

# HALFEN BRICKWORK SUPPORT

## TECHNICAL PRODUCT INFORMATION



HALFEN BRICKWORK SUPPORT

FM 10.2-E

FAÇADE



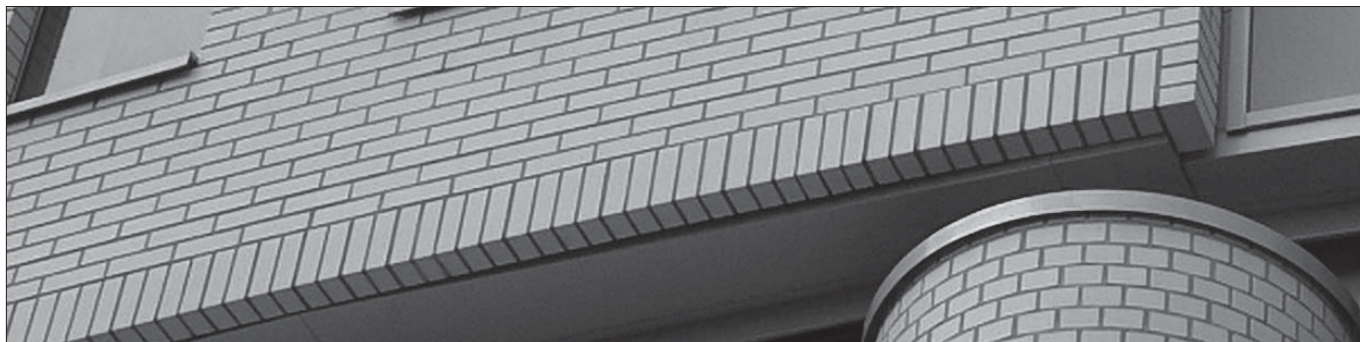
EN 845-1/ EN 845-2



**HALFEN**  
YOUR BEST CONNECTIONS

# HALFEN SUPPORT BRACKETS

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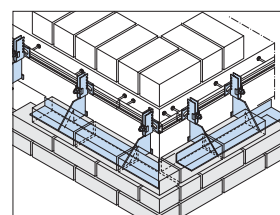
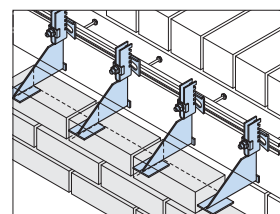
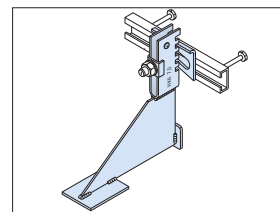


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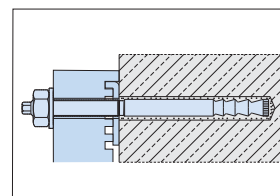
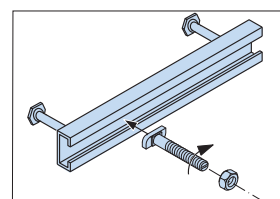
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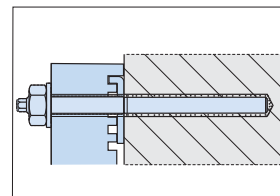


# HALFEN SUPPORT BRACKETS

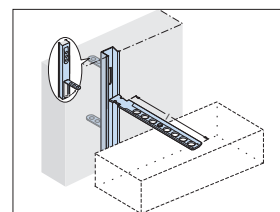
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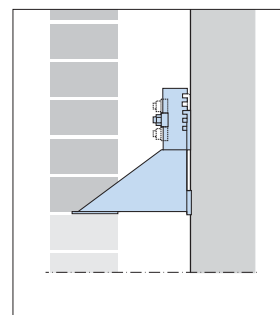


<b>Quality requirement</b>	
- HALFEN quality – CE Marking: the most solid system around	35



EN 845-1  
EN 845-2

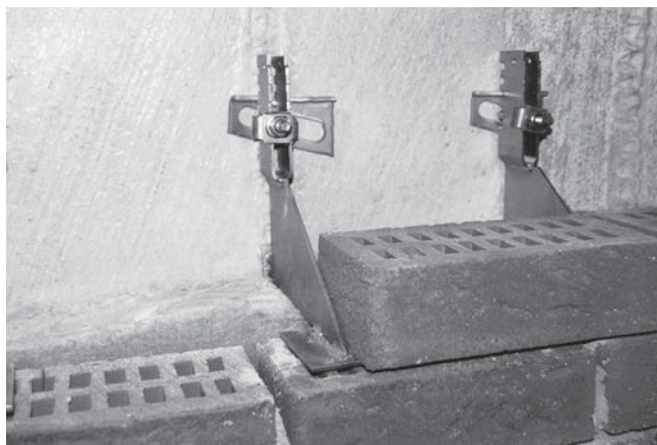
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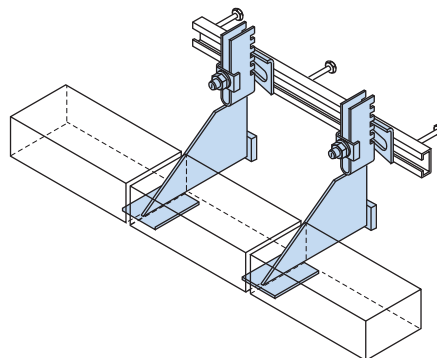
# HALFEN SUPPORT BRACKETS

## Introduction

### Applications



HK4-U

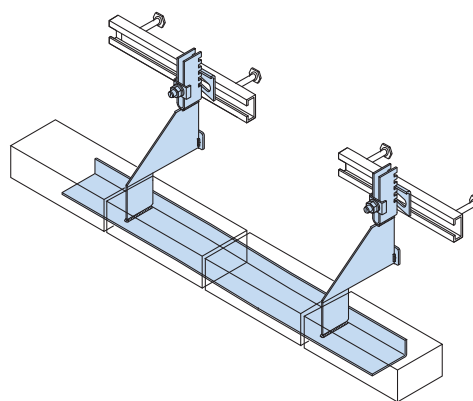


The universal standard type for supporting in the transversal joint is available in several versions

→ see page 8 - 9



HK4-FV

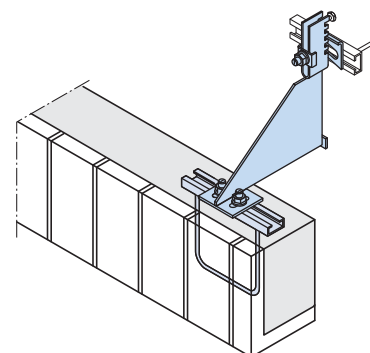


The standard type for supporting above window openings allows larger distances between the backings of the support brackets.

→ see page 10 - 11



HK4-S with HTA-ES  
for pre-cast lintels



The horizontal and vertical adjustment possibilities allow an exact positioning of the pre-cast lintels.

→ see page 18

# HALFEN SUPPORT BRACKETS

## Introduction

### Even more than a nice façade

Faced-brickwork façades are attractive and efficient.

Long-life-cycle without signs of aging

Measures to safeguard against earthquakes are on request



Sustainable protection against



heat

cold

### Why hold with HALFEN support brackets?

Brickworks have to fulfil high quality demands. They have to be economical (without follow up costs), durable and persistent. HALFEN support brackets can cope with those requirements, not only because of quality but also because of professional planning.

Material is **permanently corrosion free** according to EN 10088-2

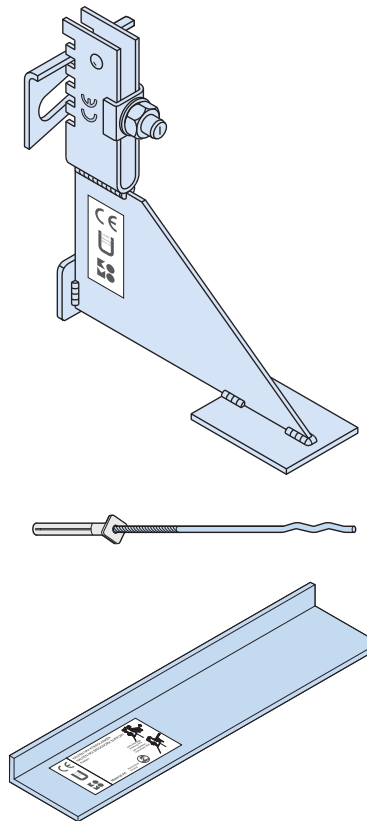


**Quality Management System** for production sites according to EN ISO 9001



### CE certification

Own production control.  
Certificated products are according to EN 845-1/ EN 845-2  
→ see page 35



Proved load ranges with **type approval**

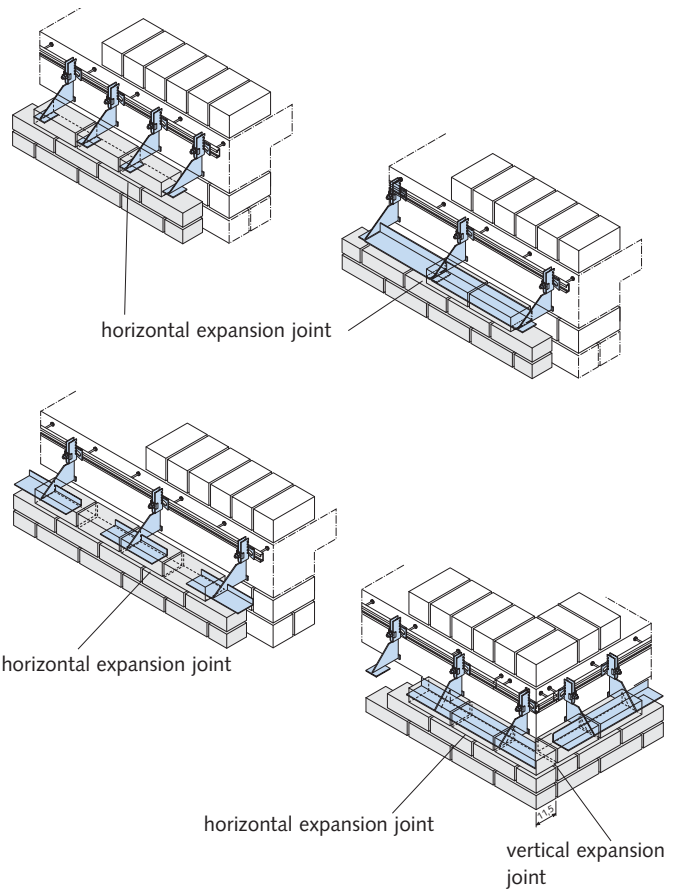


# HALFEN SUPPORT BRACKETS

## Sample applications

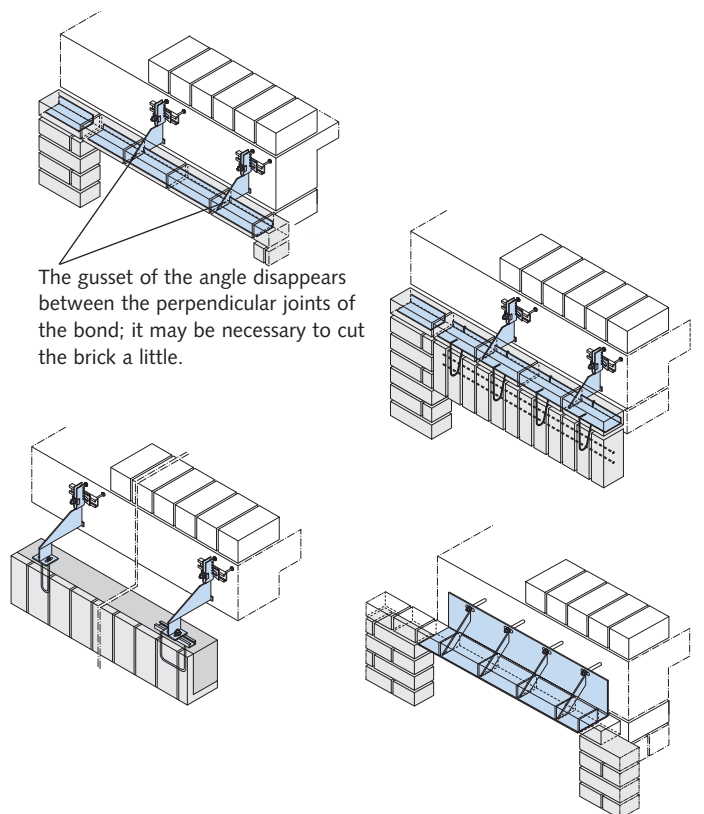
### Continuous wall surface

1. With HK4-U individual support brackets  
spacing  $e = 25 \text{ cm}$   
→ pages 8 - 9
2. With HK4-U standard support brackets  
spacing  $e \geq 50 \text{ cm}$ ,  
and support angles HW 95  
→ page 8 and pages 16 - 17
3. With HK4-P individual support brackets,  
spacing  $e = 50 \text{ cm}$   
→ page 14
4. Corner of building with HK4-F continuous angle bracket  
→ pages 10 - 11



### Supports over wall openings

1. Visible HK4-F support with continuous angle bracket  
→ pages 10 - 11
2. Invisible HK4-F support with continuous angle bracket  
and HSL support loops  
→ pages 11 - 13
3. Support brackets for pre-cast lintels with HK4-SV  
individual support brackets, lintel supported  
by cast-in threaded loops or HALFEN channels  
→ pages 18 - 20
4. Bracket angle KWL for drilling and plugging  
→ page 15

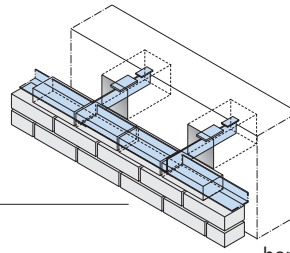


# HALFEN SUPPORT BRACKETS

## Sample applications

### Grouted-in wall anchors

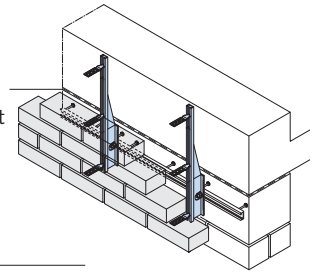
Support with KM grout-in brackets and intermediate angles placed on brackets  
→ page 21



### Parapet support brackets

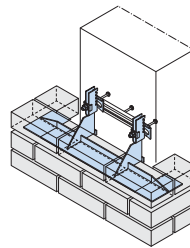
HAV for wind-resistant support of facing brickwork at the level of parapets placed on a horizontal movement joint  
→ page 22

horizontal movement joint



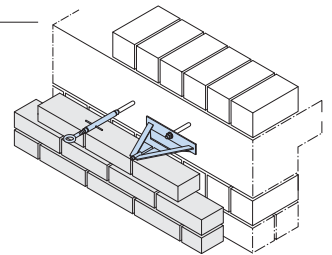
### Support brackets facing brick around column

With HK4-FRL support brackets, special construction  
→ page 11

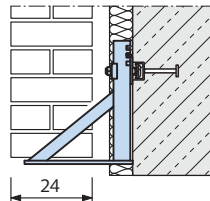


### Scaffold anchor

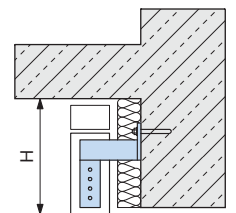
HGA-Q / HGA-ZN  
→ page 23



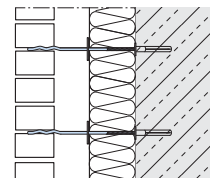
HK Special support brackets  
For larger loads  
(load levels up to 26 kN)



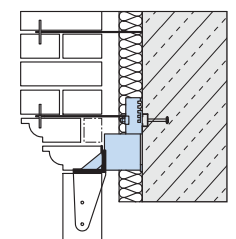
Model HK0-UL - 0.5  
For low load heights



Cavity wall ties  
For restraining against horizontal loads  
→ pages 24 - 25



Wall ties  
For restraining against horizontal loads  
→ pages 32 - 34

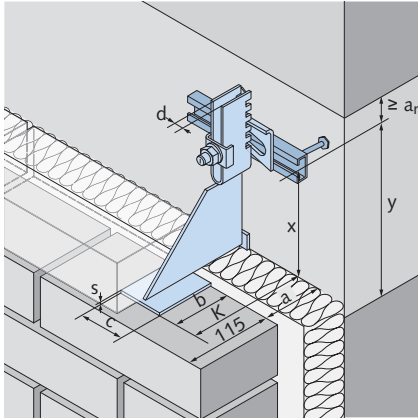


# HALFEN SUPPORT BRACKETS

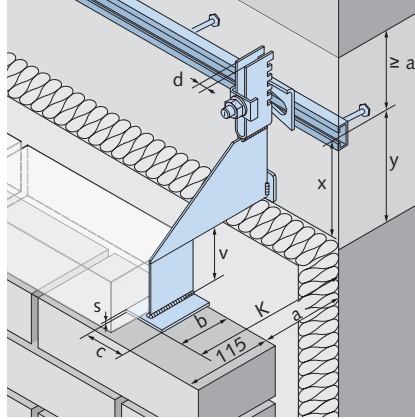
## Individual support brackets HK4 - U, HK4 - W



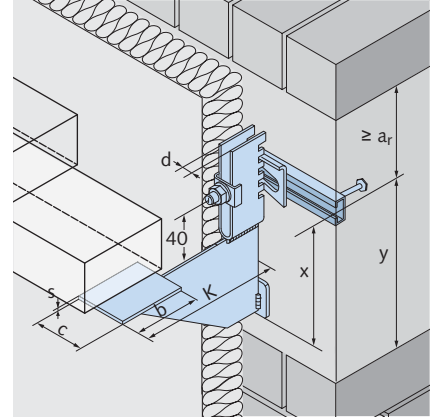
### HK4-U



### HK4-UV



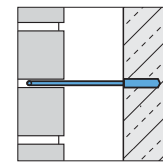
### HK4-UT



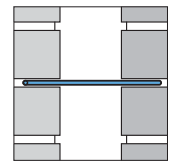
The individual support bracket HK4-U is a single support bracket with a continuous gusset and support plate. This adjustable HK4-U support bracket connects to the HALFEN HTA cast-in channels and offers an easy-to-fit, economic and safe construction. The specified load-bearing capacities refer to fixings in concrete  $\geq$  C20/25.

**Note:**  
 $y \geq x + 25$  mm;  
 $a_r$  = req. edge clearance in according with the technical approval of wall tie system

### Accessories



Cavity wall tie for drill fixing → page 24



Cavity wall tie → page 25

Tender specifications → pages 42 - 43

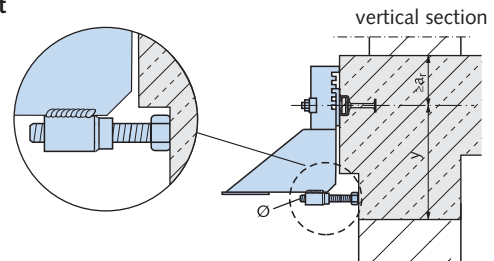
Example for ordering:

HK4 - U - 7.0 - 190

type  
 version  
 load level  
 projection K

### HK4 with depth adjustment

HK4-U - ... JF  
 with adjustment screw  
 → page 37



Selecting HK4 support brackets		distance a from wall [mm]	load level perm. $F_V = 3.5$ kN ( $F_{Rd} = 4.7$ kN)		load level perm. $F_V = 7.0$ kN ( $F_{Rd} = 9.5$ kN)		load level perm. $F_V = 10.5$ kN ( $F_{Rd} = 14.2$ kN)	
			projection K	x	projection K	x	projection K	x
	- U	40 ± 15	130	150	130	200	130	250
	- UV	60 ± 15	150	150	150	200	150	250
	- UT	80 ± 15	170	150	170	200	170	250
	- W*	100 ± 15	190	150	190	200	190	250
	- WV*	120 ± 15	210	150	210	200	210	250
		140 ± 15	230	175	230	250	230	300
		160 ± 15	250	175	250	250	250	300
		180 ± 15	270	180	270	270	270	320
		200 ± 15	290	200	290	290	290	340
		220 ± 15	310	220	310	310	310	360
		240 ± 15	330	240	330	330	330	380
		260 ± 15	350	260	350	350	350	400
support plate b × c × s			80 × 60 × 4		80 × 60 × 5		100 × 80 × 6	
width of notched bracket d			12.5		16.5		16.5	

\* HK4-W only for load range 3.5 kN and 7.0 kN / HK4-WV only for load range 3.5kN

① you can also use other width of stone than 115 mm

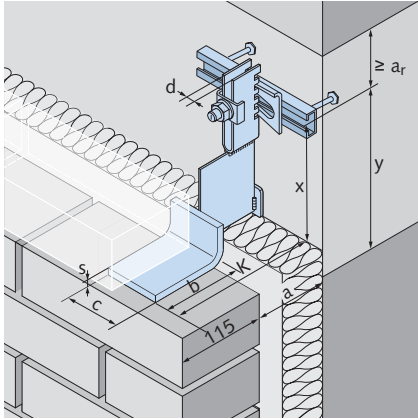


# HALFEN SUPPORT BRACKETS

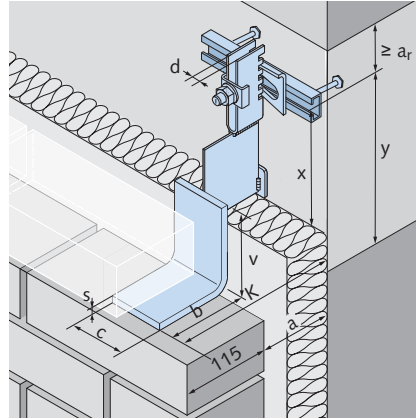
Individual support brackets HK4 - U, HK4 - W



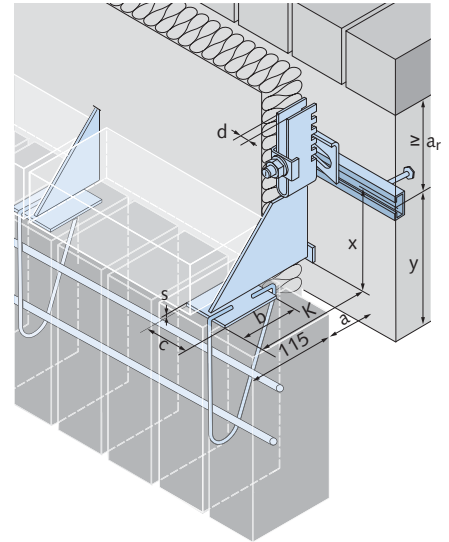
HK4-W



HK4-WV



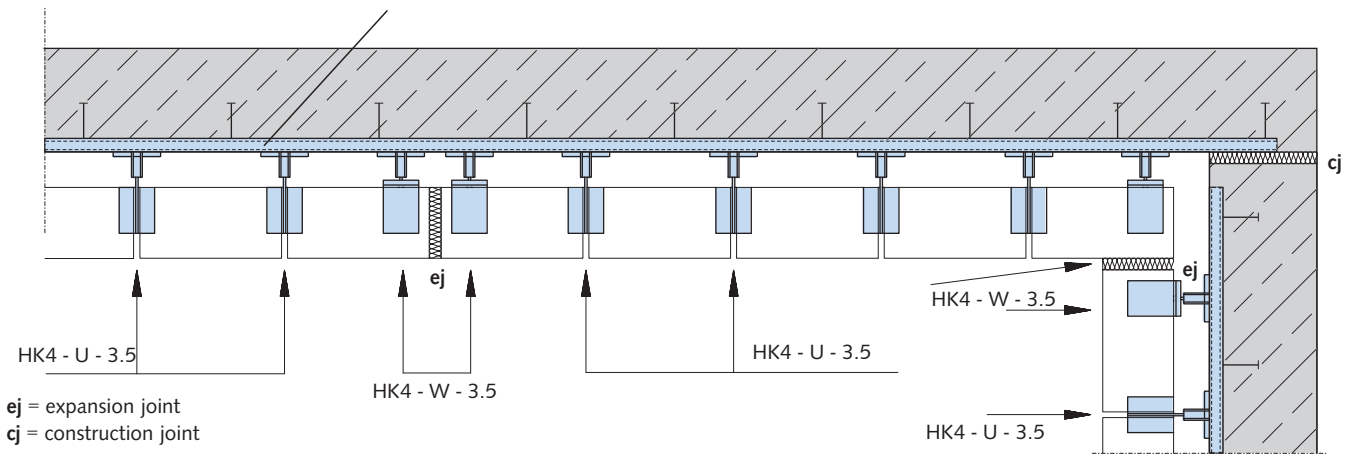
HK4-U with suspension loop



**Example:**

Supporting brickwork cladding with height  $H \leq 6.00$  m

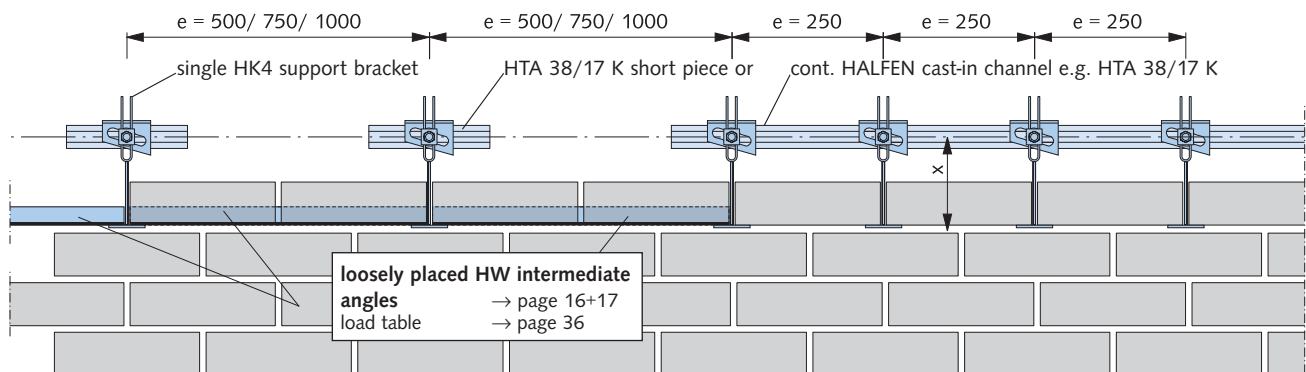
HTA 38/17 K



**Example:**

Support with and without supporting angle

all dimensions in mm

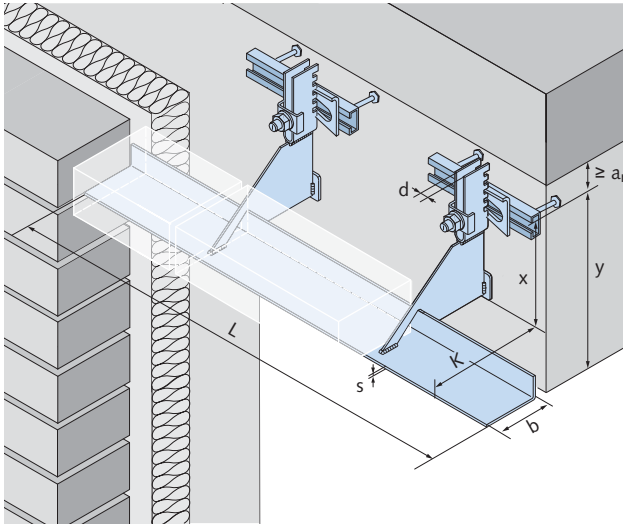


# HALFEN SUPPORT BRACKETS

## Continuous angle bracket HK4 - F

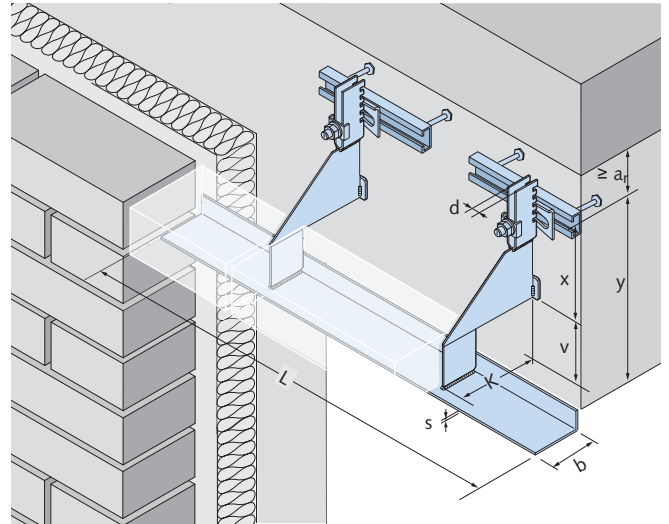


### HK4-F



standard version with two backs

### HK4-FV



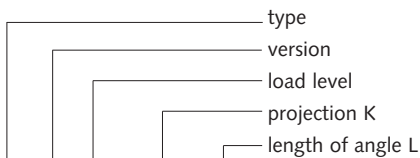
with height offset at front

In order to hold brickwork cladding of low height, e.g. parapet above window openings, the spacing between these brackets can be larger.

**Note:** To avoid excessive deflection of the support angles, they have to be supported while bricks are being laid until the brickwork has cured to sufficient strength.

standard lengths [mm] for HK4 - F/- FV		
L1	L2	L
247.5	500	995
247.5	750	1245
247.5	1000	1495

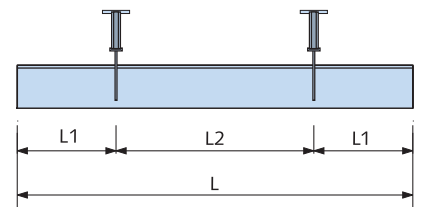
### Example for ordering:



HK4 - F - 7.0 - 190 - 1245

**Note:**  
 $y \geq x + 25 \text{ mm}$ ;  
 $a_r = \text{req. edge clearance in ac. with building control approval of wall tie system}$

Tender specifications → pages 42 - 43



Selecting HK4 support brackets	distance a from wall [mm]	load level perm. $F_V = 3.5 \text{ kN} \text{ ①}$ ( $F_{Rd} = 4.7 \text{ kN}$ )		load level perm. $F_V = 7.0 \text{ kN} \text{ ①}$ ( $F_{Rd} = 9.5 \text{ kN}$ )		load level perm. $F_V = 10.5 \text{ kN}$ ( $F_{Rd} = 14.2 \text{ kN}$ )	
		projection K	x	projection K	x	projection K	x
	40 ± 15	130	150	130	200	130	250
	60 ± 15	150	150	150	200	150	250
	80 ± 15	170	150	170	200	170	250
	100 ± 15	190	150	190	200	190	250
	120 ± 15	210	150	210	200	210	250
	140 ± 15	230	175	230	250	230	300
	160 ± 15	250	175	250	250	250	300
	180 ± 15	270	180	270	270	270	320
	200 ± 15	290	200	290	290	290	340
	220 ± 15	310	220	310	310	310	360
	240 ± 15	330	240	330	330	330	380
	260 ± 15	350	260	350	350	350	400
dimensions in mm	support angle width b	100		100		100	
	width of notched bracket d	12.5		16.5		16.5	

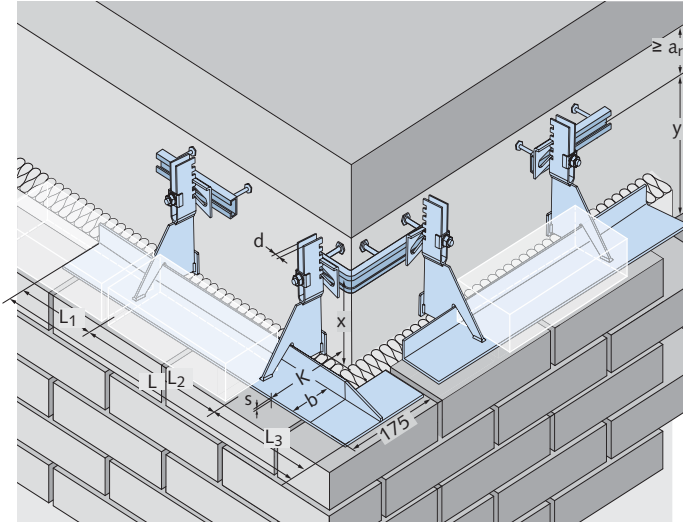
① load level/back

# HALFEN SUPPORT BRACKETS

## Continuous angle bracket HK4 - F

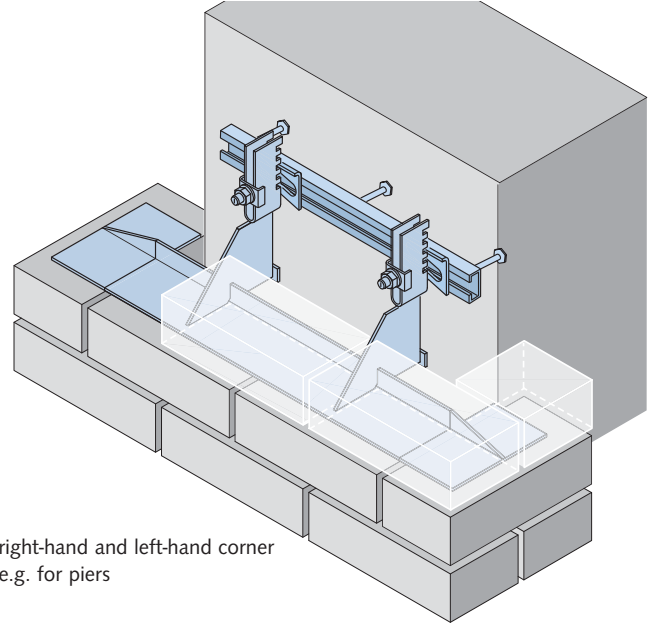


### HK4-FR



right-hand corner

### HK4-FRL

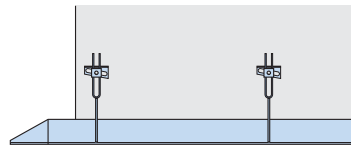


right-hand and left-hand corner  
e.g. for piers

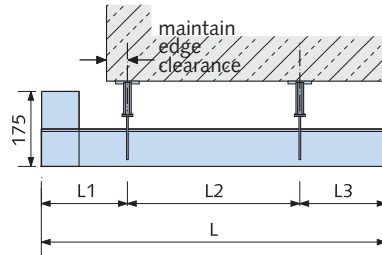
### Special versions:

**HK4-FL** with left-hand corner (for columns, corners both sides: HK4-FLR)

elevation

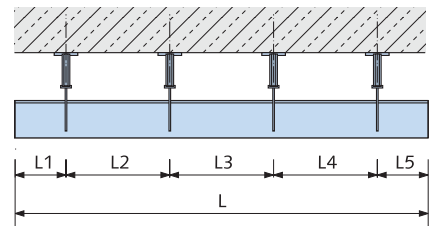
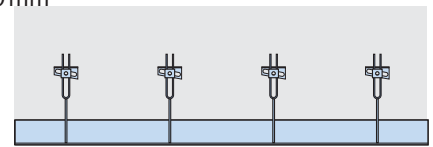


plan



Example for ordering: HK4-FL-7.0 - 180 - 983 (235/500/248)

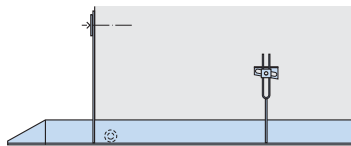
Angles with more than 2 back brackets and special dimensions, max.  $L \leq 4000$  mm



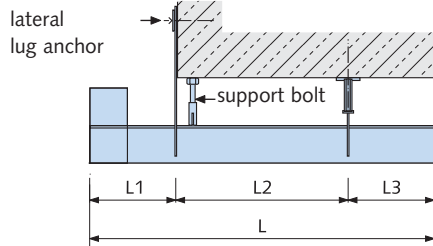
HK4-F - 7.0 - 180 - L (L1/L2/L3/L4/L5)

### HK4-FL with left-hand corner, with 1 lateral strap anchor

elevation



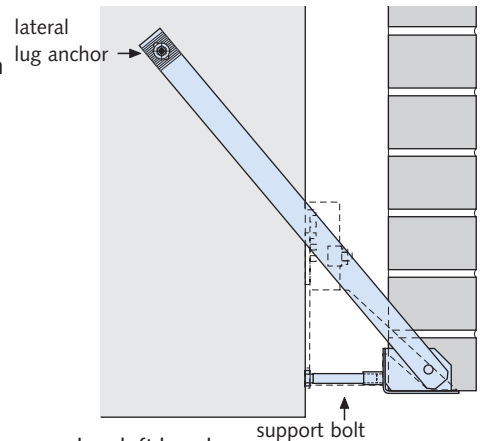
plan



Example for ordering:

HK4-FL - 7.0 - 180 - L (L1/L2/L3) with 1 lateral strap anchor left-hand

vertical section

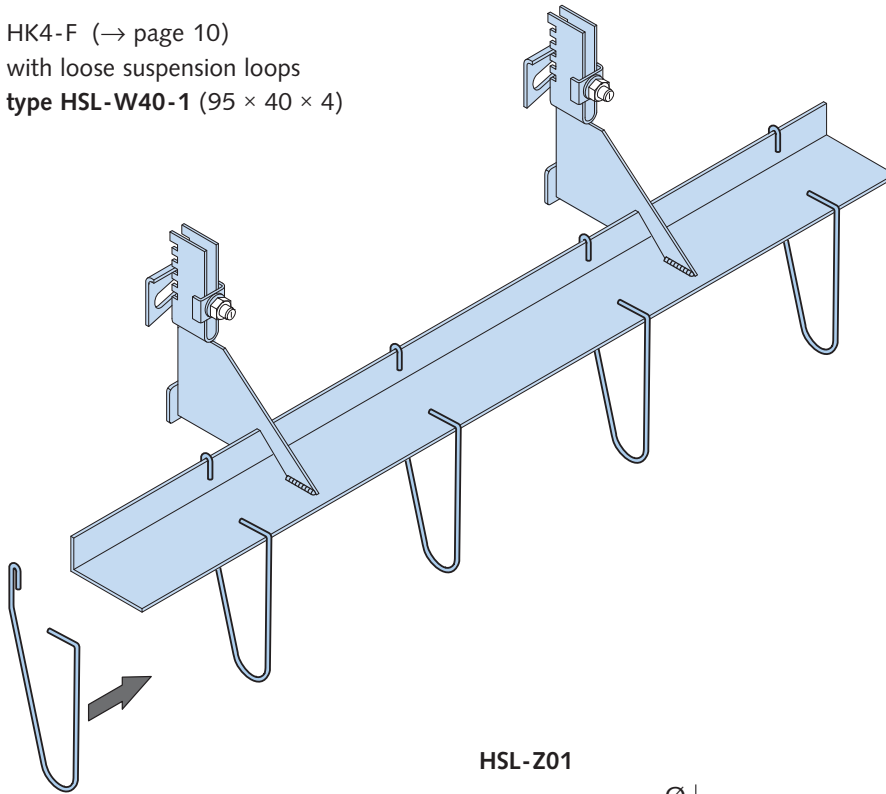


# HALFEN SUPPORT BRACKETS

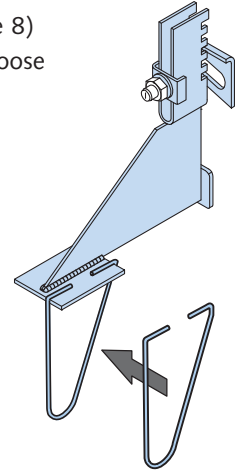
## Suspension loops

### Overview

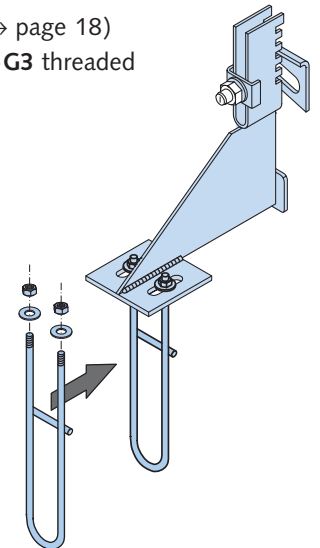
HK4-F (→ page 10)  
with loose suspension loops  
type HSL-W40-1 (95 × 40 × 4)



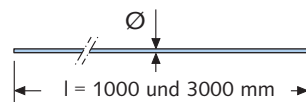
HK4-U (→ page 8)  
with HSL-A1-1 loose  
suspension loops



HK4-S (→ page 18)  
with HSL-G3 threaded  
loops



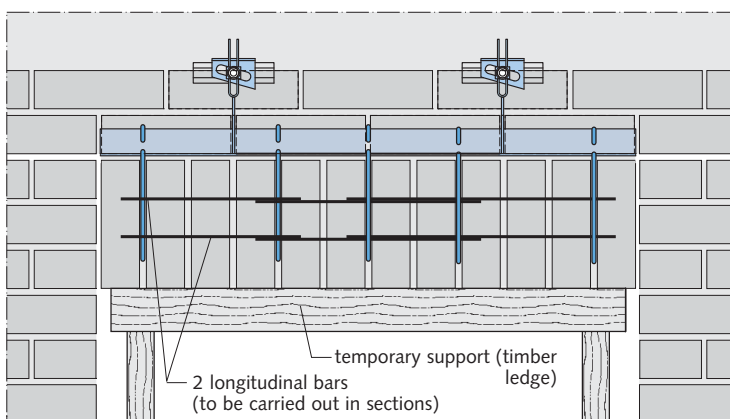
HSL-Z01



Stainless steel wire as longitudinal reinforcement for suspended soldier courses, diameter  $\text{Ø } 4 \text{ mm}$   
material: W 1.4571/ 1.4401 or 1.4404 (A4)

### Example for supporting soldier courses with concealed supports

**Note:** Bricks have to be suitable for application in soldier courses (rough surface).

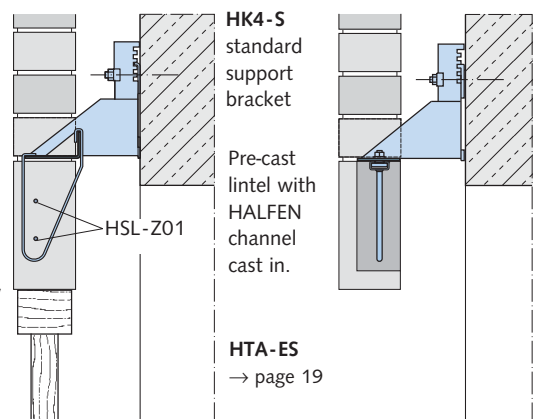


HK4-F  
standard  
support  
bracket

Place  
HSL-W  
loop onto the  
bracket and allow  
to hang  
down.

temporary support (timber ledge)  
2 longitudinal bars  
(to be carried out in sections)

### Detail with prefabricated lintel



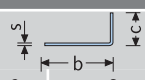
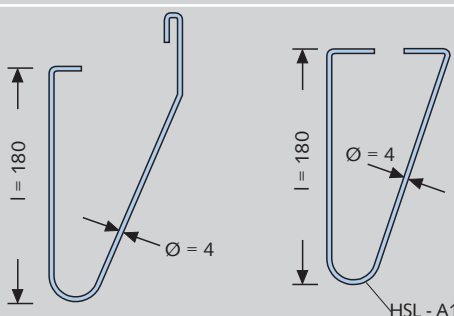
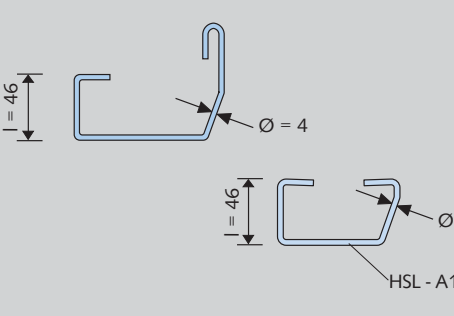
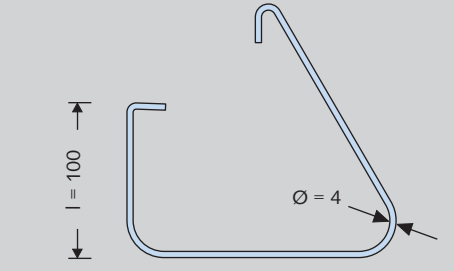
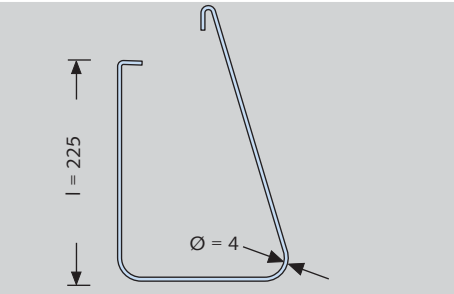
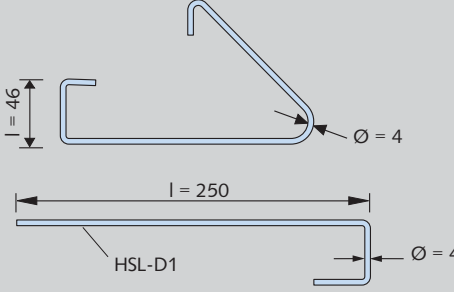
HK4-S  
standard  
support  
bracket

Pre-cast  
lintel with  
HALFEN  
channel  
cast in.

HTA-ES  
→ page 19

# HALFEN SUPPORT BRACKETS

## Suspension loops

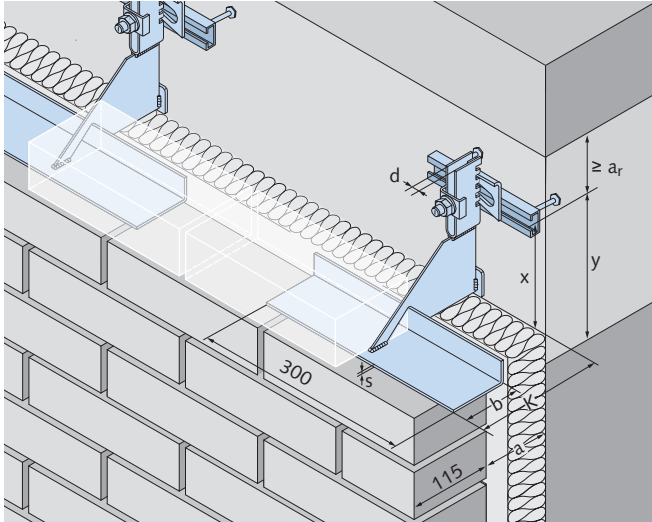
Selection of suspension loop type HSL -						
Design	version	dimensions of angle [mm]				designation of article
			b	c	s	
	1	W20	90 - 100	20	2 - 6	HSL - W20 - 1
	1	W30	90 - 100	30	3 - 6	HSL - W30 - 1
	1	W40	90 - 100	40	3 - 6	HSL - W40 - 1
	1	W50	90 - 100	50	3 - 6	HSL - W50 - 1
	1	W60	90 - 100	60	3 - 6	HSL - W60 - 1
	1	W70	90 - 100	70	4 - 8	HSL - W70 - 1
	1	W80	90 - 100	80	4 - 8	HSL - W80 - 1
	1	W90	90 - 100	90	4 - 8	HSL - W90 - 1
	1	A1	80	support angle		HSL - A1 - 1
	2	W20	90 - 100	20	2 - 6	HSL - W20 - 2
	2	W30	90 - 100	30	3 - 6	HSL - W30 - 2
	2	W40	90 - 100	40	3 - 6	HSL - W40 - 2
	2	W50	90 - 100	50	3 - 6	HSL - W50 - 2
	2	W60	90 - 100	60	3 - 6	HSL - W60 - 2
	2	W70	90 - 100	70	4 - 8	HSL - W70 - 2
	2	W80	90 - 100	80	4 - 8	HSL - W80 - 2
	2	W90	90 - 100	90	4 - 8	HSL - W90 - 2
	2	A1	80	support angle		HSL - A1 - 2
	3	W20	90 - 100	20	2 - 6	HSL - W20 - 3
	3	W30	90 - 100	30	3 - 6	HSL - W30 - 3
	3	W40	90 - 100	40	3 - 6	HSL - W40 - 3
	3	W50	90 - 100	50	3 - 6	HSL - W50 - 3
	3	W60	90 - 100	60	3 - 6	HSL - W60 - 3
	3	W70	90 - 100	70	4 - 8	HSL - W70 - 3
	3	W80	90 - 100	80	4 - 8	HSL - W80 - 3
	3	W90	90 - 100	90	4 - 8	HSL - W90 - 3
	3	A1	80	support angle		HSL - A1 - 3
	4	W20	90 - 100	20	2 - 6	HSL - W20 - 4
	4	W30	90 - 100	30	3 - 6	HSL - W30 - 4
	4	W40	90 - 100	40	3 - 6	HSL - W40 - 4
	4	W50	90 - 100	50	3 - 6	HSL - W50 - 4
	4	W60	90 - 100	60	3 - 6	HSL - W60 - 4
	4	W70	90 - 100	70	4 - 8	HSL - W70 - 4
	4	W80	90 - 100	80	4 - 8	HSL - W80 - 4
	4	W90	90 - 100	90	4 - 8	HSL - W90 - 4
	4	A1	80	support angle		HSL - A1 - 4
	5	W20	90 - 100	20	2 - 6	HSL - W20 - 4
	5	W30	90 - 100	30	3 - 6	HSL - W30 - 4
	5	W40	90 - 100	40	3 - 6	HSL - W40 - 5
	5	W50	90 - 100	50	3 - 6	HSL - W50 - 5
	5	W60	90 - 100	60	3 - 6	HSL - W60 - 5
	5	W70	90 - 100	70	4 - 8	HSL - W70 - 5
	5	W80	90 - 100	80	4 - 8	HSL - W80 - 5
	5	W90	90 - 100	90	4 - 8	HSL - W90 - 5
	5	D1	for expansion joints			HSL - D1

# HALFEN SUPPORT BRACKETS

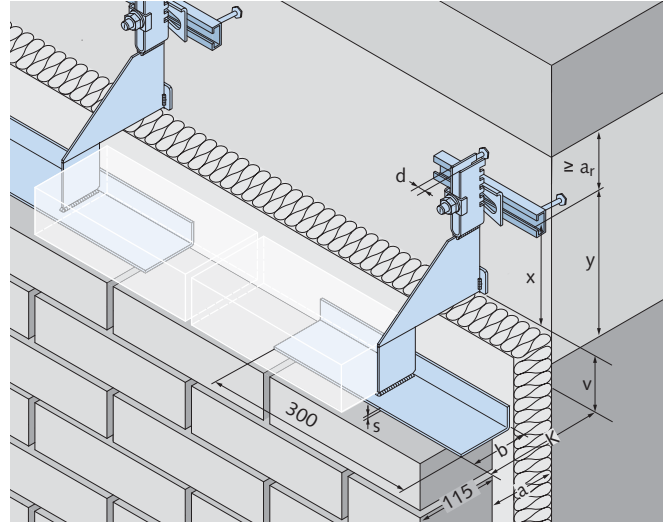
## Angle brackets HK4 - P



### HK4-P



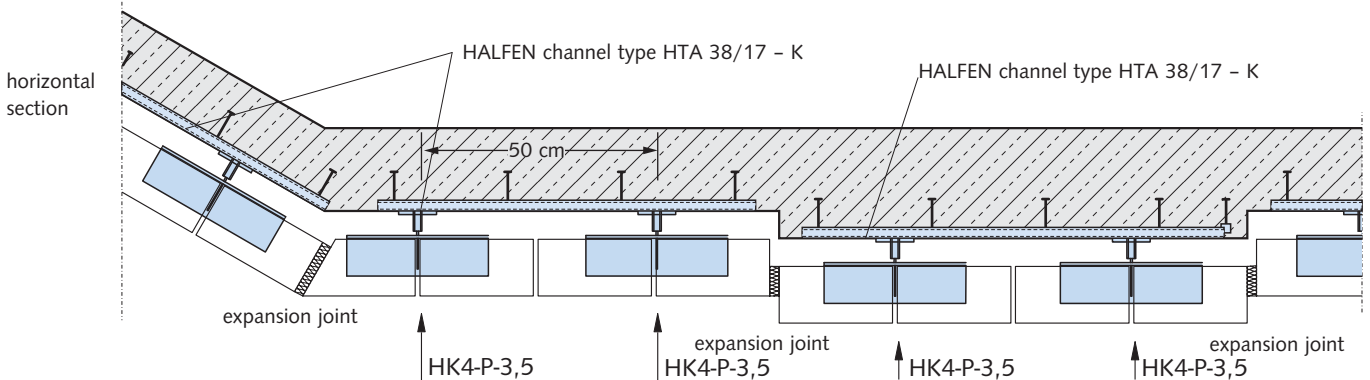
### HK4-PV

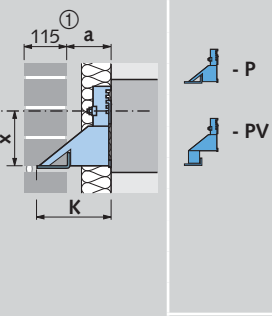


The HK4-P are used primarily in normal wall situations and at corners, e.g. internal corners or vertical joints.

The short angle provides a safe support for the bricks on each side. The brackets are fixed at 50 cm.

**Example:** Supporting brickwork cladding with height  $H \leq 3.00$  m



Selecting HK4 support brackets	distance a from wall [mm]	load level perm. $F_v = 3.5 \text{ kN} \text{ } \textcircled{2}$ ( $F_{Rd} = 4.7 \text{ kN}$ )		load level perm. $F_v = 7.0 \text{ kN} \text{ } \textcircled{2}$ ( $F_{Rd} = 9.5 \text{ kN}$ )		load level perm. $F_v = 10.5 \text{ kN} \text{ } \textcircled{2}$ ( $F_{Rd} = 14.2 \text{ kN}$ )	
		projection K	x	projection K	x	projection K	x
			40 ± 15	130	150	130	200
	60 ± 15	150	150	150	200	150	250
	80 ± 15	170	150	170	200	170	250
	100 ± 15	190	150	190	200	190	250
	120 ± 15	210	150	210	200	210	250
	140 ± 15	230	175	230	250	230	300
	160 ± 15	250	175	250	250	250	300
	180 ± 15	270	180	270	270	270	320
	200 ± 15	290	200	290	290	290	340
	220 ± 15	310	220	310	310	310	360
	240 ± 15	330	240	330	330	330	380
	260 ± 15	350	260	350	350	350	400
dimensions in mm	support angle b	100		100		100	
	width of notched bracket d	12.5		16.5		16.5	

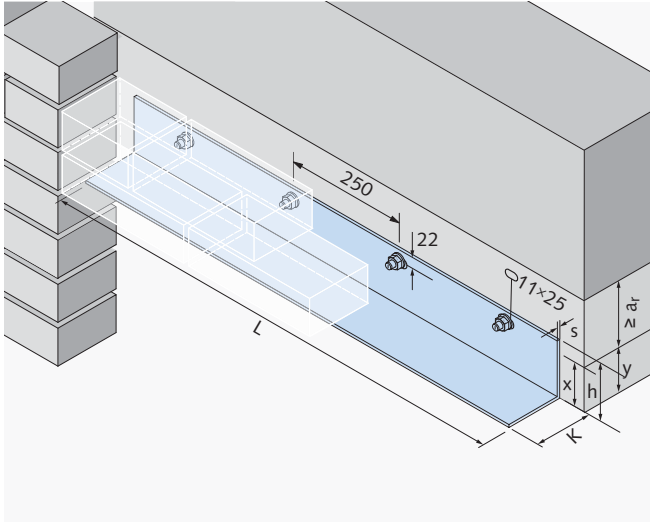
① You can also get other width of stone than 115 mm

② Loadrange/bracket

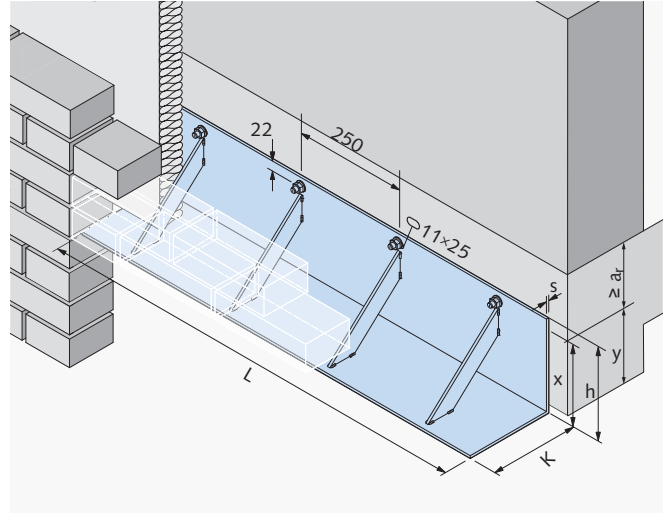
# HALFEN SUPPORT BRACKETS

## Bolt-on angles KW and KWL

### Bolt-on angle KW



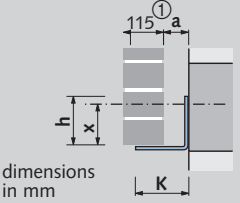
### Bolt-on angle KWL



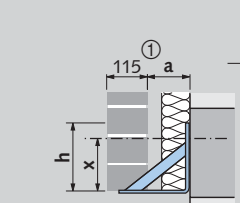
The KWL and KW angle brackets provide a simple alternative for supporting continuous wall areas. The KW and KWL angle brackets are used when the support structure is intended to remain visible from below but the air gap and the thermal insulation to be concealed.

Example for ordering:

type  
 load level  
 projection K  
**KWL - 3.2 - 170 - 750** – length of angle L

Selecting KW angle brackets  dimensions in mm	distance a from wall [mm]	load level perm. $F_V = 1.2 \text{ kN}^{\text{②}}$ ( $F_{Rd} = 1.6 \text{ kN}$ )			load level perm. $F_V = 2.1 \text{ kN}^{\text{②}}$ ( $F_{Rd} = 2.8 \text{ kN}$ )			load level perm. $F_V = 3.2 \text{ kN}^{\text{②}}$ ( $F_{Rd} = 4.3 \text{ kN}$ )		
		projection K	x	h	projection K	x	h	projection K	x	h
		10 - 20	100	74	100	100	72	100	100	70
	30 - 40	120	94	120	120	92	120	120	90	120
	material thickness s	4			6			8		

① You can use other width of stone than 115 mm  
 ② Loadrange/fixing

Selecting KWL angle brackets  dimensions in mm	distance a from wall [mm]	load level perm $F_V = 1.5 \text{ kN}^{\text{②}}$ ( $F_{Rd} = 2.0 \text{ kN}$ )			load level perm $F_V = 3.2 \text{ kN}^{\text{②}}$ ( $F_{Rd} = 4.3 \text{ kN}$ )		
		projection K	x	h	projection K	x	h
		20 - 40	130	104	130	130	102
	45 - 60	150	124	150	150	122	150
	65 - 80	170	144	170	170	142	170
	85 - 100	190	174	200	190	172	200
	105 - 120	210	194	220	210	192	220
	125 - 140	230	224	250	230	222	250
	145 - 160	250	244	270	250	242	270
	material thickness s	4			6		

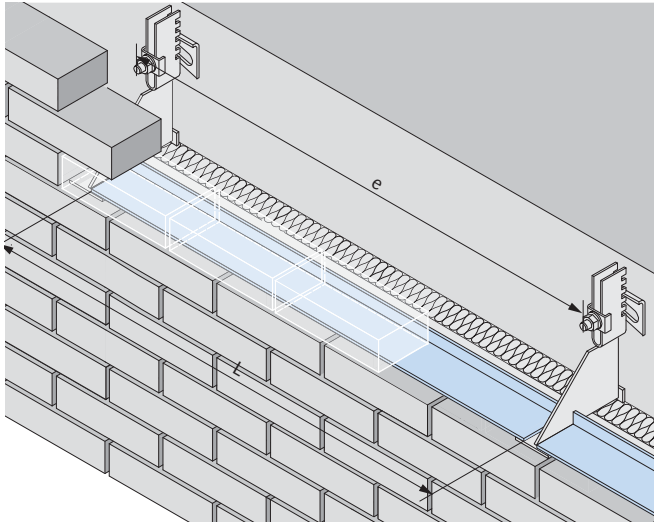
① You can use other width of stone than 115 mm  
 ② Loadrange/fixing

# HALFEN SUPPORT BRACKETS

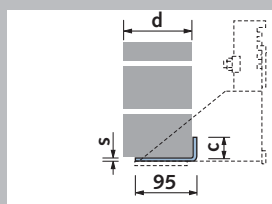
## Support angles HW



### HW-95 Support angles as intermediate angles, type-tested

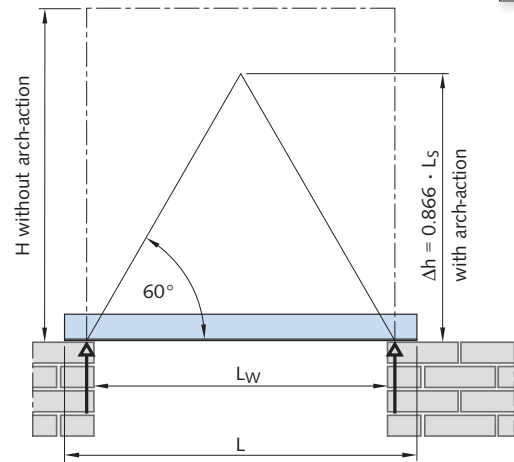
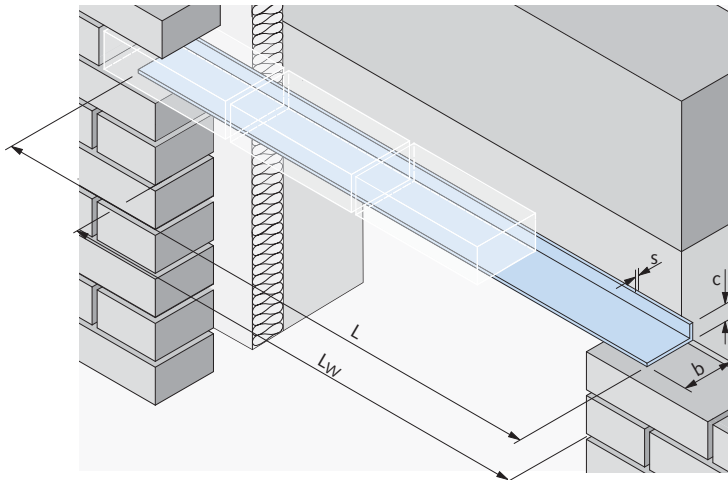


The connecting angles HW-95 are laid – as lintels - upon the support plates of single brickwork support.  
Only applicable with arch-action of the masonry.  
Designation see price list

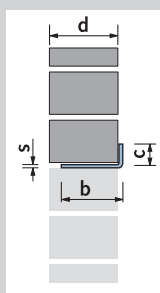
 dimensions in mm	distance between support brackets	length of angle	angle dimensions
	e	L	b × c × s
	500	<b>480</b>	95 × 20 × 2
	750	<b>730</b>	95 × 30 × 3
	1000	<b>980</b>	95 × 40 × 4



Note: For bricks of d = 90 mm we can supply HW support angles with a bearing width of 80 mm.

### Fall A: HW Support angle as support lintels over openings without suspension of lintel



### Case A: HW without suspension of lintel

 dimensions in mm	clear width $L_w$	length of angle $L$	loading height H [m] for $d \leq 11.5 \text{ cm}$ , $\gamma \leq 18 \text{ kN/m}^3$							$\Delta h$ [m]
			$\leq 1,00$	$\leq 1,25$	$\leq 1,50$	$\leq 1,75$	$\leq 2,00$	$\leq 2,25$	$\geq 2,25$	
			Dimensions of angle $b \times c \times s$ [mm]							
	510	700	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	0,497
	760	950	90 × 60 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	0,713
	1.010	1.200	90 × 60 × 4	90 × 60 × 4	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	0,930
	1.260	1.450	90 × 60 × 5	90 × 60 × 5	90 × 70 × 5	90 × 60 × 3	90 × 60 × 3	90 × 60 × 3	90 × 60 × 3	1,146
	1.510	1.700	90 × 90 × 4	90 × 90 × 4	90 × 90 × 4	90 × 90 × 5	90 × 90 × 4	90 × 90 × 4	90 × 90 × 4	1,363
	1.760	1.950	90 × 90 × 5	90 × 90 × 5	90 × 90 × 6	90 × 90 × 8	90 × 90 × 4	90 × 90 × 4	90 × 90 × 4	1,579
	2.010	2.200	90 × 90 × 8	90 × 100 × 8	90 × 100 × 8	SK	SK	SK	90 × 90 × 8	1,796

 = with arch-action  
 = without arch-action  
 SK = special construction including static proof



# HALFEN SUPPORT BRACKETS

## HW: application, calculations

### Loading on angle

- Without arch-action:

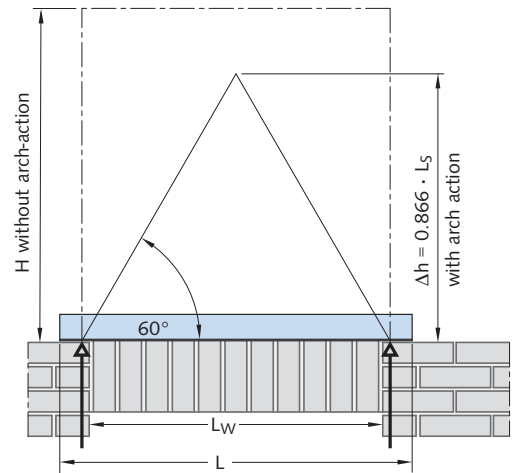
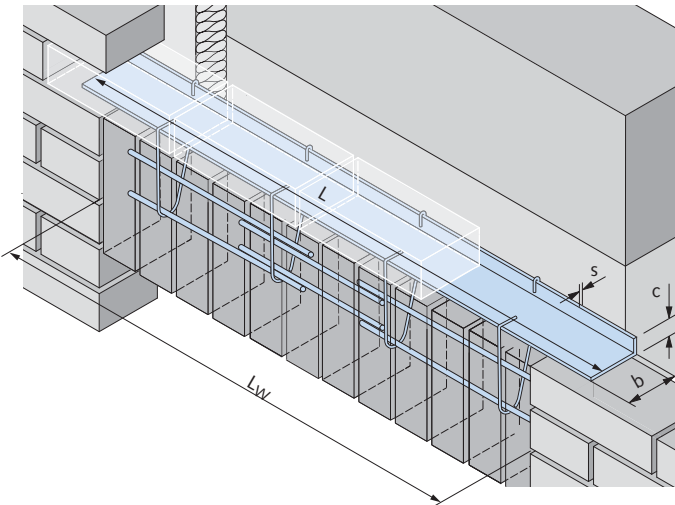
loading height =  $H$  [m]  
 load  $q = H \times d \times \gamma$  [kN/m]  
 static span  $L_S = L_w + 2 \times \text{length of bearing}/3$  [m]  
 $M_{max} = q \times L_S^2/8$  [kNm]  
 $V_{max} = q \times L_S/2$  [kN]

- With arch-action (see also DIN 1053-1, para. 8.5.3):  
**Note:** Until the hardening of the mortar the lintel has to be supported. (timber ledge → page 12)

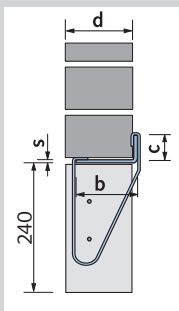
- Conditions:
1. Loading height  $\Delta h \leq H$
  2. No openings within the area of the triangle
  3. No point loads in area of the triangle
  4. Space available on the sides to transfer shear forces (→ see design manual PFM)

loading height  $\Delta h = 0.866 \times L_S$  [m]  
 load  $q = \Delta h \times d \times \gamma$  [kN/m]  
 length of angle  $L = L_w + 2 \times \text{length of bearing}$  [m]  
 static span  $L_S = L_w + 2 \times \text{length of bearing}/3$  [m]  
 $M_{max} = q \times L_S^2/12$  [kNm]  
 $V_{max} = q \times L_S/4$  [kN]

### Fall B: HW Support angle as support lintels over openings with suspension of lintel



### Case B: HW with suspension of lintel



dimensions in mm

clear width $L_w$	length of angle $L$	loading height $H$ [m] for $d \leq 11.5$ cm. $\gamma \leq 18$ kN/m <sup>3</sup>								$\Delta h$ [m]
		$\leq 1,00$	$\leq 1,25$	$\leq 1,50$	$\leq 1,75$	$\leq 2,00$	$\leq 2,25$	$\geq 2,5$		
Dimensions of angle $b \times c \times s$ [mm]										
510	700	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	90 × 30 × 3	0,497
760	950	90 × 60 × 4	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	90 × 45 × 3	0,713
1.010	1.200	90 × 60 × 4	90 × 60 × 5	90 × 60 × 3	90 × 60 × 3	90 × 60 × 3	90 × 60 × 3	90 × 60 × 3	90 × 60 × 3	0,930
1.260	1.450	90 × 90 × 4	90 × 90 × 5	90 × 90 × 5	90 × 60 × 4	90 × 60 × 4	90 × 60 × 4	90 × 60 × 4	90 × 60 × 4	1,146
1.510	1.700	90 × 90 × 5	90 × 90 × 5	90 × 90 × 6	90 × 90 × 6	90 × 90 × 4	90 × 90 × 4	90 × 90 × 4	90 × 90 × 4	1,363
1.760	1.950	90 × 90 × 5	90 × 90 × 6	90 × 90 × 8	90 × 90 × 8	90 × 90 × 5	90 × 90 × 5	90 × 90 × 5	90 × 90 × 5	1,579
2.010	2.200	90 × 100 × 8	90 × 100 × 8	90 × 110 × 8	SK	SK	SK	SK	90 × 100 × 8	1,796

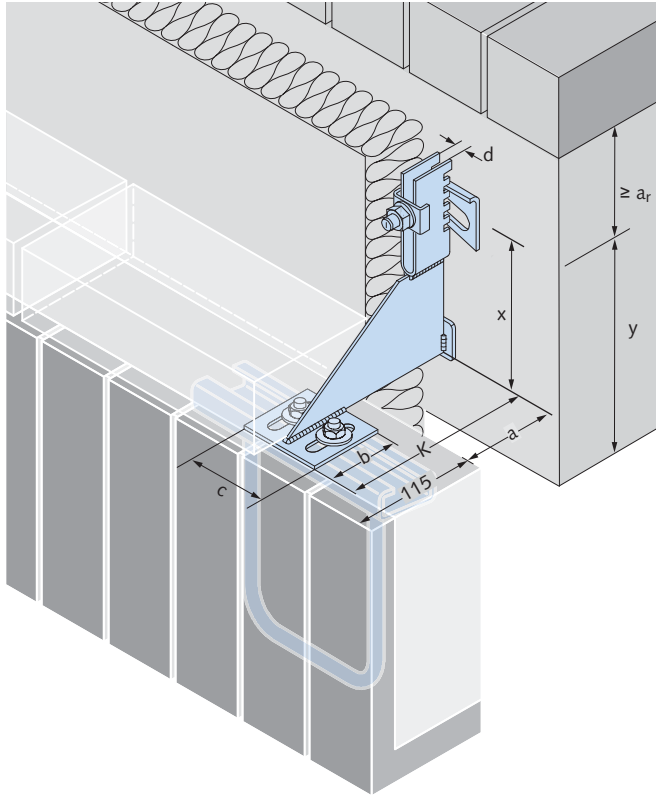
- = with arch-action
- = without arch-action
- SK = special construction including static proof

# HALFEN SUPPORT BRACKETS

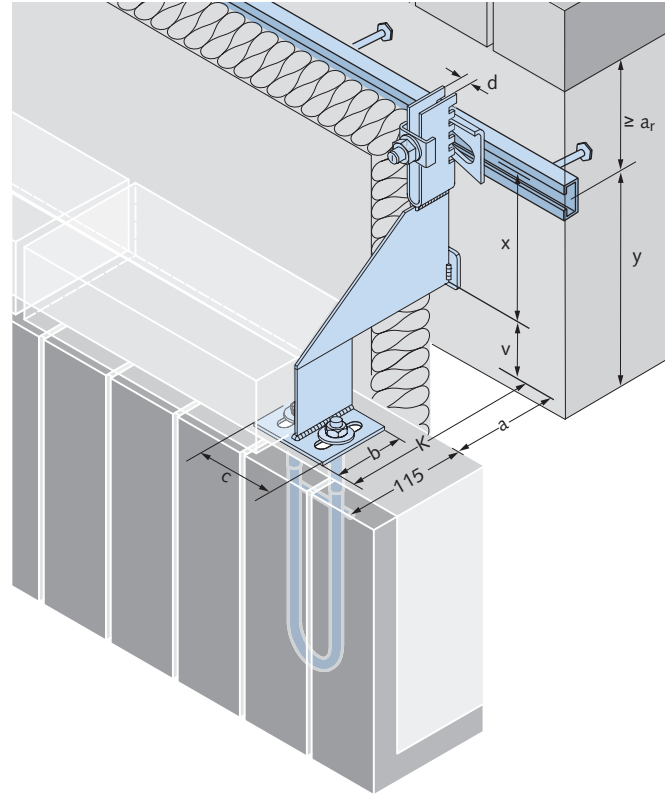
## Individual support brackets HK4-S for pre-cast lintels



**HK4-S**



**HK4-SV**



If brick cladding is supported in the area of openings by pre-cast lintels which do not have bearing on the sides (vertical joint), HK4-S support brackets can be used.

In that case, each lintel is supported by at least 2 brackets. Calculations for the pre-cast lintel have to be provided by the structural engineer or the manufacturer.

The horizontal and vertical adjustment options make an accurate alignment of the lintel possible.

Selecting HK4 support brackets	distance a from wall [mm]	load level perm. $F_V = 3.5 \text{ kN} \text{ } \textcircled{2}$ ( $F_{Rd} = 4.7 \text{ kN}$ )		load level perm. $F_V = 7.0 \text{ kN} \text{ } \textcircled{2}$ ( $F_{Rd} = 9.5 \text{ kN}$ )		load level perm. $F_V = 10.5 \text{ kN} \text{ } \textcircled{2}$ ( $F_{Rd} = 14.2 \text{ kN}$ )	
		projection K	x	projection K	x	projection K	x
	40 ± 15	130	150	130	200	130	250
	60 ± 15	150	150	150	200	150	250
	80 ± 15	170	150	170	200	170	250
	100 ± 15	190	150	190	200	190	250
	120 ± 15	210	150	210	200	210	250
	140 ± 15	230	175	230	250	230	300
	160 ± 15	250	175	250	250	250	300
	180 ± 15	270	180	270	270	270	320
	200 ± 15	290	200	290	290	290	340
	220 ± 15	310	220	310	310	310	360
	240 ± 15	330	240	330	330	330	380
	260 ± 15	350	260	350	350	350	400
support angle	b × c × s	80 × 80 × 5		80 × 80 × 7		80 × 80 × 10	
width of notched bracket	d	12.5		16.5		16.5	

① You can also get other width of stone than 115 mm

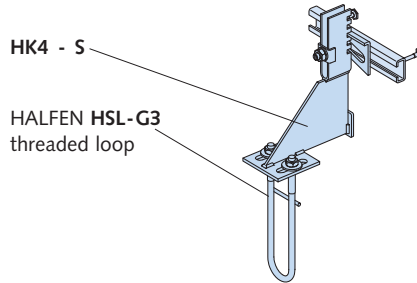
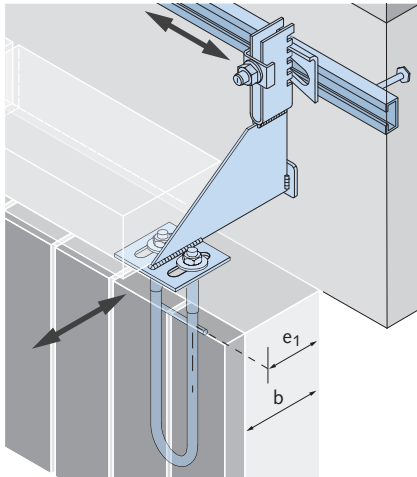
② Loadrange/bracket

# HALFEN SUPPORT BRACKETS

## Ties for pre-cast lintels



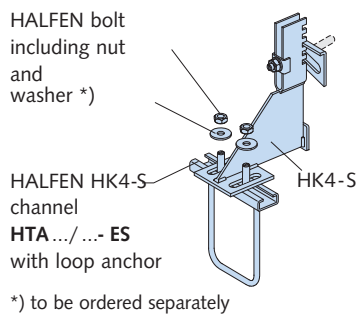
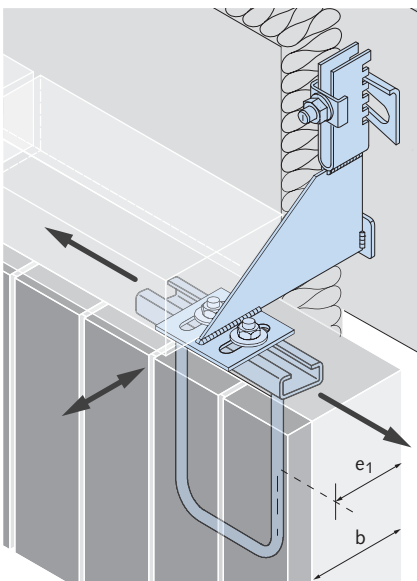
### HSL - G3: HALFEN threaded loop, cast-in, type-tested, HK4-S and bracket



for all versions: e <sub>1</sub> depending on b		
b [mm]	60	80
e <sub>1</sub> [mm]	40	50

HSL-G3	load level per bracket / threaded loop		
		zul F <sub>V</sub> = 3.5 kN (F <sub>Rd</sub> = 4.7 kN)	zul F <sub>V</sub> = 7.0 kN (F <sub>Rd</sub> = 9.5 kN)
Threaded loop	HSL - G3 - M 8	HSL - G3 - M 10	HSL - G3 - M 12
Material:	stainless steel W 1.4401, 1.4404 or 1.4571 (A4)		

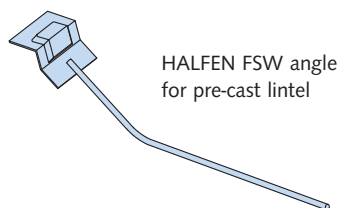
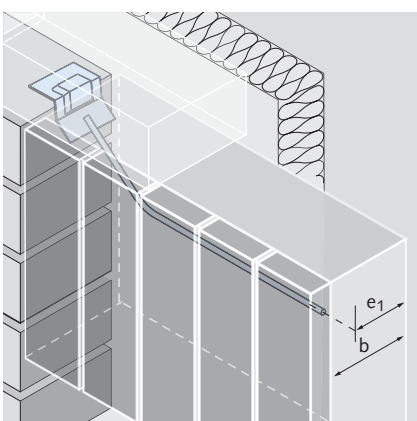
### HTA - ES: HALFEN channel, cast-in, type-tested, and bracket HK4-S



for all versions: e <sub>1</sub> depending on b		
b [mm]	60	80
e <sub>1</sub> [mm]	40	50

HTA-ES	load level per bracket / threaded loop		
		zul F <sub>V</sub> = 3.5 kN (F <sub>Rd</sub> = 4.7 kN)	zul F <sub>V</sub> = 7.0 kN (F <sub>Rd</sub> = 9.5 kN)
HALFEN channel	HTA 28/15-ES	HTA 38/17-ES	HTA 49/30-ES
HALFEN bolt including nut + washer *)	2 × HS 28/15 - M 10x30 2 × US M 10 (DIN 9021)	2 × HS 38/17 - M 10x30 2 × US M 10 (DIN 9021)	2 × HS 50/30 - M 12x40 2 × US M 12 (DIN 125)
Material:	stainless steel W 1.4401, 1.4404 or 1.4571 (A4)		

### FSW: HALFEN angle for pre-cast lintel, cast-in, type-tested



FSW	load level per bracket [kN]					
		zul F <sub>V</sub> = 3.5 (F <sub>Rd</sub> = 4.7)	zul F <sub>V</sub> = 2.6 (F <sub>Rd</sub> = 3.5)	zul F <sub>V</sub> = 3.9 (F <sub>Rd</sub> = 5.3)	zul F <sub>V</sub> = 5.1 (F <sub>Rd</sub> = 6.9)	zul F <sub>V</sub> = 5.3 (F <sub>Rd</sub> = 7.2)
Angle for pre-cast lintel	FSW - 3.5 - 80	FSW - 2.6 - 60	FSW - 3.9 - 60	FSW - 5.1 - 60	FSW - 5.3 - 80	FSW - 6.8 - 80
Material:	rod: BSt 500 S			angle: W 1.4401, 1.4404 or 1.4571 (A4)		

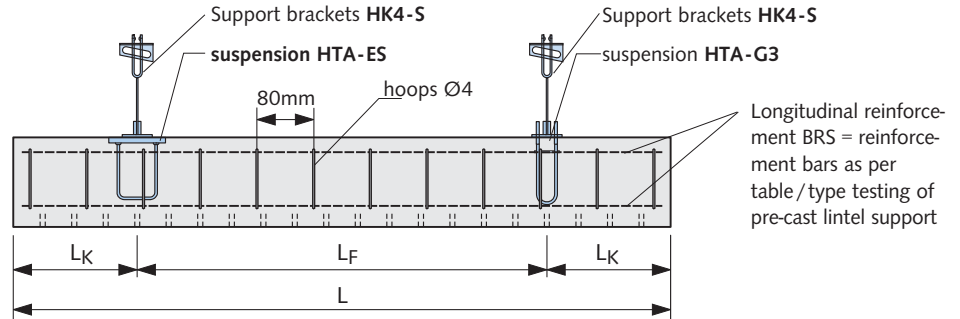
# HALFEN SUPPORT BRACKETS

## Ties for pre-cast lintels



### Sizing of HTA - ES / HSL - G3

- Required reinforcements  $A_s$  [number of bars with  $\varnothing$  mm]
- Required load level LS [kN] or HK4-S support bracket and lintel tie type HTA-ES or HSL-G3.

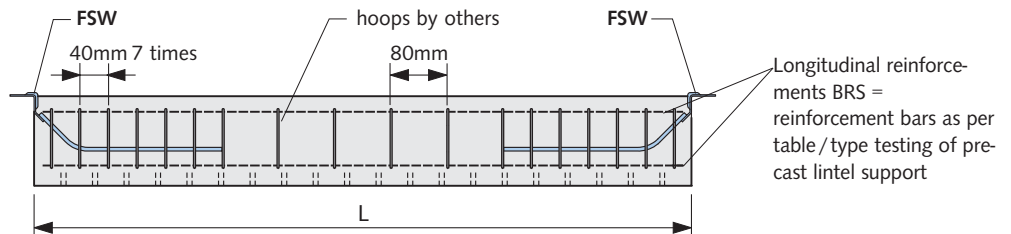


HTA-ES respectively HSL-G3		length of lintel L (length of field L <sub>F</sub> ) [m]					
		up 1.25 (0.75)	up 1.75 (1.00)	up 2.25 (1.25)	up 2.75 (1.50)	up 3.25 (2.00)	up 3.75 (2.25)
loading height H (see page 16-17) ①	up 1.00 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 8 7.0 kN	1 $\varnothing$ 8 7.0 kN
	up 1.50 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 8 7.0 kN	1 $\varnothing$ 6 + 1 $\varnothing$ 8 10.5 kN
	up 2.00 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 10.5 kN	1 $\varnothing$ 6 + 1 $\varnothing$ 8 10.5 kN	1 $\varnothing$ 6 + 1 $\varnothing$ 8 10.5 kN
	up 2.50 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 10.5 kN	1 $\varnothing$ 6 10.5 kN	1 $\varnothing$ 8 10.5 kN	
	up 3.00 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 10.5 kN	1 $\varnothing$ 6 10.5 kN		$A_s$ , top = $\varnothing$ 8
	up 3.50 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 7.0 kN	1 $\varnothing$ 6 10.5 kN	1 $\varnothing$ 6 10.5 kN			other $A_s$ , top = $\varnothing$ 6

① For brick d = 11.5 cm and density  $\leq 18$  kN/m<sup>3</sup> shortened version. For the complete table see type testing

### Sizing FSW

- Required reinforcements  $A_s$  [number of bars with  $\varnothing$  mm]
- Required load level LS [kN] of pre-cast lintel angle.



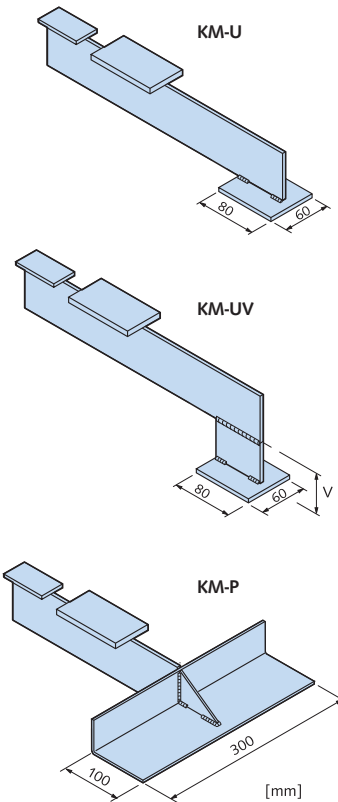
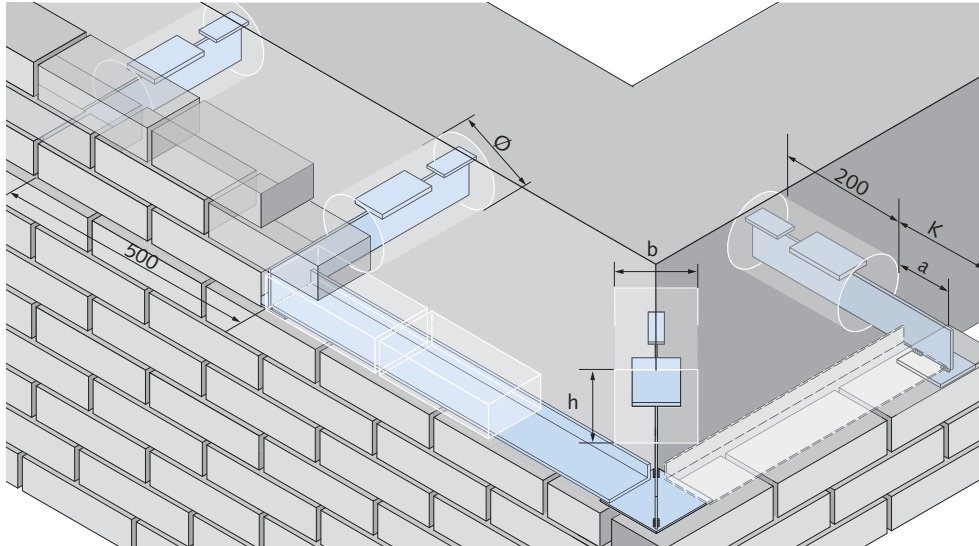
Sizing FSW		length of lintel L					
		up 1.50 m	up 2.00 m	up 2.50 m	up 3.00 m	up 3.50 m	up 4.00 m
loading height H (see page 16-17) ①	up 1.00 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 8 3.5 kN	1 $\varnothing$ 6 + 1 $\varnothing$ 8 5.3 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 10 5.3 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 10 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 12 6.8 kN
	up 1.50 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 + 1 $\varnothing$ 8 5.3 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 10 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 10 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 14 6.8 kN	
	up 1.75 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 6 + 1 $\varnothing$ 8 5.3 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 10 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 12 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 14 6.8 kN	
	up 2.00 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 8 3.5 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 10 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 12 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 14 6.8 kN	
	up 2.25 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 8 3.5 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 10 6.8 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 12 6.8 kN		
	> 2.25 m	Reinforcement $A_s$ , below load level LS 1 $\varnothing$ 6 3.5 kN	1 $\varnothing$ 8 3.5 kN	1 $\varnothing$ 6 + 1 $\varnothing$ 8 5.3 kN	1 $\varnothing$ 8 + 1 $\varnothing$ 12 6.8 kN		$A_s$ , top = $\varnothing$ 6 for all lengths of lintels

① For brick d = 11.5 cm and density  $\leq 18$  kN/m<sup>3</sup> shortened version. For the complete table see type testing

# HALFEN SUPPORT BRACKETS

## Grout-in brackets KM

### KM-U



The support brackets are suitable for supporting brick cladding that is constructed on the face of existing buildings. This involves a first step of cutting or drilling sufficiently deep recesses into the existing brickwork, using cutting equipment or a core drill. Then the support brackets have to be set in mortar in these recesses. Only cement mortar of group III should be used for this purpose. The intermediate supporting angles are put in place loosely. The height of the brick cladding supported by the brackets can not exceed 3.00 m.

Load level of the KM grout-in brackets: perm.  $F_V = 3.0 \text{ kN}$  ( $F_{Rd} = 4.0 \text{ kN}$ ). It may be necessary to perform calculation checks regarding the further load transfer from the brickwork into other parts of the building. Minimum compressive strength of the existing brickwork must be  $\geq 0.5 \text{ MN/m}^2$  with a wall thickness of at least  $\geq 24 \text{ cm}$ .

Note:  
If the compressive strength of the brickwork is higher, it is also possible to support greater weights of brickwork, i.e. panels up to 6 m high approx.

Structural calculations are required. Technical advice is available from HALFEN.

KM	wall distance a [mm]	projection K [mm]	break dimension of hole for rectangular core drill h x b [mm]	core hole diameter by the use of a core drill Ø [mm]
-U	20 ± 15	110	110 × 80	110
-UV	40 ± 15	130	115 × 85	115
-P	60 ± 15	150	120 × 90	120
-PV	80 ± 15	170	125 × 90	125
-E	100 ± 15	190	125 × 90	125
-EV	120 ± 15	210	130 × 95	130
	140 ± 15	230	140 × 100	140
	160 ± 15	250	150 × 120	150

① For the dimensions of the support plates of types KM-U and KM-P: see support brackets HK4-U and HK4-P (pages 8 - 14)

② Standard dimension v = 60 mm; other dimensions on request

③ Other brick d then 115 mm possible

Note: When constructing brick cladding on existing buildings, calculations have to be carried out to check whether the walls and the foundations are capable of transferring the additional loads with a sufficient safety factor. If this is not the case, the new brick cladding leaf has to be supported on separate foundations.

# HALFEN SUPPORT BRACKETS

## Parapet support brackets HAV

### Parapet support brackets HAV 80/...

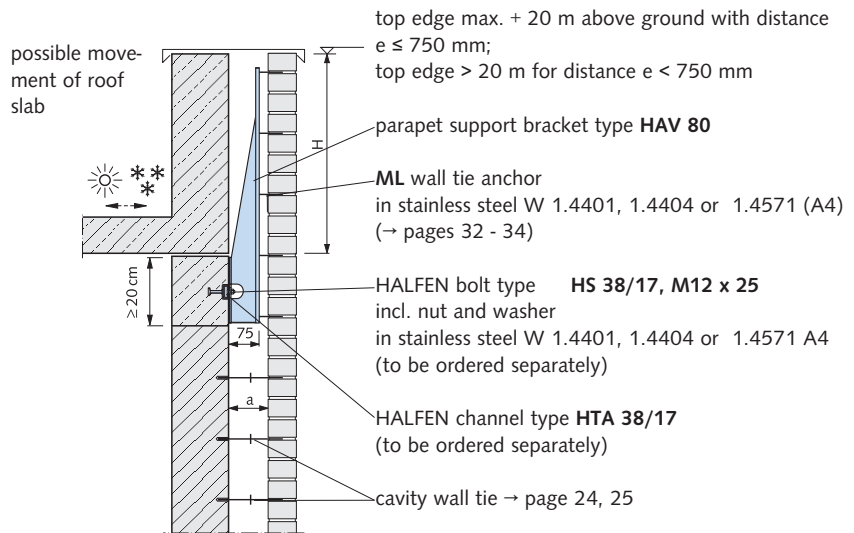
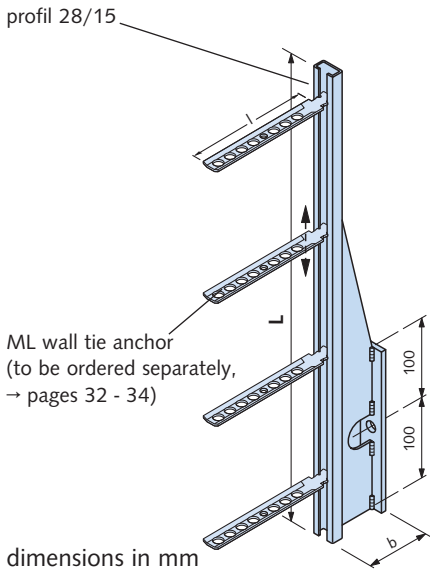
Flat roof slabs constructed in reinforced concrete are subject to particular loads from changes in temperature. The resulting longitudinal changes of the roof structure are accommodated by sliding bearings between slab and supporting structure.

When brick cladding is attached to the parapet, these longitudinal movements would lead to cracks in the brick cladding. For this reason it is necessary to separate the cladding from the parapet.

The HAV parapet support bracket achieves this purpose. The brick cladding is fixed to the parapet support bracket using wall tie anchors.

A suitable fixing for the parapet support brackets is in HALFEN channels that have been included in the casting of the ring beam. This means that any movement of the roof slab does not effect the brick cladding.

material:  
stainless steel W 1.4401, 1.4404 or 1.4571 (A4)

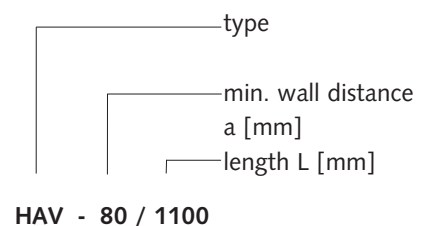


HAV -	length L			wall tie anchor	
	600mm	850 mm	1100 mm	wall distance a (mm)	with wall tie anchor
	HAV 80/600	HAV 80/850	HAV 80/1100	80 - 110	ML 85
				90 - 145	ML 120
				145 - 200	ML 180
dimension b:	75	75	75	Bigger projections are possible (Type HAV 140/850)	
requ. number of ML brackets	3	4	5		

Fixing into concrete:

	<p>recommended HALFEN channel with HALFEN bolt and nut</p> <p>HS 38/17 - M 12 x 25 calculations required in each case</p>
	<p>HALFEN HB injection anchor bolts for concrete with and without cracks</p> <p>HB-VMZ-A-70 - M12-25/115-A4 (Order No: 0432.380-00062) Calculations required in each case Cartridge and accessories are be ordered separately</p>

Example for ordering:

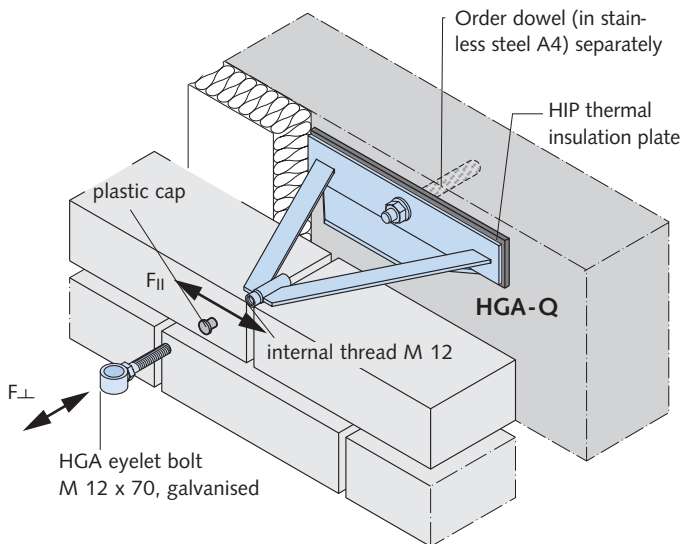


# HALFEN SUPPORT BRACKETS

## Durable scaffold anchors for brick cladding façades

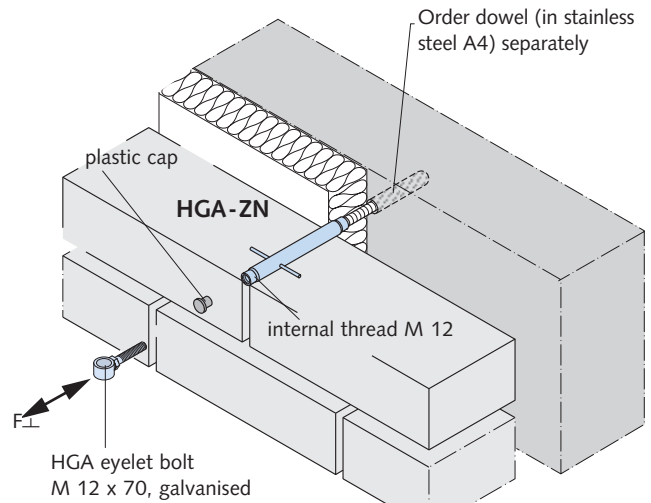
### HGA-Q Scaffold anchor

For tensile and shear loads



### HGA-ZN Scaffold anchor

Only for tensile loads



Durable scaffold anchors are used to fix work scaffoldings to existing building structures. In accordance with local regulations and building control approvals. The anchors have to be able to transfer horizontal as well as parallel-acting forces. These forces have to be safely transferred to the load-bearing inner leaf.

The HIP thermal insulation plate is a 5 mm thick PVC panel. It separates thermally the anchor from the anchoring ground.

For detailed information please refer to our "HALFEN Durable Scaffold Anchors Technical Product Information GA"

HIP	for anchor	Order-No. 0159.030-
1	HGA-Q 160/185/210	00001
2	HGA-Q 235/260/285	00002
3	HGA-Q 310/335/360	00003



### HGA-Q Scaffold anchor

plan view	scaffold anchor article designation	k <sup>ⓐ</sup> [mm]	g [mm]
	HGA-Q 160	160	165 - 185
	HGA-Q 185	185	190 - 210
	HGA-Q 210	210	215 - 235
	HGA-Q 235	235	240 - 260
	HGA-Q 260	260	265 - 285
	HGA-Q 285	285	290 - 310
	HGA-Q 310	310	315 - 335
	HGA-Q 335	335	340 - 360
	HGA-Q 360	360	365 - 385
HALFEN Wedge anchor for concrete without cracks	HB-B - 12-10-25/105-A4 (Order-No.: 0432.060-00135)		
HALFEN HB-VMZ Injection anchor bolt for concrete with and without cracks	HB-VMZ-A-70 - M12-25/115-A4 (Order-No.: 0432.380-00062)		
perm. load-bearing capacity	F <sub>⊥</sub> = ± 5.7 kN F <sub>  </sub> = 1.9 kN	(F <sub>⊥,Rd</sub> = ± 8.6 kN) (F <sub>  ,Rd</sub> = 2.9 kN)	
① other dimensions on request			

### HGA-ZN Scaffold anchor

plan view	scaffold anchor article designation	L <sup>ⓐ</sup> [mm]	g [mm]	
	HGA-ZN 115	115	145 - 165	
	HGA-ZN 145	145	165 - 195	
	HGA-ZN 175	175	195 - 225	
	HGA-ZN 205	205	225 - 255	
	HGA-ZN 235	235	255 - 285	
	HGA-ZN 265	265	285 - 305	
	HGA-ZN 295	295	315 - 335	
	HGA-ZN 325	325	345 - 365	
	HGA-ZN 355	355	375 - 395	
	HALFEN Wedge anchor for concrete without cracks	HB-B - 12-50-65/145-A4 (Order-No.: 0432.060-00016)		
	HALFEN HB-VMZ Injection anchor bolt for concrete with and without cracks	HB-VMZ-A-80 - M12-50/150-A4 (Order-No.: 0432.380-00011)		
perm. load-bearing capacity	F <sub>⊥</sub> = ± 5.7 kN	(F <sub>⊥,Rd</sub> = ± 8.6 kN)		
① other dimensions on request				

# HALFEN SUPPORT BRACKETS

## Cavity wall tie

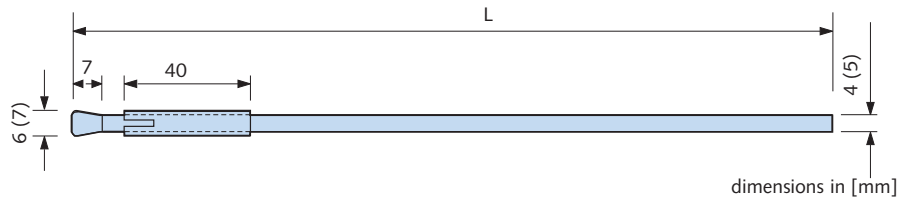
### HEA Cavity wall ties



Approved under building control for anchoring in concrete C 20/25, approval no. Z - 21.1 - 910.

Material: stainless steel A4.

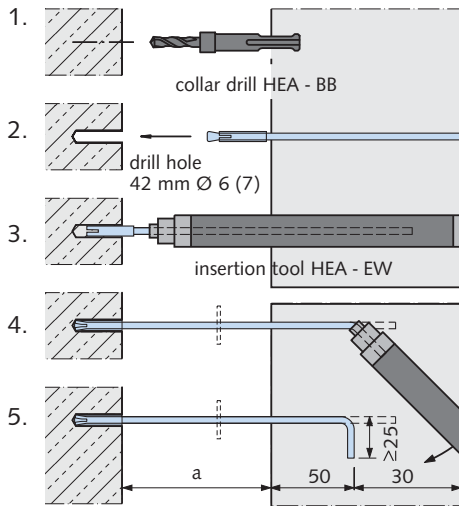
Size of drilled hole only  $\varnothing 6 \times 42$  mm or  $7 \times 42$  mm (see table below), allowing quick and easy fitting. Stainless steel dowelling ensures safe, long-term anchoring. Building material class A in accordance with DIN 4102 hence also suitable for building components subject to special requirements regarding fire resistance.



Designation	order no.	size of cavity
L / $\varnothing$ [mm]	0140.010-	a [mm]
HEA - 160/4	00001	0 - 45
HEA - 200/4	00002	45 - 85
HEA - 250/4	00004	85 - 135
HEA - 300/4	00006	135 - 185*)
HEA - 200/5	00003	45 - 85
HEA - 250/5	00005	85 - 135
HEA - 300/5	00007	135 - 185*)
HEA - BB 4	0143.010-00001	for HEA - .../4
HEA - BB 5	0143.010-00002	for HEA - .../5
HEA - EW 4	0143.020-00001	for HEA - .../4
HEA - EW 5	0143.020-00002	for HEA - .../5

\*) Cavity sizes  $\geq 150$  mm are not covered by DIN 1053-1, para. 8.4.3.2. Separate calculations are required.

#### Horizontal section:

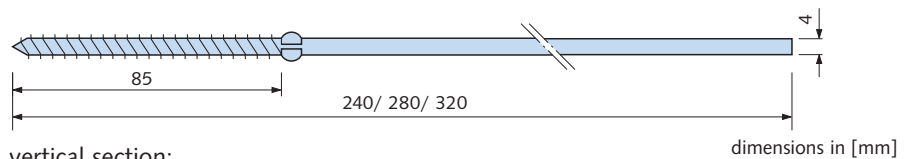


#### Fitting instructions:

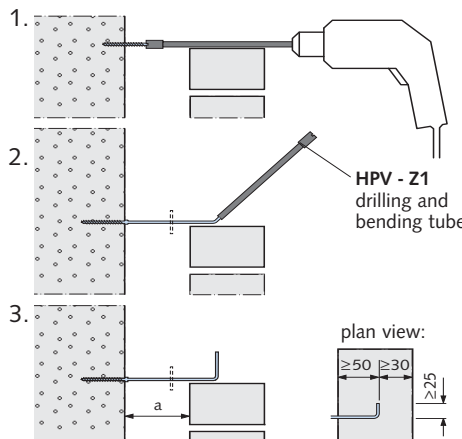
1. Drill hole  $\varnothing 6 \times 42$  mm or  $7 \times 42$  mm  
Using collar drill HEA BB4 or HEA BB5 and then clean out the hole.
2. Insert the end of the HEA cavity wall tie with the pre-fitted expansion sleeve into the hole.
3. Use the insertion tool HEA - EW 4 or HEA - EW 5 to drive the expansion sleeve into the hole until the end of the sleeve is flush with the surface of the concrete.
4. Now turn the end of the HEA cavity wall tie by  $90^\circ$  and...
5. ...lmbed it in the mortar of the wall joint.

### HPV-L Aerated concrete cavity wall tie

For anchoring brick cladding to load-bearing aerated concrete block walls.  
Material: stainless steel W 1.4401, 1.4404, 1.4571 (A4)



#### vertical section:



#### Fitting instructions:

1. Use an electric drill and the HPV-Z1 drilling tube, without pre-drilling a hole, to turn the HPV cavity wall tie into the aerated concrete. When the specified depth has been reached, the wall tie will automatically come to a halt.
2. Bend the wall tie...
3. and lay the wall tie into the mortar of the horizontal joint of the brick leaf.

Designation.	order no.	size of cavity a [mm]	number of m <sup>2</sup>	
			G2	G4
L / $\varnothing$ [mm]	0141.010-			
HPV - L - 240/4	0001	0 - 80	7	5
HPV - L - 280/4	0002	80 - 120		
HPV - L - 320/4	0003	120 - 160*)	9	7
HPV - Z1	0143.030-00001	for HPV - L - .../4		

\*) Cavity sizes  $\geq 150$  mm are not covered by DIN 1053-1, para. 8.4.3.2. Separate calculations are required.



# HALFEN SUPPORT BRACKETS

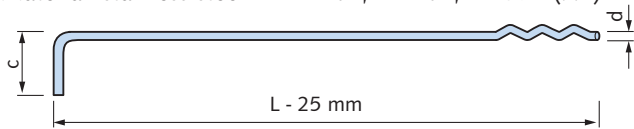
## Cavity wall tie

### LSA-W Cavity wall tie



For placing in ongoing brickwork  
approval No. Z-17.1-825

Material: stainless steel W 1.4401, 1.4404, 1.4571 (A4)



Designation of article length / d / c [mm]	order no.	size of cavity a [mm]
	0142.070-	
LSA-W-225/4/25	00001	bis 100
LSA-W-250/4/25	00002	100 - 125
LSA-W-275/4/25	00003	125 - 150
LSA-W-300/4/25	00004	150 - 175
LSA-W-340/4/25	00005	175 - 215

### LSA-DW Cavity wall tie including 8 x 60 dowel



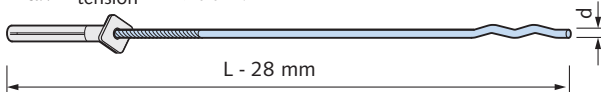
For anchoring in solid brickwork and reinforced concrete  
approval No. Z-21.2-1009 and Z-17.1-825.

Material: stainless steel W 1.4401, 1.4404, 1.4571 (A4)

Drill hole  $\varnothing 8 \times 65$  mm, according to EN 845-1

max.  $F_{\text{pressure}} = 1250$  N

max.  $F_{\text{tension}} = 1700$  N

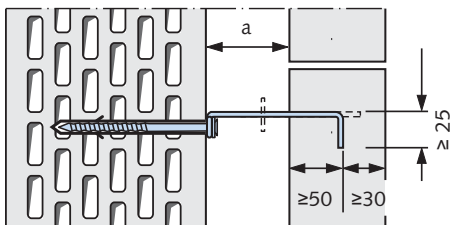


Designation of article length / d / c [mm]	order no.	size of cavity a [mm]
	0142.080-	
LSA-DW-160/4	00001	bis 25
LSA-DW-180/4	00002	25 - 45
LSA-DW-210/4	00003	45 - 75
LSA-DW-250/4	00004	75 - 115
LSA-DW-275/4	00005	115 - 140
LSA-DW-300/4	00006	140 - 165
LSA-DW-320/4	00007	165 - 185
LSA-DW-350/4	00008	185 - 200

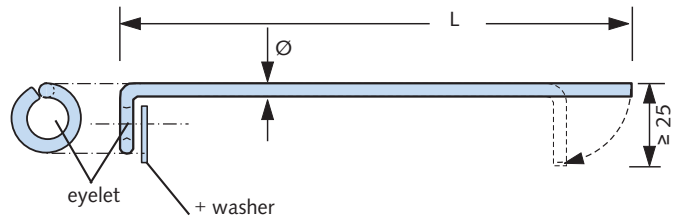
### LSA-L Cavity wall tie

For anchoring to honeycomb brickwork and lime / sand brickwork.

Dowel approved under build. reg's. and stainless steel bolt



### LSA-L Cavity wall tie with washer (stainless steel A4) and drip ring

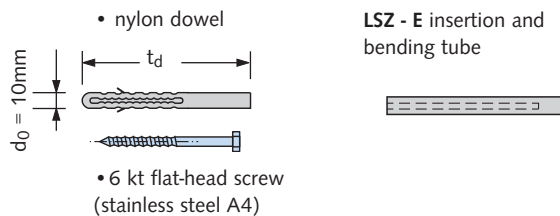


Designation Typ. L / Ø/c [mm]	order no.	size of cavity a [mm]
	0142.050-	
LSA-L-235/4	00001	20 - 150*)

to be ordered separately:

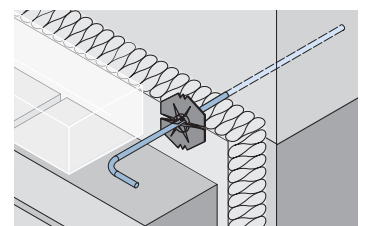
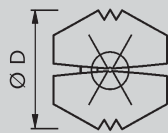
dowel and bolt for LSA-L-235/4	order no. 0432.010-	
<b>DUE-FUR 10 x 80 SS A4</b>	00001	
insertion/bending tube	order no. 0143.080-	
LSZ-E	00001	

\*) Cavity sizes > 150 mm are not covered by DIN 1053-1, para. 8.4.3.2. Separate calculations are required.



### Holder for insulation slabs, drip rings

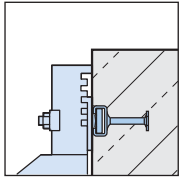
Designation of article	order no.	for anchor $\varnothing$ [mm]	$\varnothing D$ [mm]
	0143.050-		
<b>LSZ - ISO - Clip 3-6</b> insulation holder with drip nose	00002	3 - 6	60



## HALFEN KONSOLANKER

### Fixing HALFEN support brackets - Overview

#### Concrete

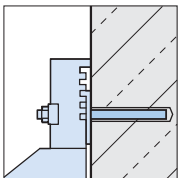


Fixing to **HTA** HALFEN  
cast-in channels  
→ page 27

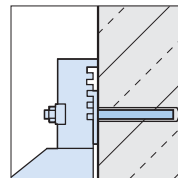
For detailed information please refer to our  
catalogue "Technical Product Information  
HALFEN Cast-in Channels B"



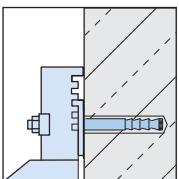
#### Chemical Anchor Bolt Systems



Fixing to HALFEN Chemical anchor  
**HB-V** only for non-cracked concrete  
→ page 28



Fixing to HALFEN Injection anchors  
**HB-VMU** only for non-cracked concrete  
→ page 29

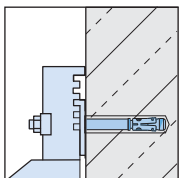


Fixing to HALFEN Injection anchors  
**HB-VMZ** for cracked concrete and  
non-cracked concrete  
→ page 29

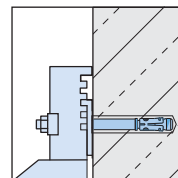
For detailed  
information please  
refer to our catalogue  
"Technical Product  
Information HALFEN  
Anchor Bolt Systems"



#### Mechanical Heavy Duty Anchors

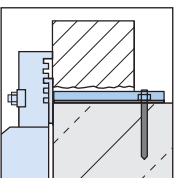


Fixing to HALFEN Wedge anchors  
**HB-BZ** for cracked concrete and non-  
cracked concrete  
→ page 30



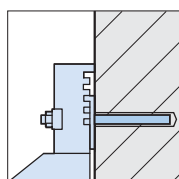
Fixing to HALFEN Wedge anchors  
**HB-B** for non-cracked concrete  
→ page 30

#### Special Ceiling fixing



**HK-DA** Ceiling anchor for fixing  
HALFEN Support bracket to thin ceiling  
edges  
→ page 31

#### Brickwork



Fixing to HALFEN Injection anchors  
**HB-VMU** for solid brick  
→ page 31

For detailed information please refer to our  
catalogue "Technical Product Information  
HALFEN Anchor Bolt Systems HB"



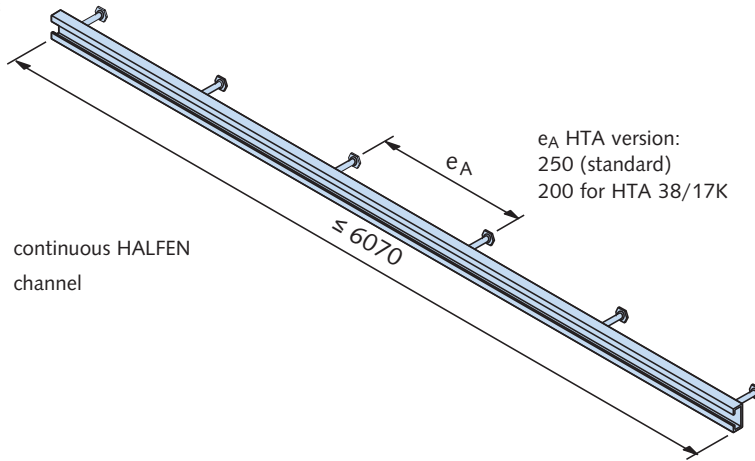
# HALFEN SUPPORT BRACKETS

## Fixing systems for concrete substrate

### HALFEN cast-in channels

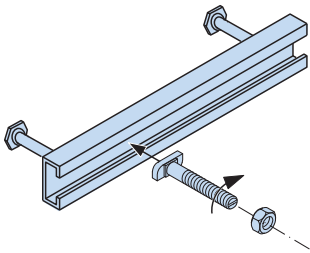
#### HTA HALFEN channels

all dimensions in mm

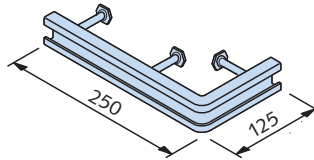


continuous HALFEN channel

HTA HALFEN channel short piece



HTA HALFEN channel end piece 250/125 mm load-bearing capacity at corners ①





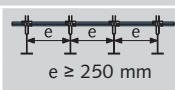
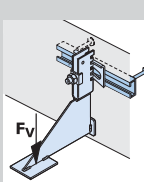
HALFEN bolt incl. nut (scope of supply → table below)

① Structural calculations on request

HALFEN channels have riveted or welded anchor studs and have been approved under building regulations for load-bearing constructions (DIBt): approval no. Z 21.4 - 34.

Fully filled with foam:  
HALFEN channels are fully filled with Haropor foam on polystyrene basis to stop fresh concrete entering the channel. After concreting the foam will keep any soiling out of the channel. The foam can be removed easily using a suitable tool (e.g. a screwdriver, hook with a flat tip, carpenters' hammer).

For detailed information please refer to our "HALFEN Cast-in Channels Technical Product Information B"

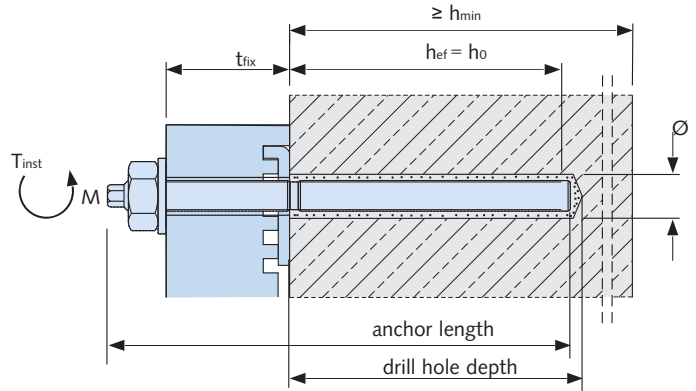
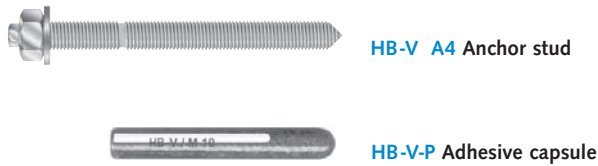
Application areas for brick cladding												
Load-bearing capacity in concrete C 20/25			HTA HALFEN channel		with HALFEN bolt HS					minimum spacing		
Permissible load per bracket of HTA channel with spacing of e:			 Designation: (add required length in mm)		including hexagonal nut designation:					 min. $a_r$ [mm] min. $a_e = \min. a_f/2$ [mm]		
HK4 support bracket load level: → pages 12 up 18	 $e \geq 250$ mm											thread
zul. $F_V$ [kN]	$F_{Rd}$ [kN]											
3,5	3.5	4.7	HTA 38/17 <sup>②</sup>	- A4	HS 38/17 -	M 12	×	72	- A4	25	75	50
 $F_V$	6.7	9.0	HTA 49/30	- A4	HS 50/30 -	M 12	×	87	- A4	25	130 <sup>③</sup>	130
	7.0	9.5	HTA 50/30	- A4							150	
	10,5	10.5	14.2	HTA 52/34	- A4	HS 50/30 -	M 16	×	87	- A4	60	165 <sup>③</sup>
			HTA 54/33	- A4	165 <sup>③</sup>							

② Short pieces L = 150 - 200 - 250 mm or version HTA . . / . . - K  
 ③ Reduced edge clearance for this application  
 All parts of the anchor in stainless steel W 1.4401, 1.4404, 1.4571 (A4)

# HALFEN SUPPORT BRACKETS

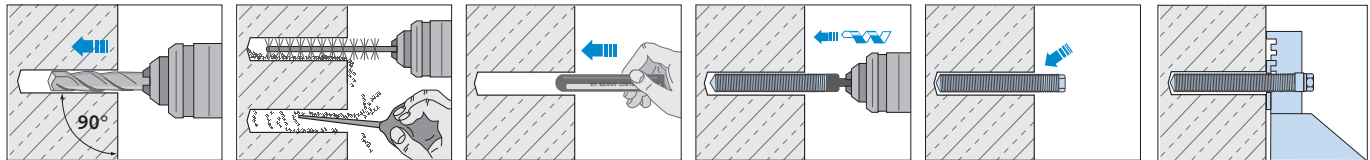
## Fixing systems for concrete substrate

### Fixing the support brackets with HALFEN HB-V Chemical anchor bolt – for non-cracked concrete

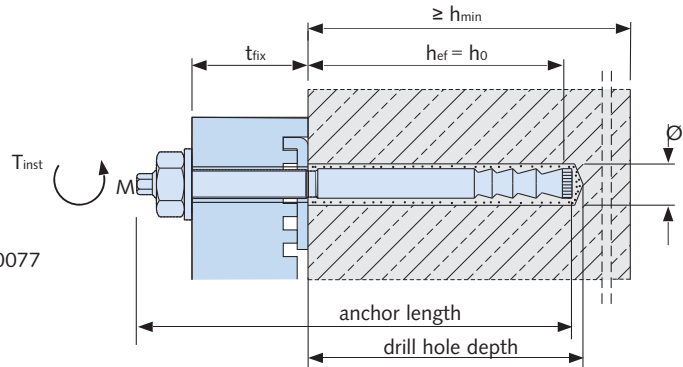


### HB -V A4 Anchor stud

designation	order no.	drill hole $\varnothing$ x depth [mm]	anchor length [mm]	maximum fixture thickness $t_{fix}$ [mm]	anchor depth $h_{ef}$ [mm]	depth of building component $h_{min}$ [mm]	tightening torque $T_{inst}$
HB-V-A 10-30/130 A4	0430.100-00003	12 x 90	130	30	90	120	20
HB-V-A 12-65/190 A4	0430.100-00064	14 x 110	190	65	110	140	40
HB-V-A 16-65/210 A4	0430.100-00012	18 x 125	210	65	125	160	80
Capsule HB-V-P 10	0433.050-00002						
Capsule HB-V-P 12	0433.050-00003						
Capsule HB-V-P 16	0433.050-00005						



### Fixing the support brackets with HALFEN HB-VMZ Injection system, for cracked and non-cracked concrete



# HALFEN SUPPORT BRACKETS

## Fixing systems for concrete substrate

HB -VMZ-A A4 Anchor stud									
designation	order no.	drill hole Ø x depth [mm]	setting depth [mm]	max. fixture thickness $t_{fix}$ [mm]	anchor length [mm]	thread [mm]	depth of anchoring $h_{ef}$ [mm]	depth of building component $h_{min}$ [mm]	tightening torque $T_{inst}$
HB-VMZ-A 60 M10-30/105 A4	0432.380-00006	12 x 65	63	30	105	M10x27	60	120	20
HB-VMZ-A 80 M12-60/160 A4	0432.380-00096	14 x 85	84	60	160	M12x56	80	120	40
HB-VMZ-A 100 M12-60/180 A4	0432.380-00016	14 x 105	104	60	180	M12x56	100	200	40
HB-VMZ-A 125 M12-60/205 A4	0432.380-00097	14 x 130	129	60	205	M12x56	125	250	40
HB-VMZ-A 90 M16-60/175 A4	0432.380-00098	18 x 98	94	60	190	M16x50	90	180	60
HB-VMZ-A 105 M16-60/190 A4	0432.380-00099	18 x 113	109	60	190	M16x50	105	200	60
HB-VMZ-A 125 M16-60/210 A4	0432.380-00019	18 x 133	130	60	210	M16x55	125	250	60

## Fixing the support brackets with HALFEN HB-VMU Injection system, for non-cracked concrete



**HB-VMU 345<sup>®</sup> Cartridge**  
Order no.: 0433.040-00131



**HB-VMU 150<sup>®</sup> Cartridge**  
Order no.: 0433.040-00129

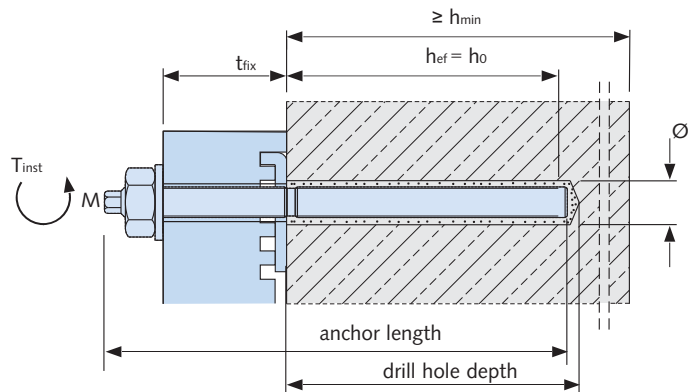
**HB-VMU 300<sup>®</sup> Cartridge**  
Order no.: 0433.040-00130



**HB-VMU-A A4 Anchor stud**



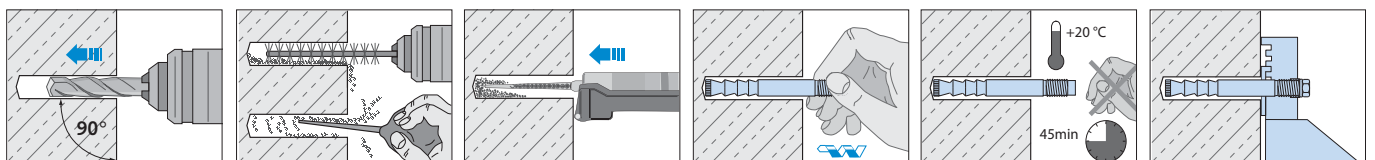
**HB-VM-X Mixing nozzle**  
Order no.: 0433.040-00039



Fire tested

- ① can be dispensed with a standard silicone dispenser.
- ② with dispenser HB-VM-P order no.: 0433.-040-00077

HB-VMU A4 Anchor stud							
designation	order no.	drill hole Ø x depth [mm]	anchor length [mm]	max. fixture thickness $t_{fix}$ [mm]	depth of anchoring $h_{ef}$ [mm]	depth of building component $h_{min}$ [mm]	tightening torque $T_{inst}$
HB-VMU-A 10-30/130 A4	0430.190-00005	12 x 90	130	30	90	130	20
HB-VMU-A 12-85/210 A4	0430.190-00016	14 x 110	210	85	110	160	40
HB-VMU-A 16-60/205 A4	0430.190-00021	18 x 125	205	60	125	200	60



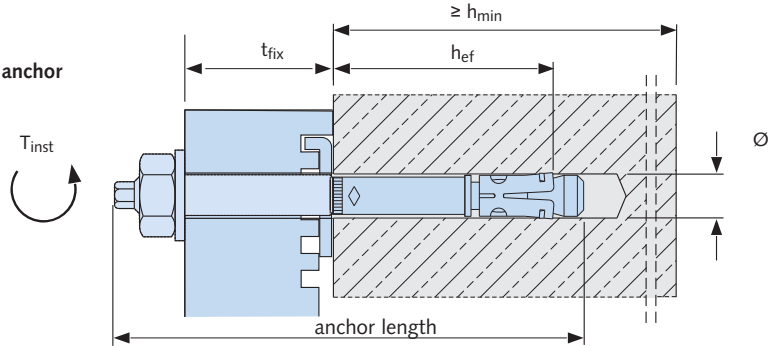
# HALFEN SUPPORT BRACKETS

## Fixing systems for concrete substrate

### Fixing the support brackets with HALFEN HB-BZ Wedge anchor – for cracked and non-cracked concrete



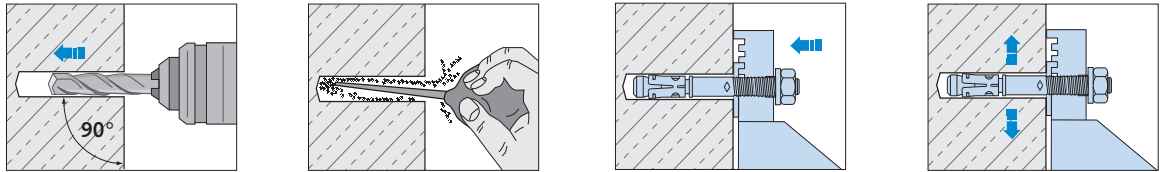
HB-BZ A4 Wedge anchor



#### Wedge anchor HB -BZ A4

designation	order no.	drill hole Ø x depth [mm]	setting depth [mm]	max. fixture thickness t <sub>fix</sub> [mm]	anchor length [mm]	thread [mm]	depth of anchoring h <sub>ef</sub> [mm]	depth of building component h <sub>min</sub> [mm]	tightening torque T <sub>inst</sub>
HB-BZ 10-30/110 A4	0432.040-00012	10x75	67	30	110	M10x40	60	120	35
HB-BZ 10-50/130 A4	0432.040-00004	10x75	67	50	130	M10x60	60	120	35
HB-BZ 12-50/145 A4	0432.040-00006	12x90	80	50	145	M12x65	65	130	50
HB-BZ 12-85/180 A4	0432.040-00015	12x90	80	85	180	M12x80	65	130	50

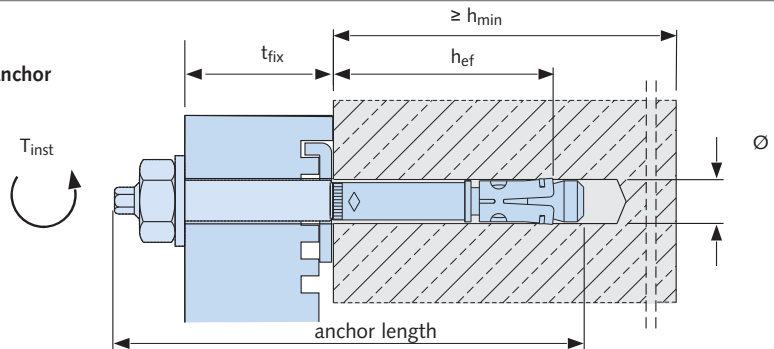
#### Installation:



### Fixing the support brackets with HALFEN HB-B Wedge anchor – for non-cracked concrete



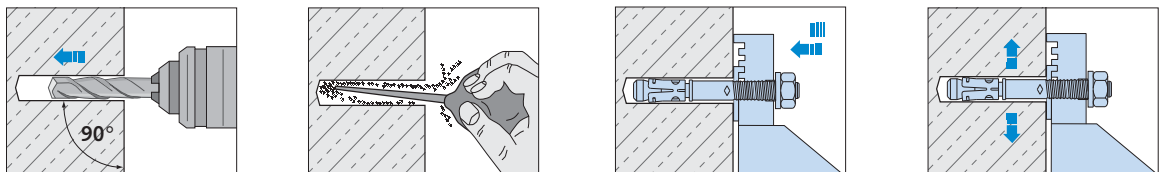
HB-B A4 Wedge anchor



#### Wedge anchor HB -B A4

designation	order no.	drill hole Ø x depth [mm]	setting depth [mm]	max. thickness t <sub>fix</sub> [mm]	anchor length [mm]	thread [mm]	depth of anchoring h <sub>ef</sub> [mm]	depth of building component h <sub>min</sub> [mm]	tightening torque T <sub>inst</sub>
HB-B 10-30-36/105 A4	0432.060-00029	10x70	60	30	105	M10x30	48	100	25
HB-B 10-50-56/125 A4	0432.060-00030	10x70	60	50	125	M10x30	48	100	25
HB-B 12-65-80/160 A4	0432.060-00035	12x90	80	65	160	M12x80	65	130	50
HB-B 16-60-78/180 A4	0432.060-00020	16x110	98	60	180	M16x80	80	160	100

#### Installation:



# HALFEN SUPPORT BRACKETS

## Fixing systems for brickwork substrate

Fixing the support brackets with HALFEN HB-VMU Injection system, for solid brick and sand- or limestone



**HB-VMU-A A4 Anchor stud**



**HB-VMU 345<sup>®</sup> Cartridge**  
Art.-Nr.: 0433.040-00131



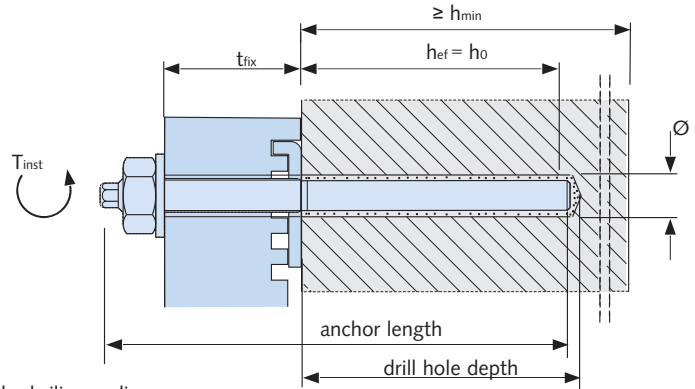
**HB-VMU 150<sup>®</sup> Cartridge**  
Art.-Nr.: 0433.040-00129



**HB-VMU 300<sup>®</sup> Cartridge**  
Art.-Nr.: 0433.040-00130



**HB-VM-X Mixing nozzle**  
Art.-Nr.: 0433.040-00039



① can be dispensed with a standard silicone dispenser.

② with dispenser HB-VM-P order no.: 0433.-040-00077

### HB-VMU A4 Anchor stud

designation	order no.	anchor length [mm]	max. fixture thickness $t_{fix}$ [mm]	depth of anchoring $h_{ef}$ [mm]	depth of building component $h_{min}$ [mm]	tightening torque $T_{inst}$
HB-VMU-A 10-30/130 A4	0430.190-00005	130	30	90	110	8
HB-VMU-A 12-80/185 A4	0430.190-00056	185	80	93	110	8

Approved loads for tension, shear and diagonal tension for all angles MZ12/KS12 = 1.7 kN

### Fixing the support brackets with HALFEN HK-DA Ceiling anchor to thin ceiling edges

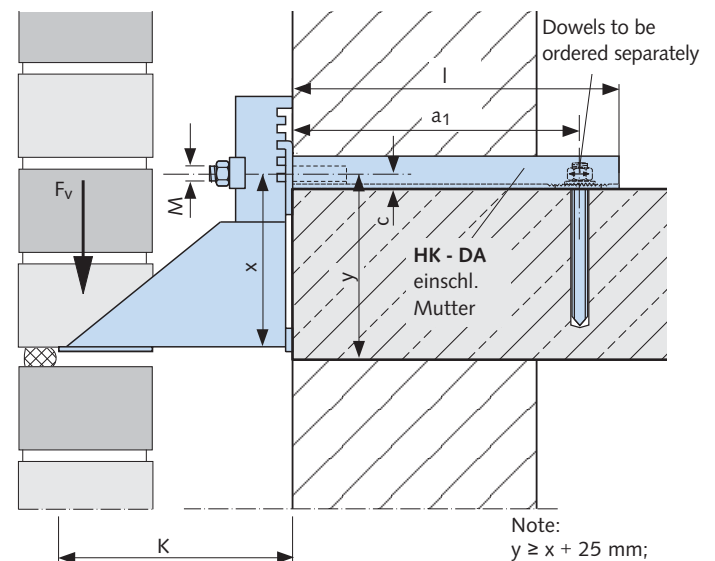
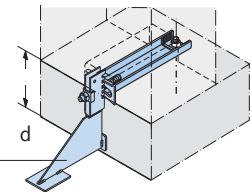
#### HK - DA Ceiling anchor

load level [kN] ( $F_{Rd}$ [kN])	order no.	M	c [mm]	$a_1$ [mm]	l [mm]
3.5 - K (4.7)	00002	M 10	10	183 ± 10	200
7.0 - L (9.5)	00005	M 12	11	293 ± 10	320
7.0 - K (9.5)	00006	M 12	11	183 ± 10	200

Included in supply: notched plate and hexagonal nut

$$d \geq x + 25 \text{ mm}$$

Suitable for load levels 3.5 kN and 7.0 kN



Note:  
 $y \geq x + 25 \text{ mm}$ ;  
 $x = \text{value from table} \rightarrow \text{page 8}$

#### Fixing to concrete ceiling C 20/25

for HK - DA -	load level [kN]: ( $F_{Rd}$ [kN]):	3.5 (4.7)	7.0 (9.5)
	HALFEN Injection anchor for concrete with and without cracks	60 M10 - 20/95 individual calculations required	80 M12 - 25/125 individual calculations required

All parts of anchor in stainless steel W 1.4571, 1.4401, 1.4404 (A4)

# HALFEN SUPPORT BRACKETS

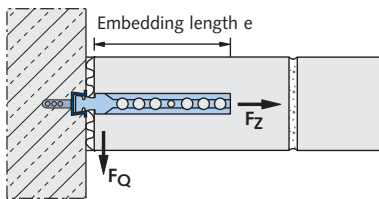
## Brick tie systems

HALFEN Brick tie systems are economic, approved and tested fixing systems for tying brickwork, in-fill panels, partition walls, cladding panels (with or without air gap or thermal insulation) to concrete walls or columns

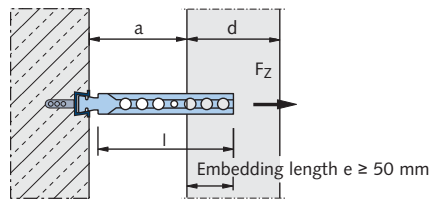
or to steel or timber structures, using HALFEN ML Wall ties. As the brick ties can move within the wall connector channels, the probability of movement cracks in the brickwork is greatly reduced.

All HTA and HMS profiles are fully filled with Haropor foam to protect them from concrete entering. The channels are fixed to the shuttering using cramps or nails. While the brickwork is being laid, the HALFEN brick ties are inserted into the channels where required / at the recommended spacings, then turned by 90° and pressed down into the mortar of the horizontal joint. The holes in the brick ties ensure a better key of the tie with the mortar of the joint.

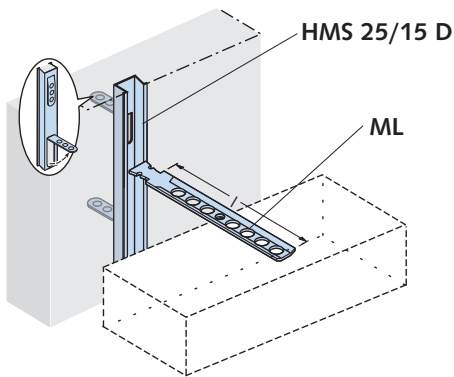
### Wall attachment



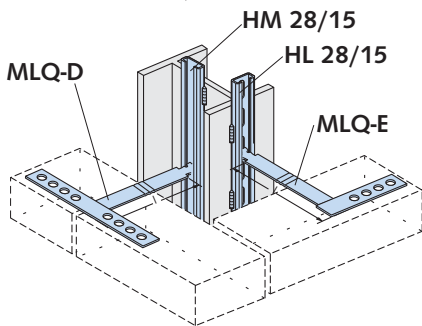
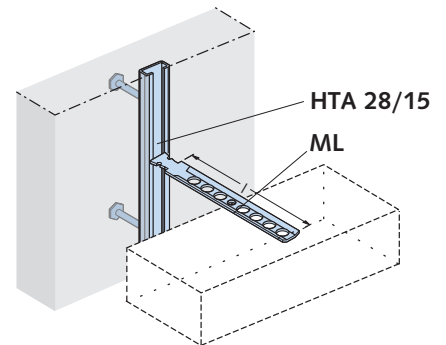
### Facing brickwork attachment



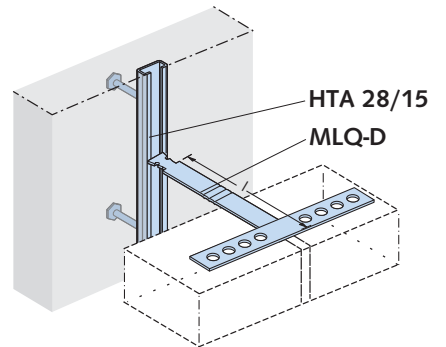
## ML Wall ties in combination with HALFEN Channels HMS 25/15-D, HTA 28/15, HM 28/15 and HL 28/15



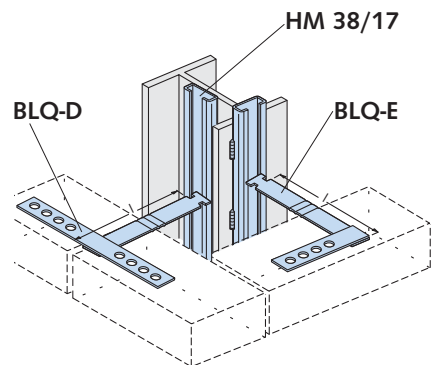
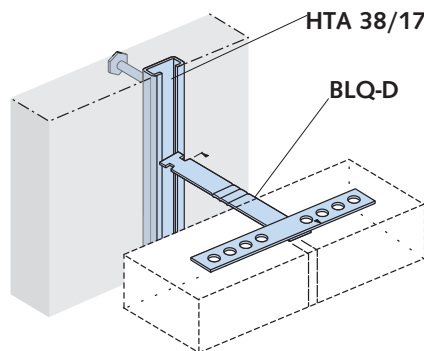
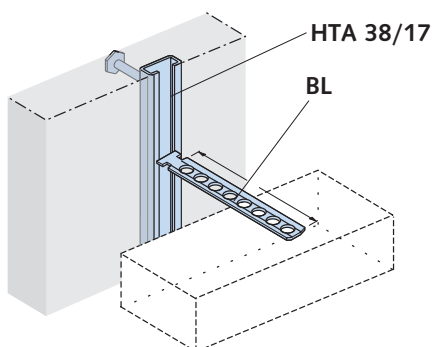
Dented anchors are bent over manually every 250 mm by site operatives to form a safe anchor in concrete.



HM 28/15 welded to steel column. HL 28/15 can be alternatively bolted with dowels on concrete.



## BL Wall tie in combination with HALFEN Channel type HTA 38/17 and HM 38/17





# HALFEN SUPPORT BRACKETS

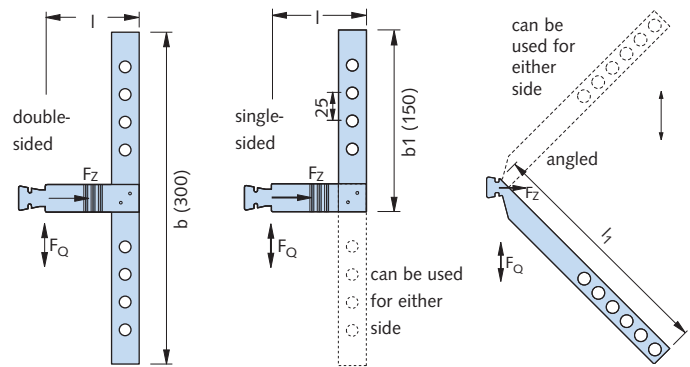
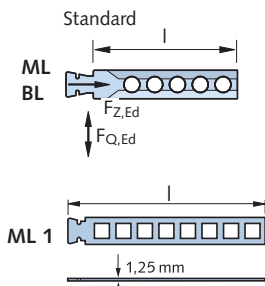
## Brick tie systems

Perm. wall distances a:			
cavity wall tie	length l (l <sub>1</sub> ) [mm]	distance a [mm]	d [mm]
	85	20 - 45	115
	120	40 - 80	
	180	85 - 140	
	(300)	0 - 80	240
	(350)	20 - 95	
	(400)	35 - 115	

### Brick ties anchors

ML, BL

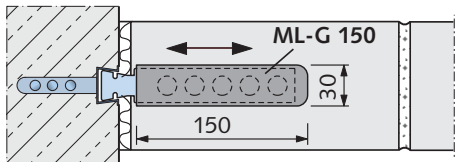
- max. loading  
 $F_Z = 0.23 \text{ kN} / F_{Z,Ed} = 0.32 \text{ kN}$   
 per cm of anchor length e,
- max.  $F_Z \leq 2.3 \text{ kN}$   
 max.  $F_{Z,Ed} \leq 3.2 \text{ kN}$
- max.  $F_Q \leq 1.9 \text{ kN}$   
 max.  $F_{Q,Ed} \leq 2.7 \text{ kN}$



ML1

- max.  $F_Z \leq 1.9 \text{ kN} / \text{max. } F_{Z,Ed} \leq 2.5 \text{ kN}$
- max.  $F_Q \leq 1.0 \text{ kN} / \text{max. } F_{Q,Ed} \leq 1.4 \text{ kN}$

### Gliding sleeve ML-G 150 for wall connections, suitable in combination with ML anchors

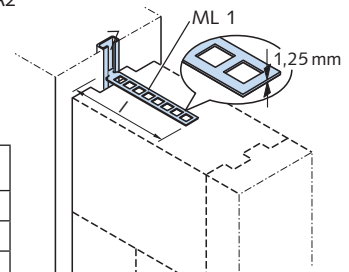


These anchor sleeves allow movement in the longitudinal direction, for example when connecting long stretches of brick wall or infill brickwork to concrete structures, to avoid cracking.  
 Material: soft PVC Order no.: 0134.010-00001

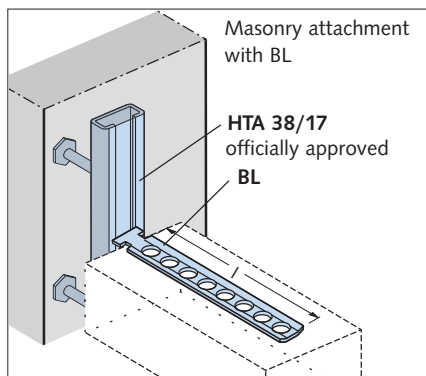
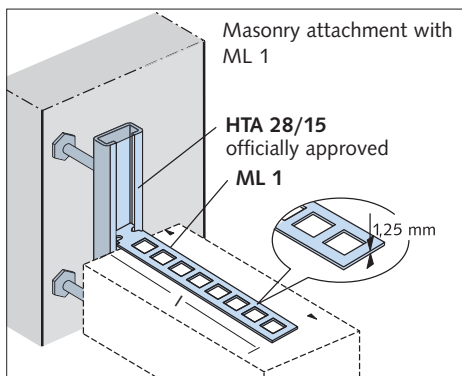
### Wall ties ML 1 for connection in interior building areas

Material: stainless steel W1.4301 A2

type	length l [mm]	order no.: 0013.010-
ML1 -	125	00001
ML1 -	185	00002
ML1 -	245	00003

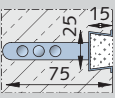
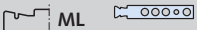

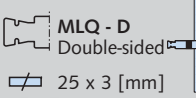
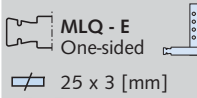
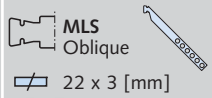

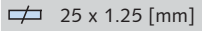
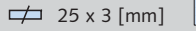
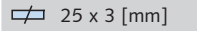
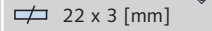
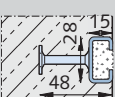
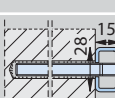

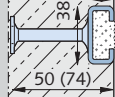
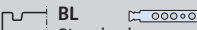
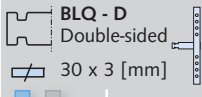
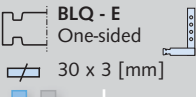
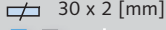
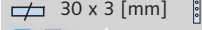
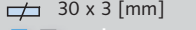






Load-bearing capacity of channels with wall tie spacing of $\geq 25 \text{ cm}$ :			
brick tie channel	HMS 25/15 D	HTA 28/15	HTA 38/17
central tensile $F_Z$ [kN] ( $F_{Z,Rd}$ )	1.2 (1.6)	3.0 (4.0)	4.5 (6.1)
tensile across $F_Q$ [kN] ( $F_{Q,Rd}$ )	1.5 (2.0)	3.0 (4.0)	4.5 (6.1)



# HALFEN SUPPORT BRACKETS

## Brick tie systems

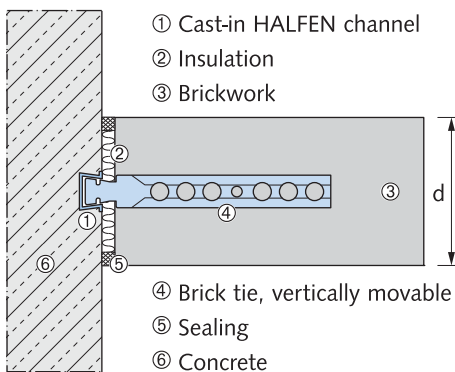
Brick tie channel		Brick tie anchor									
	<b>HMS 25/15 D</b> L = 2500 mm		<b>ML</b> Standard		<b>ML 1</b>		<b>MLQ - D</b> Double-sided		<b>MLQ - E</b> One-sided		<b>MLS</b> Oblique
			26 x 2 [mm]		25 x 1.25 [mm]		25 x 3 [mm]		25 x 3 [mm]		22 x 3 [mm]
	<b>HTA 28/15</b> L = 1050 mm <sup>①</sup> L = 6070 mm <sup>①</sup>	Type	Length l [mm]	Type	Length l [mm]	Type	Length l [mm]	Type	Length l [mm]	Type	Length l <sub>1</sub> [mm]
	<b>HL 28/15</b> L = 6070 mm <sup>①</sup>	ML - 85		ML 1 - 125		MLQ-D - 85		MLQ-E - 85		MLS - 300	
	<b>HTA 38/17</b> L = 1050 mm <sup>①</sup> L = 6070 mm <sup>①</sup>	ML - 120		ML 1 - 185		MLQ-D - 120		MLQ-E - 120		MLS - 350	
		ML - 180		ML 1 - 245		MLQ-D - 180		MLQ-E - 180		MLS - 400	
			<b>BL</b> Standard		<b>BLQ - D</b> Double-sided		<b>BLQ - E</b> One-sided	<b>Material:</b>			
			30 x 2 [mm]		30 x 3 [mm]		30 x 3 [mm]		<b>FV</b> = Steel S235JR, hot-dip galvanised		<b>SV</b> = Steel DX51D + Z275, sSendzimir galvanised
		Type	Length l [mm]	Type	Length l [mm]	Type	Length l [mm]		<b>A4</b> = Stainless steel 1.4571/1.4404/1.4401		<b>A2</b> = Stainless steel 1.4301
		BL - 85		BLQ-D - 85		BLQ-E - 85		① Other lengths: Available on request			
		BL - 120		BLQ-D - 120		BLQ-E - 120					
		BL - 180		BLQ-D - 180		BLQ-E - 180					

### Firewall mount according to DIN 4102 T4

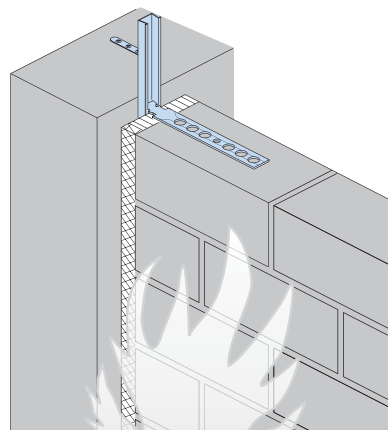
Statically required attachments of load-bearing, room-enclosing solid walls can be designed with HALFEN Brick tie channels as fire walls according to DIN 4102 T4 chapter 4.8 as well. Anchoring to the adjacent components (steel reinforced concrete support, wall) fulfils the requirements for fire rating, if it conforms to the standards of DIN 4102 T4 para. 4.8.4

Attachment of a load bearing solid wall as a fire wall according to DIN 4102 T4 para. 4.8.4 (pic. 20.2)

Horizontal section



HALFEN Brick tie anchors can be used at any desired position across the total length of the brick tie channel. As a rule, anchor spacing is 250 mm (4 anchors per meter).



### Explanations, DIN regulations

② Insulation layer: According to DIN 4102 T4 para. 4.5.2.6 insulation layers in connecting joint gaps must „[...] consist of mineral fibre according to DIN 18165 T2, 07/91, para. 2.2, must be of building material class A, have a melting point  $\geq 1000^\circ\text{C}$  according to DIN 4102 T17 and exhibit a gross density of  $\geq 30 \text{ kg/m}^3$  [...]“.

③ Masonry: Bricks (gross density class) and minimum thickness d according to DIN 4102 T4, para. 4.8.3, Table 45.

# HALFEN SUPPORT BRACKETS

## Quality demand and compliance with in force law

### HALFEN quality - CE marking: the most solid system around

The implementation of regulated construction products is done by the European Union. There is a legal duty described in the construction products directive CPD- 89/106/CE that every construction product which has gained a ETA-approval or is regulated in a harmonized norm has to be CE marked.

CE marking, is guaranteed by :

- high quality European technical specifications
- granted by notified bodies
- market surveillance by the member states

#### Why does the producer have to CE mark the construction product?

If a product which is produced for incorporation in a permanent manner in construction works, and which is placed on the European internal market, then the definition comes almost directly from the Construction Products Directive or CPD (89/106/CE).

#### Why does a CE mark have to be on the construction product?

The intention of the CPD is to establish an internal market for construction products through technical harmonisation thereby removing technical barriers to trade.

In simple terms, the CPD is replacing all national standards, approval systems, conformity systems or other systems, which can constitute technical barriers to trade in a single European system. This single European system is based on European harmonised technical specifications which will replace all conflicting national specifications. All these conflicting national specifications must be withdrawn once the harmonised European versions are available.

EN-845-1 harmonizes ancillary components for masonry like support brackets and cavity wall ties, and is binding since January 2010. EN-845-2 harmonizes ancillary components for masonry like lintels and is engaging since April 2006.

The production mechanisms of the harmonised European technical specifications ensure that all national building regulations are taken into account so that no member state has the legal right to impose any additional national requirements.

#### When does a CE mark have to be on the construction product?

CE marking is obligatory for every product placed on the EEA (European Economical area) market as soon as all conditions are fulfilled to enable this.

This means that a harmonised technical specification for the product must be available and in force.

The "date of application" which is the date after which the specification becomes effective and CE marking becomes legally possible.

The "date of the end of the coexistence period" is also given, which is the date after which CE marking becomes obligatory for every product.

#### How does the construction product have to be CE marked?

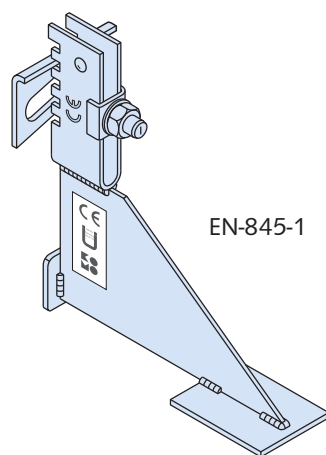
The Construction Products Directive defines a number of tasks that have to be done. It also indicates who has the responsibility to undertake these tasks. These tasks are done by the intervention of a third party, or "Notified Body".

**The CE marking requires a higher effort on the producer side, the potential benefit excuses this additional expense for sure. A construction product with CE mark ensures that the essential requirements for this product are met.**

HALFEN manufactures support brackets HK4, lintels HW and wall cavity ties LSA-DW according to the requirements of the CDP. This underlines the high quality demand as well as the incorporation of legal law in our products.

The customer has now the ability to choose faced brickwork façades with a high safety standard in constant high monitored quality.

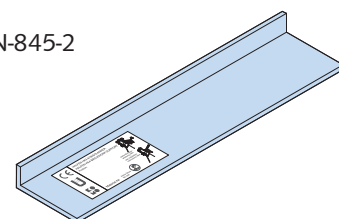
HALFEN handles only high grade primary material according to EN 10088-2 for the manufacturing of the products. This ensures that CE conform products are made out of CE conform primary material.



EN-845-1



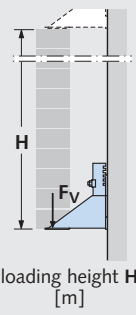
EN-845-2



# HALFEN SUPPORT BRACKETS

## Sizing table for support brackets

**Sizing of support brackets for brick cladding d = 11.5 cm**



loading height H [m]	standard support bracket e.g. HK4 - U	standard support bracket z.B. HK4 - P	standard support bracket e.g. HK4-U with intermediate angles			support bracket load level
	e = 250 mm F <sub>V</sub> [kN] (F <sub>V,d</sub> [kN])	e = 500 mm F <sub>V</sub> [kN] (F <sub>V,d</sub> [kN])	e = 500 mm	e = 750 mm	e = 1000 mm	perm. F <sub>V</sub> [kN] per bracket (F <sub>V,d</sub> [kN])
12	6.2 (8.4)					10.5 (14.2)
11	5.7 (7.7)					
10	5.2 (7.0)	10.4 (14.0)	10.4 (14.0)			
9	4.7 (6.3)	9.3 (12.6)	9.3 (12.6)			
8	4.1 (5.5)	8.3 (11.2)	8.3 (11.2)			
7	3.6 (4.9)	7.2 (9.7)	7.2 (9.7)			
6	3.1 (4.2)	6.2 (8.4)	6.2 (8.4)	9.3 (12.6)		
5	2.6 (3.5)	5.2 (7.0)	5.2 (7.0)	7.8 (10.5)	10.4 (14.0)	7.0 (9.5)
4	2.1 (2.8)	4.1 (5.5)	4.1 (5.5)	6.2 (8.4)	8.3 (11.2)	
3	1.6 (2.1)	3.1 (4.2)	3.1 (4.2)	4.7 (6.3)	6.2 (8.4)	
2	1.0 (1.4)	2.1 (2.8)	2.1 (2.8)	3.1 (4.2)	4.1 (5.5)	3.5 (4.7)
1	0.5 (0.7)	1.0 (1.4)	1.0 (1.4)	1.6 (2.1)	2.1 (2.8)	

Example: loading height H = 6.0 m  
 support with standard support brackets  
 HK 4 - U with intermediate angles, e = 500 mm  
 → F<sub>V</sub> = 6,2 kN → select support bracket for load level 7,0 kN

### Sizing

#### 1. Load computation

- H = loading height [m]
- γ = brickwork factor [kN/m<sup>3</sup>]
- a = distance from wall [mm]
- b = a + d/3 + tolerance [mm]  
tolerance = 15 mm
- d = thickness of brick [m]
- e = spacing of support brackets [m]
- F<sub>V</sub> = vertical loading per fixing point

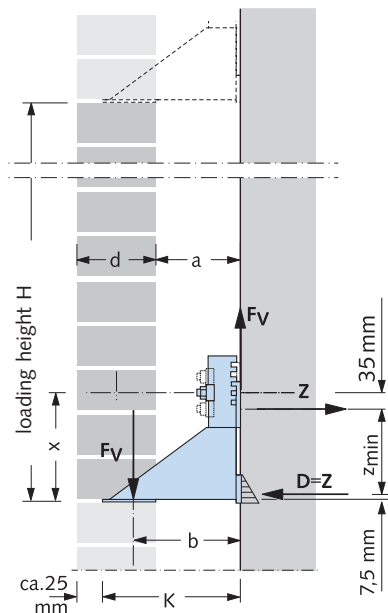
$$F_V = H \times e \times d \times \gamma \text{ [kN]}$$

$$\rightarrow F_V = H \times e \times 2.07 \quad \text{for } \gamma = 18 \text{ kN/m}^3 \text{ and } d = 0.115 \text{ m}$$

$$(F_{V,d} = 1.35 \cdot F_V)$$

#### 2. Determining the acting force

Max. F<sub>V</sub> = load level, resulting in:  
 → x (see tables HK4 support brackets, pages 8 - 18)

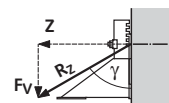


#### 3. Determining the acting force

$$z_{\min} = x - 7.5 - 35 \text{ [mm]} \rightarrow \text{HK4 - adjustable} = \pm 35 \text{ mm}$$

force (compressive/tensile) Z = - D  
 $\max Z = F_V \times b / z_{\min}$   
 $(Z_d = F_{V,d} \times b / z_{\min})$

resulting in:  
 $R_Z = \sqrt{Z^2 + F_V^2}$   
 $R_{Z,d} = \sqrt{Z_d^2 + F_{V,d}^2}$

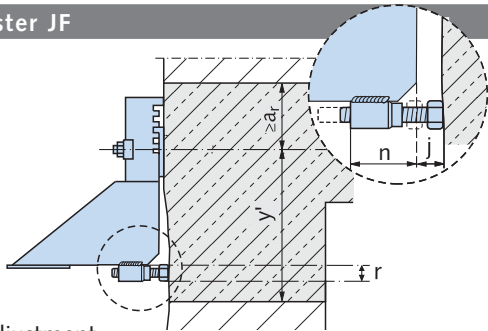


Note: When calculating the size, the approved rating of the respective fastener has to be taken into account.

# HALFEN SUPPORT BRACKETS

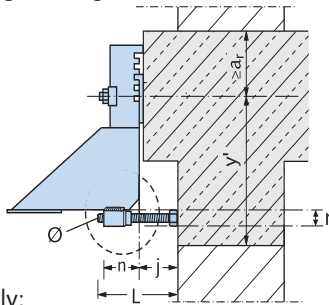
## Depth adjustments for support brackets HK4

### Depth adjuster JF



#### Continuous adjustment

- for compensating for tolerances of the building structure
- for receding backing surfaces

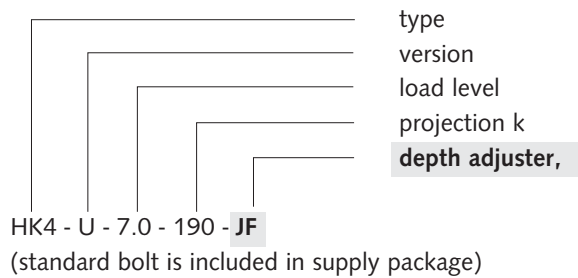


#### Scope of supply:

- threaded sleeve, welded to the support bracket at works
- adjustment bolt (standard adjustment bolt)  
special lengths on request

- Can be supplied for all HK4 support bracket types  
-U, -UV, -S, -SV, -W, -WV, -P, -PV, -F, -FV,
  - **adjustment dimension  $j \leq 125$  mm** (with special bolt)
- $y' \geq x + r + 25$  mm      $x \rightarrow$  table values pages 8 - 18

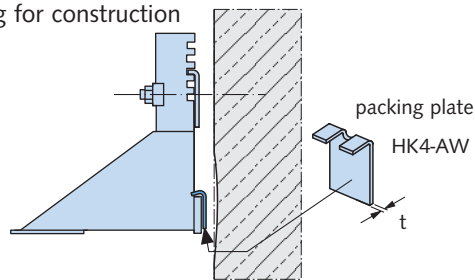
Example for ordering support bracket + depth adjuster:



Depth adjuster (standard)						
HK4 - load level [kN]	dimensions				size of bolts	
	n [mm]	r [mm]	Ø [mm]	max. j [mm]	L [mm]	
3.5	50	26	M 10	125	140	
7.0	60	30	M 12	120	140	
10.5	60	30	M12	80	100	

### Packing angles HK - AW

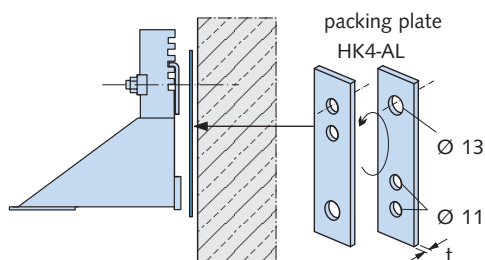
For aligning the HK4 support brackets vertically (compensating for construction tolerances)



Packing angles		
designation of article	order no.:	t [mm]
		0156.020
HK - AW - 3	00001	3
HK - AW - 6	00002	6

### Packing plate HK - AL

For depth adjustments, particularly for HK4-F and -FV support brackets.



Ausgleichsplatte		
designation of article	order no.:	t [mm]
		0156.030
HK - AL - 3	00001	3

Note: When using HK-AL packing plates the following must be taken into account:

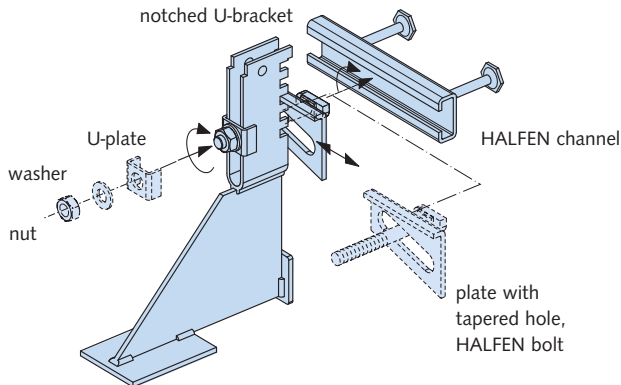


- the projection K is greater,
- there is an additional bending moment!

# HALFEN SUPPORT BRACKETS

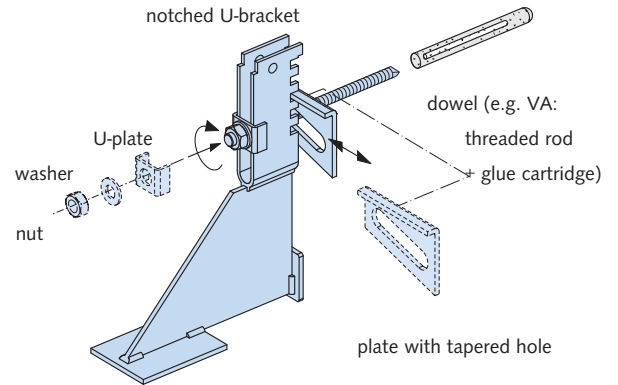
## Installation instructions

### Fitting to HALFEN channels



1. Ensure HALFEN channels are properly cast-in.
2. Pre-assemble the support bracket with HALFEN bolt, tapered-hole plate, U-plate, washer and nut. Insert the head of the bolt horizontally into the HALFEN channel, then turn to the right and tighten nut manually. The notch at the end of the bolt has to be vertical.
3. Adjust the height of the support bracket. The notch must be resting on the tapered-hole plate; if necessary, hit the notched U-bracket with a hammer until the notch makes contact. Use a torque spanner to tighten the nut.

### Fitting to dowels



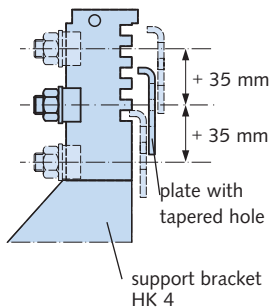
1. Insert the dowel in accordance with approved instructions.
2. Place the tapered-hole plate and support bracket on to the dowel.
3. Adjust the height of the support bracket. The notch must be resting on the tapered-hole plate; if necessary, hit the notched U-bracket with a hammer until the notch makes contact. Use a torque spanner to tighten the nut.

**Note:** Where the substrate concrete has cracks, only dowels suitable for cracked concrete may be used (e.g. HALFEN injection anchors).

### Adjustment and tightening

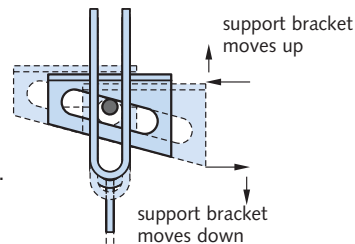
#### Rough height adjustment:

Make rough adjustment by inserting the tapered-hole plate into another notch.



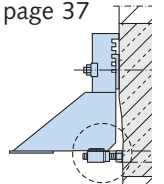
#### Fine height adjustment:

By moving the tapered-hole plate sideways, the support bracket is moved up or down.



#### Depth adjustment:

This is used to compensate for tolerances in the substrate → see page 37



#### Tightening:

After the height adjustment, use the torque spanner to tighten the nut until it reaches the required torque in accordance with the values shown in the adjacent table.

Fasteners:	Torque required for the following threads:		
	M 10	M 12	M 16
HALFEN HS bolts	15 Nm	25 Nm	60 Nm
HALFEN HB-V anchor bolt	20 Nm	40 Nm	80 Nm
HALFEN HB-VMZ injection anchor bolt	15 Nm	40 Nm	60 Nm
HALFEN BZ anchor bolt	35 Nm	50 Nm	110 Nm

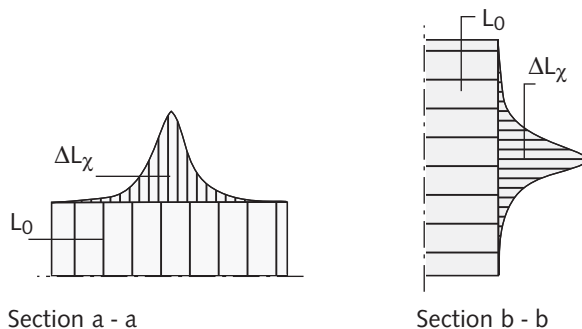
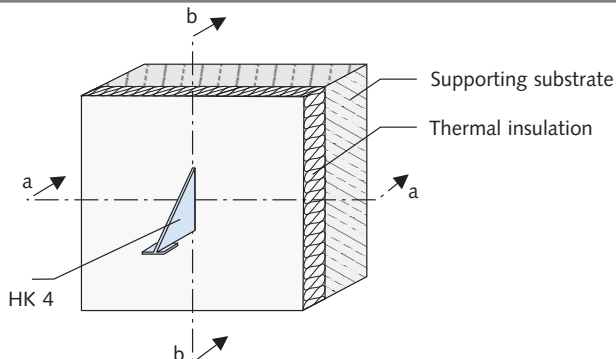
#### Notes for handling on site

1. In order to avoid rust from other parts to get to the stainless steel, remove the packaging straps as soon as possible after delivery on site.
2. After cleaning the brickwork cladding with an acidic solution, all stainless steel parts must be rinsed immediately and thoroughly with water if they have come in contact with the solution. We strongly advise not to use hydrochloric acid.

# HALFEN SUPPORT BRACKETS

## Thermal bridges

### Thermal bridge loss coefficient $\chi$ (chi) for brickwork supports HK4



#### Thermal bridges by HK4 support brackets

A faced brickwork façade is a durable construction without high maintenance charges and with a high optical entitlement. The two leaf construction ensures through the separation of heat insulation, moisture proofing and noise protection a very reliable design.

An increasing importance gets heat protection. Faced-brick-

work is carried with HK4 support brackets through the insulation layer. The brackets are heat bridges and it is our aim to keep the heat bridges as small as possible. Therefore HALFEN is providing heat loss coefficient  $\chi$  (chi) for the planers, to determine the exact influence of the HK4 support brackets. The  $\chi$  (chi) value is necessary to calculate the U-value of the two leaf-wall including heat bridges.

Thermal conductivity of the insulation / $\lambda = 0.035$ (W/mK) ; $\chi$ (chi) -value per console (W/K)															
Thermal insulation d [cm]	4	6	8	10	12	14	16	18	20	22	24	26	28	30	
HK 4 -	3.5 - 130	0.039	0.032	0.026											
	7.0 - 130	0.056	0.046	0.038											
	10.5 - 130	0.074	0.060	0.050											
HK 4 -	3.5 - 150	0.074	0.060	0.050	0.043										
	7.0 - 150	0.097	0.079	0.066	0.056										
	10.5 - 150	0.117	0.095	0.079	0.068										
HK 4 -	3.5 - 170	0.063	0.051	0.043	0.036	0.032									
	7.0 - 170	0.083	0.068	0.056	0.048	0.042									
	10.5 - 170	0.106	0.086	0.072	0.062	0.054									
HK 4 -	3.5 - 190	0.061	0.05	0.042	0.036	0.031	0.027								
	7.0 - 190	0.082	0.067	0.056	0.048	0.042	0.037								
	10.5 - 190	0.103	0.084	0.07	0.06	0.052	0.046								
HK 4 -	3.5 - 210	0.061	0.05	0.041	0.035	0.031	0.027	0.025							
	7.0 - 210	0.082	0.067	0.056	0.048	0.041	0.037	0.033							
	10.5 - 210	0.102	0.083	0.069	0.059	0.052	0.046	0.041							
HK 4 -	3.5 - 230	0.064	0.053	0.044	0.037	0.033	0.029	0.026	0.024						
	7.0 - 230	0.088	0.071	0.059	0.051	0.044	0.039	0.035	0.032						
	10.5 - 230	0.111	0.09	0.075	0.064	0.056	0.05	0.045	0.04						
HK 4 -	3.5 - 250	0.064	0.053	0.044	0.037	0.033	0.029	0.026	0.024	0.021					
	7.0 - 250	0.088	0.071	0.059	0.051	0.044	0.039	0.035	0.032	0.029					
	10.5 - 250	0.113	0.092	0.077	0.066	0.057	0.051	0.045	0.041	0.038					
HK 4 -	3.5 - 270	0.078	0.063	0.053	0.045	0.039	0.035	0.031	0.028	0.026	0.024				
	7.0 - 270	0.106	0.086	0.072	0.061	0.054	0.047	0.043	0.039	0.035	0.032				
	10.5 - 270	0.12	0.098	0.081	0.07	0.061	0.054	0.048	0.044	0.04	0.037				
HK 4 -	3.5 - 290	0.085	0.069	0.057	0.049	0.043	0.038	0.034	0.031	0.028	0.026	0.024			
	7.0 - 290	0.111	0.09	0.075	0.064	0.056	0.05	0.045	0.04	0.037	0.034	0.032			
	10.5 - 290	0.143	0.166	0.097	0.083	0.072	0.064	0.057	0.052	0.048	0.044	0.041			
HK 4 -	3.5 - 310	0.092	0.075	0.062	0.053	0.046	0.041	0.037	0.033	0.031	0.028	0.026	0.024		
	7.0 - 310	0.12	0.098	0.081	0.07	0.061	0.054	0.048	0.044	0.04	0.037	0.034	0.032		
	10.5 - 310	0.15	0.122	0.102	0.087	0.076	0.067	0.06	0.55	0.05	0.046	0.043	0.4		
HK 4 -	3.5 - 330	0.097	0.079	0.066	0.056	0.049	0.043	0.039	0.035	0.032	0.03	0.028	0.026	0.024	
	7.0 - 330	0.125	0.102	0.085	0.073	0.063	0.056	0.05	0.046	0.042	0.038	0.036	0.033	0.031	
	10.5 - 330	0.157	0.128	0.107	0.091	0.079	0.07	0.063	0.057	0.052	0.048	0.045	0.042	0.039	
HK 4 -	3.5 - 350	0.12	0.098	0.081	0.07	0.061	0.054	0.048	0.044	0.04	0.037	0.034	0.032	0.03	0.028
	7.0 - 350	0.15	0.122	0.102	0.087	0.076	0.067	0.06	0.055	0.05	0.046	0.043	0.04	0.037	0.035
	10.5 - 350	0.164	0.133	0.111	0.095	0.083	0.073	0.066	0.06	0.055	0.05	0.047	0.043	0.041	0.038

# HALFEN SUPPORT BRACKETS

## Brick cladding in accordance with DIN 1053

### Excerpt from DIN 1053 Part 1, Issue 1996 – 11

- 8.4.3** Cavity wall construction for external walls
- 8.4.3.1** Types of construction and general directives for execution
- a) When designing a non-load-bearing outer leaf (brick cladding or plastered masonry leaf) in front of a load-bearing inner leaf, the following points need to be observed:
- b) The minimum thickness of the outer leaf is 90 mm. Thinner outer leaves are called cladding and their construction is detailed in DIN 18 515. The minimum length of brick piers in the outer leaf that have to support loads from the outer leaf only is 240 mm. The outer leaf shall be supported for its full width and length. Where the supporting bearing is interrupted (e.g. on brackets), all bricks/blocks have to be supported on both sides at the level of the support.
- c) Outer leaves with a thickness of 115 mm shall be supported in vertical intervals of about 12 m. They may project up to 25 mm beyond their bearing structure. If the 115 mm thick outer leaf is not higher than 2 storeys or it is supported every other storey, it may project up to one third of its width from its bearing. These projections have to be taken into account when calculating the compression in the bearing joint.
- d) Outer leaves with a thickness of less than 115 mm must not be built to a height of more than 20 m above ground and have to be supported in vertical intervals of about 6 m. On buildings with 2 full storeys, a gable triangle up to a height of 4 m can be included without additional supports. The outer leaves may protrude a maximum of 15 mm from their bearing. . . .
- e) The leaves of the cavity wall shall be tied together with wire ties made from stainless steel wire, material number 1.4401 or 1.4571
- f) In accordance with DIN 17440 (see table 11). The wire wall ties shall have the shape and size as shown in figure 9 of DIN 1053-1.
- g) The vertical distance of the wire wall ties shall be no more than 500 mm and the horizontal distance no more than 750 mm.

On all free edges (of openings, building corners, along expansion joints and along the top edges of the outer leaves), three wire wall ties per linear metre of edge shall be fitted in addition to table 11. . . .

a) Table 11: Minimum number and diameters of wire wall ties per m<sup>2</sup> of wall area

		wire wall tie	
		minimum number	Ø
1	Min. no., unless row 2 or 3 applies	5	3
2	Wall area higher than 12 m above ground or the gap between the leaves of the wall is more than 70 to 120 mm	5	4
3	Gap between leaves of the wall more than 120 to 150	7 or 5	4 or 5

Other methods of tying the wall leaves are permissible if a test certificate can be provided to show that this method can absorb a minimum tensile and compressive force of 1 kN with 1.0 mm slip per tie. If one of these values cannot be achieved, the number of wire wall ties shall be increased accordingly. Whilst taking their structural effectiveness into account, the wire wall ties shall be designed such that they cannot conduct moisture from the outer leaf to the inner leaf (e.g. by fitting a plastic disk).

Other forms of wall ties (e.g. flat steel ties) and dowels in the brickwork are permissible provided their suitability has been documented in accordance with building regulation procedures, e.g. by a general approval under building regulations...

For external cavity walls with an air gap, the following dimensions shall be maintained (DIN 1053, part 1, 8.4.3.2 and 8.4.3.3): the air gap should be at least 60 mm wide and must not exceed 150 mm if wire wall ties are used in accordance with table 11. The width of the air gap may be reduced to 40 mm if any excess mortar protruding from at least one leaf facing the cavity is removed. ...

The air gap of min. 40 mm must not be reduced by unevenness of the thermal insulation.

#### Other relevant DIN

DIN 105	Clay masonry units
DIN 106	Calcium silicate units
DIN 267	Bolts, nuts,...
DIN 1045	Concrete and reinforced concrete; dimensions and execution
DIN 1055	Load assumptions
DIN 4420	Service and working scaffolds
DIN 17 440	Stainless steels
DIN 18 800	Structural steelwork

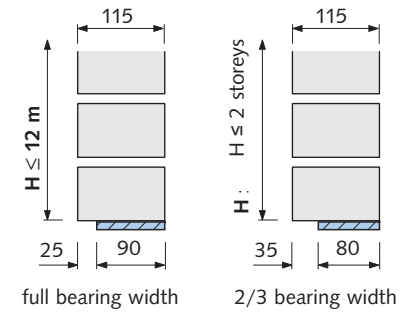
#### Building control approvals

Z - 21.4 - 34	HALFEN channels type HTA
Z - 30.3 - 6	Stainless steels

#### Type testing for HALFEN support brackets

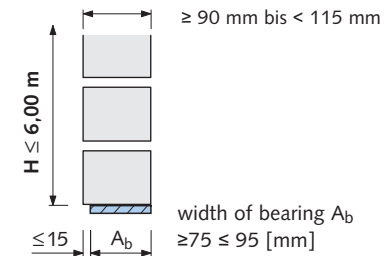
### Bearing on the support brackets

- for 115 mm thick brick cladding:

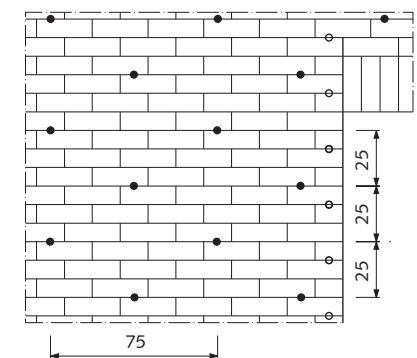


If the outer leaf is not higher than 2 storeys or it is supported every other storey, it may protrude beyond the bearing by up to one third of its thickness.

- for  $\geq 90$  mm to  $< 115$  mm thick brick cladding:



### Layout of cavity wall ties



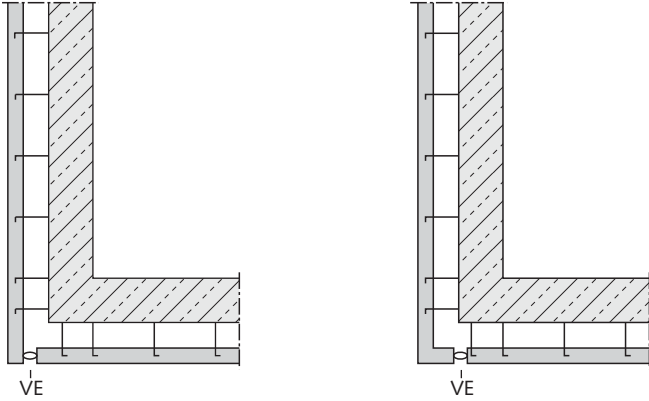
- Number of ties in the area of wall: 5 no./m<sup>2</sup> (or 7 no./m<sup>2</sup>)
- Next to openings, expansion joints and near edges, an additional 3 ties have to be fitted per linear m of edge.



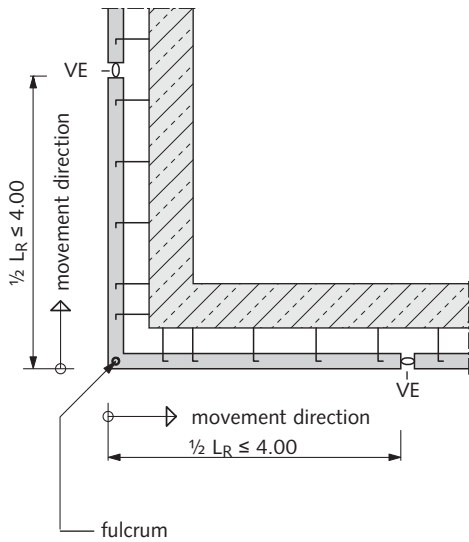
# HALFEN SUPPORT BRACKETS

## Expansion joints

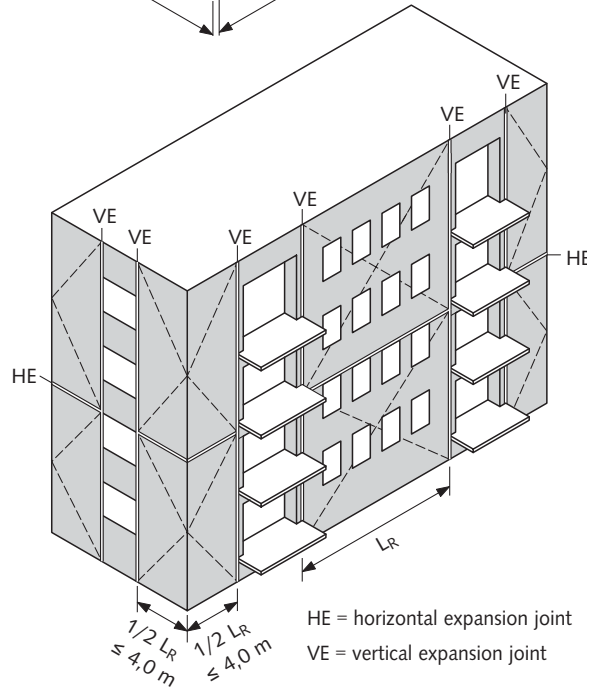
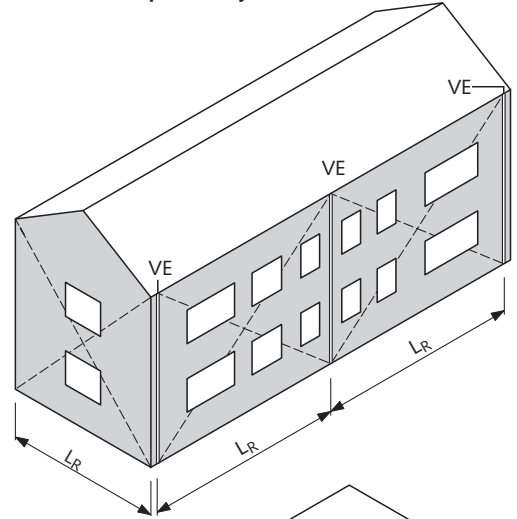
### Expansion joints at corners



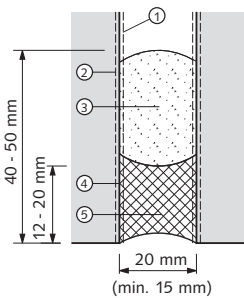
### Symmetrical corner layout with expansion joints



### Horizontal and vertical expansion joints

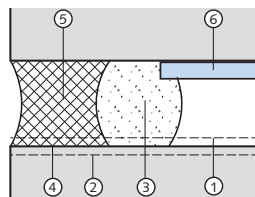


### Vertical expansion joint



Proposed detailing of joint:  
German Society for Masonry Construction

### Horizontal expansion joint under support brackets



- ① joint compressed
- ② joint expanded
- ③ closed-cell foam profile
- ④ bonding primer

### Recommended spacing of exp. joints

Maximum spacing of expansion joints $L_R$ [m] for cavity wall with facing leaf ⑦ in	with air gap and insulation	with core insulation
clay bricks	10 - 15	10 - 12
calcium silicate blocks	6 - 8	5 - 6
concrete module blocks	6 - 8	5 - 6

- ⑤ elastoplastic joint sealing compound
- ⑥ HALFEN support brackets HK4
- ⑦ as recommended by brick industry/calcium silicate industry/ concrete ind.

# HALFEN SUPPORT BRACKETS

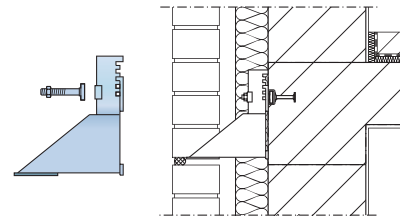
## Tender specifications

### 1. For continuous wall areas

#### 1.1 Individual support bracket with CE marking incl. fixing bolt for HALFEN channel

Supply HALFEN support bracket type HK4 - U - 7.0 - 210, load level 7.0 kN, height adjustable  $\pm 35$  mm, for distance to wall  $a = 120$  mm, including HALFEN bolt M 12 x 87 (type 50/30) in stainless steel 1.4571, 1.4401, 1.4404 (A4) CE certified and fit to cast-in HALFEN channel HTA 49/30 fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....



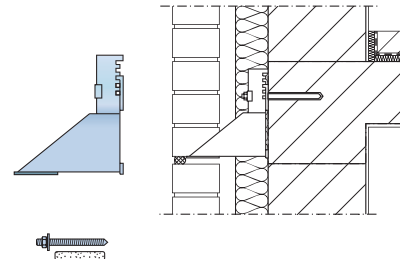
#### 1.2 Individual support bracket with CE marking for dowel fixing, separate (only for fixing in the compression zone of the concrete)

Supply HALFEN support bracket type HK4 U - 3.5 - 190, load level 3.5 kN, height adjustable  $\pm 35$  mm, for distance to wall  $a = 100$  mm, in stainless steel 1.4571, 1.4401, 1.4404 (A4) CE certified and fit with dowels, fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....

Supply HALFEN HB VA M 10 x 160 anchor bolt complete with threaded rod, washer and nut in stainless steel (A4) and mortar cartridge.

..... no. UP ..... TOTAL PR .....

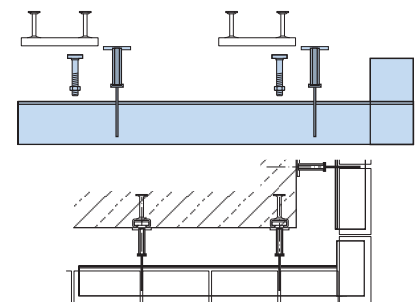


### 2. For continuous wall areas at external corners

#### 2.1 Angle support bracket with CE marking incl. fixing bolts for HALFEN channels

Supply HALFEN support bracket HK4 - FR - 3.5 - 210 - 983 (L1=235 / L2=500 / L3=248), load level 3.5 kN, length of angle 983 mm, height adjustable  $\pm 35$  mm, for distance to wall  $a = 120$  mm, including HALFEN bolt M 12 x 72 (type 38/17) in stainless steel 1.4571, 1.4401, 1.4404 (A4) CE certified and fit to cast-in HTA HALFEN channel 38/17 K (anchor distance  $a = 200$  mm) fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....



### 3. Visible supports for openings

#### 3.1 Angle support bracket with CE marking for dowel fixing, separate

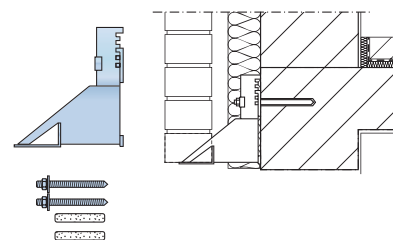
(only for fixing in the compression zone of the concrete)

Supply HALFEN support bracket type HK4 - F - 3.5 - 210 - 1245, load level 3.5 kN, length of angle 1245 mm, height adjustable  $\pm 35$  mm, for distance to wall  $a = 120$  mm, in stainless steel 1.4571, 1.4401, 1.4404 (A4) CE certified and fit with dowels, fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....

Supply HALFEN HB VA M 10 x 160 anchor bolt complete with threaded rod, washer and nut in stainless steel (A4) and mortar cartridge.

..... no. UP ..... TOTAL PR .....



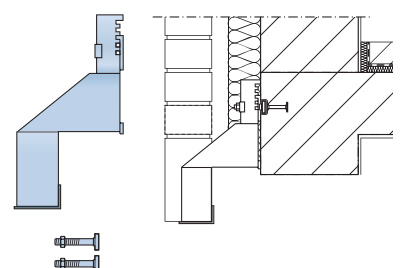
#### 3.2 Angle support bracket with offset with CE marking on HALFEN channels, separate

Supply HALFEN support bracket type HK4 - FV - 7.0 - 170 - 1245, load level 7.0 kN, with offset dimension  $v = 100$  mm, length of angle 1245 mm, height adjustable  $\pm 35$  mm, for distance to wall  $a = 80$  mm, in stainless steel 1.4571, 1.4401, 1.4404 (A4) CE certified and fit to HALFEN cast-in channels HTA 49/30, fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....

Supply HALFEN bolts type 50/30, M12 x 87 with washers and nuts in stainless steel (A4).

..... no. UP ..... TOTAL PR .....



# HALFEN SUPPORT BRACKETS

## Tender specifications

### 4. Invisible supports for openings

#### 4.1 Angle support brackets with CE marking, suspension loops and fixing bolts, separate

Supply HALFEN support brackets type HK4 - F - 3.5 - 190 - 1245, load level 3.5 kN, length of angle 1245 mm, height adjustable  $\pm 35$  mm, for distance to wall  $a = 100$  mm, in stainless steel 1.4571, 1.4401, 1.4404 (A4) CE certified and fit, fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....

Supply HALFEN bolts type 38/17, M 12 x 72 with washers and nuts in stainless steel (A4) CE certified.

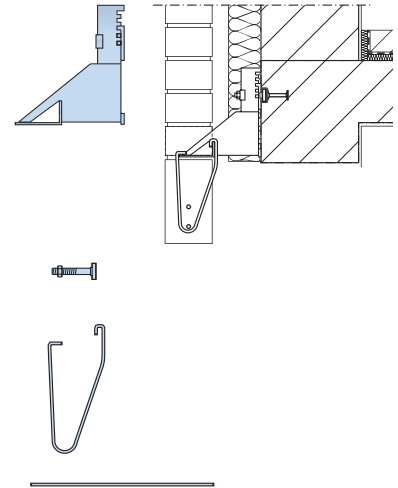
..... no. UP ..... TOTAL PR .....

Supply suspension loops for angle support brackets HSL - W - 40 - 1 in stainless steel (A4) CE certified and fit with a spacing of approx. 25 cm.

..... no. UP ..... TOTAL PR .....

Supply stainless steel wire  $\varnothing 4$  mm, length 1000 mm, in stainless steel A4 CE certified and fit in accordance with drawing as longitudinal reinforcement for suspended soldier courses.

..... no. UP ..... TOTAL PR .....

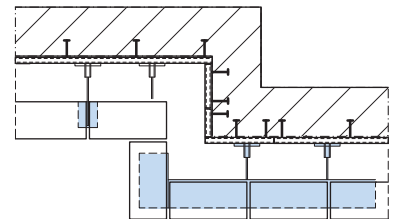


### 5. Support at columns and projections

#### 5.1 Angle support bracket with CE marking incl. fixing bolts for HALFEN channels

HALFEN support brackets HK4 - FL (FR, FRL) - 3.5 - 210 - 810, load level 3.5 kN, length of angle 810 mm, height adjustable  $\pm 35$  mm, for distance to wall  $a = 120$  mm, including HALFEN bolts M 12 x 87 (type 38/17) in stainless steel 1.4571/ 1.4401/ 1.4404 (A4) CE certified and fit to cast-in HALFEN channel HTA 38/17 K (anchor distance  $a = 200$  mm) fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....



### 6. Support for pre-cast lintel

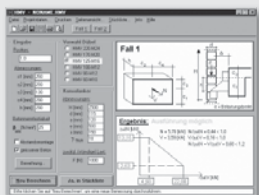
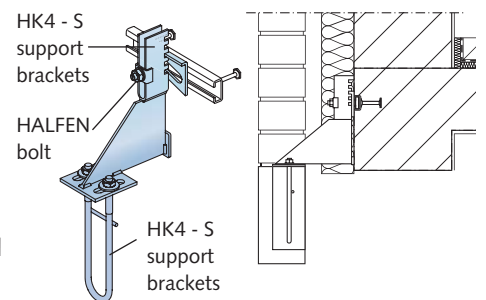
#### 6.1 Individual support brackets with CE marking incl. fixing bolts for HALFEN channel

HALFEN support brackets HK4 - S - 7.0 - 250, load level 7.0 kN, height adjustable  $\pm 35$  mm, for distance to wall  $a = 160$  mm, including HALFEN bolts M 12 x 87 (type 50/30) in stainless steel 1.4571, 1.4401, 1.4404 (A4) CE certified and fit to cast-in HALFEN channel HTA 49/30 fully aligned and in compliance with the installation instructions.

..... no. UP ..... TOTAL PR .....

Supply HALFEN threaded loops type HSL - G3 - M 10 in stainless steel A4 and cast into pre-cast lintel in the correct position in accordance with the installation instructions.

..... no. UP ..... TOTAL PR .....



**Dimensioning software for support brackets**  
visit [www.halfen.com](http://www.halfen.com)



• **Design manual PFM**  
(PDF-Format, Acrobat Reader®)

• **CAD libraries:**  
- HK4 Support brackets  
- HTA HALFEN channels  
- Wall connection channels and ties

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