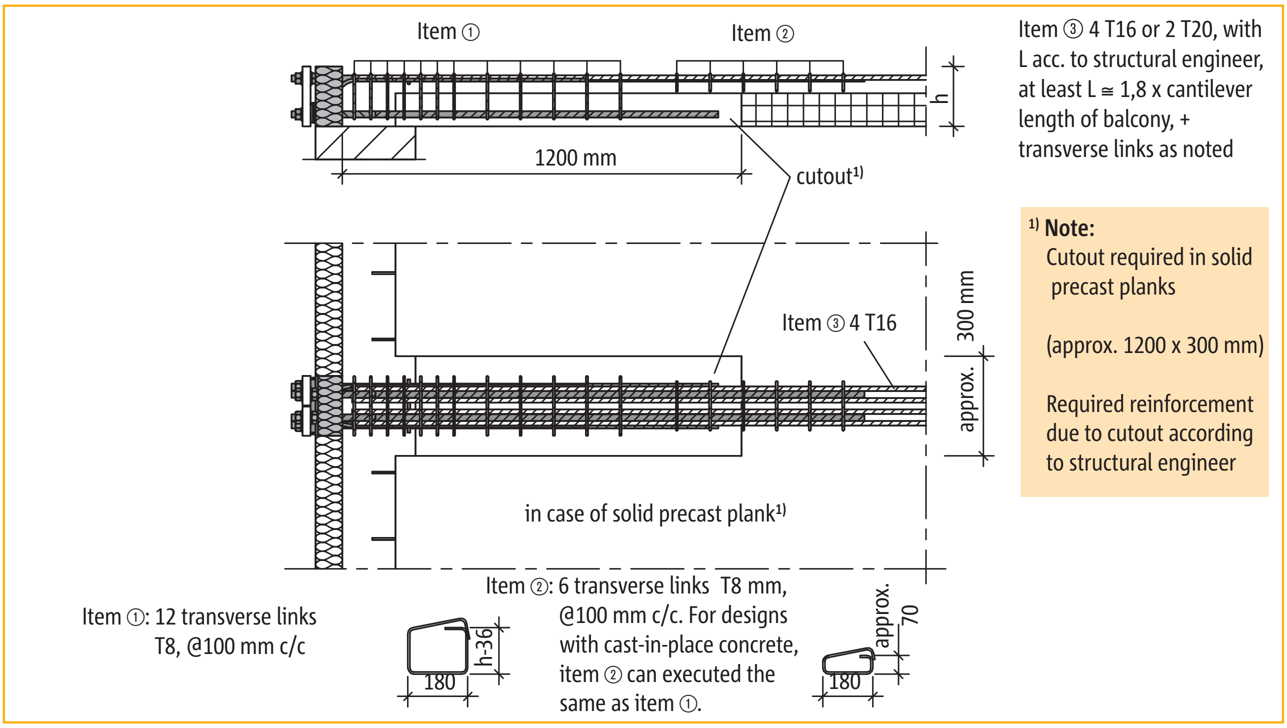


Plan view: Schöck Isokorb® type KS 14 when used for lifting forces

Schöck Isokorb® type KS 20

Overlapping joint: Design lap splice with 4 T16 or with 2 T20 according to BS, L according to structural engineer, item ③ (additional on-site reinforcement)

Transverse reinforcement: External transverse reinforcement links (see illustration), item ① and item ②

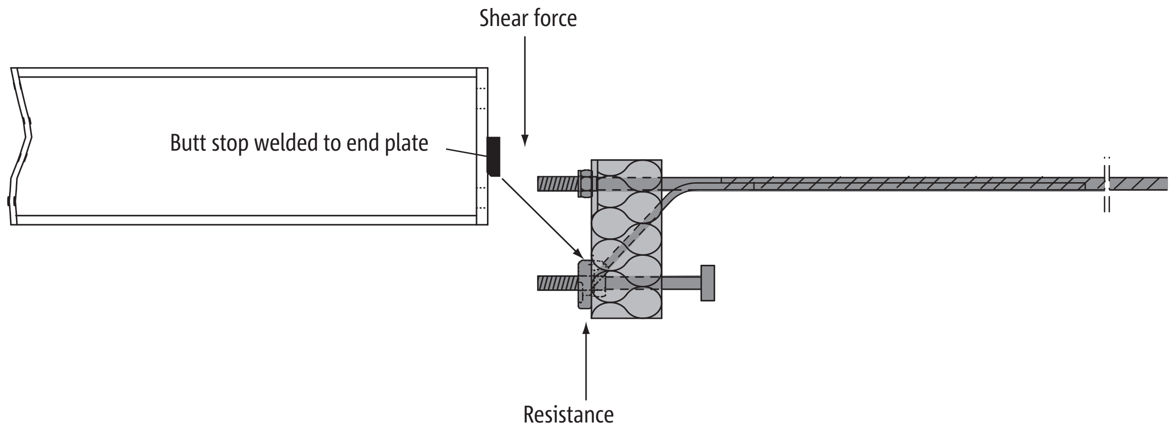


On-site connection reinforcement for Schöck Isokorb® type KS 20

Schöck Isokorb® type KS

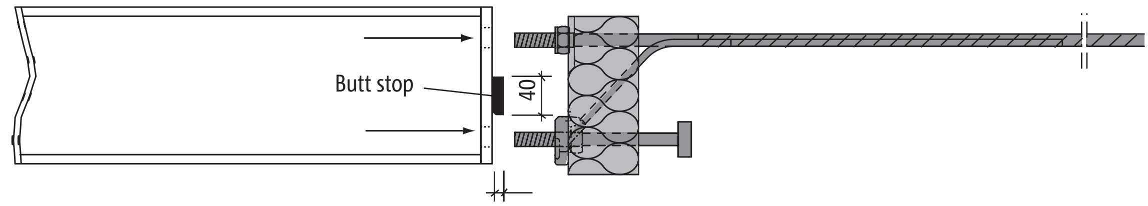
Important information

A butt stop, welded to the on-site end plate, is imperative for transfer of shear forces to the Schöck Isokorb® type KS (or QS)



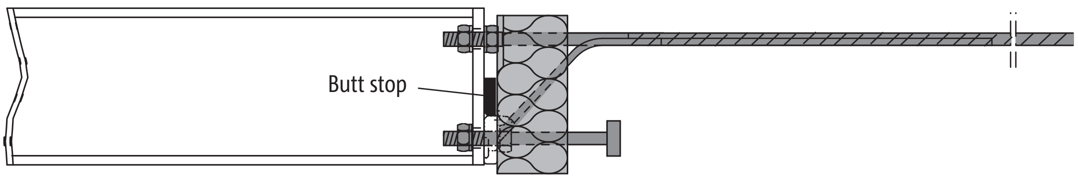
Side view: Imperative butt stop for the connection of steel fin to Schöck Isokorb®

The butt stop has to be provided by the steel fabricator



Side view: Mounting of steel fin to Schöck Isokorb®

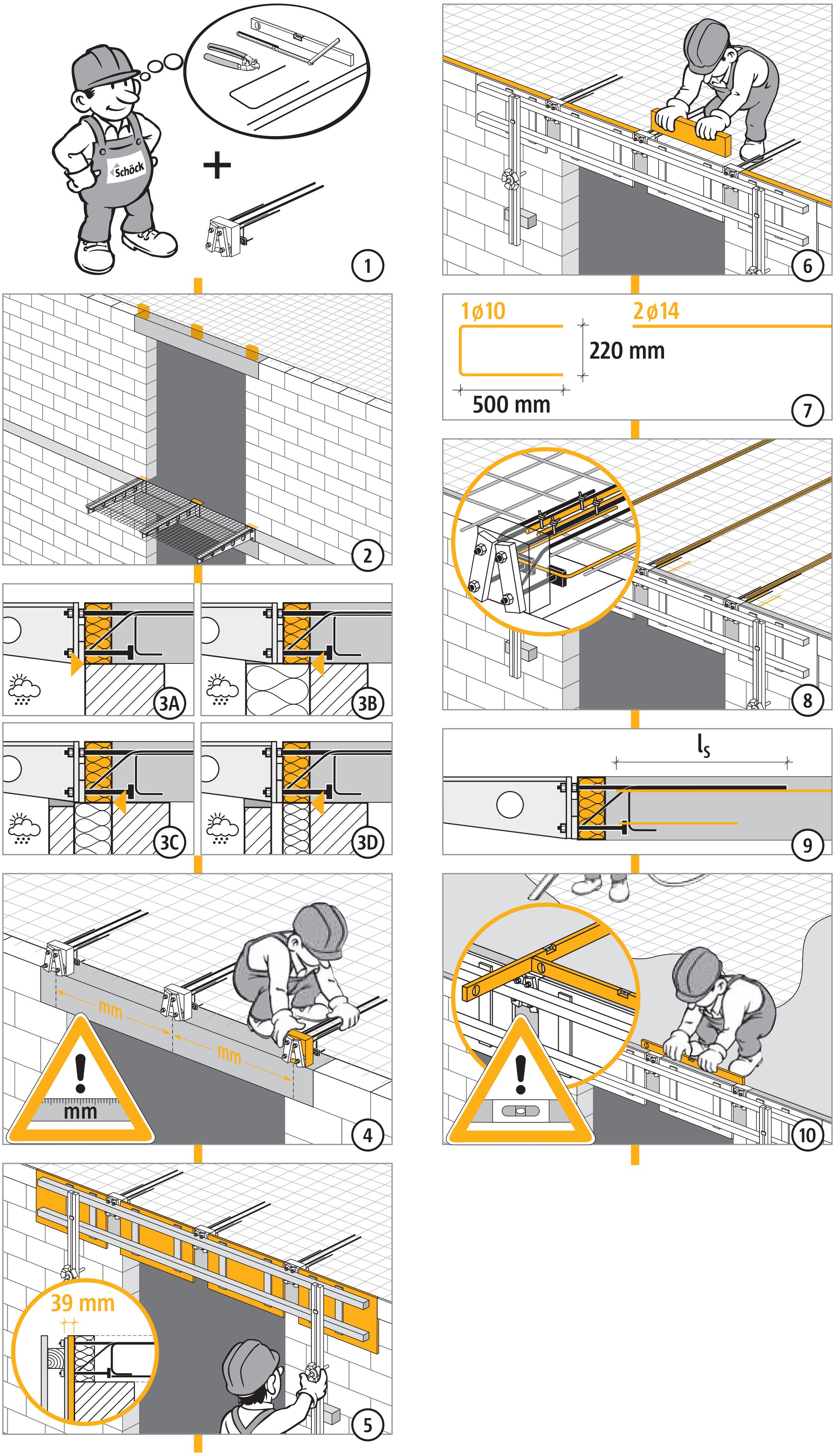
After the installation of the cantilever beam with end plate and its butt stop, the butt stop transferres the shear forces to the type KS (or QS)



Side view: Once installed the butt stop transferres the shear forces

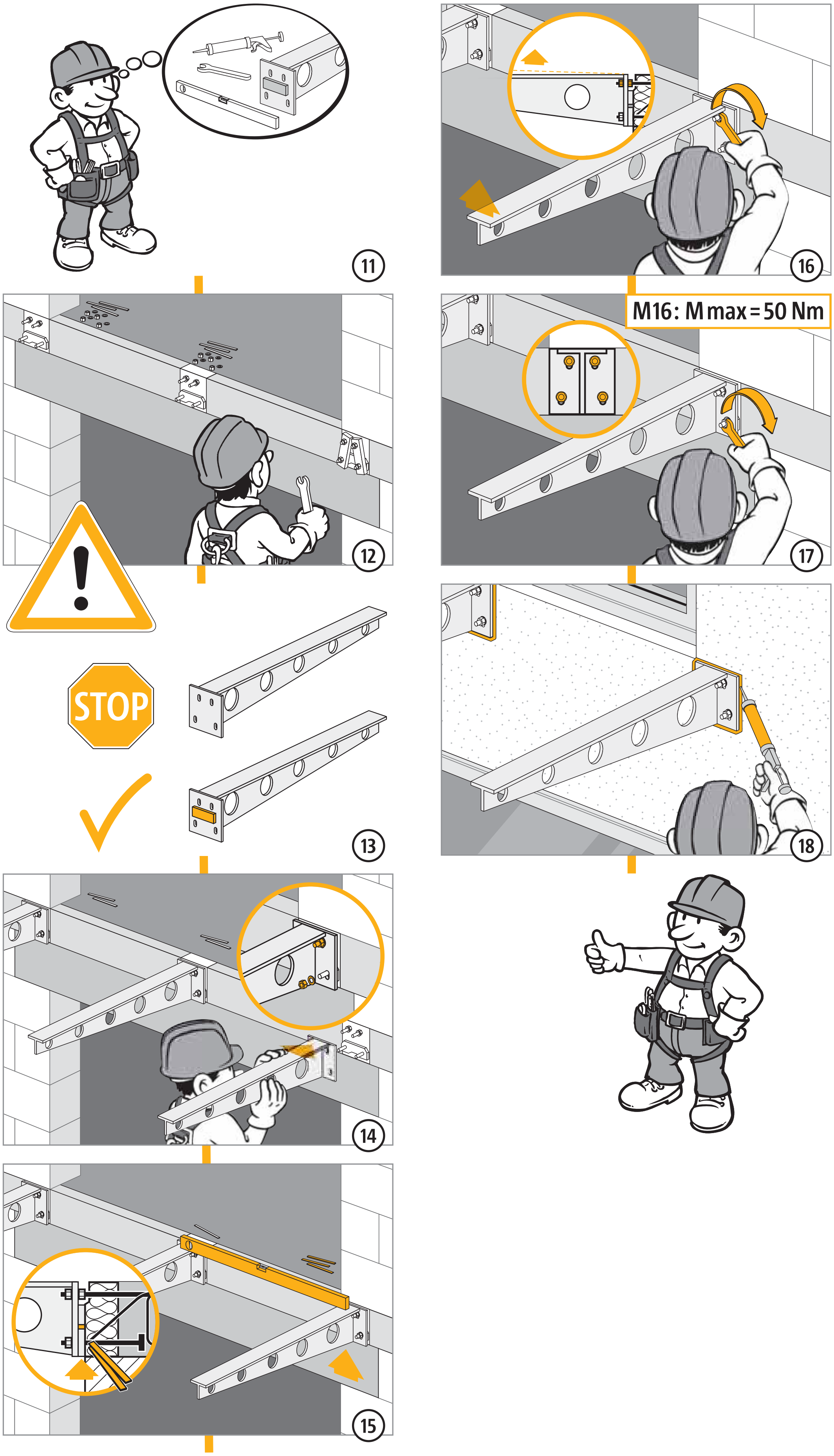
Schöck Isokorb® type KS 14

Method statement for concrete frame constructor



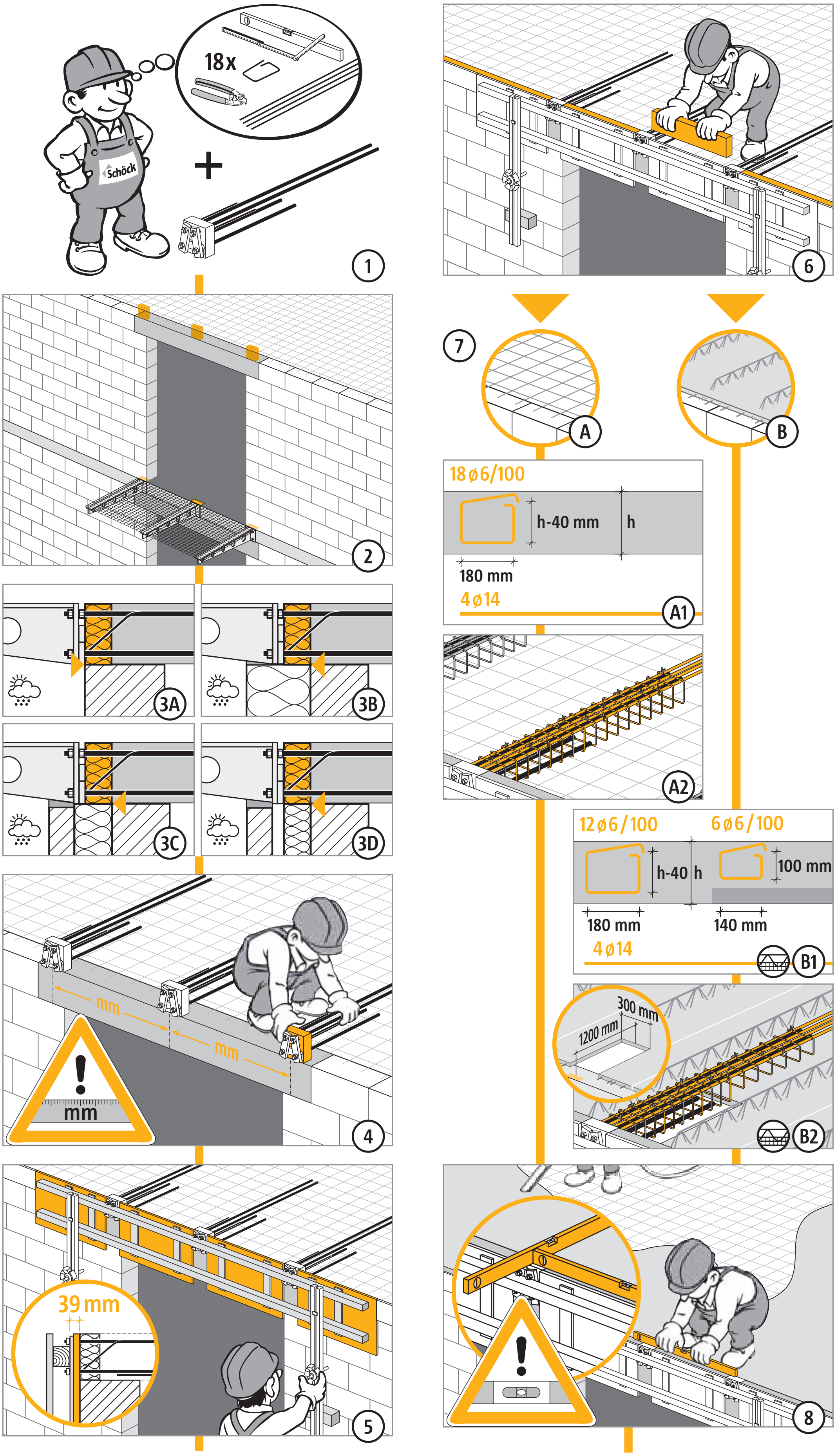
Schöck Isokorb® type KS 14

Method statement for steel fabricators



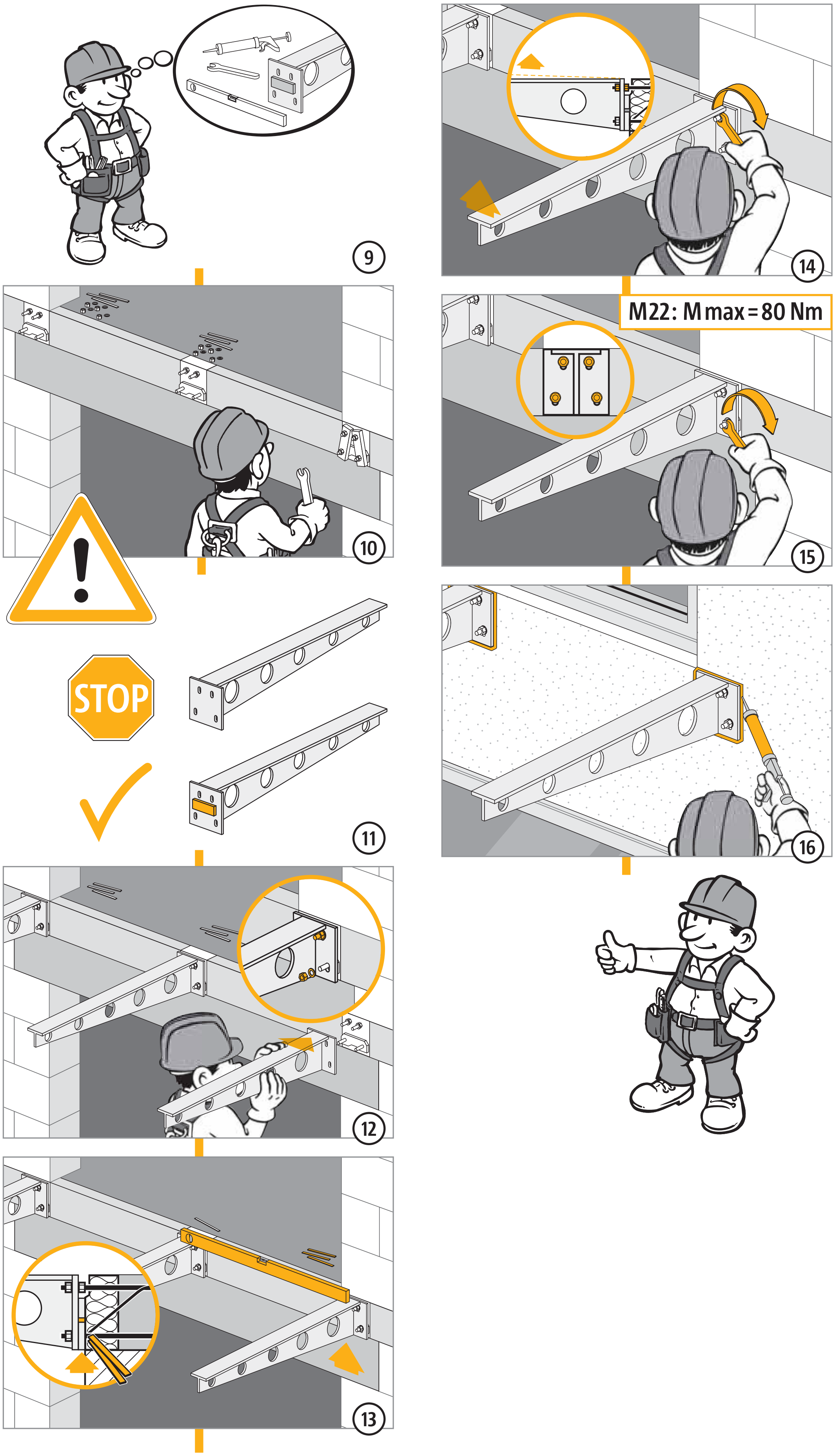
Schöck Isokorb® type KS 20

Method statement for concrete frame constructor



Schöck Isokorb® type KS 20

Method statement for steel fabricators



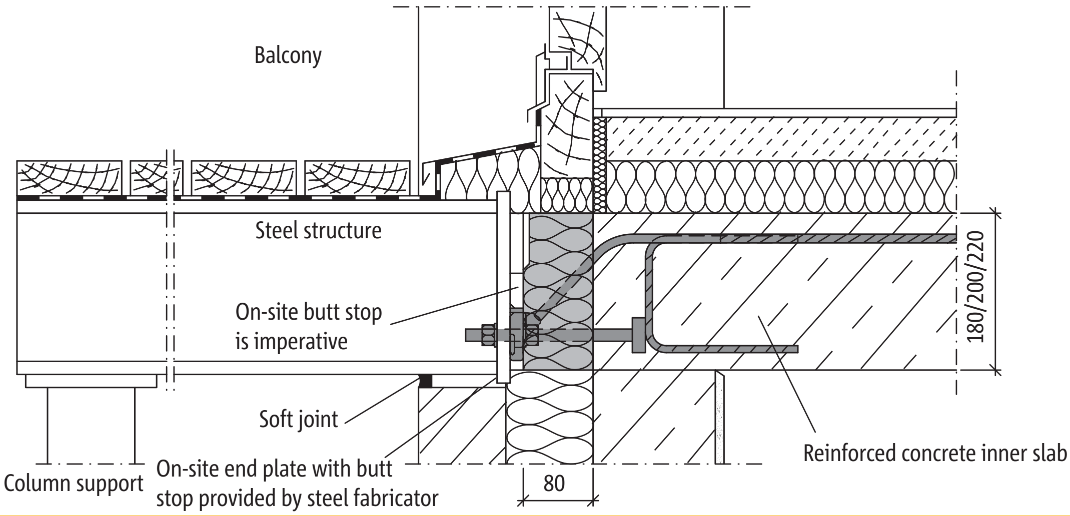
Schöck Isokorb® type QS

Schöck Isokorb® type QS 10

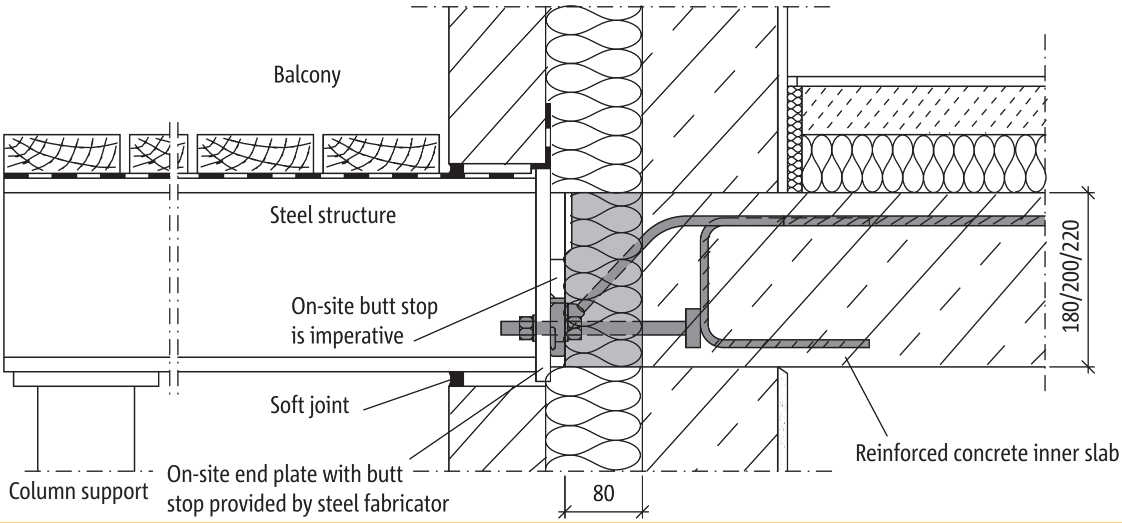
Contents

Schöck Isokorb® type QS

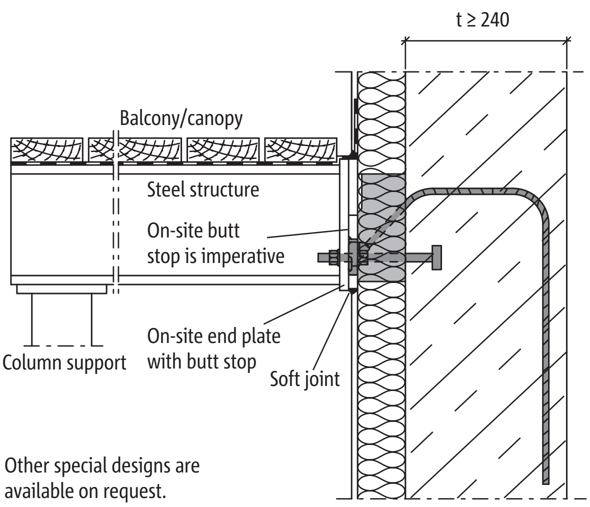
Connection layouts



Connection with Schöck Isokorb® type QS in a door area, cavity wall

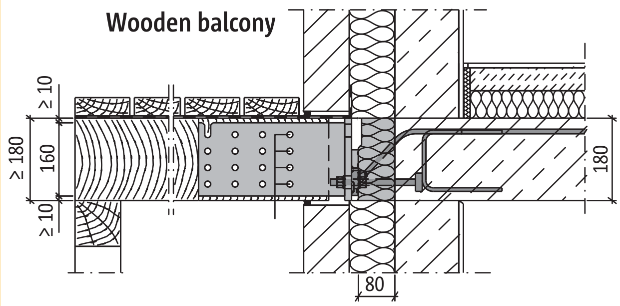


Connection with Schöck Isokorb® type QS in a wall area, cavity wall



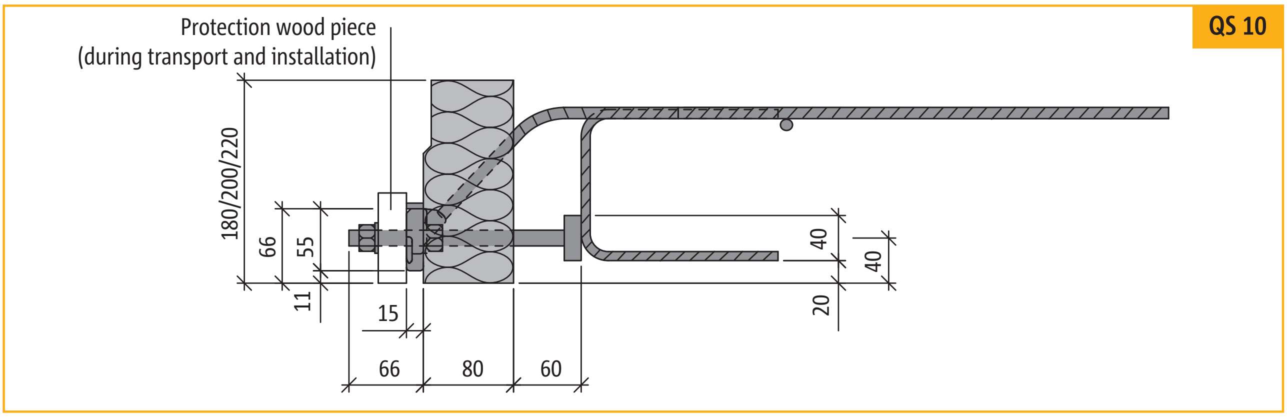
Other special designs are
available on request.

Connection with Schöck Isokorb® type QS in a wall area without adjacent inner slab - special design

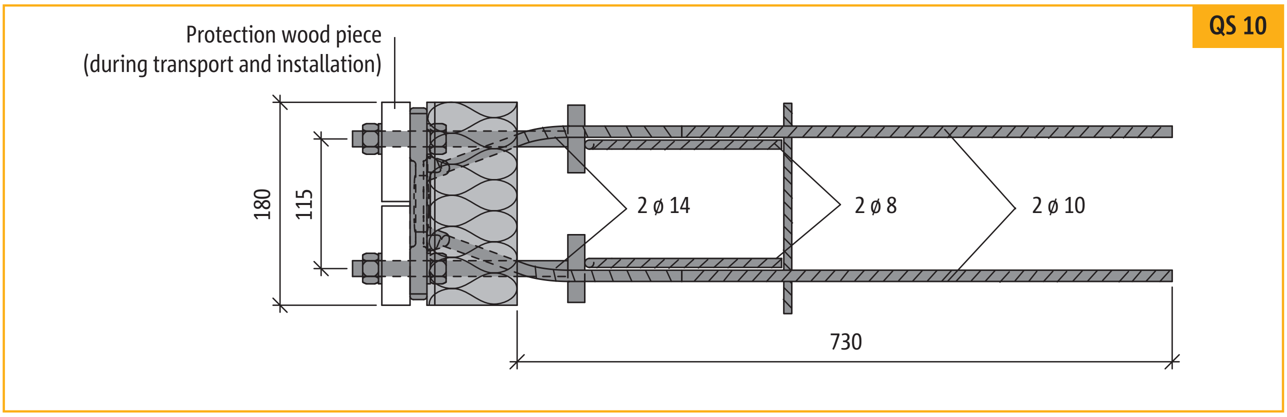


Connection with Schöck Isokorb® type QSH for thermal separation of wooden members from a reinforced concrete inner slab. For more information please contact our design department under 0845 241 3390.

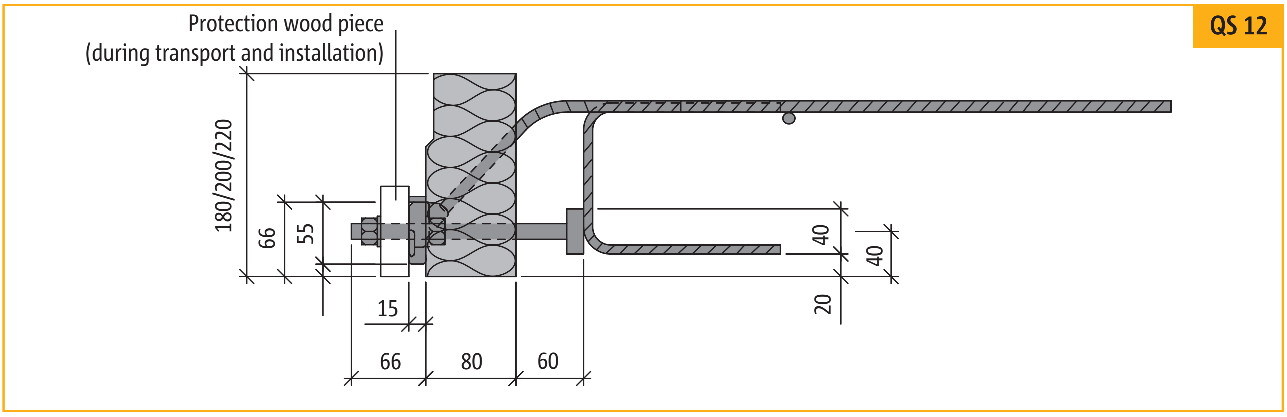
Schöck Isokorb® type QS
Dimensions



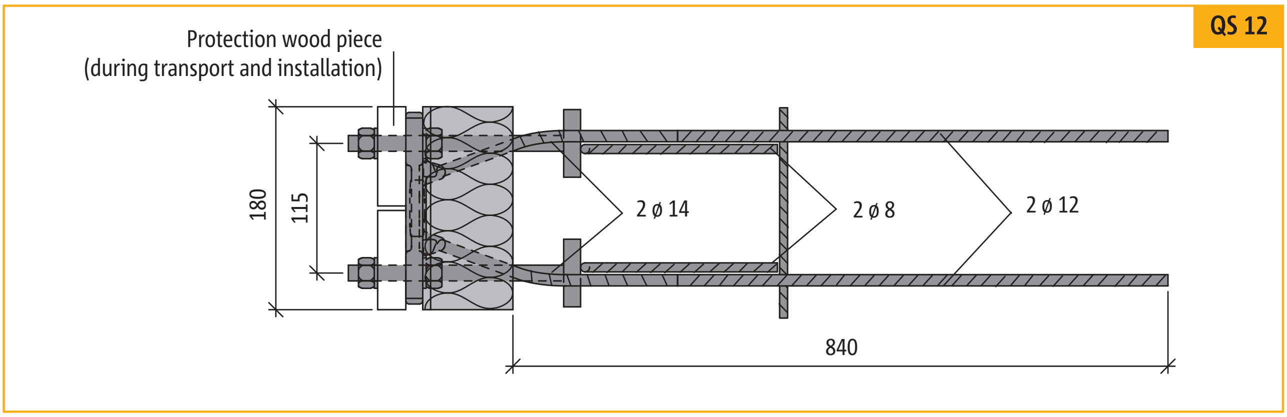
Side view: Schöck Isokorb® type QS 10



Plan view: Schöck Isokorb® type QS 10



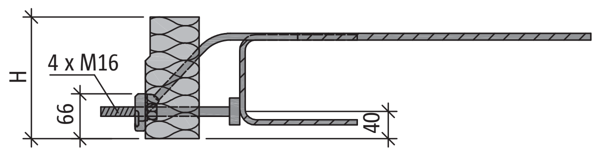
Side view: Schöck Isokorb® type QS 12



Plan view: Schöck Isokorb® type QS 12

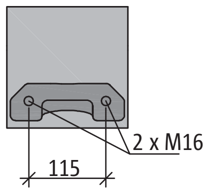
Schöck Isokorb® type QS

Views/On-site end plate/On-site connection reinforcement

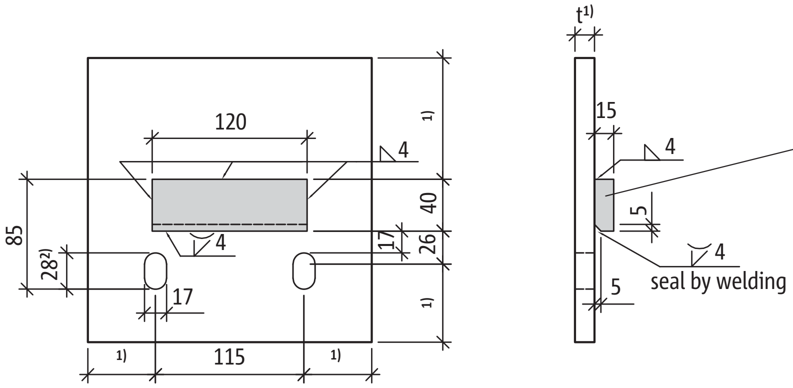


Free fixing length = 30 mm

Side view: Schöck Isokorb® type QS 10 and QS 12



Front view: Schöck Isokorb® type QS 10 and QS 12



Choice of steel type according to the structural requirements.

Anti-corrosion protection to be applied after welding.

Important note:
The butt stop is imperative in order to transfer shear forces – provided by the steel fabricator

[1] According to the information provided by the structural design engineer.

[2] Hole size corresponds to a height adjustment of +10 mm. The scope for height adjustment can be increased by enlarging the hole size.

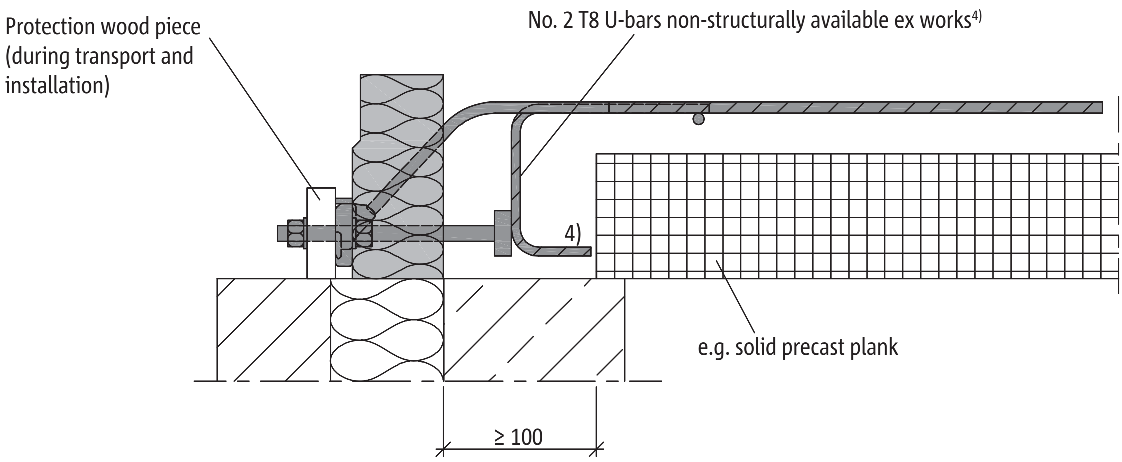
[3] Note the free fixing length.

Steel construction: The tolerances of the internal structure must be checked in all cases.

On-site end plate to Schöck Isokorb® type QS 10 and QS 12

On-site connection reinforcement

The 2 non-structural edge U-bars ø 8 mm, are provided as standard on every type QS element (see illustration below). Further connection reinforcement for Schöck Isokorb® is not required.



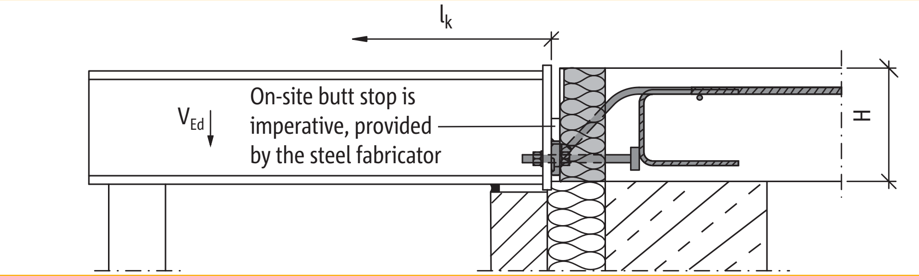
[1] According to the information provided by the structural design engineer.
[2] Hole size corresponds to a height adjustment of +10 mm. The scope for height adjustment can be increased by enlarging the hole size.
[3] Note the free fixing length.
[4] When using precast planks, the lower legs of the 2 ex works U-bars T8 can be shortened on-site.

Schöck Isokorb® type QS

Capacity/Expansion joint spacing/Installation tolerances

Design and capacity table

The member forces are taken in relation to the rear edge of the end plate.



▸ Check list on page 173 is to be observed!

Schöck Isokorb® type QS 10

H [mm]	Member forces	
	V_{Rd} [kN]	H_{Rd}[1)] [kN]
180, 200, 220	+48.32	±2.50

Schöck Isokorb® type QS 12

H [mm]	Member forces	
	V_{Rd} [kN]	H_{Rd}[1)] [kN]
180, 200, 220	+69.58	±2.50

Expansion joint spacing

The determination of the permissible expansion joint spacing (= distance between expansion joints) is based on a balcony slab made of reinforced concrete, in case of it is fixed to the steel profiles.

Schöck Isokorb® type	Permissible joint spacing [m]
QS 10, QS 12	7.20

If constructive measures are implemented to allow movement between the balcony slab and the individual steel profiles, then only the distances between the fixed connections are significant.

Installation tolerances

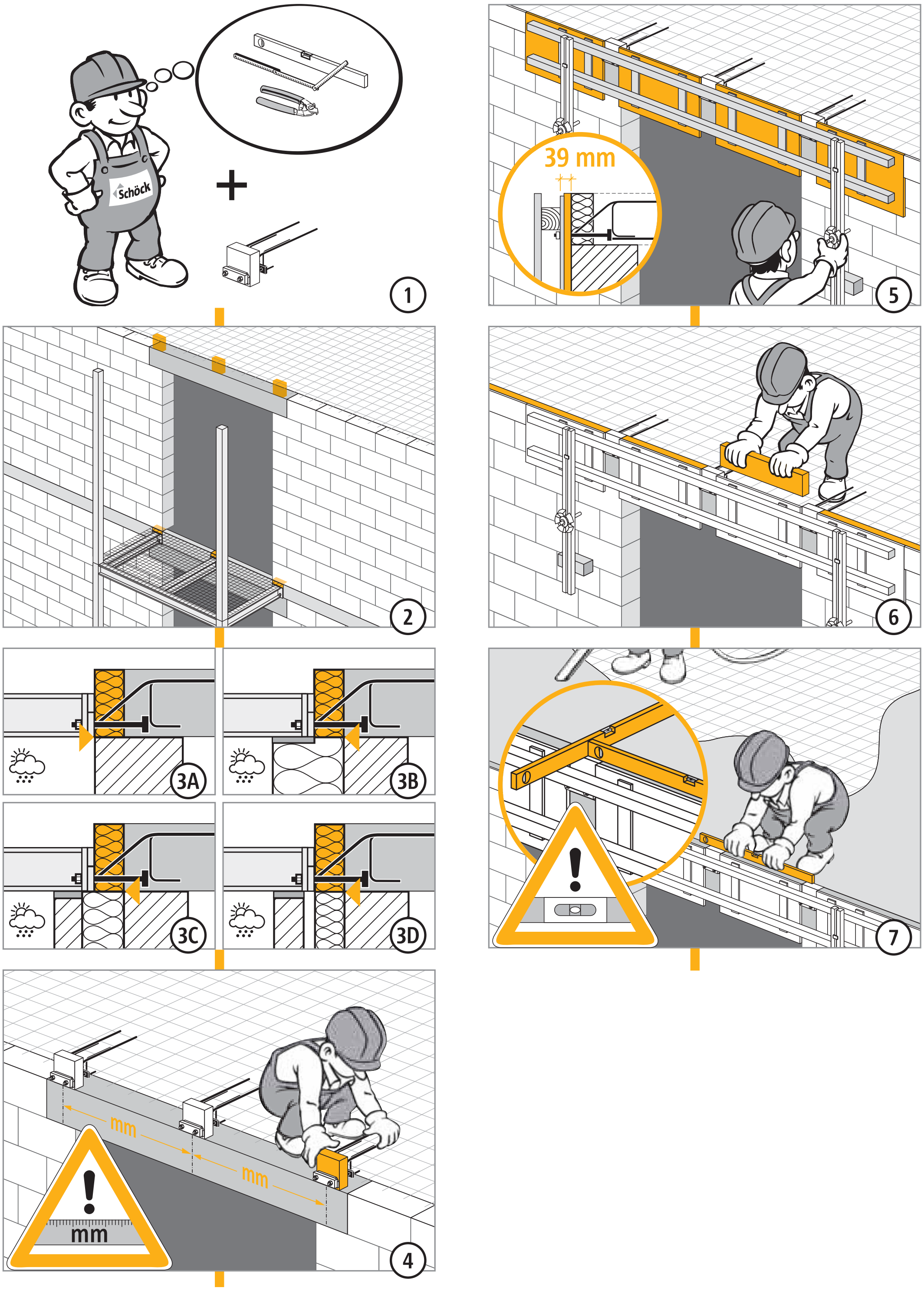
Due to its design, the Schöck Isokorb® type KS/QS **only allows compensation of tolerances in a vertical direction.**
The tolerance is: +10 mm in a vertical direction; ±0 mm in a horizontal direction. We recommend the use of an on-site template to secure the position.The planning engineer should inform the **concrete frame contractor** about these details in the implementation plans.

In order to ensure that the shell and the finishings join together properly without the need for modification or reworking, the **site management** must check that the tolerances are met and **take this into account in the design of the steel structure.** Dimension tolerances must be taken into account.

[1)] In order to absorb the present horizontal force (H) parallel to the outside wall, a minimum shear force of 2.9 · H must be ensured.

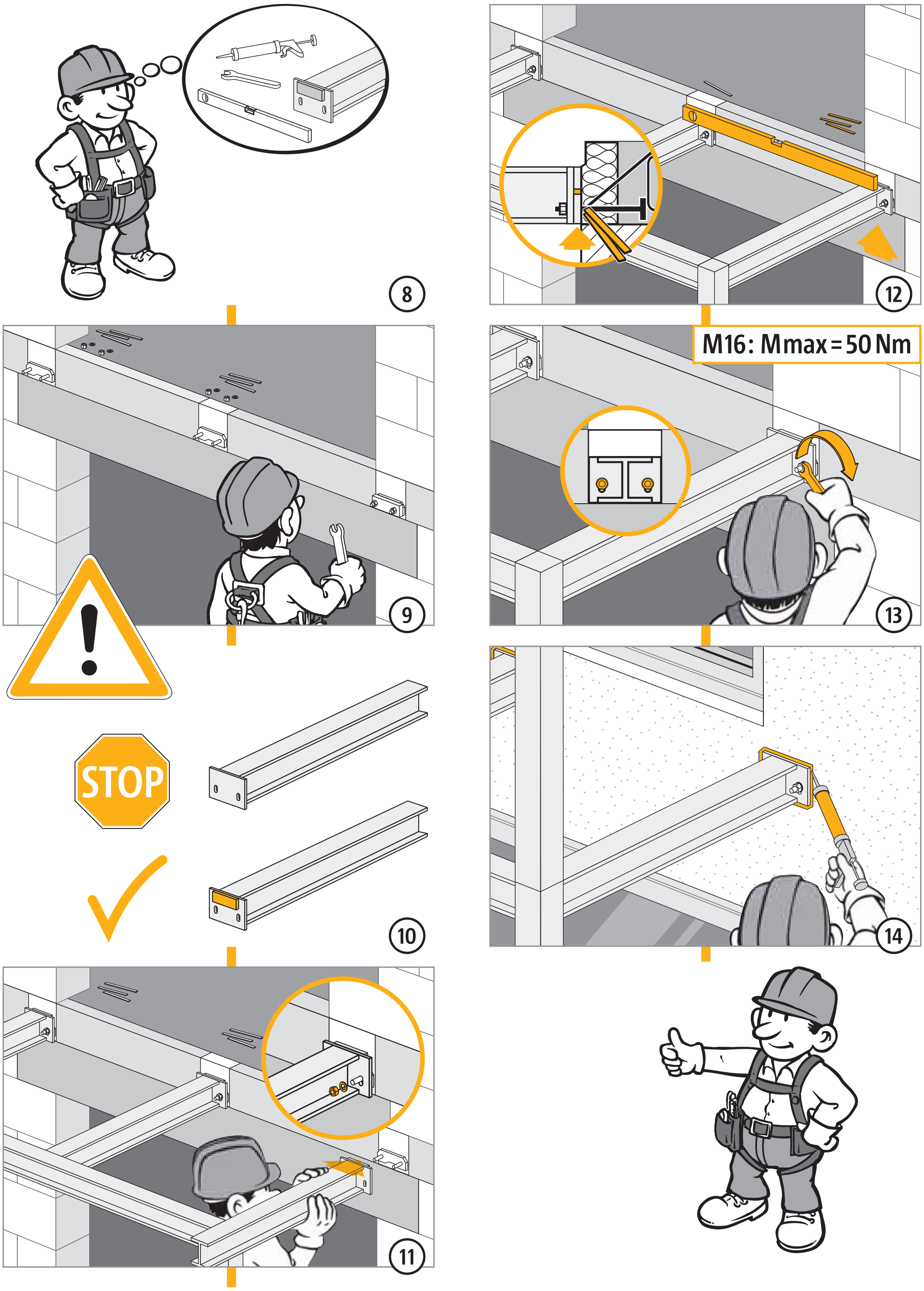
Schöck Isokorb® type QS

Method statement for concrete frame contracter



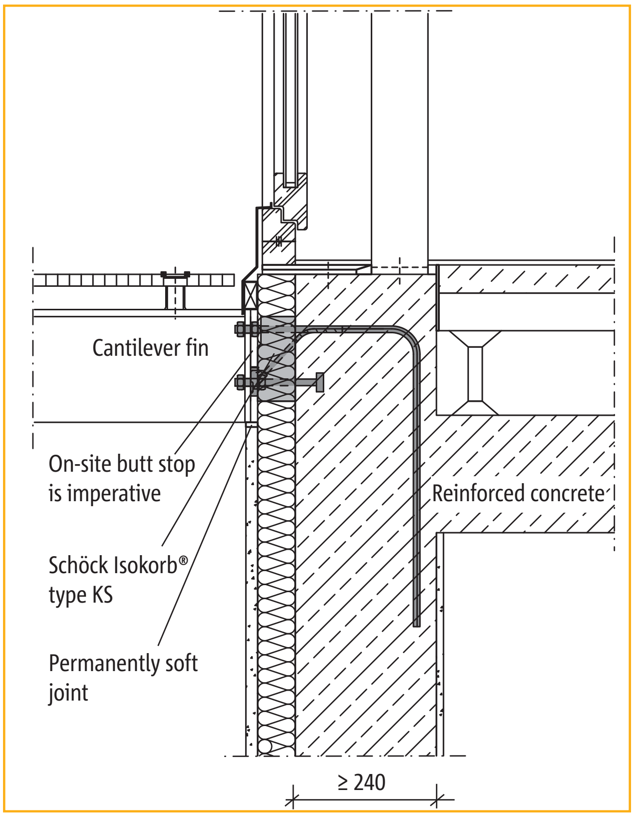
Schöck Isokorb® type QS

Method statement for steel fabricators

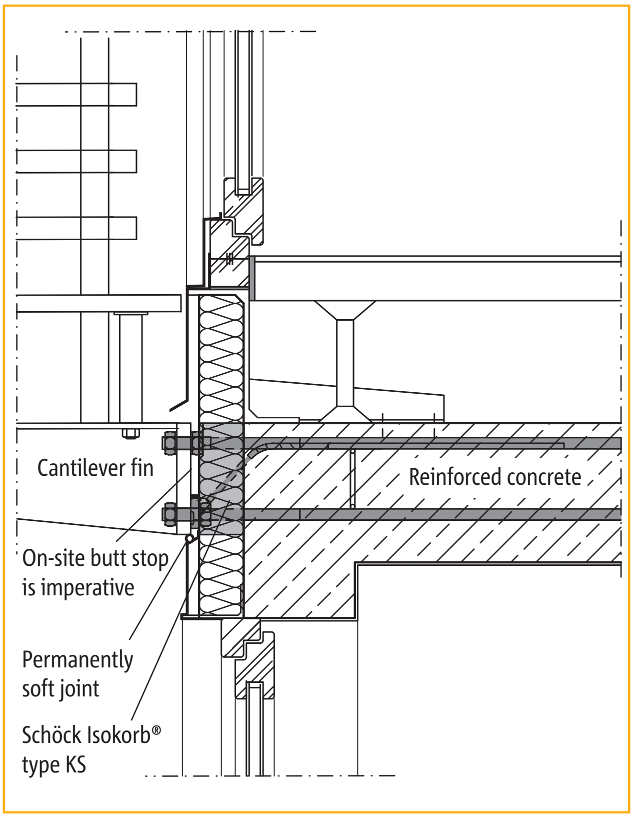


Schöck Isokorb® type KS/QS

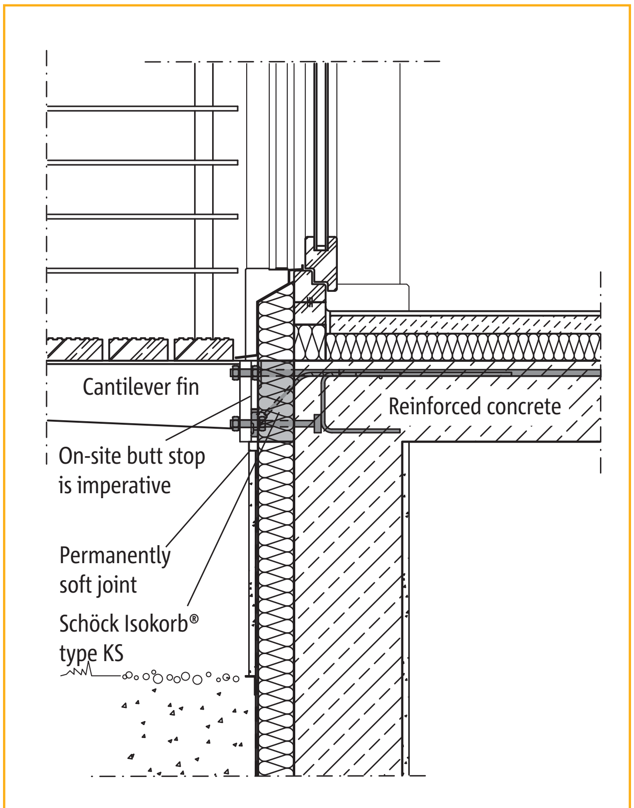
Construction details



Cleaning balcony to façade



Façade balcony connection



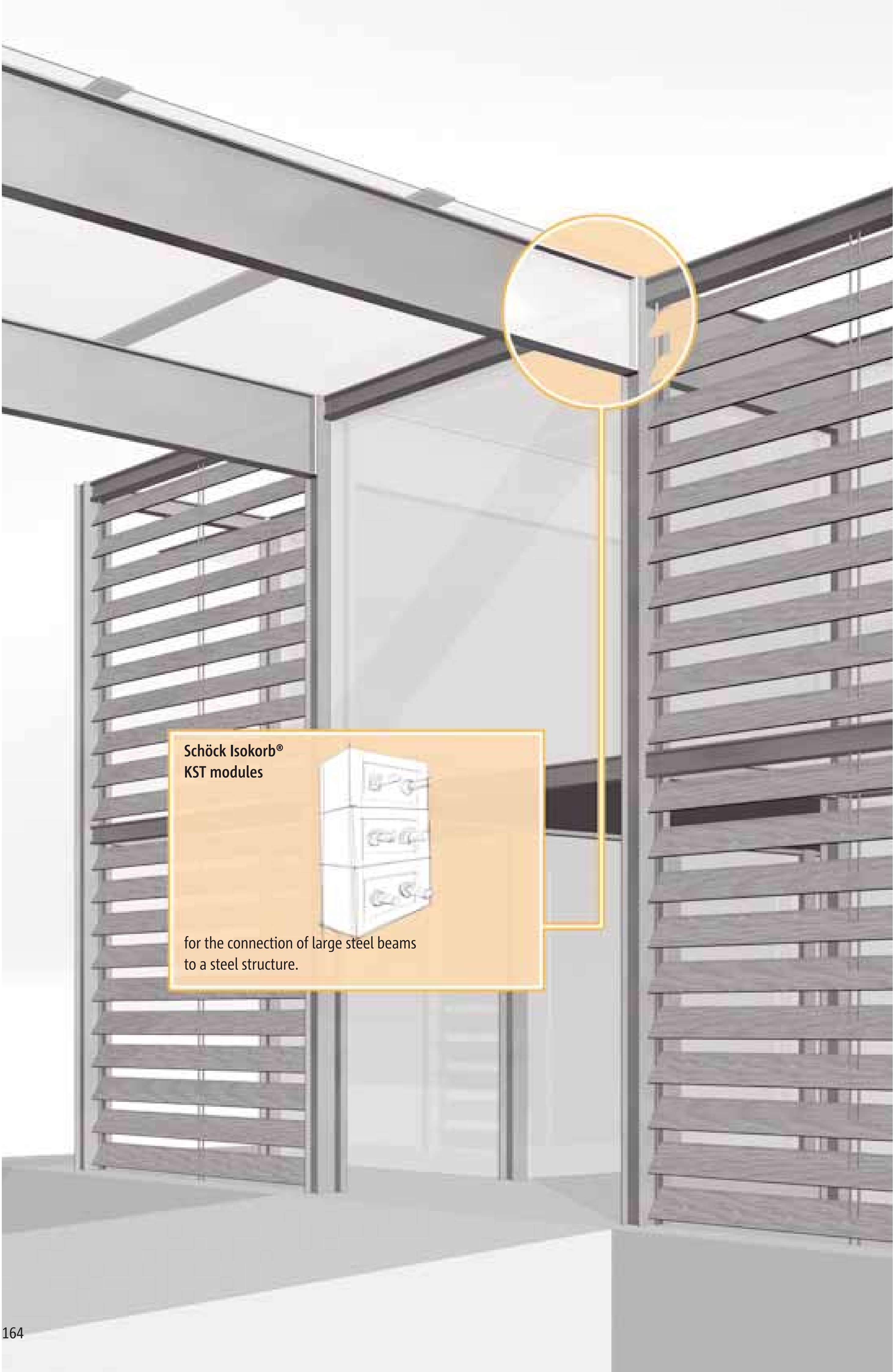
Notes

- The on-site end plate with butt stop has to be provided by the steel fabricator.

Reinforced concrete-to-steel

Schöck Isokorb® type KS/QS
Check list

- [ ] Have the member forces on the Isokorb® connection been determined at the design level?
- [ ] Is there a fire safety requirement for the overall load-bearing structure/Isokorb® (see page 140)?
- [ ] Are lifting-off forces active at the Isokorb® connection in conjunction with positive connection moments (see page 147)?
- [ ] Do the calculations of the deflection of the overall structure take into account the precamber due to the Schöck Isokorb® (see page 146)?
- [ ] Are temperature deformations assigned directly to the Isokorb® connection? Expansion joint spacing according to pages 147 and 159.
- [ ] Have the the requirements and dimensions of the on-site end plate been met (refer to pages 145 and 158)?
- [ ] Was sufficient reference made to the on-site end plate with butt stop which is absolutely essential?
- [ ] Has the information for the site management and/or the concrete frame contractor relating to installation tolerances been adopted in the shell plans (refer to pages 146 and 159)?
- [ ] If the Isokorb KS 20 type is used with precast planks, has the cutout on the inner slab side been taken into account (see page 149)?
- [ ] Have the tightening torques for the screwed connections been marked in the implementation plan (refer to pages 152, 154 and 161)?
  The nuts should be tightened finger-tight without planned preload; the following tightening torques apply:
  KS 14 (bolt ø 16): M_{max} 50 Nm
  KS 20 (bolt ø 22): M_{max} 80 Nm
  QS 10 (bolt ø 16): M_{max} 50 Nm
  QS 12 (bolt ø 16): M_{max} 50 Nm


Schöck Isokorb®
KST modules
for the connection of large steel beams
to a steel structure.

Schöck Isokorb® type KST

Page 167

for the connection of free cantilever steel beams to a steel structure.

Schöck Isokorb® module, type KST-QST

Page 178

for the connection of supported steel beams to a steel structure.

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 (λ = 0,035 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 this relates to the Schöck products.

- Stress corrosion cracking
  An appropriate Schöck-protection needs to be provided in environments with a high chlorine content (e.g. inside indoor swimming pools, ...). 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.

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 telphone 0845 241 3390.

Schöck Isokorb® type KST

Schöck Isokorb® type KST

Contents

KST

Steel-to-steel

Schöck Isokorb® type KST

Element arrangements/Connection layouts

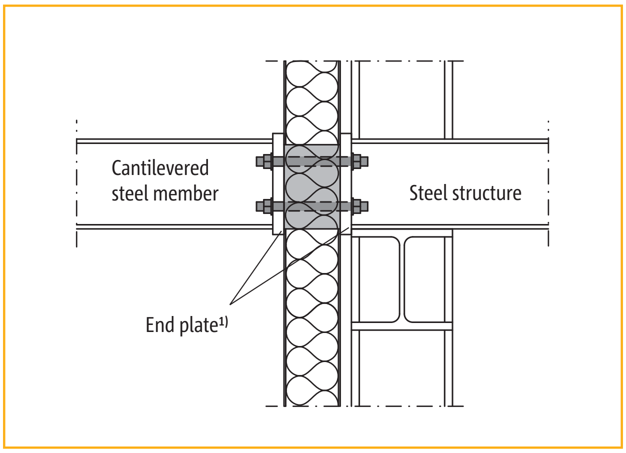


Figure 1: Schöck Isokorb® type KST for cantilevered steel structures

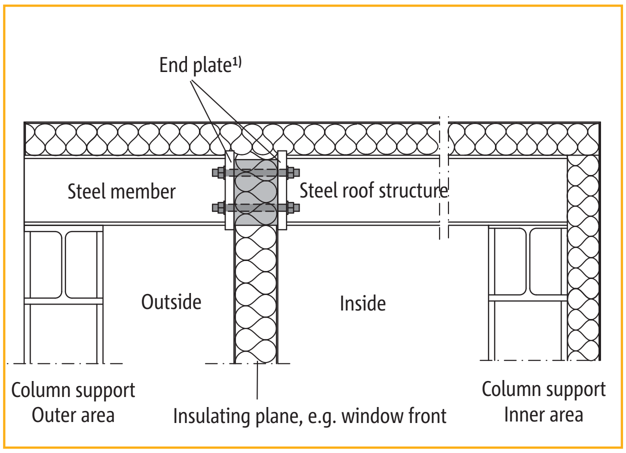


Figure 2: Schöck Isokorb® type KST for separation within the structural system

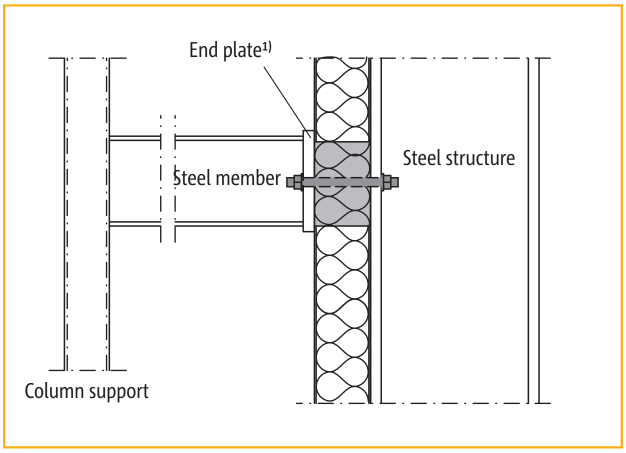


Figure 3: Schöck Isokorb® module, type KST-QST/KST-ZQST for supported steel structures

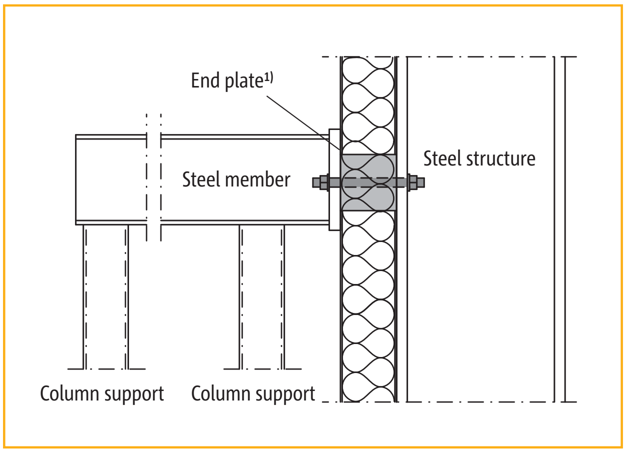


Figure 4: Schöck Isokorb® KST-ZST module for restrained steel structures

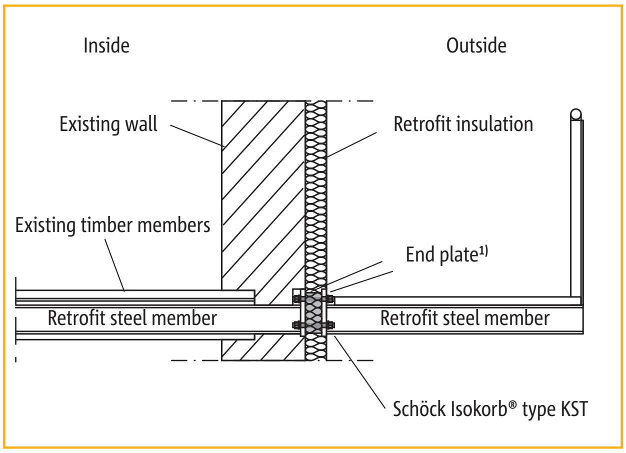
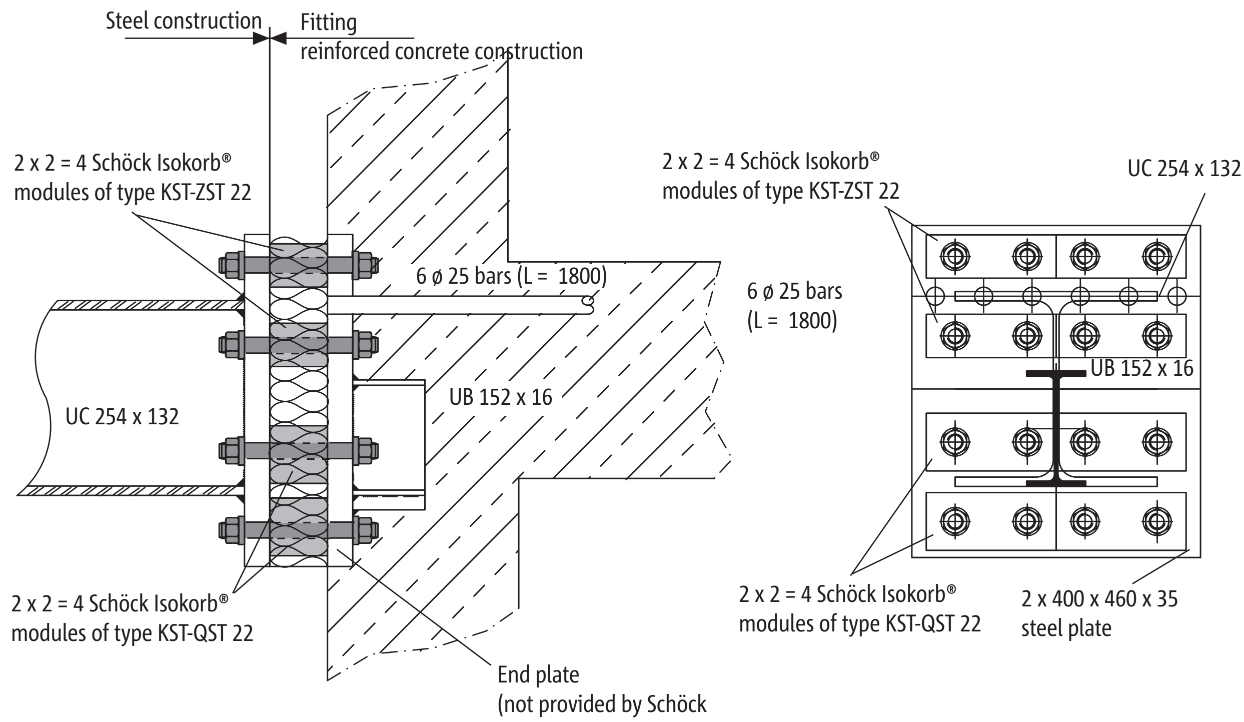


Figure 5: Schöck Isokorb® type KST for a renovation/retrofit balcony installation

[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 (refer to page 146).
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.

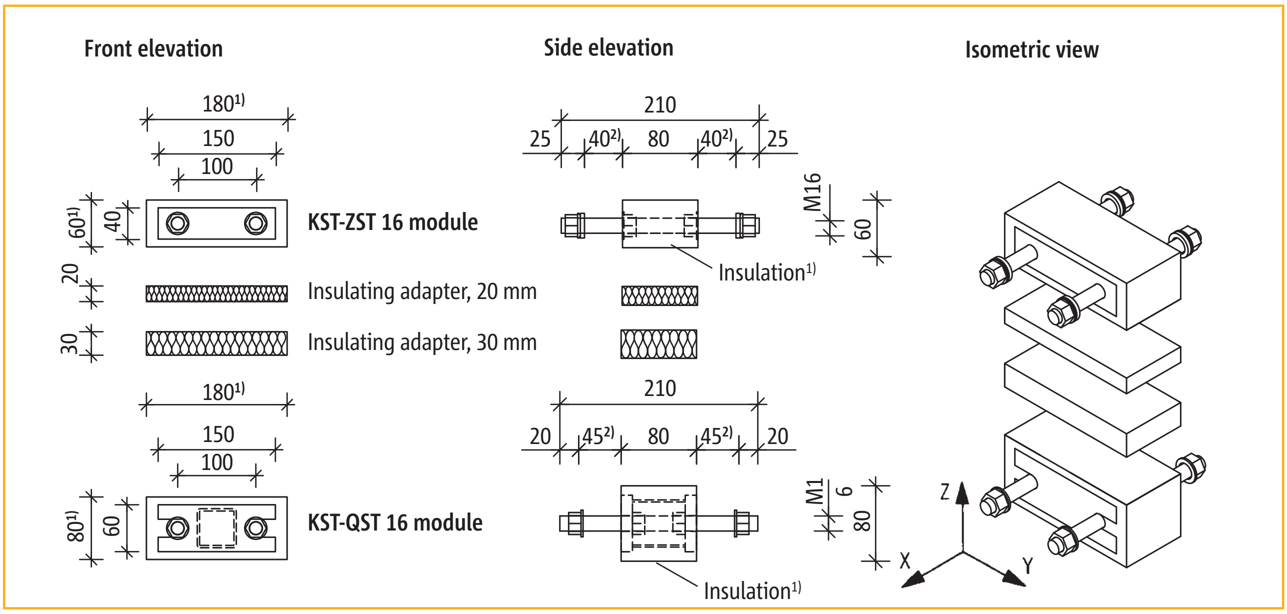
Schöck Isokorb® type KST

Views/Dimensions

Schöck Isokorb® type KST – basic type

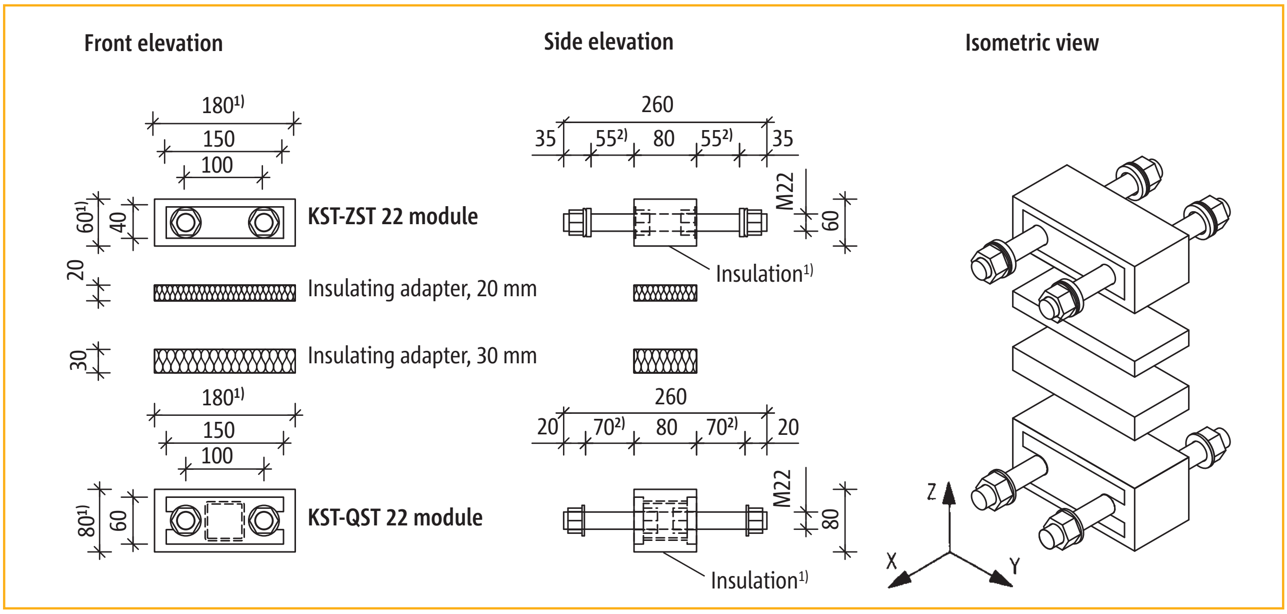
The basic KST type consists of one ZST module, one QST module, one insulating adapter with a thickness of 20 mm and one insulating adapter with a thickness of 30 mm. With these modules it is possible to achieve a vertical bolt separation of up to 120 mm (60/2 + 20 + 30 + 80/2). If your application requires 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

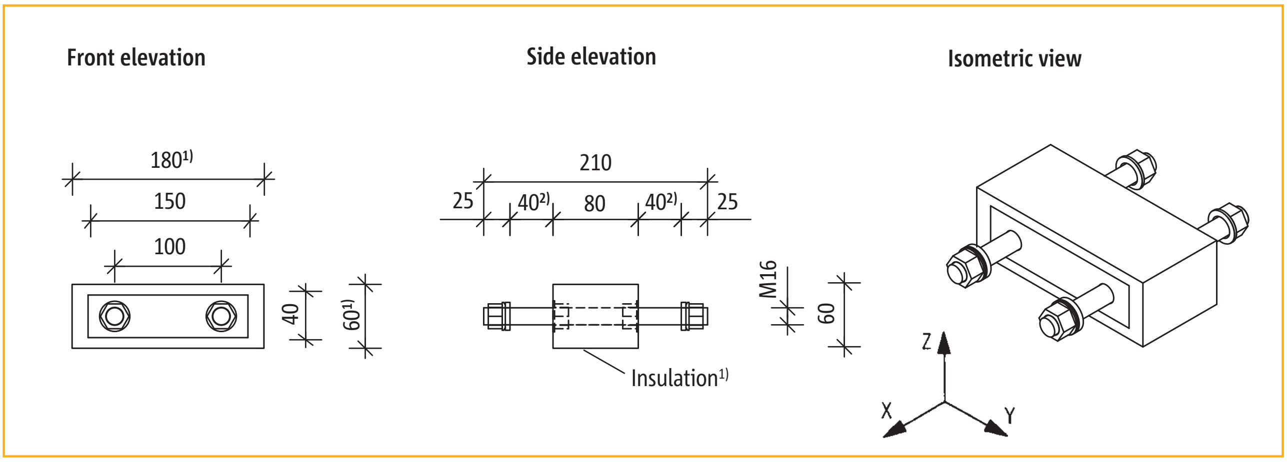
[1] If required, the insulating element can be cut off up to the steel plates (150 x 40 for the KST-ZST module, 150 x 60 for the KST-QST module and KST-ZQST module). The minimum distance is therefore 50 mm (40/2 + 60/2).
[2] Available fixing length

Schöck Isokorb® type KST
Views/Dimensions

Schöck Isokorb® module, type KST-ZST

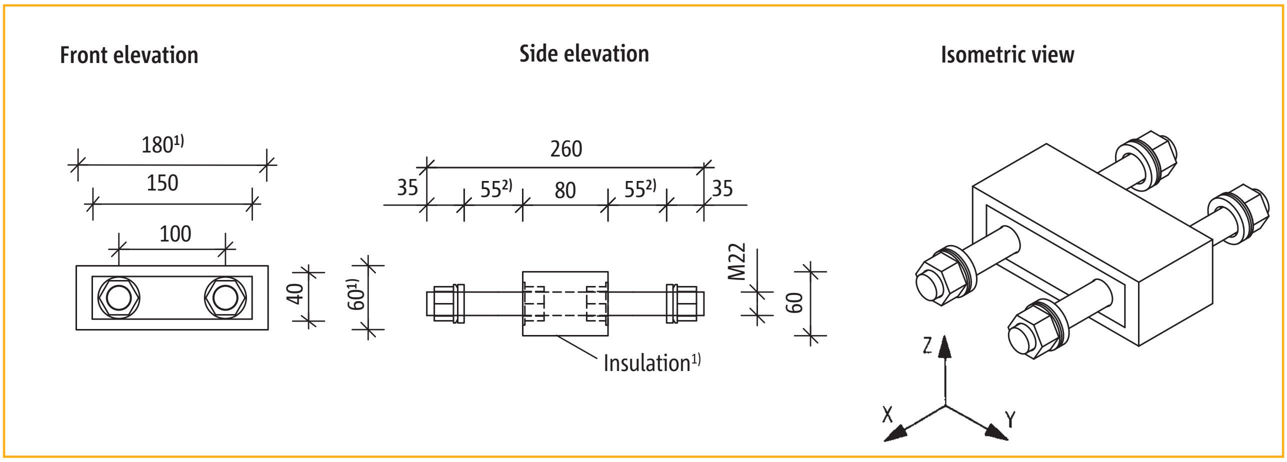
The KST-ZST module is used to absorb tensile forces. It comprises one insulating element (180/60/80 mm) and two stainless threaded rods with the corresponding nuts. The outer washers take the form of a ball socket and a conical disc. This offers advantages in terms of fatigue resistance. Refer also to the section about expansion joints on pages 176 - 177. 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

KST

Steel-to-steel

[1)] If required, the insulating element can be cut off up to the steel plates (150 x 40 for the KST-ZST module).
[2)] Available fixing length

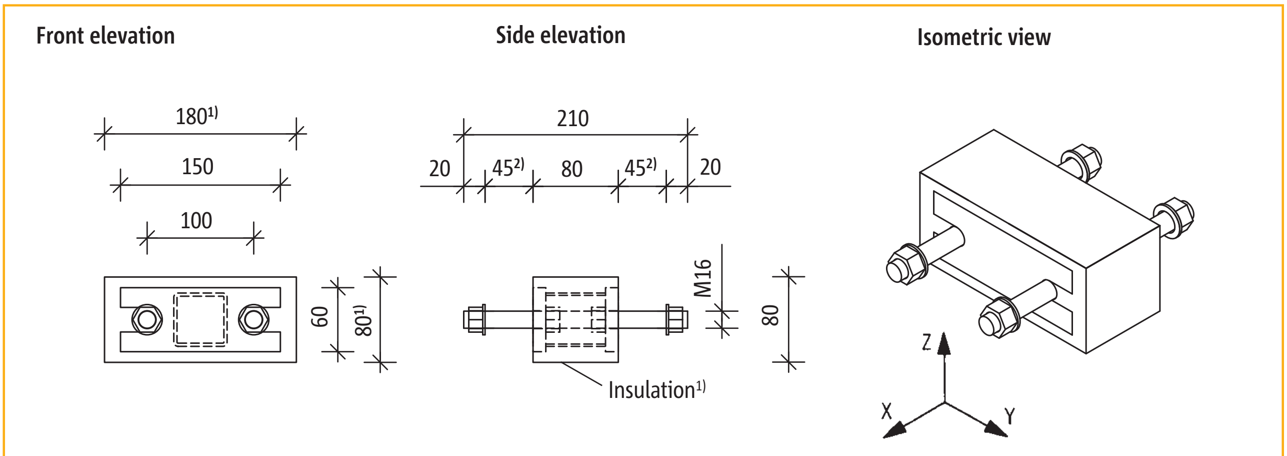
Schöck Isokorb® type KST

Views/Dimensions

Schöck Isokorb® module, type KST-QST

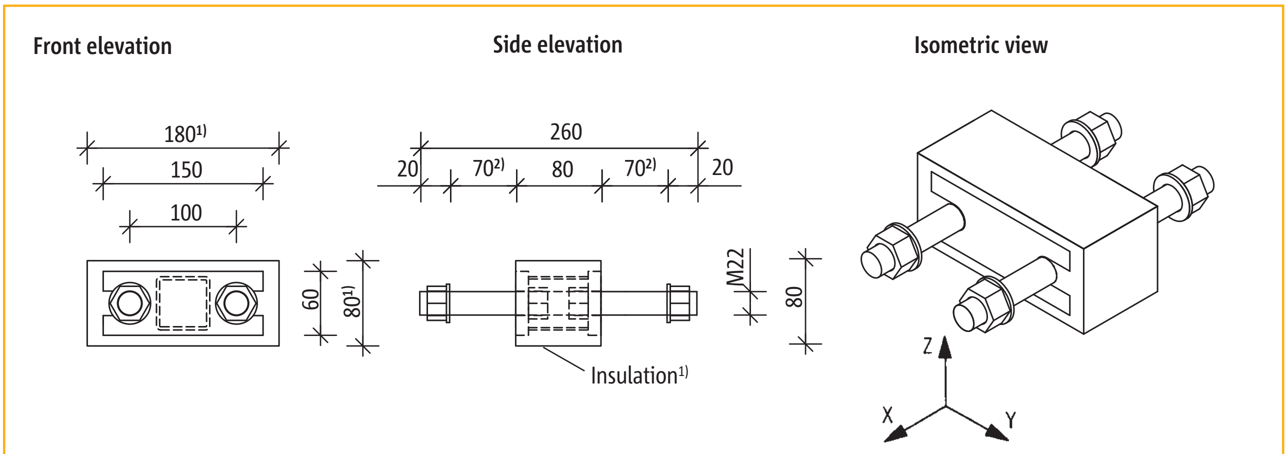
The KST-QST module is used to absorb compressive forces and shear forces. It consists of an insulating element (180/80/80 mm), two stainless threaded rods with corresponding nuts and a rectangular hollow section which is welded into the module. The rectangular hollow section transmits the shear forces. 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 combinations, 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

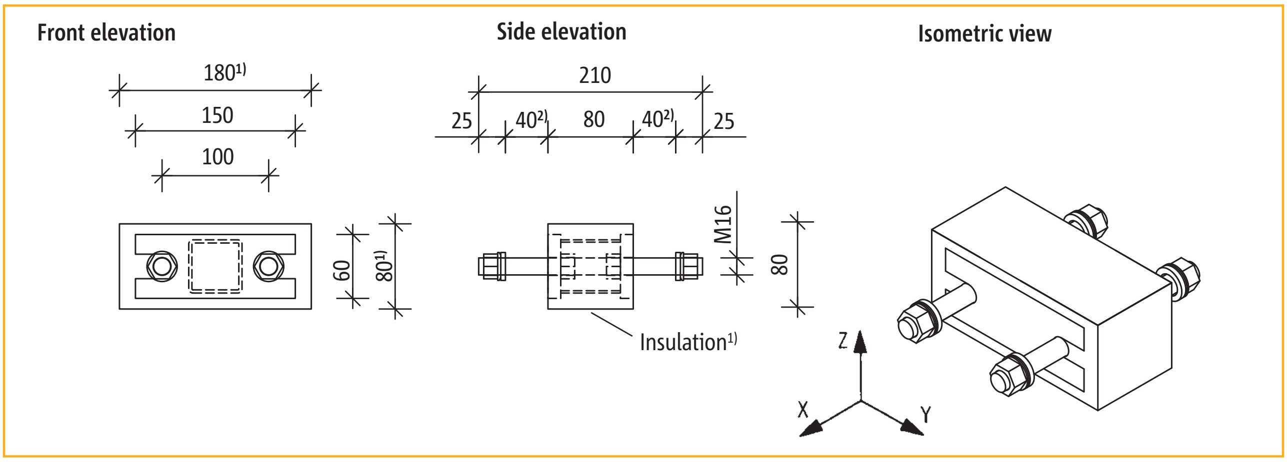
[1] If required, the insulating element can be cut off up to the steel plates (150 x 60 for the KST-QST module and the KST-ZQST module).
[2] Available fixing length

Schöck Isokorb® type KST
Views/Dimensions

Schöck Isokorb® module, type KST-ZQST

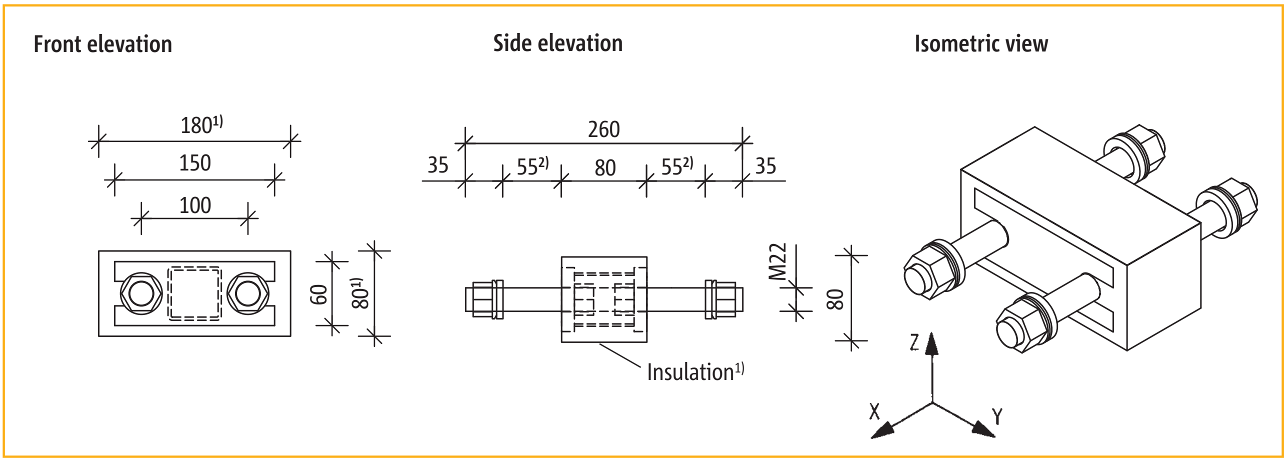
The KST-ZQST module combines the technical features of the KST-ZST module with those of the KST-QST module. It should be used for applications in which tensile forces are continuously transmitted and, at the same time, horizontal forces resulting from temperature deformations are transferred from the 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

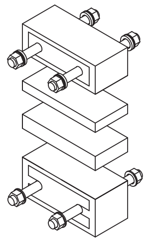
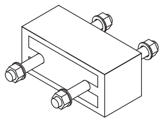
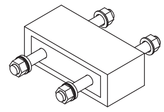


Views - Schöck Isokorb® module, type KST-ZQST 22

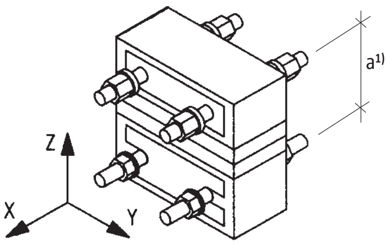
[1)] If required, the insulating element can be cut off up to the steel plates (150 x 60 for the KST-QST module and the KST-ZQST module).
[2)] Available fixing length

Schöck Isokorb® type KST

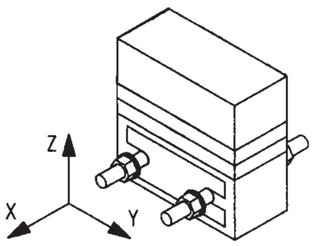
Design and capacity table

Schöck Isokorb® type						
	KST 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 x $F_{x,t,Rd}$[1]	a x $F_{x,t,Rd}$[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

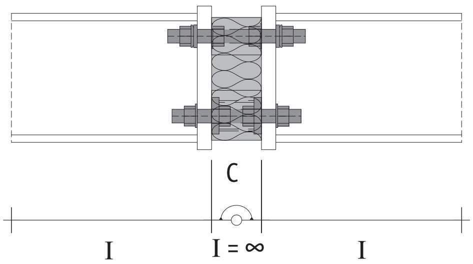


Schöck Isokorb® module, type KST-QST/KST-ZQST

[1] a = distance between the tension rods and compression bars of the Isokorb® element (inner lever arm), minimum possible axis separation between tension rods and compression bars = 50 mm (without insulating adapters after processing of the polystyrene – see pages 170 - 173[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 179 - 190.
[5] Please make sure that you read the notes on expansion joints/fatigue resistance on pages 176 - 177 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 179	3 700 x a²	$\varphi = \frac{M_K}{C}$	
No. 4 - see page 180	6 000 x a²		
No. 5 - see page 182	5 200 x a²		
No. 6 - see page 182	12 000 x a²		
No. 7 - see page 183	24 000 x a²		
No. 8 - see page 184	6 000 x a²		
No. 9 - see page 186	12 000 x a²		
No. 10 - see page 188	24 000 x a²		

a [cm] = refer to the design variants on pages 178 - 190.
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.

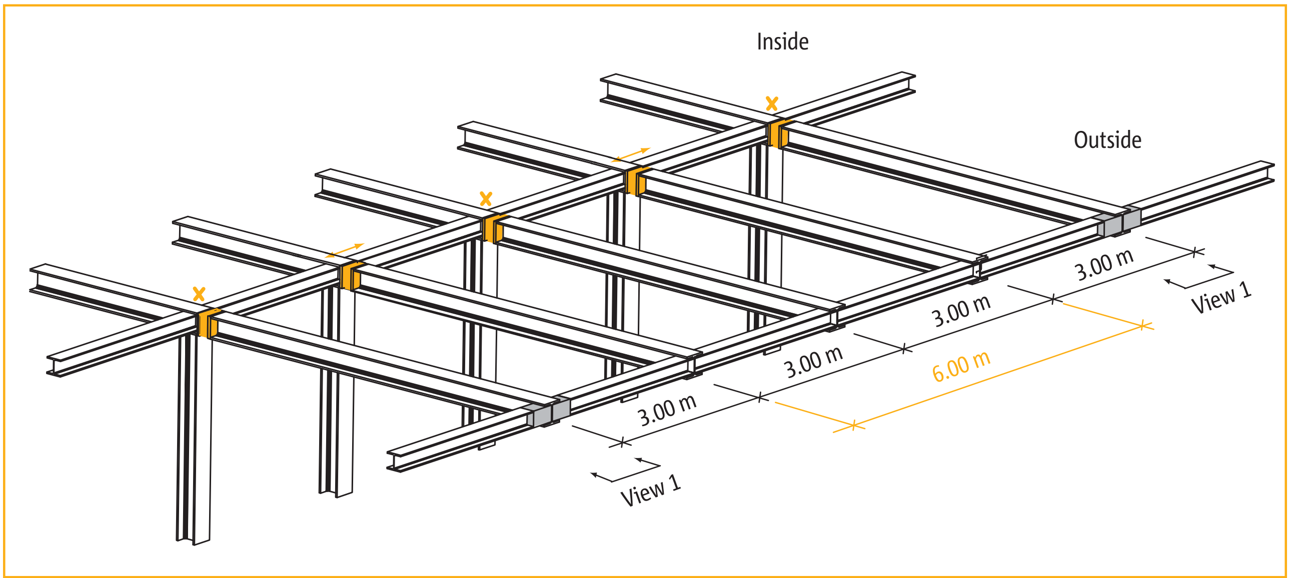
If, nonetheless, temperature deformations are assigned directly to the Isokorb® connection, then the Isokorb® type KST construction will be fatigue-resistant up to a construction length of 6 m by virtue of its special components (KST-QST module, KST-ZQST module: sliding film on the pressure plate; KST-ZST 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:

- 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)



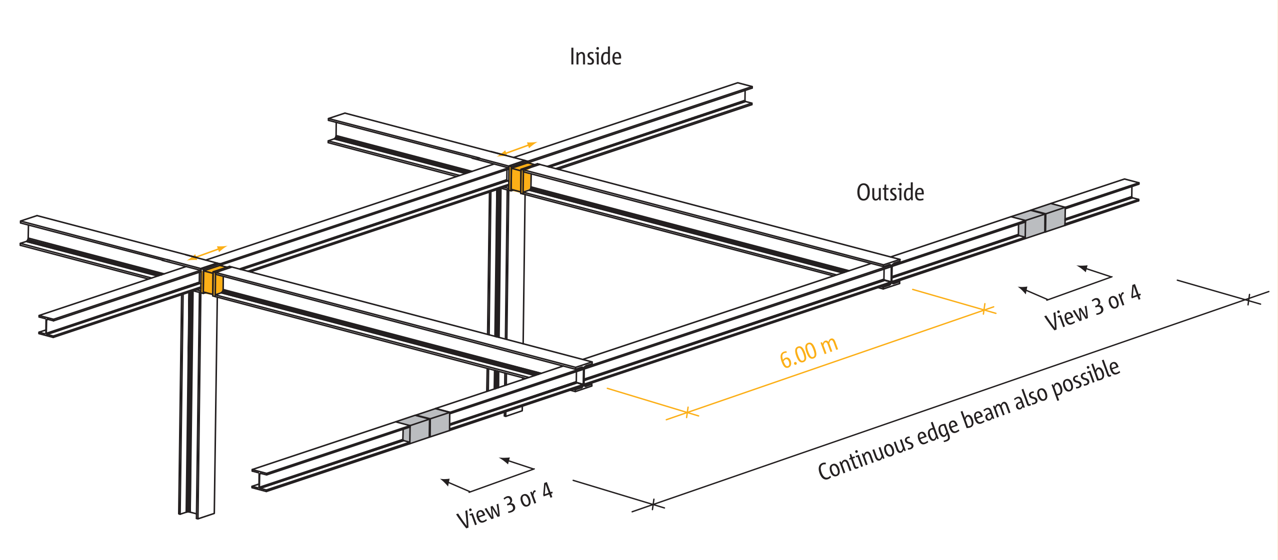
Example showing the arrangement of expansion joints, variant 1

KST

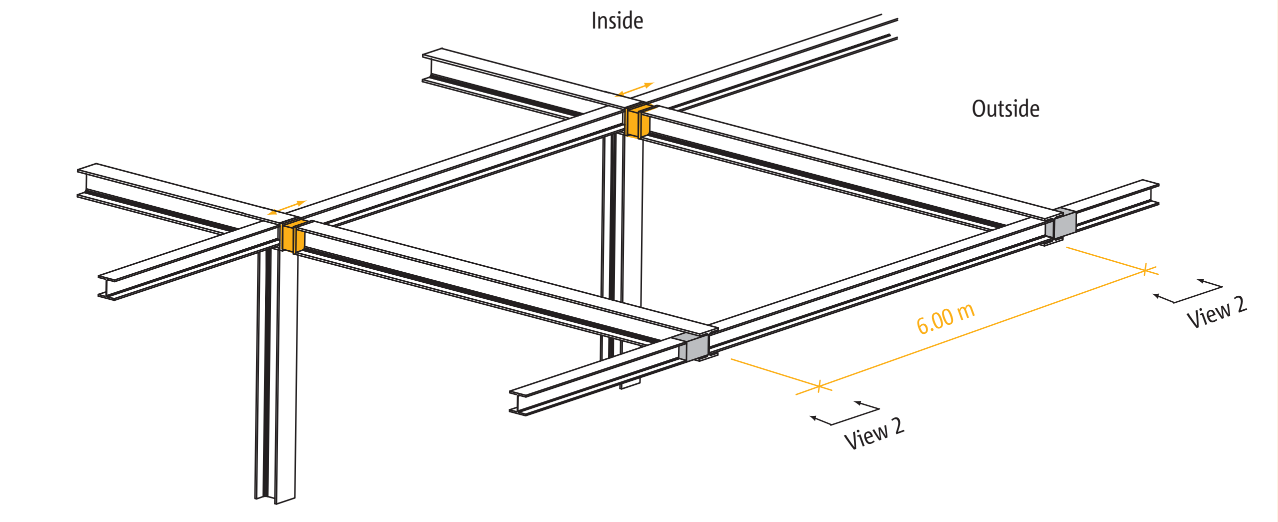
Steel-to-steel

Schöck Isokorb® type KST

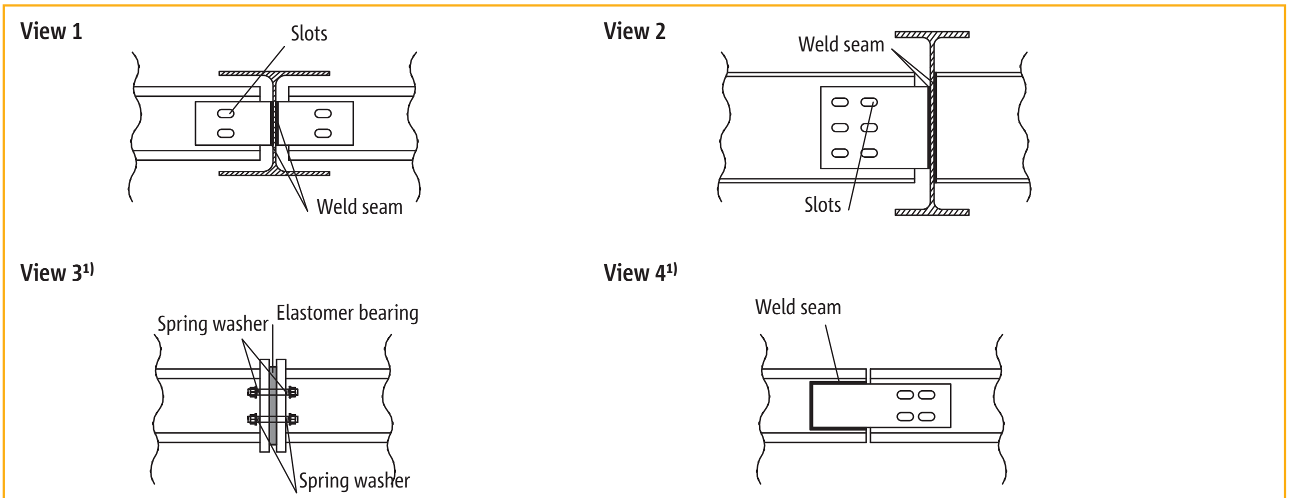
Expansion joints/Fatigue resistance



Example showing the arrangement of expansion joints, variant 2



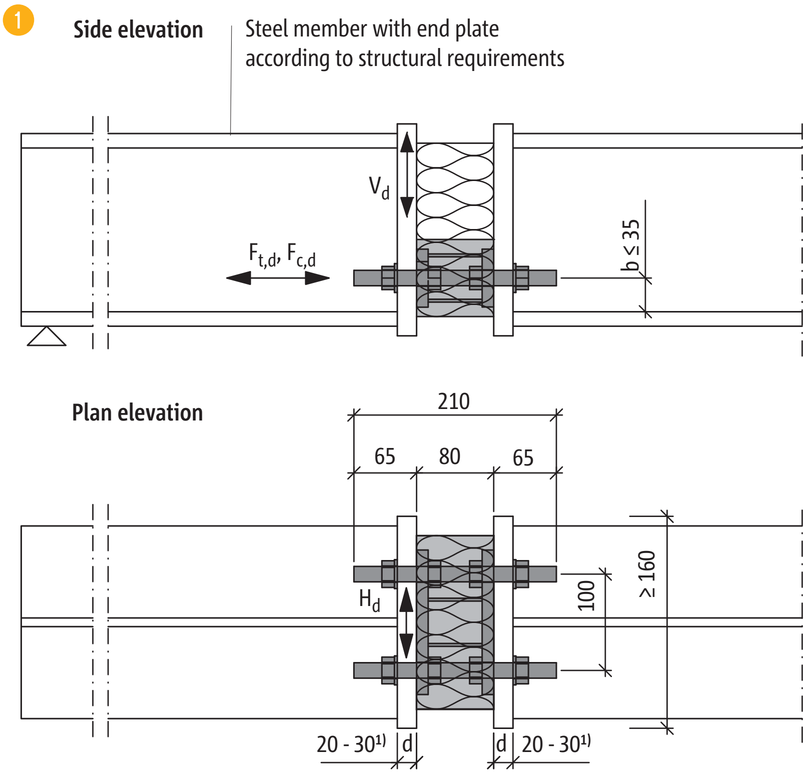
Example showing the arrangement of expansion joints, variant 3



[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:

$$\frac{\max.\ F_{t,d}}{F_{t,Rd}} = \frac{F_{c,d}}{F_{c,Rd}} \begin{cases} \leq 1.0 & : 30\text{ mm} \\ \leq 0.75 & : 25\text{ mm} \\ \leq 0.5 & : 20\text{ mm} \end{cases}$$

[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 176 - 177 for the expansion joint spacings.

[3)] Always refer to the information about expansion joints/fatigue resistance on pages 176 - 177.

Schöck Isokorb® modules, type KST-QST 16, KST-ZQST 16[2)]

KST

Example showing a supported connection of an UB 152 x 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, for load case:

Shear force

$\frac{V_{z,d}}{V_{z,Rd}} < 1.0 \qquad \frac{H_d}{H_{Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,QST16} = 25\text{ kN}/30\text{ kN} = 0.83 \quad < 1.0$

$H_d/H_{Rd,QST16} = 3\text{ kN}/6\text{ kN} = 0.5 \quad < 1.0$

Compression

$\frac{F_{c,d}}{F_{c,Rd}} < 1.0$

$F_{cd}/F_{c,Rd,QST16} = 80\text{ kN}/116{,}8\text{ kN} = 0.68 \quad < 1.0$

Tensile force (see note on page 174)

Interaction condition: $3V_{z,d} + 2H_d + F_{t,d} = \max F_{t,d}$

$\frac{\max F_{t,d}}{F_{t,Rd}} < 1.0$

$\max F_{t,d} = 3V_{z,d} + 2H_d + F_{t,d} = 3 \times 25\text{ kN} + 2 \times 3\text{ kN} + 30\text{ kN} = 111\text{ kN}$

$\max F_{t,d} / F_{t,Rd,QST16} = 111\text{ kN}/116.8\text{ kN} = 0.95 < 1.0$

Minimum end plate thickness [d] without detailed verification, using mild steel S235: Distance b ≤ 35mm

$$\frac{F_{c,d}}{F_{c,Rd,QST16}} \text{ or } \frac{\max F_{t,d}}{F_{t,Rd,QST16}} \begin{cases} \leq 1.0 & : 30\text{ mm} \\ \leq 0.75 & : 25\text{ mm} \\ \leq 0.5 & : 20\text{ mm} \end{cases}$$

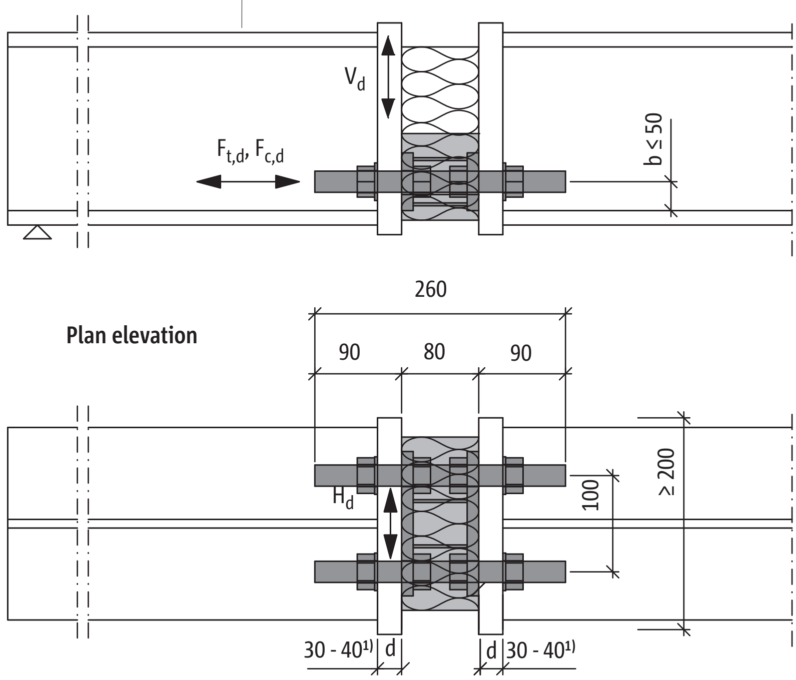
$$\frac{\max F_{t,d}}{F_{t,Rd,QST16}} = 0{,}95 < 1{,}0 \rightarrow d = 30\text{ mm}$$

Steel-to-steel

Schöck Isokorb®

Design configurations, type KST-QST 22 module, KST-ZQST 22 module, KST 16

2 **Side elevation** Steel member with end plate according to structural requirements



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, $F_{t,d}$:

$3\ V_d + 2\ H_d + F_{t,d} = \max F_{t,d} \leq F_{t,Rd}$

[1] Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

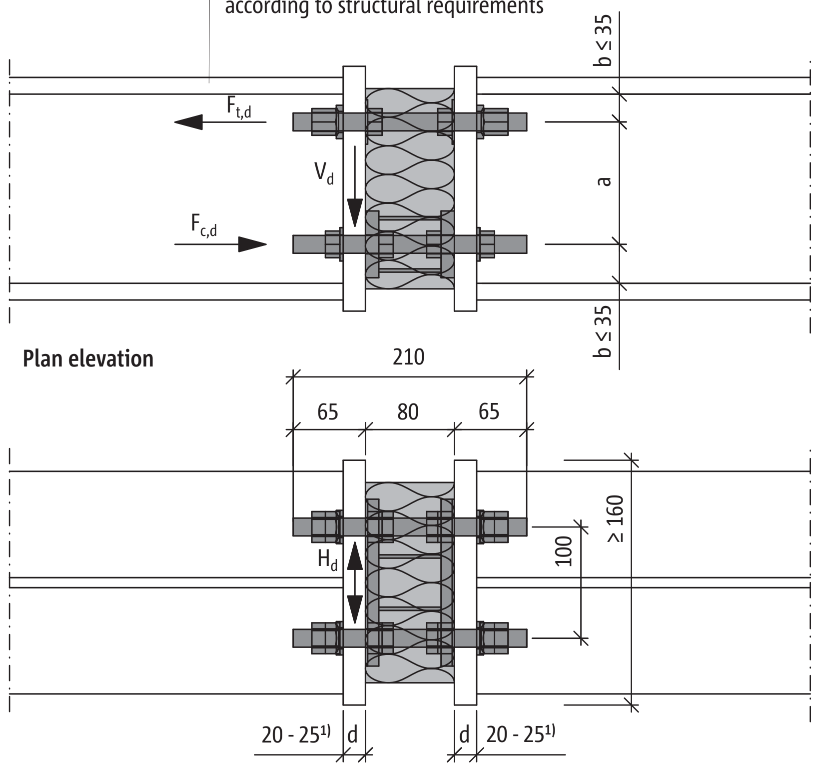
$\frac{\max. F_{t,d}}{F_{t,Rd}} = \frac{F_{c,d}}{F_{c,Rd}}$ ≤ 1.0 : 40 mm; ≤ 0.75 : 35 mm; ≤ 0.5 : 30 mm

[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 176 - 177 for the expansion joint gaps.

[3] Always refer to the information about expansion joints/fatigue resistance on pages 176 - 177.

Schöck Isokorb® modules, type KST-QST 22, KST-ZQST 22[2]

3 **Side elevation** Steel member with end plate according to structural requirements



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

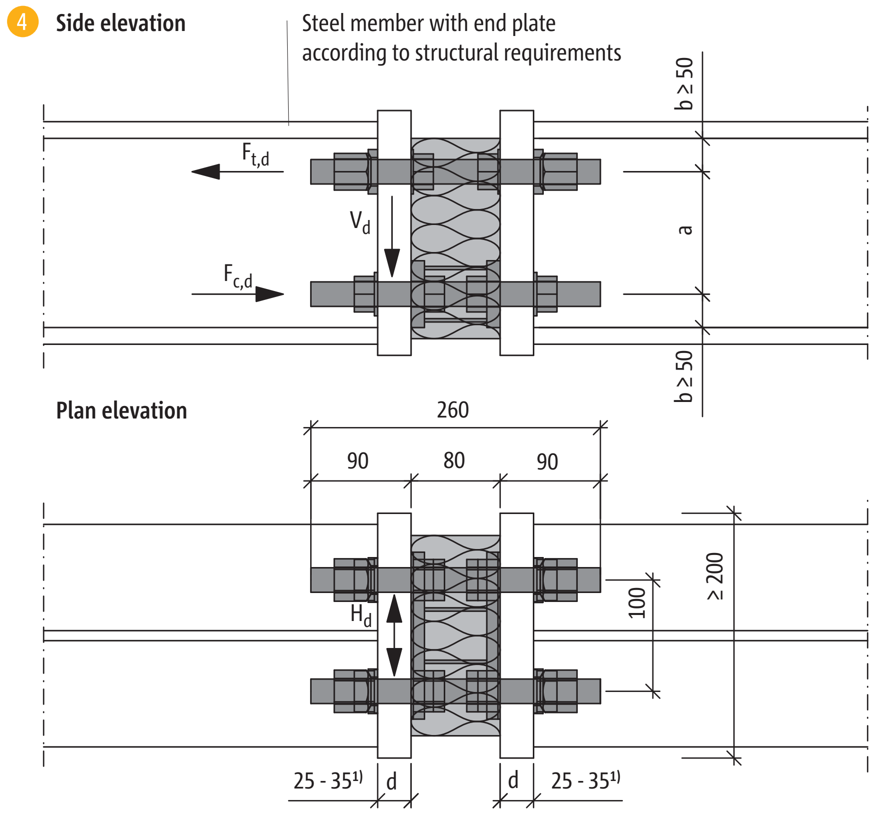
a < 150: 30 mm

[2] Always refer to the information about expansion joints/fatigue resistance on pages 176 - 177.

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 176 - 177.

Schöck Isokorb® type KST 22

Example of moment connections for UB 203 x 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 22, for load case:

Shear force/horizontal force

$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$ $\quad$ $\frac{H_d}{H_{Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,QST22}$ = 32 kN/36 kN = 0.89 < 1.0

$H_d/H_{Rd,QST22}$ = 4 kN/ 6 kN = 0.67 < 1.0

Positive moment

$\frac{F_{c,d}}{F_{c,Rd}} < 1{,}0$ $\quad$ $\frac{F_{t,d}}{F_{t,Rd}} < 1.0$

$F_{c,d} = F_{t,d} = M_{y,d}/a$ = 18 kNm/0.12 m = 150 kN

$F_{c,d}/F_{c,Rd,QST22}$ = 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

Negatives moment (lifting off)

max $F_{t,d} < F_{t,Rd}$

$F_{c,d} = F_{t,d} = M_{y,d}/a$ = 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 174)

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 174)
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

$$\frac{\max F_{t,d}}{F_{t,Rd}} < 1$$

$\max F_{t,d} / F_{t,Rd,ZST22} = 97.67/225.4 = 0.43 < 1$

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

$F_{t,d}/F_{t,Rd} = 150 \text{ kN}/225.4 \text{ kN} = 0.67$

$$a \leq 150: \quad \frac{F_{t,d}}{F_{t,Rd}} = 0{,}67 < 0.8 \rightarrow d = 30 \text{ mm}$$

Deformation due to $M_{y,d}$ (see page 175)
Buckling angle

$$\varphi = \frac{M_K}{c} \text{ [rad]}$$

$c = 6000 \times a^2$ [cm]

$$\varphi = \frac{18/1{,}45^{1)} \times 100}{864000} = 1.4368 \times 10^{-3} \text{[rad]}$$

$c = 6000 \times 12^2 = 864000$ [KNcm/rad]

[1] Conversion of M_{yd} into M_K
(with global safety factor $\gamma_f = 1.45$)

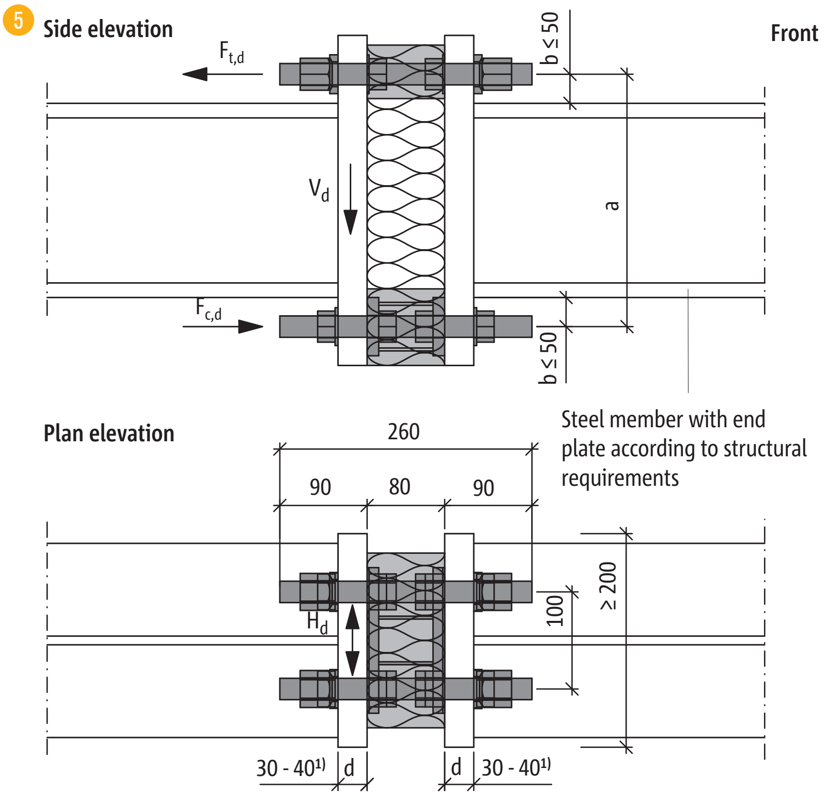
KST

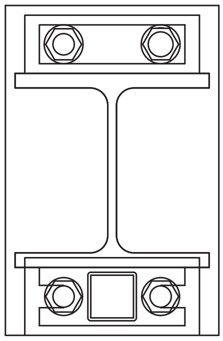
Notes on the example

- The information relating to the fatigue resistance of expansion joints on pages 176 - 177 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 184). 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.

Steel-to-steel

Schöck Isokorb® type KST 22
Design configurations





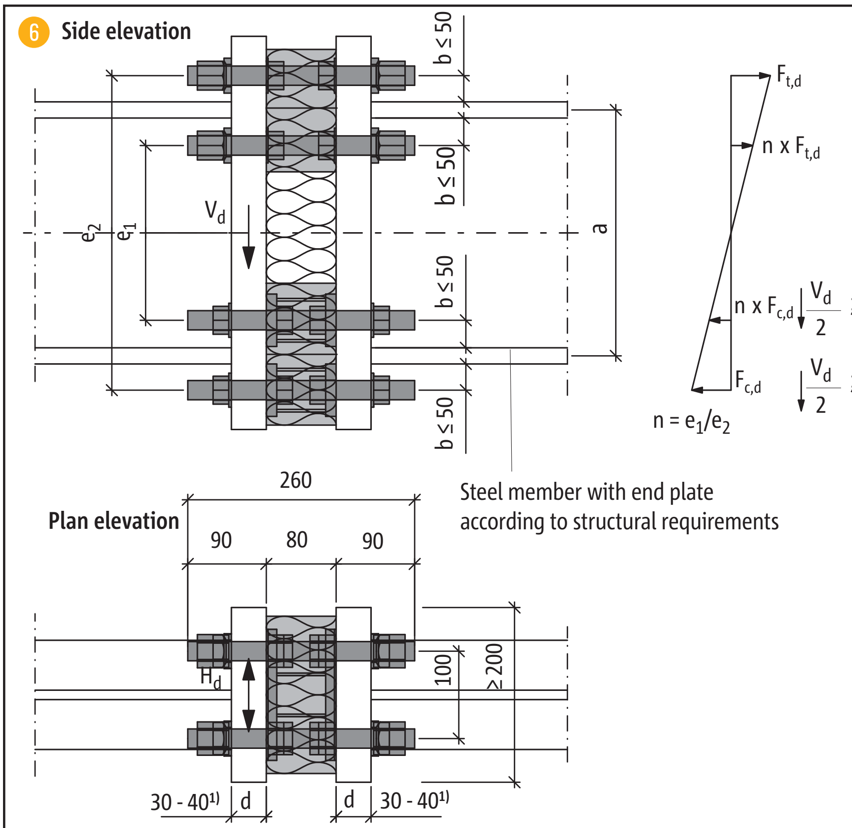
KST 22	
H_{Rd}	6 kN[2)]
V_{Rd}	36 kN
$F_{t,Rd}$, $F_{c,Rd}$	225.4 kN

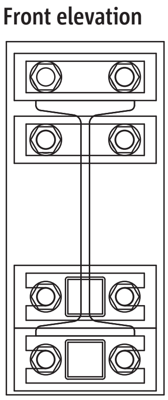
1) Minimum end plate thicknesses [d] without detailed verification, using mild steel S235:

$\frac{F_{t,d}}{F_{t,Rd}}$ ≤ 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 176 - 177.

Schöck Isokorb® type KST 22





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 176 - 177.

Schöck Isokorb® for connection of members with 2 x KST 22 (2 tensile and 2 compressive shear force modules)

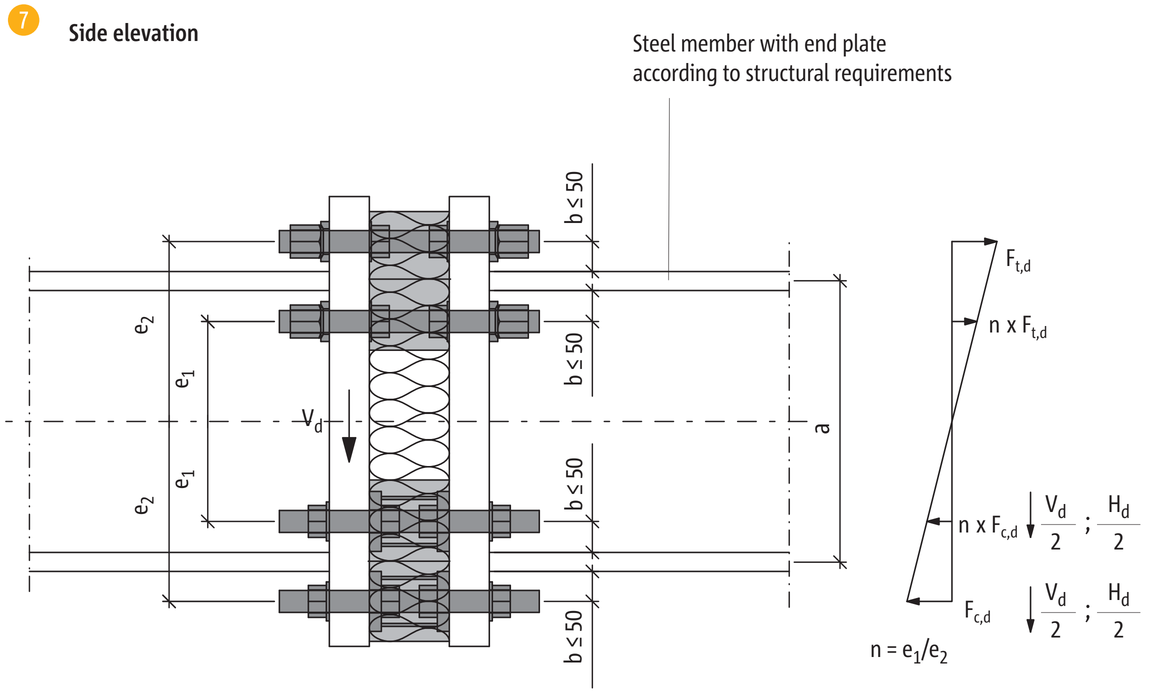
KST

Steel-to-steel

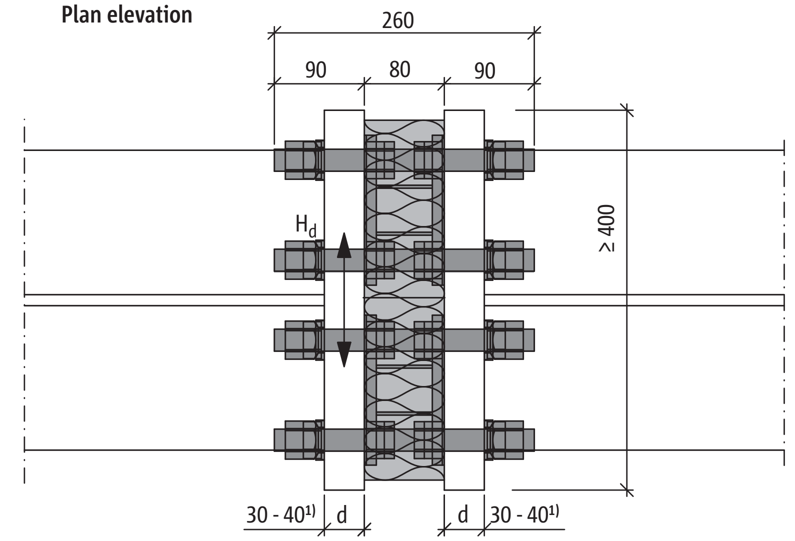
Schöck Isokorb® type KST 22

Design configuration

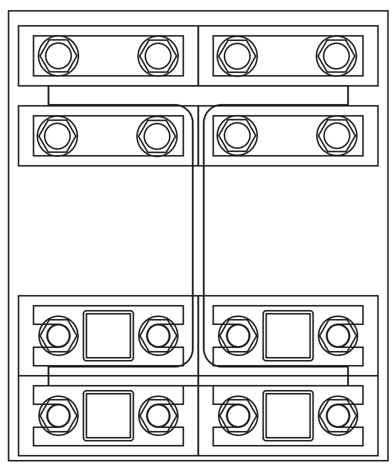
7 **Side elevation**



Plan elevation



Front elevation



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:

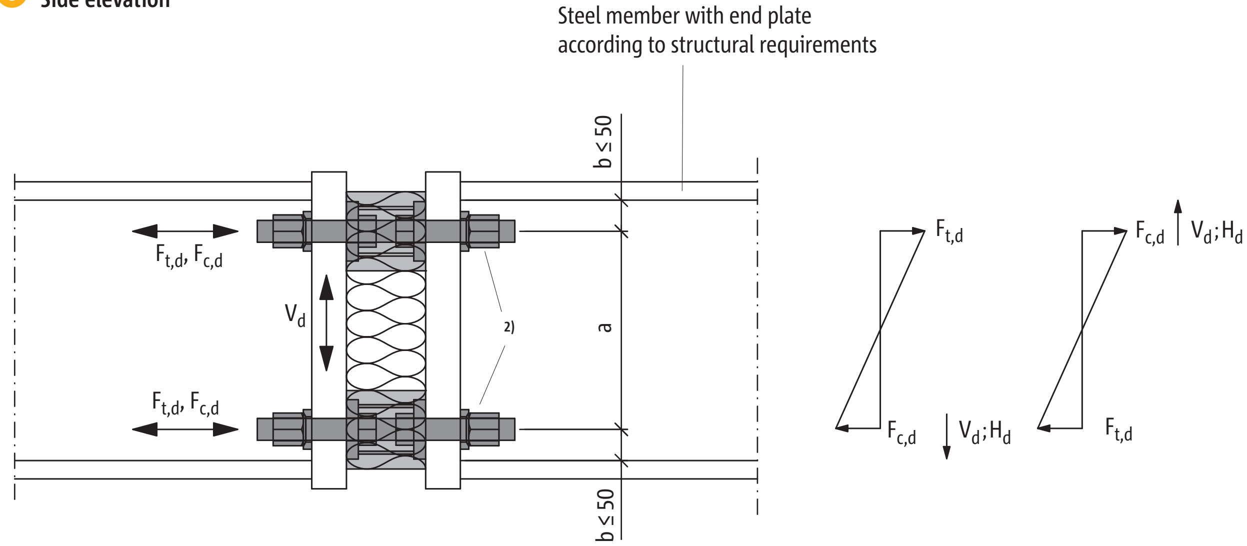
$$\frac{F_{t,d}\text{ per module}}{F_{t,Rd}} \quad \begin{array}{l} \leq 1.0 \;\;: 40\text{ mm} \\ \leq 0.75 : 35\text{ mm} \\ \leq 0.5 \;\;: 30\text{ mm} \end{array}$$

[2] Always refer to the information about expansion joints/fatigue resistance on pages 176 - 177.

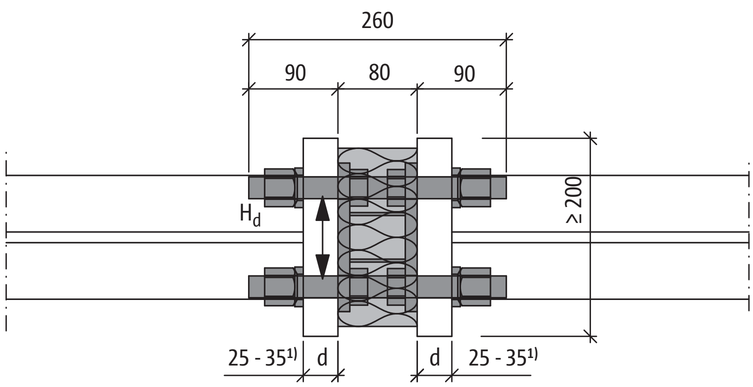
Schöck Isokorb® for connection of members with 4 x KST 22 (4 tensile and 4 compressive shear force modules)

Schöck Isokorb® type KST-QST 22 module, KST-ZQST 22 module
Design configuration

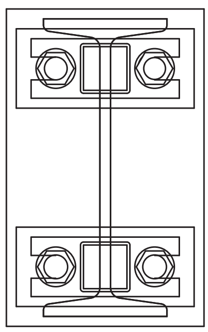
8 Side elevation



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:

$$\frac{F_{t,d}\text{ per module}}{F_{t,Rd}} \quad \begin{array}{l} \leq 1.0 : 35\text{ mm} \\ \leq 0.8 : 30\text{ mm} \\ \leq 0.5 : 25\text{ mm} \end{array}$$

[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 173 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 176 - 177.

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 x 23 for lifting-off forces with 2 x KST-ZQST 22 modules

Loads:	Load case 1:	$V_{z,d} = \ 32$ kN	$H_d = \pm 5$ kN	$M_{y,d} = -18$ kNm
	Load case 2:	$V_{z,d} = -34$ kN	$H_d = \pm 5$ kN	$M_{y,d} = \ 20$ kNm
	a = 0.12 m			

Verifications for KST-ZQST 22 module, for load case:

Shear force/horizontal force

$\frac{V_{z,d}}{V_{z,Rd}} < 1.0 \qquad \frac{H_d}{H_{Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,ZQST22} = 32\text{ kN}/36\text{ kN} = 0.89 \quad < 1.0$

$H_d/H_{Rd,ZQST22} = \ 5\text{ kN}/\ 6\text{ kN} = 0.83 \quad < 1.0$

Positive moment

$\frac{F_{c,d}}{F_{c,Rd}} < 1.0 \qquad \frac{F_{t,d}}{F_{t,Rd}} < 1.0$

$F_{c,d} = F_{t,d} = M_{y,d}/a = 18\text{ kNm}/0.12\text{ m} = 150\text{ kN}$

$F_{c,d}/F_{c,Rd,ZQST22} = 150\text{ kN}/225.4\text{ kN} = 0.67 < 1.0$

$F_{t,d}/F_{t,Rd,ZQST22} = 150\text{ kN}/225.4\text{ kN} = 0.67 < 1.0$

Negatives moment (lifting off)

$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$

$\frac{F_{c,d}}{F_{c,Rd}} < 1.0 \qquad \frac{F_{t,d}}{F_{t,Rd}} < 1.0$

$V_{z,d}/V_{z,Rd,ZQST22} = 34\text{ kN}/36\text{ kN} = 0.94 < 1.0$

$F_{c,d} = F_{t,d} = M_{y,d}/a = 20\text{ kNm}/0.12\text{ m} = 166.67\text{ kN}$

$F_{c,d}/F_{c,Rd,ZQST22} = 166.67\text{ kN}/225.4\text{ kN} = 0.74 < 1.0$

$F_{t,d}/F_{t,Rd,ZQST22} = 166.67\text{ kN}/225.4\text{ kN} = 0.74 < 1.$

Minimum end plate thickness [d] without detailed verification, using mild steel S235: Distance b ≤ 50 mm

$$\frac{\max F_{t,d}}{F_{t,Rd,QST22}} \begin{cases} < 1.0\text{: } 35\text{ mm} \\ < 0.8\text{: } 30\text{ mm} \\ < 0.5\text{: } 25\text{ mm} \end{cases}$$

$$\frac{F_{t,d}}{F_{t,Rd}} = 0{,}74 < 0{,}8 \rightarrow d = 30\text{ mm}$$

Deformation due to $M_{y,d}$ see page 175

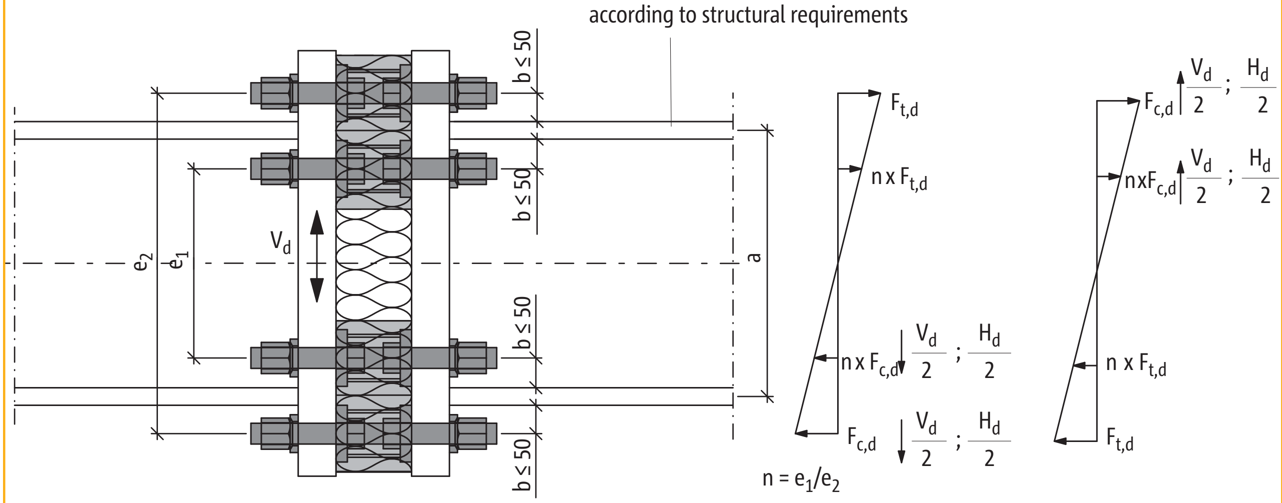
Notes

- 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 x 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.

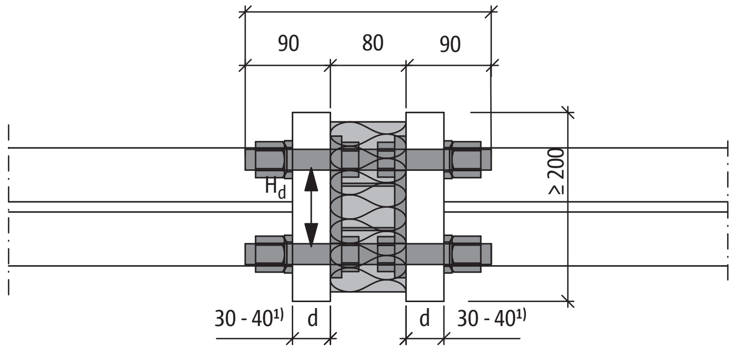
Schöck Isokorb® type KST-QST 22 module, KST-ZQST 22 module

Design configuration

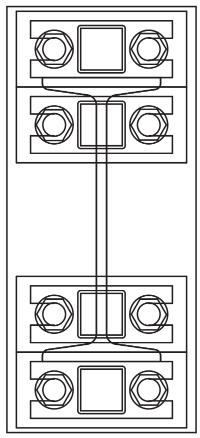
9 **Side elevation**



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:

$\frac{F_{t,d} \text{ per module}}{F_{t,Rd}}$ ≤ 1.0 : 40 mm
≤ 0.75 : 35 mm
≤ 0.5 : 30 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 173 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 176 - 177.

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 x 33 for lifting-off forces with 4 x 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, for load case:

Shear force

$$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$$

$V_{z,Rd,ZQST22}$ = 2 x 36 kN 72 kN
$V_{z,d}/V_{z,Rd,ZQST22}$ = 55 kN/72 kN = 0.76 < 1.0

Positive moment

$$F_{c,d} = F_{t,d} = M_{y,d}/e_2 + (\frac{e_1}{e_2} \text{ x e1})$$

$F_{c,d} = F_{t,d}$ = 130 kNm/(0.45 m + (0.25 m/0.45 m x 0.25 m))
$F_{c,d} = F_{t,d}$ = 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
$Ft/F_{t,Rd,ZQST22}$ = 220.8 kN/225.4 kN = 0.98 < 1.0

Negative moment (lifting off)

$$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$$

$V_{z,Rd,ZQST22}$ = 2 x 36 kN 72 kN
$V_{z,d}/V_{z,Rd,ZQST22}$ = 40 kN/72 kN = 0.55 < 1.0

$$F_{c,d} = F_{t,d} = M_{y,d}/e_2 + (\frac{e_1}{e_2} \text{ x e1})$$

$F_{c,d} = F_{t,d}$ = 80 kNm/(0.45 m + (0.25 m/0.45 m x 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

$$\frac{\max F_{t,d}}{F_{t,Rd,QST22}} \begin{cases} < 1.0\text{: 40 mm} \\ < 0.8\text{: 35 mm} \\ < 0.5\text{: 30 mm} \end{cases}$$

$$\frac{F_{t,d}}{F_{t,Rd}} = 0.98 \le 1.0 \rightarrow d = 40 \text{ mm}$$

Deformation due to $M_{y,d}$ see page 175

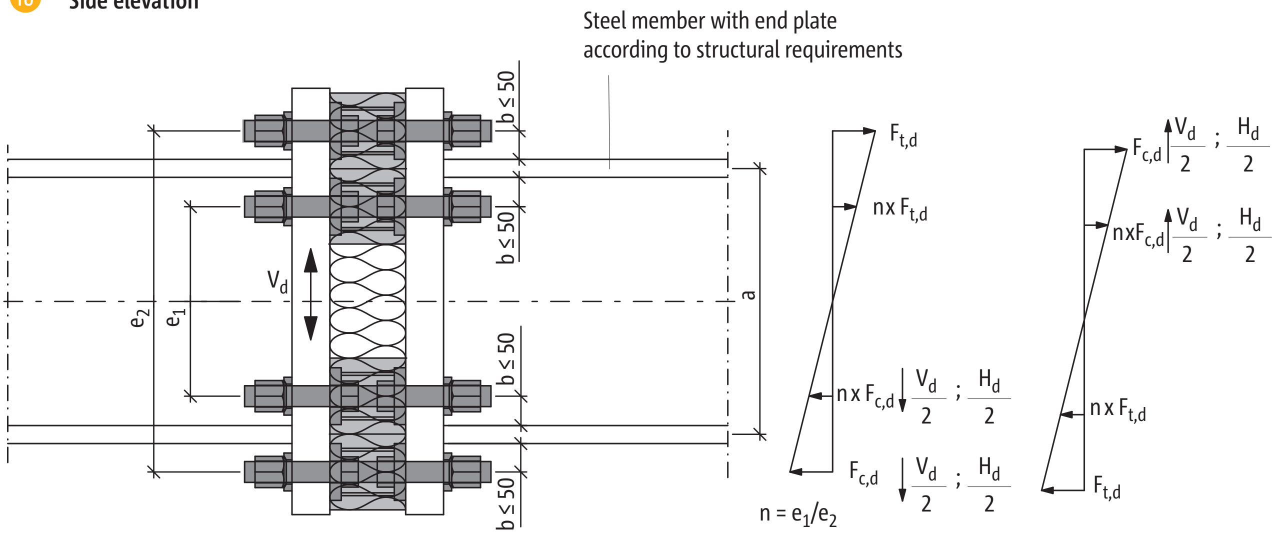
Notes

- 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.
  $(F_{c,d} = 166.67 \ge \frac{225.4}{8} = F_{t,Rd})$
- 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, we recommend a symmetrical connection with 4 x 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.

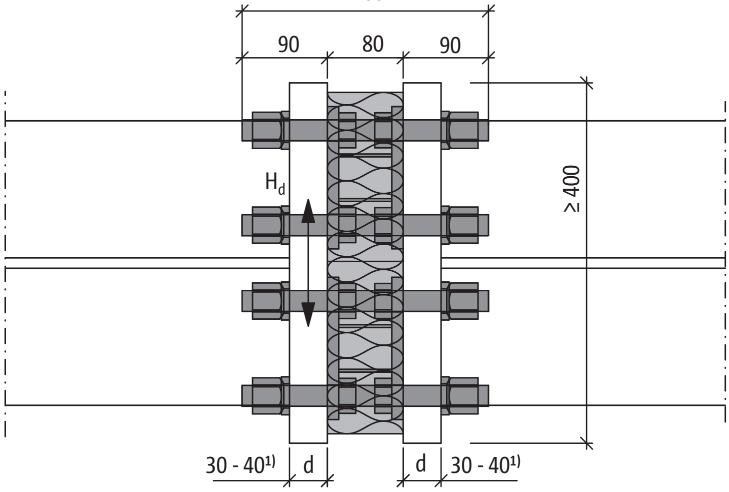
Schöck Isokorb® type KST-QST 22 module, KST-ZQST 22 module

Design configuration

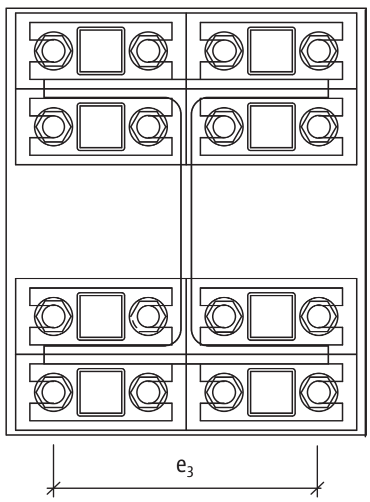
10 **Side elevation**



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:

$\frac{F_{t,d} \text{ per module}}{F_{t,Rd}}$ ≤ 1.0 : 40 mm
≤ 0.75 : 35 mm
≤ 0.5 : 30 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 173 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 176 - 177.

Schöck Isokorb® for connection of members with 8 KST-QST 22 modules/KST-ZQST 22 modules[2)]

Schöck Isokorb®

Example: type KST-QST 22 module, KST-ZQST 22 module

Example: Moment connection for HEA 360 with 4 x KST-ZQST 22 modules

Loads:
Load case 1 (status during usage): $V_{z,d} =$ 126 kN $H_d = \pm 20$ kN $M_{y,d} = -236$ kNm
Load case 2 (assembly): $V_{z,d} = -96$ kN $M_{y,d} =$ 166 kNm $M_{z,d} = \pm 22$ 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/horizontal force

$$\frac{V_{z,d}}{V_{z,Rd}} < 1.0$$

$V_{z,Rd,QST22} = 4 \times 36$ kN = 144 kN
$V_{z,d}/V_{z,Rd,QST22} = 126$ kN/144 kN = 0.88 < 1.0

$H_{Rd,QST22} = 4 \times 6$ kN = 24 kN
$H_d/H_{Rd,QST22} = 20$ kN/24 kN = 0.83 < 1.0

Positive moment

$$M_{y,d} = 2 \times F_{t,Rd} \times e_2 + 2 \times \frac{e_1}{e_2} \times F_{t,Rd} \times a_1$$

$$F_{t,Rd,\,QST22} = \frac{M_{yd}}{2 \times e_2 + 2 \times \frac{e_1}{e_2}\; e_1} \qquad \frac{236\text{ KNm}}{2 \times 0.45\text{ m} + 2 \times \frac{0.215\text{ m}}{0.45\text{ m}} \times 0.215\text{ m}} = 213.5\text{ KN}$$

$$\frac{F_{c,d}}{F_{c,Rd}} < 1.0 \qquad \frac{F_{t,d}}{F_{t,Rd}} < 1.0$$

$F_{c,d}/F_{c,Rd,\,QST22} = 213.5$ 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

$$\frac{\max F_{t,d}}{F_{t,Rd,QST22}} \begin{cases} < 1.0\text{: 40 mm} \\ < 0.8\text{: 35 mm} \\ < 0.5\text{: 30 mm} \end{cases}$$

$$\frac{F_{t,d}}{F_{t,Rd}} = 0.95 < 1.0 \rightarrow d = 40\text{ mm}$$

Deformation due to $M_{y,d}$ (see page 175)
Buckling angle

$$\varphi = \frac{M_K}{C}\ [\text{rad}] \qquad \varphi = \frac{236/1.45 \times 100}{25.5336^{06}}\ [\text{rad}]$$

$$c = 24\,000 \times a^2 \qquad c = 24\,000 \times \left(\frac{(21.5\text{ cm} + 45\text{ cm})}{2}\right)^2 = 26.5335 \times 10^6\ [\text{KNcm/rad}]$$

KST

Steel-to-steel

Schöck Isokorb®

Example type KST-QST 22 module, KST-ZQST 22 module

Loading combination during assembly:

Shear force/horizontal force

$$\frac{V_{zd}}{V_{z,Rd}} < 1{,}0$$

$V_{z,Rd,QST22} = 4 \times 36\ kN = 144\ kN$

$V_{z,d} / V_{z,Rd,QST22} = 96\ kN / 144\ kN = 0.66 < 1.0$

Negative moment (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-to-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

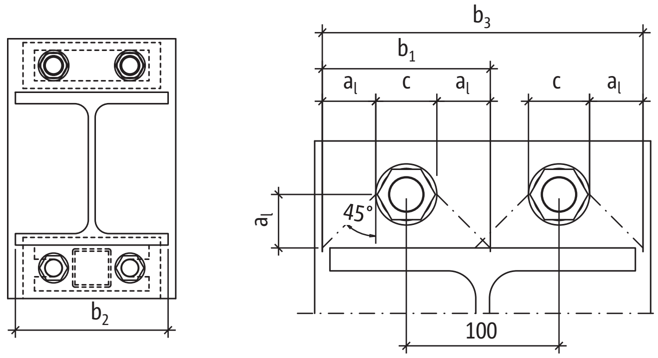
Calculation of max. bolt force: $\frac{F_{t,max,d}}{2} = F_{t,max,d}$ per bolt

Max. moment in the end plate:
$M_d = F_{t,\,max,d,bolt} \times a_l = [kNmm]$
$W = d^2 \times b_{ef}/6 = [mm^2]$ 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

$b_1 = 2 \times a_l + c$ [mm]
b_2 = member width or width of end plate [mm]
$b_3 = 2 \times a_l + c + 100$ [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

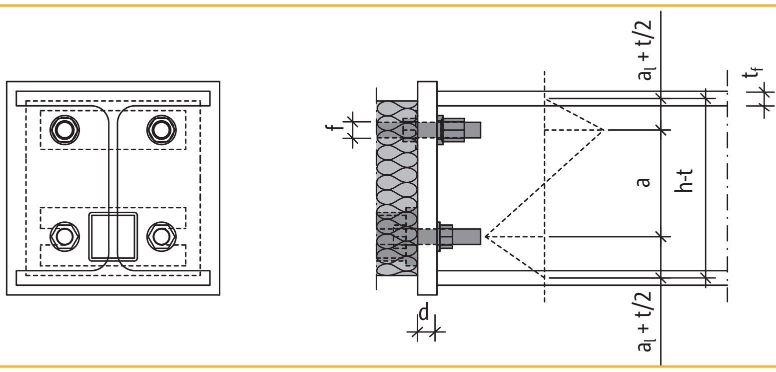
Example - end plate flush

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

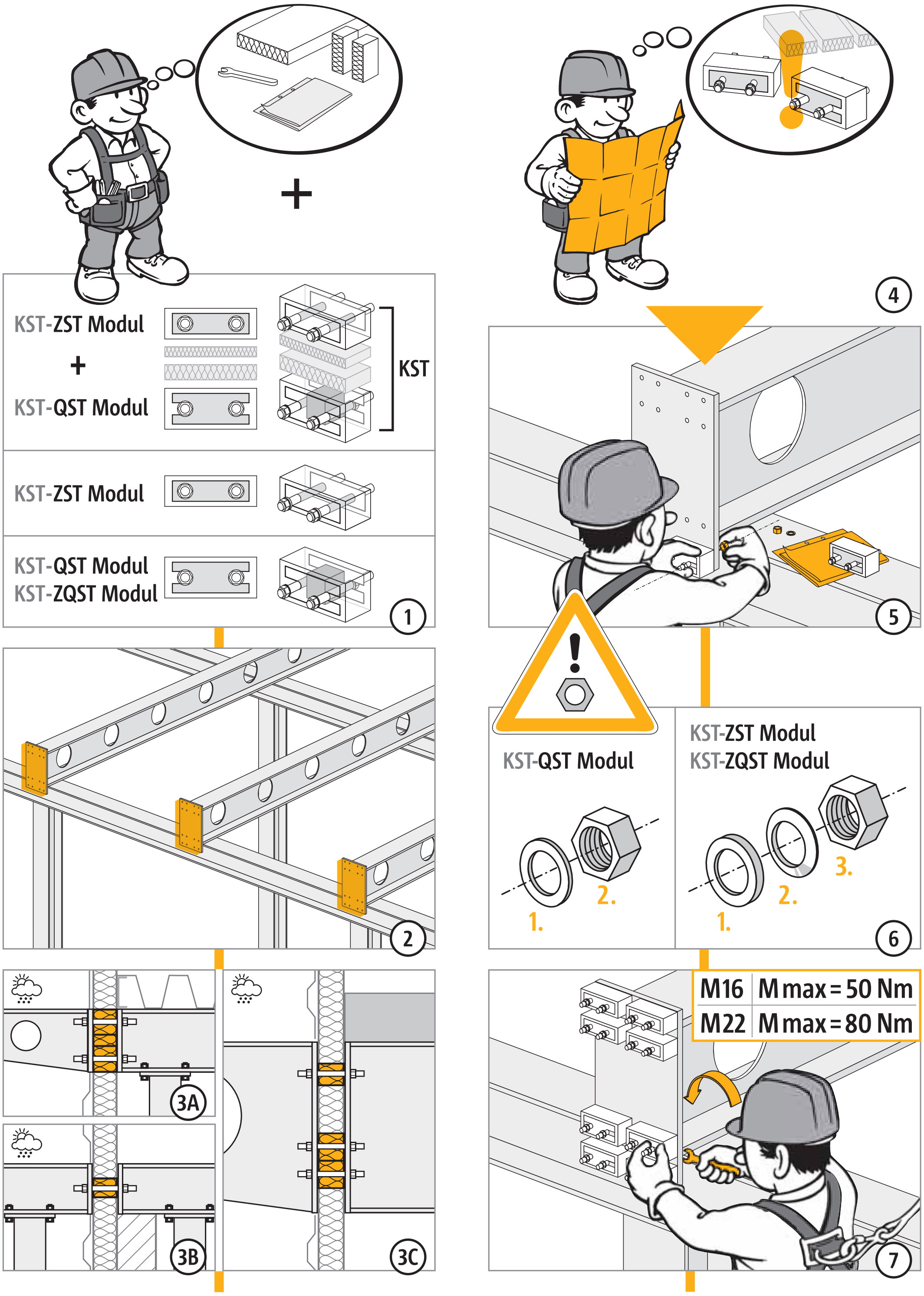
$b_{ef} = b - 2 \times f$
d = thickness of end plate
f = diameter of bore
f (KST 16) = 18 mm
f (KST 22) = 24 mm
b = width of end plate

$M_{R,d} = W \times f_{y,k}/1.1$
$M_d/M_{R,d} = \leq 1.0$



Schöck Isokorb® type KST 16 dimensioning of the end plate

Schöck Isokorb® type KST
Method statement

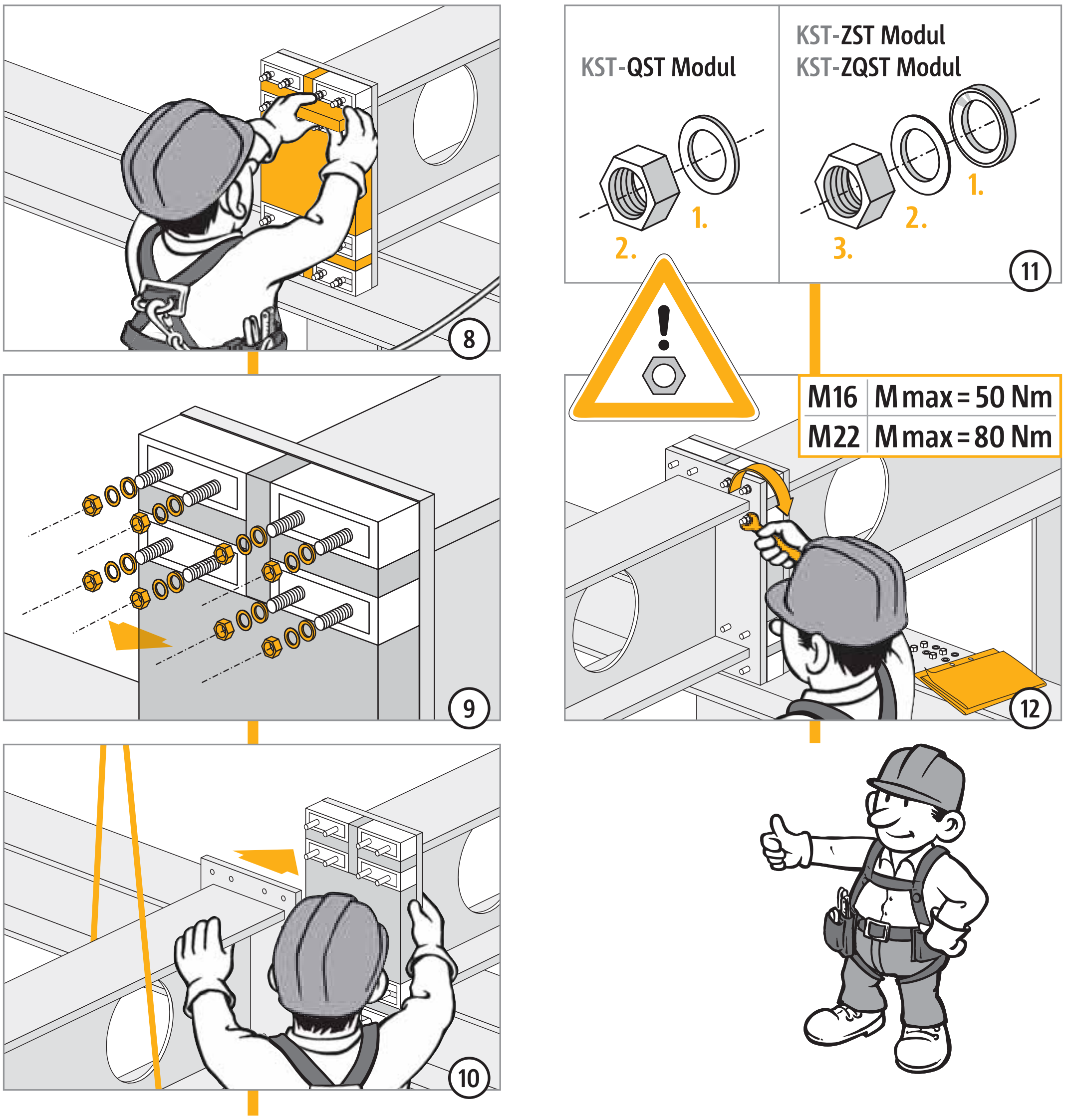


KST

Steel-to-steel

Schöck Isokorb® type KST

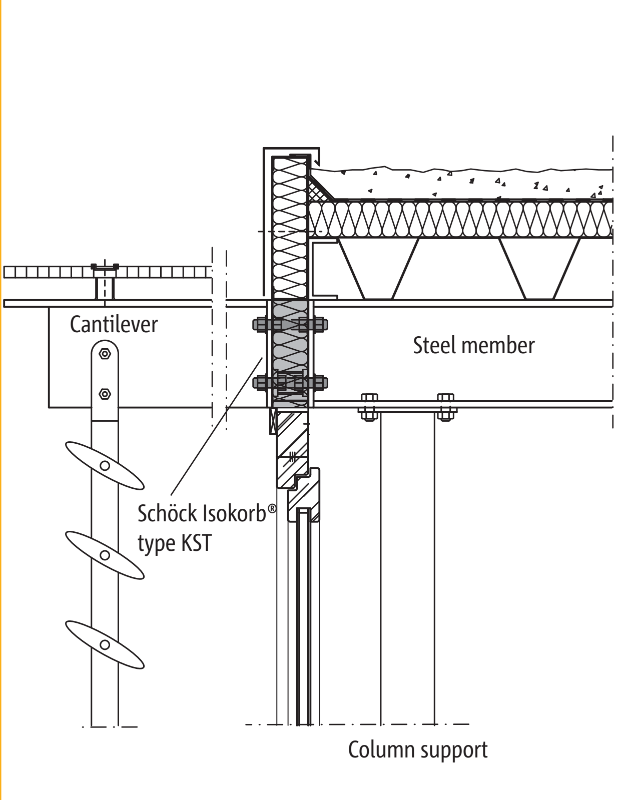
Method statement



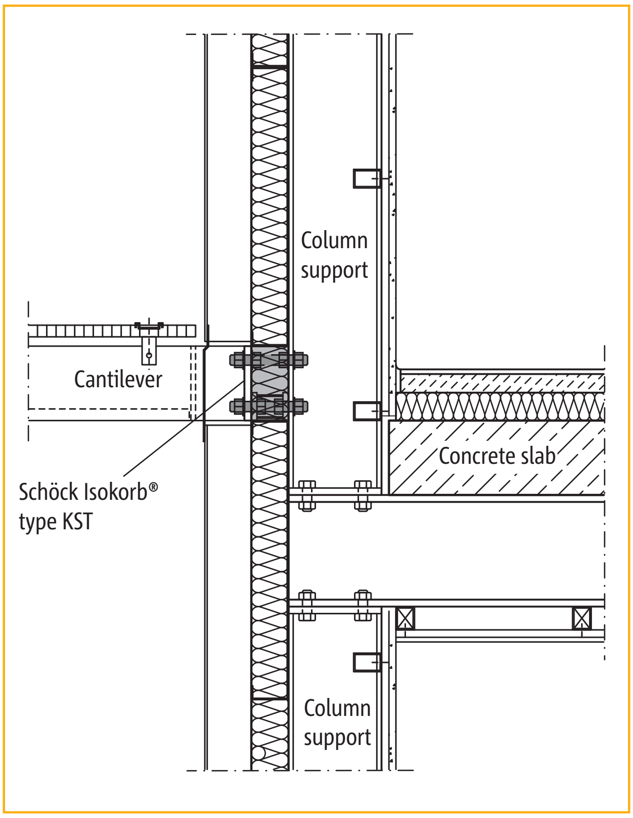
KST

Steel-to-steel

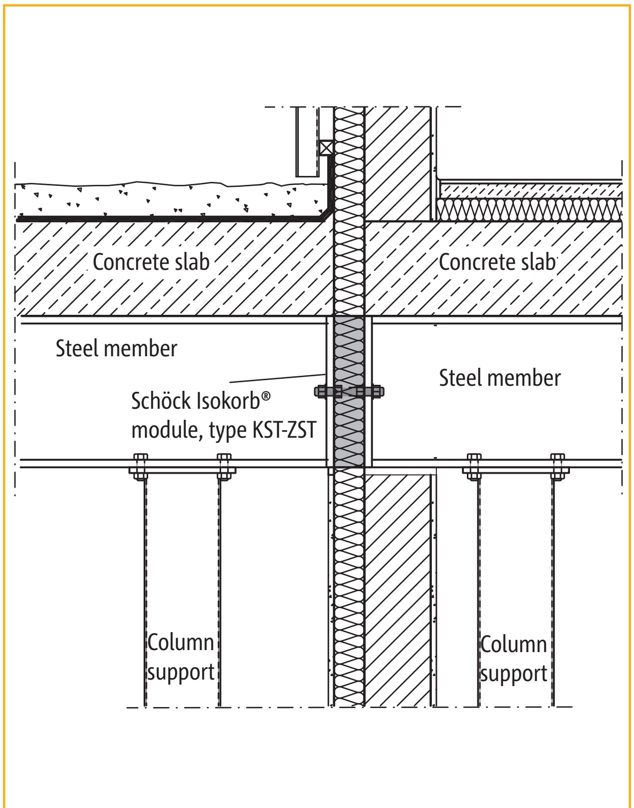
Schöck Isokorb® type KST
Constructions details



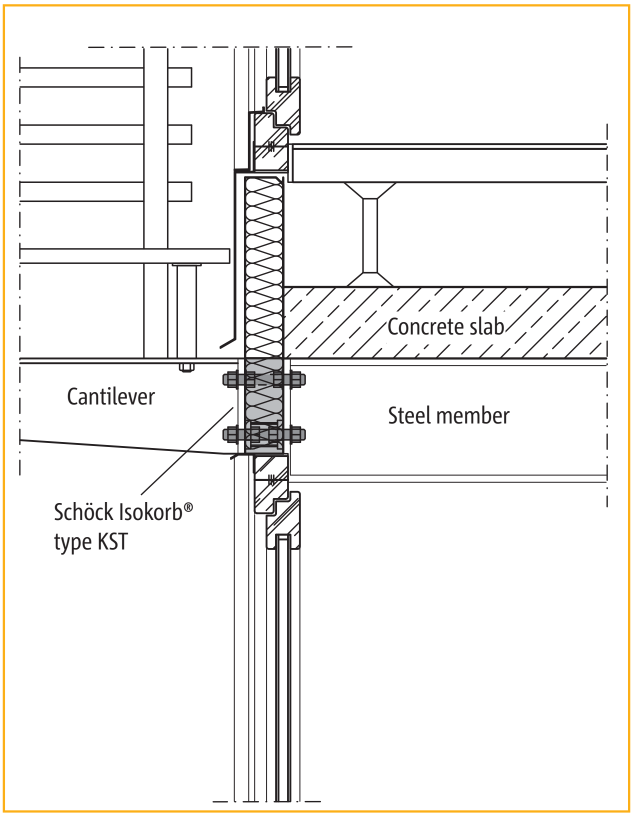
Provision of adjustable shading



Cantilevered canopy construction to column



Thermally insulated building transition



Façade balcony connection

Steel-to-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 175)?

- Are temperature deformations assigned directly to the Isokorb® connection? Expansion joint spacing (see pages 176 - 177)?

- Will the Isokorb® connection be exposed to an environement with a high chlorine content (e.g. eg. inside indoor swimming pools) (see page 166)?

- Is there a fire safety requirement for the overall load-bearing structure/Isokorb® (see page 166)?

Selection and calculation of the Isokorb® elements (refer also to pages 170 - 173 and the examples on pages 178 - 190)

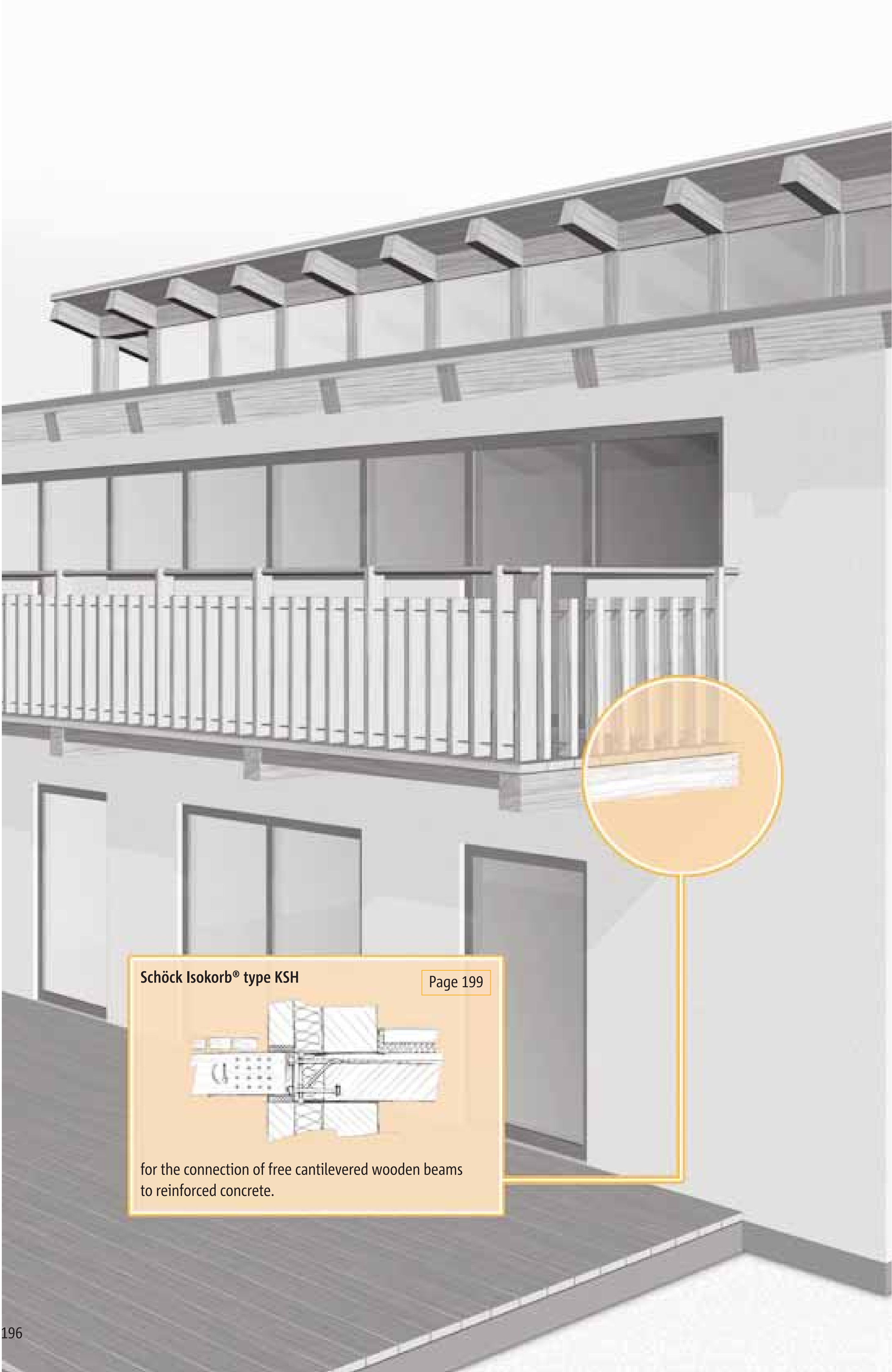
- Are the selected modules adequately dimensioned - refer to the "Design and calculation table" on page 174?
- Have wind loads with a slight lift-off effect been assigned to the KST connection (see page 174[6)])?
- Is the interaction relationship $3 \times V_z + 2 \times H_y + Z_x = \max Z_d \leq Z_{x,Rd}$ satisfied for the KST-QST module and KST-ZQST module under tensile loads with simultaneous shear loads (see page 174[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 184 - 185)?

- End plate calculation without more detailed verification (see pages 178 - 188):
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 178 - 190)?
Front plate calculation with detailed verification: see page 201

- Did the deformation calculations for the overall structure take into account the deformation due to M_K in the Isokorb® connection (see page 175)?

- Are the individual modules clearly marked in the implementation plan and works plan so that there is no risk of their being interchanged.

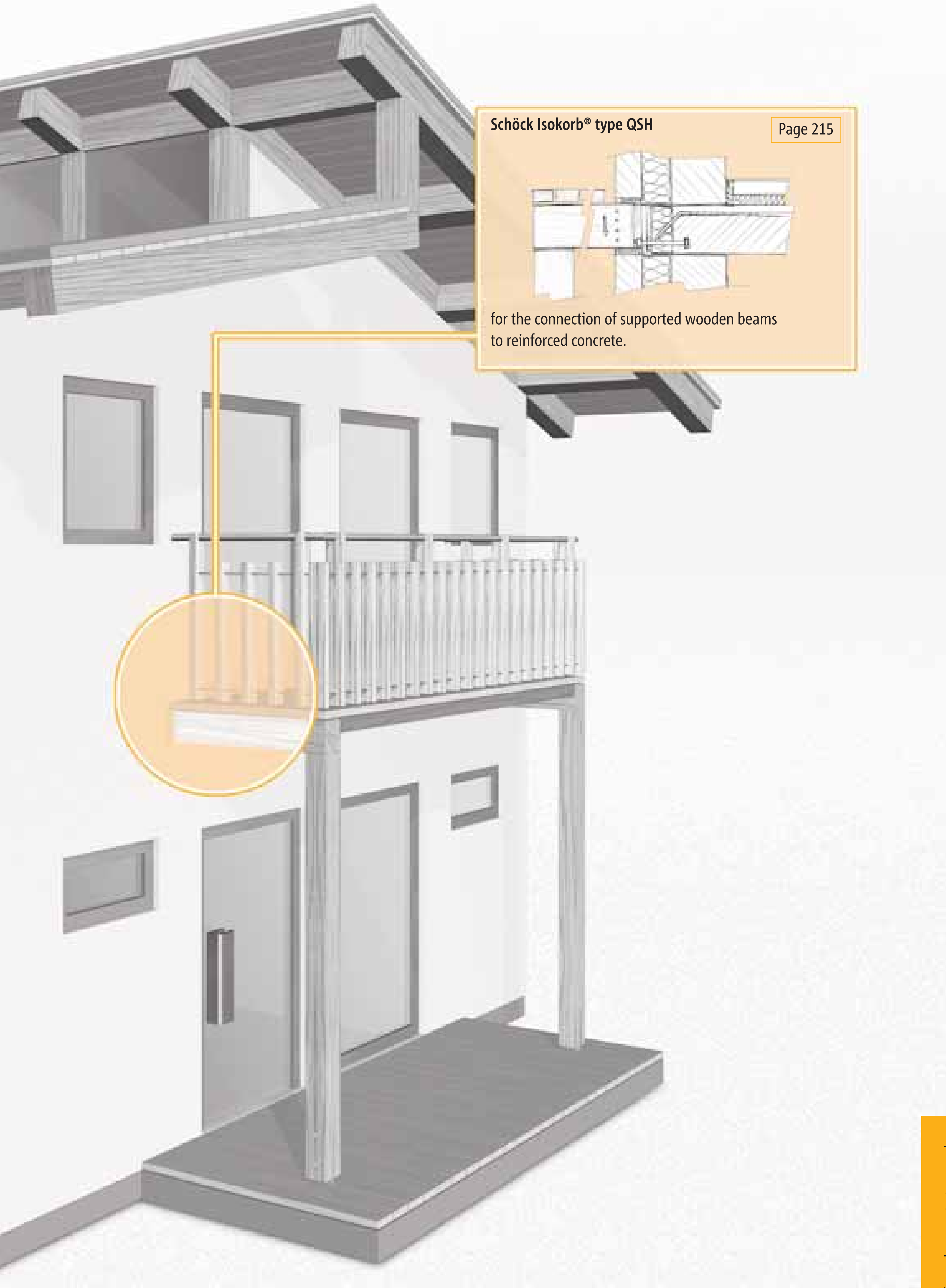
- Have the tightening torques for the screwed connections been marked in the implementation plan (refer to page 192 - 193)? The nuts should be tightened finger-tight without planned preload; the following tightening torques apply:
KST 16 (bolt ø 16): M_{max} 50 Nm
KST 22 (bolt ø 22): M_{max} 80 Nm



Schöck Isokorb® type KSH

Page 199

for the connection of free cantilevered wooden beams to reinforced concrete.



Schöck Isokorb® type QSH

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for the connection of supported wooden beams to reinforced concrete.

Schöck Isokorb® type KSH/QSH
Materials/Anti-corrosion protection/Fire protection/Notes

Materials on the inner slab side

Concrete	Minimum concrete strength class C25/30 Standard concrete acc. to BS EN 206-1 (lightweight concrete is not permissible) and according to the environmental classification acc. to BS 8500 or acc. to EC 2 National Annex
Reinforcing steel	B 500 B acc. to BS 4449 and BSt 500 NR, material no. 1.4362 or no. 1.4571
Pressure plate in the concrete	S 235 JRG 2, S 355 JO
Stainless steel	Material no.: 1.4401, 1.4404, 1.4462 or 1.4571, S 460 for connecting devices on the Isokorb® element acc. to approval no.: Z-30.3-3 Components and connecting devices made of nonrusting steels
Pressure plate for external application	Material no.: 1.4404 and 1.4571 or higher grade, e.g. 1.4462, S 460
Insulating material	Polystyrene hard foam, λ = 0,035 W/(m x K)

Materials on the balcony side

Wood	Solid softwood timber S 10 (NH II), in accordance with the new standard C 24 Solid softwood timber S 13 (NH III), in accordance with the new standard C 30 Glued laminated timber BS 11 (glued + waterproof), in accordance with the new standard GL 24 c Glued laminated timber BS 14 (glued + waterproof), in accordance with the new standard GL 28 c
Steel	Fin and dowels made of S 235, hot dip galvanized μ = 70-80

Anti-corrosion protection

The stainless steel used for Schöck Isokorb® type KSH corresponds to the material no.: 1.4401, 1.4404, 1.4462 or 1.4571. According to the general technical approval (Z-30.3-6), Appendix 1, “Components and fastening elements made of nonrusting steels”, these types of steel are classified as resistance class III/moderate.
In the case of the connection of a Schöck Isokorb® type KSH in conjunction with a hot dip galvanised front plate, there are no concerns with regard to contact corrosion resistance (see approval Z-30.3-6, section 2.1.6.4).

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 KSH. Any special fire safety measures should be executed on-site.
Components of the Schöck Isokorb® type KSH which are located within the insulating layer are to be protected against excessively high temperatures through on-site measures.

Notes

- The calculations of the wooden construction are based on DIN 1052, T1: 2004-8 (relates to EC 5)
- The range of potential applications for Schöck Isokorb® type KSH elements for wooden balconies covers inner slab and balcony structures with predominantly static and evenly distributed live loads in accordance with EC 1, equation (2.2).
- Static proof must be presented for the adjacent components on both sides of the Schöck Isokorb® type KSH.
- The upper and lower reinforcement of the inner slab should be located as close as possible to the thermal insulation layer, taking into account the required concrete cover.
- The nominal dimension C_{nom} for the concrete cover in accordance with BS EN 1992-1-1, equation (4.1), has to be chosen with 15 mm + C_{dev} in the inside area.

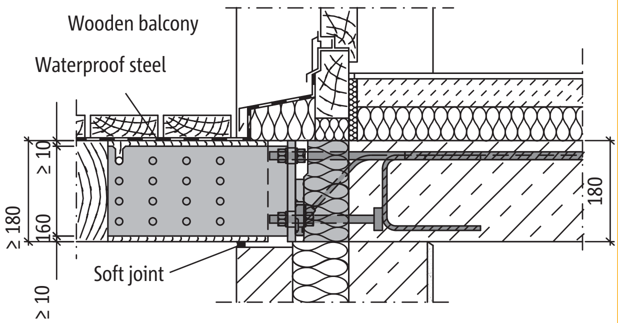
Schöck Isokorb® type KSH

Schöck Isokorb® type KSH (= type KS14-H180 plus steel fin)

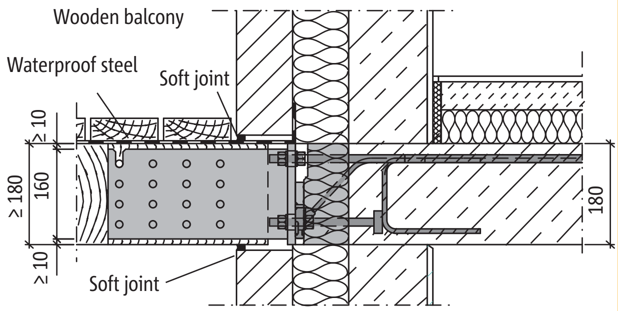
Contents

Schöck Isokorb® type KSH

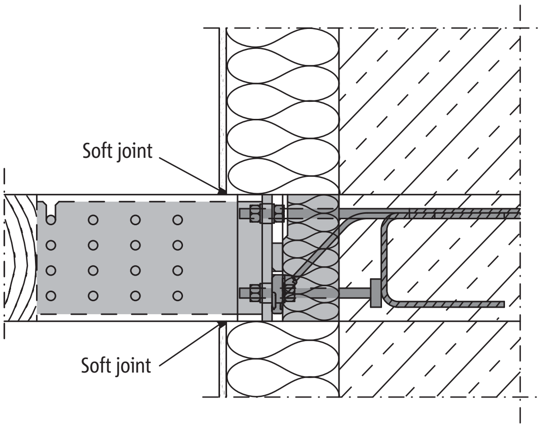
Connection layouts



Connection with Schöck Isokorb® type KSH in a door area, cavity wall

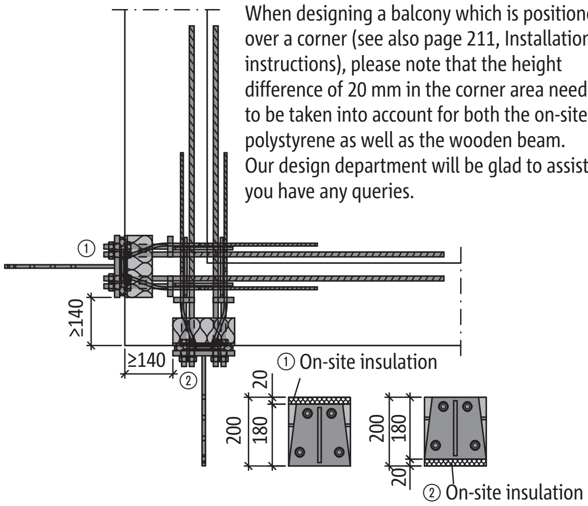


Connection with Schöck Isokorb® type KSH in a wall area, cavity wall

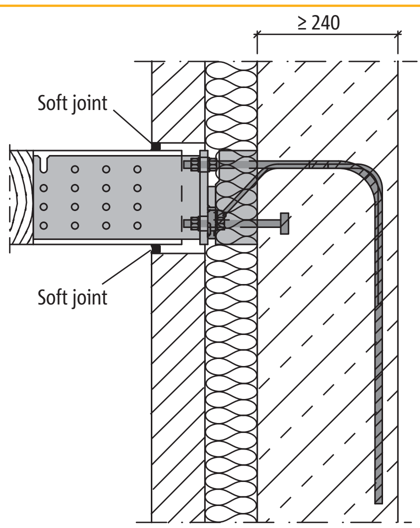


Connection with Schöck Isokorb® type KSH, single-leaf brickwork with external insulation

When designing a balcony which is positioned over a corner (see also page 211, Installation instructions), please note that the height difference of 20 mm in the corner area needs to be taken into account for both the on-site polystyrene as well as the wooden beam. Our design department will be glad to assist if you have any queries.



Plan view: Connection with Schöck Isokorb® type KSH in a corner area

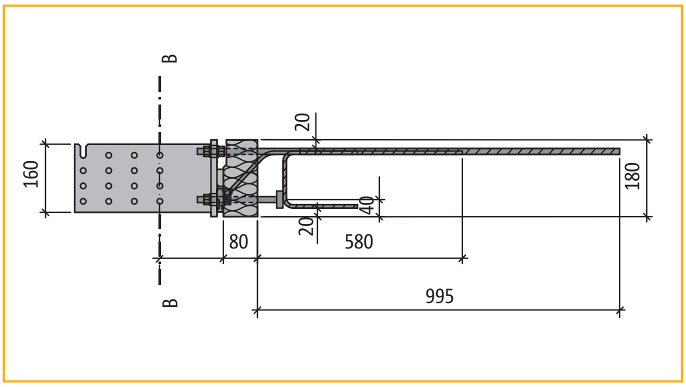


Connection with Schöck Isokorb® type KSH in a wall area without an adjacent inner slab - special design

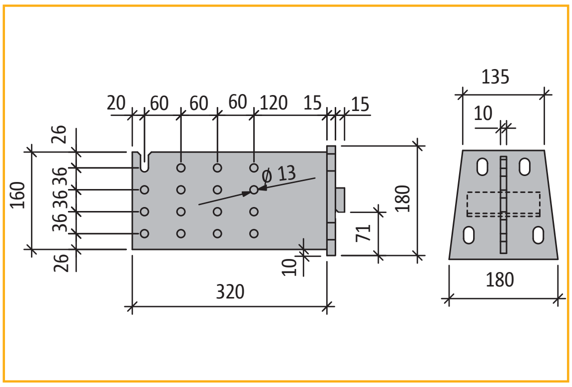
Other special designs are available on request.

Schöck Isokorb® type KSH

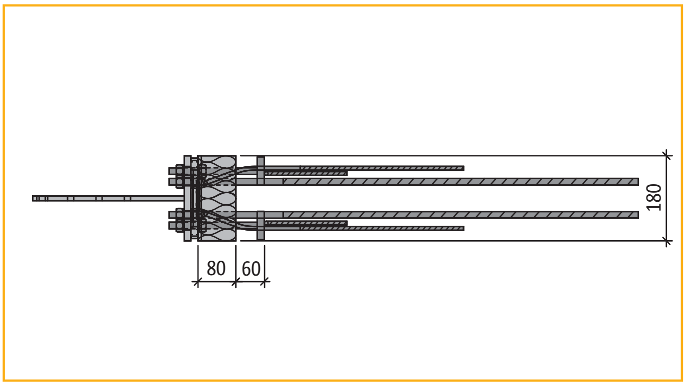
Cross-sections/Plan views



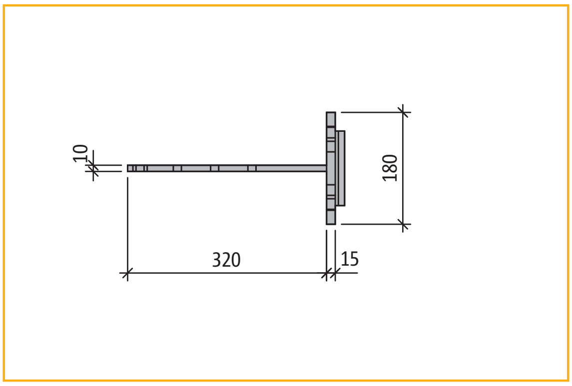
Cross-section: Schöck Isokorb® type KSH



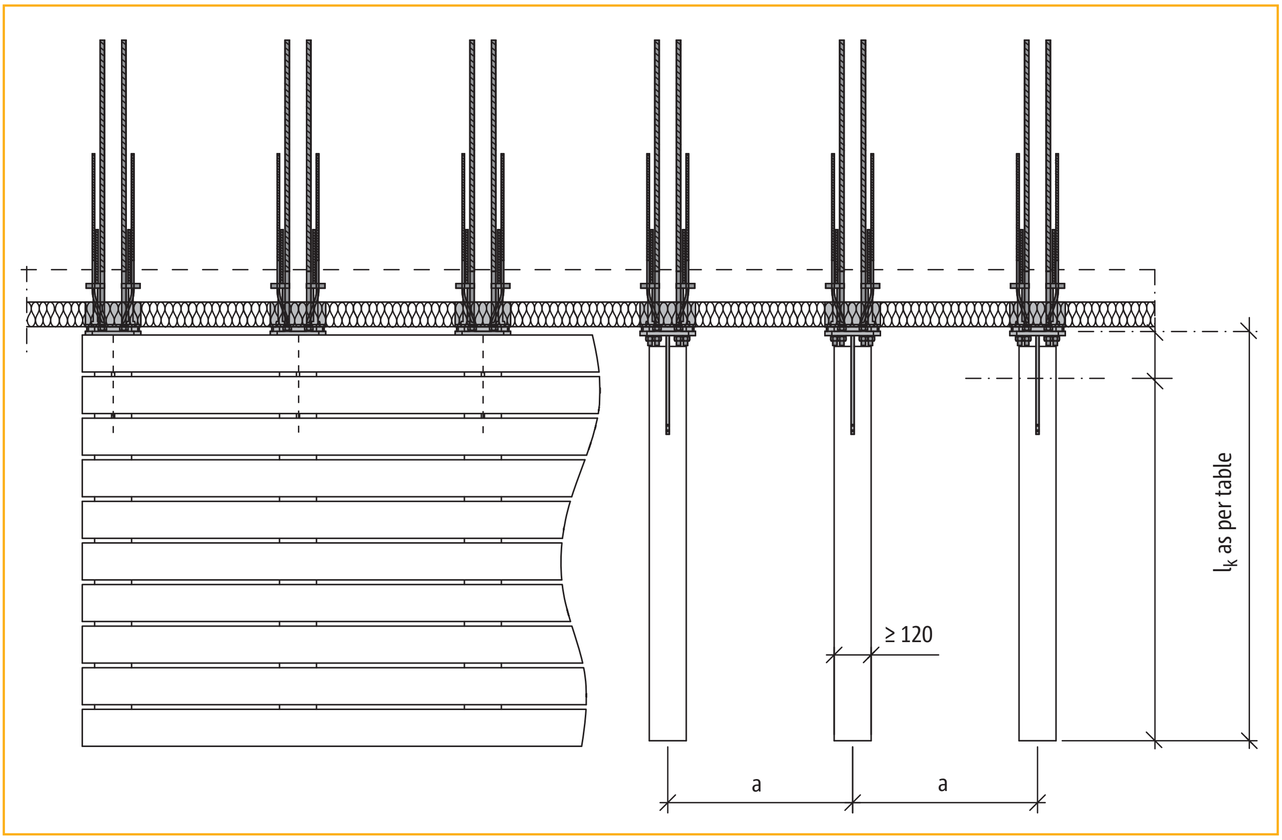
View/side view: Steel fin of Schöck Isokorb® type KSH



Plan view: Schöck Isokorb® type KSH



Plan view: Steel fin of Schöck Isokorb® type KSH



Plan view of a balcony with Schöck Isokorb® type KSH

Schöck Isokorb® type KSH

Basis for calculations according to DIN 1052: 2004-8

Calculation tables

The engineer responsible for drawing up the planning of the load-bearing structure must check independently whether the indicated conditions apply. For this reason the calculation tables should only be used as a tool which is intended to assist with calculations and dimensioning.

Loads

Given: Softwood timber beam C 24:	**b/h = 120/200**
Own weight with light coating:	g_B = 0.5 kN/m²
Live load:	q = 4.0 kN/m²
Own weight of railing:	F_G = 0.75 kN/m
Horizontal load on railing at beam height 1.0 m:	H_G = 0.5 kN/m

Partial safety cofficient and combination coefficient

γ_G = 1.35

γ_Q = 1.5

Ψ_O = 0.7

Member forces

l_k: Cantilevered length (up to the middle of the support)

a: Distance between the wooden beams

$M_{Ed} = (\gamma_G \times g_B + \gamma_Q \times q) \times a \times l_k^2/2 + \gamma_G \times F_G \times a \times l_k + \gamma_Q \times \Psi_O \times H_G \times 1.0\ m \times a$ [kNm]

$V_{Ed} = (\gamma_G \times g_B + \gamma_Q \times q) \times a \times l_k + \gamma_G \times F_G \times a$ [kN]

KSH

Resistance values (for the reinforced concrete connection)

M_{Rd} = −8.35 kNm

V_{Rd} = +18.00 kN

H_{Rd} = ±2.50 kN

figures of type KS14 H180, acc. to EC 2 (see page 146)

Schöck Isokorb® type KSH

Calculation tables according to DIN 1052: 2004-8

Input parameters: l_k

$M_{Ed} = (1.35 \times 0.5 + 1.5 \times 4.0) \times a \times l_k^2/2 + 1.35 \times 0.75 \times a \times l_k + 1.5 \times 0.7 \times 0.5 \times 1.0 \times a$

$V_{Ed} = (1.35 \times 0.5 + 1.5 \times 4.0) \times a \times l_k + 1.35 \times 0.75 \times a$

from M: max a = 9.33 kNm/(6.675 kN/m x $l_k^2/2$ + 1.0125 kN x l_k + 0.525 kNm)

from V: max a = 18.00 kN/(6.675 kN/m x l_k + 1.0125 kN)

The smaller value is decisive.

Dependency of a on l_k (values in [m]):

Arising moment in the reduced design cross-section of the wood: $M_{Ed,\,B\text{-}B}$ [kNm]

Cantilever l_k	Axis separation between the wooden beams a [mm]						
[m]	**400**	**450**	**500**	**550**	**600**	**650**	**700**
0.5	−0.54	−0.60	−0.67	−0.74	−0.81	−0.87	−0.94
0.6	−0.69	−0.77	−0.86	−0.95	−1.03	−1.12	−1.21
0.7	−0.87	−0.98	−1.08	−1.19	−1.30	−1.41	−1.52
0.8	−1.07	−1.21	−1.34	−1.47	−1.61	−1.74	−1.88
0.9	−1.30	−1.47	−1.63	−1.79	−1.96	−2.12	−2.28
1.0	−1.56	−1.76	−1.95	−2.15	−2.34	−2.54	−2.73
1.1	−1.85	−2.08	−2.31	−2.54	−2.77	−3.00	−3.23
1.2	−2.16	−2.43	−2.70	−2.97	−3.24	−3.51	−3.78
1.3	−2.50	−2.81	−3.12	−3.43	−3.75	−4.06	−4.37
1.4	−2.86	−3.22	−3.58	−3.94	−4.29	−4.65	−5.01
1.5	−3.25	−3.66	−4.07	−4.47	−4.88	−5.29	−5.69
1.6	−3.67	−4.13	−4.59	−5.05	−5.51	−5.97	−6.43
1.7	−4.12	−4.63	−5.15	−5.66	−6.18	−6.69	−7.21
1.8	−4.59	−5.16	−5.74	−6.31	−6.89	−7.46	−8.03
1.9	−5.09	−5.72	−6.36	−7.00	−7.63	−8.27	
2.0	−5.61	−6.32	−7.02	−7.72	−8.42		
2.1	−6.17	−6.94	−7.71	−8.48			
2.2	−6.74	−7.59	−8.43				
2.3	−7.35	−8.27					
2.4	−7.98						
2.5							
V_{Ed} [kN]	+6.97	+7.38	+7.77	+8.14	+8.50	+8.83	+9.15
max l_k [m][1)]	2.46	2.31	2.18	2.07	1.97	1.88	1.81

Values can be interpolated; max l_k must not be exceeded.

[1)] max l_k from the steel construction proof for the adapter fin.

Schöck Isokorb® type KSH

Calculation tables according to DIN 1052: 2004-8

M_{Rd} [kNm] and V_{Rd} [kN] for softwood C 24:

h	Wooden beam b [mm]					
[mm]	120		140		160	
	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}
180	−6.44	+16.26	−7.61	+19.22	−8.56[1)]	+22.17
200	−6.99[1)]	+18.34	−7.74[1)]	+21.68	−8.56[1)]	+25.01
220	−6.99[1)]	+20.26	−7.74[1)]	+23.94	−8.56[1)]	+27.63

M_{Rd} [kNm] and V_{Rd} [kN] for softwood C 30:

h	Wooden beam b [mm]					
[mm]	120		140		160	
	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}
180	−7.48[1)]	+16.26	−8.32[1)]	+19.22	−9.23[1)]	+22.17
200	−7.48[1)]	+18.34	−8.32[1)]	+21.68	−9.23[1)]	+25.01
220	−7.48[1)]	+20.26	−8.32[1)]	+23.94	−9.23[1)]	+27.63

M_{Rd} [kNm] and V_{Rd} [kN] for glued laminated timber GL 24c:

h	Wooden beam b [mm]					
[mm]	120		140		160	
	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}
180	−6,44	+16,26	−7,61	+19,22	−8,56[1)]	+22,17
200	−6,99[1)]	+18,34	−7,74*	+21,68	−8,56[1)]	+25,01
220	−6,99[1)]	+20,26	−7,74*	+23,94	−8,56[1)]	+27,63

M_{Rd} [kNm] and V_{Rd} [kN] for glued laminated timber GL 28c:

h	Wooden beam b [mm]					
[mm]	120		140		160	
	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}	M_{Rd}	V_{Rd}
180	−7.48[1)]	+16.26	−8.32[1)]	+19.22	−9.23[1)]	+22.17
200	−7.48[1)]	+18.34	−8.32[1)]	+21.68	−9.23[1)]	+25.01
220	−7.48[1)]	+20.26	−8.32[1)]	+23.94	−9.23[1)]	+27.63

Example:

Given: a = 0.50 m; l_k = 1.8 m ≤ 2.18 m (read off - see page 203)
Load moment: M_{Ed} = –5,74 kNm, load shear force: V_{Ed} = +7.77 kN (read off, see page 203)
Softwood C 24 possible: 120/180, or softwood C 30: 120/180, or glued laminated timber GL 24 c: 120/180, or glued laminated timber GL 28 c: 120/80

[1)] The bearing pressure of the projected area is critical.

Schöck Isokorb® type KSH

Calculation example based on DIN 1052: 2004-8

Wooden cantilever balcony with Schöck Isokorb® type KSH

1. Verification for the wood connection

Dimensions

Length of projection: $l_k = 1.50$ m

Balcony width: b = 4.50 m

Balcony area: A = 6.75 m²

Inner slab thickness: d = 180 mm

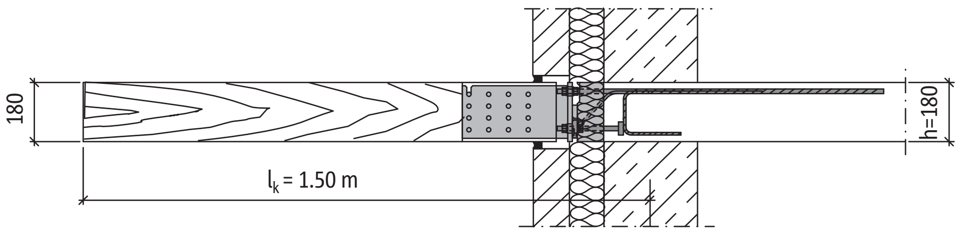
Load assumptions

Own weight with light coating: $g_B = 0.5$ kN/m²

Live load: q = 4.0 kN/m²

Own weight of railing: $F_G = 0.75$ kN/m

Horizontal load on railing at beam height 1.0 m: $H_G = 0.5$ kN/m



Choice: Maximum axis separation between the wooden beams: a = 700 mm with Schöck Isokorb® type KSH (see page 203)

$M_{Ed} = -5.69$ kNm

$V_{Ed} = +9.15$ kN

Softwood C 24

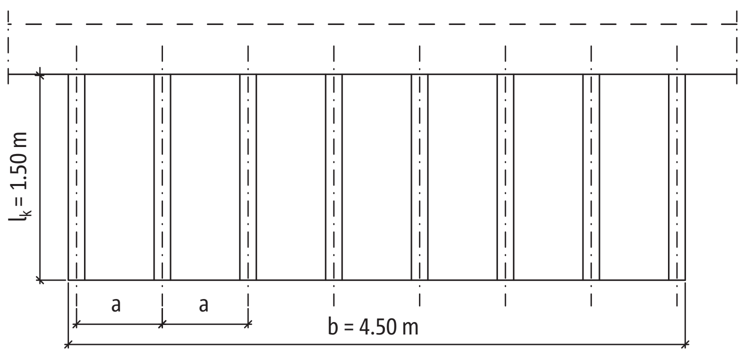
Required number of connections: n = (4.50/0.7) + 1 = 7.4 → 8 x Schöck Isokorb® type KSH

▶ **Choice: 8 x Schöck Isokorb® type KSH, floor panel h = 180 mm**

Possible dimensions of the wooden beams (see page 214, table 1):

Softword C24 120/180 mm → $M_{Rd} = -6.44$ kNm $> M_{Ed} = -5.69$ kNm

$V_{Rd} = +16.26$ kN $> V_{Ed} = +9.15$ kN



Notes

- Wind suck/lifting forces: Due to the design of the Schöck Isokorb® type KSH, it is assumed that the shear force points downwards by design.
- If lifting-off forces are present, please contact our design department under 0845 241 3390.

Schöck Isokorb® type KSH

Calculation example according to EC 2 (inner slab)

Wooden cantilever balcony with Schöck Isokorb® type KSH

2. Verification for the reinforced concrete connection

Schöck Isokorb® type KSH			
Element length [mm]	180		
Tension rods	2 ø 14		
Shear force rods	2 ø 8		
Pressure bearings	2 ø 14		
Distance between the pressure bearings [mm]	115		
Distance between the tension rods [mm]	70		
Reinforced concrete floor slab h [mm]	Member forces		
	M_{Rd} [kNm]	V_{Rd} [kN]	H_{Rd} [kN]
180	–8.35	+18.00	±2.50

M_{Rd} (reinforced concrete connection) = –8.35 kNm > M_{Rd} (wood connection) = –6.44 kNm > M_{Ed} = –5.69 kNm → Wood connection is critical

V_{Rd} (reinforced concrete connection) = +18.00 kN > V_{Rd} (wood connection) = +16.26 kN > V_{Ed} = +9.15 kN → Wood connection is critical

▸ **Verification for Schöck Isokorb® type KSH, floor slab h = 180 mm, wooden beam 8 x 120/180 is satisfied.**

Schöck Isokorb® type KSH
Deflection/Installation tolerances

Precamber

The values indicated in the table result solely from the elastic steel elongation of the Schöck Isokorb® type KSH under 100 % exploitation of the bending moment. The final precamber of the balcony results from the deformation calculation of the connected balcony structure plus the precamber resulting from the Schöck Isokorb® type KSH.

Precamber values [%] for M_{Rd}:

Schöck Isokorb® type	Balcony slab thickness h = 180 mm
KSH	0,6

These data include the own weight and the live load (g + q) of the balcony.

Superelevation: Table value x l_k/100 x M_{pd}/M_{Rd} (Recommendation: M_{pd} from g + q/2)

Example: Precamber

Selected load combination for precamber due to Schöck Isokorb® Typ KSH: g + q/2

$M_{pd} = (\gamma_G \times g_B + \gamma_Q \times q/2) \times a \times l_k^2/2 + \gamma_G \times F_G \times a \times l_k + \gamma_Q \times \psi_O \times H_G \times 1.0 \times a$
$M_{pd} = (1.35 \times 0.5 + 1.5 \times 4.0/2) \times 0.7 \times 1.5^2/2 + 1.35 \times 0.75 \times 0.7 \times 1.5 + 1.5 \times 0.7 \times 0.5 \times 1.0 \times 0.7$
$M_{pd} = -4.32$ kNm

$p = [\tan \alpha \times l_k \times (M_{sd}/M_{Rd})] \times 10$
$p = [0.6 \times 1.5 \times (4.32/8.35)] \times 10$
$p = 5$ mm

Installation tolerances

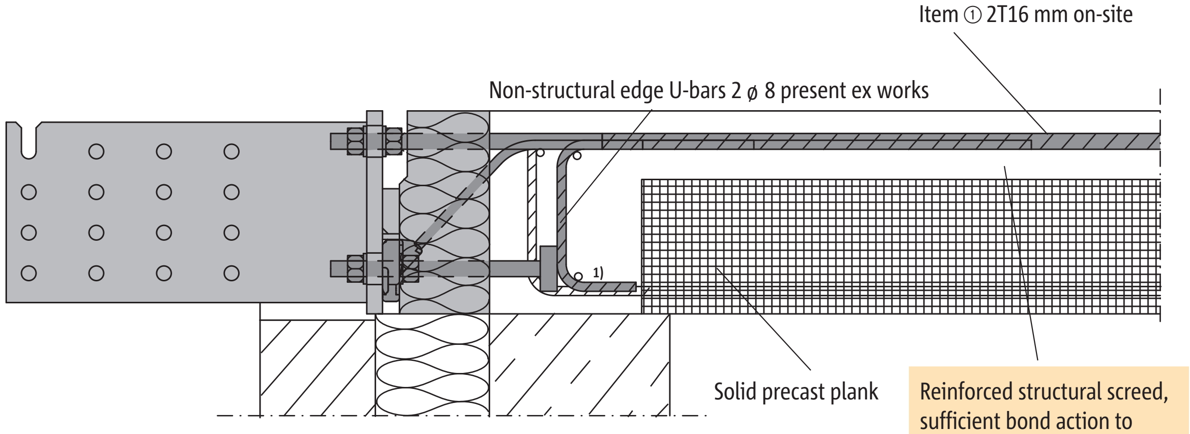
The implementation plans for the shell constructor must include a reference to the required installation accuracy (horizontal and vertical alignment) of the Schöck Isokorb® elements. Any inaccuracy on the part of the shell constructor can only be compensated for to a limited extent by the carpenter (a maximum of 10 mm in a vertical direction) or with additional outlay (see pages 146 and 213).

Schöck Isokorb® type KSH

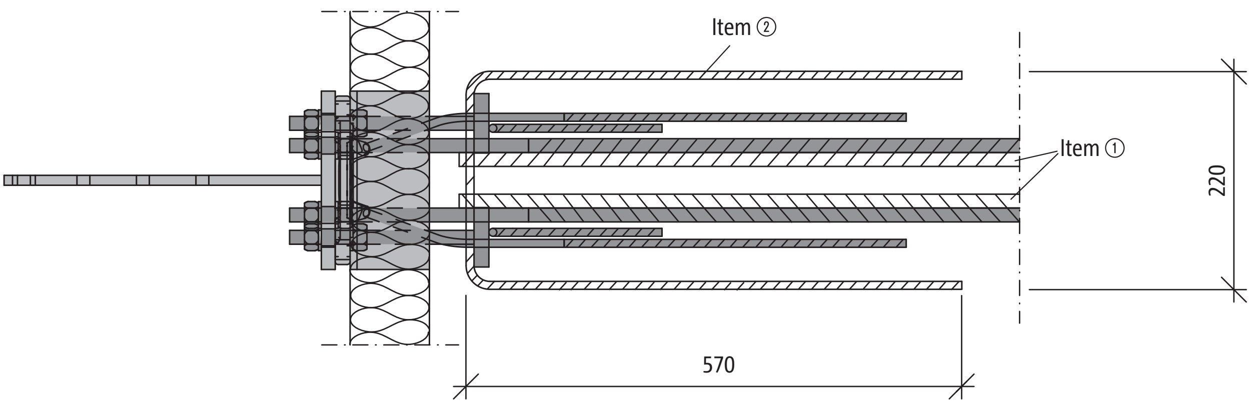
On-site connection reinforcement

Lap splice design: Connection with No. 2 T16, L according to structural engineer, design according to EC 2, item ①
Transverse reinforcement: Non-structural transverse reinforcement according to EC 2

The non-structural edge U-bars, No. 2 T8[1], are provided as standard ex works
Only in the case of lifting forces: 1 additional U-bar T8 mm required in the area of the pressure bearings, item ②



Side view: Schöck Isokorb® type KSH for designs with precast planks



Item ② On-site U-bar T10 in the area of the pressure bearings $d_{br} = 4d_s$, only required if lifting-off forces are present.

Plan view: Schöck Isokorb® type KSH for lifting forces

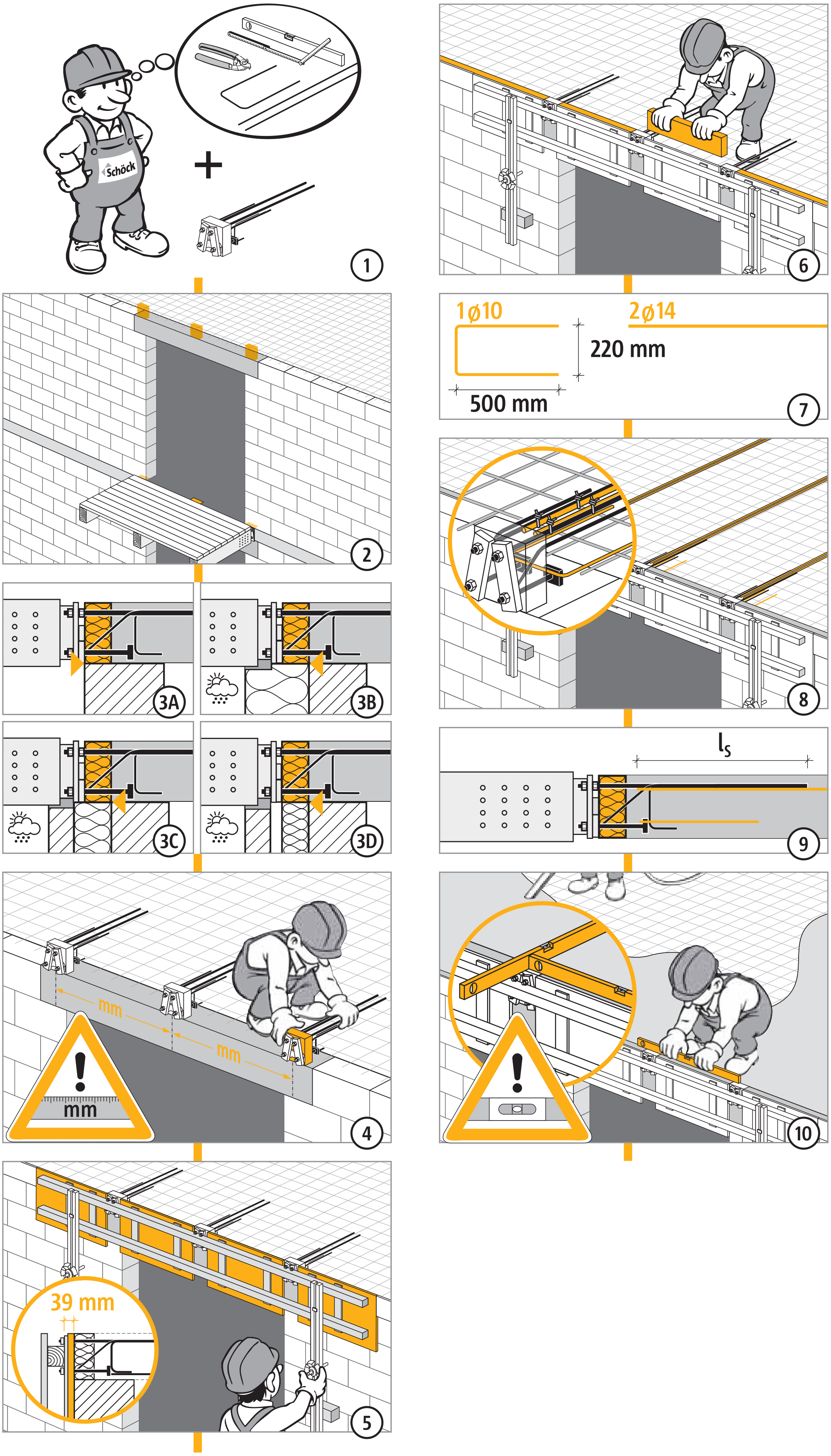
Note

- Sufficient bond action between precast plank and structural screed has to be guaranteed!

[1] When using precast planks, the lower legs of the 2 U-bars ø 8 mm can be shortened on-site.

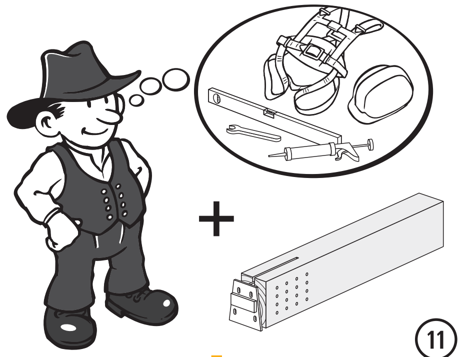
Schöck Isokorb® type KSH

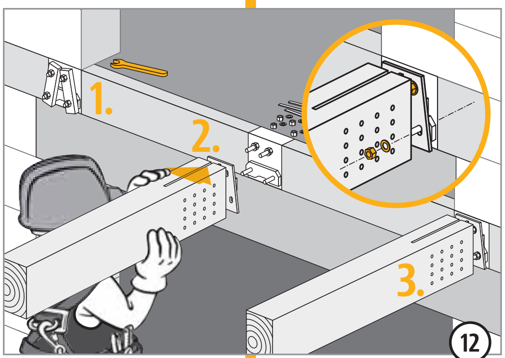
Method statement for the carpenter in the carpenter’s workshop

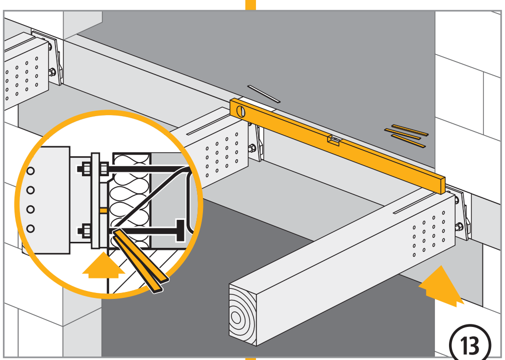


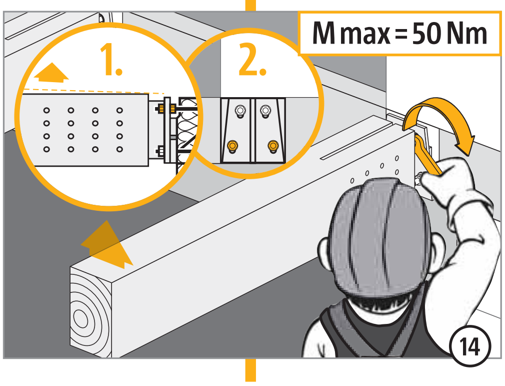
Schöck Isokorb® type KSH

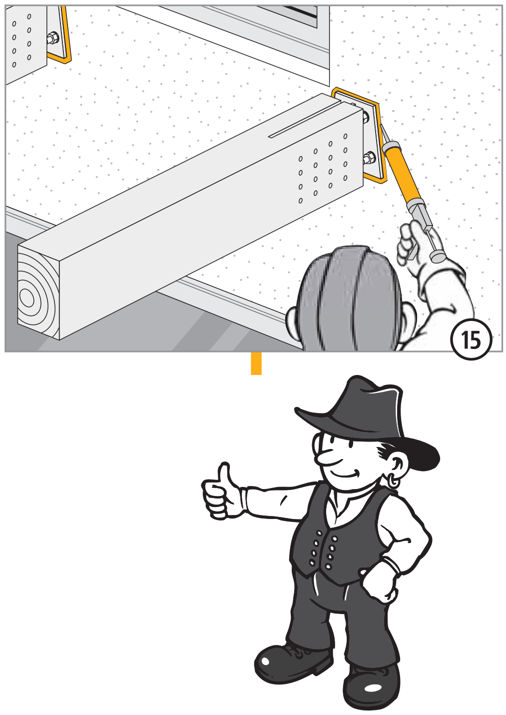
Method statement for the concrete frame constructor





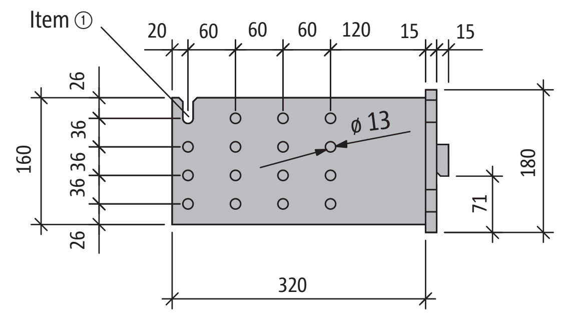






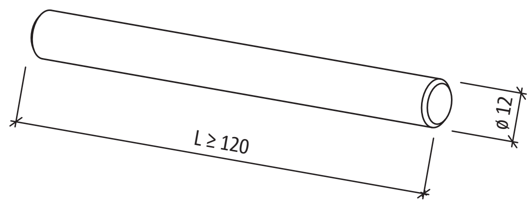
Schöck Isokorb® type KSH
Method statement

Pre-fabrication at the carpenter's workshop



Item ① Lug for hooking in - see installation instructions, point 2

View: Schöck Isokorb® type KSH fin



View: Dowels ø 12

Individual parts <u>per</u> connection of a wooden beam

- 1 fin with end plate, hot dip galvanised (included in the delivery)
- 2 spacer shims for compensation of any height differences (included in the delivery)

To be provided by the timber frame construction company

- 16 dowels ø 12 mm
- Minimum length l ≥ 120 mm

Requirements for the wood

- Softwood, sorting class C 24
- Softwood, sorting class C 30
  Timber moisture on installation u ≤ 20 %
- Glued laminated timber, sorting class GL 24 c (glued + waterproof)
- Glued laminated timber, sorting class GL 28 c (glued + waterproof)

Notes

- The use of larch wood or glued laminated timber (glued + waterproof) is recommended because of their superior weather resistance.
- A drilling template for the carpenter is enclosed with every steel fin on delivery.
- The following assembly sequence is recommended for pre-fabrication at the carpenter:
  1. Trimming of the wooden beam and preperation of the slot for the fin and the bores for the dowels according to the dimensions (see page 212). Our drilling template can be used instead of marking the holes for drilling.

  2. Inserting the fin. Here, the lug for hooking in on the fin makes it easier to correctly position it in the wooden beam above the first tapped in dowel. Rotate the fin to align it with the holes in the wooden beam so that the remaining dowels can be put in position.
- Note on corner instsallations:
  In a corner installation the beams and the floor slab must be at least 200 mm high. The Isokorb® elements, which are supplied at a height of 180 mm, are underlaid with a 20 mm strip of polystyrene on-site. In order to be able to guide the tension rods of the Schöck Isokorb® past each other in the inner slab area (Isokorb® 2nd layer), an individual Isokorb® element needs to sit 20 mm lower in the corner area. The polystyrene strip can be fitted on the top of this element. At the same time the strut also sits 20 mm lower in the beam, at adistance of 10 mm from the lower edge of the beam. However, this distance is 30 mm for the remainder of the beam. The beams are thus all at the same height.

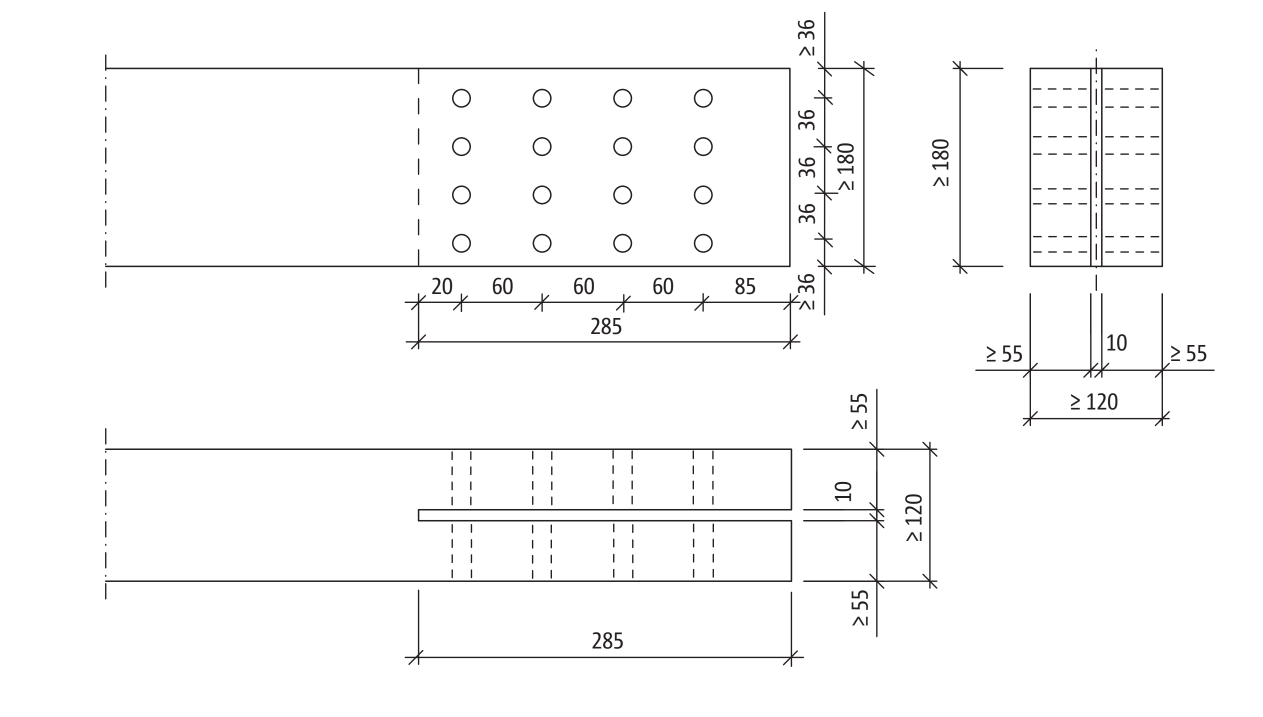
Schöck Isokorb® type KSH
Method statement

Design recommendations

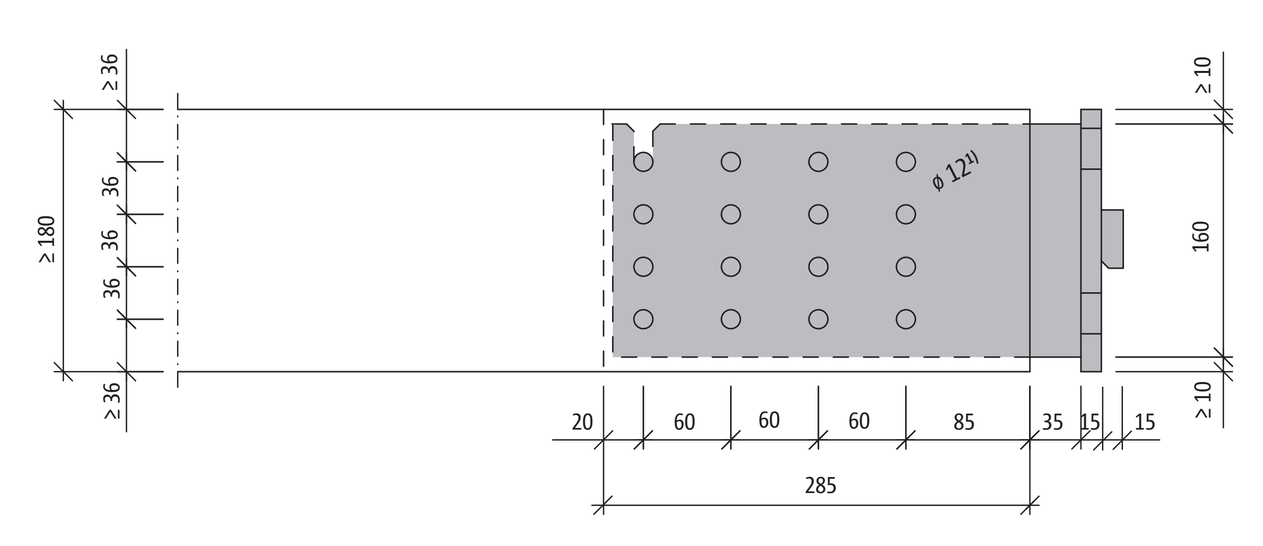
1. Cover the slot on the top of the wooden beam to protect it against water (e.g. with roofing cardboard or sheet metal. Allow a protrusion of at least 10 mm on both sides).
   Advantage: No standing water in the slot, no dirt marks on the side of the beam.

2. Slope off the top edges of the beam so that the water can run off quickly.

Trimming of the wooden beam



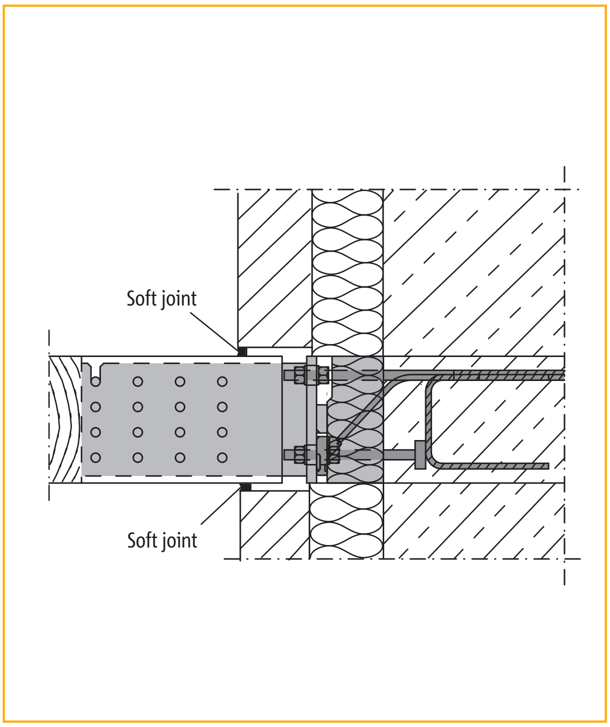
Installation of the Schöck fin in the wooden beam



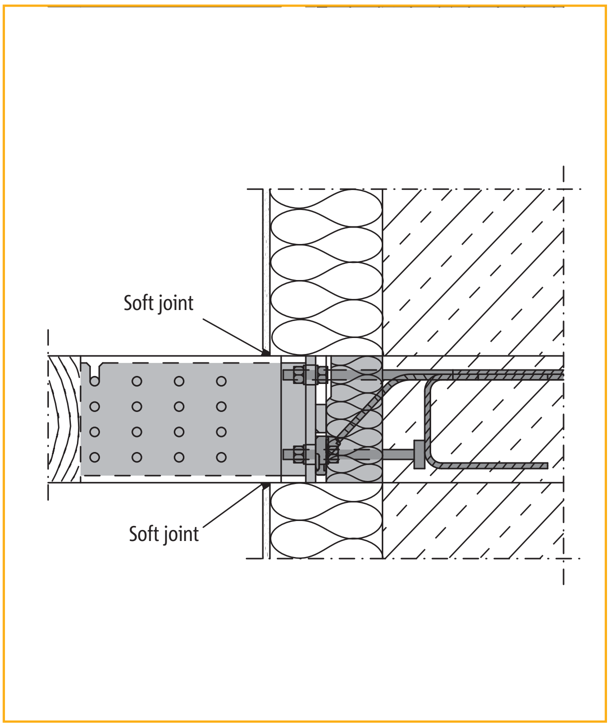
[1] *Drill ø 12 holes in the wooden beam.*

Schöck Isokorb® type KSH

Installation of the wooden beams on the construction site



Schöck Isokorb® type KSH for cavity wall



Schöck Isokorb® type KSH for single-leaf brickwork with external insulation

Installation instructions on the construction site

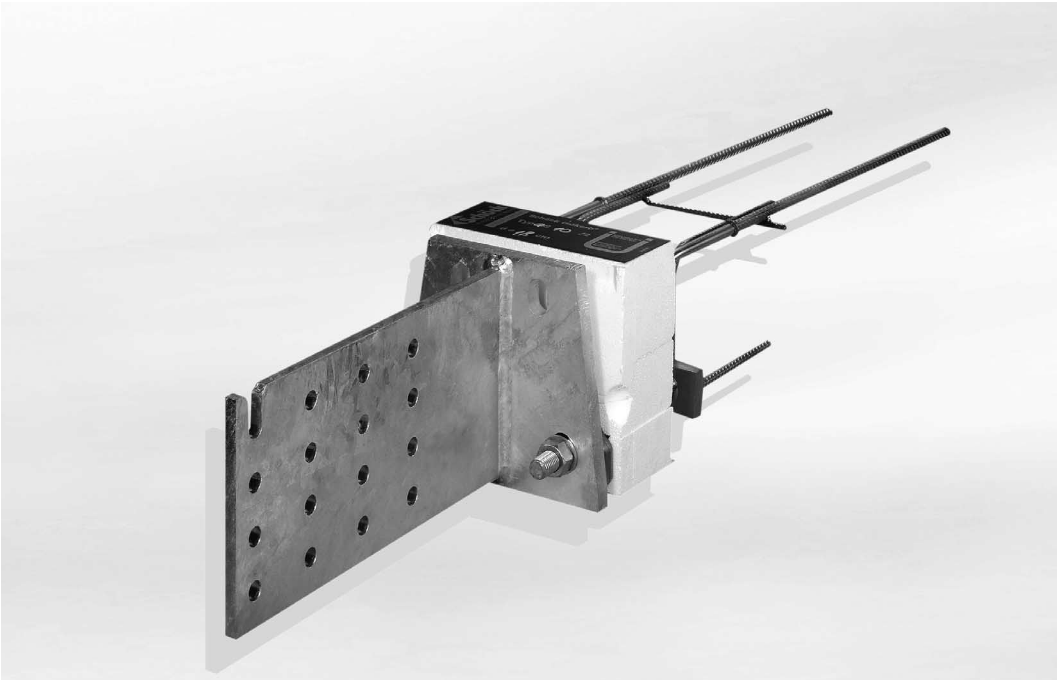
The Schöck Isokorb® type KSH was installed by the concrete frame constructor without a fin as part of the construction of the concrete inner slab. Depending on the facade layout, we recommend that the timing of the installation of the individual balcony beams including fins on the Isokorb® type KSH should be arranged with the facade builder.

Depending on what is agreed, the beam can be attached on-site to the mounting plate of the pressure shoe. The beam can be aligned in the desired position by turning the nuts on the tension rods. In the process, a precamber of the wooden beam of 1/200 of the cantilevered length should be taken into account.

After all of the wooden beams have been installed the coating and the railing of the balcony are installed.

Following the installation and alignment of the wooden beams, the gap between the head plate and the plaster or between the wooden beams and the plaster should be filled and/or sealed using standard recognised methods.

Schöck Isokorb® type QSH



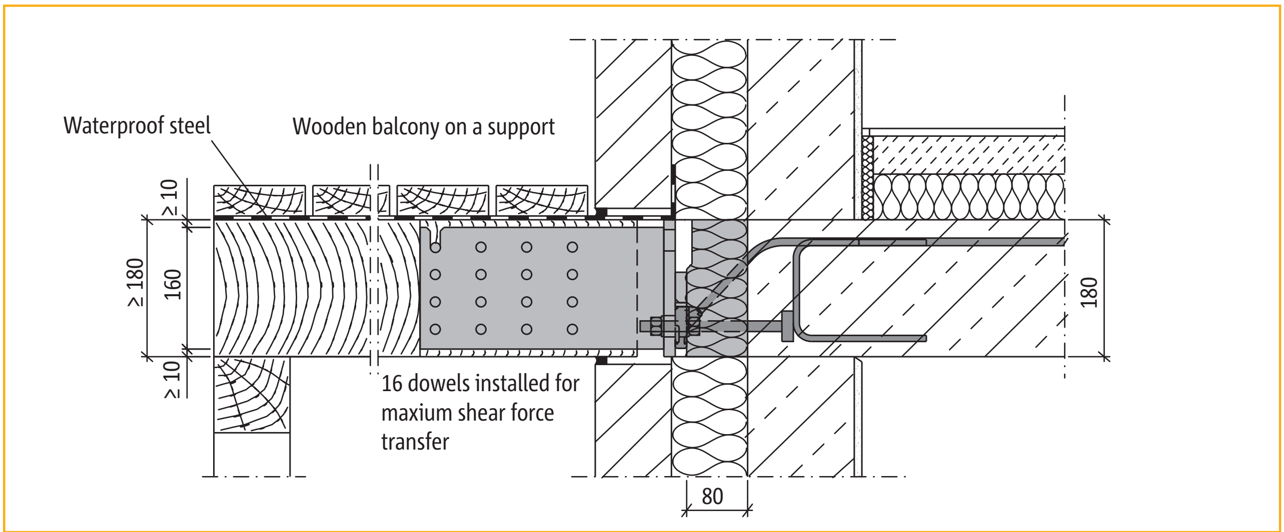
Schöck Isokorb® type QSH (type QS10-H180 plus steel fin)

Contents

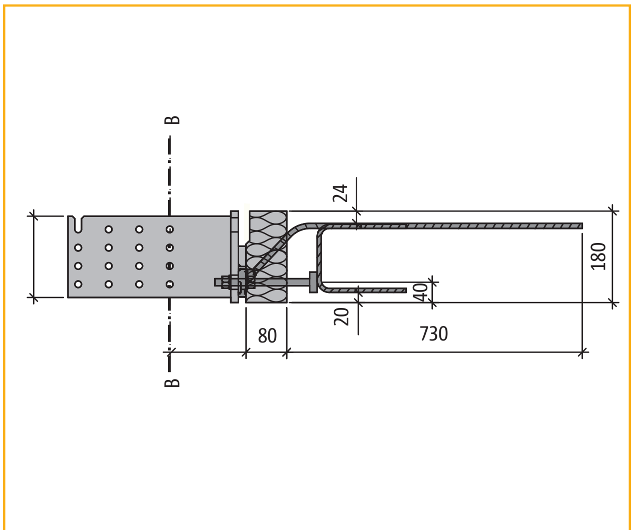
QSH

Schöck Isokorb® type QSH

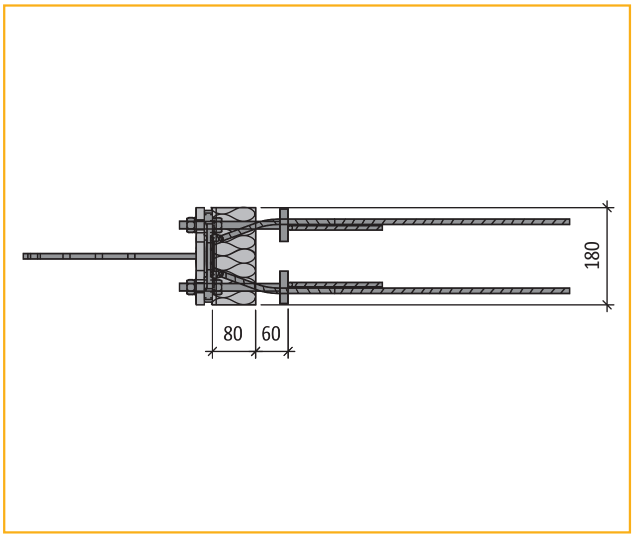
Connection layouts/Calculation/Notes



Connection with Schöck Isokorb® type QSH in a wall area



Side view: Schöck Isokorb® type QSH



Plan view: Schöck Isokorb® type QSH

Calculation

16 dowels ø 12 are required to absorb the maximum shear force of the Schöck Isokorb® type **QSH of V_{Rd} = +33.00 kN.**

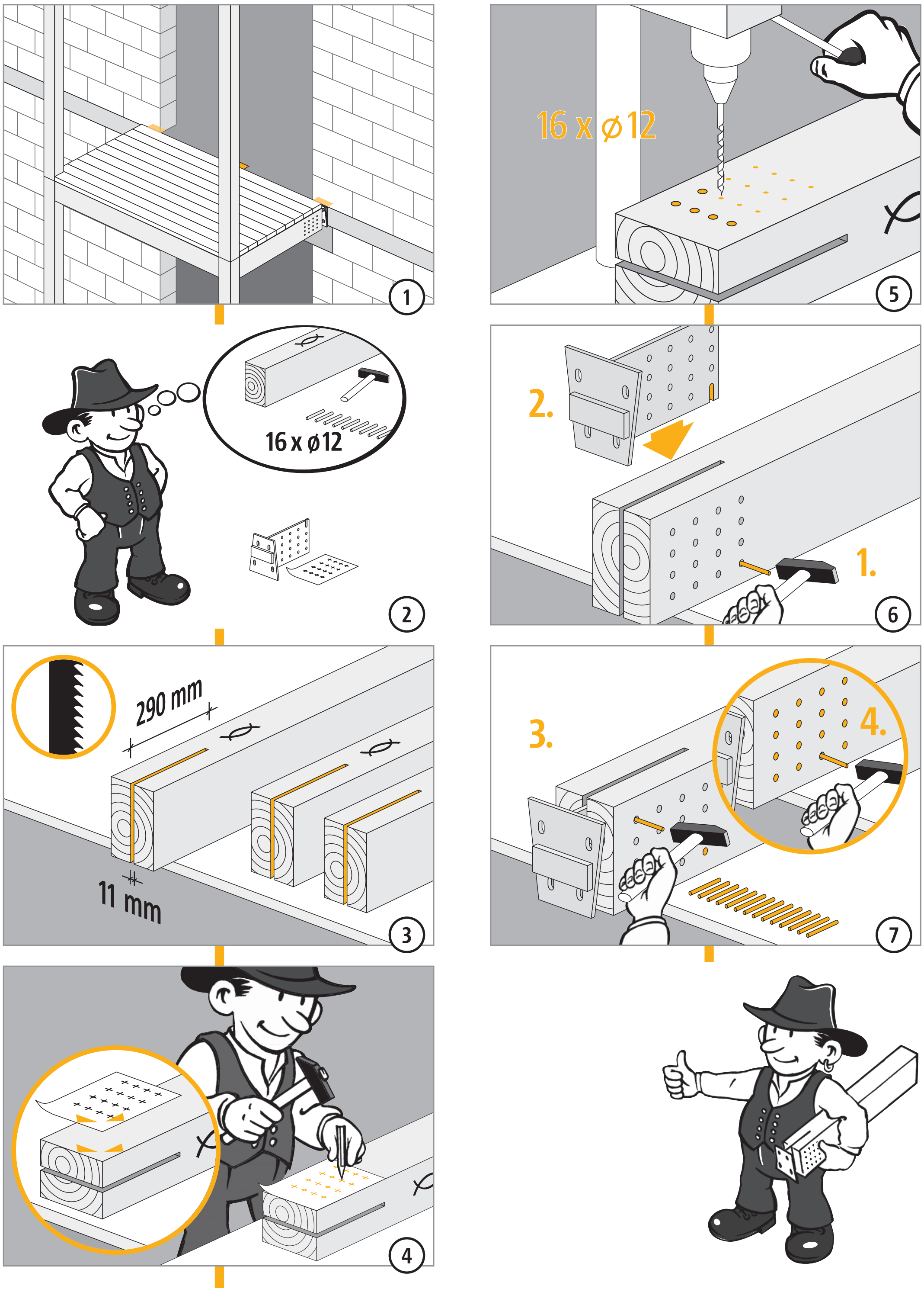
The shear force load bearing capacity needs to be verified in the reduced wood cross-section B-B (e.g. via cross-sectional boards for type KSH from page 204).

Notes

- Refer to page 212 for the form and dimensions of the fin.
- For information about installation and trimming see pages 212 - 213 and page 217 - 219.
- A drilling template for the carpenter is enclosed with every steel fin on delivery.

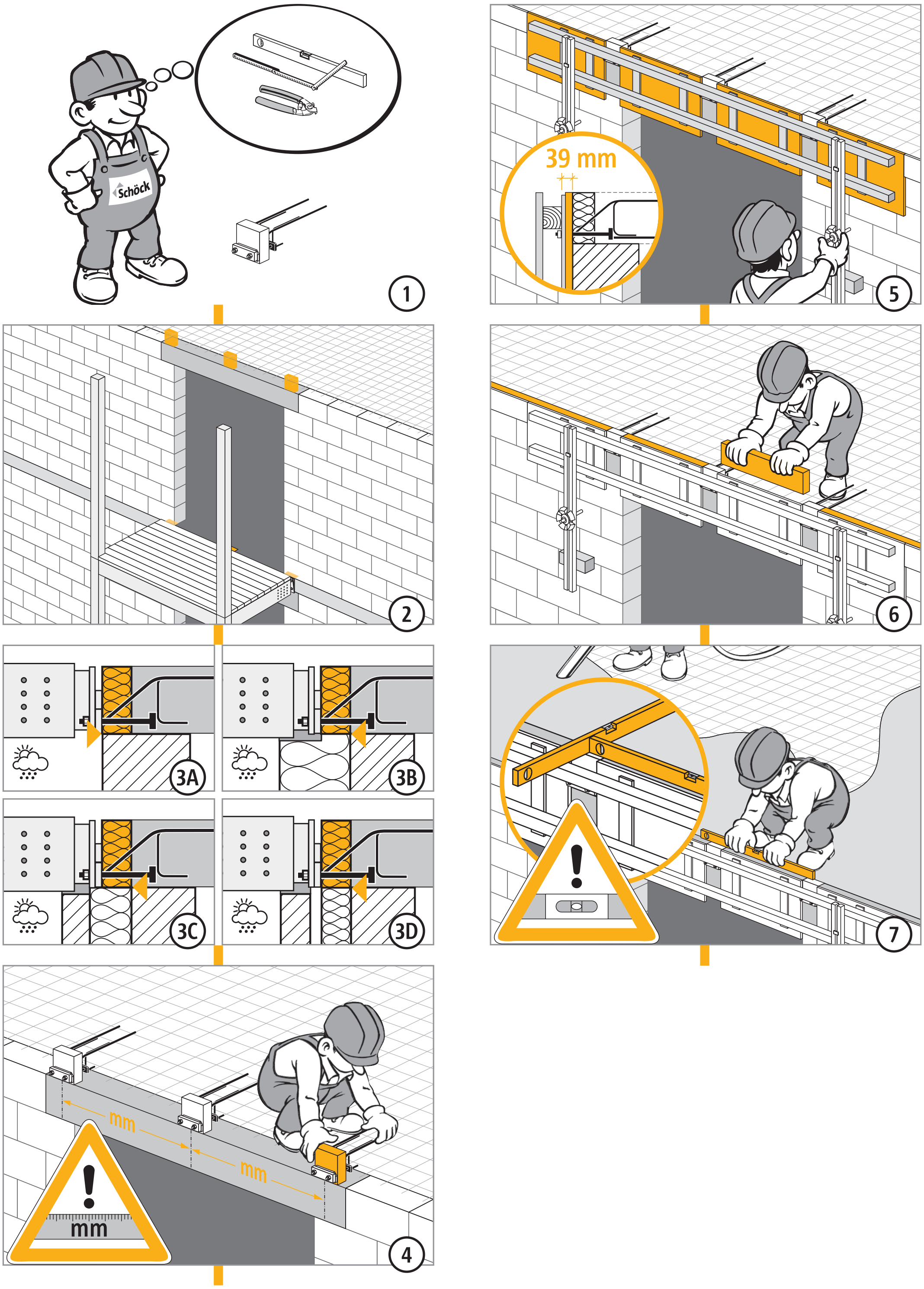
Schöck Isokorb® type QSH

Method statement for the carpenter in the carpenter's workshop



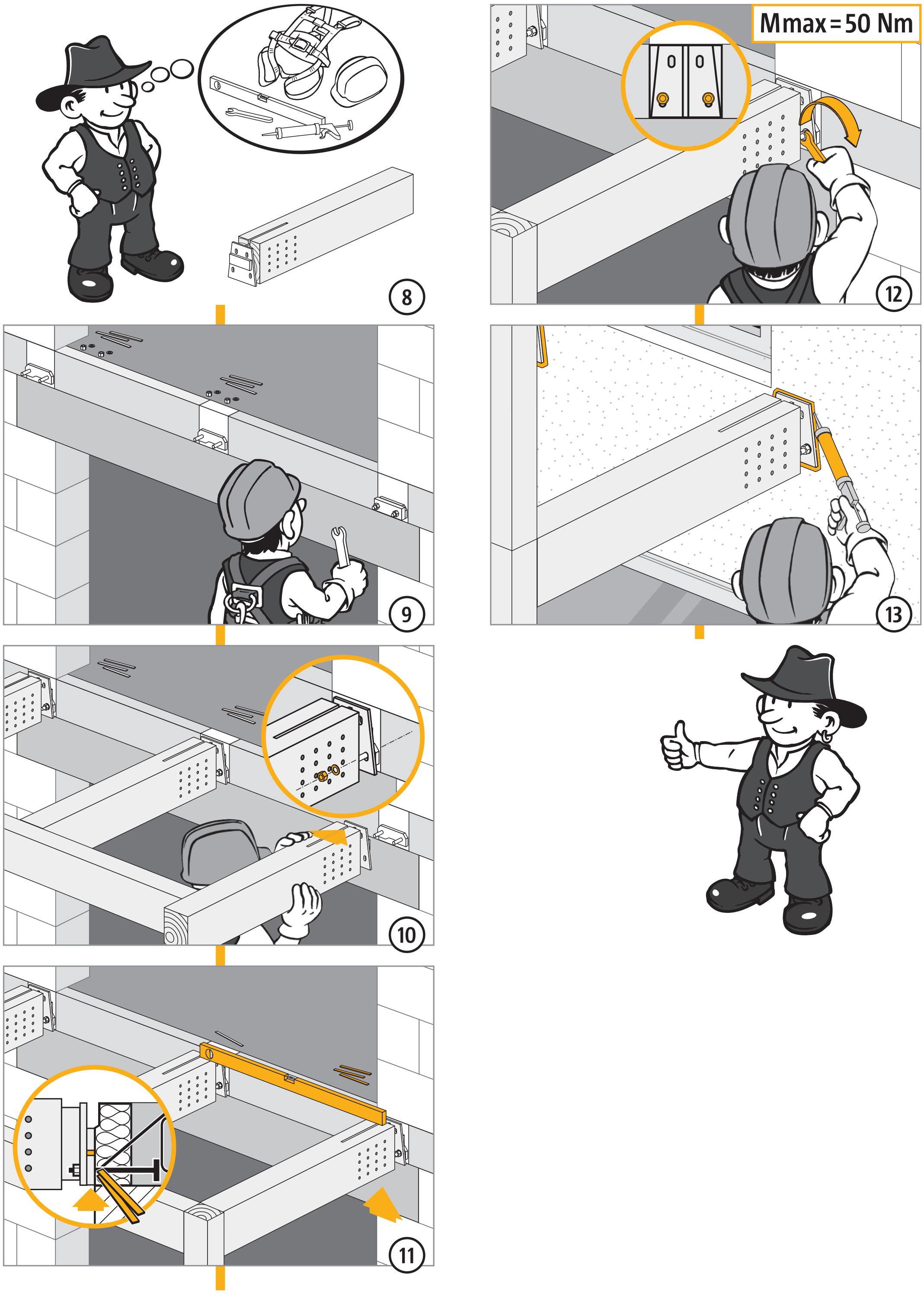
Schöck Isokorb® type QSH

Method statement for the concrete frame constructor



Schöck Isokorb® type QSH

Method statement for the carpenter on the construction site



Schöck Isokorb® type KSH/QSH

Check list

- [ ] As a pre-condition for application of the calculation tables on pages 202 - 203, were the calculations performed in accordance with the pre-defined load assumptions?

- [ ] Was the use of the wood resistance tables on page 204 matched to the planned wood quality?

- [ ] Has the information for the construction management and/or the concrete frame constructor relating to installation tolerances been adopted in the concrete frame design (refer to page 207)?

- [ ] Have the tightening torques for the screwed connections been marked in the implementation plan (refer to pages 210 and 219)?

Notes

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