

HALFEN HLB LOOP BOX

TECHNICAL PRODUCT INFORMATION



HALFEN HLB LOOP BOX

HLB 16-E

CONCRETE



HALFEN
YOUR BEST CONNECTIONS

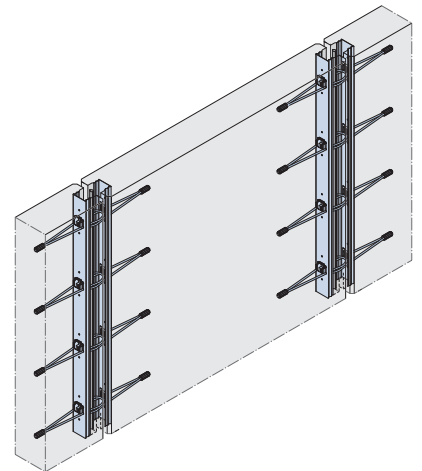
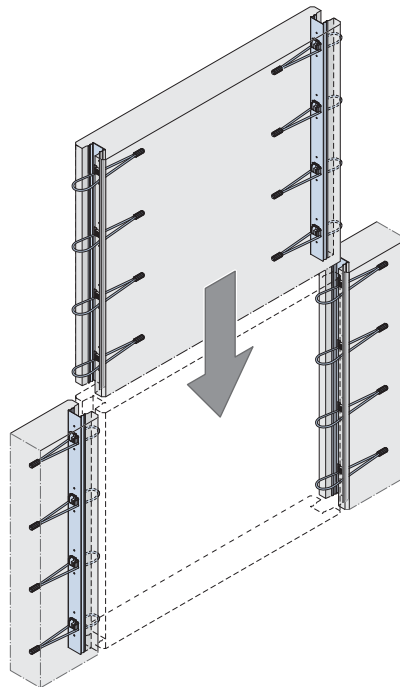
HALFEN HLB LOOP BOX

Introduction

Economical solutions with HALFEN HLB Loop Box



- Sturdy steel case - ensures stability when nailing to the formwork and during concreting
- Solid steel cover - the HLB Loop Box element can be glued to steel formwork
- Pre-punched nail holes for easy fixing to the formwork
- The loops pop up automatically - time saving: no rebending is required
- Flexible wire loops can spring back during setting up - closing a gap can be easily carried out
- Officially approved system - guarantees reliability of the design
- Ideal product dimensions, the HLB Loop Box elements are packed in standard euro-pallet dimensions - advantageous for logistics and storage
- HLB Spacer (foam recess body) used as modules for interspaces - can be simply cut to length using a common cutter or sharp knife and allow flexible and quick assembly



HALFEN HLB LOOP BOX

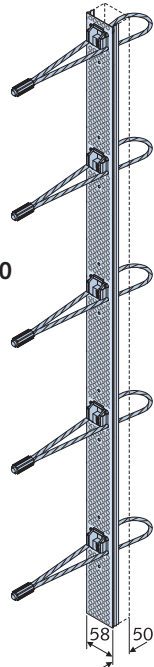
Product overview

HLB Loop Box - The Complete Range

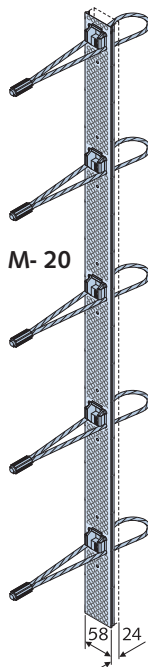
HLB M

Multi Loop Box
→ Pages 4-9
for load bearing
or constructive
junctions

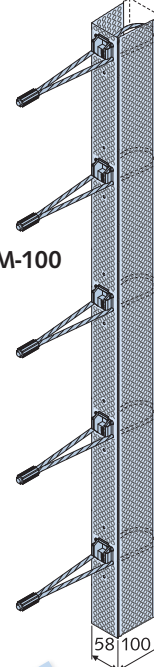
HLB M- 50



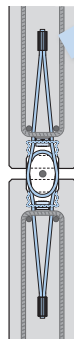
HLB M- 20



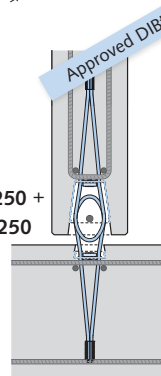
HLB M-100



HLB M- 50/250
→ Pages
6-7

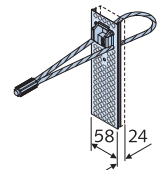


HLB M- 20/250 +
HLB M-100/250
→ Pages
8-9



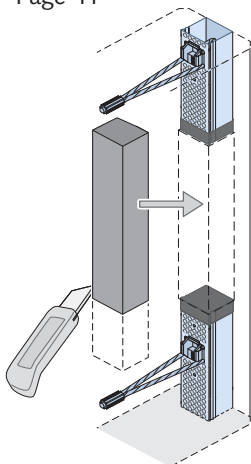
HLB S

Single Loop Box
→ Page 10
for constructive
junctions



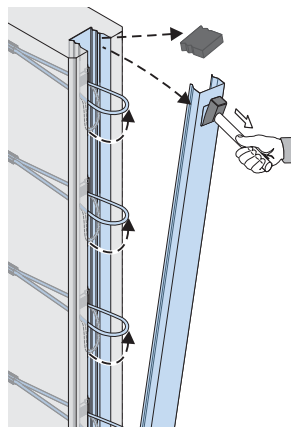
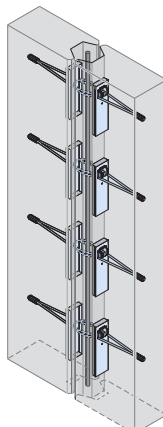
HLB Spacer

→ Page 11



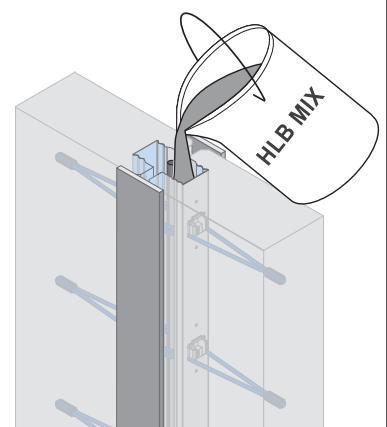
HLB Application

→ Pages 12-15



HLB Mix

→ Page 16



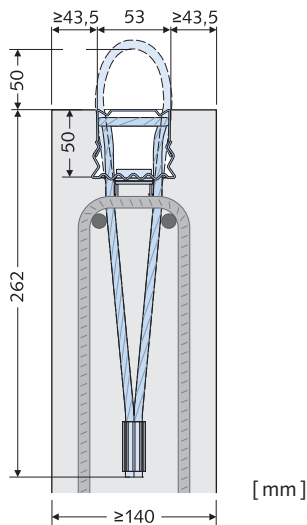
HALFEN HLB LOOP BOX

Product description

HLB M Multi Loop Box

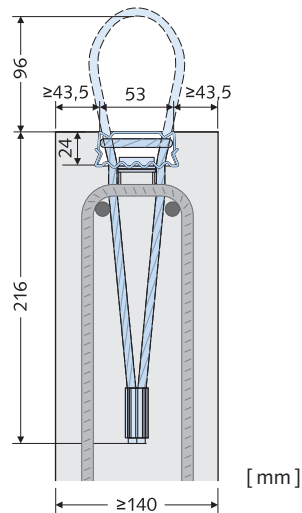
for the junction between precast concrete elements under transverse loads perpendicular and parallel to the joint

HLB M- 50



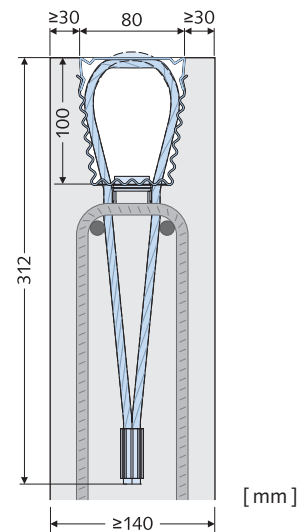
HLB M- 50/250 officially approved by DIBt: → see Pages 6-7

HLB M- 20



HLB M- 20/250 in combination with HLB M-100/250 officially approved by DIBt: → see Pages 8-9

HLB M-100



Standard gap width: 20 mm

Installation dimensions → Pages 14-15

Directives for installation → Pages 14-15

Notes for the constructive load bearing behaviour → Pages 12-13

Materials:

Casing: steel, galvanised; profiled back, with pre-punched nail holes; cover with pre-punched opening for removing after striking the formwork

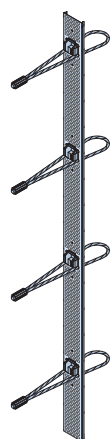
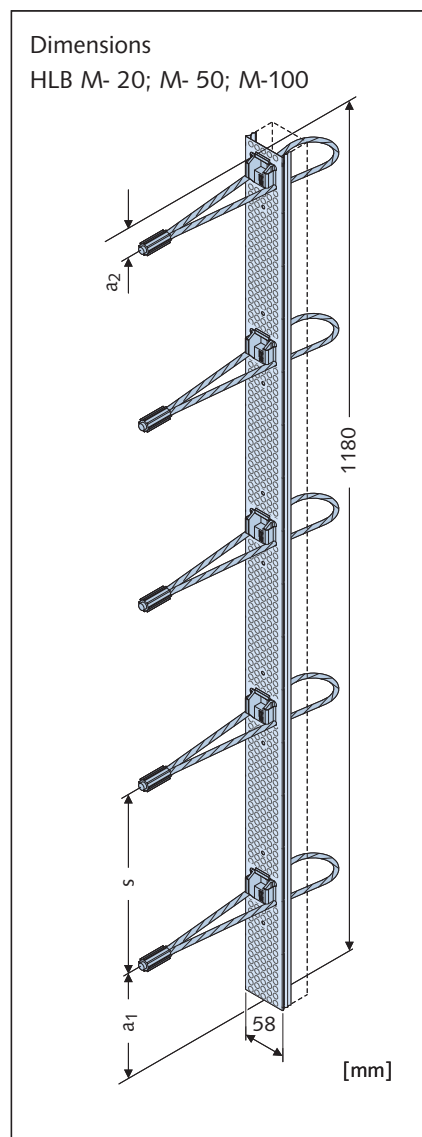
Steel wire loop: high strength, galvanised; steel ferrule

HALFEN HLB LOOP BOX

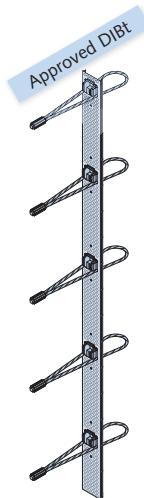
Product description

HLB M Multi Loop Box

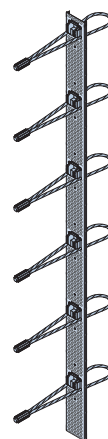
Type selection



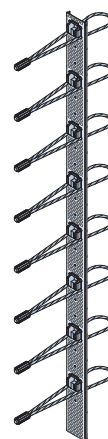
s = 300 mm
4 Loops



s = 249 mm
5 Loops



s = 199 mm
6 Loops



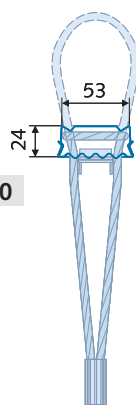
s = 143 mm
8 Loops

Product range HALFEN HLB M Multi Loop Box

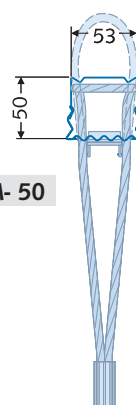
Item name	Article no.	No. of loops	s [mm]	a ₁ [mm]	a ₂ [mm]	Weight [kg]	Packing unit [pieces]
HLB M- 20/300	0058.030-00003	4	300	175	105	1.5	80
HLB M- 20/250	0058.030-00004	5	249	133	51	1.7	80
HLB M- 20/200	0058.030-00005	6	199	133	52	1.8	80
HLB M- 20/150	0058.030-00006	8	143	133	46	2.1	80
HLB M- 50/300	0058.040-00003	4	300	175	105	1.8	60
HLB M- 50/250	0058.040-00004	5	249	133	51	1.9	60
HLB M- 50/200	0058.040-00005	6	199	133	52	2.1	60
HLB M- 50/150	0058.040-00006	8	143	133	46	2.4	60
HLB M-100/300	0058.050-00003	4	300	175	105	2.5	40
HLB M-100/250	0058.050-00004	5	249	133	51	2.6	40
HLB M-100/200	0058.050-00005	6	199	133	52	2.8	40
HLB M-100/150	0058.050-00006	8	143	133	46	3.0	40

Order example for HALFEN Loop Box:

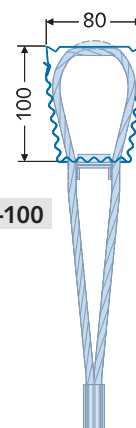
Product group - Type **HLB M-100 / 250**
 Loop Box size
 Nominal spacing of the loops [mm]



HLB M- 20



HLB M- 50



HLB M-100

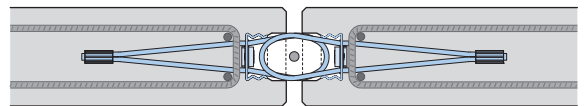
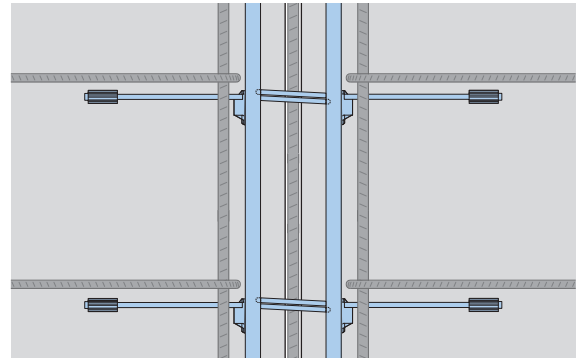
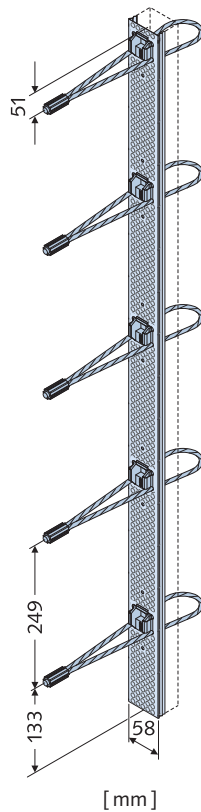
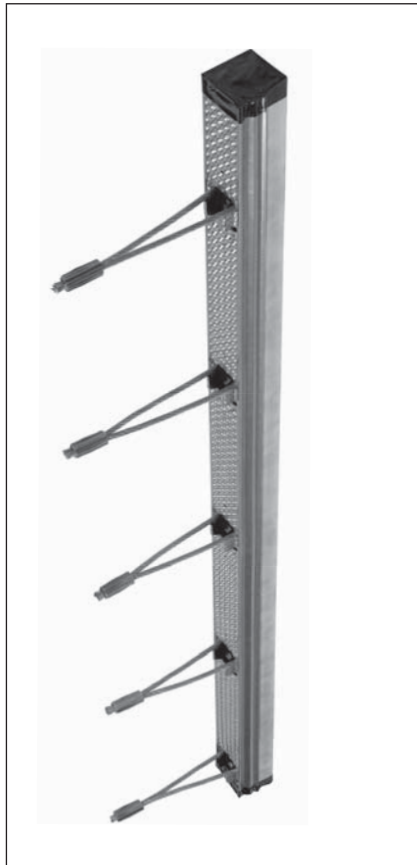
HALFEN HLB LOOP BOX

Product description

HLB M 50 Multi Loop Box

Combination of HLB M- 50/250 on both sides - officially approved, approval DIBt No. Z-21.8-1869

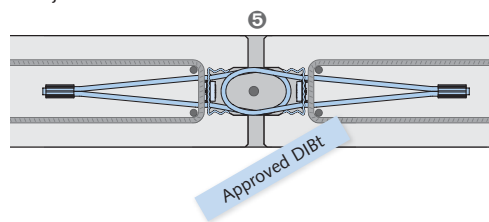
for the junction between precast concrete elements under transverse loads perpendicular and parallel to the joint



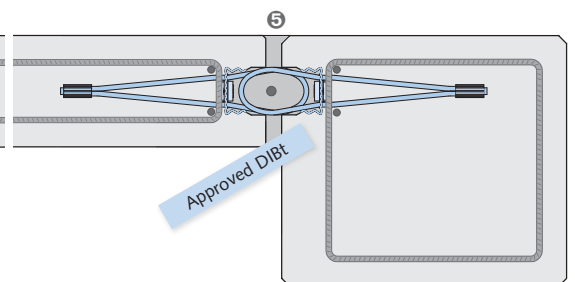
Standard gap width: 20 mm
Installation dimensions → Page 7
Directives for installation → Pages 14-15

Application examples of the combination HLB M- 50/250 + HLB M- 50/250:

Butt junction wall to wall



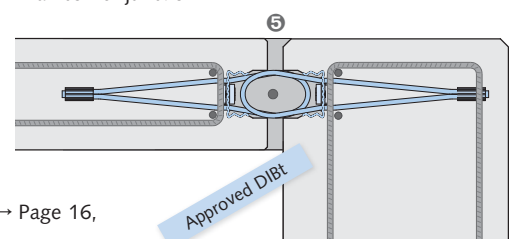
Junction wall to column



Order example for HALFEN Loop Box:

Product group - Type **HLB M- 50 / 250**
Loop Box size _____
Nominal spacing of the loops [mm] _____

Wall corner junction



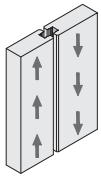
⑤ Joint filling with HLB Mix → Page 16,
Joint details → Page 15

HALFEN HLB LOOP BOX

Product description, load capacity according to EC 2, application examples

Load capacity for applications according to EC 2

The official approval applies for construction elements under predominantly static loads. If imposed deformations due to e.g. temperature changes or outdoor weathering can not be excluded, the crack width of the junction has to be restricted to $w_k \leq 0.3 \text{ mm}$. Transverse loads do not lead to an additional crack opening. The product is not designed for regular tension loads. To include the expansion forces arising in the joint, an exterior tensional force has to be taken into consideration according to DAfStb booklet 525, which is at least 1.5 times the shear force to be transferred perpendicularly over the joint. The official approval is to be observed.



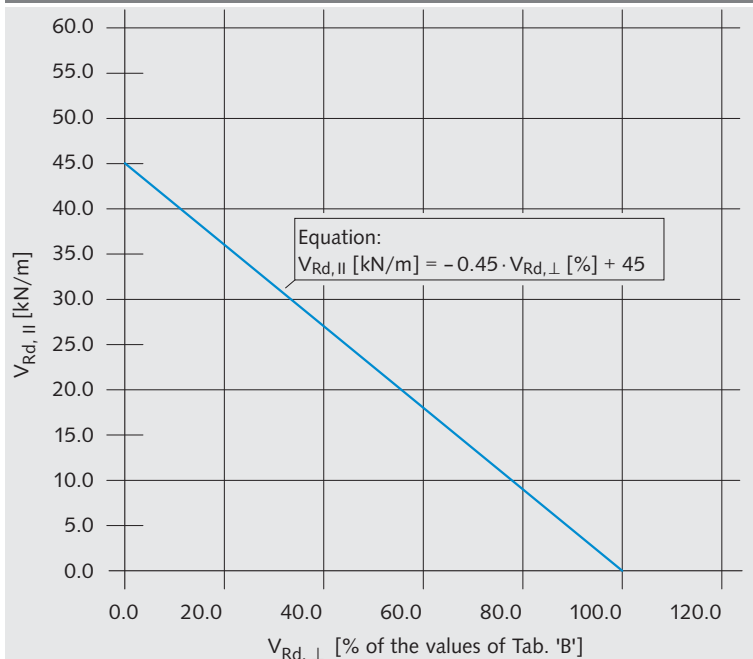
Design value of the transverse load capacity parallel to the joint (plane of the wall) $V_{Rd, \parallel}$ [kN/m]				
Wall thickness [cm]	HLB M- 50/250 + HLB M- 50/250			
	C30/37	C35/45	C40/50	C45/55
≥ 14	45.0 *			

* Moreover, no further limitation of the absorbable shear stresses in the joint of diaphragms according to EC2, chapter 10.9.3 (12) is required.

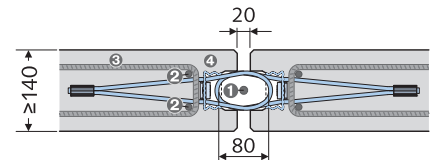
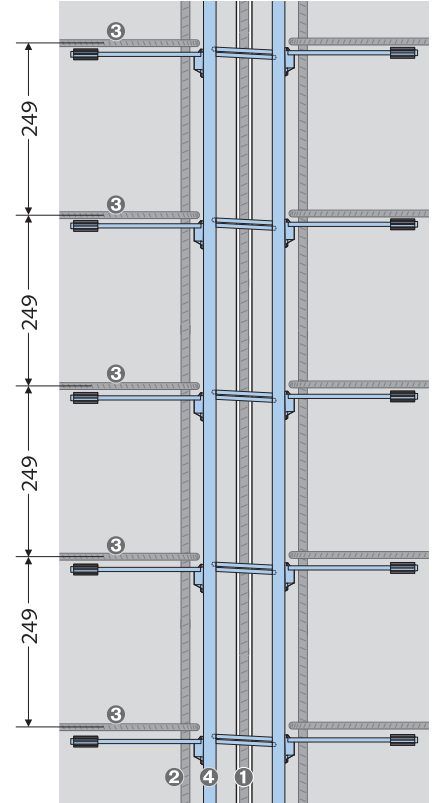
Design value of the transverse load capacity perpendicular to the joint (plane of the wall)
 $V_{Rd, \perp}$ [kN/m] (Table 'B')

Wall thickness [cm]	HLB M- 50/250 + HLB M- 50/250			
	C30/37	C35/45	C40/50	C45/55
14	8.8	10.0	10.7	11.4
15	10.2	11.6	12.4	13.3
16	11.7	13.3	14.3	15.2
17	13.2	15.0	16.1	17.2
18	14.8	16.9	18.1	19.3
19	16.4	18.7	20.1	21.4
20	18.1	20.6	22.2	23.6
21	19.9	22.6	24.3	25.9
22	21.6	24.7	26.5	28.2
23	23.5	26.8	28.7	30.6
24	25.4	28.9	31.0	33.0
25	27.3	31.1	33.3	35.5
≥ 26	29.2	33.3	35.7	37.5

Interaction diagram of the design values of the transverse load capacities parallel and perpendicular to the joint

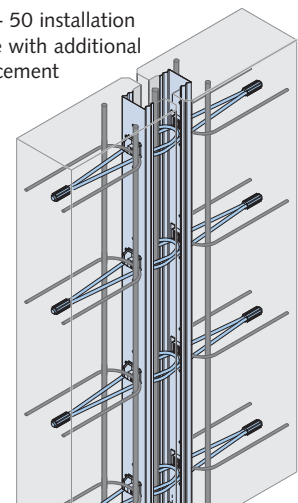


Minimum reinforcement, alignment



- ① Bar B500 A, diam. 12 mm
- ② Bar B500 A, diam. 10 mm
- ③ Stirrup B 500 A, diam. 8 mm, anchoring according to EC2
- ④ HLB M- 50

HLB M- 50 installation scheme with additional reinforcement



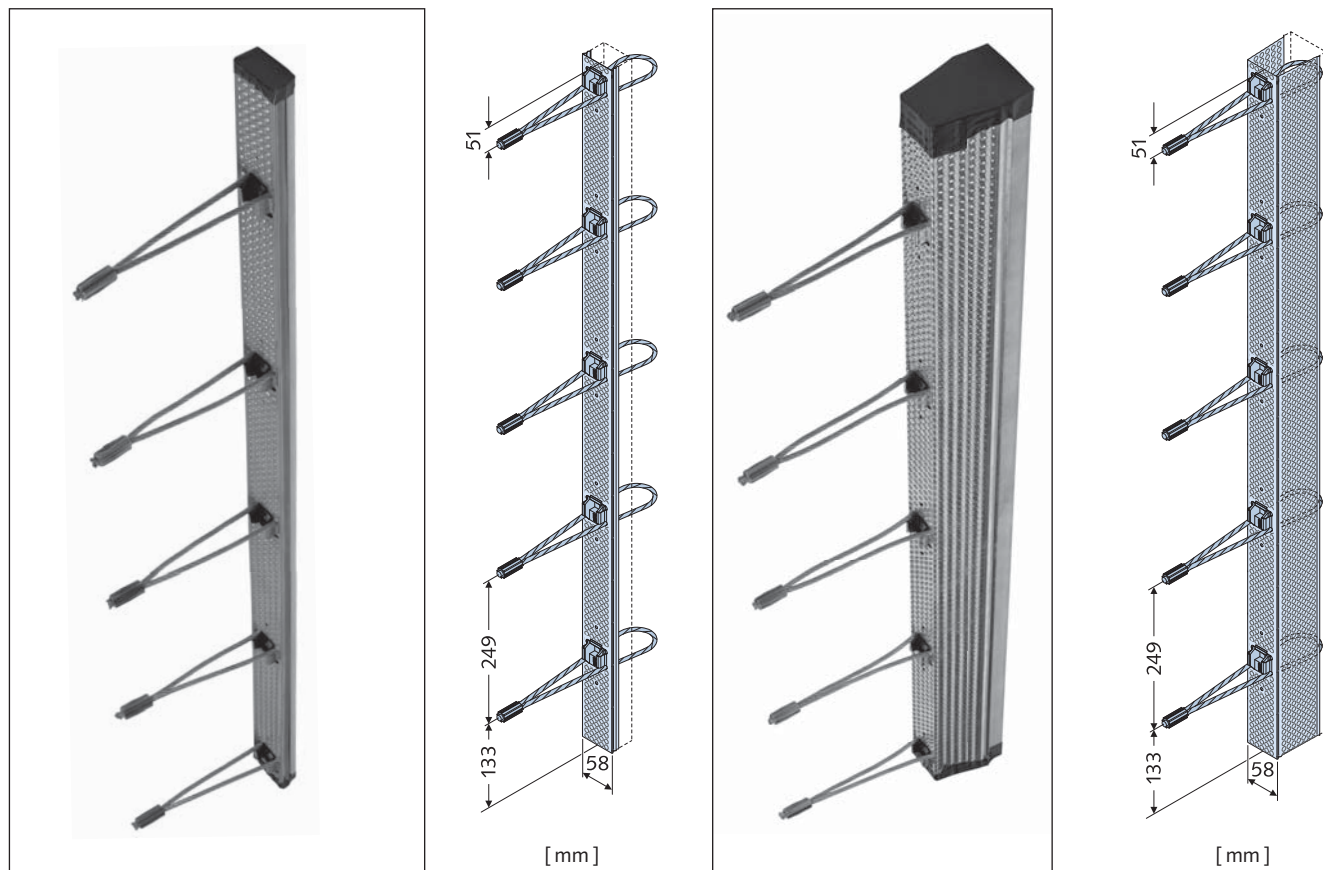
HALFEN HLB LOOP BOX

Product description

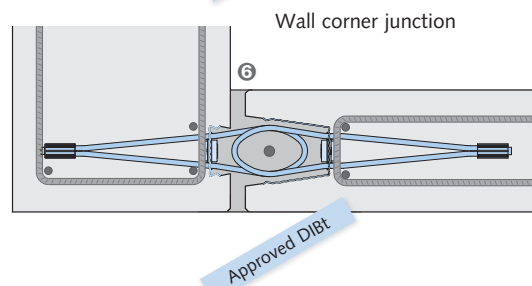
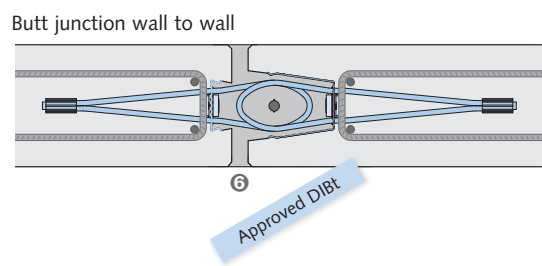
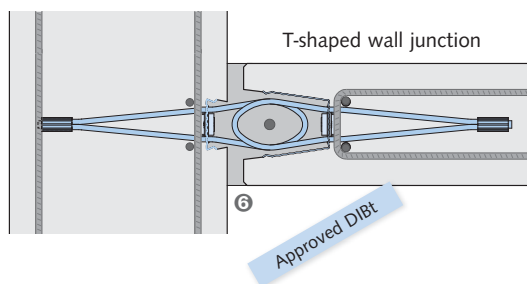
HLB M 20 and HLB M 100 Multi Loop Box

Combination of HLB M- 20/250 + HLB M-100/250 - officially approved, approval DIBt No. Z-21.8-1871

for the junction between precast concrete elements under transverse loads perpendicular and parallel to the joint



Application examples of the combination HLB M- 20/250 + HLB M-100/250:



Standard gap width: 20 mm

Installation dimensions → Page 9

Directives for installation → Pages 14-15

Order examples for HALFEN Loop Box:

HLB M-100 / 250

HLB M- 20 / 250

Product group - Type _____
 Loop Box size _____
 Nominal spacing of the loops [mm] _____

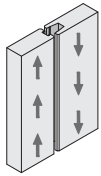
⑥ Joint filling with HLB Mix → Page 16,
 Joint details → Page 15

HALFEN HLB LOOP BOX

Product description, load capacity according to EC 2, application examples

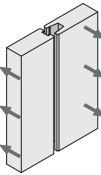
Load capacity for applications according to EC 2

The official approval applies for construction elements under predominantly static loads. If imposed deformations due to e.g. temperature changes or outdoor weathering can not be excluded, the crack width of the junction has to be restricted to $w_k \leq 0.3 \text{ mm}$. Transverse loads do not lead to an additional crack opening. The product is not designed for regular tension loads. To include the expansion forces arising in the joint, an exterior tensional force has to be taken into consideration according to DAfStb booklet 525, which is at least 1.5 times the shear force to be transferred perpendicularly over the joint. The official approval is to be observed.

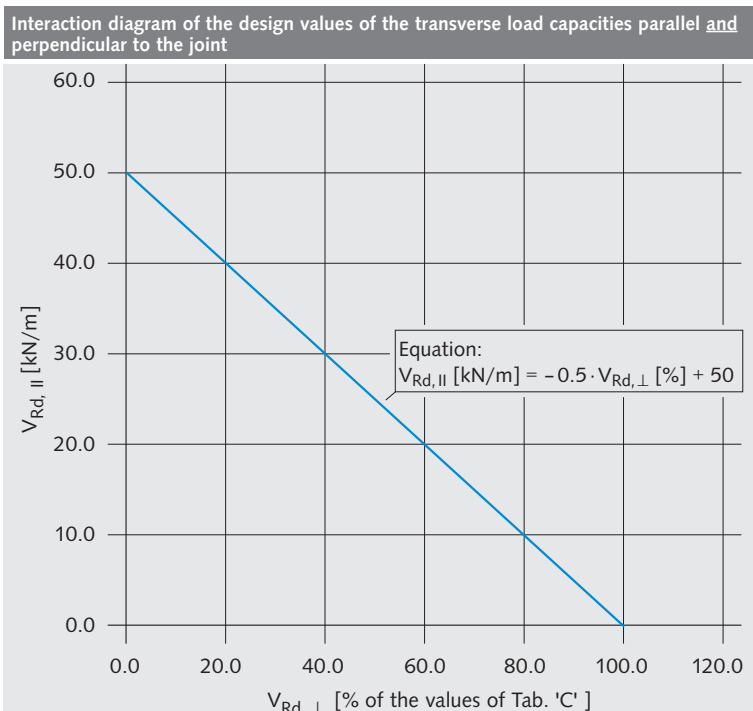
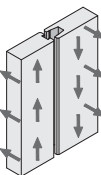


Design value of the transverse load capacity parallel to the joint (plane of the wall) $V_{Rd, \parallel}$ [kN/m]				
Wall thickness [cm]	HLB M- 20/250 + HLB M-100/250			
	C30/37	C35/45	C40/50	C45/55
≥ 14	50.0 *			

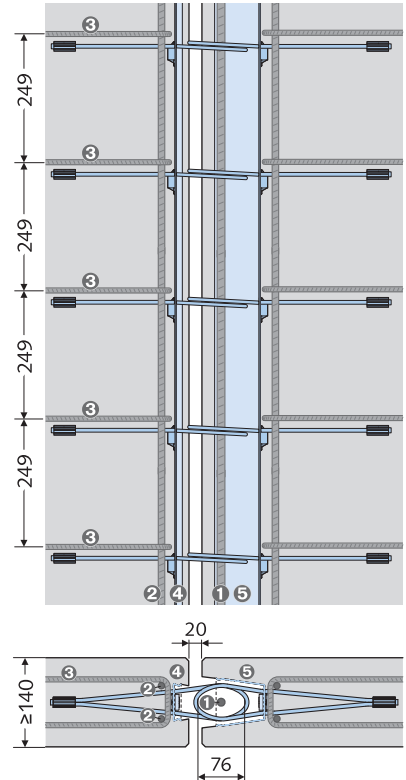
* Moreover, no further limitation of the absorbable shear stresses in the joint of diaphragms according to EC2, chapter 10.9.3 (12) is required.



Design value of the transverse load capacity perpendicular to the joint (plane of the wall) $V_{Rd, \perp}$ [kN/m] (Table 'C')				
Wall thickness [cm]	HLB M- 20/250 + HLB M-100/250			
	C30/37	C35/45	C40/50	C45/55
14	8.8	10.0	10.7	11.4
15	10.2	11.6	12.4	13.3
16	11.7	13.3	14.3	15.2
17	13.2	15.0	16.1	17.2
18	14.8	16.9	18.1	19.3
19	16.4	18.7	20.1	21.4
20	18.1	20.6	22.2	23.6
21	19.9	22.6	24.3	25.9
22	21.6	24.7	26.5	28.2
23	23.5	26.8	28.7	30.6
24	25.4	28.9	31.0	33.0
25	27.3	31.1	33.3	35.5
≥ 26	29.2	33.3	35.7	37.5

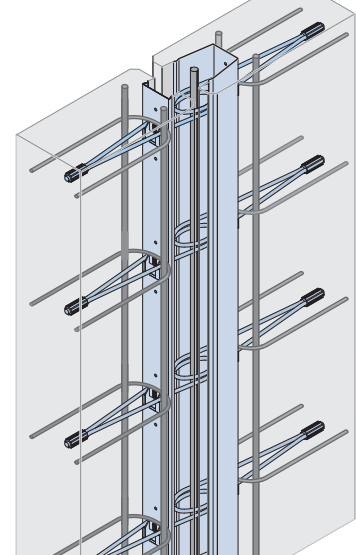


Minimum reinforcement, alignment



- ① Bar B500 A, diam. 12 mm
- ② Bar B500 A, diam. 10 mm
- ③ Stirrup B500 A, diam. 8 mm, anchoring according to EC2
- ④ HLB M- 20/250
- ⑤ HLB M-100/250

HLB M- 20/250 + HLB M-100/250 installation scheme with additional reinforcement



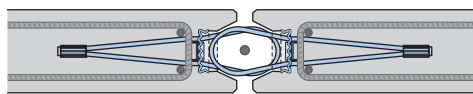
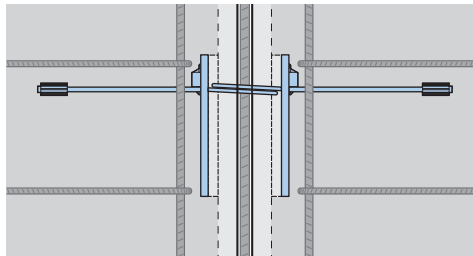
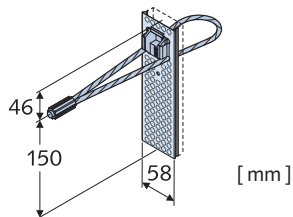
HALFEN HLB LOOP BOX

Product description

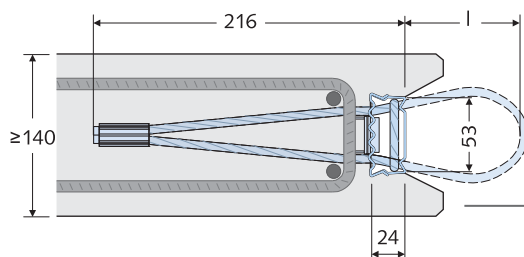
HLB S Single Loop Box

for constructive junctions between precast concrete elements

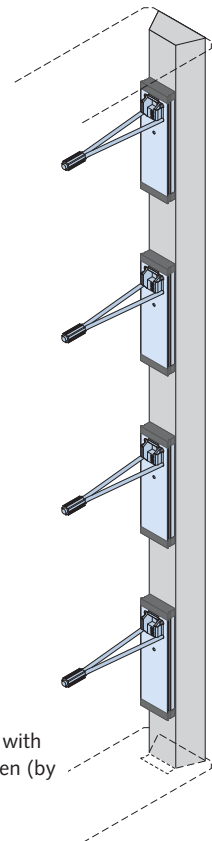
HLB S



Standard gap width: 20 mm
Installation dimensions → Pages 14-15
Directives for installation → Pages 14-15
Notes for the constructive load bearing behaviour → Pages 12-13



Installation with
timber batten (by
contractor)



Materials:

Casing: Steel, galvanised; profiled back, with pre-punched nail holes; lid with pre-punched opening for removing after striking the formwork
Steel wire loop: High strength, galvanised; steel ferrule

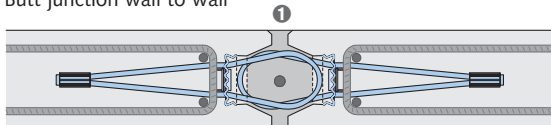
Product range HALFEN HLB S Single Loop Box						
Item name	Article no.	No. of loops	Loop length l [mm]	Clip colour	Weight [kg]	Packing unit [pieces]
HLB S-80	0058.010-00001	1	76	black	0.3	500
HLB S-100	0058.010-00002	1	96	white	0.3	500
HLB S-120	0058.010-00003	1	116	blue	0.3	500

Order example for HALFEN Loop Box:

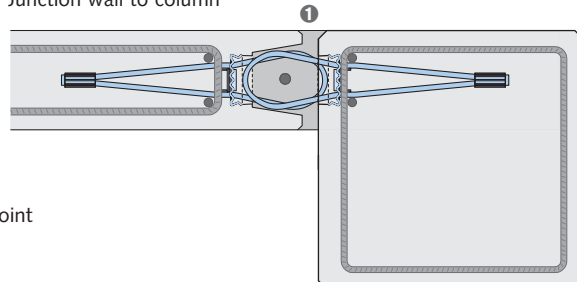
Product group - Type **HLB S-100**
Nominal loop length l [mm]

Application examples HLB S:

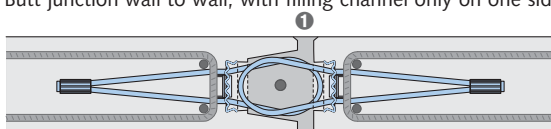
Butt junction wall to wall



Junction wall to column



Butt junction wall to wall, with filling channel only on one side of the joint



① Joint filling with HLB Mix → see Page 16,
Joint details → Page 15

HALFEN HLB LOOP BOX

Application

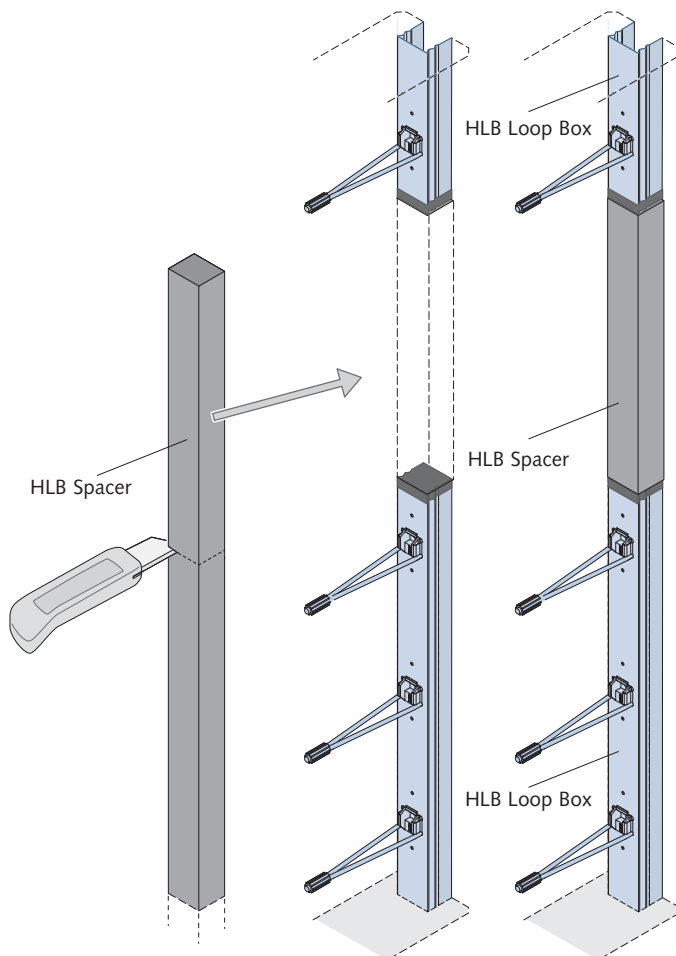
HLB Spacer for Loop Box

Economical and time saving method for producing a continuous joint filling channel, which is requested, if HALFEN Multi Loop Box elements are applied with interspacing for length adaption.

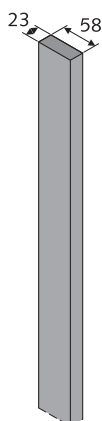
Material: foam profile strip, dimensionally stable

Application:

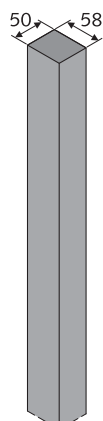
- Select the HLB Spacer type suitable to the Loop Box
- Cut to the required length using a common cutter or sharp knife
- Attach the HLB Spacer to the formwork using nails, glue or adhesive tape



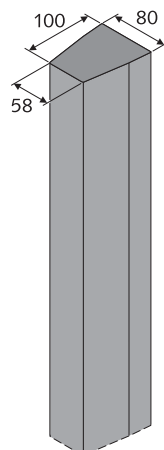
HLB Spacer- 20



HLB Spacer- 50



HLB Spacer-100



Type range HALFEN HLB Spacer for Loop Box				
Item name	Article no.	fits to Loop Box	Packing unit [pieces]	Length [mm]
HLB Spacer- 20	0058.070-00001	HLB M- 20	80	1000
HLB Spacer- 50	0058.070-00002	HLB M- 50	60	1000
HLB Spacer-100	0058.070-00003	HLB M-100	40	1000

Order example HLB Spacer:

HLB Spacer- 50

Product group - Type _____
fits to Loop Box HLB M size _____

HALFEN HLB LOOP BOX

Information on the constructive load bearing behaviour

Note: for the officially approved product combinations refer to the information given in this brochure (→ Pages 6-9) and in the official approval documents.

The following notes provide a basic understanding of the load bearing behaviour for the **constructive application**. However they are not to be considered as normative proofs.

1. Transfer of tension loads perpendicular to the joint

The transfer of tension loads results from the overlap of the wire loops (fig. 1). In the area of the loops the compression loads are transmitted to the grout fill. A tension load acts vertically to the plane of the loop, which must be taken up by a vertical reinforcement bar, as shown in fig. 2.

Assuming a global safety factor $\gamma = 3.0$ and a minimum breaking load of the cable of $F_{\min} = 22.7$ kN the maximum applicable tension load $Z_{\max, l}$ is 15.1 kN per wire loop.

$$Z_{\max, l} = \frac{F_{\min} \cdot 2}{\gamma} = \frac{22.7 \cdot 2}{3.0} = 15.1 \text{ kN}$$

Considering the serviceability limit state we recommend to specify a load not exceeding 10 kN per loop (characteristic value). Experimental tests, which have been carried out with concrete grade C30/37 and a clearance between the HLB S elements of 11 cm in the longitudinal direction of the joint, resulted in a widening of the joint of 0.4 mm at this load.

Fig. 1: Tension loads perpendicular to the joint

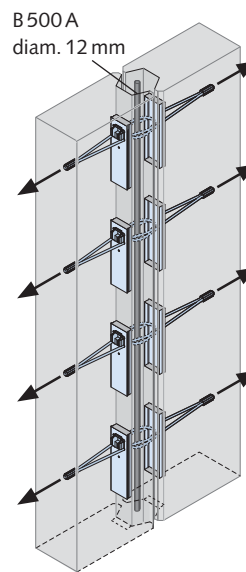
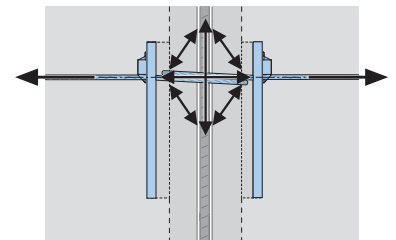


Fig. 2: Model for the tension load vertical to the joint



2. Transfer of shear loads parallel to the joint

Shear loads can act parallel to the joint (fig. 3). A model for the transfer of these shear loads across the joint is shown in fig. 4. Therein the shear load acting in the joint is divided into a tension and a compression strut. The values of the tension and compression loads depend on the angle ϑ .

HALFEN Single Loop Box: According to the model scheme shown in fig. 4 a strut is formed between the recess boxes of the precast elements facing each other. The tension load is transferred to the overlapping cable loops.

Fig. 3: Shear load parallel to the joint

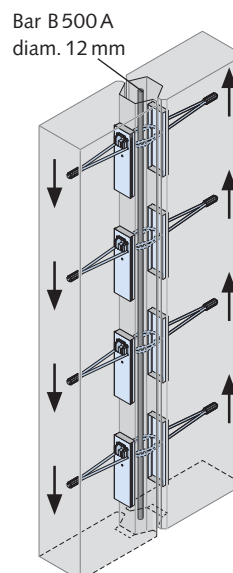
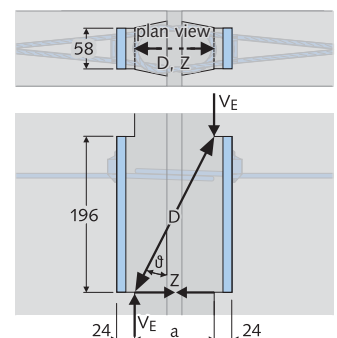


Fig. 4: Model for shear load parallel to the joint



HALFEN HLB LOOP BOX

Information on the constructive load bearing behaviour

3. Transfer of shear loads perpendicular to the joint

For the transfer of shear loads perpendicular to the joint (fig. 5) the geometry of the joint is particularly important. It can be assumed, that between the concrete flanks of the opposing precast elements a strut is formed according to fig. 6. The tension load is transferred to the overlapping cable loops.

It is recommended to carry out the calculation in the same way as for unreinforced slab joints, wherein the geometry is to be considered.

Fig. 5: Shear load perpendicular to the joint

Bar B 500 A
diam. 12 mm

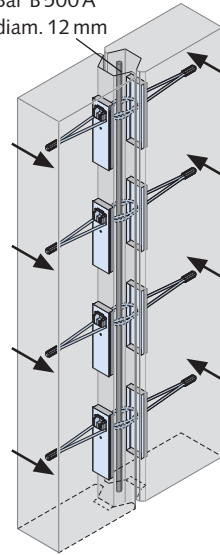
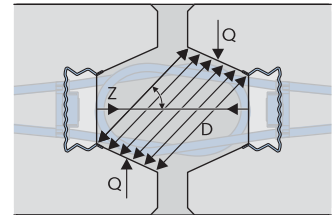


Fig. 6: Model for shear load perpendicular to the joint



Notes for fire protection

Regarding the fire protection the relevant regulations apply.

The cable loop of the HALFEN HLB Loop Box consists of a steel wire strength class 1770. It is commonly used in reinforced concrete structures. Therefore the regulations for reinforcement steel and for tensioning cables are to be observed.

In this connection the breaking stresses of the reinforcement steel and the cable loops at high temperatures have to be checked.

Furthermore, different demands are made on the centre distances for reinforcement steel and for tensioning cables. The minimum dimensions for the centre distances and further details of the constructive design depend on the required fire resistance class.

HALFEN HLB LOOP BOX

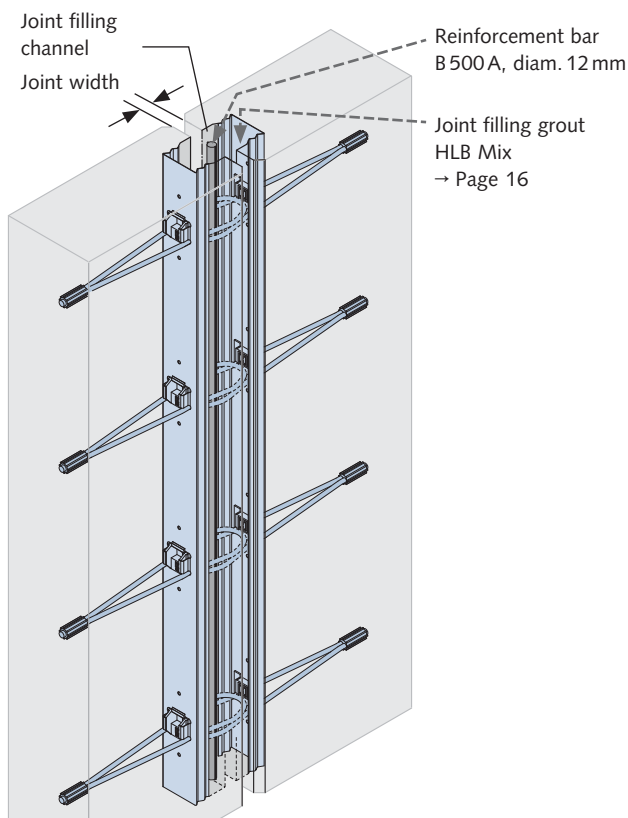
Installation instructions

Joint for in-situ grout fill

The joint for the in-situ grout fill has to be provided throughout the entire height of the concrete element.

An adequate joint depth must be provided, depending on the length of the cable loop. It must be ensured that

- the cable loops have a sufficient overlapping and that
- popped up loops have enough space without abutting.

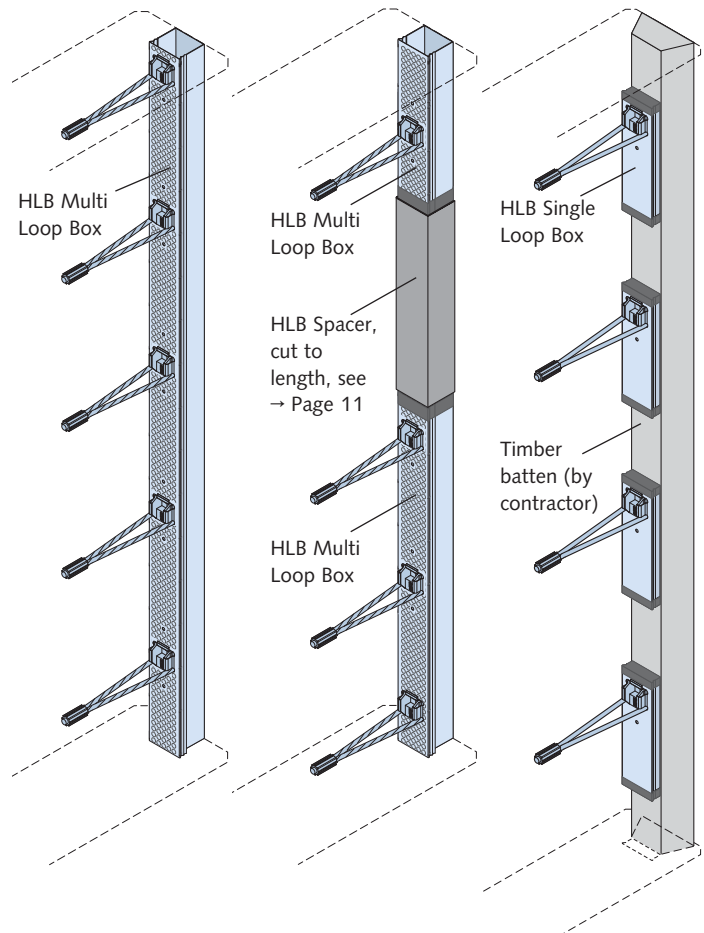


Construction details:

HLB M
Multi Loop Box:
Continuous casing

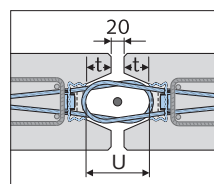
HLB M
Multi Loop Box:
Continuous casing
+ interspace filled
with HLB Spacer

HLB S
Single Loop Box
single elements on
timber batten



After setting up the precast elements, a reinforcement bar (reinforcing steel B500A) diam. 12 mm must be inserted into the joint through the overlapping cable loops.

For applications designed as constructive junction it is recommended to provide U-shaped stirrups (reinforcing steel grade B500A) diam. 8 mm, so that an overlap junction between the tail of the cable loops and the U-shaped stirrup is created as with the officially approved HLB Loop Boxes.

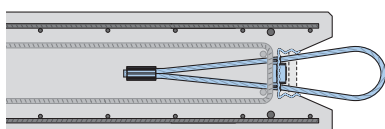


HLB S: joint depth t, overlapping U [mm] at 20 mm gap width, HLB elements in pairs		
HLB S	t	U
- 80	40	52
-100	50	72
-120	60	92

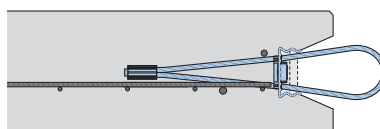
Reinforcement

- Examples for HLB Loop Box applications designed as constructive junction:

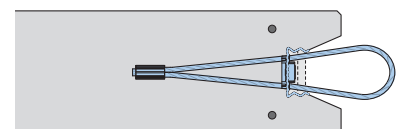
- surface area reinforcement



- centric area reinforcement



- without area reinforcement



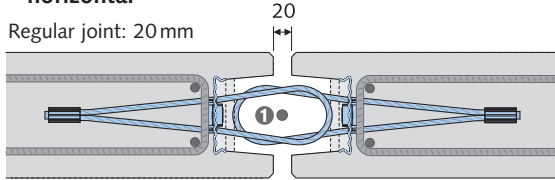
HALFEN HLB LOOP BOX

Installation instructions

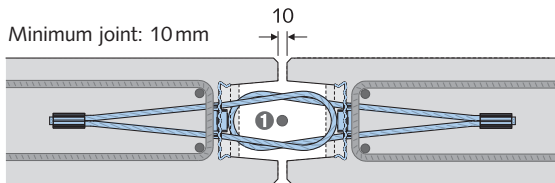
Installation tolerances according to the official approvals, recommended also for applications designed as constructive junctions

• horizontal

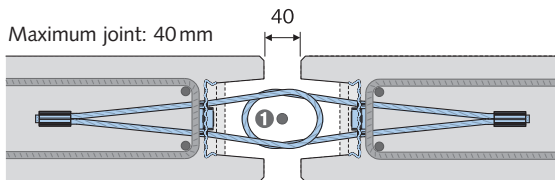
Regular joint: 20 mm



Minimum joint: 10 mm



Maximum joint: 40 mm



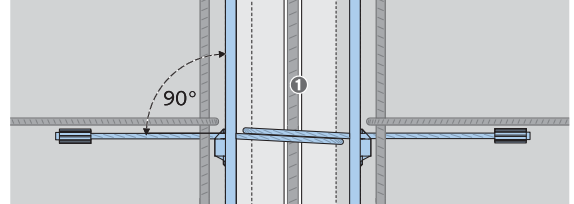
Bar B 500 A, diam. 12 mm

Dry grout per meter joint length [kg/m]; joint: 2 cm

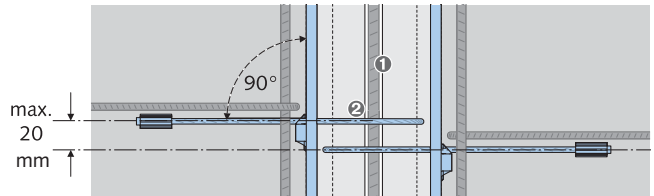
Wall thickness [cm]	HLB M- 50 + HLB M- 50	HLB M- 20+ HLB M-100
14	16.7	22.1
16	17.5	22.9
18	18.3	23.7
20	19.1	24.5
22	19.9	25.3
24	20.7	26.1
26	21.5	26.9

• vertical

Regular arrangement: loops at the same level



Vertical tolerance: maximum 20 mm



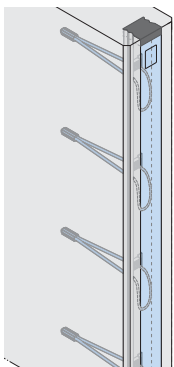
① Bar B 500 A, diam. 12 mm

② A vertical tolerance of maximum 20 mm is permissible. Wire binding of the cable loops is not compulsory.

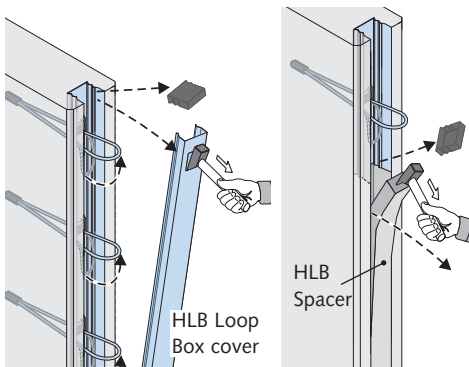


Note: Welding on HLB Loop Box elements is not permitted.

On the construction site:

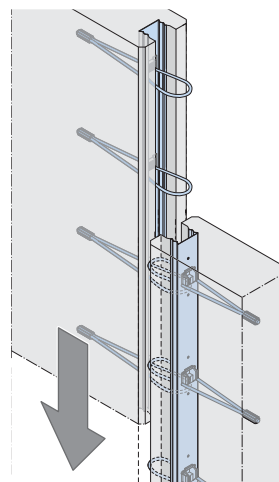


1. State of delivery with closed HLB Loop Box

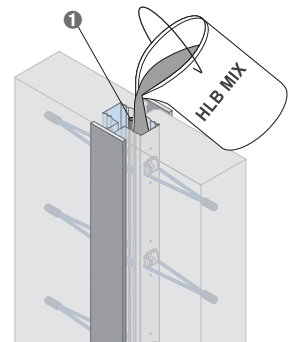


2. Remove the HLB Loop Box cover: strike in the pre-punched hole and pull out the steel cover, using an appropriate tool, e.g. a carpenter's hammer. Remove end covers (adhesive tape).

If HLB Spacers are incorporated, they must be removed, using an appropriate tool.



3. Setting up the precast element. The wire loops must stick out perpendicular to the joint, and after deflection during the setting up they should spring back into this position.



4. Insert the reinforcement bar diam. 12 mm and encase the joint with appropriate formwork. Prepare the HLB Mix joint grout according to the manufacturers instructions. The maximum grouting height is 3.5 m. HLB Mix joint grout is capable of flowing, no additional compaction is required.

HALFEN HLB LOOP BOX

In-situ joint grout filling

HALFEN HLB Mix joint grout for producing a load bearing joint fill without further compaction

According to the official approval HLB Mix grout must be used for filling the joint. Mixing and applying the grout should be carried out with reasonable care, the manufacturers instructions are to be observed.

Properties of the HLB Mix joint grout:

- Graining 0...5 mm
- Consistency: capable of flowing, subsequent compaction is not necessary
- Maximum workability time at 20°C: 90 min, pumpable
- Guide value for the cube compression strength (150 mm), tested at 20 °C:
 - after 24 hours: minimum 40 N/mm²
 - after 28 days: compression strength grade C60/75
- shrinkage class SKVB II
- resistant to frost and de-icing salt



Delivery form: bags à 25 kg
(for about 12.5 l of grout)

Storage: durable for 9 months
storage in package and dry
conditions.

Order example for HLB Mix joint grout:

HLB Mix grout 25 kg, Article no. 0058.060-00001

Mixing:

Mix the HLB Mix joint grout with approx. 2.5 l to 3.0 l of water. Pour the water into the compulsory Mixer ①, leaving a remaining quantity, add the grout, and after a short period of mixing ② pour in the remaining quantity of water ③ and mix for at least 5 minutes ④.

Substrate:

The substrate must be well cleaned. Loose particles which prevent adhesion, i.e. cement sludge, moulding grease etc. must be completely removed by air blasting or similar treatment. It must have a minimum breakaway resistance of $\geq 1.5 \text{ N/mm}^2$ and sufficient bearing strength. The substrate must be sufficiently pre-watered!

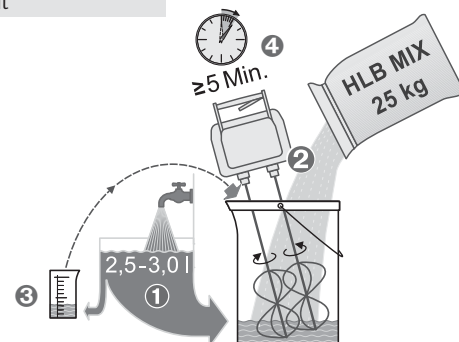
Joint moulding, additional reinforcement bar:

Usually a spacing is left between the edges of the abutting precast elements. After connecting the loops of the HLB Loop Boxes with a reinforcement bar ⑤, the joints between the 2 elements are encased with formwork. For high elements or if the formwork allows no high pressure, the grout casting should be carried out in 2 steps.

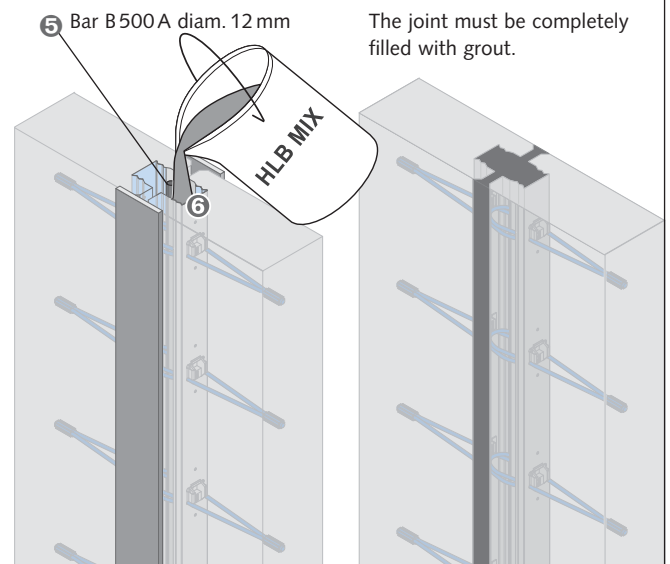
Filling the joint ⑥:

The grout is poured in continuously up to the required filling height. Observe the height limit: the maximum height for pouring the HLB grout mix is limited to a **maximum of 3.50 m**, if necessary the grout must be filled in using a hose, or the height of the casting channel must be limited accordingly. The compaction may be facilitated using an internal spud vibrator or by poking. The temperatures of the environment and the building structure should be not below +5°C during the preparation of the grout and until 36 hours after pouring.

Preparation of the HLB Mix joint grout



Joint filling



HALFEN HLB LOOP BOX

Order form

☐

Enquiry

☐

Order

(Please mark your option)

Please send back to HALFEN via FAX

– Select contact data for your subsidiary
from this catalogue's last page –

Construction project:

Company

Street

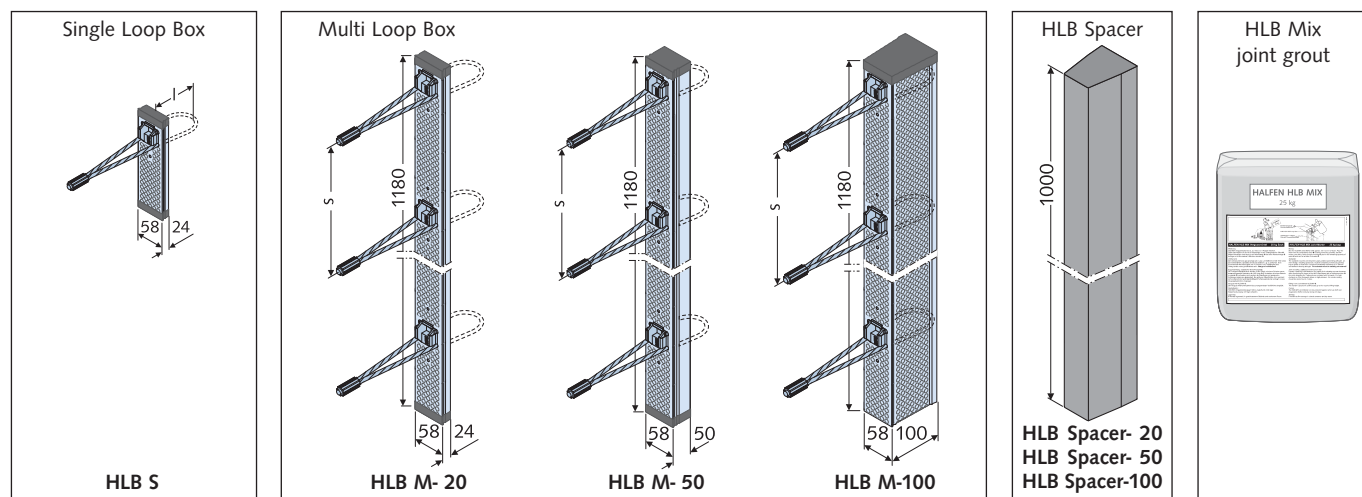
Postcode / City

Contact person

Phone

Fax

E-Mail



Pos.	Type	Quantity [piece]	Order no.	Unit price [EUR]	Total price per pos. [EUR]
Sum: plus packing and shipping costs					EUR

Delivery address:
(only if the delivery
address is not
identical with the
ordering address)

Date,
signature

Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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