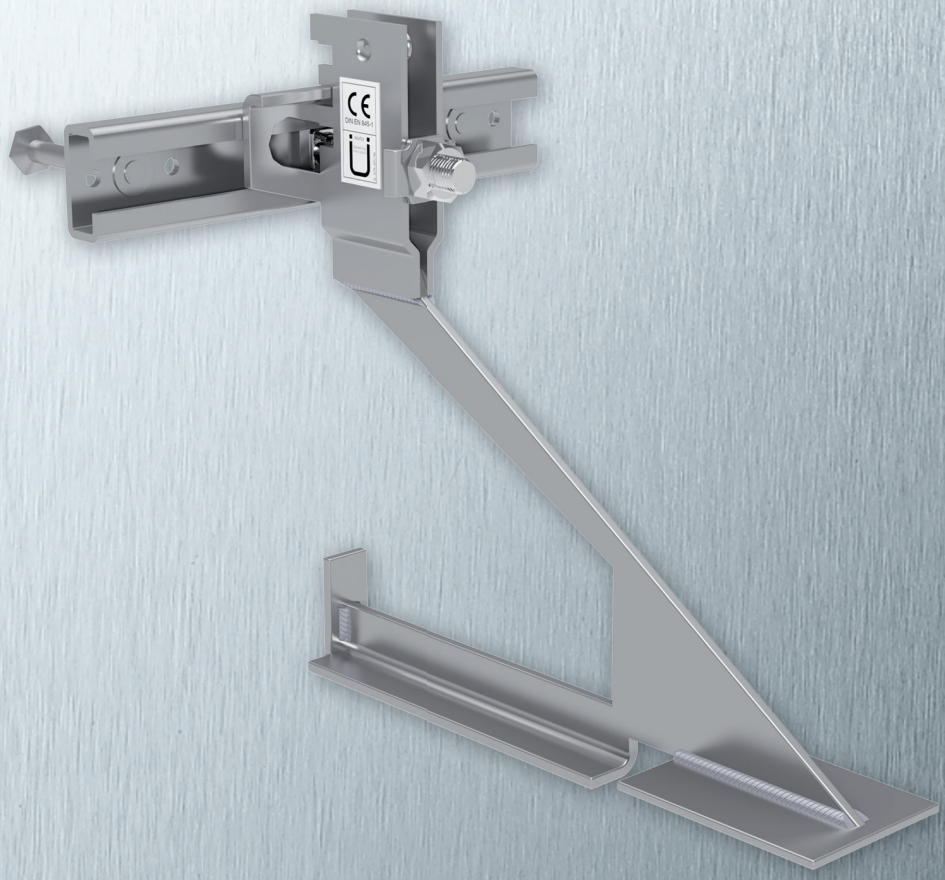
HALFEN BRICKWORK SUPPORT

TECHNICAL PRODUCT INFORMATION



HALFEN BRICKWORK SUPPORT

FAÇADE

FM 18-E

NEW!

- The Brickwork Support Bracket 5.0
- HK5 - with increased load capacities and reduced thermal heat transfer

HALFEN

A CRH COMPANY

HALFEN SUPPORT BRACKETS

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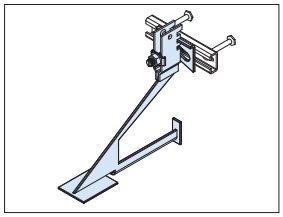

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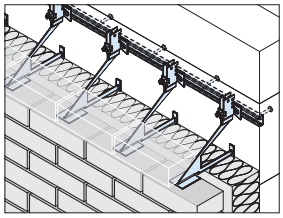

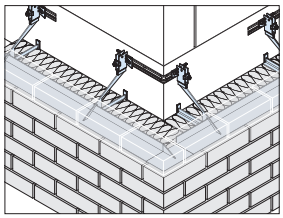

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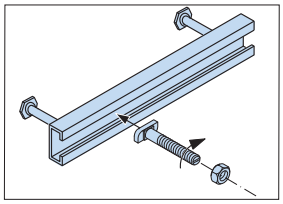

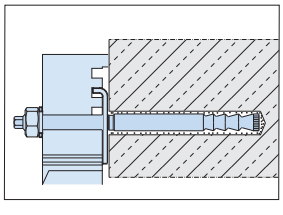

HALFEN SUPPORT BRACKETS

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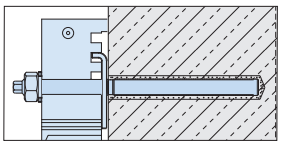

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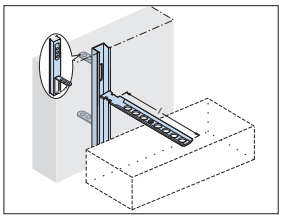

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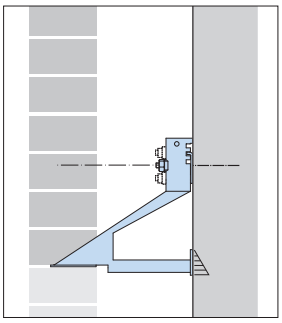


More than just a pretty face – an introduction to brick façades

Facing bricks have excellent material characteristics and are therefore an outstanding solution for durable façade construction. They are maintenance free and weather resistant. With the broad selection available they offer numerous design possibillities and are suitable for different architectural styles. Used in the proven two-leaf construction method they also provide optimal thermal and acoustic insulation.

Based on many years of experience and with our focus on the increased requirements on energy efficiency, HALFEN continues to develop and improve its brickwork façade support brackets.

THE BRICKWORK SUPPORT BRACKET 5.0

NEW!

HK5 – with increased load capacities and reduced thermal heat transfer

The new 5.0 generation of brickwork support anchors has significant advantages: With its slim structural design thermal bridging has again been reduced by up to 27% in comparison with the already improved HK4 Thermo. Additional measures for insulation, for example, placing insulation strips between the wall and the brackets or similar insulation components are no longer necessary.

In addition, the HALFEN HK5 Brickwork support brackets are now suitable for up to 14% higher loads.
The number of anchors and the time required for installation can therefore be reduced.
Façade construction becomes more economic with higher energy efficiency.

CE

Manufactured with in-house production control and CE marked according to DIN EN 845-1/ DIN EN 845-2

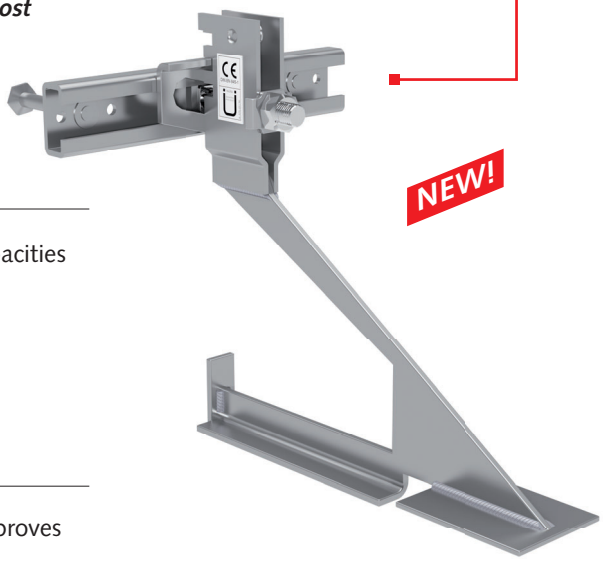
QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001 www.dnvgl.com

Quality management-system
for production facilities according to DIN EN ISO 9001

HALFEN Brickwork support brackets

The advantages at a glance

HALFEN products for façade construction are a combination of many years of experience with continuous innovation.
This ensures: top safety standards, fastest building progress and cost efficient high durability.



New load range

- up to14% increased load capacities
- 4.0 kN instead of 3.5 kN
- 8.0 kN instead of 7.0 kN
- 12.0 kN instead of 10.5 kN

Reduced thermal heat transfer

- the slim structural design improves χ - values by up to 27%
- an expert report confirms a reduced influence to the heat transmission coefficient U [W/(m² K)] of a façade
- no additional thermal insulation is required

HALFEN HK5 Brickwork support bracket
with increased load capacities and reduced thermal heat transfer

Our familiar quality

- up to 350 mm cantilevers
- ±20 mm vertical adjustability
- ±15 mm horizontal adjustability

New lean duplex material

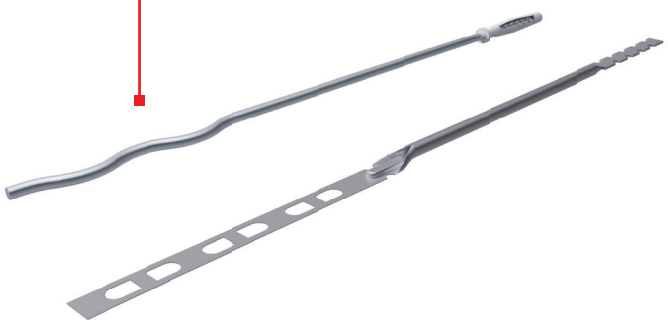
- stainless high-grade steel of corrosion resistance class (CRC) III
- building authority approved
- yield limit ≥ 400 N/mm² allows the cross section to be reduced without reducing the load capacity

Quality check system

- building authority approved bracket head
- type tested brackets for up to 350 mm cantilevers

HALFEN Brick ties

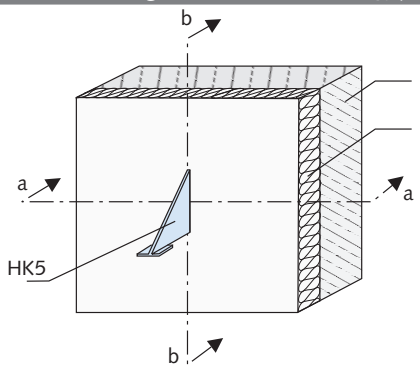
- universal application
- time saving, no bending of ties required
- verified and building authority approved for numerous bricks and mortar combinations
- approved for large gaps

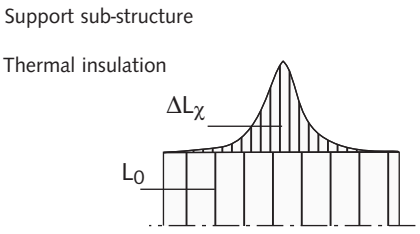


www.halfen.com/products/brickwork support systems

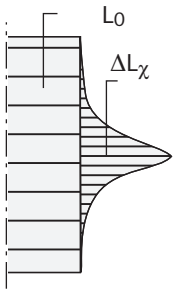
NEW!

Thermal bridge loss coefficient χ (chi) for HK5 Brickwork supports





Section a - a



Section b - b

Thermal-bridges in HK5 Single support brackets

A brickwork façade is a durable construction with a pleasing aesthetic appearance and low maintenance costs. Cavity wall construction is a very reliable design method providing good heat insulation, a good moisture barrier as well as being a good noise barrier. Of increased importance is thermal heat loss. The brick-cladding is supported by HK5 Brackets through the insulation layer to the main structure. These brackets cause thermal heat bridges. With effective planning our aim is to keep the thermal heat bridges as small as possible. Using the thermal heat loss coefficient χ (chi) it is possible to determine the exact effect of the HK5 Support brackets on the heat transmission coefficient for the wall.

Thermal conductivity – insulation / λ = 0.035 (W/mK) ; χ (chi) -value per bracket (W/K)

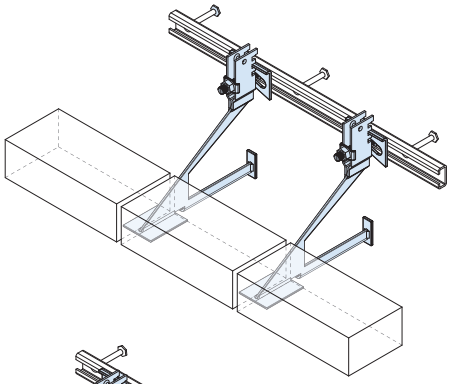
Thermal insulation d [cm]		2	4	6	8	10	12	14	16	18	20	22	24	26
HK5 -	4.0 - 130	0.087	0.080											
	8.0 - 130	0.114	0.108											
	12.0 - 130	0.128	0.123											
HK5 -	4.0 - 150	0.074	0.077	0.055										
	8.0 - 150	0.098	0.110	0.083										
	12.0 - 150	0.110	0.125	0.096										
HK5 -	4.0 - 170	0.066	0.063	0.041	0.028									
	8.0 - 170	0.082	0.083	0.058	0.040									
	12.0 - 170	0.094	0.098	0.069	0.045									
HK5 -	4.0 - 190	0.066	0.062	0.039	0.028	0.022								
	8.0 - 190	0.082	0.081	0.055	0.038	0.031								
	12.0 - 190	0.093	0.096	0.065	0.044	0.035								
HK5 -	4.0 - 210	0.065	0.062	0.038	0.027	0.022	0.018							
	8.0 - 210	0.081	0.081	0.053	0.035	0.030	0.026							
	12.0 - 210	0.093	0.095	0.064	0.042	0.034	0.029							
HK5 -	4.0 - 230	0.066	0.064	0.041	0.029	0.024	0.021	0.018						
	8.0 - 230	0.081	0.081	0.053	0.036	0.029	0.025	0.021						
	12.0 - 230	0.094	0.097	0.065	0.043	0.033	0.028	0.025						
HK5 -	4.0 - 250	0.066	0.063	0.041	0.029	0.024	0.021	0.018	0.016					
	8.0 - 250	0.081	0.081	0.063	0.035	0.028	0.024	0.022	0.019					
	12.0 - 250	0.094	0.097	0.065	0.043	0.033	0.028	0.025	0.022					
HK5 -	4.0 - 270	0.067	0.064	0.041	0.029	0.024	0.021	0.018	0.016	0.014				
	8.0 - 270	0.081	0.082	0.053	0.035	0.028	0.024	0.021	0.019	0.017				
	12.0 - 270	0.094	0.096	0.065	0.043	0.033	0.028	0.025	0.022	0.020				
HK5 -	4.0 - 290	0.067	0.064	0.041	0.029	0.024	0.021	0.018	0.016	0.015	0.013			
	8.0 - 290	0.081	0.082	0.053	0.035	0.028	0.024	0.021	0.019	0.017	0.016			
	12.0 - 290	0.097	0.100	0.070	0.047	0.038	0.032	0.028	0.026	0.023	0.021			
HK5 -	4.0 - 310	0.067	0.064	0.041	0.030	0.025	0.022	0.019	0.017	0.015	0.014	0.012		
	8.0 - 310	0.081	0.081	0.053	0.036	0.029	0.025	0.022	0.019	0.017	0.016	0.014		
	12.0 - 310	0.097	0.100	0.070	0.048	0.038	0.033	0.029	0.026	0.023	0.021	0.019		
HK5 -	4.0 - 330	0.073	0.071	0.049	0.037	0.031	0.027	0.024	0.022	0.020	0.018	0.017	0.015	
	8.0 - 330	0.087	0.088	0.061	0.043	0.036	0.031	0.027	0.025	0.022	0.021	0.019	0.017	
	12.0 - 330	0.097	0.100	0.070	0.047	0.038	0.033	0.028	0.025	0.023	0.021	0.020	0.018	
HK5 -	4.0 - 350	0.072	0.070	0.049	0.036	0.031	0.027	0.024	0.022	0.020	0.018	0.017	0.016	0.014
	8.0 - 350	0.086	0.087	0.060	0.043	0.036	0.029	0.027	0.024	0.022	0.020	0.019	0.018	0.016
	12.0 - 350	0.095	0.098	0.069	0.046	0.037	0.031	0.026	0.025	0.023	0.021	0.019	0.018	0.017

Façade with core insulation

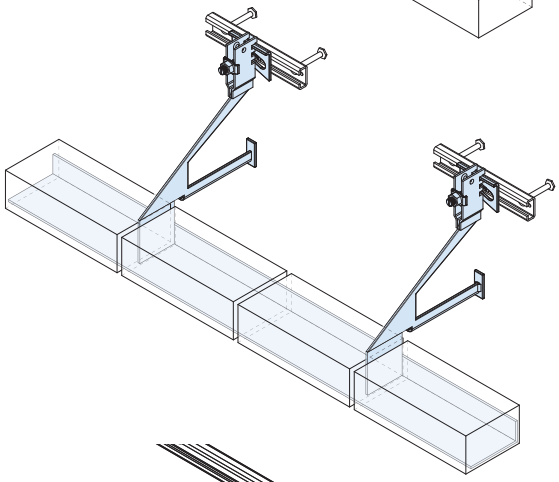
Sample Applications

Applications

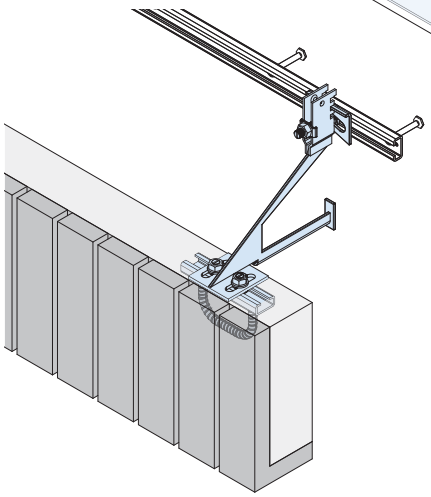
HK5-U
The universal standard for support in transverse joints is available in several types,
see page 10–11



HK5-FV
The standard type for support above window openings allows larger spacing behind the support brackets.
Variants for different applications are available,
see page 14–15



HK5-S with HTA-ES
Precast lintel support
The precast unit is horizontally and vertically adjustable for exact alignment,
see page 21



Materials:
L4: Steel, corrosion resistance class (CRC) III according to Z-30.3-6
(Group 1.4062, 1.4162, 1.4362...).
A4: Steel, corrosion resistance class (CRC) III according to Z-30.3-6 and EN 1993-1-4: 2006, table A.1, row 3
(Group 1.4404, 1.4571...).
A2: Steel, corrosion resistance class (CRC) II according to Z-30.3-6 and EN 1993-1-4: 2006, table A.1, row 2
(Group 1.4307...).
HCR: Steel, corrosion resistance class (CRC) IV according to Z-30.3-6 and EN 1993-1-4: 2006, table A.1, row 4
(Group 1.4439, 1.4462...).

Sample Applications

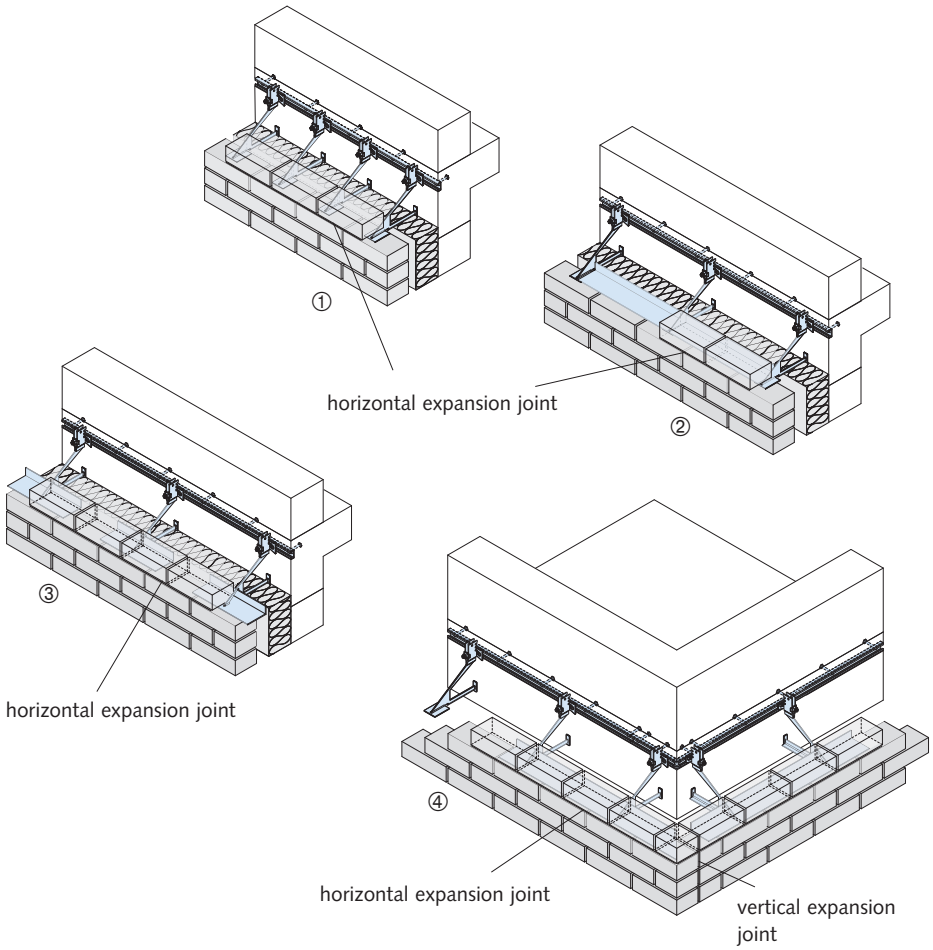
Continuous wall surface

① HK5-U Single support brackets,
spacing e = 25 cm,
see page 10–11

② HK5-U Single support brackets,
spacing e ≥ 50 cm,
and HW 95 Support angle,
see page 10 and page 18–19

③ HK5-P Angle support brackets,
spacing e = 50 cm,
see page 16

④ HK5-F Angle support brackets,
see page 13



Support over wall openings

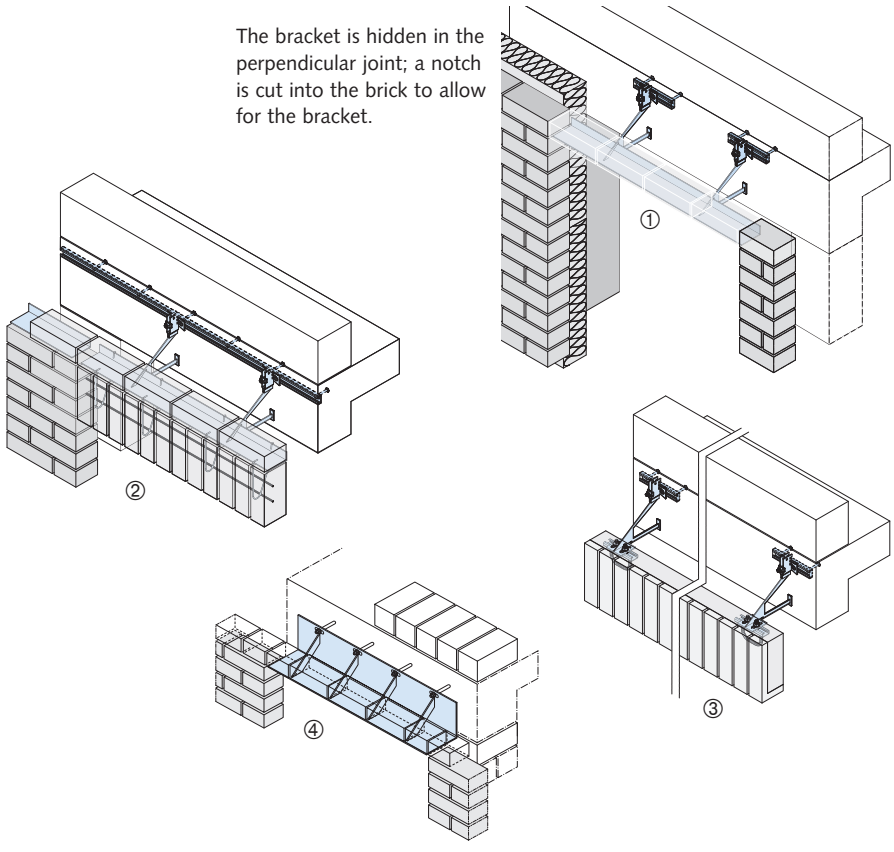
① HK5-F Support with visible
angle support bracket,
see page 12

② HK5-F Support with hidden
angle support bracket
and HSL Suspension loops,
see page 14–15

③ Support brackets for precast lintels
with HK5-SV single support
brackets, the lintel is supported
by HALFEN HTA-ES Channels with
cast-in metal loops,
see page 19–21

④ KWL Angles; anchor bolt fixing,
see page 17

The bracket is hidden in the perpendicular joint; a notch is cut into the brick to allow for the bracket.

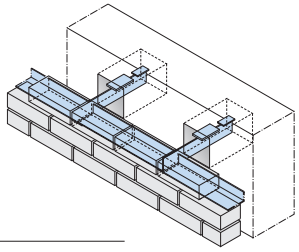


HALFEN SUPPORT BRACKETS

Sample Applications

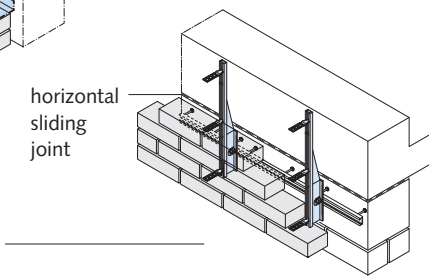
KM Grout-in wall anchors

Support with grout-in brackets and angle support brackets placed between the grout-in brackets, see page 22



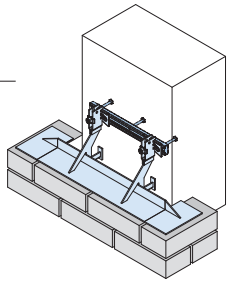
HAV Parapet support brackets

Wind-resistant support of parapet brickwork facing on horizontally sliding roof slabs, see page 23



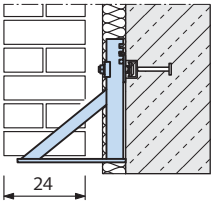
HK5-FLR Support brackets for brick-facing on columns

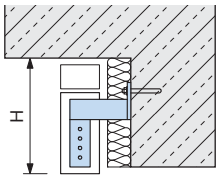
With angle support brackets, special construction, see page 13



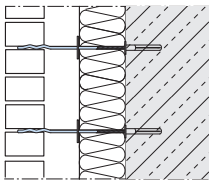
HK Special support brackets for larger loads (loads up to 26 kN)

Model HK0-UL – 0.5 for low height installations

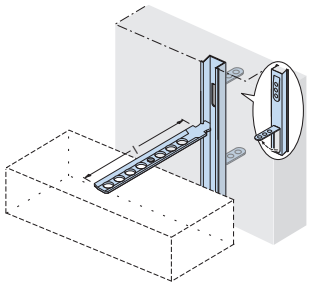




Cavity wall ties for horizontal load support, see page 24–26



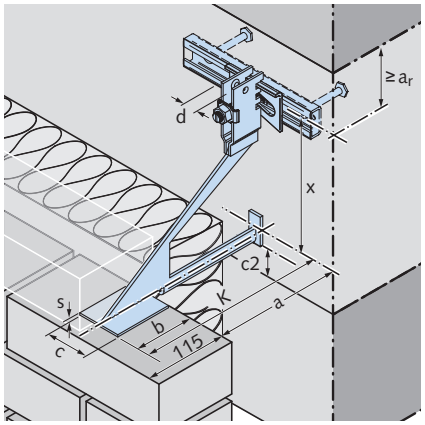
Brickwork connection anchor for horizontal load support, see page 33–35



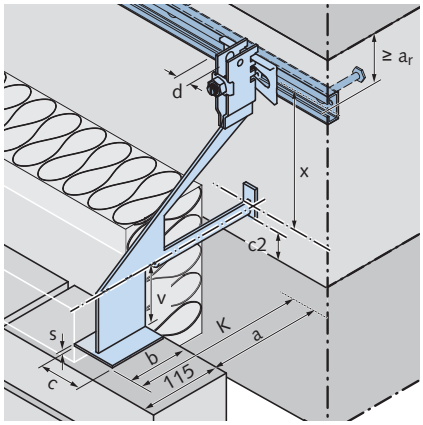
Installation with HALFEN Anchor bolt systems: More information can be found in Technical Product Information: “HALFEN HB Anchor bolt systems“.

HK5 - U, HK5 - W Single Support Brackets

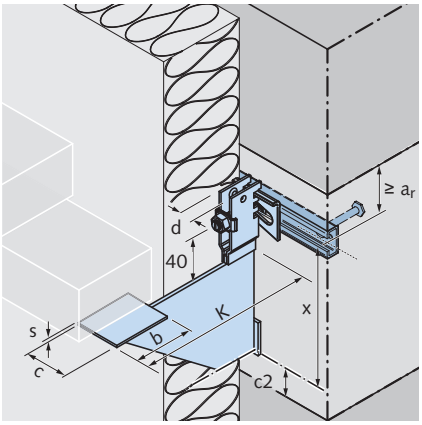
HK5 - U



HK5 - UV



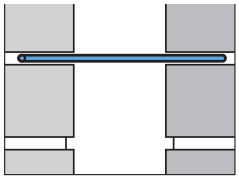
HK5 - UT



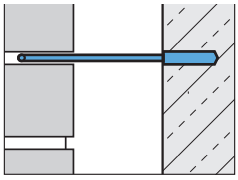
The HK5-U Single support bracket is a standard single bracket with optimized web plate and a support-plate. Used in combination with HALFEN HTA Cast-in channels, the adjustable HK5-U Wall bracket provides an easy-to-install, cost-effective and safe construction.
The specified load-bearing capacities are for fixings in concrete ≥ C20/25.

Note:
- c_2 = required edge distance according to type test report or static calculation
- additional suspension height up to 350 mm
- a_r = required edge distance according to the technical approval for the anchorage

Accessories

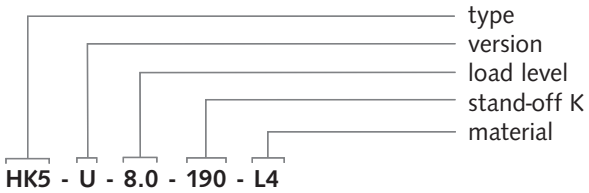


Brick wall tie for drill fixing, see page 25, 26

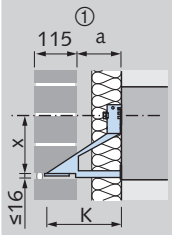


Brick wall tie, see page 24

Order example:



Selecting HK5 Single support brackets



	Spacing **a** from wall [mm]	Allowable load F_V =4.0 **kN** (F_{Rd} = **5.4 kN**)		Allowable load F_V = **8.0 kN** (F_{Rd} = **10.8 kN**)		Allowable load F_V = **12.0 kN** (F_{Rd} = **16.2 kN**)	
		Length **K**	**x**	Length **K**	**x**	Length **K**	**x**
-U	40 ± 15	**130**	150	**130**	200	**130**	264
	60 ± 15	**150**	150	**150**	200	**150**	264
-UV	80 ± 15	**170**	150	**170**	200	**170**	264
	100 ± 15	**190**	150	**190**	200	**190**	264
-UT	120 ± 15	**210**	150	**210**	200	**210**	264
	140 ± 15	**230**	175	**230**	250	**230**	314
-W*	160 ± 15	**250**	175	**250**	250	**250**	314
	180 ± 15	**270**	180	**270**	270	**270**	334
-WV*	200 ± 15	**290**	200	**290**	290	**290**	354
	220 ± 15	**310**	220	**310**	310	**310**	374
	240 ± 15	**330**	240	**330**	330	**330**	394
	260 ± 15	**350**	260	**350**	350	**350**	414
Support plate b × c × s		80 × 60 × 3		80 × 60 × 4		100 × 80 × 5	
Notch spacing d		12.5		16.5		16.5	

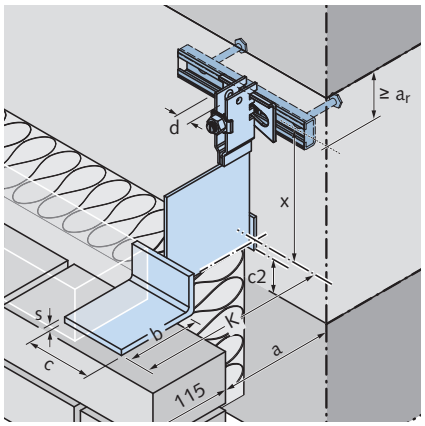
Dimensions in mm

* **HK5-W** only for load range 4.0 kN and 8.0 kN / **HK5-WV** only for load range 4.0 kN

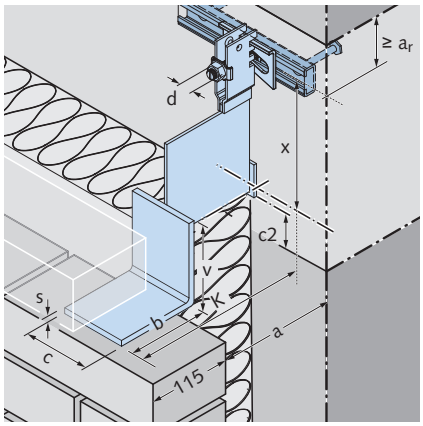
① other brick dimensions are also possible

HK5 - U, HK5 - W Single Support Brackets

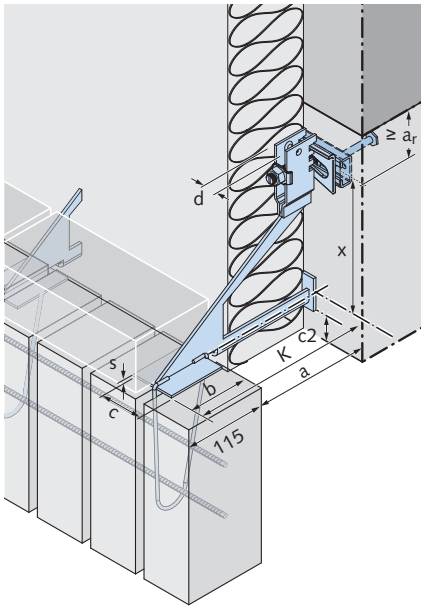
HK5 - W



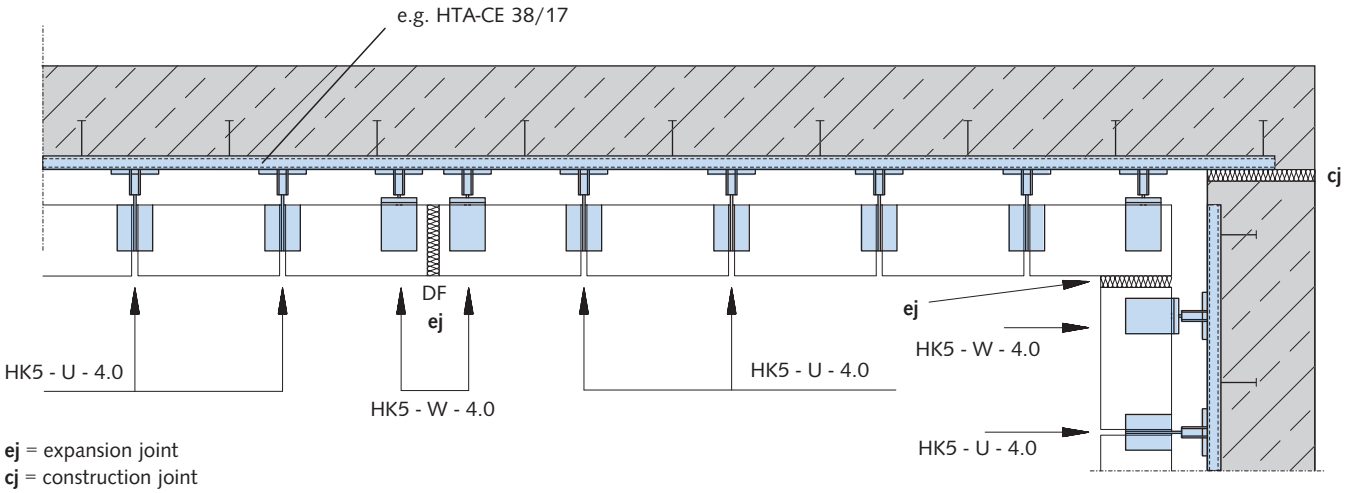
HK5 - W



HK5 - U with suspension loop



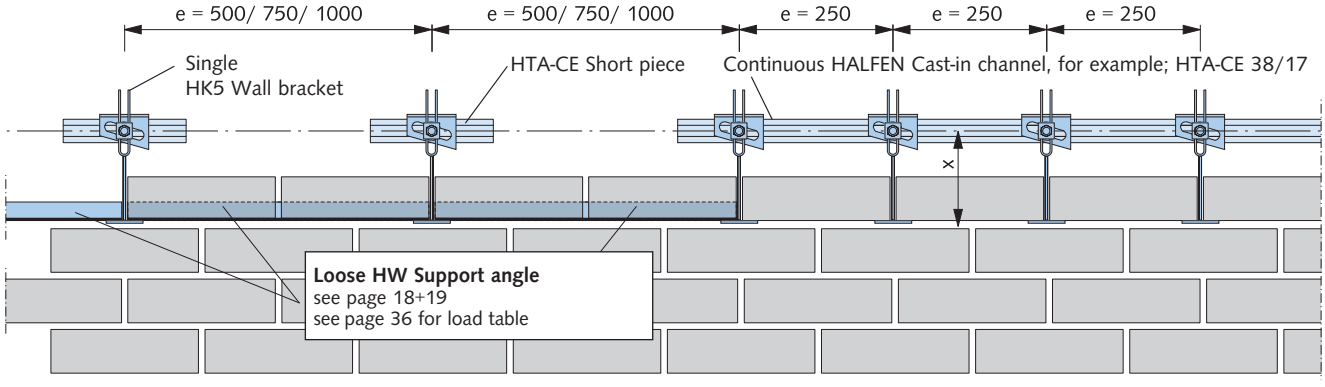
Example:
Brickwork cladding support with height = H ≤ 6.00 m



ej = expansion joint
cj = construction joint

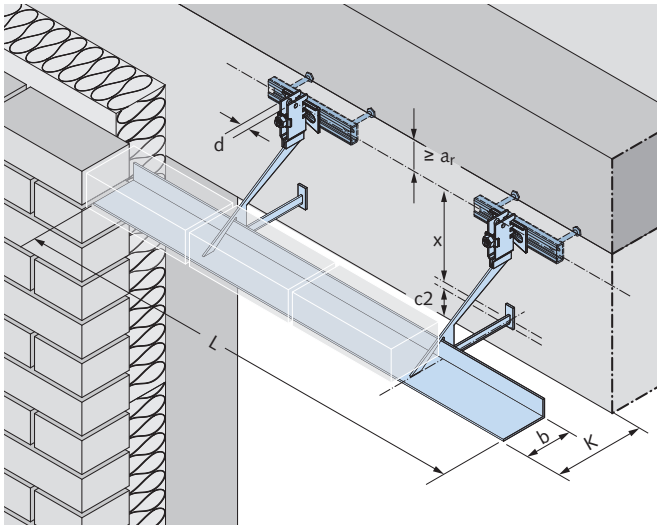
Example:
Support with and without support angle

All dimensions in mm



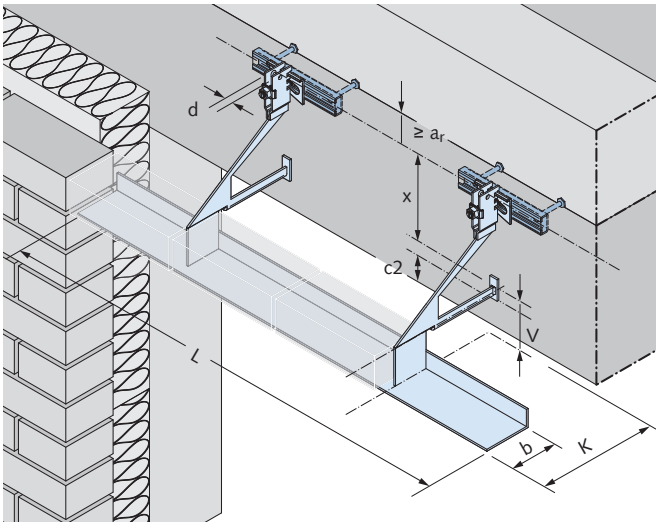
Continuous HK5 - F Angle Support Bracket

HK5 - F



Standard version HK5 with angle and two supports

HK5 - FV



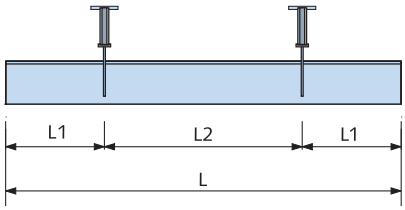
With height offset to the front;
additional suspension height v up to 350 mm

For support of low-height brickwork cladding, e.g. parapets above window openings; allows larger brackets spacing.

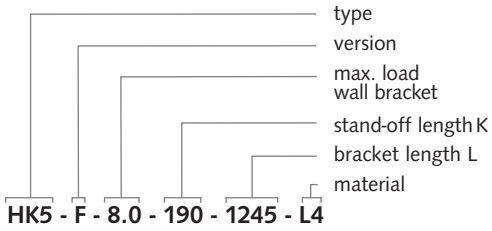
Note: Support the brickwork while work is in progress until sufficient stability has been reached to avoid excessive deflection of the angle support bracket.

Standard lengths [mm] for HK5 - F/- FV		
L1	L2	**L**
247.5	500	**995**
247.5	750	**1245**
247.5	1000	**1495**

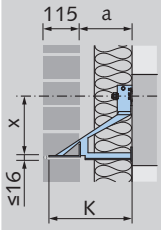
Note:
- c_2 = required edge distance according to type test report or static calculation
- additional suspension height up to 350 mm
- a_r = required edge distance according to the technical approval for the anchorage

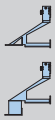


Order example:



Selecting HK5 Angle support bracket





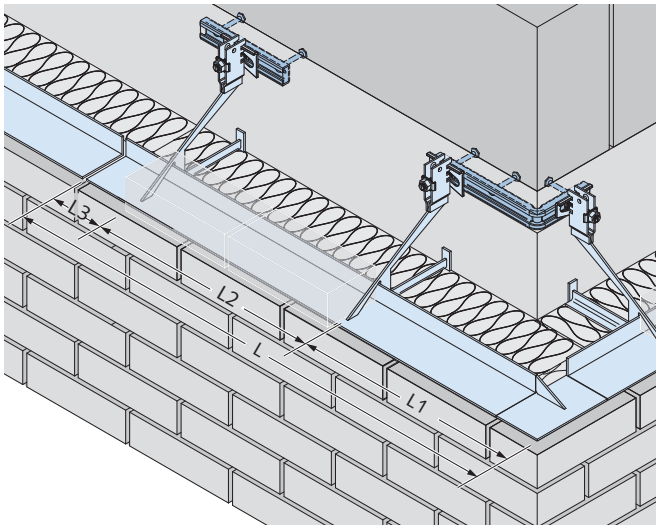
Spacing **a** from wall [mm]	Allowable load F_V = **4.0 kN** ① (F_{Rd} = **5.4 kN**)		Allowable load F_V = **8.0 kN** ① (F_{Rd} = **10.8 kN**)		Allowable load F_V = **12.0 kN** ① (F_{Rd} = **16.2 kN**)	
	Length **K**	**x**	Length **K**	**x**	Length **K**	**x**
40 ± 15	**130**	150	**130**	200	**130**	264
60 ± 15	**150**	150	**150**	200	**150**	264
80 ± 15	**170**	150	**170**	200	**170**	264
100 ± 15	**190**	150	**190**	200	**190**	264
120 ± 15	**210**	150	**210**	200	**210**	264
140 ± 15	**230**	175	**230**	250	**230**	314
160 ± 15	**250**	175	**250**	250	**250**	314
180 ± 15	**270**	180	**270**	270	**270**	334
200 ± 15	**290**	200	**290**	290	**290**	354
220 ± 15	**310**	220	**310**	310	**310**	374
240 ± 15	**330**	240	**330**	330	**330**	394
260 ± 15	**350**	260	**350**	350	**350**	414
Angle width b	100		100		100	
Width of notched bracket d	12.5		16.5		16.5	

Dimensions in mm

① allowable load, HK5 Angle support brackets

Continuous HK5 - F Angle Support Bracket

HK5 - FR



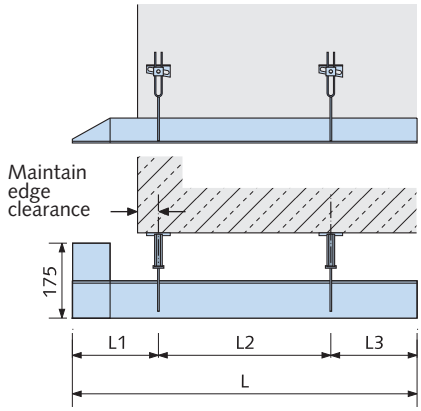
Right-corner support element

Custom solutions:

HK5 - FL with left-hand corner
(HK5-FLR for columns, 2 corner elements)

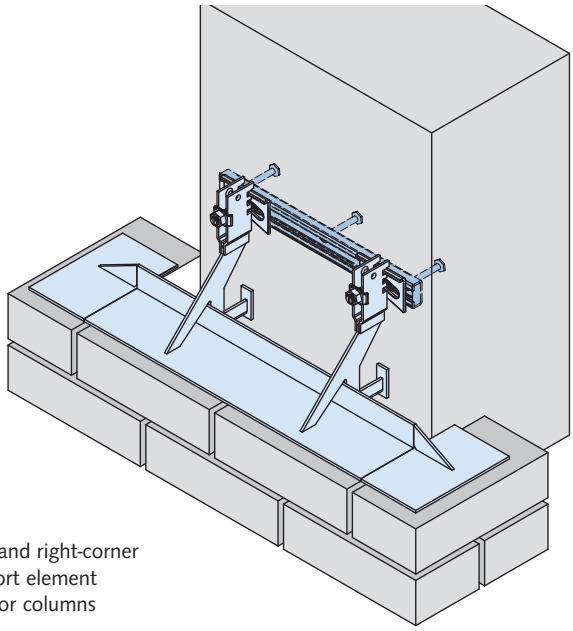
Elevation

Plan



Order example: HK5-FL-8.0 - 180 - 990 (305/440/245)

HK5 - FLR

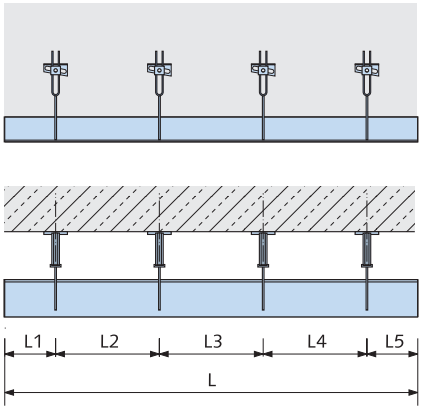


Left- and right-corner
support element
e.g. for columns

Angle support brackets; more than 2 brackets and custom dimensions, max. L ≤ 4000 mm

Elevation

Plan

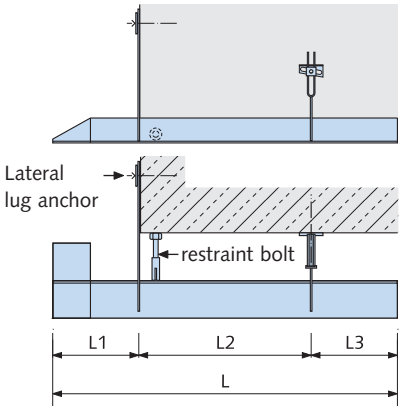


HK5-F - 8.0 - 180 - L (L1/L2/L3/L4/L5)

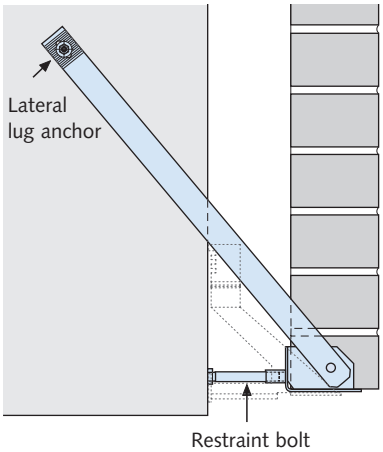
HK5 - FL with left-corner, with 1 lateral anchor strap

Elevation

Plan



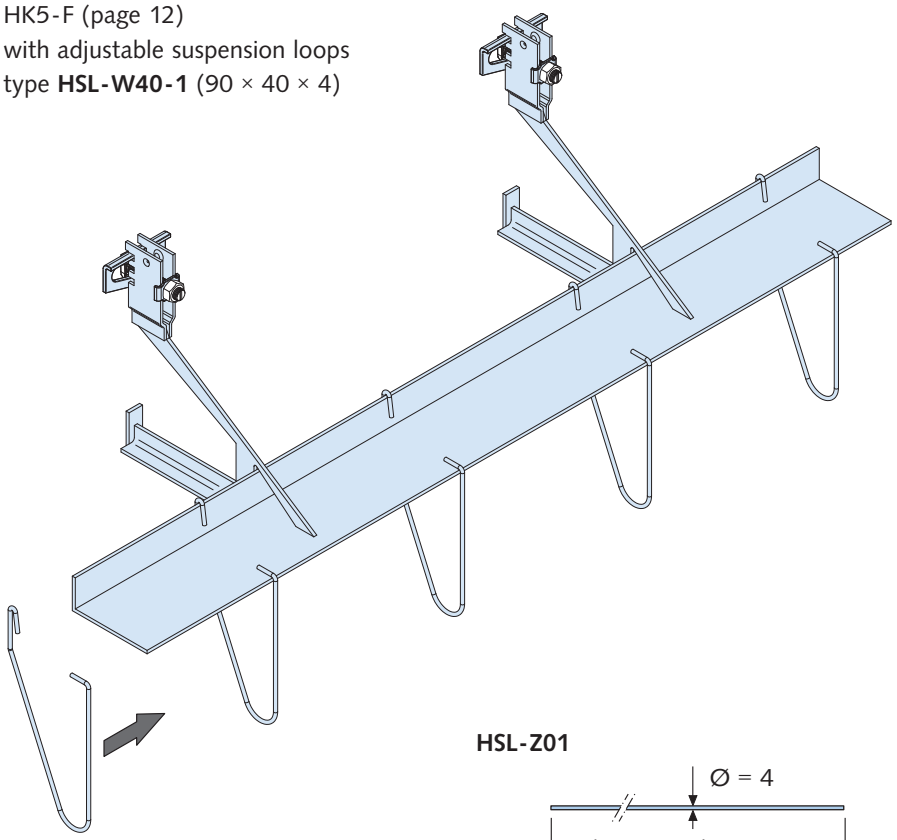
Vertical section



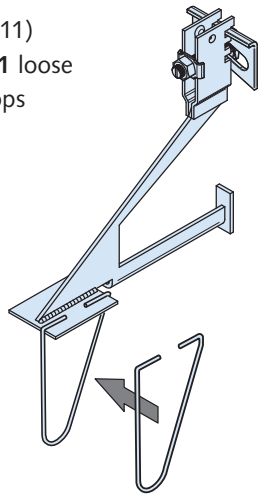
Order example: HK5-FL - 8.0 - 180 - L (L1/L2/L3) with 1 lateral strap anchor, left

Overview

HK5-F (page 12)
with adjustable suspension loops
type **HSL-W40-1** (90 × 40 × 4)

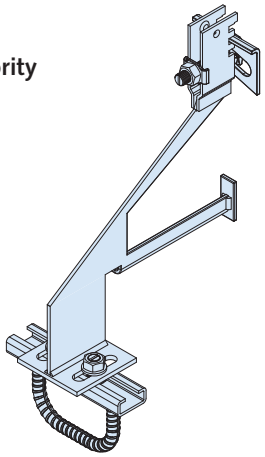


HK5-U (page 11)
with **HSL-A1-1** loose
suspension loops



HK5-S (see page 20)
with **HTA-ES**

building authority approved

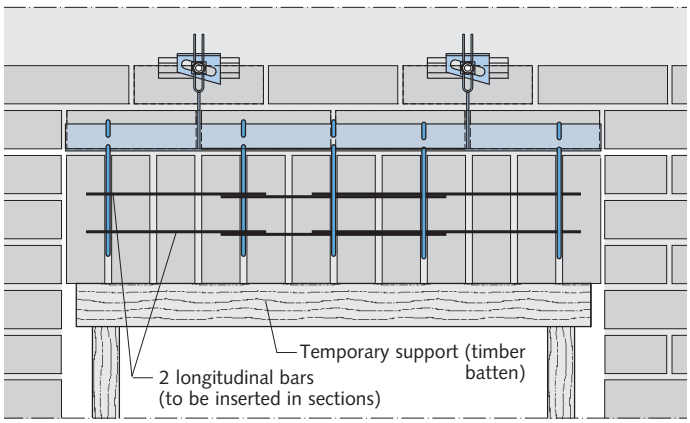


HSL-Z01

Stainless steel wire as longitudinal reinforcement for suspended soldier courses, diameter Ø 4 mm,
material: W 1.4571 or 1.4404 (A4)

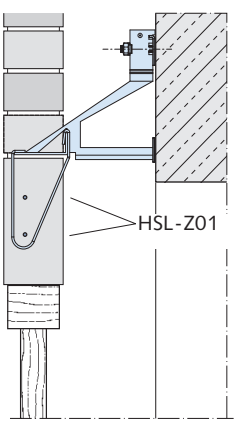
Example: supporting soldier courses with concealed supports

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



HK5-F
Angle support bracket

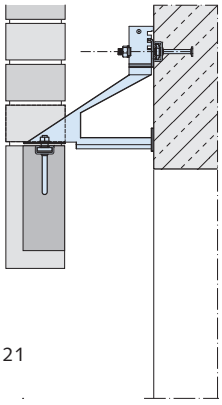
Place **HSL-W** loop onto the bracket and allow to hang.



Detail with prefabricated lintel

HK5-S
Support bracket

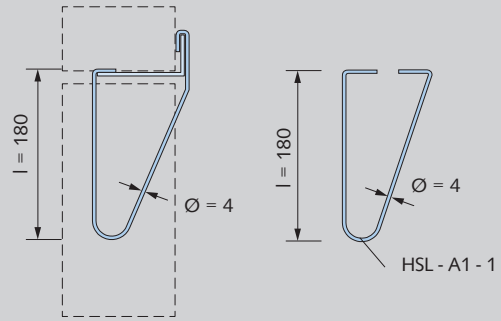
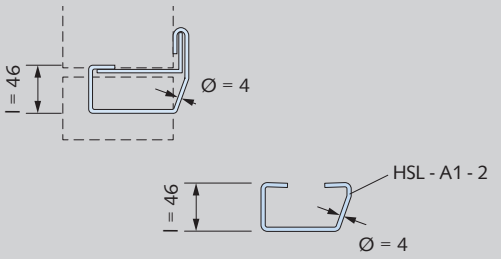
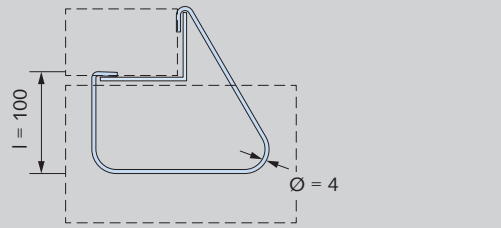
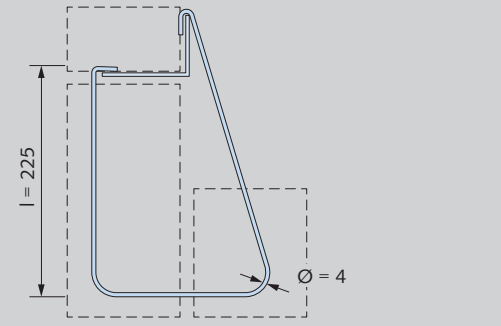
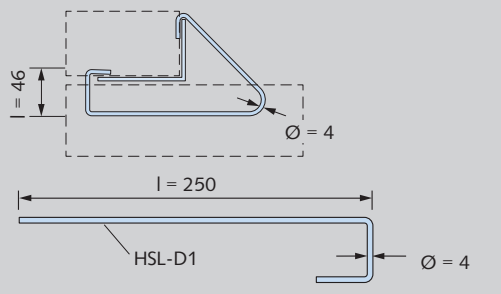
Precast lintel with HALFEN Cast in channel.



HTA-ES
see page 21

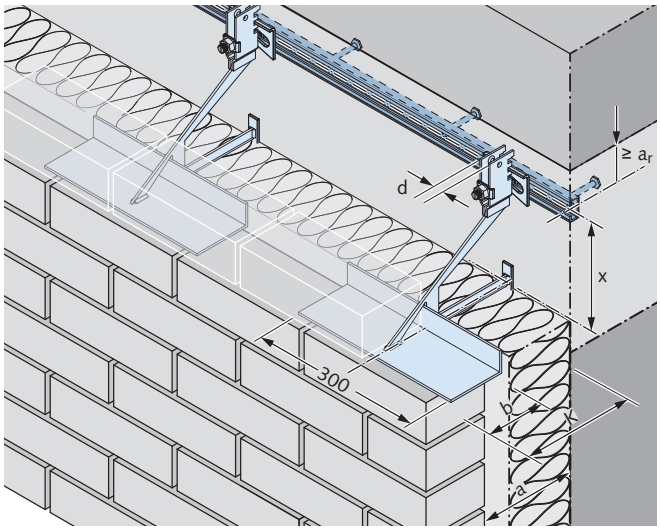
Suspension Loops

Selection – suspension loop type HSL

Design		Type	Support bracket dimensions [mm] b	c	s	Article name
	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	Support bracket b=80			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	Support bracket b=80			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
	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
	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
		D1	For expansion joints			HSL - D1

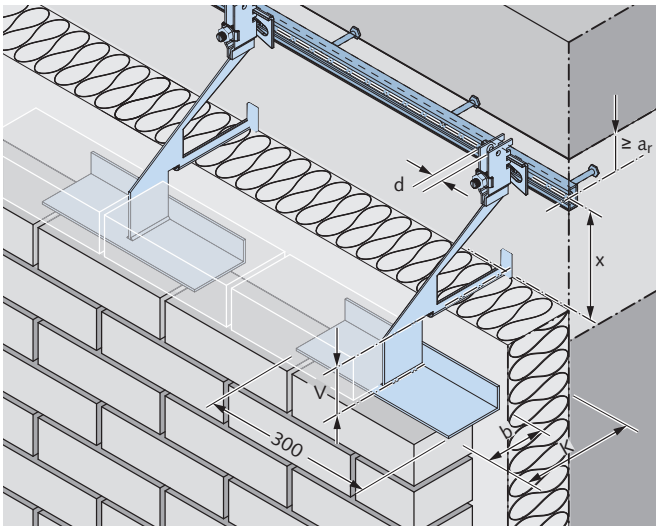
HK5 - P Angle Support Brackets

HK5 - P



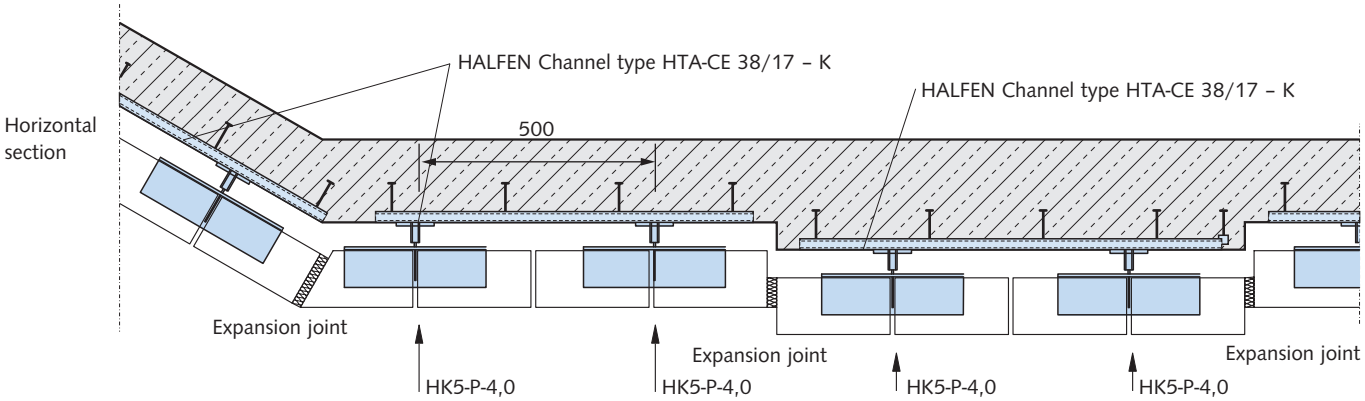
The HK5-P are used primarily in standard wall situations and at corners, e.g. internal corners or vertical joints.

HK5 - PV

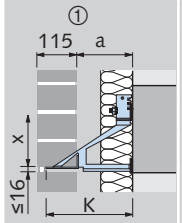


Each side of the short bracket provides ample support for a brick. The HK5 Angle support brackets are spaced at 50 cm.

Example: Supporting brickwork cladding with height H ≤ 3.00 m



Selecting HK5 Angle support brackets

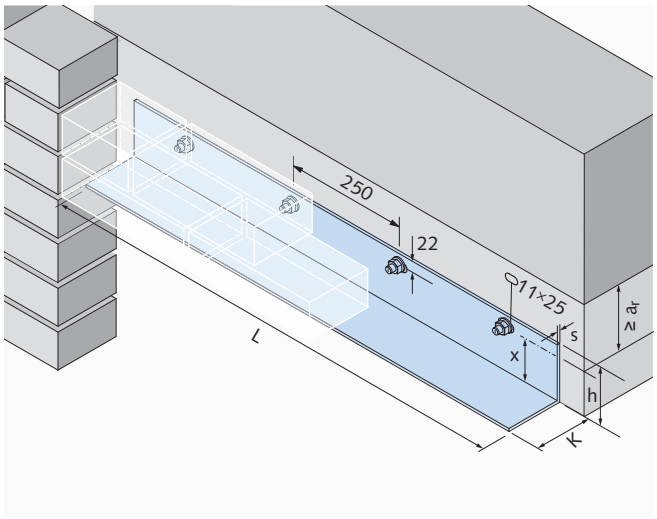


Distance **a** from wall [mm]	Allowable load F_V = **4.0 kN** ② (F_{Rd} = **5.4 kN**)		Allowable load F_V = **8.0 kN** ② (F_{Rd} = **10.8 kN**)		Allowable load F_V = **12.0 kN** ② (F_{Rd} = **16.2 kN**)	
	Length **K**	**x**	Length **K**	**x**	Length **K**	**x**
40 ± 15	**130**	150	**130**	200	**130**	264
60 ± 15	**150**	150	**150**	200	**150**	264
80 ± 15	**170**	150	**170**	200	**170**	264
100 ± 15	**190**	150	**190**	200	**190**	264
120 ± 15	**210**	150	**210**	200	**210**	264
140 ± 15	**230**	175	**230**	250	**230**	314
160 ± 15	**250**	175	**250**	250	**250**	314
180 ± 15	**270**	180	**270**	270	**270**	334
200 ± 15	**290**	200	**290**	290	**290**	354
220 ± 15	**310**	220	**310**	310	**310**	374
240 ± 15	**330**	240	**330**	330	**330**	394
260 ± 15	**350**	260	**350**	350	**350**	414
Dimensions in mm — Support angle b	100		100		100	
Dimensions in mm — Notch width d	12.5		16.5		16.5	

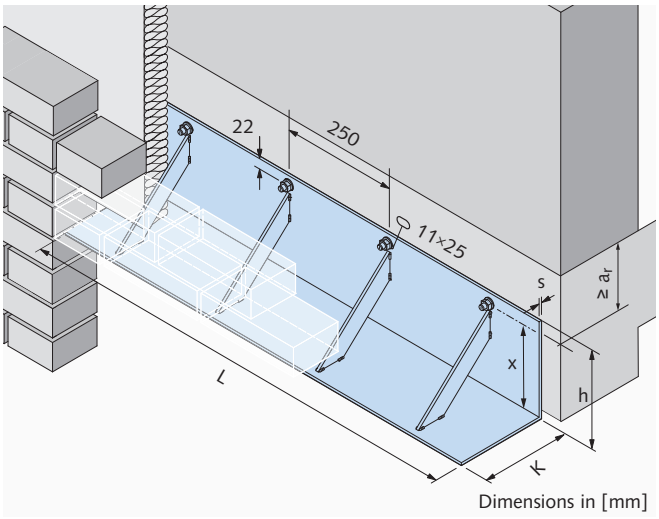
① other brick dimensions are also possible ② load range/HK5 Angle support brackets ③ additional suspension height up to 350 mm

KW and KWL Bolt-on Angle

Bolt-on angle KW



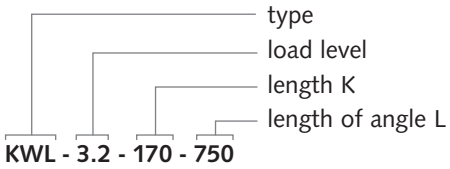
Bolt-on angle KWL



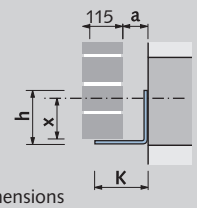
Dimensions in [mm]

The KWL and KW Bolt-on angles provide a simple alternative for supporting continuous brick cladding. The KW and KWL Bolt-on angles are used when the support structure is intended to remain visible from below but the ventilation gap and the thermal insulation are to be concealed.

Order example:



Selecting KW Bolt-on angle

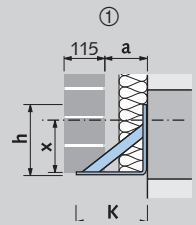


dimensions in mm

Spacing **a** from wall [mm]	Allowable load F_V = **1.2 kN**② (F_{Rd} = **1.6 kN**)			Allowable load F_V = **2.1 kN**② (F_{Rd} = **2.8 kN**)			Allowable load F_V = **3.2 kN**② (F_{Rd} = **4.3 kN**)		
	Length **K**	**x**	**h**	Length **K**	**x**	**h**	Length **K**	**x**	**h**
10 - 20	**100**	74	100	**100**	72	100	**100**	70	100
30 - 40	**120**	94	120	**120**	92	120	**120**	90	120
Material thickness s	4			6			8		

① other brick dimensions are also possible
② load range/bolt-on angle

Selecting KWL Bolt-on angle

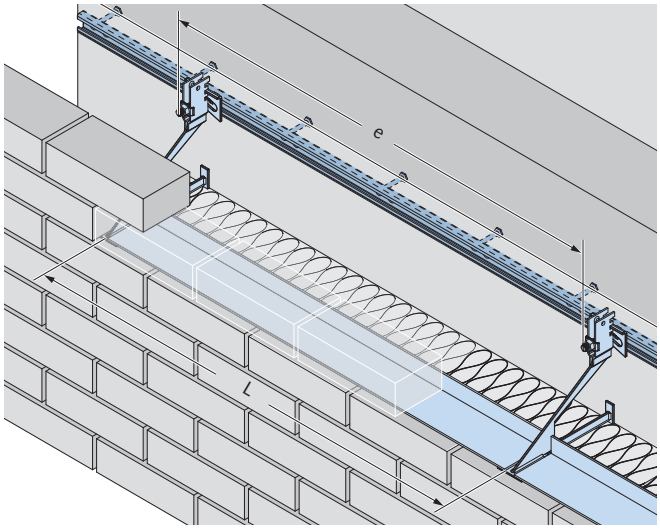


dimensions in mm

Spacing **a** from wall [mm]	Allowable load F_V = **1.5 kN**② (F_{Rd} = **2.0 kN**)			Allowable load F_V = **3.2 kN**② (F_{Rd} = **4.3 kN**)		
	Length **K**	**x**	**h**	Length **K**	**x**	**h**
20 - 40	**130**	104	130	**130**	102	130
45 - 60	**150**	124	150	**150**	122	150
65 - 85	**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		

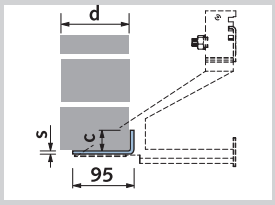
① other brick dimensions are also possible
② load range / bolt-on angle

HW-95 Support angle, type-tested



The HW-95 Support angles are placed between two HK5 Single support brackets on the support flanges. Only used with brick arch-action.

For article number, see price list.

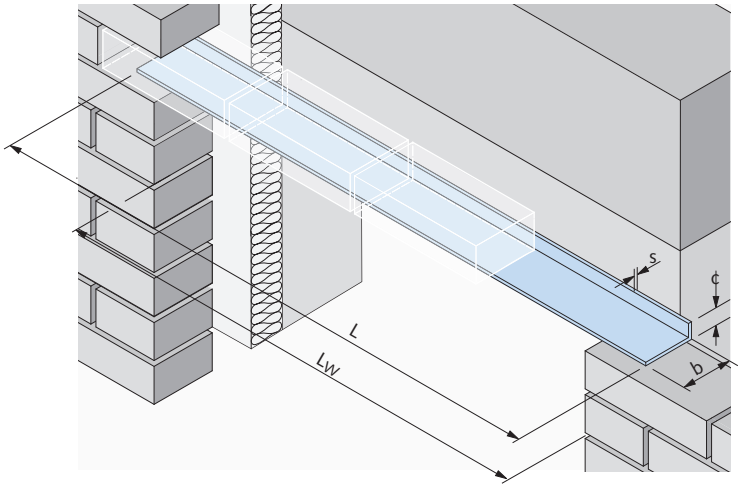


dimensions in mm

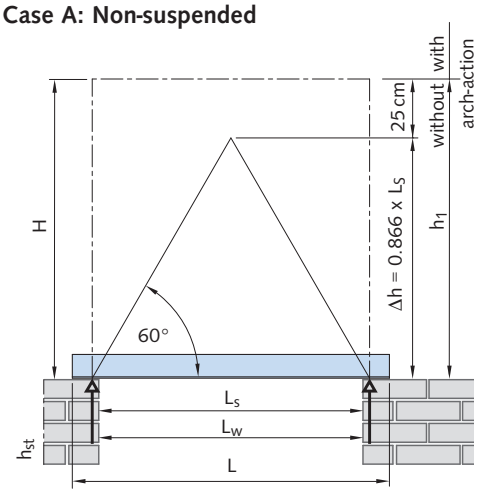
Spacing between the HK5 Support brackets e	Length of support bracket **L**	Angle dimensions **b × c × s**
500	**480**	95 × 20 × 2
750	**730**	95 × 30 × 3
1000	**980**	95 × 40 × 4

Note: HW Support angles with a support width of 80 mm are available for bricks of d = 90 mm

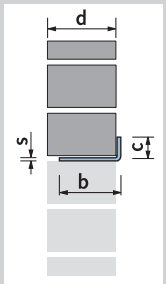
Case A: HW Support angle used in a non-suspended lintel over an opening



Case A: Non-suspended



Case A: HW for a non-suspended lintel



Dimensions in mm

Clear width L_W	Support angle length L	Load height H [m] for d ≤ 11.5 cm, γ ≤ 18kN/m³ ≤ 1.00	≤ 1.25	≤ 1.50	≤ 1.75	≤ 2.00	≤ 2.25	≥ 2.25	Δh [m]
		Dimensions of angle support **b** × **c** × **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 = custom angle including static verification

Loading on the support angle

Without arch-action:

Load height		=	H [m]
Load	q	=	H × d × γ [kN/m]
Static span	L_S	=	Lw + 2 × support length/3 [m]
M_{max}		=	q × L_S^2/8 [kNm]
V_{max}		=	q × L_S/2 [kN]

With arch-action (see also DIN 1996).

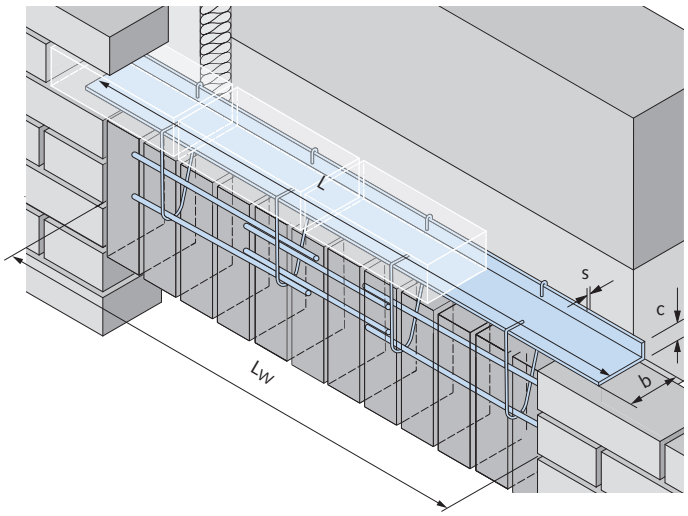
Note: Support the lintel until the mortar has hardened, (timber batten, see page 14)

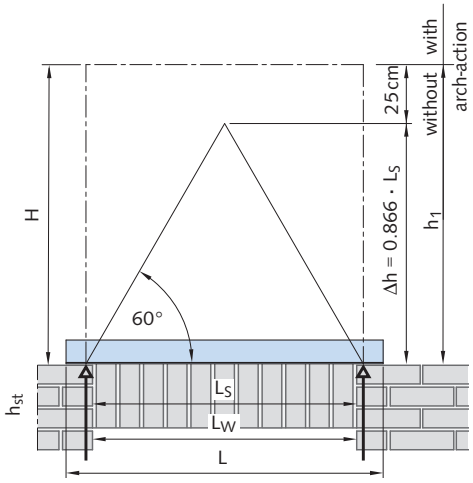
Assumption

1. Load height Δh ≤ H
2. No openings in the arch-triangle
3. No point loads in arch-triangle
4. Space available at sides to transfer shear forces (see PFM Design handbook)

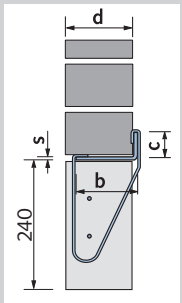
Load height	Δh	=	0.866 × L_S [m]
Load	q	=	Δh × d × γ [kN/m]
Length of angle	L	=	Lw + 2 × support length [m]
Static span	L_S	=	Lw + 2 × support length/3 [m]
M_{max}		=	q × L_S^2/12 [kNm]
V_{max}		=	q × L_S/4 [kN]

Case B: HW Support angle used as a suspended lintel over an opening





Case B: HW with suspended lintel



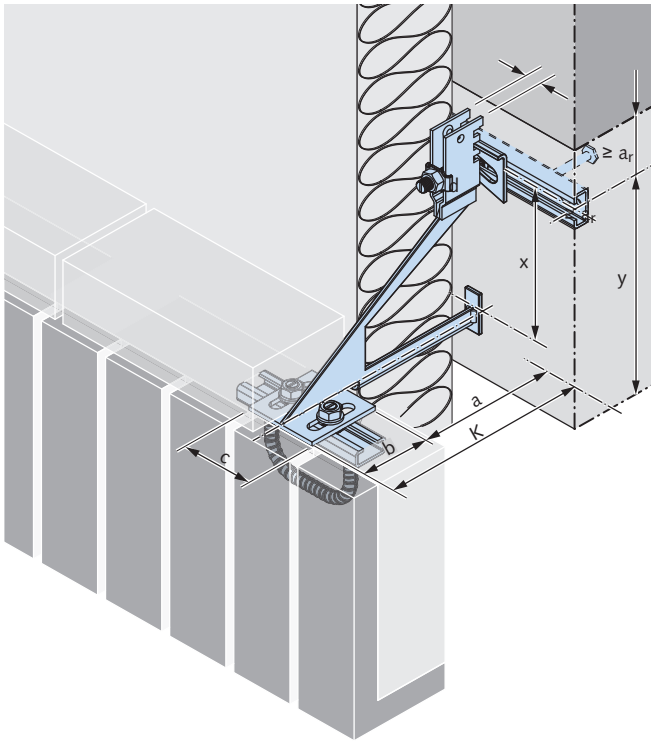
dimensions in mm

Clear width L_W	Angle support length L	Load height H [m] for d ≤ 11.5 cm. γ ≤ 18 kN/m³ ≤ 1.00	≤ 1.25	≤ 1.50	≤ 1.75	≤ 2.00	≤ 2.25	≥ 2.5	Δh [m]
		Dimensions of angle support **b** × **c** × **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 × 4	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	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	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	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	1.579
2,010	2,200	90 × 100 × 8	90 × 100 × 8	90 × 110 × 8	SK	SK	SK	90 × 100 × 8	1.796

= with arch-action
= without arch-action
SK = custom bracket including static verification

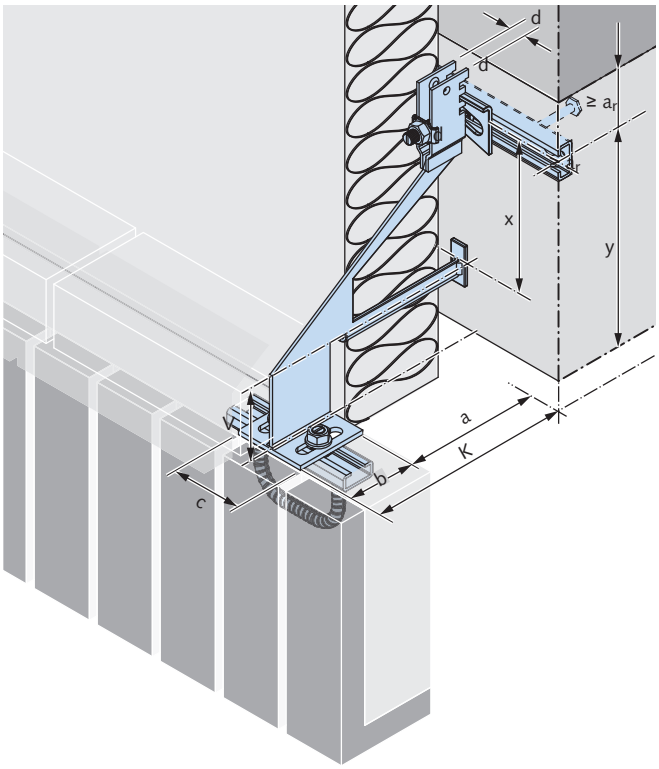
Single HK5-S Support Brackets for Precast Lintels

HK5-S



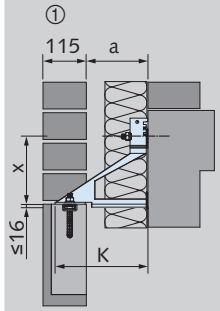
HK5-S Single support brackets can be used for precast lintels supporting brick cladding over openings without load transfer to the sides (vertical joint).

HK5-SV



Each precast lintel is supported by at least 2 support brackets. Static proof for the precast lintel must be provided by a structural engineer or the precast manufacturer. Horizontal and vertical adjustability allow accurate alignment of the lintel.

HK5 Single support bracket types

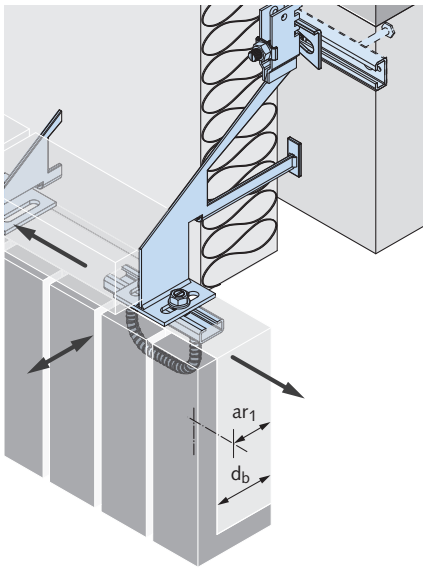


Dimensions in mm

	Distance **a** from wall [mm]	Load level allow. F_V = **4.0 kN** ② (F_{Rd} = **5.4 kN**)		Load level allow. F_V =**8.0 kN** ② (F_{Rd} = **10.8 kN**)		Load level allow. F_V = **12.0kN** ② (F_{Rd} = **16.2 kN**)	
		Length **K**	**x**	Length **K**	**x**	Length **K**	**x**
-S / -SV	40 ± 15	**130**	150	**130**	200	**130**	264
	60 ± 15	**150**	150	**150**	200	**150**	264
	80 ± 15	**170**	150	**170**	200	**170**	264
	100 ± 15	**190**	150	**190**	200	**190**	264
	120 ± 15	**210**	150	**210**	200	**210**	264
	140 ± 15	**230**	175	**230**	250	**230**	314
	160 ± 15	**250**	175	**250**	250	**250**	314
	180 ± 15	**270**	180	**270**	270	**270**	334
	200 ± 15	**290**	200	**290**	290	**290**	354
	220 ± 15	**310**	220	**310**	310	**310**	374
	240 ± 15	**330**	240	**330**	330	**330**	394
	260 ± 15	**350**	260	**350**	350	**350**	414
Angle support b × c × s		80 × 80 × 4		80 × 80 × 6		80 × 80 × 8	
Notched range d		12.5		16.5		16.5	

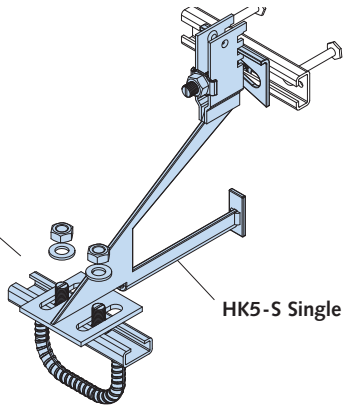
① other brick dimensions are also possible ② load range/HK5 Support bracket

HTA-ES: HALFEN Cast-in channel (approved) and HK5-S Single support bracket



HTA-ES Installation set
(order separately)
two HALFEN Bolts
including
nuts and washers

HALFEN Channel
HTA . . / . . **- ES**
with loop anchor



HK5-S Single support bracket

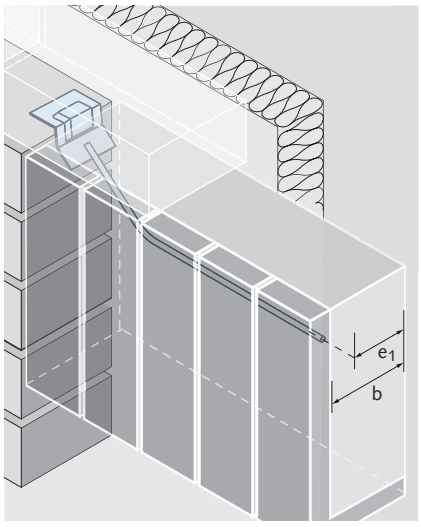
Building authority approved

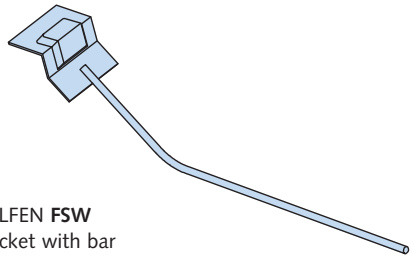
- smallest minimal width of d_b = 60 mm possible
- minimal reinforcement required (no additional reinforcement required)
- optional; also available with a centric bolt
- optionally available in HCR quality

Extract from the approval, see approval Z-21.4-1989 for complete data		
d_b [mm]	60	80
a_{r1} [mm]	40	50

HTA-ES			
HALFEN Channel	**HTA-ES 28/15**	**HTA-ES 38/17**	**HTA-ES 49/30**
Rated resistance for concrete C30/37	F_V = **3.5 kN** (F_{Rd} = **4.7 kN**)	F_V = **7.0 kN** (F_{Rd} = **9.5 kN**)	F_V = **10.5 kN** (F_{Rd} = **14.2 kN**)
Rated resistance for concrete C40/50	F_V = **4.0 kN** (F_{Rd} = **5.4 kN**)	F_V = **8.0 kN** (F_{Rd} = **10.8 kN**)	F_V = **12.0 kN** (F_{Rd} = **16.2 kN**)
Installation set: HALFEN Bolt including nut + washer	2 × **HS 28/15 - M10×30** 2 × **US M10** (DIN 9021)	2 × **HS 38/17 - M10×30** 2 × **US M10** (DIN 9021)	2 × **HS 50/30 - M 12×40** 2 × **US M12** (DIN 125)
Material	Stainless steel W 1.4404, 1.4571 (A4) or Duplex steel 1.4062, 1.4162, 1.4362 (L4), HCR on request		

FSW: Precast lintel bracket with bar – type tested



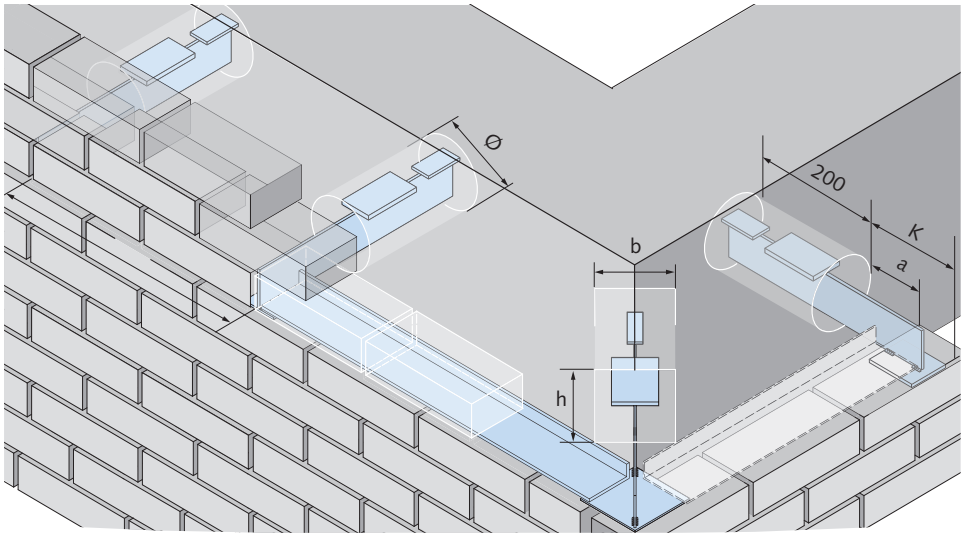


HALFEN **FSW**
Bracket with bar

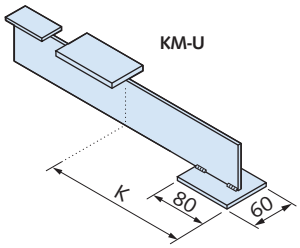
For all variants; e_1 is dependent on b		
b [mm]	60	80
e_1 [mm]	40	50

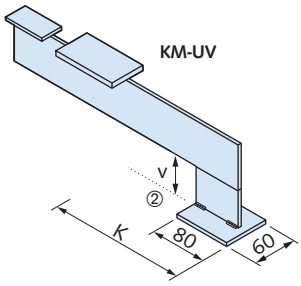
FSW Precast lintel bracket with bar						
	Allowable load per bracket [kN]					
	F_V = **3.5** (F_{Rd} = **4.7**)	F_V = **2.6** (F_{Rd} = **3.5**)	F_V = **3.9** (F_{Rd} = **5.3**)	F_V = **5.1** (F_{Rd} = **6.9**)	F_V = **5.3** (F_{Rd} = **7.2**)	F_V = **6.8** (F_{Rd} = **9.2**)
Precast lintel bracket	**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:	Rebar material: B500		Angle bracket: W 1.4404 or 1.4571 (A4) or duplex 1.4062, 1.4162, 1.4362 (L4)			

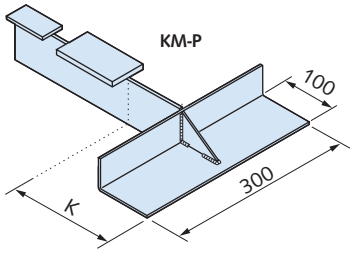
Grout-in Brackets KM

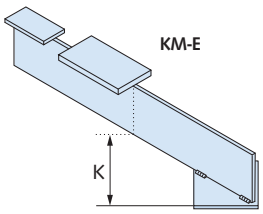


Application example; corner of building with HALFEN KM Grout-in brackets









The support brackets are suitable for supporting brick cladding constructed on the face of existing buildings.
First, sufficiently deep recesses are core-drilled or cut into the existing brickwork. The brackets are then fixed with mortar in the recesses.
Only use (group III) cement mortar.
The intermediate angle support brackets are placed between the brackets. The maximum allowable height of the brick cladding supported by the brackets is 3.00 m.

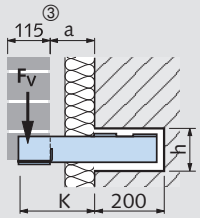
It may be required to statically verify the load transfer from the pressure plate into the main structure of the building. Minimum compressive strength of the existing brickwork must be ≥ 0.5 MN/m² with a wall thickness ≥ 24 cm.

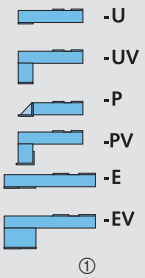
Note:
Larger cladding heights up to approximately 6 m may be possible if the compressive strength of the supporting brickwork allows.

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

The allowable load of the KM grout-in brackets is; **allow. F_V = 3.0 kN (F_{Rd} = 4.0 kN).**

KM





Wall spacing **a** [mm]	Length **K** [mm]	Dimensions; rectangular cut and chiselled recess h × b [mm]	Core-drill-hole diameter Ø [mm]
20 ± 15	**110**	110 × 80	110
40 ± 15	**130**	115 × 85	115
60 ± 15	**150**	120 × 90	120
80 ± 15	**170**	125 × 90	125
100 ± 15	**190**	125 × 90	125
120 ± 15	**210**	130 × 95	130
140 ± 15	**230**	140 × 100	140
160 ± 15	**250**	150 × 120	150

① dimensions of the support plates of types KM-U and KM-P; see HK5-U and HK5-P Wall brackets (see page 10–16).
② standard dimension v = 60 mm; other dimensions on request.
③ other brick dimensions are also possible.
Note: A structural engineer must be consulted when adding brick cladding to existing buildings to determine if the existing walls and foundations are suitable to support the extra load with a sufficient safety factor. If these are insufficient, the new brick cladding must be supported on separate foundations.

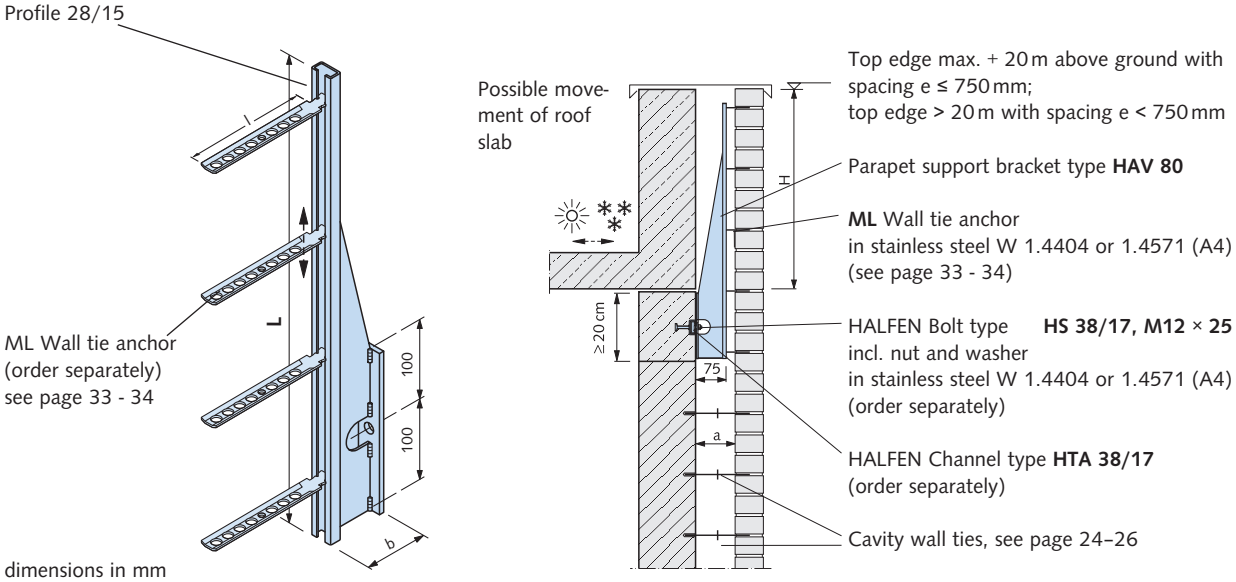
Parapet support brackets HAV 80/...

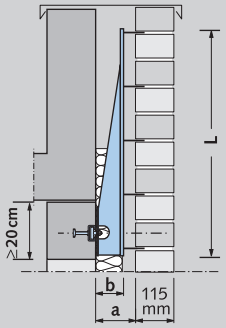
Flat, reinforced concrete roof slabs are subject to exceptional forces from temperature fluctuations. The resulting longitudinal expansion and contraction of the roof structure are solved with sliding bearings between the slab and the supporting structure.

Longitudinal movements would result in cracks in the brick cladding if attached directly to the roof parapet. This is why it is required to separate any brick cladding from the parapet. The HAV Parapet support bracket achieves this purpose. The brick cladding is fixed to the parapet support bracket using ML Wall tie anchors.

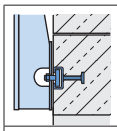
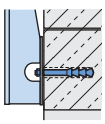
Suitable fixing points for the parapet support brackets are HALFEN Channels cast into the ring beam.
Any subsequent movement in the roof slab does not affect the brick cladding.

Material:
Stainless steel 1.4404 or 1.4571 (A4)

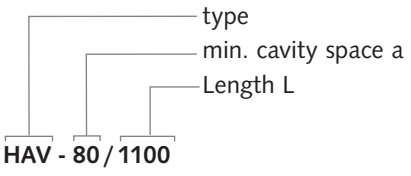


HAV					Wall tie anchor	
		Length L [mm]			Wall spacing **a** [mm]	With wall tie anchor
		600	**850**	**1.100**		
		Article name			80 - 110	**ML 85**
		HAV 80/600	**HAV 80/850**	**HAV 80/1100**	90 - 145	**ML 120**
					145 - 200	**ML 180**
	Dimension b:	75	75	75	**Larger cavity spacings are possible (Type HAV 140/... 600, 850 or 1100)**	
	Required number of ML brackets:	3	4	5		

Anchored in concrete:

 Recommended HALFEN Channel with HALFEN Bolt and nut	HS 38/17 - M 12 × 25 separate calculations required
 HALFEN HB Injection anchor bolts for cracked and non-cracked concrete	HB-VMZ-A-70 - M12-25/115-A4 (Order no. 0432.380-00062) separate calculations required; order cartridge and accessories separately

Order example:

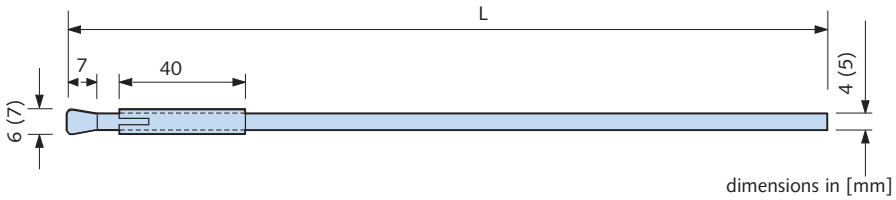


All dimensions in [mm]

HEA Cavity wall ties

For anchoring in concrete ≥ C 20/25. Building authority approval Z - 21.1 - 910. Material: Stainless steel A4.

The cavity wall tie only requires a 6 or 7 mm diameter, 42 mm deep drilled hole (see table below), resulting in a quick and simple installation. A durable safe anchorage is ensured with a stainless steel plug, building material class A according to DIN 4102; therefore the plugs are also suitable for use in building-components with increased fire resistance requirements.



HEA Cavity wall impact anchors

Article name. L/Ø [mm]	Order no. 0140.010-	Cavity size a [mm]	
HEA - 160/4	00001	0 - 45	Number of anchors per metre acc. to approval Z-21.1-910
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	

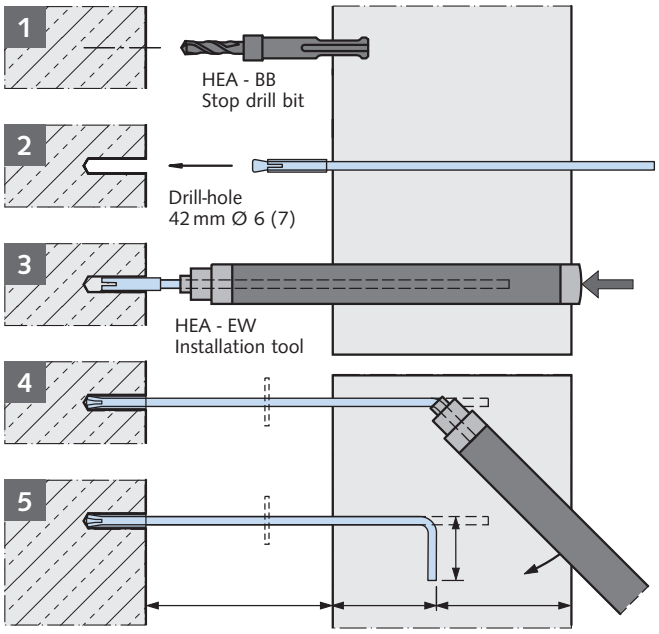
Installation accessories for HEA Cavity wall impact anchors

Article name	Order no.		Ø [mm]
Stop drill bit	0143.010-		
HEA-BB 4	00001	for HEA - .../4	6
HEA-BB 5	00002	for HEA - .../5	7
Impact tool	0143.020-		
HEA-EW 4	00001	for HEA - .../4	4
HEA-EW 5	00002	for HEA - .../5	5

Installation instructions:

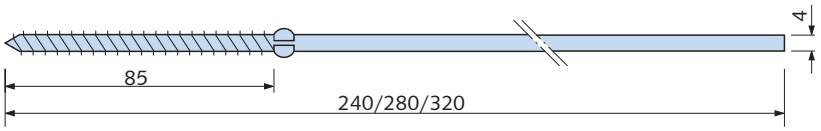
1. Drill a 6 mm or a 7 mm hole respectively to a depth of 42 mm using a HEA BB4 or HEA BB5 Stop drill bit.
2. Clean out the hole and insert the pre-fitted expansion sleeve end of the HEA Cavity wall tie into the hole.
3. Use the HEA - EW 4 or the HEA - EW 5 Insertion tool to drive the expansion sleeve into the hole until the end of the expansion sleeve is flush with the surface of the concrete.
4. Bend the tip of the HEA Cavity wall tie by 90°
5. Embed the brick tie in the mortar joint in the brickwork.

Vertical section:



HPV-L Cavity wall tie for aerated concrete

To anchor facing brickwork to load-bearing aerated concrete brick walls.
Material: Stainless steel W 1.4404, 1.4571 (A4)



Dimensions in [mm]

HPV-L Cavity wall tie for aerated concrete		
Article name L / Ø [mm]	Order no. 0141.010-	Cavity spacing a [mm]
HPV - L - 240/4	0001	0 - 80
HPV - L - 280/4	0002	80 - 120
HPV - L - 320/4	0003	120 - 160*)

*) Cavity spacings ≥ 150 mm are not included in DIN 1996, a separate verification is required.

HPV-L Application tool		
Article name	Order no.	
HPV - Z1	0143.030-00001	for HPV - L - . . ./4

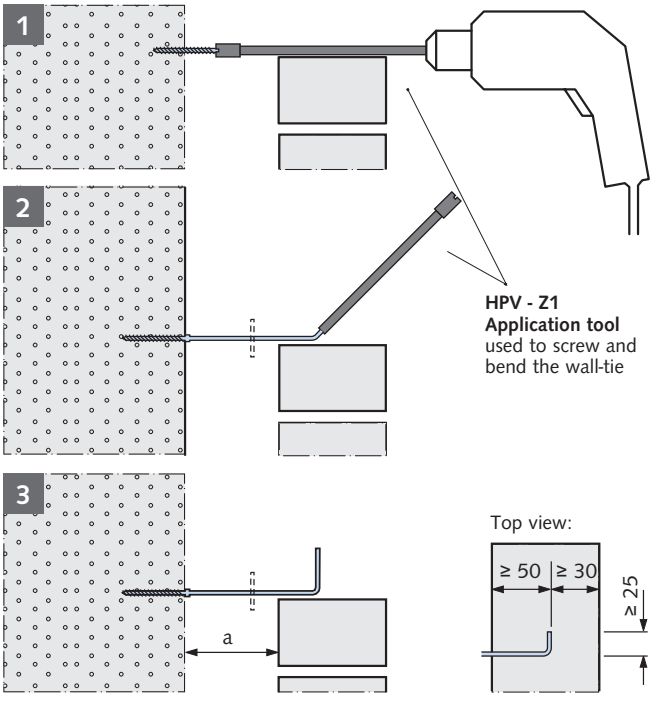
Installation instructions:

1. Use a power drill and the application tool to screw the HPV - L Cavity wall tie into aerated concrete brick; it is not necessary to pre-drill the hole. The cavity wall tie self-anchors on reaching the specified screw depth.

2. Bend the end of the HPV-L Cavity wall tie using the application tool.

3. Embed the end wall tie in the mortar of the wall joint.

Number of anchors per m² according to DIN EN 1996-2/NA Table NA.D.1 and according to DIN EN 1996-1-1 chapter 6.5.



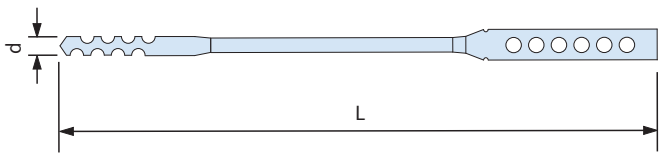
vertical section

LSA-F/-FS Cavity wall tie

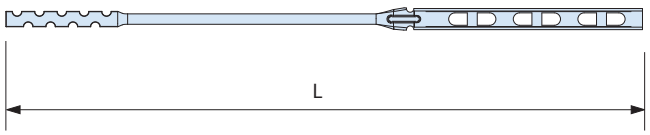
LSA-F/-FS: For application in masonry (also suitable for thin-bed mortar) Building authority approval Z-17.1-888
Material: Stainless steel W 1.4571 (A4) or 1.4362

Cavity wall ties LSA-F/-FS		
Article name length / d [mm]	Order no. 0142.	Cavity spacing **a** [mm]
LSA-F-280/6	120-00001	115 - 135
LSA-F-300/6	120-00002	135 - 155
LSA-F-320/6	120-00003	155 - 175
LSA-F-340/6	120-00004	175 - 195
LSA-F-360/6	120-00005	195 - 210
LSA-FS-280-A4	140-00001	up to 130
LSA-FS-300-A4	140-00002	up to 150
LSA-FS-320-A4	140-00003	up to 170

LSA-F



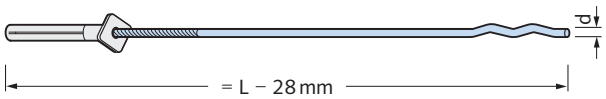
LSA-FS



More information on cavity spacing and the number of anchors required per m² can be found in approval no. Z-17.1-888.

LSA-DW Cavity wall anchor including 8 × 60 dowel

Suitable for wall cavities up to 250 mm.

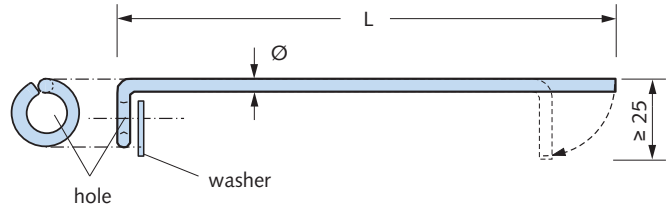


For anchorage in solid masonry + concrete
Building authority approvals Z-21.2-1009, Z-17.1-825 and Z-17.1-1138. Material: Stainless steel W 1.4404, 1.4571 (A4).
Drill-hole diameter: 8 × 65 mm

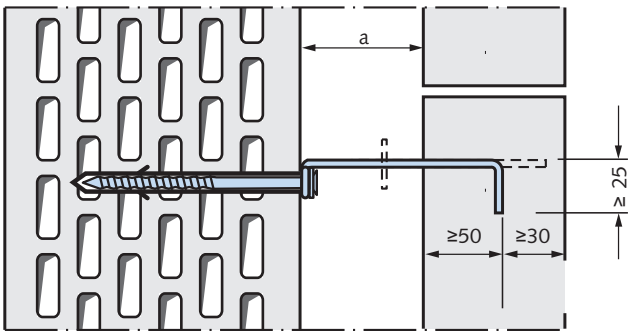
LSA-DW Cavity wall anchor including dowel			
Article name L / d [mm]	Order no. 0142.080-	Cavity spacing [mm]	Number of anchors per m² in accordance with approval no. Z-17.1-825 and Z-17.1-1138
LSA-DW-180/4	00002	25 - 45	
LSA-DW-210/4	00003	45 - 75	
LSA-DW-250/4	00004	75 - 115	
LSA-DW-275/4	00005	115 - 140	
LSA-DW-300/4	00006	140 - 165	
LSA-DW-320/4	00007	165 - 185	
LSA-DW-350/4	00008	185 - 215	
LSA-DW-400/4	00009	215 - 250	

LSA-L Cavity wall anchor

Building authority approved dowel and stainless steel screw, for anchorage in vertical coring brick masonry and cored hole sand-lime brick masonry.



LSA-L Cavity wall anchor with washer (stainless steel A4) and ISO-Clip (see below)



LSA-L Cavity wall anchor		
Article name Type L /Ø [mm]	Cavity spacing **a** [mm]	Order no. 0142.050-
LSA-L-235/4	20 - 150*	00001

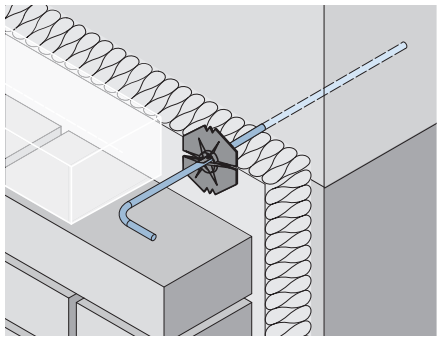
*) Cavity spacings ≥ 150 mm are not included in DIN 1996, a separate verification is required..

Number of anchors per m² according to DIN EN 1996-2/NA Table NA.D.1 and according to DIN EN 1996-1-1 chapter 6.5.

Dowel and screw for LSA-L-235/4		
Article name		Order no. 0432.010-
DUE-FUR 10×80 SS A4	Nylon-dowel t_d, d_0 = 10mm, Hexagonal-fixing bolt (stainless steel A4)	00001

Impact tool for LSA-.L		
Article name		Order no. 0143.080-
LSZ-E		00001

LSZ Insulation clip ISO-CLIP

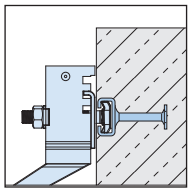


LSZ Insulation clip ISO-CLIP				
Article name		for anchor Ø [mm]	Ø D [mm]	Order no. 0143.050-
LSZ - ISO - Clip 3-6 Insulation clip with drip	Ø D	3 - 6	60	00002
LSZ-ISO-CLIP Maxi-F Insulation clip	Ø D	6	100	00003

HALFEN SUPPORT BRACKETS

Fixing HALFEN Support Brackets - Overview

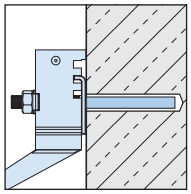
Concrete



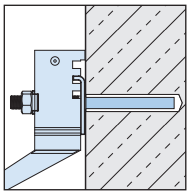
Installation to
HALFEN **HTA-CE** Cast-in channels,
see page 28.

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

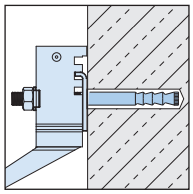
Bonded anchor bolt systems



Installation with
HALFEN **HB-V** Bonded anchor;
only for non-cracked concrete,
see page 29.



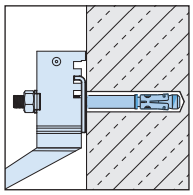
Installation with
HALFEN **HB-VMU plus** Injection anchors; for cracked concrete and non-cracked concrete, see page 30.



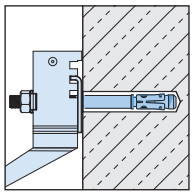
Installation with
HALFEN **HB-VMZ** Injection anchors;
for cracked concrete and
non-cracked concrete,
see page 29, 30.

Please refer to our catalogue "Technical Product Information HALFEN Anchor bolt systems"

Mechanical Heavy Duty Anchors

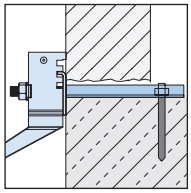


Installation with
HALFEN **HB-BZ** Wedge anchors;
for cracked and non-cracked concrete,
see page 31.



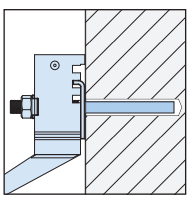
Installation with
HB-B HALFEN Wedge anchors;
for non-cracked concrete,
see page 31.

Special slab fixing



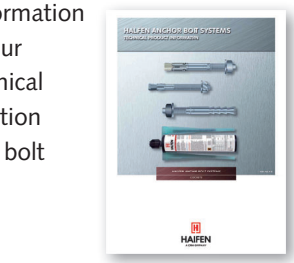
HK-DA Slab anchor for installation with HALFEN HK5 Support bracket to thin slab edges,
see page 32.

Masonry



Installation with
HALFEN **HB-VMU plus** Injection anchors,
for masonry,
see page 32.

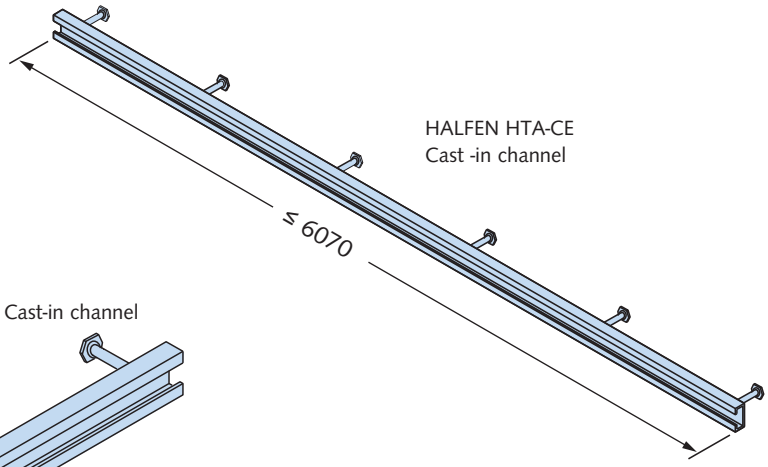
For detailed information please refer to our catalogue "Technical Product Information HALFEN Anchor bolt systems".



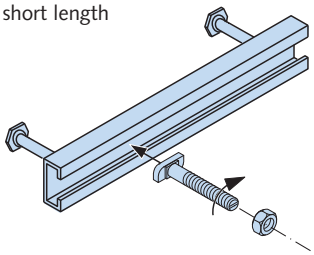
HALFEN Cast-in channels

HTA HALFEN Cast-in channels

all dimensions in mm



HTA HALFEN Cast-in channel
short length



HALFEN Bolt incl. nut (see table below for available bolts)

HALFEN Cast-in channels have pressed or welded anchor studs and are ETA approved for application in load-bearing structures:
Approval no. ETA - 09/0339.

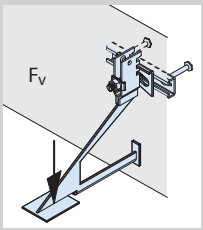
Foam filler:
HALFEN Cast-in channels are foam strip filled to stop concrete filling the channel. The foam will also keep the channel free of dirt after striking the formwork. The foam is easily removed using a suitable tool (e.g. a standard screwdriver).

Further information can be found in "HALFEN Cast-in channels" Technical Product Information

Application for brick faced façades

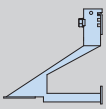
Recommended HALFEN Channels
Verification is according to EOTA TR 047 in combination with ETA-09/0339 (HALFEN Channels).

HK5 Support brackets
Load capacities:
See page 10 to 21




4.0


8.0


12.0

HALFEN HTA-CE Channel		with HALFEN HS Bolt incl. nut						
Article name: (add length in mm)		Article name:	Order no.	Thread		l [mm]		Torque [Nm]
HTA-CE 38/17	**- A4**	**HS 38/17**	**0161.050-00001**	**M12**	x	**72**	**- A4**	**25**
HTA-CE 40/25	**- A4**	**HS 40/22**	**0350.070-00007**	**M12**	x	**80**	**- A4**	**25**
HTA-CE 49/30	**- A4**	**HS 50/30**	**0161.090-00001**	**M12**	x	**87**	**- A4**	**25**
HTA-CE 40/22P	**- A4**	**HS 40/22**	**0350.070-00013**	**M16**	x	**80**	**- A4**	**60**
HTA-CE 50/30P	**- A4**	**HS 50/30**	**0161.090-00002**	**M16**	x	**87**		
HTA-CE 54/33	**- A4**							

All anchor elements are stainless steel W 1.4404, 1.4571 (A4)

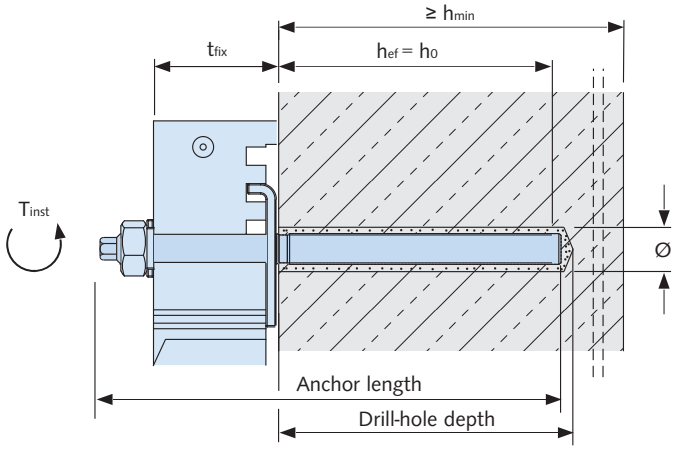
HALFEN HB-V Bonded anchor bolt – for non-cracked concrete

HB-V A4 Anchor stud

HB-V-P Adhesive capsule

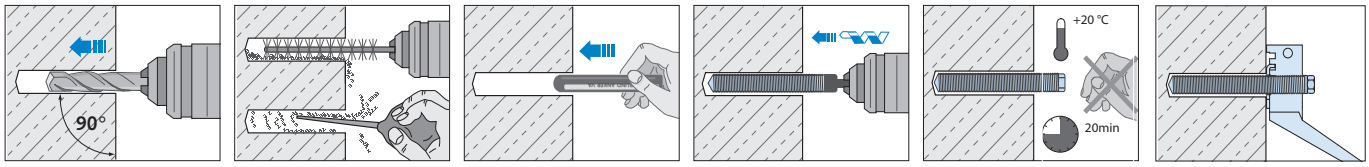
European Technical Assessment - Option 8
ETA-07/0257
M8 - M24

EDELSTAHL Rostfrei
Stainless steel



Anchor HB-V A4 stud							
Article name	Order no. 0430.100-	Drill-hole Ø × depth [mm]	Plug length [mm]	Maximum clamping thickness t_{fix} [mm]	Anchorage depth h_{ef} [mm]	Min. component depth h_{min} [mm]	Torque T_{inst}
HB-V-A 10-65/165 A4	00004	12 × 90	165	65	90	120	20
HB-V-A 12-65/190 A4	00064	14 × 110	190	65	110	140	40
HB-V-A 16-65/210 A4	00012	18 × 125	210	65	125	160	80

HB-V-P Chemical dowels	
Article name	Order no. 0433.050-
Capsule HB-V-P 10	00002
Capsule HB-V-P 12	00003
Capsule HB-V-P 16	00005



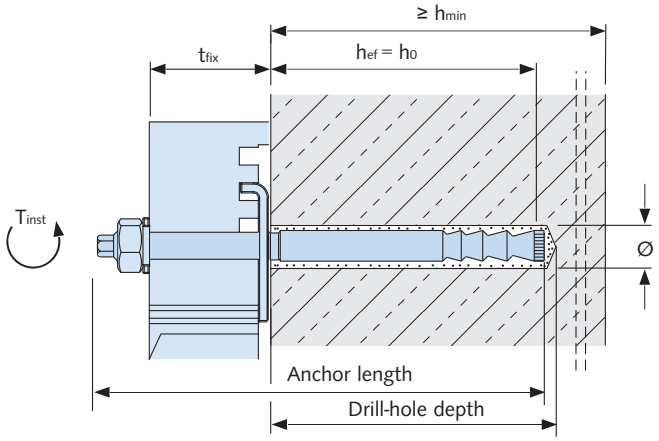
HALFEN HB-VMZ Injection system, for cracked and non-cracked concrete

HB-VMZ-A A4 Anchor stud

HB-VMZ 280 ml Cartridge
Order no. 0433.040-00100
can be dispensed with a standard silicone dispenser
HB-VMZ 420 ml Cartridge
Order no. 0433.040-00101

Matching dispenser
HB-VM-P 345 Profi for 280 ml Cartridge
Order no. 0433.040-00078
HB-VM-P 420 Profi for 420 ml Cartridge
Order no. 0433.040-00080

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

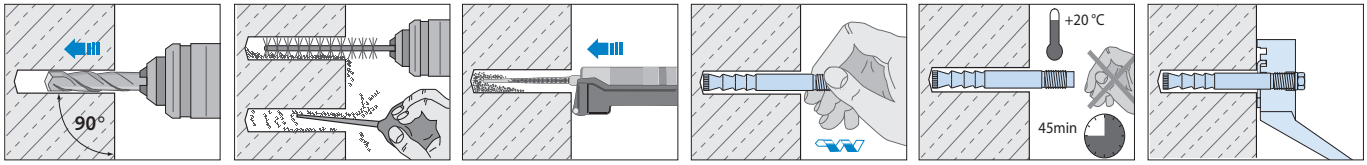


European Technical Assessment - Option 1
ETA-07/0256
M8 - M24

EDELSTAHL Rostfrei
Stainless steel

HB-VMZ-A A4 Anchor plug

Article name	Order no. 0432.380-	Drill-hole Ø × depth [mm]	Max. clamping thickness t_{fix} [mm]	Anchor length [mm]	Thread [mm]	Anchoring depth h_{ef} [mm]	Building component depth h_{min} [mm]	Torque T_{inst} [Nm]
HB-VMZ-A 60 M10-60/135 A4	00007	12 × 65	60	135	M10x47	60	100	15
HB-VMZ-A 80 M12-60/160 A4	00096	14 × 85	60	160	M12x56	80	110	25
HB-VMZ-A 100 M12-60/180 A4	00016	14 × 105	60	180	M12x56	100	130	30
HB-VMZ-A 125 M16-60/210 A4	00019	18 × 133	60	210	M16x55	125	170	50



Installing the support brackets with the HALFEN HB-VMU plus Injection system, for cracked and non-cracked concrete

HB-VMU plus 280 ml Cartridge
Order no. 0433.040-00137
can be dispensed with a standard silicone dispenser,
or HB-VM-P 345 Profi Order no. 0433.040-00078

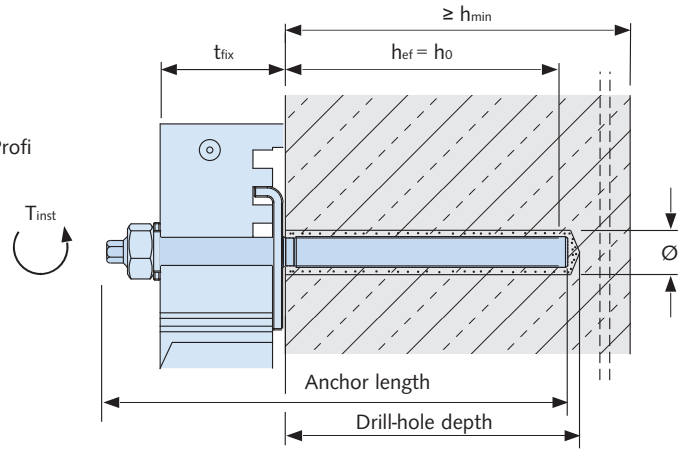
European Technical Assessment - Option 1
ETA-16/0691

EDELSTAHL Rost frei
Stainless steel

HB-VMU plus 410 ml Cartridge
Order no. 0433.040-00136
matching dispenser HB-VM-P 420 Profi
Order no. 0433.040-00080

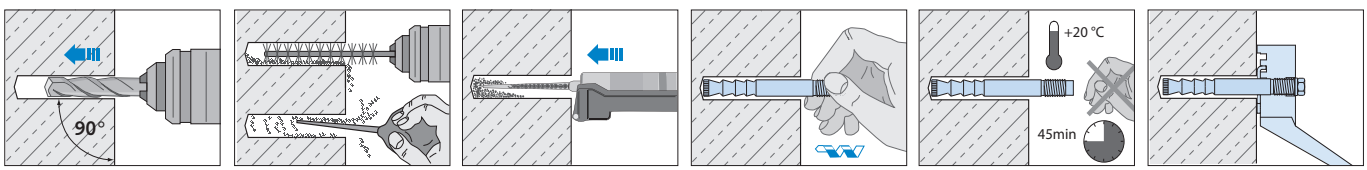
HB-VMU-A A4 Anchor rod

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



HB-VMU A4 Anchor stud

Article name	Order no. 0430.190-	Drill-hole Ø × depth [mm]	Anchor length [mm]	Max. clamping thickness t_{fix} [mm]	Anchoring depth h_{ef} [mm]	Building component thickness h_{min} [mm]	Torque T_{inst} [Nm]
HB-VMU-A 10-90/190 A4	00008	12 × 90	190	90	90	130	20
HB-VMU-A 12-85/210 A4	00016	14 × 110	210	85	110	160	40
HB-VMU-A 16-60/210 A4	00021	18 x 125	210	60	125	200	60



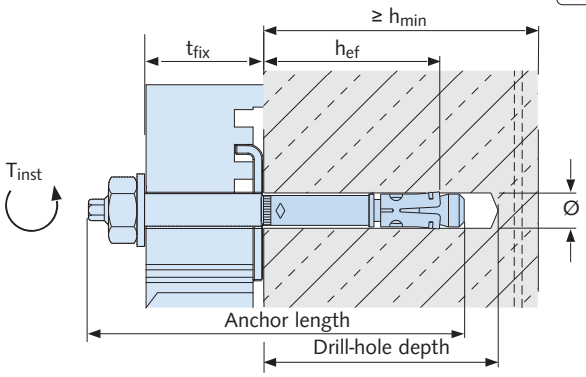
Fixing HK5 Support brackets with HALFEN HB-BZ Wedge anchor – for cracked and non-cracked concrete

HB-BZ A4 Wedge anchor

European Technical Assessment - Option 1
ETA-07/0249

EDELSTAHL Rostfrei

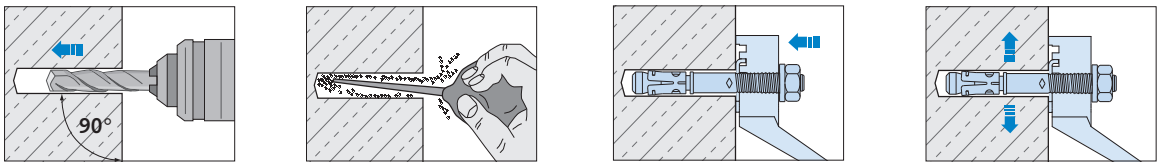
Stainless steel



HB-BZ A4 Wedge anchor

Article name	Order no. 0432.040-	Drill-hole Ø × depth [mm]	Embedment depth [mm]	Max. clamping thickness t_{fix} [mm]	Anchor length [mm]	Thread [mm]	Anchoring depth h_{ef} [mm]	Building component thickness h_{min} [mm]	Torque T_{inst} [Nm]
HB-BZ 10-50-70/130 A4	00030	10 × 75	68	50	130	M10x82	60	100	35
HB-BZ 12-50-70/145 A4	00032	12 × 90	80	50	145	M12x86	70	120	50
HB-BZ 16-50-70/170 A4	00034	16 × 110	97	50	170	M16x91	85	140	110

Installation:



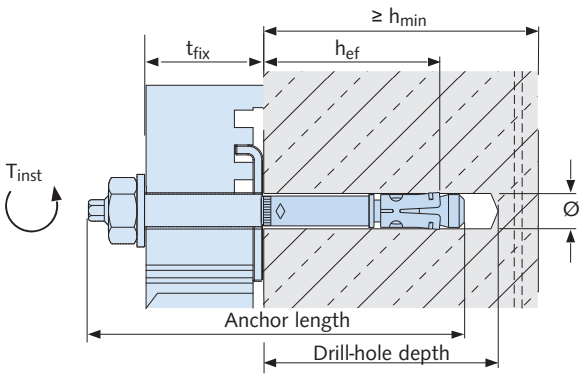
Fixing HK5 Support brackets with HALFEN HB-B Wedge anchors – for non-cracked concrete

HB-B A4 Wedge anchor

European Technical Assessment - Option 7
ETA-07/0247

EDELSTAHL Rostfrei

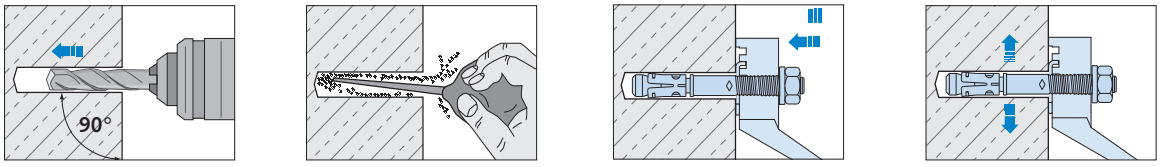
Stainless steel



HB-B A4 Wedge anchor

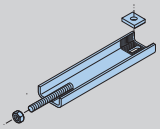
Article name	Order no. 0432.060-	Drill-hole Ø × depth [mm]	Embedment depth [mm]	Max. clamping thickness t_{fix} [mm]	Anchor length [mm]	Thread [mm]	Anchoring depth h_{ef} [mm]	Building com-ponent depth h_{min} [mm]	Torque T_{inst} [Nm]
HB-B 10-50-56/125 A4	00030	10 × 70	62	50	125	M10 × 80	48	100	25
HB-B 12-65-80/160 A4	00035	12 × 90	81	65	160	M12 × 100	65	130	50
HB-B 16-60-76/180 A4	00020	16 × 95	99	60	180	M16 × 110	82	160	100

Installation:



Fixing the HK5 Support bracket to thin slabs with the HALFEN HB-VMU Injection system

Selection – HK - DA Slab anchors

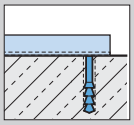


HK - DA -

Load range [kN] (F_{Rd} [kN])	Order no. 0156.010-	M	c [mm]	a_1 [mm]	l [mm]
4.0 - L (5.4)	00001	M10	10	293 ± 10	320
4.0 - K (5.4)	00002	M10	10	173 ± 10	200
8.0 - L (10.8)	00005	M12	11	293 ± 10	320
8.0 - K (10.8)	00006	M12	11	173 ± 10	200

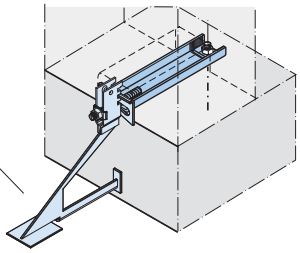
Included in delivery, notched plate and (hexagonal) nut

Fixing to concrete slab - C 20/25

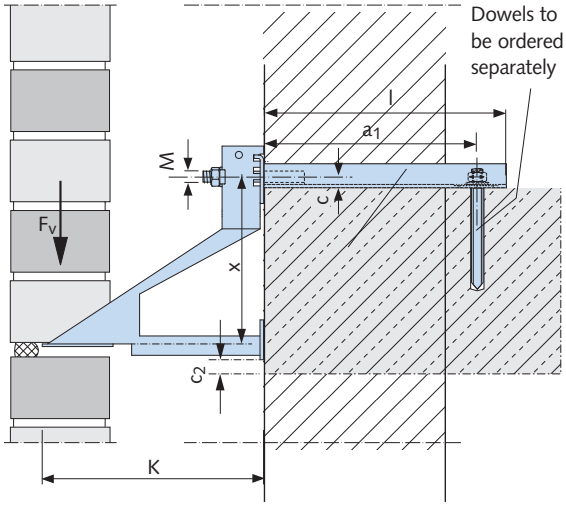
For HK - DA -	Load range [kN] (F_{Rd} [kN])	**4.0 (5.4)**	**8.0 (10.8)**
	HALFEN Injection anchor for cracked and non-cracked concrete	60 M10 - 20/95 separate calculation required	80 M12 - 25/125 separate calculation required

All anchor parts are stainless steel; W 1.4571, 1.4404 (A4)

Suitable for load range 4.0 kN and 8.0 kN



Note:
- c_2 = required edge distance in according with type test report or static calculation



Fixing HK5 Support brackets with HALFEN HB-VMU Injection dowels to solid masonry

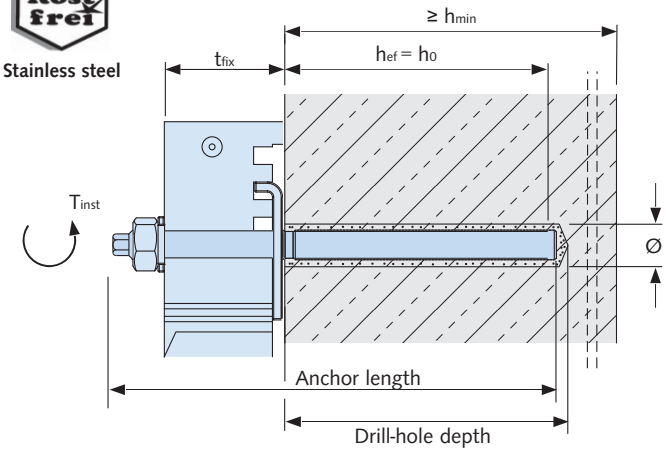
HB-VMU-A A4 Anchor rod

HB-VMU plus 280 Cartridge
Order-no. 0433.040-00137
suitable for standard silicone dispenser (gun)
or HB-VM-P 345 Profi
Order-no. 0433.040-00078

HB-VMU plus 410 Cartridge
Order-no. 0433.040-00136
matching dispenser
HB-VM-P 420 Profi
Order-no. 0433.040-00080

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

EDELSTAHL Rostfrei
Stainless steel



HB-VMU A4 Thread anchor

Artikelbezeichnung	Order no. 0430.190-	Drill-hole Ø × depth [mm]	Anchor length	Max. clamping range t_{fix}	Anchor depth	Min. required thickness for component	Torque
		[mm]	[mm]	[mm]	h_{ef} [mm]	h_{min} [mm]	T_{inst}
HB-VMU-A 10-65/165 A4	00007	12 x 90	165	65	90	130	20
HB-VMU-A 12-85/210 A4	00016	14 x 110	210	85	110	160	40

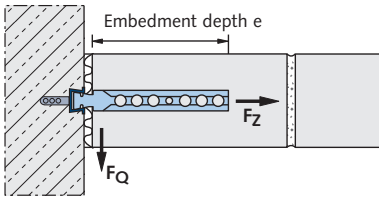
Allowable loads for tension, shear and diagonal tension for all angle support brackets MZ12/KS12 = 1.7 kN

HALFEN Brick tie systems are economic and proved fixing systems using HALFEN ML Brick ties for fixing brickwork, in-fill panels, partition walls, cladding panels (with or without air gap or thermal insulation) to steel or timber structures or concrete walls and columns. **The brick ties are able to move vertically in the wall connector channels; this greatly reduces movement cracks in the brickwork.**

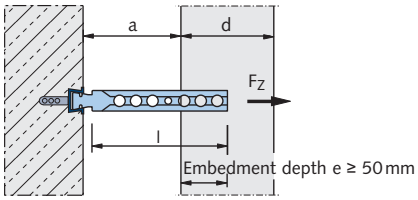
All HTA-CE and HMS profiles have a foam filling to prevent concrete ingress. The channels are attached to the formwork using standard nails.

The HALFEN Brick tie anchors are inserted at the recommended intervals (static requirements) in the brick wall during construction. The anchors are inserted in the brick tie channels, turned 90°, laid flat between the rows of brick and pressed into the mortar. The perforations in the anchors optimise anchorage with the mortar.

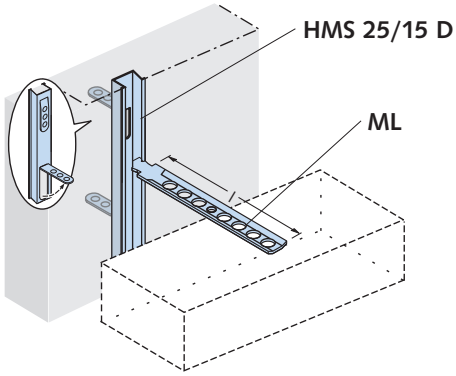
Wall connection



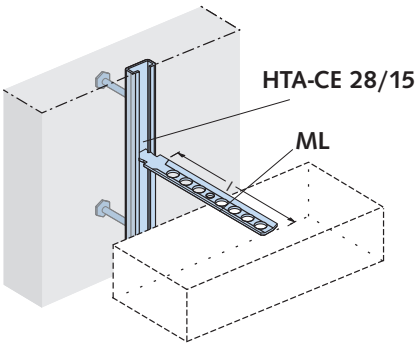
Facing brickwork connection

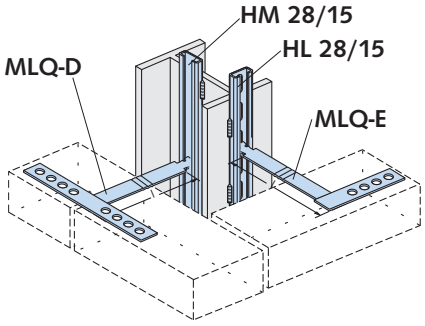


ML Brick ties in combination with HALFEN Channels HMS, HTA, HM and HL

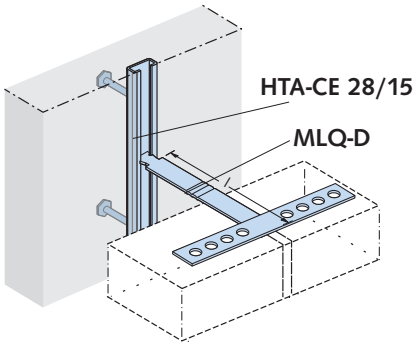


The pre-punched anchors in the HMS Channels are bent out by hand every 250 mm on-site to ensure safe anchorage in the concrete.

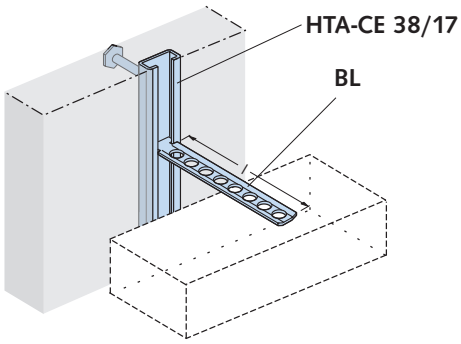


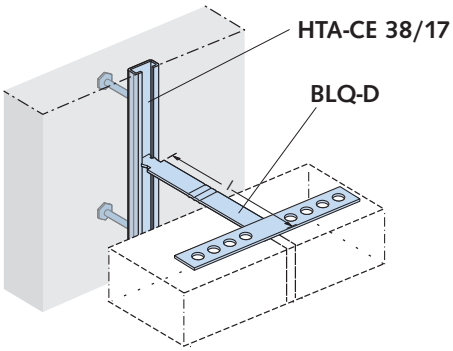


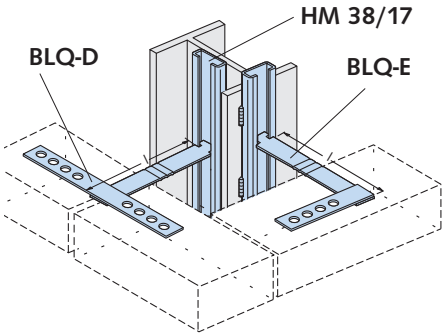
HM 28/15 welded to steel column.
HL 28/15 can be alternatively bolted with dowels to concrete.

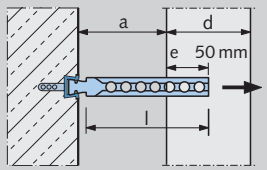


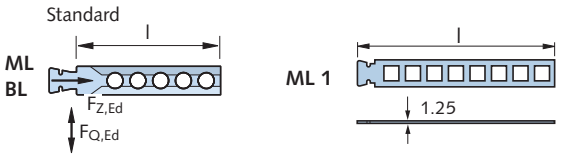
BL Brick tie in combination with HALFEN Channel type HTA 38/17 and HM 38/17





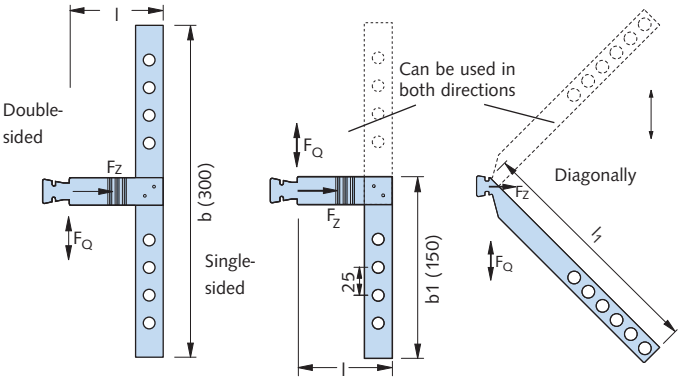


Allowable wall spacing a			
Connection two-leaf masonry	Length **l** (l_1) [mm]	Spacing **a** [mm]	**d** [mm]
	85	20 - 45	115
	120	40 - 80	
	180	85 - 140	
	(300)	0 - 80	240
	(350)	20 - 95	
	(400)	35 - 115	

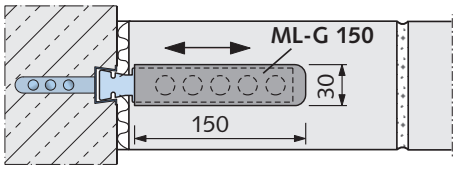


HALFEN Brickwork anchors are verified in accordance with EN 845-1 for various anchor channels with a minimum embedment depth of 50mm:

Characteristic load-bearing capacity (validated preformance)				
		BL	ML	ML1
F_Z [KN] Axial load	HTA-CE	3.2	2.7	2.5
	HMS	-	1.6	1.6
F_Q [KN] Shear load	HTA/HMS	2.7	1.5	1.4
F_D [KN] Compression load	HTA/HMS	1.0 (BL180)	1.0 (ML180)	0.375 (ML1-245)



Sliding sleeve ML-G 150 for ML-Anchor, for wall connections

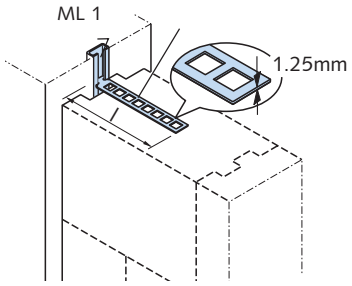


Allows movement in the anchor longitudinal direction; this helps to avoid cracking in long sections of brick wall or infill brickwork connected to concrete structures.
Material: Soft-PVC Order no. 0134.010-00001

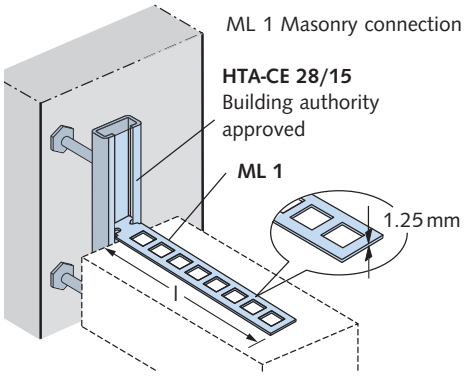
Brick ties ML 1 for connections in interior applications

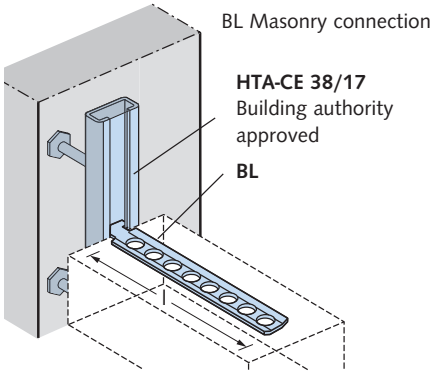
Material: Stainless steel W1.4301 A2

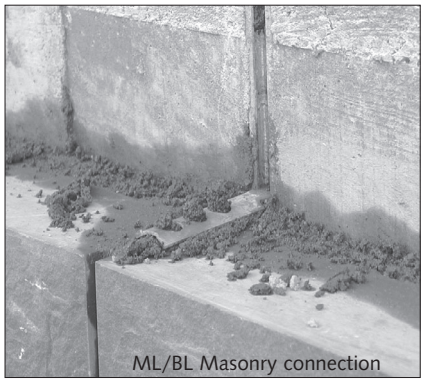
Type	Length l [mm]	Order no. 0013.010-
ML1 -	125	00001
	185	00002
	245	00003

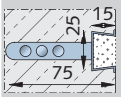
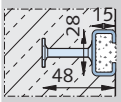
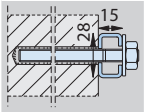
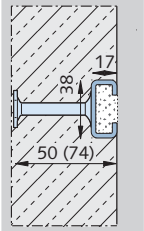


Channels load-bearing capacity with wall tie spacing of ≥ 25 cm			
Brick tie channel	**HMS 25/15 D**	**HTA-CE 28/15**	**HTA-CE 38/17**
Centric tension **F_Z** [kN] ($F_{Z,Rd}$)	1.2 (1.6)	3.0 (4.0)	4.5 (6.1)
Transverse stress **F_Q** [kN] ($F_{Q,Rd}$)	1.5 (2.0)	3.0 (4.0)	4.5 (6.1)







Brick-tie channel		Brick-tie anchor				
	**HMS 25/15 D** L = 2500 mm	**ML** Standard 26 × 2 [mm]	**ML 1** 25 × 1.25 [mm]	**MLQ - D** Double-sided 25 × 3 [mm]	**MLQ - E** One-sided 25 × 3 [mm]	**MLS** Diagonal 22 × 3 [mm]
		Type / Length l [mm]	Type / Length l [mm]	Type / Length l [mm]	Type / Length l [mm]	Type / Length l_1 [mm]
	**HTA-CE 28/15** L = 1050 mm① L = 6070 mm①	**ML - 85**	**ML 1 - 125**	**MLQ-D - 85**	**MLQ-E - 85**	**MLS - 300**
	**HL 28/15** L = 6070 mm①	**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**
	**HTA-CE 38/17** L = 1050 mm① L = 6070 mm①	**BL** Standard 30 × 2 [mm] Type / Length l [mm]	**BLQ - D** Double-sided 30 × 3 [mm] Type / Length l [mm]	**BLQ - E** One-sided 30 × 3 [mm] Type / Length l [mm]	**Material:** **FV** = Steel S235JR, hot-dip galvanised **SV** = Steel DX51D + Z275, Sendzimir galvanised **A4** = Stainless steel 1.4571/1.4404 **A2** = Stainless steel 1.4301	
		BL - 85	**BLQ-D - 85**	**BLQ-E - 85**		
		BL - 120	**BLQ-D - 120**	**BLQ-E - 120**		
		BL - 180	**BLQ-D - 180**	**BLQ-E - 180**	① Other lengths: **Available on request**	

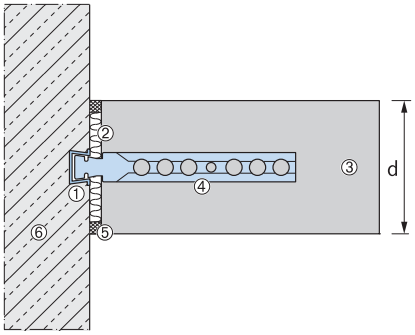
Firewall connection according to DIN 4102-4 : 2016-05

Solid masonry fire walls

Statically required connections of load bearing, room-enclosing, masonry walls can also be designed as fire walls in accordance DIN 4102-4 section 9.8.4 using HALFEN Brick tie channels.
The anchorage to adjacent components (steel reinforced concrete supports or walls) meet the requirements for stability and fire resistance if the anchorage conforms to the standards set in DIN 4102-4 section 9.8.4 (figure 9.13, variant 2).

Anchor spacings

HALFEN Brick tie anchors can be used at any position along the whole length of the brick tie channel. Generally the standard spacing between the anchors is 250 mm (4 anchors per metre).



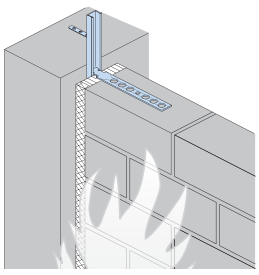
Definition, DIN regulations

① **HALFEN Cast-in channel**
② **Insulation layer:**
According to DIN 4102-4 section 9.2.14 insulation layers in connecting joint gaps must, "[...] be made of non-flammable mineral fibre; have a melting point ≥ 1000 °C as stated in DIN 4102-17; and have a gross density of ≥ 30 kg/m³" and must not smoulder.
③ **Masonry:**
Bricks (gross density class) and minimum wall thickness according to DIN EN 1996-1-2: 2011-04.
④ **Masonry connection** (vertically adjustable)
⑤ **Expansion joint**
⑥ **Concrete**

Product information

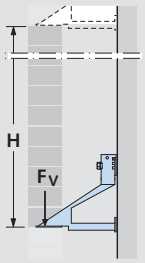
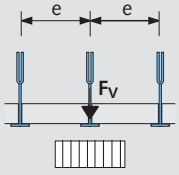
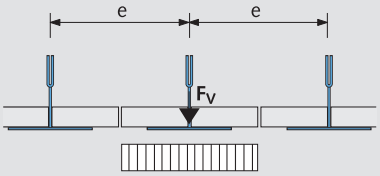
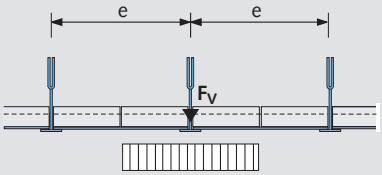
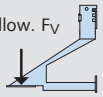
HALFEN Cast-in channel Type ①	④ Brick tie anchor	
	for standard grout	for thin mortar
HMS 25/15 D	ML	ML 1
HTA 28/15	ML	ML 1
HTA 38/17	BL	–

Connection of a load bearing masonry wall as a firewall according to DIN 4102-4 section 9.8.4 (figure 9.13) or according to DIN EN 1996-1-2: 2011-04 (figure E.4B)



Calculation Table for Support Brackets

Dimensioning support brackets for brick cladding d = 11.5 cm with γ = 18 kN/m²

 Load height **H** [m]	Single support bracket e.g. HK5 - U  e = 250 mm **FV** [kN] (**FV,d** [kN])	Single support bracket e.g. HK5 - P  e = 500 mm **FV** [kN] (**FV,d** [kN])	Single support bracket e.g. HK5 - U with intermediate angle brackets  e = 500 mm	e = 750 mm	e = 1000 mm **FV** [kN] (**FV,d** [kN])	Support bracket **Load range**  Allow. FV [kN] per bracket (**FV,d** [kN])
12	6.2 (8.4)					
11	5.7 (7.7)	11.4 (15.4)	11.4 (15.4)			
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 (5.6)	8.3 (11.2)	8.3 (11.2)			**12.0** (16.2)
7	3.6 (4.9)	7.2 (9.8)	7.2 (9.8)	10.9 (14.7)		
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)	
4	2.1 (2.8)	4.1 (5.6)	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)	**8.0** (10.8)
2	1.0 (1.4)	2.1 (2.8)	2.1 (2.8)	3.1 (4.2)	4.1 (5.6)	
1	0.5 (0.7)	1.0 (1.4)	1.0 (1.4)	1.6 (2.1)	2.1 (2.8)	**4.0** (5.4)

Example: Load height H = 5.0 m; support with standard support brackets; HK5 - U with angle bracket, e = 750 mm → F_V = 7.8 kN
→ selected support bracket for load group **8.0 kN**

Load groups 4.0 8.0 12.0

Calculation

1. Load calculation

H = load height [m]
γ = brickwork factor [kN/m³]
a = cavity dimension [mm]
b = a + $\frac{d}{2}$ + tolerance [mm]
tolerance = 15 mm
d = brick thickness [m]
e = spacing of HK5 support brackets [m]
F_V = vertical loading per fixing point

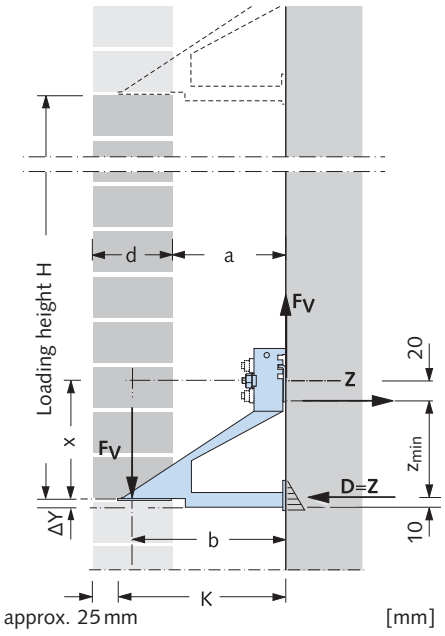
$F_V = H \times e \times d \times \gamma$ [kN]

→ $F_V = H \times e \times 2.07$ for γ = 18 kN/ m³ and d = 0.115 m

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

2. Selecting a HK5 Support bracket

Max. F_V = load level, results in → x (see tables; HK5 support brackets, page 10–21)



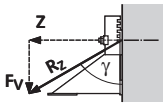
3. Calculating the acting load R_Z

z_{min} = x + ΔY - 10 - 20 [mm]
→ HK5 - adjustability = ± 20 mm

Tension/compression load Z = - D
max $Z = F_V \times b / z_{min}$
($Z_d = F_{V,d} \times b / z_{min}$)

Resulting load $R_Z = \sqrt{Z^2 + F_V^2}$

$R_{Z,d} = \sqrt{Z_d^2 + F_{V,d}^2}$

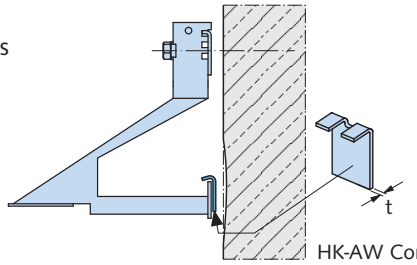


Note: Refer to the approval for the selected fixing method for calculation.

Depth Adjustments for HK5 Support Brackets

HK-AW Compensation shims

For aligning the HK5 Support brackets vertically (compensating for construction tolerances).



HK-AW Compensation shims

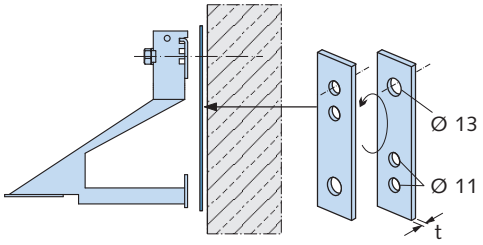
Compensation shims		
Article name	Order no. 0156.020-	t [mm]
HK - AW - 3	00001	3
HK - AW - 6	00002	6

HK-AL Compensation shims

For depth adjustments, particularly for HK5-F and -FV Angle support brackets.

Note: Take the following into account when using HK-AL Compensation shims:

- cantilever K increase
- increased bending moment



HK-AL Compensation shims

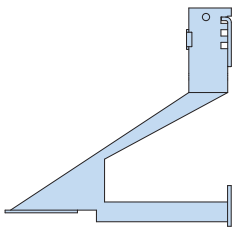
Compensation shims		
Article name	Order no. 0156.030-	t [mm]
HK - AL - 3	00001	3

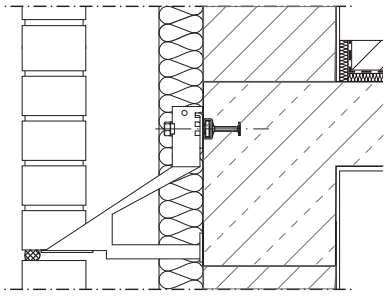
Tender text example

Single support bracket
HALFEN HK5-U Support bracket,
to support brick facing masonry, made from stainless steel, corrosion resistance class III according to approval Z-30.3-6 and according to approval EN 1993-1-4: 2006, table A.1, section 3;
optimised thermal properties,
height adjustable ±20 mm,
type tested with general building authority approval for the bracket head,
with CE marking,

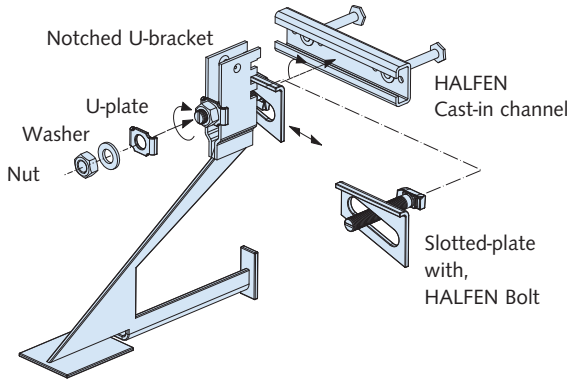
Type HK5-U-LS-K
with
U = Standard single support bracket,
LS = Load groups [kN] ..... (4,0 / 8,0 / 12,0),
K = bracket cantilever length [mm] ..... (130 / 150 / 170 / 190 / 210 / 230 / 250 / 270 / 290 / 310 / 330 / 350) for a wall spacing of (K - 90 mm) ± 15 mm,

or similar; deliver and install according to manufacturers instructions.
Fixing system not included.



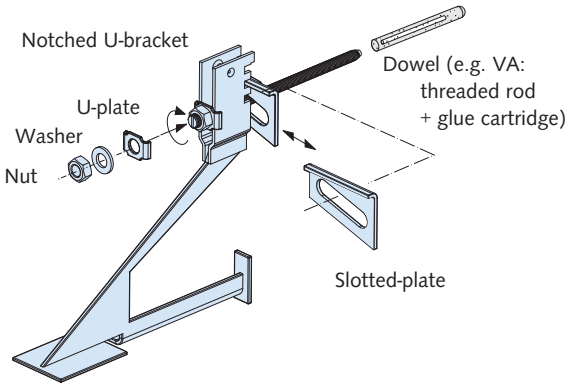


Fixing to HALFEN Channels



1. Check the HALFEN Cast-in channel is properly installed.
2. Assemble the support bracket, the HALFEN Bolt, slotted plate, U-plate, washer and nut as illustrated. Insert the head of the bolt horizontally into the HALFEN Channel, then turn to the right and tighten the nut by hand. The notch at the shaft-end of the bolt has to be vertical.
3. Adjust the height of the support bracket. A notch in the U-bracket must be resting on the slotted plate; if necessary, tap the bracket lightly with a hammer until contact is made. Use a torque spanner to tighten the nut.

Fixing with dowels



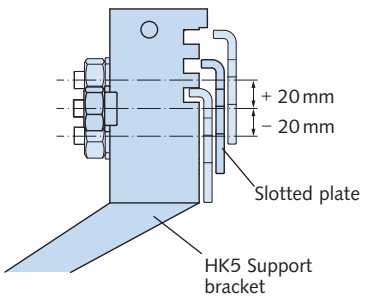
1. Install the dowel according to the approval.
2. Place the slotted plate and the support bracket on to the threaded rod using the U-plate, washer and nut as illustrated.
3. Adjust the height of the support bracket. A notch in the U-bracket must be resting on the slotted plate; if necessary, tap the bracket lightly with a hammer until contact is made. Use a torque spanner to tighten the nut.

Note: Only use suitable, approved dowels in cracked concrete (e.g. HALFEN Injection anchors).

Adjustment and tightening

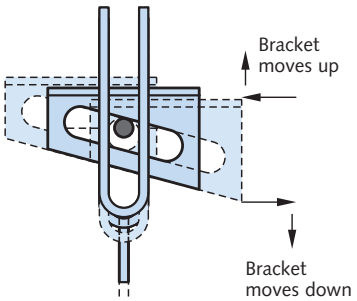
Rough height adjustment:

Select a suitable notch for initial adjustment.



Exact height adjustment:

Move the slotted plate sideways for fine adjustment of the HK5 Support bracket.



Tightening:

After height adjustment, use a torque spanner to tighten the nut with the required torque in accordance with the values shown in the table below.

Method of fastening:	Required torque [Nm] for thread:		
	M10	M12	M16
HALFEN Bolt HS	15	25	60
HALFEN Bonded anchor V	20	40	80
HALFEN Injection anchor VMZ	15	25/30①	50
HALFEN Injection anchor VMU	20	40	60
HALFEN Bolt-anchor BZ	35	50	110
① see page 29–30			

Notes for on-site handling

1. Remove the packaging straps as soon as possible after delivery to the construction site to avoid rust stains on the stainless steel.
2. All stainless steel parts must be immediately rinsed thoroughly with water if they have come into contact with acidic solutions, as sometimes used for cleaning brickwork. HALFEN strongly advises against using hydrochloric acid based products.

HALFEN SUPPORT BRACKETS
Brick cladding in accordance with DIN EN 1996

Excerpt from DIN EN 1996-2/NA, Issue 2012-01
(non-offical translation)

NA.D Cavity wall construction
NA.D.1 General directives for execution
[...]
(4) The following points need to be observed when designing a non-load-bearing outer skin (brick cladding or plastered masonry leaf) to front a load-bearing structure wall.

a) Only the thickness of the main structural wall is to be used for verification.

b) The minimum thickness of the outer skin is 90 mm. Thinner outer skins are called cladding and their construction is detailed in DIN 18 515. The minimum length of brick piers in the outer skin that have to support loads only from the outer skin is 240 mm. The outer skin must be supported for its full width and length. Where the support is interrupted (e.g. on brackets), all bricks/blocks must be supported on both sides at the level of the support. [...]

d) Outer skins with a thickness of 115 mm should be supported in vertical intervals of about 12 m. They may project up to 25 mm beyond their load bearing support. If the 115 mm thick outer skin is not higher than two floors or it is supported every two floors, it may project up to 38 mm from its bearing. These projections have to be taken into account when calculating the compression in the load bearing support. [...]

e) Outer skins with a thickness of t ≥ 105 mm and t < 115 mm must not be built to a height of more than 25 m above ground level and have to be supported in vertical intervals of about 6 m. On buildings with two full floors, a triangle gable up to a height of 4 m can be included without additional supports. These exterior skin may protrude a maximum of 15 mm from the load bearing support. [...]

f) Outer skins with a thickness of t ≥ 90 mm and t < 105 mm must not be built to a height of more than 20 m above ground level and have to be supported in vertical intervals of about 6 m. On buildings with two full storeys, a gable triangle up to a height of 4 m can be included without additional supports. For the joints of the facing surface, smooth pointing is required (no separate pointing).

The outer skin may protrude a maximum of 15 mm from their load bearing support.

g) In accordance with the general building approval the facing wall must be secured with stainless steel wire ties or with anchors in stainless steel in accordance with DIN EN 845-1; the application of which is regulated by a general building approval. The wire wall ties must be of the shape and size as shown in picture NA.D.1 with:

- vertical spacing: max. 500 mm;
- horizontal spacing: max. 750 mm;
- cavity between the walls : max. 150 mm;
- diameter: 4 mm;
- minimum mortar class IIa;
- minimum number of anchors: see table NA.D.1; if nothing else is regulated in a general building authority approval

Table NA.D.1 – Minimum number n_{tmin} of wire ties per m² façade (wind zones acc. to DIN EN 1991-1-4/NA)

building height	windzone 1 to 3 windzone 4 on shore	windzone 4 coast of North Sea and Baltic Sea including islands	windzone 4 North Sea islands
h ≤ 10 m	7[a]	7	8
10 m ≤ h ≤ 18 m	7[b]	8	9
18 m ≤ h ≤ 25 m	7	8[c]	

a) in windzone 1 and 2 inland zone: 5 anchors/m²
b) in windzone 1: 5 anchors/m²
c) if one side length of the building is smaller than h/4: 9 anchors/m²

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 must be fitted in addition to table NA.D.1. [...]

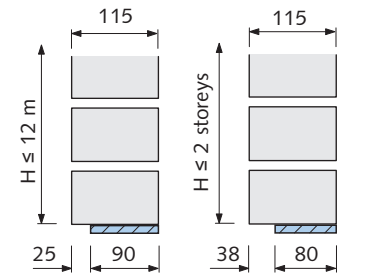
While taking their structural effectiveness into account, the wire wall ties must be designed to ensure they do not conduct moisture from the outer skin to the inner main structure (e.g. by fitting a drip disc), see picture NA.D.1). [...]

NA.D.2 Ventilation gap
(1) The following must be maintained:

a) If a ventilation gap is planned in the cavity, it should be at least 60 mm. The air gap may be reduced to 40 mm if all excess mortar protruding into the cavity is removed. [...]

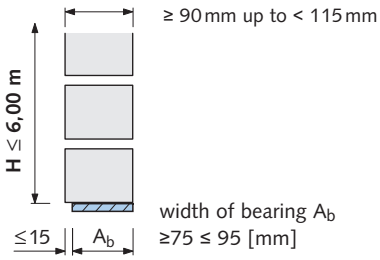
Bearing on the support brackets

- for 115 mm thick brick skin

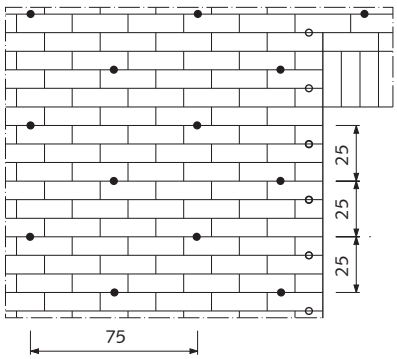


If the outer skin is not higher than 2 storeys or it is supported every two storeys, it may protrude beyond the support by up to 38 mm.

- for brickwork skins ≥ 90 mm to < 115 mm thick

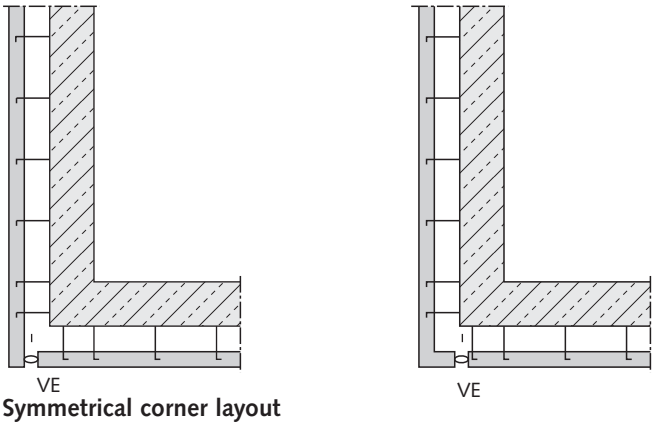


Layout of cavity wall ties

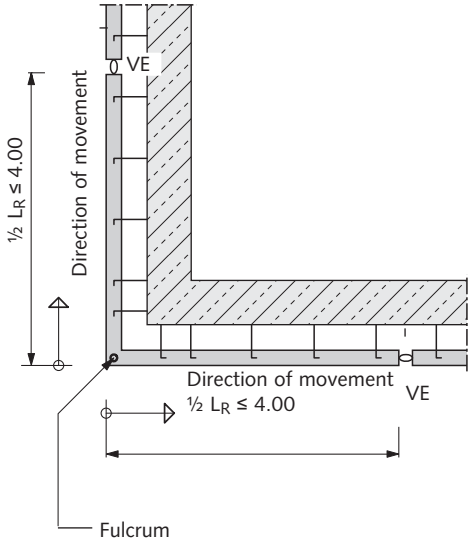


- number of ties in the area of wall 7 ties/m²
- 3 additional ties have to be fitted next to openings, expansion joints, near edges and per linear metre of edge

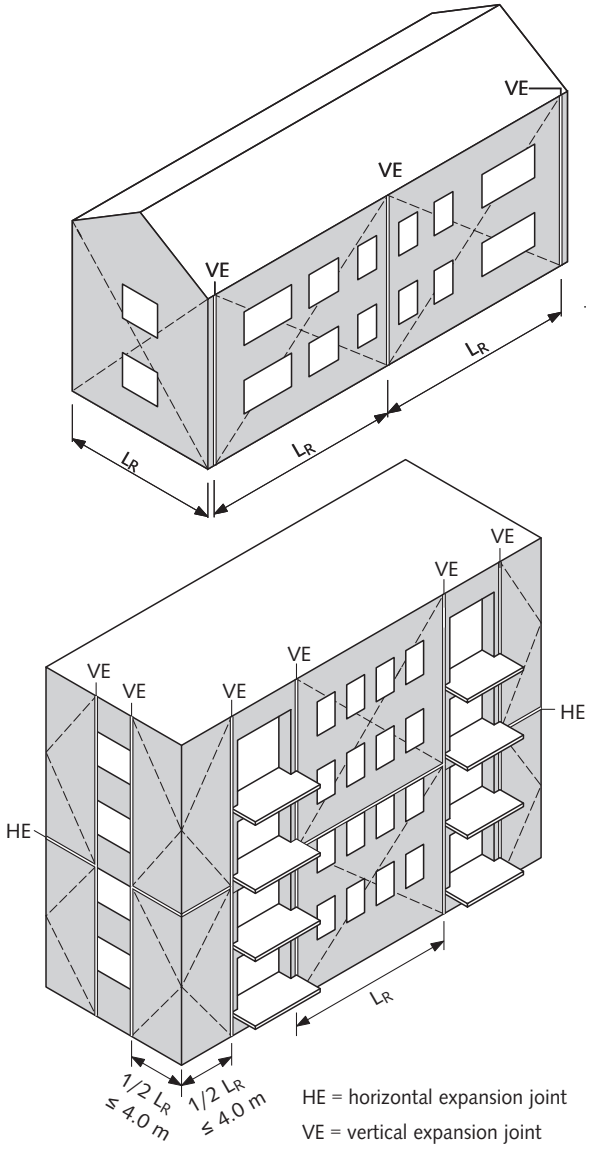
Expansion joints at corners



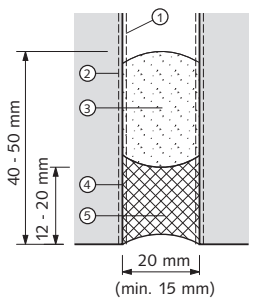
Symmetrical corner layout with expansion joints



Horizontal and vertical expansion joints

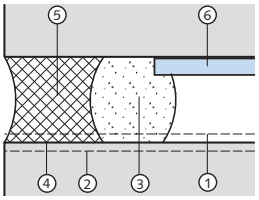


Vertical expansion joint



Example; detail of expansion joint, recommendation from the German Society for Masonry Construction *(Deutsche Gesellschaft für Mauerwerksbau)*.

Horizontal expansion joint
under support brackets



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

Recomm. spacing of expansion 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
standard clay bricks	10 - 12	10 - 12
calcium silicate blocks	6 - 8	5 - 6
concrete module blocks	6 - 8	5 - 6

⑤ elastoplastic joint sealing compound
⑥ HALFEN HK5 Support brackets
⑦ as recommended by the brick/lime-stone industry and the concrete industry

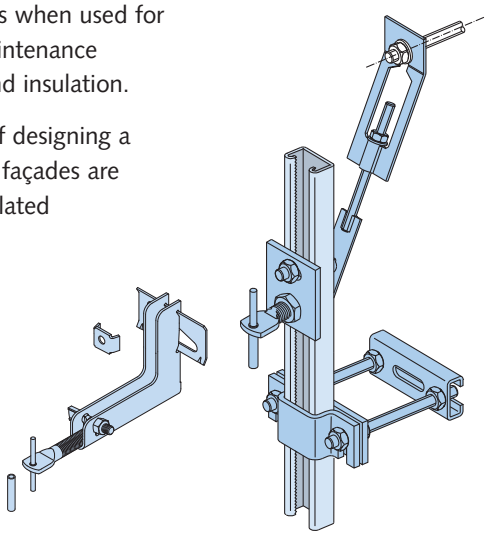
Natural stone façades

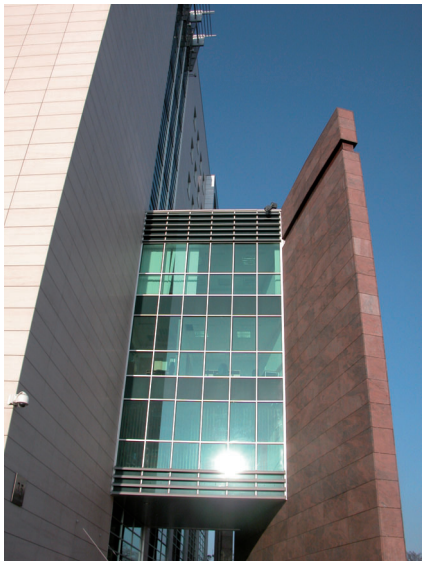
Natural stone offers numerous advantages when used for designing façades. It is a durable, low maintenance material that improves the building's sound insulation.

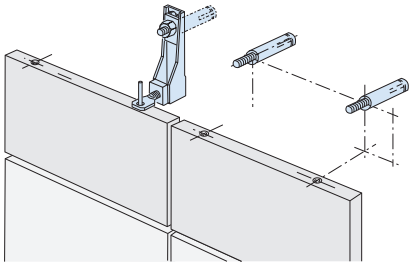
These are only a few of the advantages of designing a façade using natural stone. Natural stone façades are usually designed and constructed as ventilated curtain-wall façades.

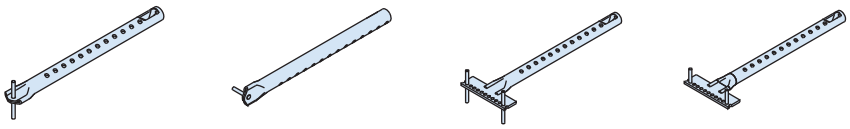
HALFEN Natural stone fixing systems are the optimal solution when planning a ventilated curtain façade.

Further information in our catalogue:
HALFEN Natural stone support systems







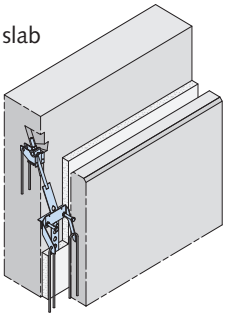


Concrete façades

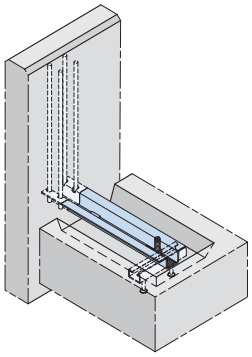
Innovative production methods in precast concrete plants and new self-compacting concretes allow contemporary surface textures. Therefore, high quality, economical as well as functional, good quality precast-concrete components are possible. These façade components are secured to the load-bearing structure of the building as separate, thin façade elements.

Following distinctions in construction type are made:

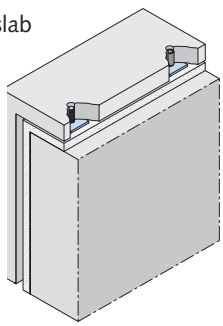
Suspended façade slab



Parapet element



Corner slab



Further information in our catalogue: **HALFEN Concrete façade anchor systems**

Connection Solutions.

The HALFEN Product Range

Paserelle Simone de Beauvoir, France

FIXING SYSTEMS, FRAMING SYSTEMS AND ACCESSORIES

HTA
Cast-In Channels

HZA
DYNAGRIP Cast-In Channels

HTA-CS
Curved Solutions Channels

HGB -
Balustrade Fixings

HMS -
Brick Tie Channels

HTU Cast-In Channels

DEMU
Fixing anchors

HALFEN Framing Channels and HALFEN Bolts

HALFEN Framing System/ Accessories

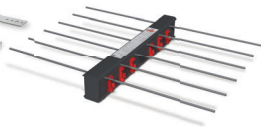
REINFORCEMENT SYSTEMS

HBS-05
Screw Connections

MBT
Reinforcement Couplers

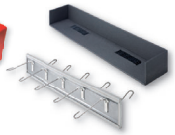
HBT
Rebend Connections

HDB
Shear Rails



HIT
Insulated Connections

HBB
bi-Trapez-Box®



HTT/HTF
Impact Sound Insulation Elements

HCC
Column Shoes

HSC
Stud Connectors

LIFTING SYSTEMS, CONCRETE PRECAST SYSTEMS, NATURAL STONE SYSTEMS, BRICKWORK SUPPORT SYSTEMS, ROD SYSTEMS

DEHA KKT
Spherical Head Lifting Anchors

DEHA HA
Socket Anchors

DEHA HD-Socket Lifting Anchor System

FRIMEDA TPA
Lifting Anchor System

FPA
Façade Panel Anchors

FA
Flat Anchors

Body Anchors

UMA
Grout-In Anchors

SUK
Sub Structures

HK5
Brickwork Support System

DETAN
Tension Rod System

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