

JORDAHL[®] double shear connectors



Technical information

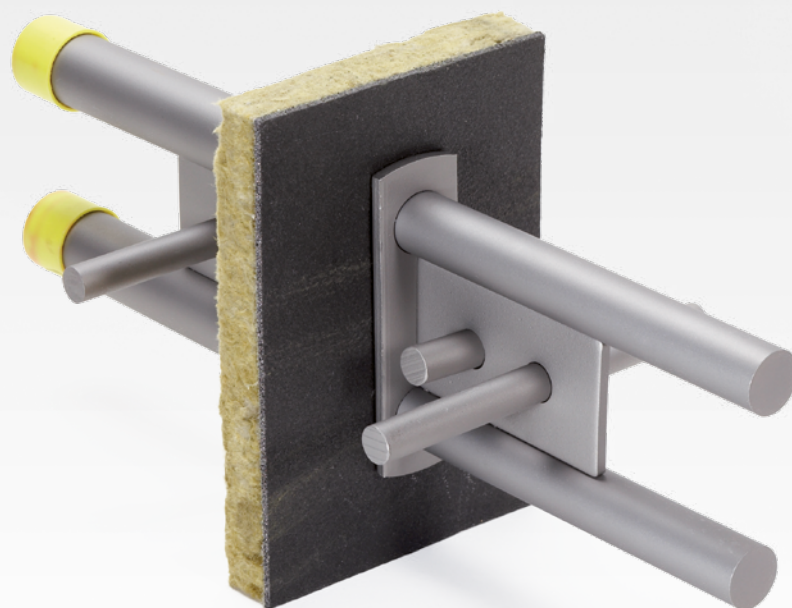
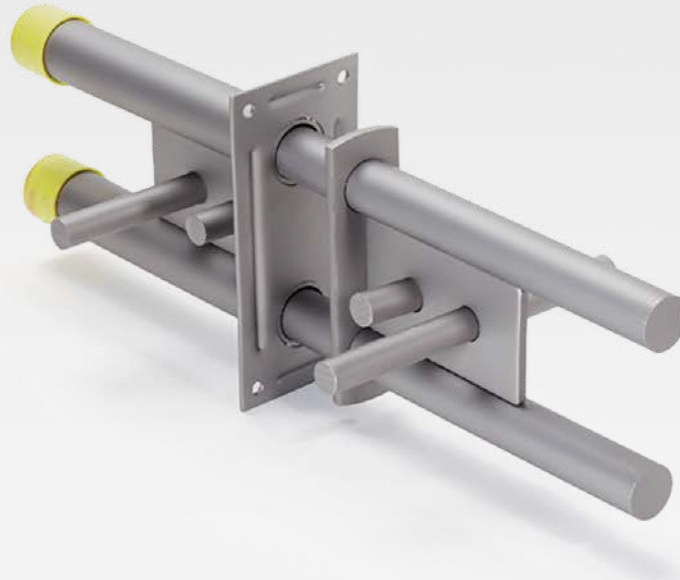


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JORDAHL® double shear connectors



Product description

The idea behind the development of double shear connectors was to ensure the transmission of high shear forces between concrete components. JORDAHL GmbH, which evolved from Deutsche Kahneisen Gesellschaft mbH, recognised the advantages of such a solution early on and introduced a corresponding product in Germany at the end of the 1980s under the brand name JORDAHL® double shear connector (JDSD). Today, double shear connectors are internationally accepted as a universal solution for shear force transmission across structural joints.

JORDAHL® double shear connectors have proven themselves in decades of use and are approved by the building authorities under the number Z-15.7-237. Development and production meet the requirements of DIN EN ISO 9001-2015. The excellent load-bearing behaviour has been tested and confirmed by leading institutes in Switzerland, the United Kingdom, Poland and Germany.

Material

All parts of the JORDAHL® double shear connectors are always made of stainless steel. The near-surface materials meet the requirements of corrosion resistance class (CRC) III or IV in accordance with building authority approval no. Z-30.3-6. This means that no further corrosion protection is necessary, even under a high chloride load, such as that associated with seawater or an industrial atmosphere.



Advantages

- High load-bearing capacity thanks to the bending-resistant design
- No explosive effects in concrete
- Optimal pressure distribution thanks to integrated shear dowels
- High-strength and corrosion-resistant material
- Copious freedom of movement
- Large joint widths up to 60 mm are permitted
- Uniform force transmission
- Low sliding pressure friction between dowels and sliding tubes
- Easy, fast and accurate installation
- Higher load-bearing capacity makes them cost-effective because a lower quantity is required per running metre or relative to the shear force being transmitted



Service

- Building-related consultation
- Efficient and cost-conscious planning
- Powerful and intuitive software
- Preparation of structural analyses

Areas of application

JORDAHL® double shear connectors for the safe transmission of high shear forces between concrete components

Double shear connectors from JORDAHL are used to transfer shear forces across structural joints and offer the greatest movement capacity in the longitudinal and transverse directions. In conventional joints, for example in ceilings, they can safely replace complex constructions consisting of individual dowels. Double shear connectors often offer a solution for designing expansion joints in the case of ceiling supports. Instead of brackets, they can safely transmit the shear forces across the joint between the components. They are also used as connecting elements in

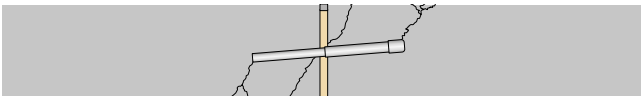
expansion joints of columns and beams, and between foundation concrete slabs. In general, they can also ensure shear force transmission in walls.

To cater for almost any requirement, the double shear connector JDSD is available in two versions:

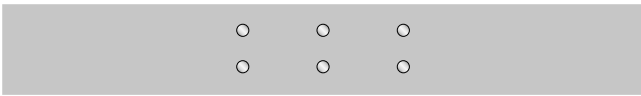
- Double shear connector JDSD for movement in the longitudinal direction
- Double shear connector JDSDQ for movement in the longitudinal and transverse directions

The shear dowel HED from H-BAU is suitable for structural connections.

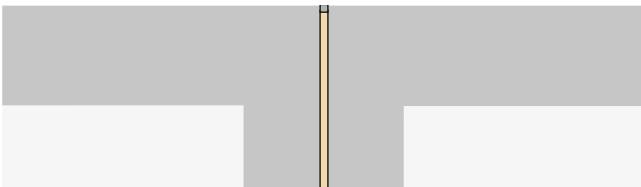
Conventional joint formation



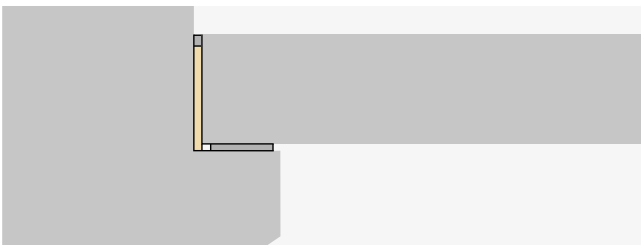
Ceiling with expansion joint and individual dowel



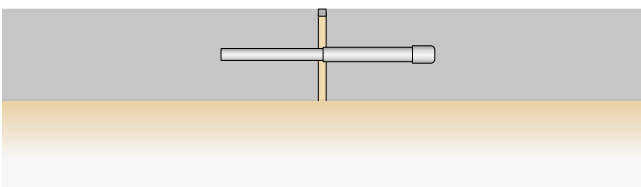
6 individual dowels



Double column

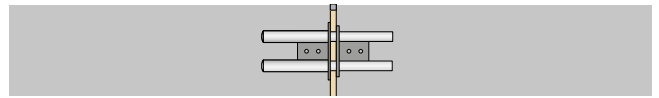


Ceiling support with a bracket

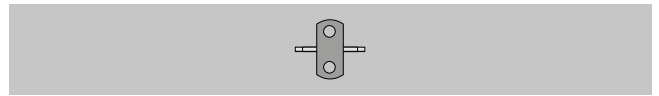


Foundation slab with individual dowel

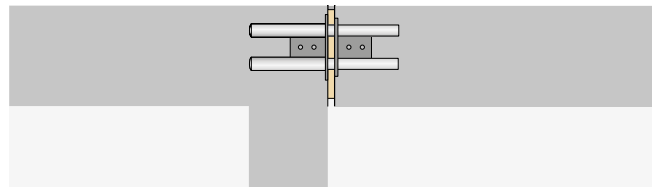
Joints with double shear connector JDSD



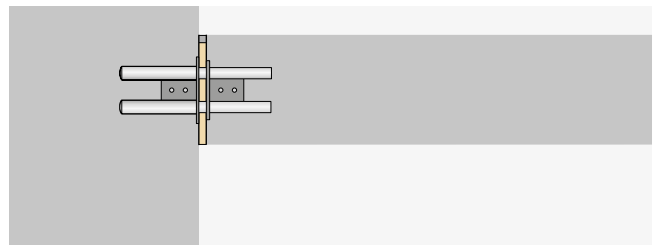
Expansion joint in a ceiling with JDSD



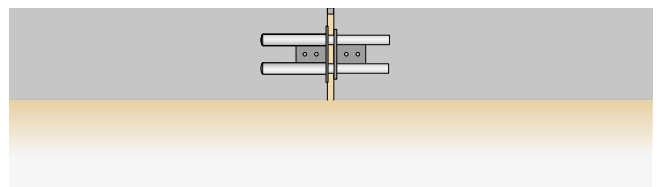
One JDSD can replace these individual dowels



At least one column can be omitted with this design



Ceiling support, bracket can be omitted



Expansion joint in a foundation with JDSD

Examples



JORDAHL® double shear connectors are highly stressable due to their bending-resistant design: they can be barely be deformed at all and so do not produce an explosive effect in the concrete. Carefully selected stainless steel materials ensure a long service life and excellent corrosion resistance.

Installation advantages

Using JORDAHL® double shear connectors eliminates the effort required to create the formwork for elaborate brackets, interlocked joints, double columns, and so on. The head plate of the sleeve enables fast and accurate installation. Simply nailing the sleeve to the formwork ensures that the dowel can be inserted later with an exact fit. The tear-resistant film protects the sleeve from penetrating concrete.



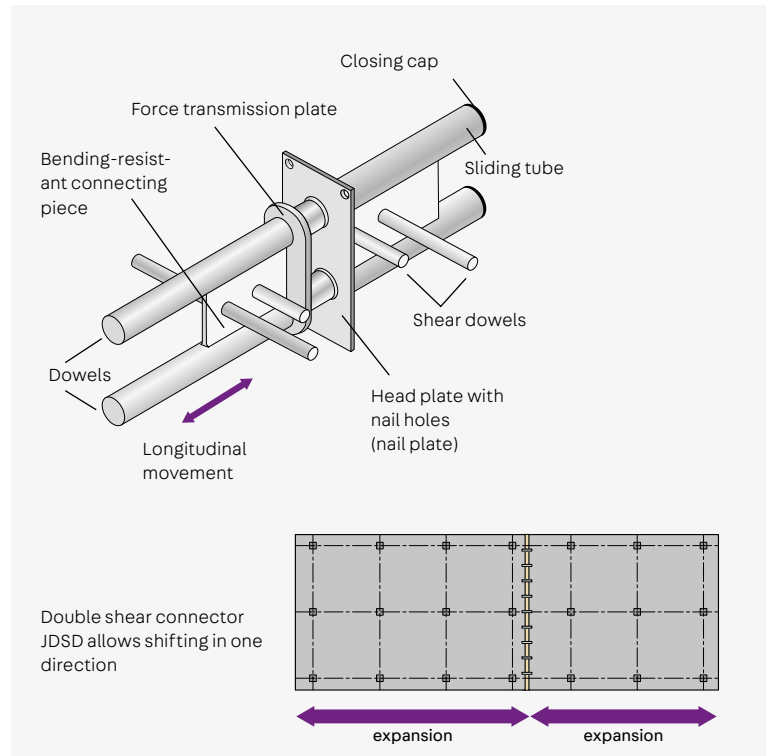
JDSD

JORDAHL® double shear connector JDSD for movements in the longitudinal direction

The double shear connector JDSD is a two-part shearing force connector consisting of a dowel element and a sleeve (sliding tube). To ensure expansion in the component, the pair of dowels are able to move in the longitudinal direction within the sleeve. This type is available in various standard sizes. It can withstand design loads of up to 996.5 kN and can be used for joint widths of up to 60 mm.

Application

JORDAHL® double shear connectors JDSD are the preferred choice for use in expansion joints of large-format slabs. They provide a form-fit solution between shear walls, between retaining walls, and in abutments and cantilever walls.



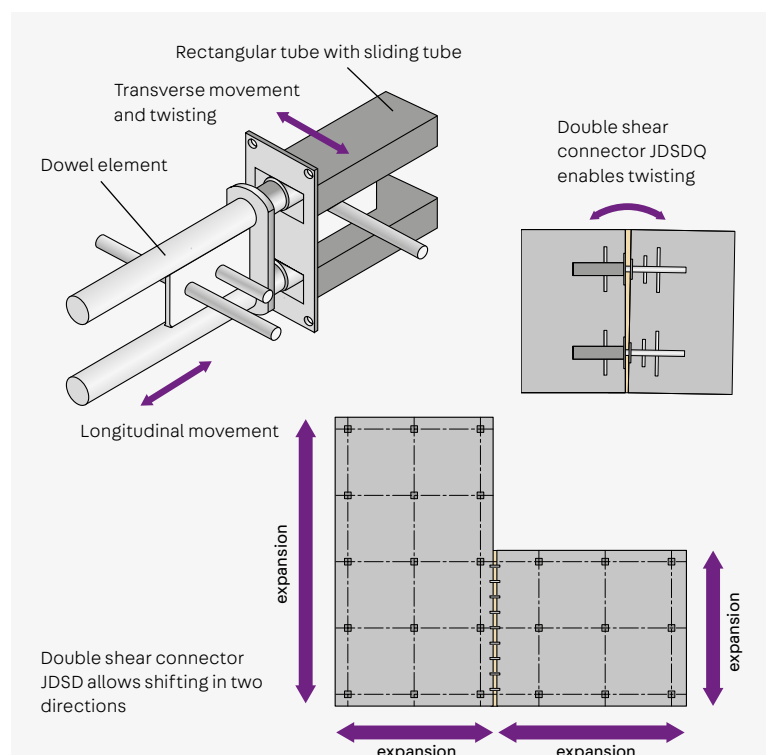
JDSDQ

JORDAHL® double shear connector JDSDQ for movements in the longitudinal and transverse directions

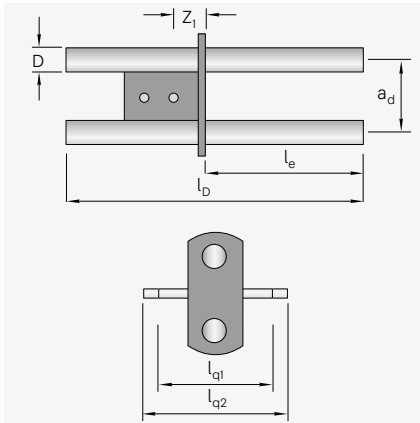
The double shear connector JDSDQ combines all the advantages of the double shear connector JDSD. In addition, the sliding tubes are guided transversely in rectangular tubes. This allows transverse movements and twisting - in addition to movements in the longitudinal direction of the dowel. This type is available in various standard sizes. It can withstand design loads of up to 896.8 kN and can be used for joint widths of up to 60 mm.

Application

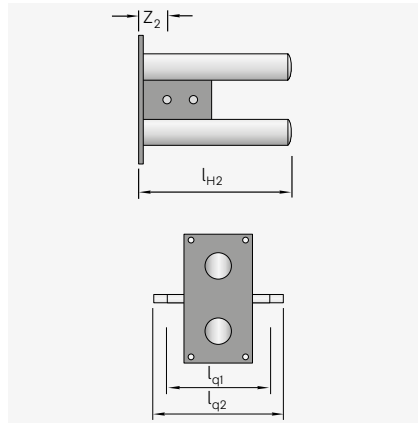
JORDAHL® double shear connectors JDSDQ are often used in the area of corners and recesses on concrete slabs. Movements occur there in two directions, with shearing forces having to be transmitted at the same time.



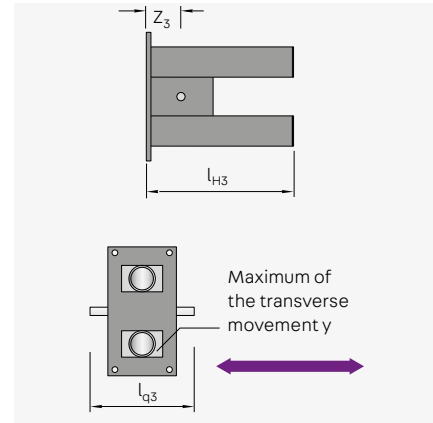
Technical data



Dowel element



Sleeve (sliding tube) JDSD



Sleeve (rectangular tube) JDSDQ

JDSD JDSDQ	Dowel diameter	Total length	Centre to centre distance of the dowels	Max. insertion length	Position of the shear dowel	Shear dowel length
	D	ld	ad	le	Z1	lq1/lq2
20 HF ¹⁾	14	250	40	120	31	50/110
25 HF	16	260	48	120	31	50/110
30 HF	18	280	50	130	31	50/130
45 HF	20	300	65	150	31	50/130
60 HF	22	340	75	150	33	50/150
90 HF	24	360	90	180	33	60/160
120 HF	30	400	100	210	34	80/170
130	35	470	105	260	34	80/170
150	42	550	120	270	34	80/210
400	52	660	160	330	70	130/300
450	65	690	180	360	80	130/300

For dowel element JDSD JDSDQ	Sleeve (sliding tube) JDSD mm			Sleeve (rectangular tube) JDSDQ mm			
	Sleeve length	Position of the shear dowel	Shear dowel length	Sleeve length	Position of the shear dowel	Shear dowel length	Max. transverse movement
	lH2	Z2	lq1/lq2	lH3	Z3	lq3	y
20 HF ¹⁾	120	28	50/110	–	–	–	–
25 HF	120	28	50/110	140	53	70	± 13
30 HF	135	28	50/130	160	53	70	± 12
45 HF	155	29	50/130	175	53	70	± 11
60 HF	155	31	50/150	175	56	120	± 10
90 HF	185	33	60/160	200	58	160	± 11
120 HF	210	36	80/170	235	58	170	± 20
130	265	36	80/170	275	59	170	± 18
150	275	41	80/210	305	54	170	± 10
400	335	70	130/300	350	64	300	± 13
450	370	80	130/300	400	89	300	± 27

¹⁾ Type 20 HF is only available in the form of connector JDSD 20 HF, which allows movement in the longitudinal direction

Sizing

Selecting the right double shear connector for the required load is a straightforward process because approval Z-15.7-237 shows what reinforcement is required in each case along with the associated rated resistances. A summary is presented on this page and the ones that follow.

You can select a connector directly from these tables without having to perform any further verifications or analyses. The max. rated resistance for $V_{Rd,S}$ and $V_{Rd,C}$ must not be exceeded when arranging the reinforcement according to the approval. Our software (see p. 18) will help you to find the optimum dowel size. Using this software, you can calculate the appropriate double shear connector for the local reinforcement conditions on the basis of the approval.

The decisive resistance for determining the size is the smallest rated resistance out of the load-bearing capacity of the steel and the load-bearing capacity of the concrete:

$$V_{Rd} = \min(V_{Rd,S}; V_{Rd,C})$$

$V_{Rd,S}$

Rated resistance for the load-bearing capacity of the steel while taking account of frictional forces in the longitudinal direction ($f_{\mu} = 0.9$) or the longitudinal and transverse directions ($f_{\mu}^2 = 0.81$)

$V_{Rd,C}$

Rated resistance for the load-bearing capacity of the concrete taking into account the additional reinforcement

$$V_{Rd,C} = \min(V_{Rd,ce}; V_{Rd,ct})$$

$V_{Rd,ce}$

Rated resistance to concrete edge failure (according to approval)

$V_{Rd,ct}$

Rated resistance to punching shear (according to approval)

Load-bearing capacity of the steel

Rated resistances for the load-bearing capacity of the steel $V_{Rd,S}$ in kN while taking account of frictional forces in the longitudinal or transverse direction ($f_{\mu} = 0.9$)

	JDSD JDSDQ	Joint width f mm				
		≤ 20	≤ 30	≤ 40	≤ 50	≤ 60
	20 HF	51.6	34.4	25.8	20.7	17.2
	25 HF	75.4	51.4	38.5	30.8	25.7
	30 HF	103.2	73.2	54.9	43.9	36.6
	45 HF	135.1	100.4	75.3	60.2	50.2
	60 HF	171.2	132.9	100.2	80.2	66.8
	90 HF	211.3	169.5	130.1	104.1	86.7
	120 HF	356.3	304.1	251.8	203.2	169.4
	130	260.0	228.6	197.3	165.9	138.4
	150	389.4	351.8	314.2	276.5	238.9
	400	619.1	572.5	525.9	479.4	432.8
	450	996.5	938.2	880.0	821.8	763.5

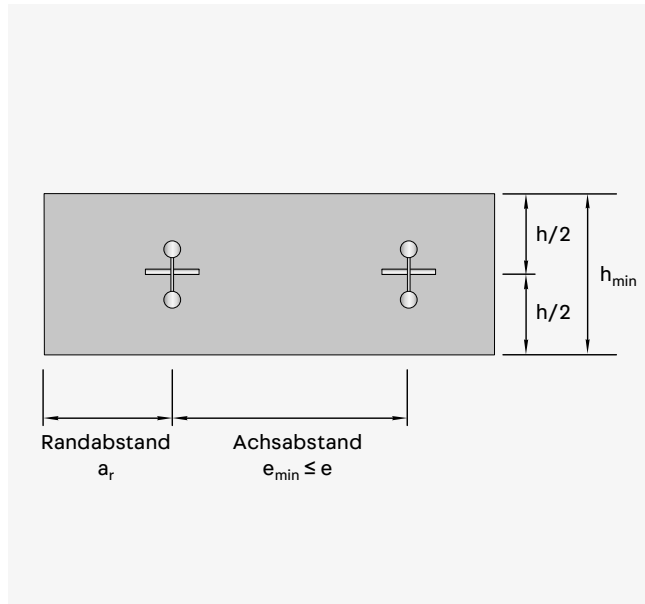
Rated resistances for the load-bearing capacity of the steel $V_{Rd,S}$ in kN while taking account of frictional forces in the longitudinal and transverse directions ($f_{\mu}^2 = 0.81$)

	JDSDQ	Joint width f mm				
		≤ 20	≤ 30	≤ 40	≤ 50	≤ 60
	25 HF	67.8	46.2	34.7	27.7	23.1
	30 HF	92.9	65.8	49.4	39.5	32.9
	45 HF	121.6	90.3	67.7	54.2	45.2
	60 HF	154.1	119.6	90.2	72.1	60.1
	90 HF	190.2	152.6	117.1	93.7	78.0
	120 HF	320.7	273.7	226.7	182.9	152.4
	130	234.0	205.8	177.5	149.3	124.5
	150	350.5	316.6	282.7	248.9	215.0
	400	557.2	515.3	473.3	431.4	389.5
	450	896.8	844.4	792.0	739.6	687.2

Minimum distances

Joint width f

The maximum distance that is permitted between the components being connected during use



Centre to centre distance e

With the specified centre to centre distance, the double shear connectors do not influence each other and their load-bearing behaviour corresponds to that of separately installed connectors. A reduction is possible, but requires additional verification/analysis.



Notes

In order to achieve a line-like support, we recommend that you do not exceed a centre to centre distance of $5h$ for the connectors.

Edge distance a_r

The edge distance a_r , according to the table below must be observed.

l_c = distance dimension for determining the basic control perimeter

h_{min} = minimum component thickness

e = centre to centre distance between the shear dowels

d_m = mean usable height

e_{min} = minimum distance between connectors

a_r = minimum edge distance

JSD JSDSQ	Distance dimension	Minimum component thickness	Required centre to centre distance ¹⁾ with h_{min} $e = 3.0 \times d_m + l_c$	Minimum distance between connectors with h_{min} $e_{min} = 1.5 \times h_{min}$	Minimum edge distance $a_r = 0.75 \times h_{min}$
20 HF ²⁾	6	16	> 43.5	24	12
25 HF	6	16 (17) ³⁾	> 43.5	24 (25.5) ³⁾	12
30 HF	6.5	18	> 49.5	27	13.5 (12) ⁴⁾
45 HF	6.5	20	> 55.5	30	15 (12) ⁴⁾
60 HF	6.5	24	> 66.5	36	18 (12) ⁴⁾
90 HF	8.5	24	> 68.5	36	18 (12) ⁴⁾
120 HF	10	28	> 82	42	21 (15) ⁴⁾
130	10	35	> 103	52.5	26.25 (15) ⁴⁾
150	10	45	> 132	67.5	33.75 (15) ⁴⁾
400	16	60	> 177	90	45 (23) ⁴⁾
450	16	65	> 196	97.5	48.75 (23) ⁴⁾

¹⁾ Minimum distance between connectors without the individual connectors influencing one another, with minimum permissible concrete covering and reinforcement according to approval

²⁾ Not available as JSDSQ

³⁾ Applies to JSDSQ

⁴⁾ Minimum edge distance for columns

Load-bearing capacity of concrete

The table below contains the rated resistances for the load-bearing capacity of the concrete for the double shear connectors JSD for a longitudinal or transverse movement. If the component thickness and the reinforcement presented (see p. 12) are observed, no separate verification/analysis of the load-bearing capacity of the concrete is required. The load-bearing capacity of the concrete must be analysed/verified:

- in the case of deviating reinforcement in the punching cone
- if the minimum centre to centre distances e are not observed
- if larger slab thicknesses are used

The JORDAHL® software is perfect for calculating other load cases, such as the combination of longitudinal and transverse movements. This enables you to plan your use of JORDAHL® double shear connectors JSD efficiently.

Rated resistances for the load-bearing capacity of the concrete $V_{Rd,c}$ in kN for a joint width ≤ 20 mm ¹⁾ taking into account the reinforcement according to approval ²⁾

JSD JSDQ ³⁾	Component thickness h mm	Concrete quality						
		C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
20 HF ⁴⁾	≥ 160	30.5	34.4	37.7	41.1	44.0	46.8	49.5
	≥ 180	44.8	50.5	51.6	51.6	51.6	51.6	51.6
	≥ 200	49.0	51.6	51.6	51.6	51.6	51.6	51.6
	≥ 220	51.6	51.6	51.6	51.6	51.6	51.6	51.6
25 HF	≥ 160	31.3	35.4	38.8	42.3	45.4	48.4	51.2
	≥ 180	45.8	51.7	56.8	61.9	66.4	69.2	71.7
	≥ 200	63.1	71.2	75.4	75.4	75.4	75.4	75.4
30 HF	≥ 180	45.2	51.0	56.0	61.0	65.4	69.5	72.0
	≥ 200	62.4	70.3	77.2	84.2	90.3	96.1	101.7
	≥ 220	82.4	92.8	101.9	103.2	103.2	103.2	103.2
45 HF	≥ 200	51.5	58.4	64.2	70.3	75.5	80.6	84.6
	≥ 220	69.7	78.9	86.8	95.0	102.0	108.8	114.3
60 HF	≥ 240	119.8	130.0	135.1	135.1	135.1	135.1	135.1
	≥ 240	121.7	137.9	149.5	157.3	164.5	171.1	171.2
	≥ 260	131.3	148.6	163.4	171.2	171.2	171.2	171.2
	≥ 280	140.0	158.7	171.2	171.2	171.2	171.2	171.2
90 HF	≥ 260	127.6	144.5	158.9	173.9	183.7	191.1	197.9
	≥ 280	136.9	155.3	170.9	187.4	200.7	208.7	211.3
	≥ 300	145.8	165.7	182.3	200.2	211.3	211.3	211.3
	≥ 320	148.3	168.5	185.5	203.9	211.3	211.3	211.3
	≥ 340	190.7	211.3	211.3	211.3	211.3	211.3	211.3
120 HF	≥ 280	133.9	152.0	167.2	183.4	196.4	204.3	211.6
	≥ 300	169.1	182.2	193.6	203.8	213.1	221.6	229.5
	≥ 320	172.4	195.6	208.9	219.9	229.9	239.1	247.7
	≥ 340	187.4	211.4	232.2	253.2	271.7	289.3	306.3
130	≥ 350	194.5	219.7	241.5	260.0	260.0	260.0	260.0
	≥ 400	260.0	260.0	260.0	260.0	260.0	260.0	260.0
150	≥ 450	309.9	352.2	387.7	389.4	389.4	389.4	389.4
	≥ 500	343.7	389.4	389.4	389.4	389.4	389.4	389.4
	≥ 550	376.3	389.4	389.4	389.4	389.4	389.4	389.4
400	≥ 600	525.5	598.6	619.1	619.1	619.1	619.1	619.1
	≥ 700	607.8	619.1	619.1	619.1	619.1	619.1	619.1
	≥ 800	619.1	619.1	619.1	619.1	619.1	619.1	619.1
450	≥ 650	579.6	661.8	729.6	777.3	812.7	845.2	875.4
	≥ 800	700.1	802.7	885.9	981.6	996.5	996.5	996.5
	≥ 950	815.9	938.2	996.5	996.5	996.5	996.5	996.5

¹⁾ In the case of the values highlighted in dark grey, the rated resistance for the load-bearing capacity of the steel (joint width ≤ 20 mm) has been reached while taking account of frictional forces in the longitudinal or transverse direction.

²⁾ The specified values only apply in conjunction with the associated reinforcement on page 14.

³⁾ For the purpose of using the JSDQ connector, the rated resistance for the load-bearing capacity of the concrete (see table) must be multiplied by the factor $f_{\mu} = 0.9$ for the combination of longitudinal and transverse movements to be on the safe side. The optimum connector size can be determined by using our software (see page 18).

⁴⁾ Type 20 HF is only available in the form of connector JSD 20 HF, which allows movement in the longitudinal direction.

Reinforcement JDSD and JDSDQ to be provided by you

JDSD JDSDQ	Component thickness h mm	Reinforcement to be provided by you					Reinforcement distances mm				
		A_{sx1}	A_{sx2}	A_{sy1}	A_{sy2}	Pos. 1	A_{sx}		A_{sy}	Pos. 1	
							l_c	a_1	$a_1 - a_{n+1}$	$b_1 - b_{n+1}$	$b_{stirrup}$
20 HF ¹⁾	≥ 160	4 Ø 10		2 Ø 10	2 Ø 10			30			
	≥ 180	4 Ø 12	–	2 Ø 12	2 Ø 12	1 Ø 6	60	32	–	50	120
	≥ 200	4 Ø 12	–	2 Ø 12	2 Ø 12	1 Ø 6	60	32	–	50	120
25 HF	≥ 160	4 Ø 10		2 Ø 10	2 Ø 10			30			
	≥ 180	4 Ø 12	–	2 Ø 12	2 Ø 12	1 Ø 6	60	32	–	50	120
	≥ 200	4 Ø 14	2 Ø 14	2 Ø 14	2 Ø 14	1 Ø 6	60	34	50	50	120
30 HF	≥ 180	4 Ø 12	–	2 Ø 12	2 Ø 12			32			
	≥ 200	4 Ø 14	2 Ø 14	2 Ø 14	2 Ø 14	1 Ø 8	65	34	50	50	140
	≥ 220	4 Ø 16	2 Ø 16	2 Ø 16	4 Ø 16	1 Ø 8	65	36	50	50	140
45 HF	≥ 200	4 Ø 12	–	2 Ø 12	2 Ø 12			32			
	≥ 220	4 Ø 14	2 Ø 14	2 Ø 14	2 Ø 14	1 Ø 8	65	34	50	50	160
	≥ 240	6 Ø 16	4 Ø 16	2 Ø 16	4 Ø 16	1 Ø 8	65	36	50	50	160
60 HF	≥ 240										
	≥ 260	6 Ø 16	6 Ø 16	2 Ø 16	6 Ø 16	1 Ø 8	65	36	50	50	180
	≥ 280	6 Ø 16	6 Ø 16	2 Ø 16	6 Ø 16	1 Ø 8	65	36	50	50	180
90 HF	≥ 260										
	≥ 280										
	≥ 300	6 Ø 16	6 Ø 16	2 Ø 16	6 Ø 16	1 Ø 8	85	36	50	50	180
120 HF	≥ 320										
	≥ 340	6 Ø 20	4 Ø 20	2 Ø 20	6 Ø 20		70	50			
	≥ 280	8 Ø 16	2 Ø 16	2 Ø 16	6 Ø 16	1 Ø 10	100	36	50	50	180
130	≥ 300	8 Ø 16	2 Ø 16	2 Ø 16	6 Ø 16	1 Ø 10	100	36	50	50	180
	≥ 320	6 Ø 20	6 Ø 20	2 Ø 20	6 Ø 20	1 Ø 10	100	50	50	50	200
	≥ 340	6 Ø 20	6 Ø 20	2 Ø 20	6 Ø 20	1 Ø 10	100	50	50	50	200
150	≥ 350	6 Ø 20	4 Ø 20	2 Ø 20	6 Ø 20	1 Ø 12	100	50	50	50	200
	≥ 400	8 Ø 20	4 Ø 20	2 Ø 20	6 Ø 20	1 Ø 12	100	50	50	50	250
	≥ 450	8 Ø 20	8 Ø 20	2 Ø 20	8 Ø 20	1 Ø 12	100	50	50	50	250
400	≥ 500	8 Ø 20	8 Ø 20	2 Ø 20	8 Ø 20	1 Ø 12	100	50	50	50	250
	≥ 550	8 Ø 20	8 Ø 20	2 Ø 20	8 Ø 20	1 Ø 12	100	50	50	50	250
	≥ 600	8 Ø 25	8 Ø 25	2 Ø 25	8 Ø 25	1 Ø 12	160	50	50	50	320
450	≥ 700	8 Ø 25	8 Ø 25	2 Ø 25	8 Ø 25	1 Ø 12	160	50	50	50	320
	≥ 800	8 Ø 25	10 Ø 25	2 Ø 25	8 Ø 25	1 Ø 12	160	50	50	50	320
	≥ 950	8 Ø 25	10 Ø 25	2 Ø 25	8 Ø 25	1 Ø 12	160	50	50	50	320

¹⁾ Type 20 HF is only available in the form of connector JDSD 20 HF, which allows movement in the longitudinal direction.

Pos.:

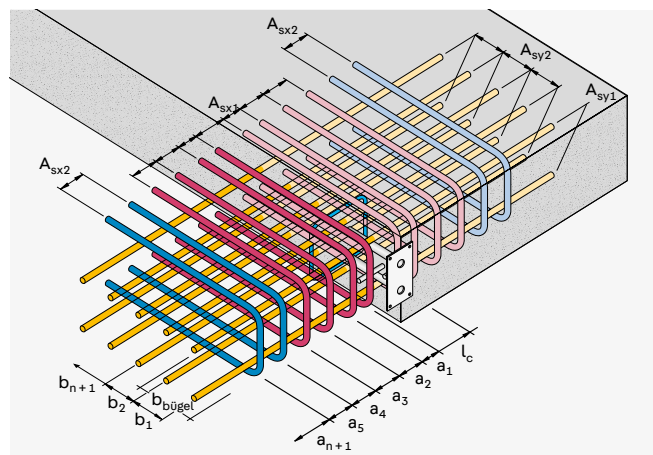
A_{sx1} = insert-stirrups on both sides as vertical suspension reinforcement

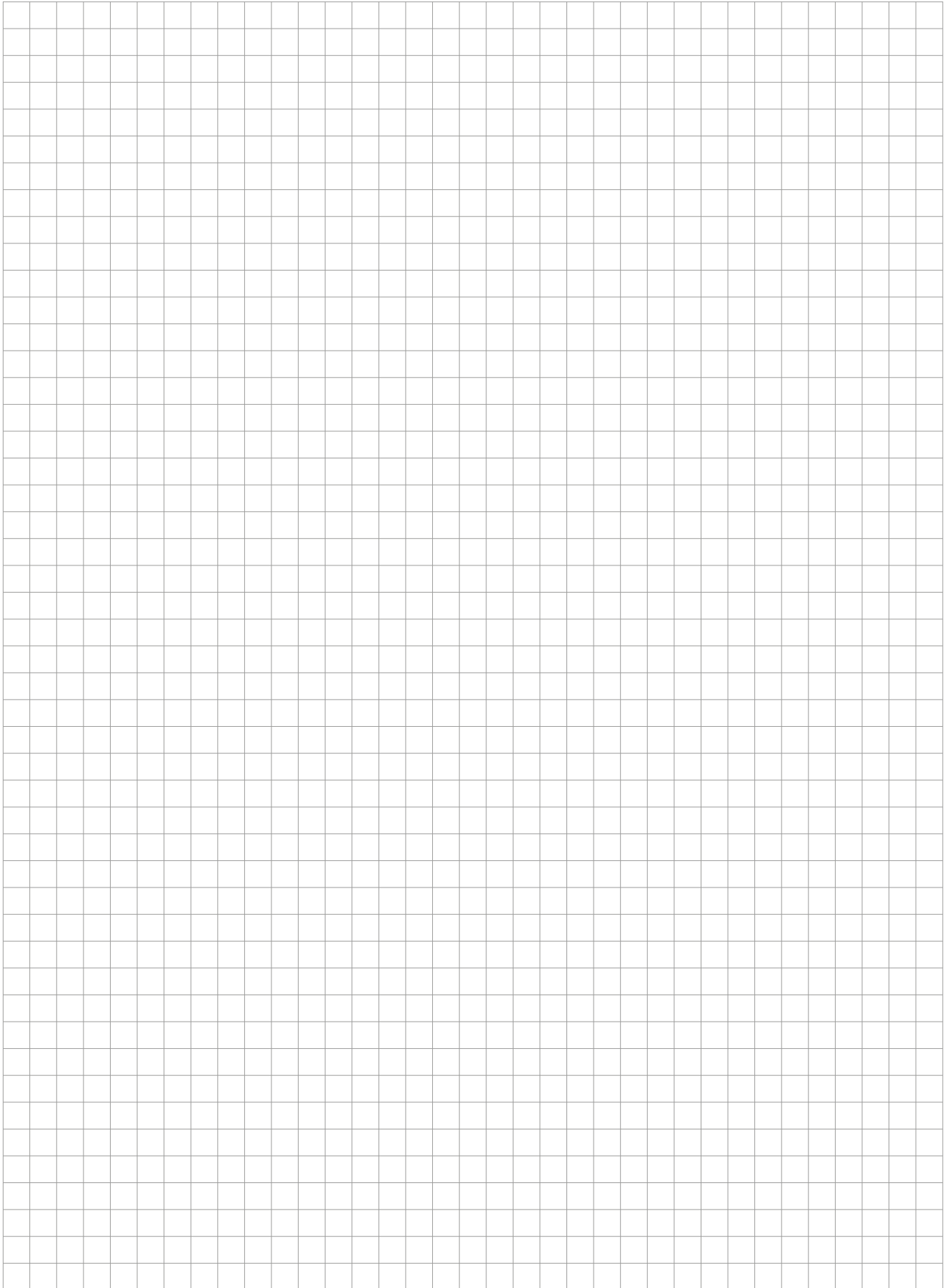
A_{sx2} = insert-stirrups on both sides in the punching shear area

A_{sy1} = horizontal reinforcement parallel to the edge

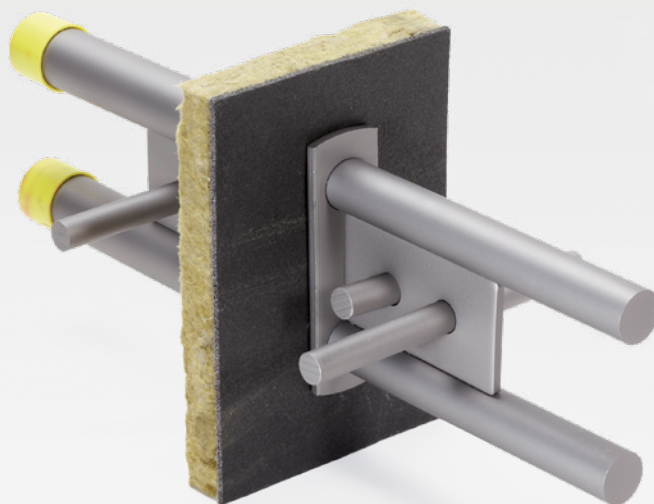
A_{sy2} = horizontal reinforcement top and bottom

The reinforcement specifications correspond to the approval.





Fire-protection collars JBRM



Product description

If components are subject to fire protection requirements in accordance with DIN 4102-2 or DIN EN 13501-2, JORDAHL® shear connectors with fire-protection collars have to be installed. The fire-protection collar is a mineral wool insulation plate with a coating on one side. The coating foams up in case of fire and completely seals the joint.

In terms of its dimensions, the rectangular fire-protection collar varies according to the shear connector sizes and is offered in thicknesses of 20 mm and 30 mm:

- JBRM 20 for construction joints up to 20 mm
- JBRM 30 for construction joints up to 30 mm
- Larger construction joints are possible by combining JBRMs

The maximum joint opening must not be more than 10 mm greater than the thickness of the fire-protection collar. The maximum joint width must not exceed 60 mm.

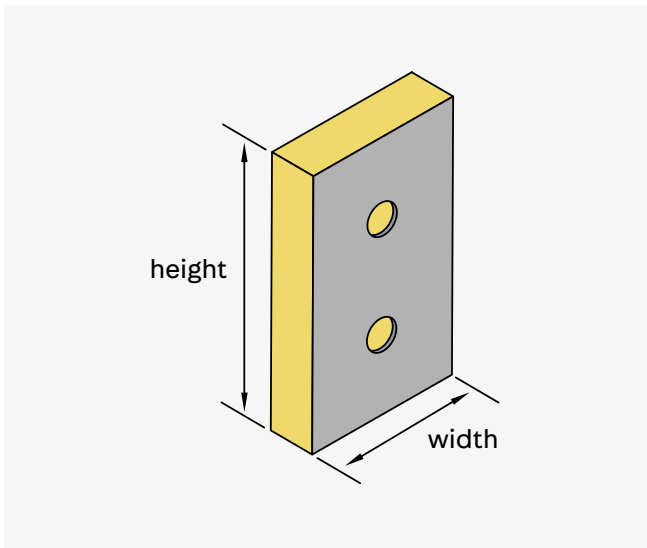
Fire resistance duration according to DIN EN 13501-2

The shear connectors can achieve the fire protection target of up to 120 minutes (R120) when used with the respective fire-protection collars! The only way to ensure the smoke tightness (E) and insulating effect (I), and a maximum fire resistance duration of up to REI 120 overall, is by cladding the entire construction joint with suitable mineral wool and fire-protection coatings from end to end. Even when the JORDAHL® shear connectors are fitted with fire-protection collars, the maximum achievable fire resistance duration of the construction joint depends on the insulation used and the fire protection measures between the respective connectors. Thus, the fire resistance duration (REI 30, REI 60, REI 90, REI 120) that can be achieved with the JORDAHL® shear dowels and fire-protection collars varies according to the ceiling thickness and the design of the construction joint.

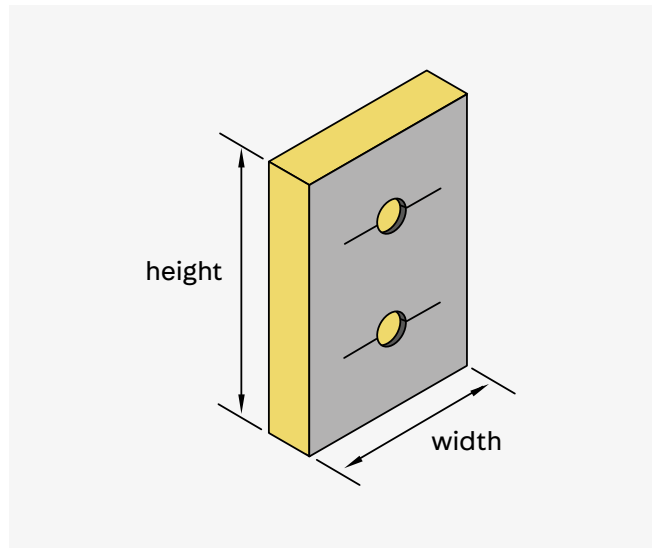


Example order for a JORDAHL® fire-protection collar for the JORDAHL® double shear connector JDSD 25 HF

Connector type	Connector size	Fire-protection collar	Joint width mm
JDSD	25 HF	JBRM	20



JORDAHL® fire-protection collar for JDSD

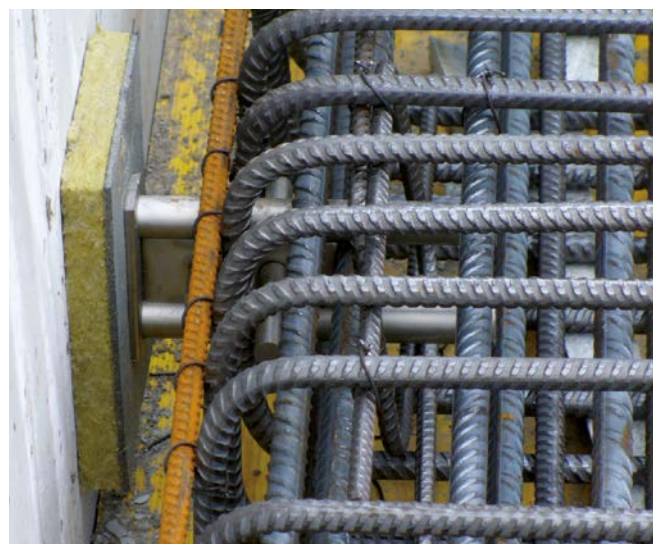
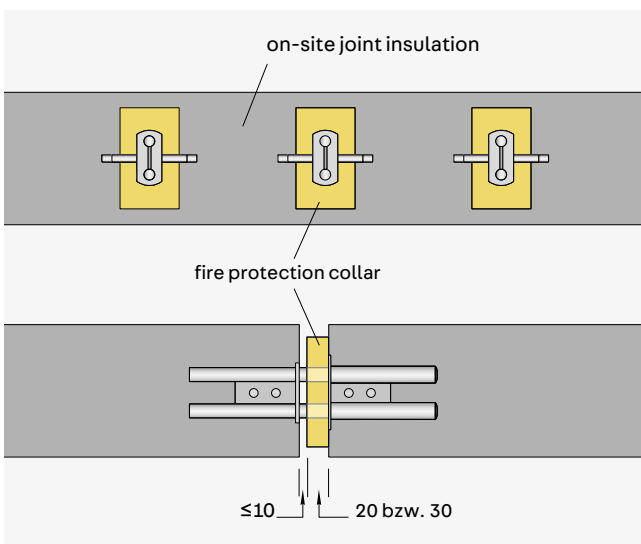


JORDAHL® fire-protection collar for JDSDQ

JORDAHL® fire-protection collar for JORDAHL® double shear connector

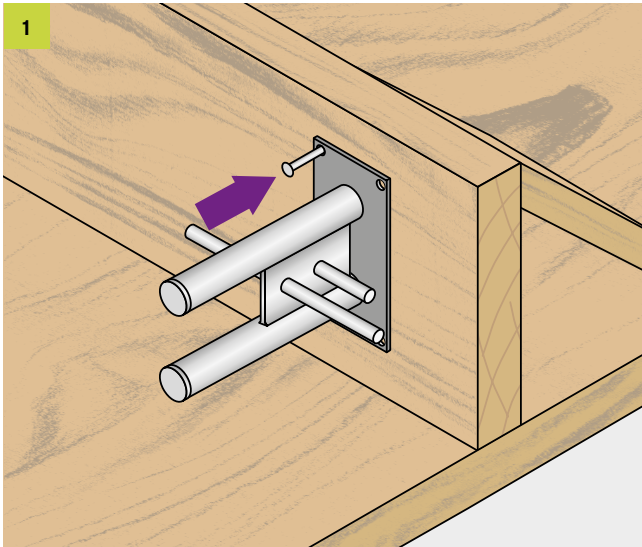
Connector type	Width/height mm
JDSD 20 HF	110/150
JDSD 25 HF	110/150
JDSD 30 HF	110/150
JDSD 45 HF	110/165
JDSD 60 HF	110/180
JDSD 90 HF	110/195
JDSD 120 HF	110/210
JDSD 130	120/220
JDSD 150	130/245
JDSD 400	150/295
JDSD 450	150/325

Connector type	Width/height mm
JDSDQ 25 HF	120/150
JDSDQ 30 HF	120/150
JDSDQ 45 HF	120/165
JDSDQ 60 HF	130/180
JDSDQ 90 HF	140/195
JDSDQ 120 HF	150/210
JDSDQ 130	150/220
JDSDQ 150	150/245
JDSDQ 400	200/295
JDSDQ 450	200/325



Installation

Installation is quick and ensures perfect fit:



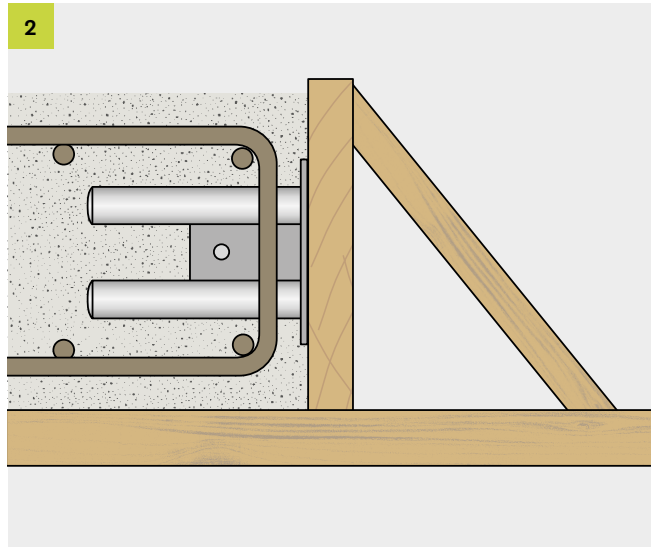
Step 1

The sleeves of the shear connectors are nailed to the formwork in accordance with the intended centre to centre and edge distances as per the reinforcement plan. Care must be taken to ensure that the sleeves are correctly oriented in relation to the direction of force.



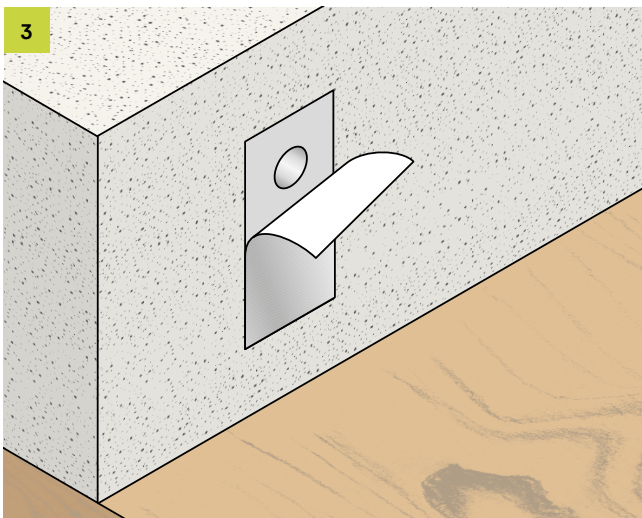
Notes

The sticker must not be removed.
It prevents concrete from penetrating.



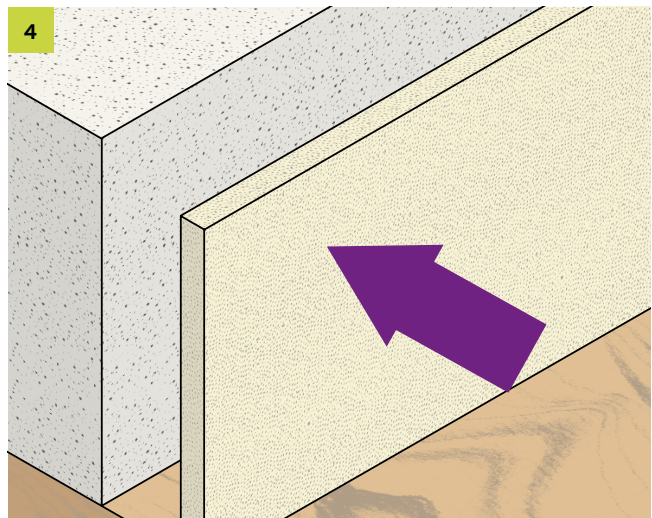
Step 2

The necessary hanger reinforcement of the construction section is laid in place as per the reinforcement plan and then covered with concrete.



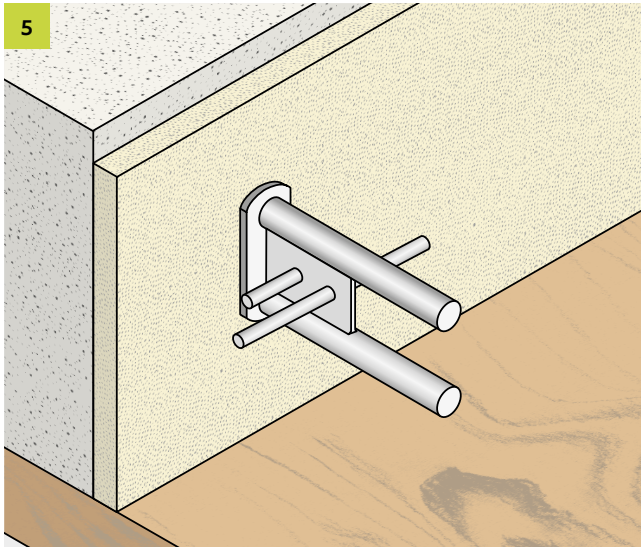
Step 3

After the formwork is stripped, the sticker is removed or pierced.



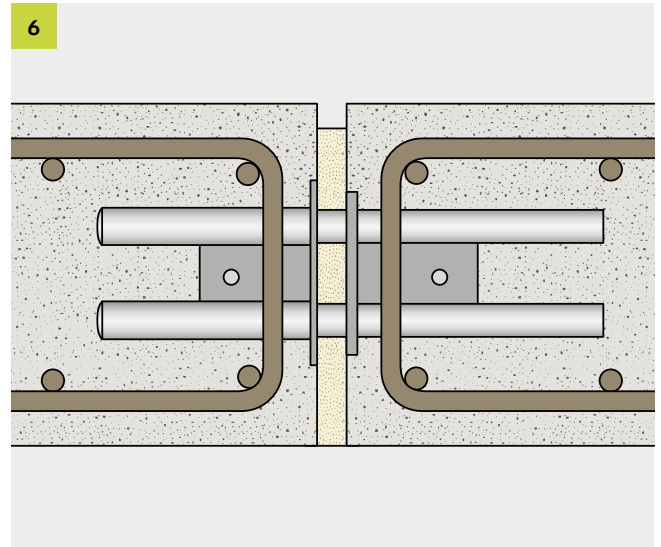
Step 4

The joint material is applied. When fire-protection collars (see p. 14) are used, a corresponding recess for the fire-protection collar must be cut into the joint material.



Step 5

The dowel element of the double shear connector JDSD or JDSDQ is pushed through the joint material into the sleeve. Shifting of the dowel during concreting is prevented by the clamping pressure point located in the sliding tube. This has no influence on the subsequent joint movement.



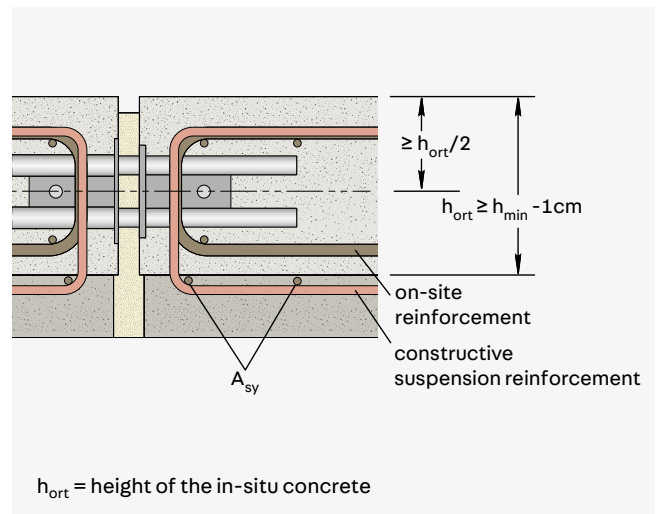
Step 6

The necessary hanger reinforcement of the second construction section is laid in place as per the reinforcement plan and then covered with concrete.

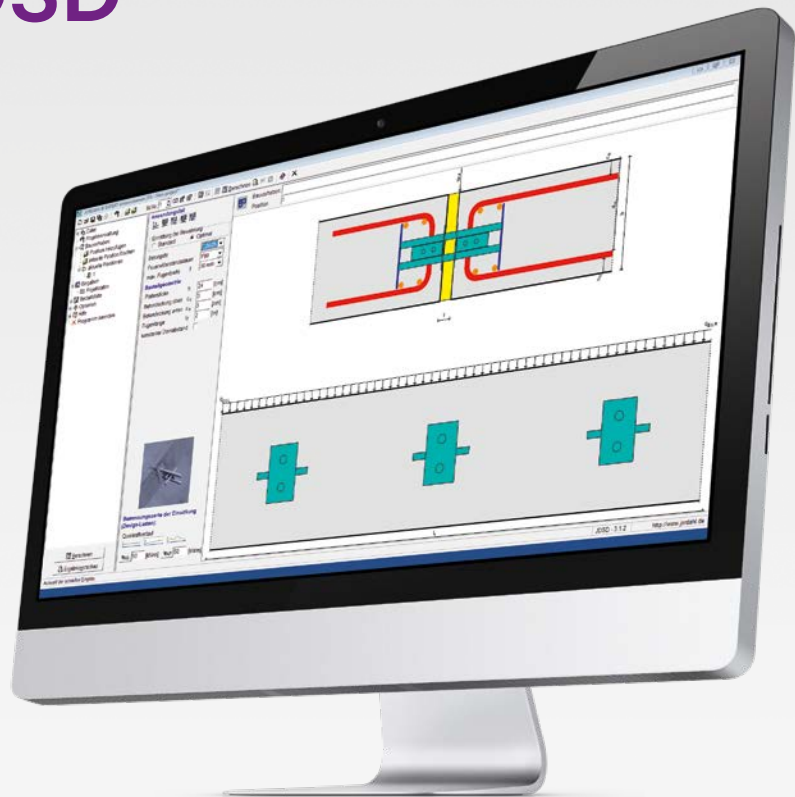
When installing double shear connectors in filigree slabs we recommend:

- Insertion of structural suspension reinforcement in the filigree slab (sized for $V_{Ed} / 3 \leq V_{Rd} / 3$)
- The thickness of the in-situ concrete must be greater than the minimum component thickness h_{min} minus 1 cm for the selected connector.
- The dimension $h_{ort}/2$ between the shear connector centre line and the top edge of the in-situ concrete must be half the thickness of the in-situ concrete part and half the minimum component thickness.
- The reinforcement A_{sy} can also be located outside the filigree slab if the in-situ concrete is sufficiently thick.
- The reinforcement to be provided by you (A_{sx} and A_{sy} top) is to be arranged in accordance with the approval or the sizing software.

Installation is performed according to the principle already described.



Software JDSD



The intuitive software from JORDAHL helps to determine the optimal double shear connector JDSD. This sizing is based on building authority approval no. Z-15.7-237.

For the longitudinal or transverse direction, the connectors are calculated as JDSD and for the longitudinal and transverse directions as JDSDQ.

Project management

Individual items and data can be entered and saved in the project management facility. Thus, a separate file containing the individual items of the construction project can be created for each project and revised again as required.



Advantages

- Most cost-effective solution is displayed first
- Simple modification of the reinforcement
- Quick and straightforward entry of influences (e.g. irregular line loads)
- All entries are displayed on one page
- Easy entry and structuring of projects
- The result is a verifiable static calculation




Software download

The JORDAHL® double shear connector JDSD/ JDSDQ software is available at www.pohlcon.com → Downloads → Digital


Application cases

In the JDSD planning software, you can initially choose between the following application cases.


Individual double shear connector

For the calculation of an individual double shear connector, e.g. in a downstand beam 

Pair of connectors: slab to slab / slab to wall

For the calculation of a downstand beam or a beam with two double shear connectors 

Row of connectors: slab to slab / slab to wall

For connecting a slab to another slab or a wall, with more than one double shear connector 

Calculation parameters

After you have done that, enter the calculation parameters listed below in the relevant entry fields.

- Concrete quality
- Fire resistance duration
- Joint width
- Slab thickness or wall thickness
- Concrete cover
- Joint length or length of beam or width of column
- Constant connector distance

Load parameters

For the different application cases, the load is entered differently as the design value of the influence. Depending on the case, you can choose between the listed load types.

Individual double shear connector

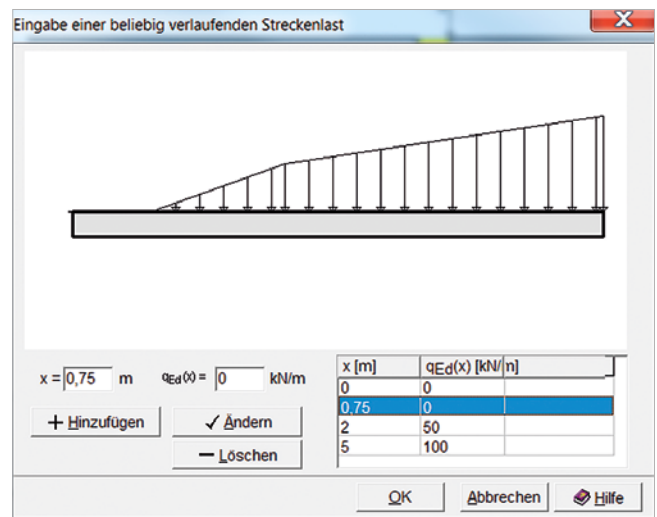
- Load entered as a point load $V_{Ed,p}$ in kN

Pair of connectors

- Load entered as a design value q_{Ed} in kN/m
- Constant line load (constant shear force)
- Straight line load (shear force with different initial and final loads)

Row of connectors

- Constant line load (constant shear force)
- Straight line load (shear force with different initial and final loads)
- Any kind of line load (A separate window appears in which any line load can be entered by specifying the respective coordinates and the respective load value.)



Entry of any kind of line load



JORDAHL consultation

We offer comprehensive consulting and development services for our products.

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Our team is very easy to reach:

T +49 30 68283-314
 technik-jordahl@pohlcon.com

Calculation

After entering all the required calculation parameters, you can start the calculation. All the connector types that could be used for this load case are marked with a green check mark. The most economical connector is marked. This proposal is based on the best price/performance ratio of the available double shear connectors. In the selection window, the quantity of connectors and the degree of utilisation for the analyses are displayed:

- Load-bearing capacity of the steel η_s
- Punching shear η_{ct}
- Concrete edge failure η_{ce}

Connectors that cannot be used for this design case are marked with a red cross. The reason is noted in the Remarks column.

By clicking in the view window, you can copy each of the views as a sketch to the clipboard, save them in a file (*.emf, *.bmp, *.jpg) or display them in full-screen mode. A DXF export of the reinforcement or the connector can also be performed.

After performing the calculation, you can change the reinforcement manually using the "BSt" button.

Printout of results

The result preview is structured as a structural analysis sheet and includes:

- Input data
- Load
- Type and quantity of the selected double shear connector
- The required and existing edge and centre to centre distances
- Reinforcement ratio
- Required reinforcement cross-sections A_{sx} , A_{sy} and pos. 1
- Rated resistances for the selected double shear connector
- Connector utilisation/degree of utilisation of the load-bearing capacities



Data export

The results can be exported in the file formats *.emf, *.bmp, *.jpg or *.txt. The reinforcement displayed on the second page should be exported in DXF format or via the clipboard. The connector views can likewise be exported in DXF format. The individual images can also be copied via the clipboard.

The JDSD software makes it possible to maintain a list of requirements for selected double shear connector items within a construction project.



DWG download

The JORDAHL® double shear connectors JDSD/JDSDQ are available for download as a view, section and plan view in DWG format in the CAD library at: www.pohlcon.com/downloads

Tender texts

Free tender texts for your specifications

Tender texts are a key part of the work performed by planners, architects and construction engineers. We want to make it as easy as possible for you to compile the tender texts for your specifications. That is why we provide you with ready-made tender texts for our complete range of products. This will make it even easier and faster for you to apply for construction projects.

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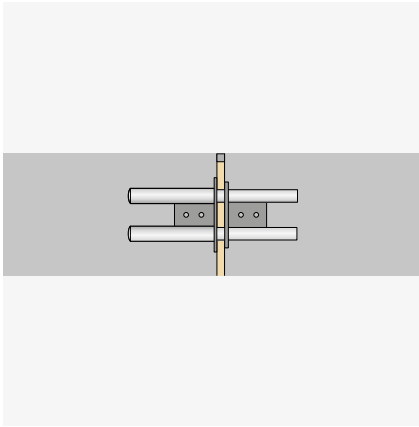
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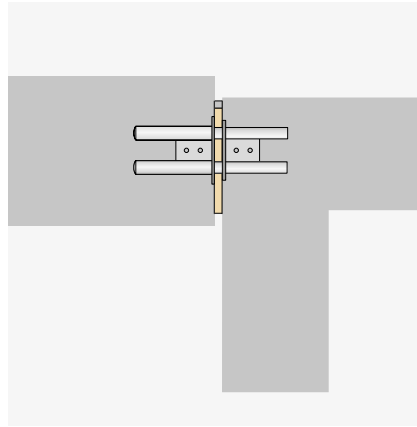


Application examples



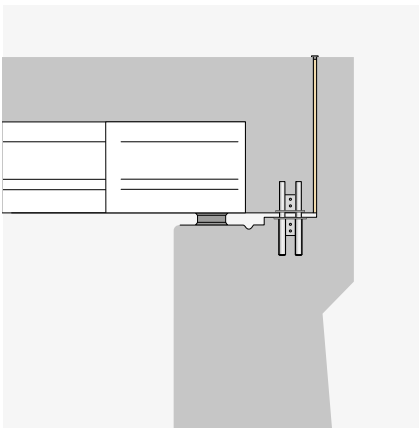
Slab-slab connections*

Large foundation slabs and ceilings have expansion and construction joints across which shear forces must be transmitted. Double shear connectors absorb these loads and reduce the amount of shifting caused by uneven settling. If adjacent sections are of different sizes, shifts occur in two directions. In such situations, the double shear connector JDSDQ - which allows transverse movement - should be used.



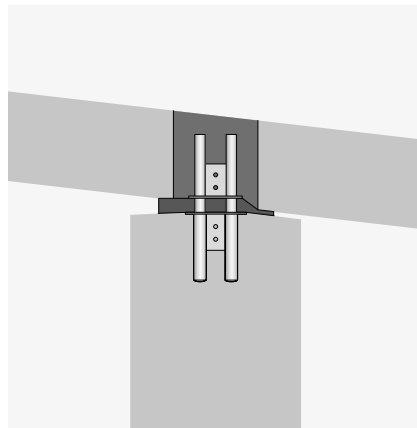
Slab-beam-column connection*

In long buildings, separation by means of structural expansion joints is often necessary. Subdivision of the building parts traditionally requires a column before and after the expansion joint. These are called double columns. The use of double shear connectors eliminates the need for one of the supports. This cuts costs, reduces the construction time and increases the floor space.



Connection in bridge abutments*

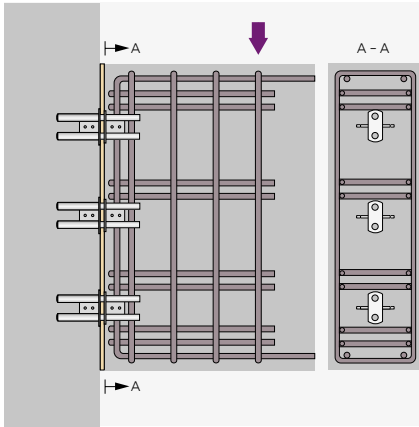
Double shear connectors are used as connecting pieces and for alignment between the bridge support structure and bridge abutment. This makes installation much easier, and the double shear connectors allow the road surface to be subsequently raised for bearing replacement.



Connection between precast element and in-situ concrete*

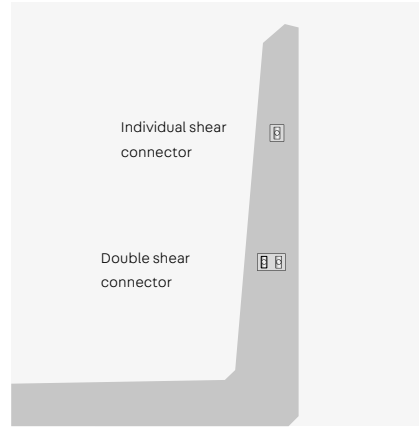
At the end point of the Eurotunnel between Dover and Calais, double shear connectors are used as connecting pieces between in-situ concrete load-bearing walls and precast ramp slabs. The ramps lead the cars from the bridges to the shuttle trains at the tunnel.

*Illustration/drawing with no reinforcement or with incomplete reinforcement



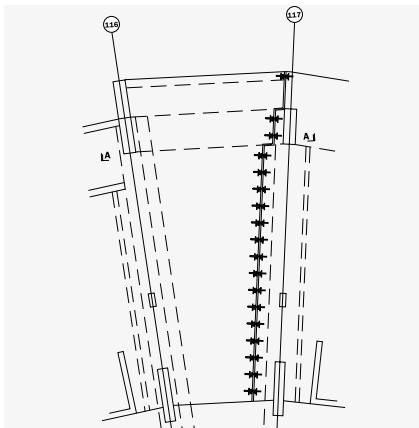
Column-beam connection

For this connection, double shear connectors can also be arranged one above the other. A possible arrangement of the reinforcement is shown in the illustration.
 (The reinforcement in the column must be verified by you).



Slab-parapet connection*

The use of shear dowels in the vertical joints of parapets is a simple and cost-effective way of connecting sections together. Double shear connectors also allow some twisting in the joints without reducing the horizontal shear capacity.



Beam-slab connection*

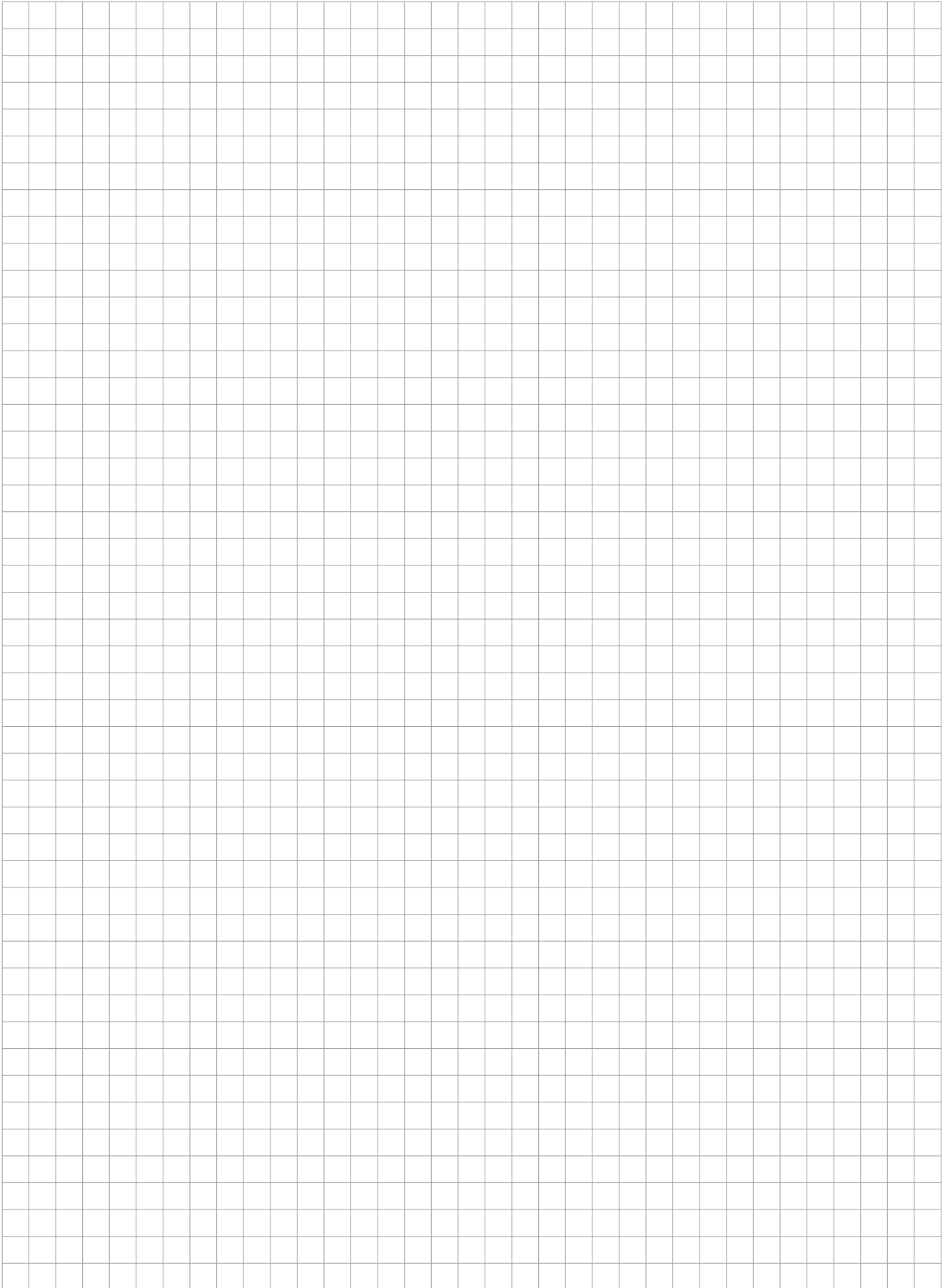
In stadium construction, for example, shear connectors offer a cost-saving and simple way of transferring shear forces into the columns from the points where they occur between grandstand slabs and beams. From an architectural point of view, they also represent an elegant alternative to double frames and bracket supports.

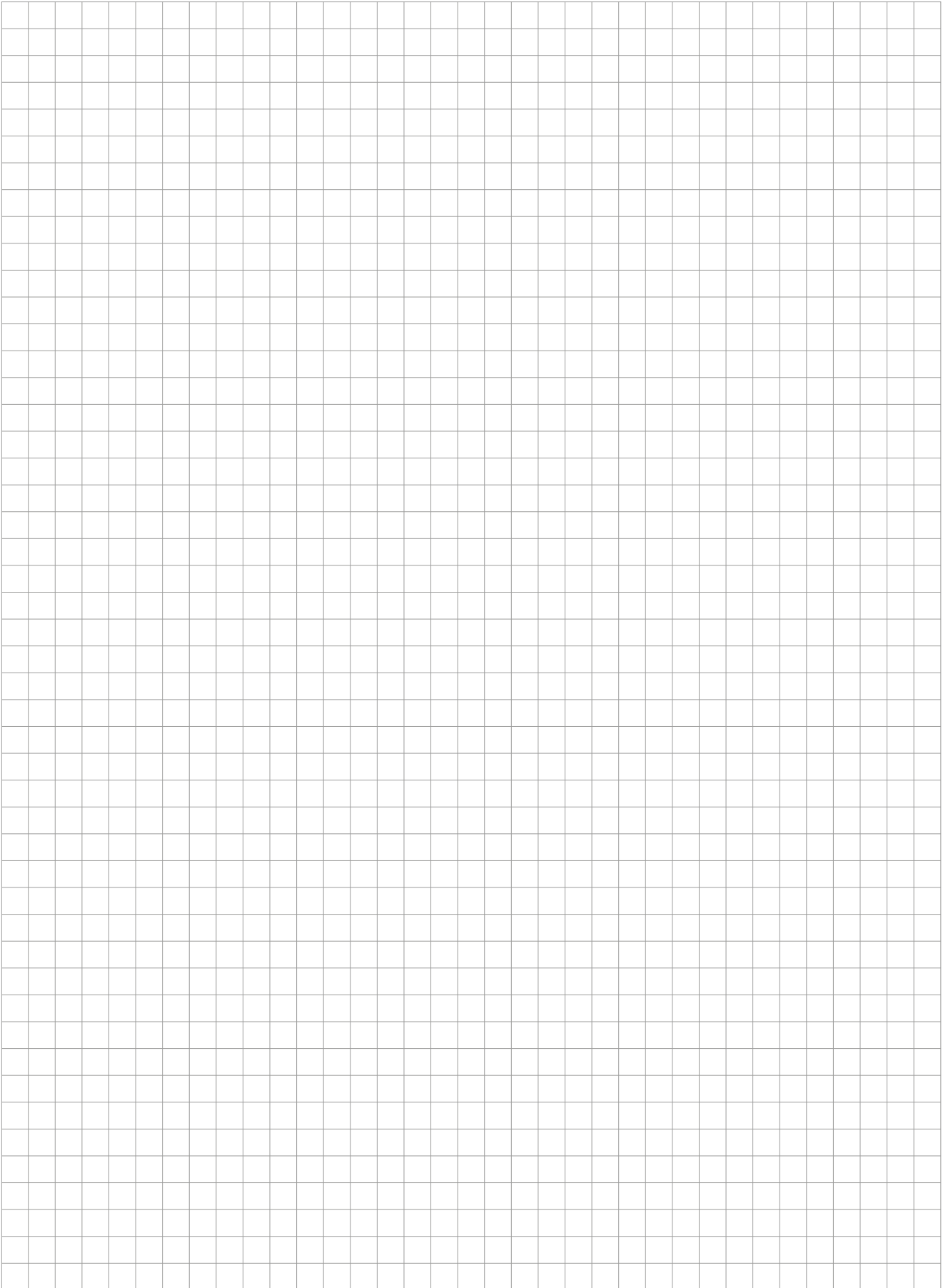


Connection of grandstand slabs

JORDAHL® double shear connectors connect grandstand elements safely and efficiently.

*Illustration/drawing with no reinforcement or with incomplete reinforcement





Our synergy concept for your benefit

With us, you benefit from the collective experience of three established manufacturers, who combine products and expertise in a comprehensive range. That is the PohlCon synergy concept.



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Our extensive network of consultants is available to answer all your questions about our products on site. From planning to use, you can enjoy personal support from our qualified employees.



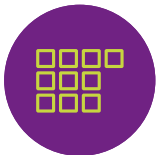
Digital solutions

Our digital solutions provide targeted support in planning with our products. From tender texts to CAD details and BIM data, right through to modern software solutions, we offer customized support for your planning process.



7 fields of application

We think in terms of holistic solutions. This is why we have combined our products into seven fields of application, where you can benefit from their synergy and the overall PohlCon product range.



10 product categories

In order to find the right product in our extensive range even faster, we have divided our products into ten product categories. This way you can navigate clearly and precisely between our products.



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