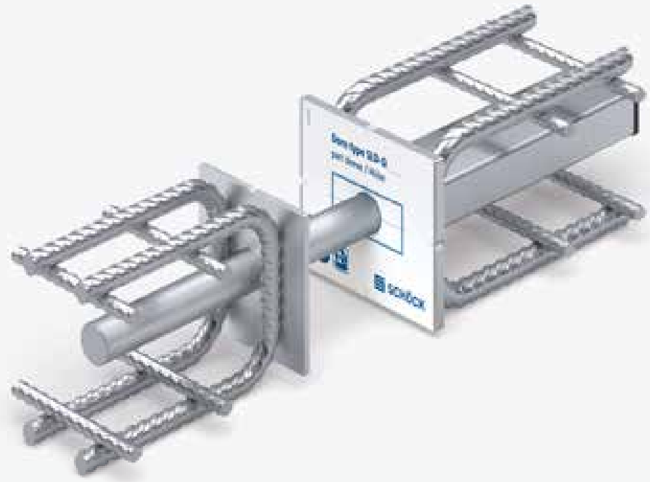

Technical Information according to AS 3600:2018

Schöck Dorn

September 2022

Telephone hotline for design support services
Telephone: +49 7223 967-634
Fax: +49 7223 967-470
export@schoeck.com

Planning and consulting service

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

Schöck Bauteile GmbH
Schöckstraße 1
D-76534 Baden-Baden

Design support – for technical issues

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E-Mail: export@schoeck.com

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Tel.: +49 (0) 7223 967-435
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Notes | Symbols

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Notes Symbols

Hazard note

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

Info

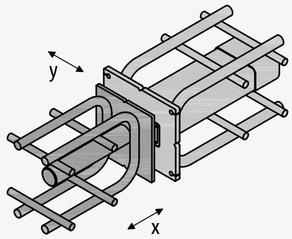
The square with an "i" indicates important information which, for example, must be read in conjunction with the design.

Check list

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

Summary of types

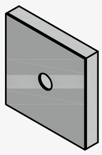
Schöck Dorn type SLD-Q Page 11



SLD-Q

This heavy duty dowel serves the transmission of high shear forces in bulding joints and with this enables free movement in the longitudinal and transverse direction to the dowel axis. Through the stiff anchoring body it is particularly suited for the connection of thin structural components.

Schöck fire protection collar BSM Page 10



BSM

The fire protection collar protects the dowel from direct flame encroachment and heat. Thus a classification of the shear force connection in the fire resistance class R120 is possible. With an appropriate joint configuration the requirements of fire resistance class REI120 can be met.

Scheduled expansion joints | Schöck Dorn solution

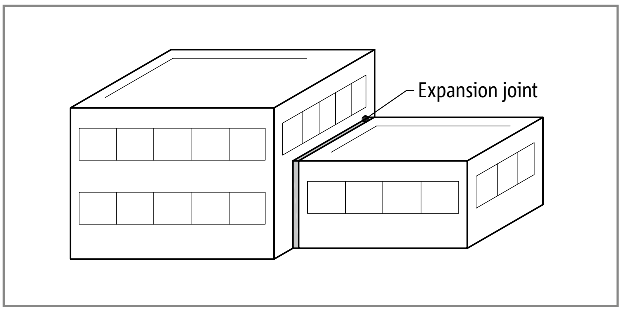


Fig. 1: Gebäudefuge – Dehnfuge durchtrennt das gesamte Gebäude

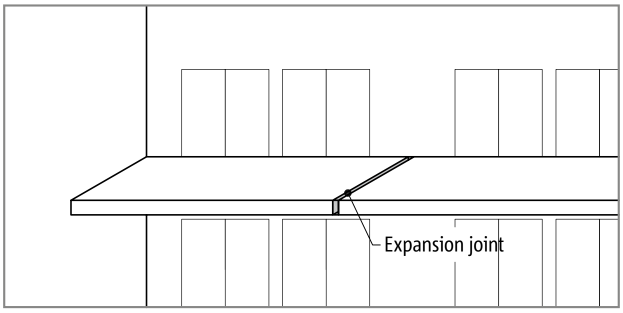


Fig. 2: Bauteilfuge – Dehnfuge teilt nur einzelne Bauteile

Scheduled expansion joints

In long concrete structural components, due to temperature elongation, shrinkage, swelling or creeping of the concrete, considerable forced stresses can arise. These stresses lead to cracks or other structural damage. For this reason expansion joints are arranged in order to enable a zero-stress deformation of the structural components. These expansion joints can separate complete parts of a building or only individual structural components. A typical structural component expansion joint is, for example, positioned in long balconies. On the other hand, with a building expansion joint, attention must be paid that all structural components are seperated by a joint.

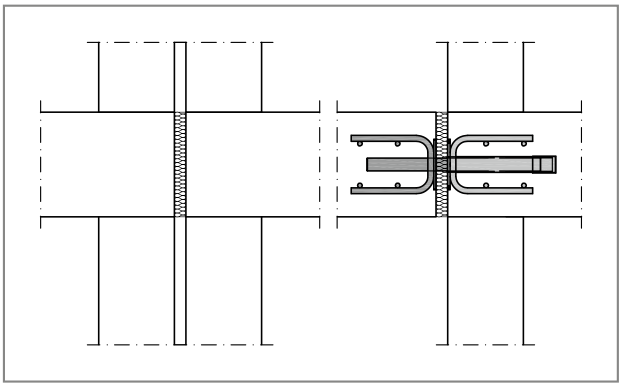


Fig. 3: Expansion joint using a Schöck Dorn instead of a twin column or double wall

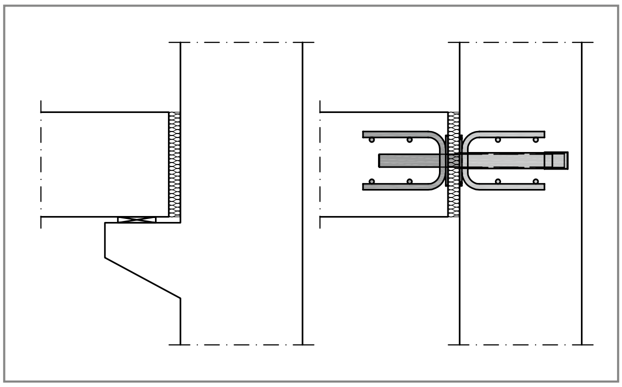


Fig. 4: Expansion joint using a Schöck Dorn instead of a support corbel

Schöck Dorn solution

In the area of the joint the structural components separated by the joint must be supported. Furthermore, different deformations of the building parts are also to be avoided. Conventionally, for this, corbels with slide bearings or a double arrangement of the load bearing walls and columns have been used at the structural component joint. These solutions are expensive to reinforce and to form. In addition, they require space which limits later development and usage.
Using the Schöck Dorn, horizontal movements are enabled and vertical loads transmitted. This system offers many advantages:

- Simpler formwork and reinforcement management
- Better use of space through doing away with double supports and corbels
- Production in one or in separate building phases possible
- Schöck Dorn type SLD-Q (heavy duty dowel) with general building supervisory approval Z-15.7-236
- User-friendly design program for free download at www.schoeck.com
- Joint configuration in fire resistance class R120 possible
- Secure and maintenance-free connection through the employment of high-grade stainless steels

Connection situations

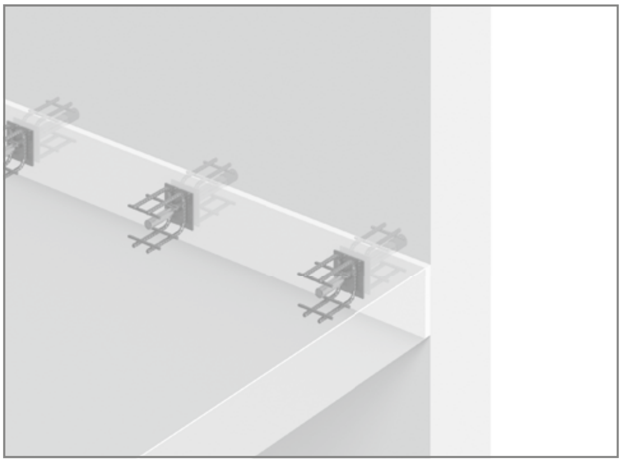


Fig. 5: Schöck Dorn type SLD-Q: Connection slab-wall

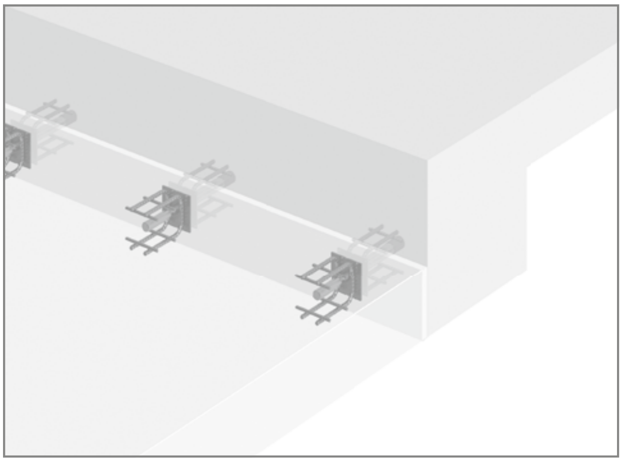


Fig. 6: Schöck Dorn type SLD-Q: Connection slab-downstand beam

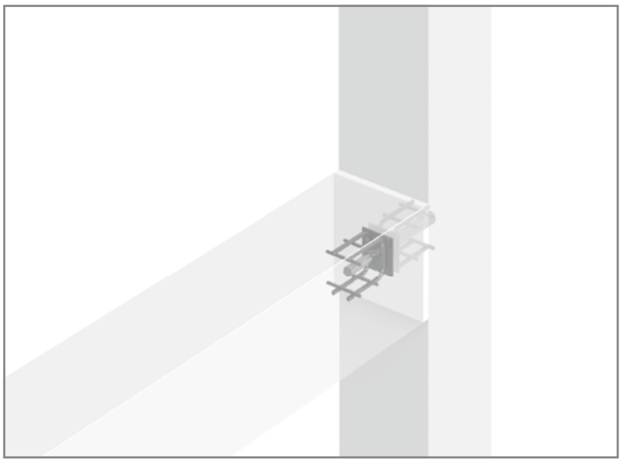


Fig. 7: Schöck Dorn: Connection beam-column

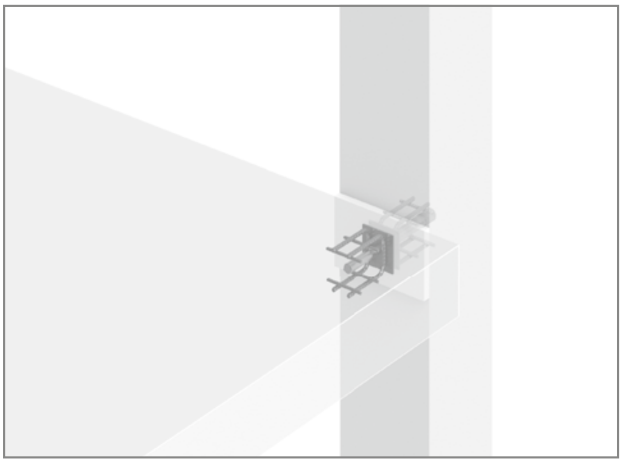
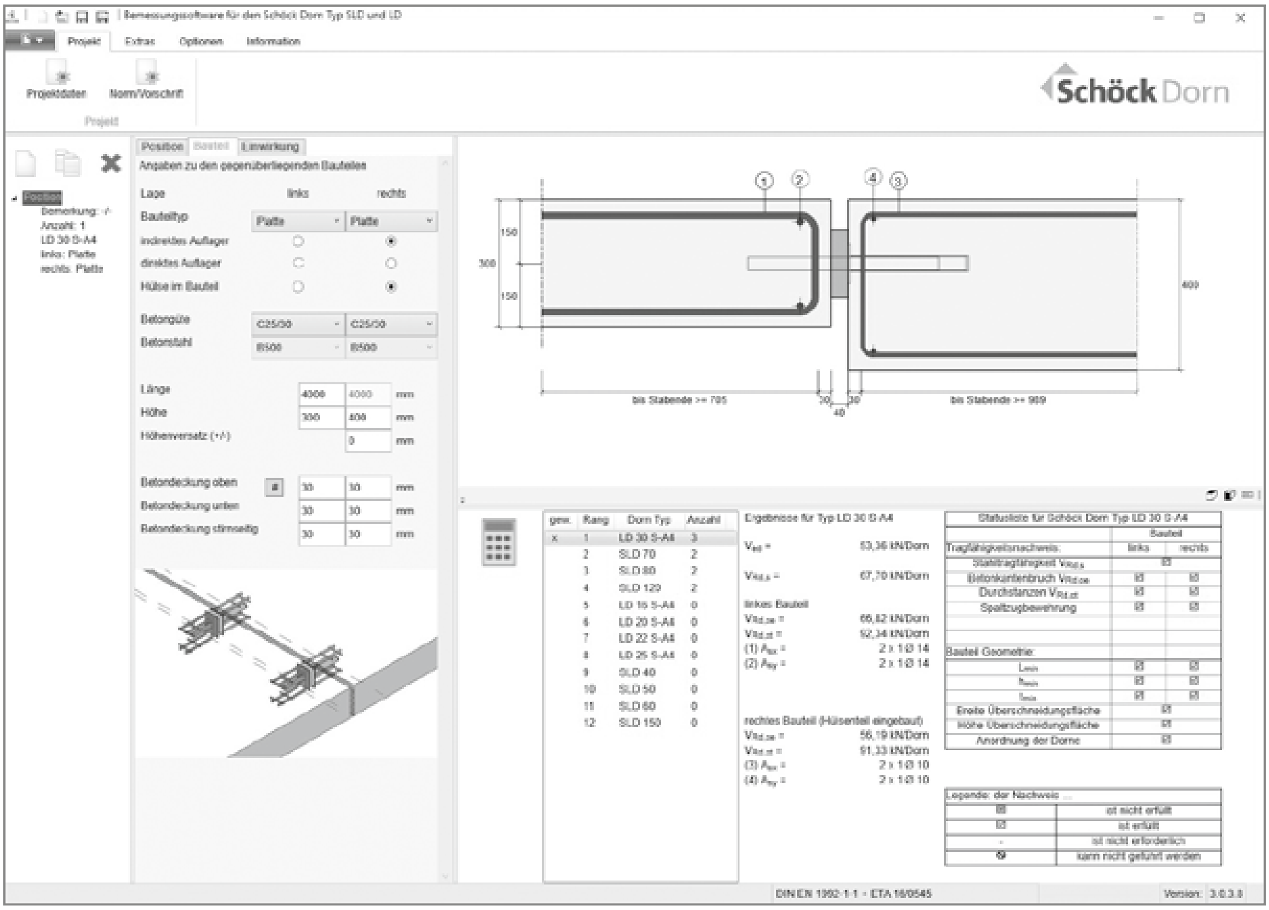


Fig. 8: Schöck Dorn: Connection slab-column

Design software

The Schöck Dorn software allows a simple and rapid design of expansion joints using the Schöck Dorn type SLD-Q.

- Design takes place in accordance with approvals and AS 3600
- Many different application cases are verifiable (slab-slab, slab-wall, slab-downstand beam, etc.)
- Automatic determination of the dowel spacings and dowel types
- Flexible load input through distributed loads, triangular loads or with free arrangement
- Automatic determination and graphic representation of the edge reinforcement
- Easy transfer of the design results onto the drawing through dxf output
- Free download without registration



Fire protection sleeve

Schöck fire protection collar BSM

Using the Schöck fire protection collar the joint design with the Schöck Dorn type SLD-Q can be configured in a fire resistance class R120. This sleeve consists of an incombustible mineral fibre plate with a 2 mm thick Promaseal® PL strip. In the case of fire the Promaseal® expands in order to close an air gap in the joint of up to 10 mm and thus to protect the dowel. Thus no further cladding of the joint is necessary.
Depending on the planned joint width the fire protection collar is available with a thickness of 20 or 30 mm. For larger joint widths several fire protection collars can be combined.

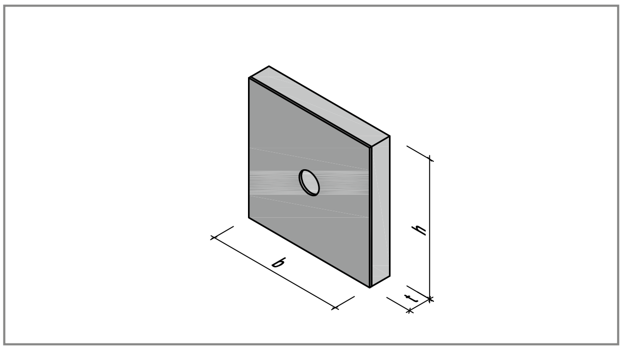


Fig. 9: Configuration of the Schöck fire protection collar

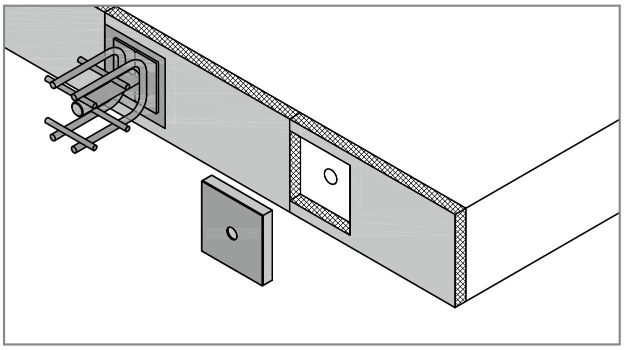
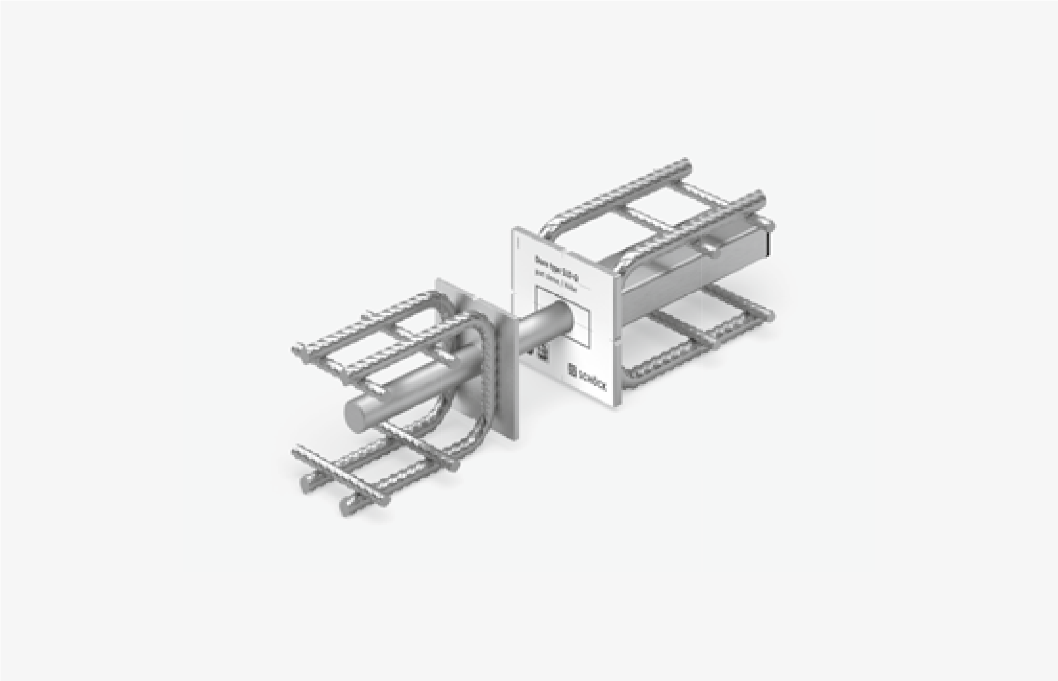


Fig. 10: Configuration of the Schöck fire protection collar in the joint

Fire protection sleeve for Schöck Dorn type SLD-Q	Thickness	Height	Width
	Dimension [mm]		
SLD-Q 40-150 BSM 0	2.5	170	190
SLD-Q 40/50 BSM 20	20	120	150
SLD-Q 40/50 BSM 30	30		
SLD-Q 60/70 BSM 20	20	150	160
SLD-Q 60/70 BSM 30	30		
SLD-Q 80 BSM 20	20	170	190
SLD-Q 80 BSM 30	30		
SLD-Q 120/150 BSM 20	20	250	250
SLD-Q 120/150 BSM 30	30		

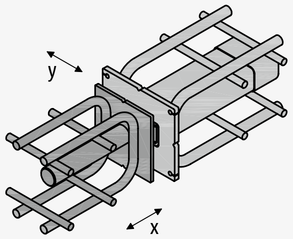
Schöck Dorn type SLD-Q



Schöck Dorn type SLD-Q
Heavy duty dowel for the transmission of high shear forces between thin concrete structural components with freedom of movement along and transverse to the dowel axis.

Product characteristics | Application areas

Schöck Dorn type SLD-Q Page 11



SLD-Q

This heavy duty dowel serves the transmission of high shear forces in bulding joints and with this enables free movement in the longitudinal and transverse direction to the dowel axis. Through the stiff anchoring body it is particularly suited for the connection of thin structural components.

Type designations in planning documents

Dowel type
Sleeve movable transversely
Load-bearing level

SLD - Q - 60

Product characteristics

The Schöck Dorn type SLD-Q (heavy duty dowel) consists of a sleeve part and a dowel part, which are concreted into the respective building components adjacent to the joint. The dowel transmits the loads from one structural component through bending in the sleeve and thus into the other structural component. With this, the welded-on stirrups and the front plate ensure an optimum anchoring of the concrete.
The sleeve of the Schöck Dorn type SLD-Q has a rectangular tube allowing the round dowel to move in the axial direction and transversely. This enables the transmission of vertical forces in the joint and simultaneous moveability in all horizontal directions. This prevents constraints due to temperature deformation and shrinkage.

Application areas

The Schöck Dorn type SLD-Q is tested and approved for the transmission of mainly statically relevant shear forces in expansion joints. The approval Z-15.7-236 from the German Institute for Structural Engineering (DIBt) regulates the design for normal reinforced concrete. The joint widths can vary between 10 and 60 mm. The sleeve of the Schöck Dorn type SLD-Q is designed for a horizontal displacement of ± 12 mm. Dowel and sleeve consist of stainless steels of the material numbers 1.4362, 1.4571 as well as 1.4404. All dimensions, reinforcement and geometry tables below apply according to AS 3600. The concrete load-bearing resistance were determined with a concrete cover of 30 mm.

Minimum dowel spacing/component dimensions

Schöck Dorn type SLD-Q	40	50	60	70	80	120	150
Minimum component dimensions	Dimension [mm]						
Slab thickness h_{min}	160	160	180	200	240	300	350
Wall thickness b_w	200	210	215	250	305 + c_{nom}	460 + c_{nom}	540 + c_{nom}
Beam width b_u	240	240	270	300	360	450	530
Minimum dowel spacing							
Horizontal $e_{h,min}$	240	240	270	300	360	450	530
Vertical $e_{v,min}$	120	120	140	160	200	215	235
Minimum edge distance							
Horizontal $e_{R,min}$	120	120	135	150	180	225	265

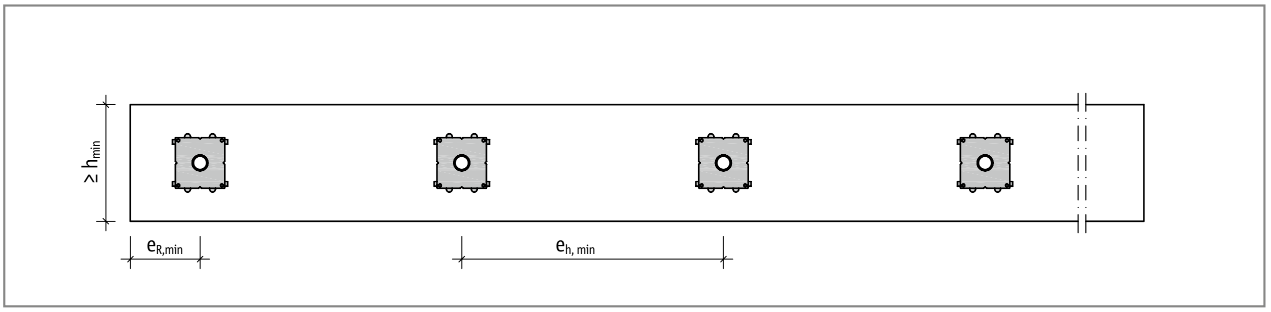


Fig. 11: Schöck Dorn type SLD-Q: Minimum structural component dimensions and dowel spacings in a slab

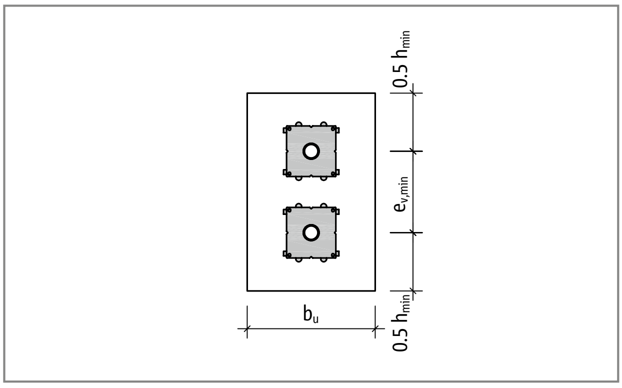


Fig. 12: Schöck Dorn type SLD-Q: Minimum structural component dimensions and dowel spacings in the front face of a beam or wall

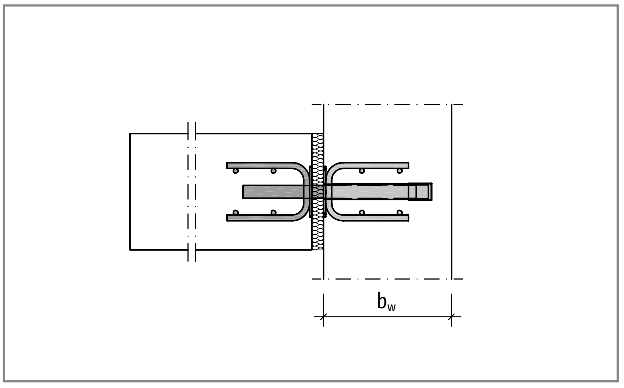


Fig. 13: Schöck Dorn type SLD-Q: Minimum structural component thickness of a wall or column

Critical dowel spacings/edge distances

With the observation of the critical edge distances and dowel spacings no mutual influencing of the punching cone is to be taken into account. The design table on page 18 is based on these spacings. Should these spacings be undercut an additional punching shear design taking into account the shortened perimeter is required.
The maximum dowel spacing is limited in the Product Standard ETAG 030 to 8 times the slab height.

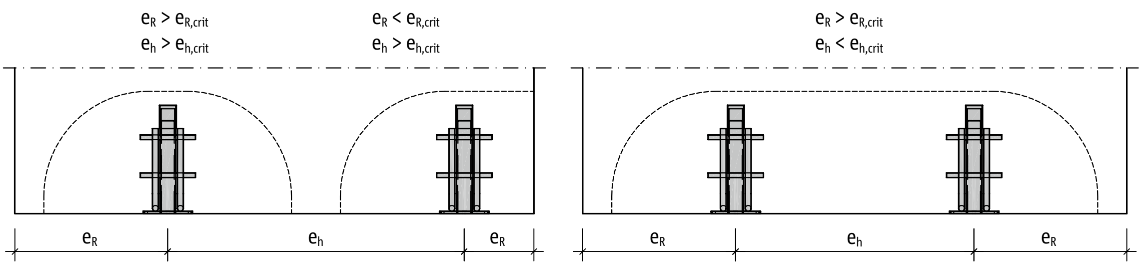
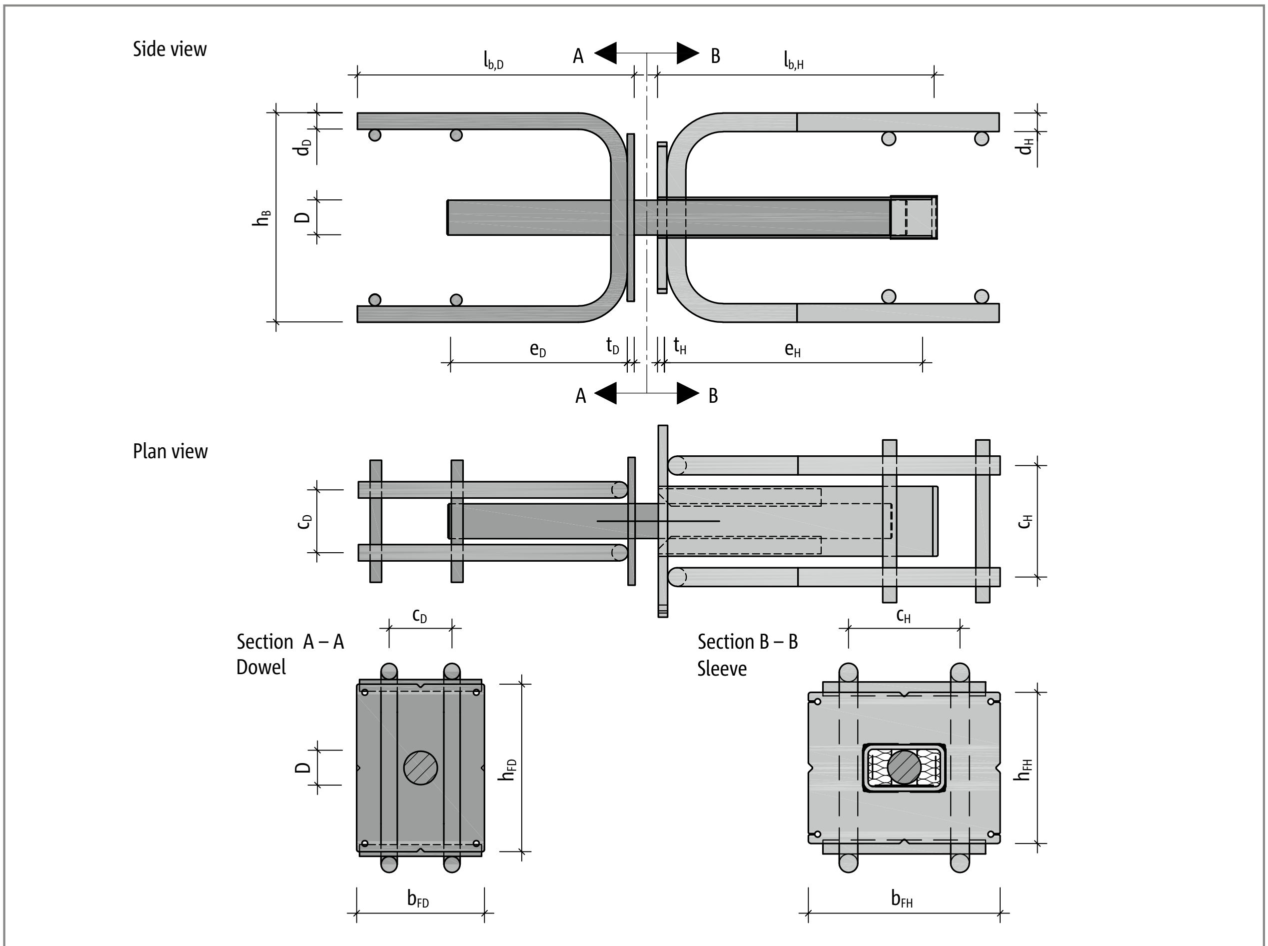


Fig. 14: Schöck Dorn type SLD-Q: Circular cut depending on critical dowel spacing and edge separation

Schöck Dorn type SLD-Q	40	50	60	70	80	120	150
Slab thickness [mm]	**Critical dowel spacings $e_{h,crit}$ [mm]**						
160	455	455	-	-	-	-	-
180	500	500	515	-	-	-	-
200	545	545	565	585	-	-	-
220	590	590	610	630	-	-	-
250	725	725	675	695	730	-	-
280	815	815	815	765	795	-	-
300	875	875	875	885	840	915	-
350	1025	1025	1025	1035	955	1065	1075
Slab thickness [mm]	**Critical edge distances $e_{R,crit}$ [mm]**						
160	360	360	-	-	-	-	-
180	395	395	405	-	-	-	-
200	430	430	445	455	-	-	-
220	465	465	480	495	-	-	-
250	570	570	530	545	570	-	-
280	640	640	640	600	620	-	-
300	690	690	690	695	655	705	-
350	805	805	805	815	745	825	825

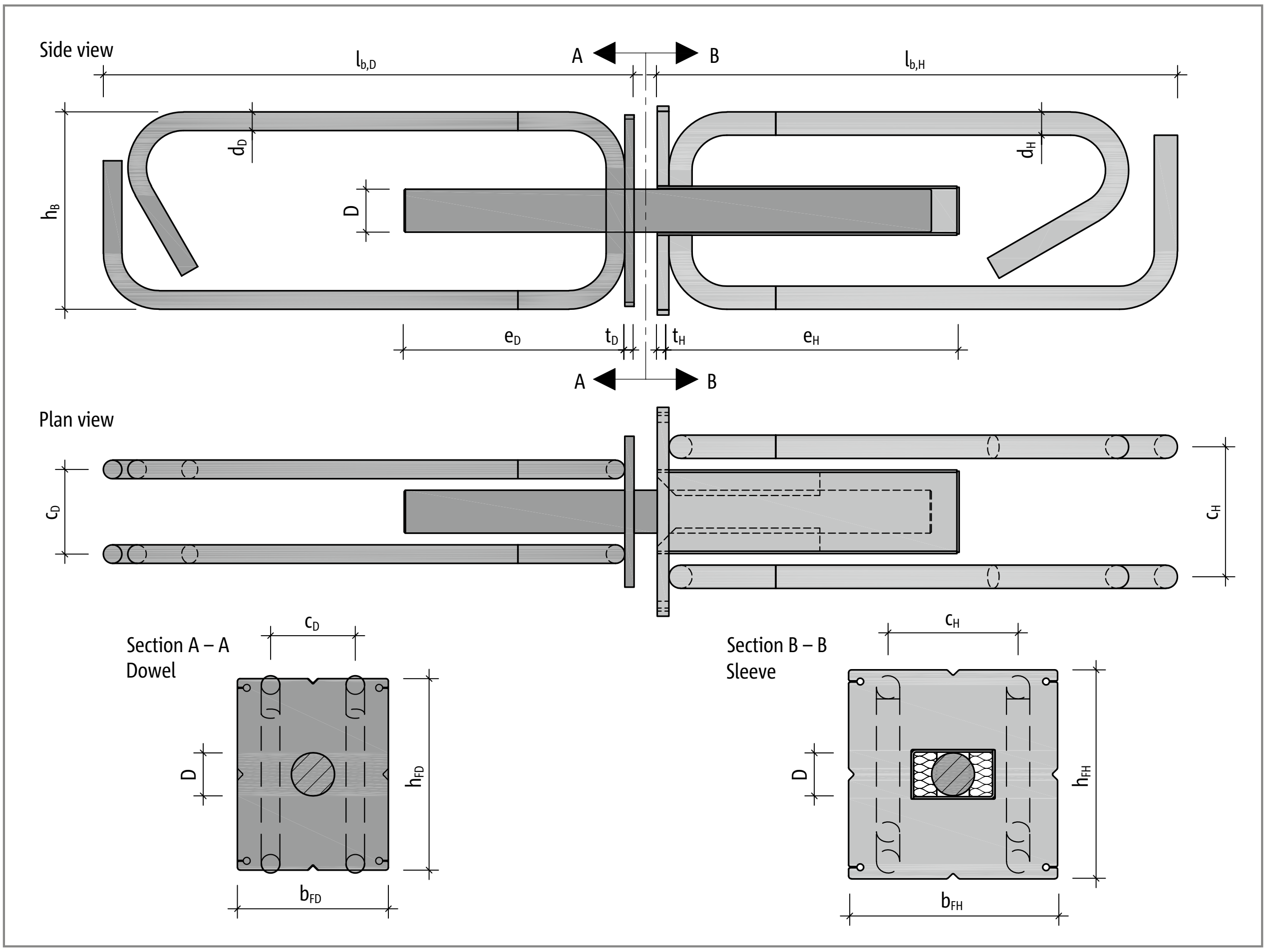
Product description SLD-Q 40–80



15: Schöck Dorn type SLD-Q 40 to SLD-Q 80: Dimensions

Schöck Dorn type SLD-Q		40	50	60	70	80
Dowel part		**Dimensions [mm]**				
Diameter dowel	D	22	22	24	27	30
Dowel anchoring depth	e_D	100	115	130	145	155
Diameter Stirrup	d_D	10	10	12	12	14
Stirrup height	h_B	100	100	120	140	180
Stirrup length	$l_{b,D}$	146	146	169	220	238
Stirrup spacing	c_D	42	42	46	49	54
End plate thickness	t_D	4	4	4	5	6
End plate height	h_{FD}	85	87	117	129	144
End plate width	b_{FD}	65	85	85	95	110
Sleeve part						
Sleeve length	e_H	165	180	195	211	221
Diameter Stirrup	d_H	10	12	12	14	16
Stirrup length	$l_{b,H}$	168	175	171	214	294
Stirrup spacing	c_H	76	78	82	86	96
End plate thickness	t_H	5	6	6	8	8
End plate height	h_{FH}	95	95	110	110	130
End plate width	b_{FH}	105	110	120	130	165

Product description SLD-Q 120–150



16: Schöck Dorn type SLD-Q 120, SLD-Q 150: Dimensions

Schöck Dorn type SLD-Q		120	Q 150
Dowel part		Dimensions [mm]	
Diameter dowel	D	37	42
Dowel anchoring depth	e_D	190	230
Diameter Stirrup	d_D	16	20
Stirrup height	h_B	170	210
Stirrup length	$l_{b,D}$	457	458
Stirrup spacing	c_D	73	82
End plate thickness	t_D	8	10
End plate height	h_{FD}	165	180
End plate width	b_{FD}	130	145
Sleeve part			
Sleeve length	e_H	258	302
Diameter Stirrup	d_H	20	25
Stirrup length	$l_{b,H}$	448	536
Stirrup spacing	c_H	112	122
End plate thickness	t_H	10	10
End plate height	h_{FH}	180	210
End plate width	b_{FH}	180	200

Design SLD-Q f'c 32MPa / f'c 40MPa

Design resistance V_{Rd} = min [steel load-bearing capacity $V_{Rd,s}$, concrete edge resistance $V_{Rd,c}$, punching shear resistance $V_{Rd,ct}$]

The following design values have been determined in accordance with AS 3600 with a concrete cover of 30 mm. With higher concrete cover the load-bearing capacity for a correspondingly reduced slab height must be applied. The maximum load-bearing capacities listed here apply only in connections with a reinforcement arrangement in accordance with pages 20 or 21 and under observation of the critical dowel spacing or edge distance in accordance with page 15.

Schöck Dorn type SLD-Q		40	50	60	70	80	120	150
Slab thickness [mm]	**Joint width [mm]**	**Design resistances V_{Rd}, f'c 32MPa / f'c 40MPa [kN/dowel]**						
160	**10**	57.8	57.8					
	20	57.8	57.8					
	30	50.2	57.8					
	40	37.6	50.1					
	50	30.1	40.1					
	60	25.1	33.4					
180	**10**	63.1	63.1	65.6				
	20	63.1	63.1	65.6				
	30	50.2	63.1	65.6				
	40	37.6	50.1	65.0				
	50	30.1	40.1	52.0				
	60	25.1	33.4	43.4				
200	**10**	68.3	68.3	92.7	111.4			
	20	67.6	68.3	92.7	111.4			
	30	50.2	66.4	84.8	111.4			
	40	37.6	50.1	65.0	92.6			
	50	30.1	40.1	52.0	74.1			
	60	25.1	33.4	43.4	61.7			
220	**10**	73.4	97.0	100.7	158.3			
	20	67.6	85.6	100.7	139.6			
	30	50.2	66.4	84.8	116.1			
	40	37.6	50.1	65.0	92.6			
	50	30.1	40.1	52.0	74.1			
	60	25.1	33.4	43.4	61.7			
250	**10**	80.8	102.5	112.3	163.1	204.3		
	20	67.6	85.6	105.7	139.6	178.2		
	30	50.2	66.4	84.8	116.1	152.0		
	40	37.6	50.1	65.0	92.6	125.9		
	50	30.1	40.1	52.0	74.1	101.6		
	60	25.1	33.4	43.4	61.7	84.7		
280	**10**	85.0	102.5	123.6	163.1	204.3		
	20	67.6	85.6	105.7	139.6	178.2		
	30	50.2	66.4	84.8	116.1	152.0		
	40	37.6	50.1	65.0	92.6	125.9		
	50	30.1	40.1	52.0	74.1	101.6		
	60	25.1	33.4	43.4	61.7	84.7		

Design SLD-Q f’c 32MPa / f’c 40MPa

Schöck Dorn type SLD-Q		40	50	60	70	80	120	150
Slab thickness [mm]	Joint width [mm]	Design resistances V_{Rd}, f’c 32MPa / f’c 40MPa [kN/dowel]						
300	10	85.0	102.5	126.6	163.1	204.3	238.4	
	20	67.6	85.6	105.7	139.6	178.2	238.4	
	30	50.2	66.4	84.8	116.1	152.0	238.4	
	40	37.6	50.1	65.0	92.6	125.9	221.6	
	50	30.1	40.1	52.0	74.1	101.6	189.4	
	60	25.1	33.4	43.4	61.7	84.7	158.9	
350	10	85.0	102.5	126.6	158.3	204.3	262.7	328.9
	20	67.6	85.6	105.7	139.6	178.2	262.7	328.9
	30	50.2	66.4	84.8	116.1	152.0	253.8	328.9
	40	37.6	50.1	65.0	92.6	125.9	221.6	305.3
	50	30.1	40.1	52.0	74.1	101.6	189.4	268.7
	60	25.1	33.4	43.4	61.7	84.7	158.9	232.2
400	10	85.0	102.5	126.6	163.1	204.3	270.7	372.0
	20	67.6	85.6	105.7	139.6	178.2	270.7	372.0
	30	50.2	66.4	84.8	116.1	152.0	253.8	341.9
	40	37.6	50.1	65.0	92.6	125.9	221.6	305.3
	50	30.1	40.1	52.0	74.1	101.6	189.4	268.7
	60	25.1	33.4	43.4	61.7	84.7	158.9	232.2
450	10	85.0	102.5	126.6	163.1	198.5	265.7	372.0
	20	67.6	85.6	105.7	139.6	178.2	265.7	372.0
	30	50.2	66.4	84.8	116.1	152.0	253.8	341.9
	40	37.6	50.1	65.0	92.6	125.9	221.6	305.3
	50	30.1	40.1	52.0	74.1	101.6	189.4	268.7
	60	25.1	33.4	43.4	61.7	84.7	158.9	232.2
500	10	85.0	102.5	126.6	163.1	204.3	270.7	372.0
	20	67.6	85.6	105.7	139.6	178.2	270.7	372.0
	30	50.2	66.4	84.8	116.1	152.0	253.8	341.9
	40	37.6	50.1	65.0	92.6	125.9	221.6	305.3
	50	30.1	40.1	52.0	74.1	101.6	189.4	268.7
	60	25.1	33.4	43.4	61.7	84.7	158.9	232.2

On-site reinforcement

Schöck Dorn type SLD-Q	Slab thickness	40	50	60	70	80
A_{sx} (right / left)	≤ 200	2 • 3 • N12	2 • 3 • N12	2 • 3 • N12	2 • 2 • N16	
	≤ 300	2 • 2 • N12	2 • 3 • N12	2 • 3 • N12	2 • 3 • N16	2 • 3 • N16
	≤ 400	2 • 2 • N12	2 • 2 • N12	2 • 3 • N12	2 • 3 • N16	2 • 3 • N16
	≤ 500	2 • 2 • N12	2 • 2 • N12	2 • 2 • N12	2 • 2 • N16	2 • 2 • N16
A_{sy} (top / bottom)	≤ 200	2 • 6 • N12	2 • 6 • N12	2 • 6 • N12	2 • 6 • N16	
	≤ 300	2 • 4 • N12	2 • 4 • N12	2 • 6 • N12	2 • 6 • N16	2 • 8 • N16
	≤ 400	2 • 3 • N12	2 • 3 • N12	2 • 4 • N12	2 • 6 • N16	2 • 8 • N16
	≤ 500	2 • 2 • N12	2 • 2 • N12	2 • 3 • N12	2 • 4 • N16	2 • 6 • N16

Schöck Dorn type SLD-Q	40	50	60	70	80
s_1 for slab thickness ≤ 300 mm	30	32	34	32	36
s_1 for slab thickness > 300 mm	50	50	50	50	50
s_i	50	50	50	50	50
Pos. 1	2 • N8	2 • N8	2 • N8	2 • N8	2 • N8
$e_1 e_1$	65	80	95	105	115
l_{c1} SLD Q	92	98	106	111	122

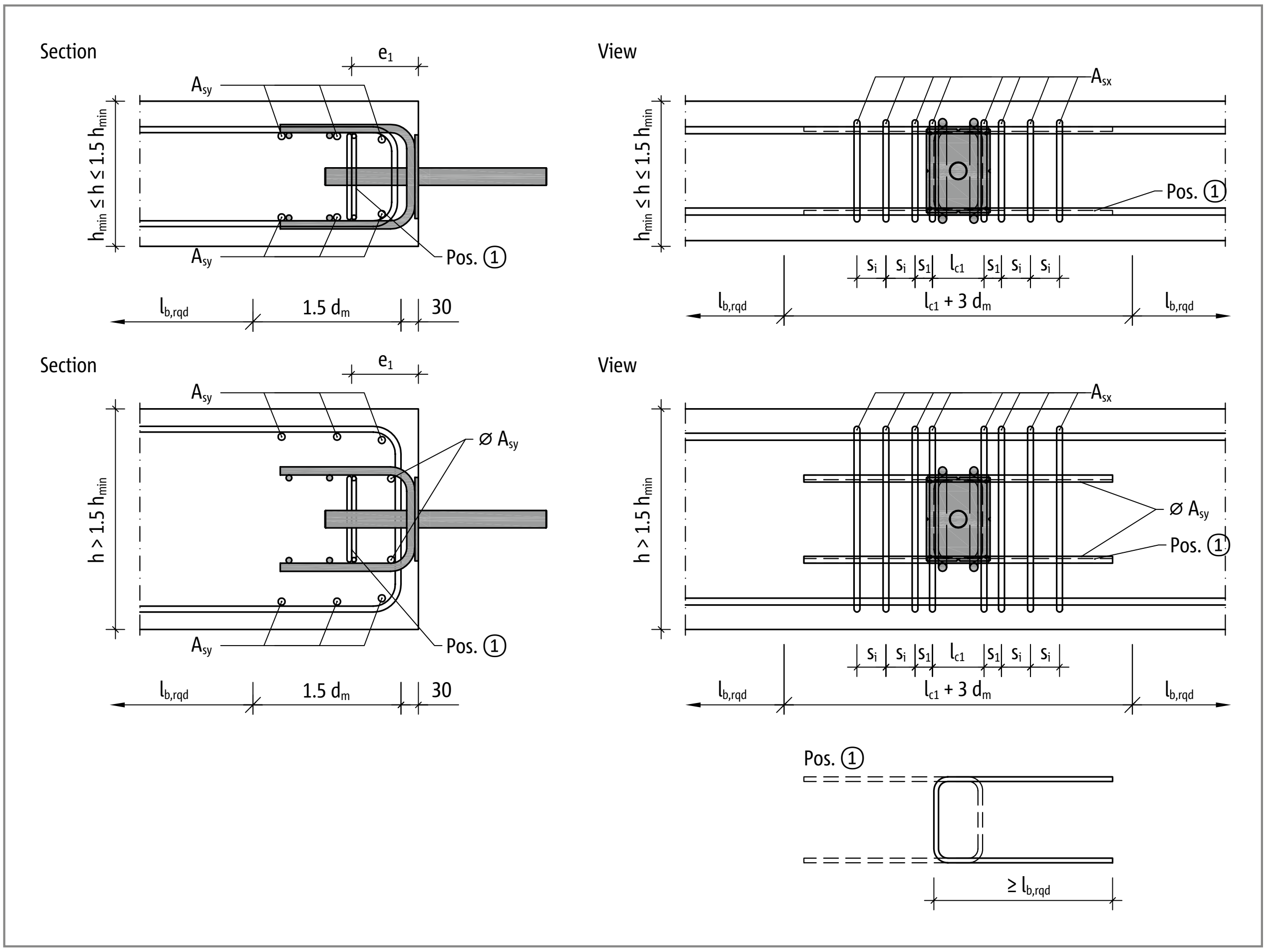


Fig. 17: Schöck Dorn type SLD-Q 40 to SLD-Q 80: On-site reinforcement

On-site reinforcement

Schöck Dorn type SLD-Q	Slab thickness	120	150
A_{sx} (right / left)	≤ 200		
	≤ 300	2 • 5 • N16	
	≤ 400	2 • 5 • N16	2 • 6 • N20
	≤ 500	2 • 3 • N16	2 • 4 • N20
A_{sy} (top / bottom)	≤ 200		
	≤ 300	2 • 10 • N20	
	≤ 400	2 • 10 • N16	2 • 10 • N20
	≤ 500	2 • 6 • N16	2 • 10 • N20

Schöck Dorn type SLD-Q	120	150
s_1 for slab thickness ≤ 300 mm	50	50
s_1 for slab thickness > 300 mm	50	50
s_1	50	50
Pos. 1	2 • N10	2 • N12
e_1	150	185
l_{c1} SLD Q	151	171

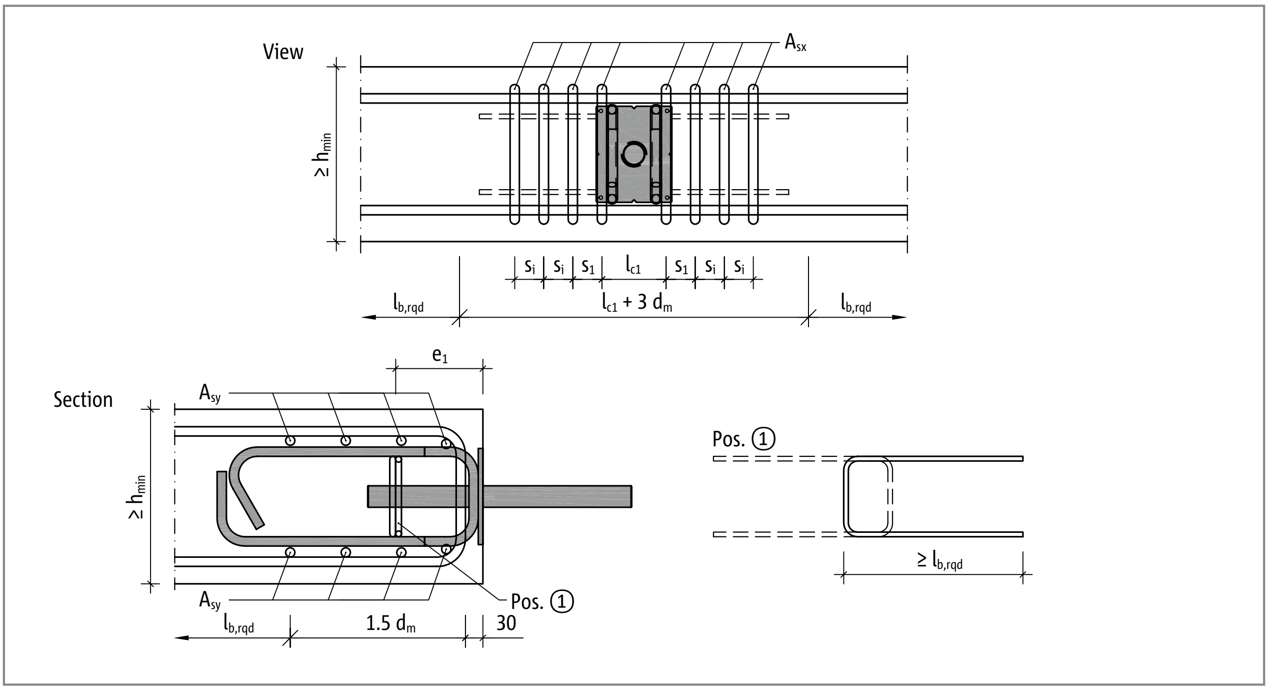


Fig. 18: Schöck Dorn type SLD-Q 120, SLD-Q 150: On-site reinforcement

On-site reinforcement

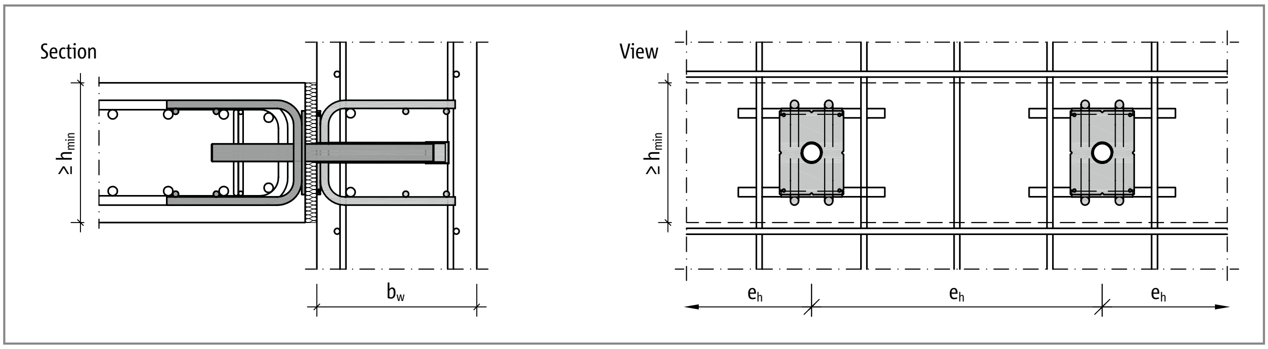


Fig. 19: Schöck Dorn type SLD-Q: On-site reinforcement for floor-wall connection

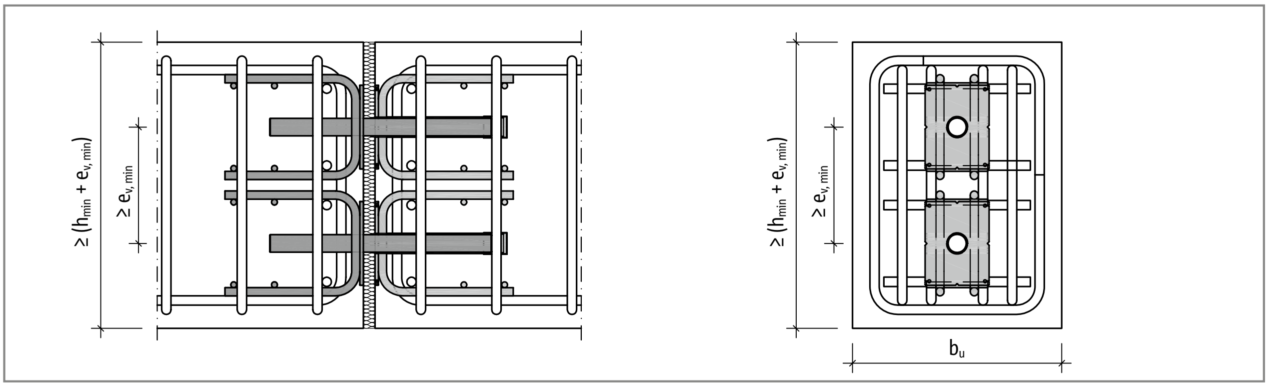


Fig. 20: Schöck Dorn type SLD-Q: On-site reinforcement for beam connection

Verification of the load-bearing capacity | steel load-bearing capacity

Verification of the load-bearing capacity in accordance with approval document Z-15.7-236

The load-bearing capacity of an expansion joint connection using the Schöck Dorn type SLD-Q is determined as being the minimum verifiable resistance to punching through shear failure, concrete edge failure and steel load-bearing resistance.

$$V_{Ed} \leq V_{Rd}$$
$$V_{Rd} = \min(V_{Rd,ct}; V_{Rd,c}; V_{Rd,s})$$

with:

V_{Ed} - design value of the effective shear force
V_{Rd} - design resistance of the dowel connection
$V_{Rd,ct}$ - design resistance against punching shear failure
$V_{Rd,c}$ - design resistance against concrete edge failure
$V_{Rd,s}$ - design resistance against steel failures of the dowel

These verifications are necessary if the constraints for the design tables are not observed. The punching shear design must be conducted if the critical spacings according to page 15 are undercut or the on-site reinforcement according to page 20 has been modified. The load-bearing capacity of the concrete edge must, in addition, be checked if the on-site reinforcement deviates from the recommendations on page 20.

Steel load-bearing capacity in accordance with approval document Z-15.7-236

The steel load-bearing capacity of the Schöck Dorn type SLD-Q is determined from the minimum of the load-bearing capacities of the welded-on stirrups, the welded seams, the end plate and the dowel. It is thus independent of the surrounding concrete. The load-bearing capacity is always relevant in structural components in which concrete edge and punching shear failure can be ruled out. This is the case, for example, in walls or columns.

Schöck Dorn type SLD-Q	40	50	60	70	80	120	150
Joint width [mm]	Steel load-bearing capacity $V_{Rd,s}$ [kN]						
10	76.5	94.3	113.9	146.8	183.8	270.7	372.0
20	60.8	77.0	95.1	125.6	160.3	257.4	340.6
30	45.2	59.8	76.3	104.5	136.8	228.4	307.7
40	33.9	45.1	58.5	83.3	113.3	199.4	274.8
50	27.1	36.1	46.8	66.7	91.5	170.5	241.9
60	22.6	30.1	39.0	55.6	76.2	143.0	209.0

Punching shear design

Punching shear design in accordance with approval document Z-15.7-236

The punching shear design in accordance with approval document Z-15.7-236, in deviation from the standard AS 3600, is carried out with a spacing of 1.5d.

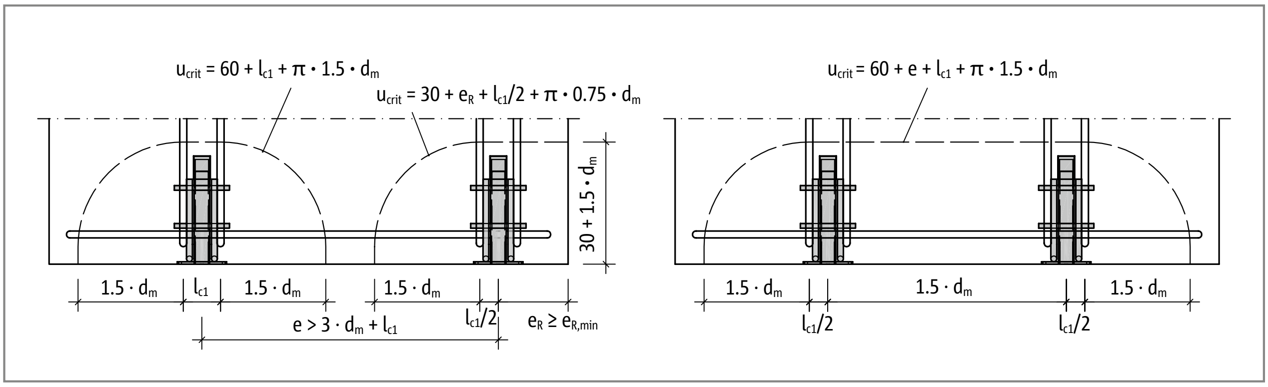


Fig. 21: Schöck Dorn type SLD-Q: Lengths of the perimeter for the punching shear design dependent on the dowel spacings

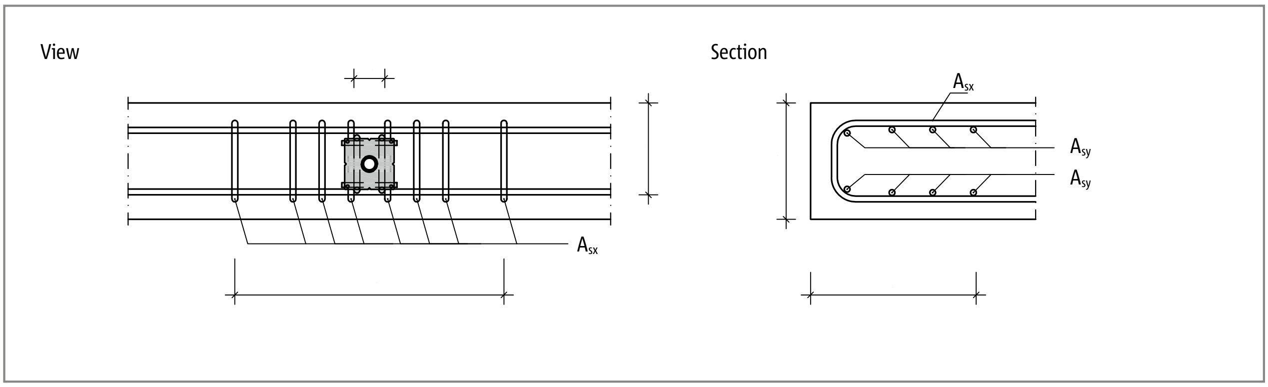


Fig. 22: Schöck Dorn type SLD-Q: Dimensions of the punching area

Punching shear resistance:

$$V_{Rd,ct} = 0.14 \cdot \eta_1 \cdot \kappa \cdot (100 \cdot \rho_l \cdot f_{ck})^{1/3} \cdot d_m \cdot u_{crit}/\beta$$

with:

η_1 = 1.0 for standard concrete

$\kappa = 1 + (200 / d_m)^{1/2} \leq 2.0$

d_m - mean static effective depth [mm]
$d_m = (d_x + d_y) / 2$

ρ_l - reinforcement ratio of longitudinal reinforcement within the perimeter
$\rho_l = (\rho_x \cdot \rho_y)^{1/2} \leq 0.5 \cdot f_{cd} / f_{yd} \leq 0.02$
$\rho_x = A_{sx} / (d_x \cdot b_y)$
$\rho_y = A_{sy} / (d_y \cdot b_x)$

f_{ck} - characteristic compression strength of the concrete

β - coefficient for consideration of non-uniform load application; with dowels at the corners 1.5, otherwise 1.4

u_{crit} - length of the critical perimeter (see diagram)

Concrete edge failure

Verification against concrete edge failure in accordance with approval document Z-15.7-236

The verification against concrete edge failure is a product-specific verification and is based on the evaluation of tests. For the verification, the load-bearing capacity is calculated with the aid of the suspended reinforcement on both sides of the dowel. However, only the legs of the suspended reinforcement may be taken into account, whose effective anchoring length (l'_i) in the breakout cone is greater than zero. Otherwise these legs are too far from the dowel and are thus ineffective.

$$V_{Rd,ce} = (\Sigma V_{Rd,1,i} + \Sigma V_{Rd,2,i}) \cdot f_\mu \leq \Sigma A_{sx,i} \cdot f_{yd} \cdot f_\mu$$

$$f_\mu = 0.9 \text{ for type SLD-Q}$$

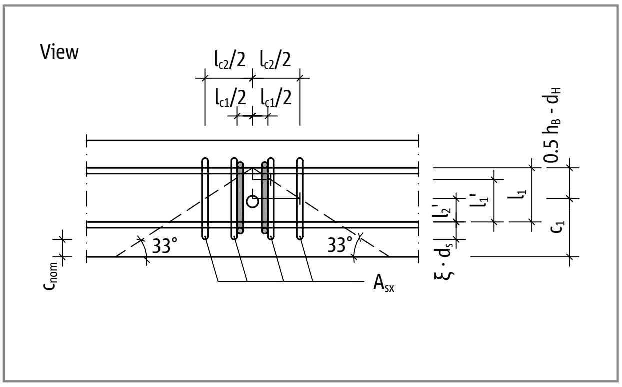


Fig. 23: Schöck Dorn type SLD: Dimensions of the breakout cone of the concrete edge

$V_{Rd,1,i}$ - hook load-bearing capacity of a stirrup alongside the dowel

$$V_{Rd,1,i} = 0.357 \cdot \psi_i \cdot A_{sx,i} \cdot f_{yk} \cdot (f_{ck} / 30)^{1/2} / \gamma_c$$

with:

- ψ_i - coefficient to take into account the spacing of the suspended reinforcement of the dowel
  - $\psi_i = 1 - 0.2 \cdot (l_{ci} / 2) / c_1$
  - $l_{ci}/2$ = distance $A_{sx,i}$ from dowel, of the suspended reinforcement considered
  - l_{c1} - distance of the first stirrup row of the dowel, see page 20
  - c_1 - edge separation starting from the dowel centre up to the free edge
- $A_{sx,i}$ - cross-section of a leg of the suspended reinforcement in the breakout cone
- f_{yk} - characteristic yield strength of the suspended reinforcement
- f_{ck} - characteristic compression strength of the concrete
- γ_c - $\gamma_c = 1.5$

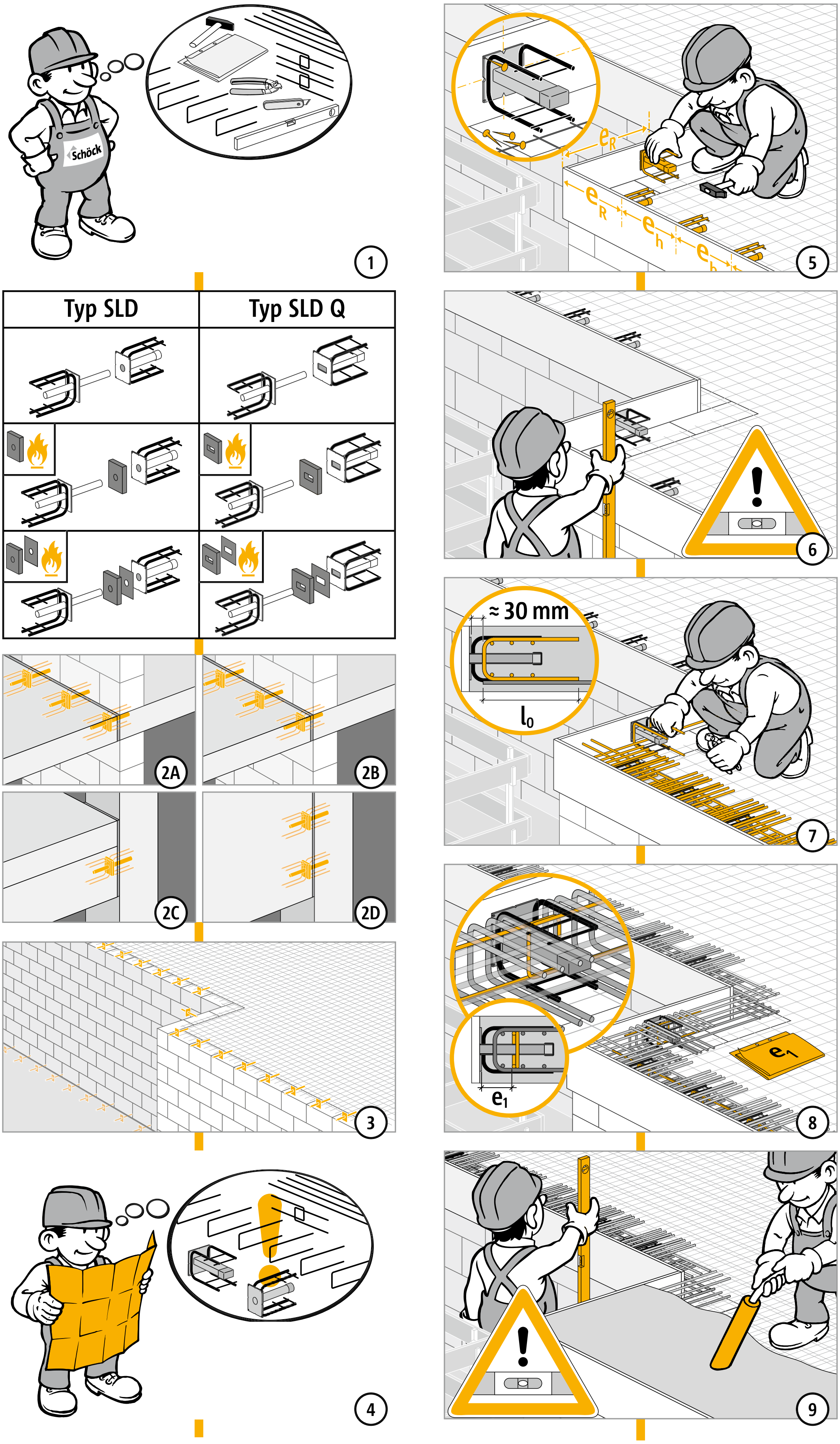
$V_{Rd,2,i}$ – bond resistance of a stirrup alongside the dowel

$$V_{Rd,2,i} = \pi \cdot d_s \cdot l'_i \cdot f_{bd}$$

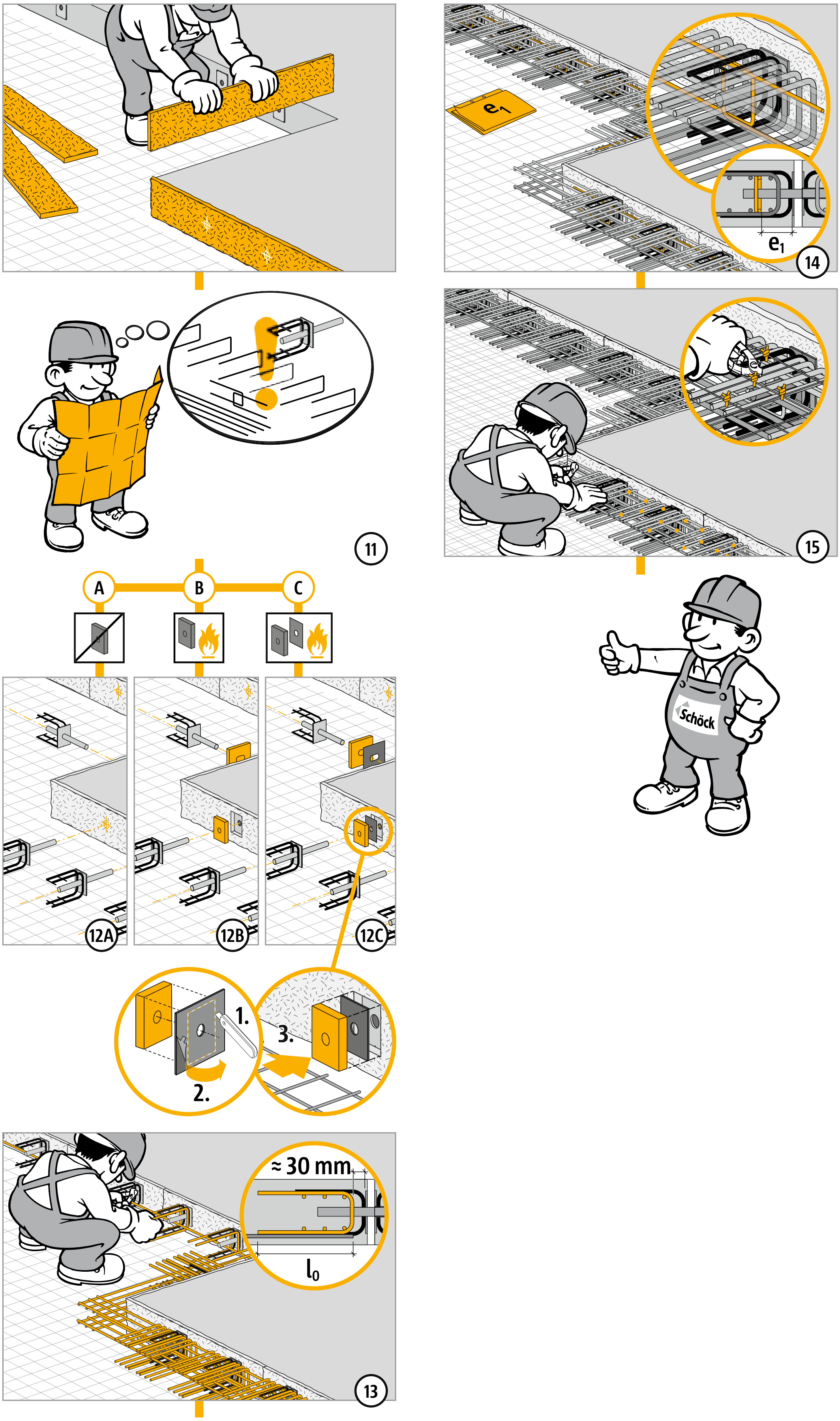
with:

- d_s - diameter of the suspended reinforcement in [mm]
- l'_i - effective anchoring length of the suspended reinforcement in the breakout cone
  - $l'_i = l_1 - (l_{ci} / 2) \cdot \tan 33°$
  - $l_{ci}/2$ - distance $A_{sx,i}$ from dowel of the suspended reinforcement considered
  - $l_1 = h / 2 + (0.5 \cdot h_b - d_h) - \xi \cdot d_s - c_{nom}$
  - $\xi = 3$ for $d_s \leq 16$ mm
  - $\xi = 4.5$ for $d_s > 16$ mm
  - h_b, d_h - dimensions of the Schöck Dorn type SLD-Q, see page 16 and 17
  - c_{nom} - concrete cover of the suspended reinforcement
- f_{bd} - design value of the bond resistance between reinforcing steel and concrete

Installation instructions



Installation instructions



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