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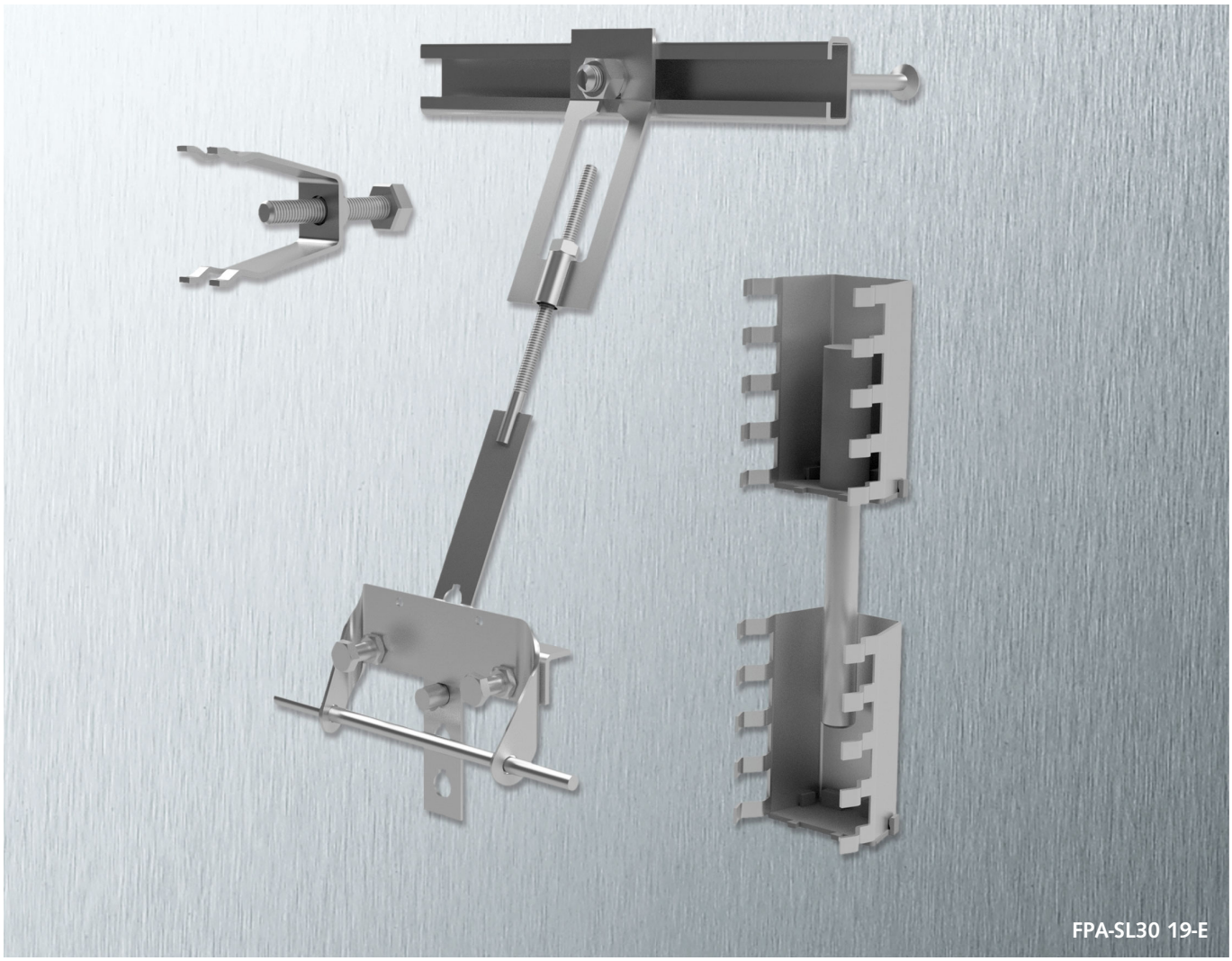
HALFEN

HALFEN FPA-SL30 SYSTEM
Technical Product Information



- Fixing system for thin, large-format concrete façade panels
- Façade panel anchor and horizontal anchorages building authority approved for façade panel thicknesses from 3 - 5 cm

Leviat®
A CRH COMPANY

We are one team.
We are Leviat.

Leviat is the new name of CRH's construction accessories companies worldwide.

Under the Leviat brand, we are uniting the expertise, skills and resources of HALFEN and its sister companies to create a world leader in fixing, connecting and anchoring technology.

The products you know and trust, including the HALFEN FPA-SL30 System, will remain an integral part of Leviat's comprehensive brand and product portfolio. As Leviat, we can offer you an extended range of specialist products and services, greater technical expertise, a larger and more agile supply chain and better, faster innovation.

By bringing together CRH's construction accessories family as one global organisation, we are better equipped to meet the needs of our customers, and the demands of construction projects, of any scale, anywhere in the world.

This is an exciting change. Join us on our journey.

Read more about Leviat at Leviat.com

Our product brands include:

Ancon®

HALFEN

PLAKA

60 locations

sales in **30+** countries

3000 people worldwide

Imagine. Model. Make.

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HALFEN ANCHORING SYSTEMS CONCRETE FAÇADES

We are global market leader for concrete façades fastening systems

Project: maxmodul – administration building TF2

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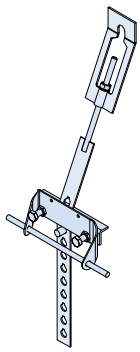
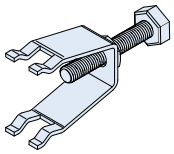
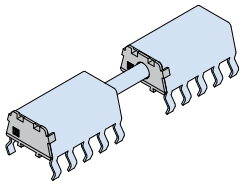
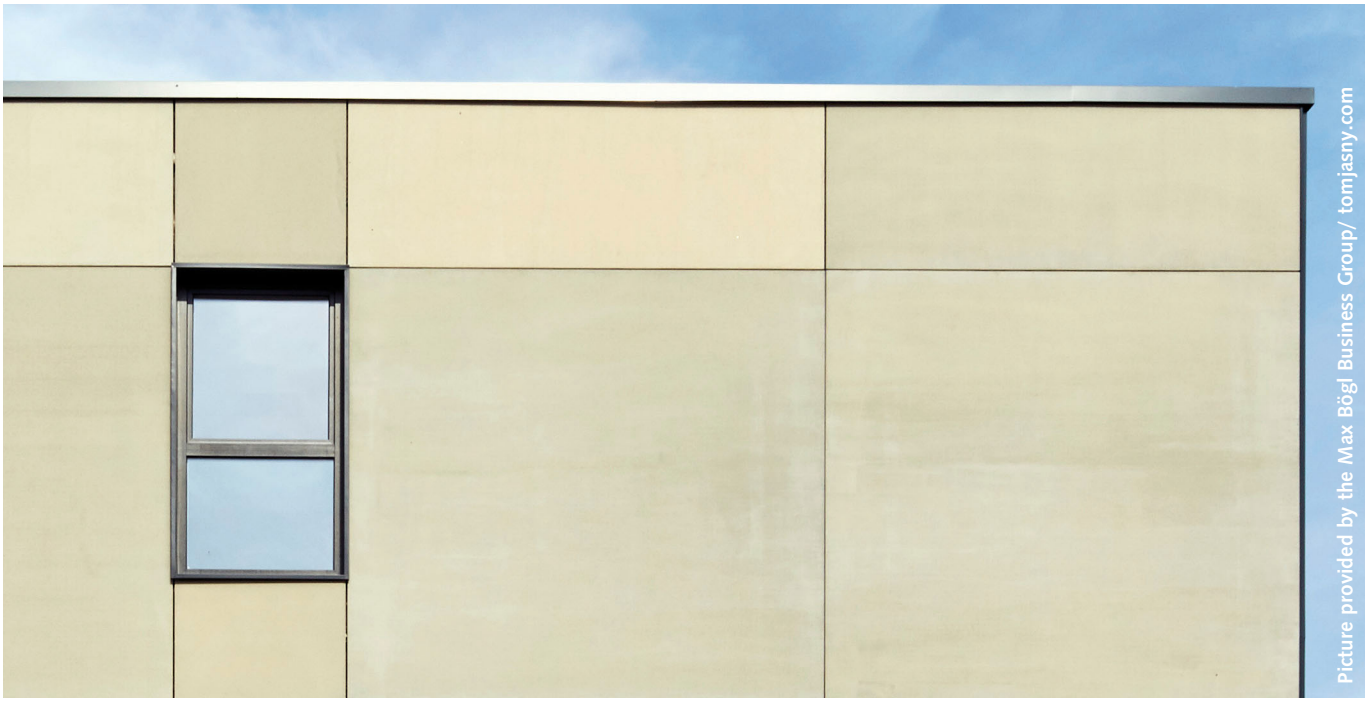








Picture provided by the Max Bögl Business Group/ tomjasny.com

Reliable and economical project planning

This catalogue includes information on necessary constructive planning and dimensioning, the corresponding details for the constructive design of concrete façades, and the necessary anchoring and fixing materials.

We have a comprehensive range of product and we have also competent engineers available with extensive experience to assistance with planning, calculation and static consultation from the beginning of a project through to final installation of the elements.

In addition to one-on-one consultation and the project support provided by the engineers in our technical service team, we also provide easy-to-use dimensioning software to facilitate your projects.

Our products provide reliability, quality and safety - for you and your company.

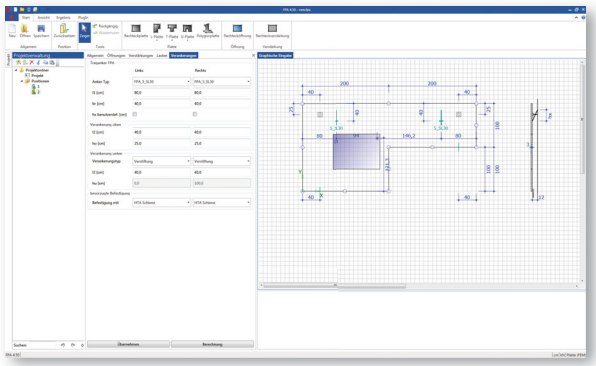
HALFEN

Design software – The perfect tool for reliable planning

The HALFEN FPA Design software is user-friendly and easy to use. A calculation is provided after entering the façade panel dimensions, selecting the anchors and if required, various other options.

FPA Software features

- design of asymmetrical slabs i.e. anchor positioning using the integrated FE core
- FPA and spacer bolts allow increased wall spacing
- all accessories are integrated in the software (horizontal anchors, suction restraints, fixing material)
- pre-set slab geometries (U, L, T, etc.)



- itemized parts listed according to installation and assembly components
- integrated wind load tool
- transfer of dowel loads
- installation plan with anchor positions and type designation
- detailed drawings of all anchoring positions

FPA calculation results

- designation of the calculated anchor type
- loads per anchor
- designation of the spacer bolts i.e. dowels
- horizontal anchorage loads
- suction restraints, if required
- results output/printout with drawing

Free and easy-to-use design software available at
www.halfen.com ► Downloads ► Software/CAD

More information about **HALFEN Façade panel anchors** fixings can be found in our technical information catalogue **"HALFEN Anchoring system concrete façades"**
www.halfen.com ► Publications ► Catalogues ► Concrete façades

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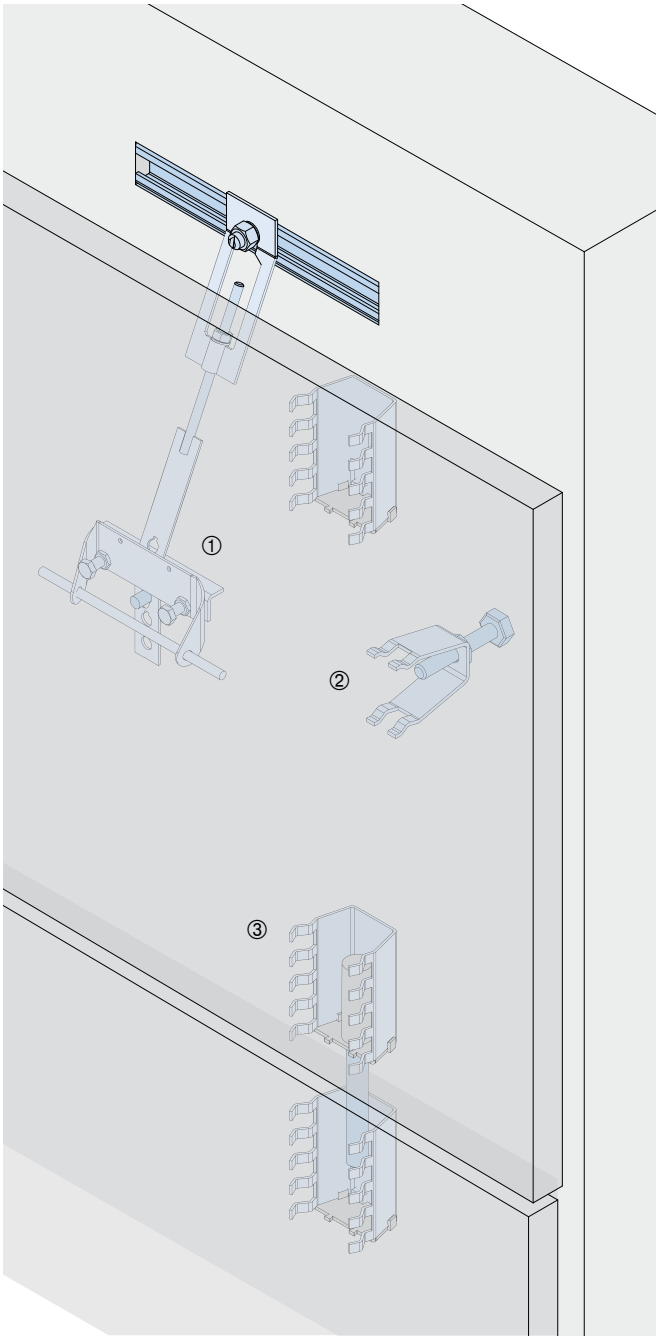
The advantages of the HALFEN FPA-SL30-System at a glance

The use of textile reinforcement eliminates the need for concrete coverings ≥ 25 mm. This allows production of concrete slabs with minimal thickness, i.e. as low as 3 cm. In addition to the direct increase of usable floor space compared to the overall footprint of the building, this also has other advantages:

- **Sustainability (resource efficient construction)**
- **Production costs (low material costs)**
- **Transport costs (reduced slab weight)**

Using thin façade slabs also provide an interesting solution for renovating or upgrading existing façades.



System overview

The HALFEN FPA-SL30 system consists of the following components:

① **FPA-SL30**
Adjustable suspended, tension-anchor system for transferring the dead-load of façade slabs to the main support structure.

② **DS13-SL30**
Anchoring element and adjustable spacer bolt for setting the distance to the wall and for transferring horizontal loads

③ **HFV-SL30**
Adjustable dowel system which provides a positive-locking connection between two façade panel elements

With the building authority approved FPA-SL30 system, statically determined and constraint-free suspended façade panels as thin as 3-5cm are possible. The quick and simple installation of the tried and tested FPA system has not been changed; a supporting structure is not required.

Requirements on the concrete:
- Concrete grade ≥ C50/60
- Aggregate size ≤ 8mm

Requirements on the slab reinforcement:
- no specific demands (stainless steel or non-steel mesh reinforcement allowed)
- according to static requirements

Material: Abbreviations and description	
A4/L4	Steel, corrosion resistance class (CRC) III according to DIN EN 1993-1-4: 2015-10, table A.3

HALFEN FPA-SL30 Façade Panel Anchor

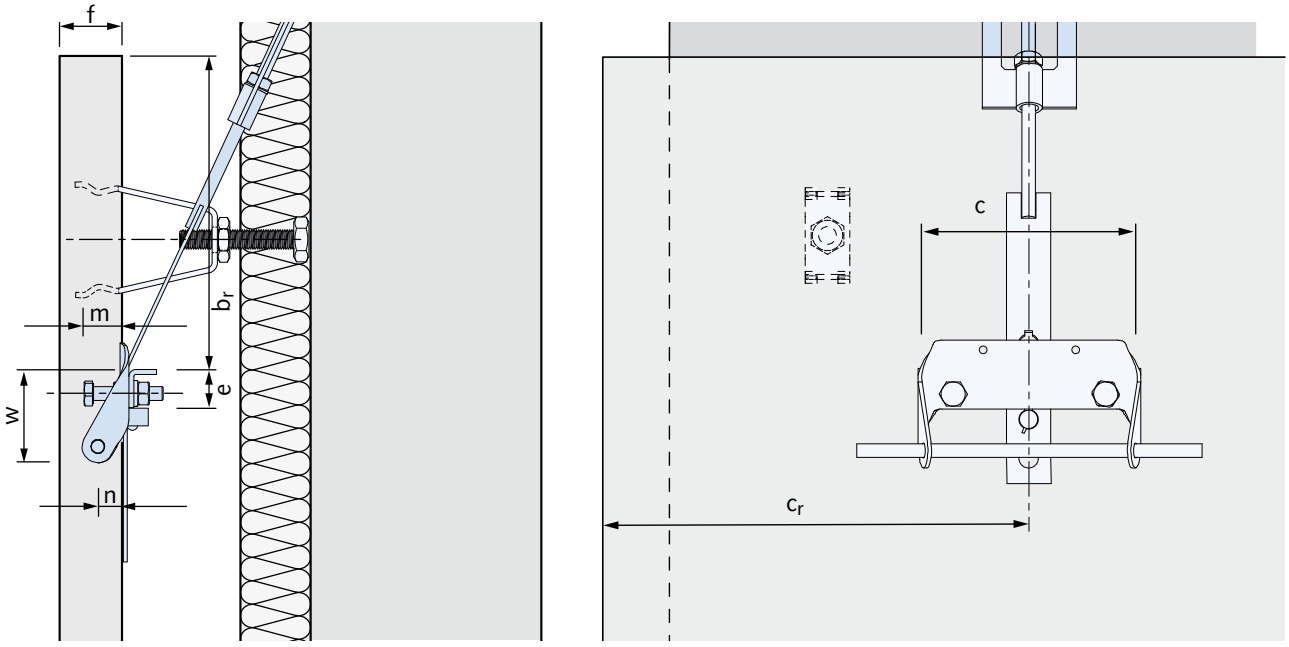
Product components

FPA - M (Installation component)**:**
Perforated strap, nut, washer, locking bolt and top bracket (Colour code: yellow)

FPA - E - SL30 (Cast-in component)**:**
Bracket element with angled bracket, cross bar and recess former (Colour code: yellow/turquoise)

FPA-E-SL30 Cast-in component for the precast element

The cast-in component of the SL30 Façade panel anchor system is the same for all types.
The dimensions are listed in the table below, installation instructions can be found on pages 12-13.



Specifications, Cast-in component FPA-E-SL30 [mm]									
Load group	Load capacity $F_{V,Rd}$ [kN]	Cast-in component FPA-E-SL30 for FPA-5, FPA-5A, FPA-5S							
		f	b_r min	c_r min	c	e	m	n	w
5.0	6.75 ①	30-50	60	150	122	22	26	16	54

① See general building authority approval no. Z-21.8-2067 for edge spacings < 60 cm (b_r) or < 75 cm (c_r),

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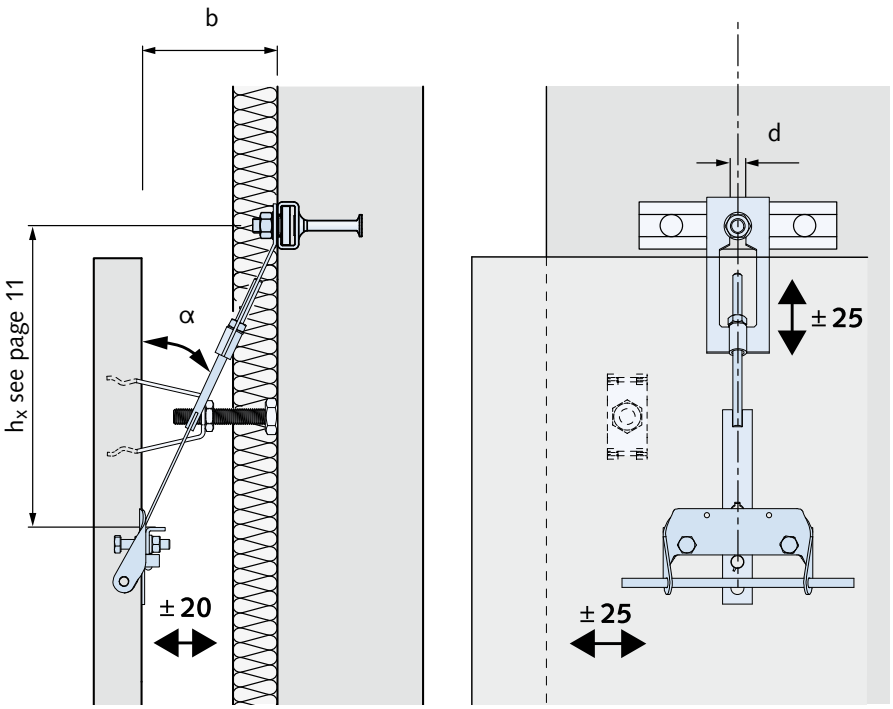
FPA-5-SL30 Façade Panel Anchor



Dimensions in [mm]

Notes: Use of fixings for façade anchors

We recommend using HALFEN HTA Cast-in channels or dowels suitable for tensile zones. If dowels are used, which are not suitable for use in tensile zones, then these must be verified before application. All fixings must be verified using the effective loads.

Material: A4/L4
(Material specifications, see page 5)

Scope of delivery FPA-5-SL30

FPA - 5 - M (Installation component)**:** Perforated strap, nut, washer, and top bracket

FPA - E - SL30 (Cast-in component): Bracket element with angled bracket, cross bar and recess former

FPA - 5 - G - SL30 (Set): includes:
FPA - 5 - M
+ **FPA - 5 - E - SL30**

Order example

FPA - **5** - **M** - **5,0** - **200**

❶ ❷ ❸ ❹ ❺

① Type
② Version
③ Scope of delivery
④ Load class
⑤ Wall spacing b

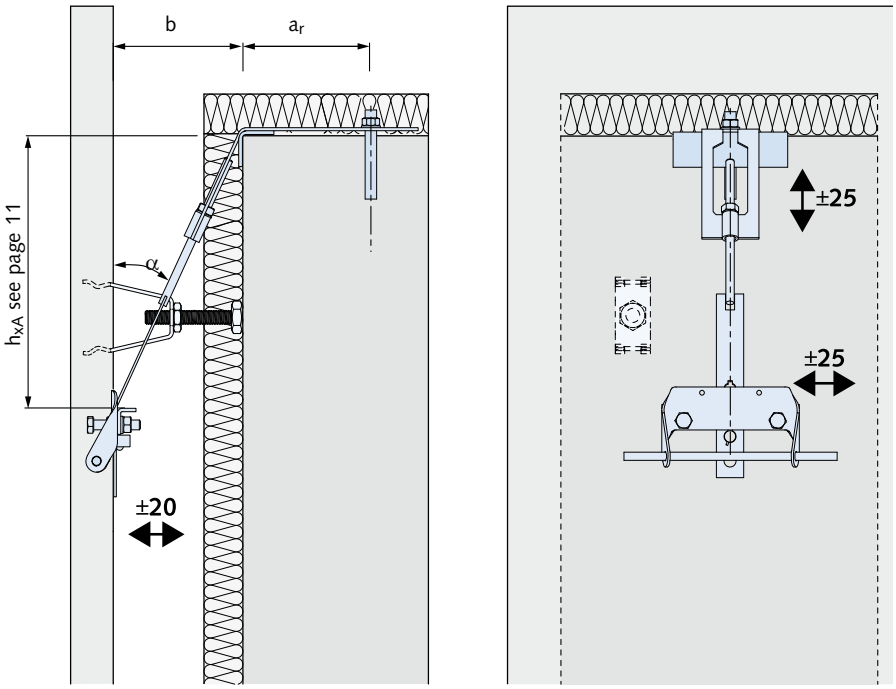
Please order spacer bolts and sleeves separately, see page 15

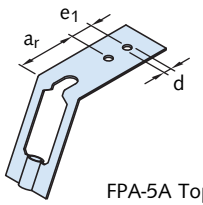
Specifications FPA-5-SL30

Load group	Load capacity $F_{V,Rd}$ [kN]	Nominal angle α ② with walls spacing = 80 - 350 mm	Hole diameter Installation component d [mm]
5.0	6.75 ①	25.0°	13

① See general building authority approval no. Z-21.8-2067 for edge spacings < 60 cm (b_r) or < 75 cm (c_r)
② More information about the perforated strap can be found on page 11.

FPA-5A-SL30 Façade Panel Anchor





FPA-5A Top bracket

Material: A4/L4
(Material specifications, see page 5)

Dimensions in [mm]

Scope of delivery FPA-5A-SL30

FPA - 5A - M (Installation component)**:**
Perforated strap, nut and washer, locking bolt, top bracket and edge protector

FPA - E - SL30 (Cast-in component):
Bracket element with angled bracket, cross bar and recess former

FPA - 5A - G - SL30 (set):
FPA - 5A - M
+ **FPA - E - SL30**

Please order spacer bolts and sleeves separately, see page 15

Order example

FPA - 5A - M - 5,0 - 200

❶ ❷ ❸ ❹ ❺

① Type
② Version
③ Scope of delivery
④ Load class
⑤ Wall spacing b

Specifications FPA-5A-SL30

Load group	Load capacity $F_{V,Rd}$ ①	Nominal angle α ②	Hole diameter, installation component d	Hole spacing e_1	Edge spacing a_r
	[kN]	with walls spacing b = 80 - 350 mm	[mm]	[mm]	[mm]
5.0	6.75	25.0°	Ø 11	24	110

① See general building authority approval no. Z-21.8-2067 for edge spacings < 60 cm (b_r) or < 75 cm (c_r),
② More information about the perforated strap can be found on page 11

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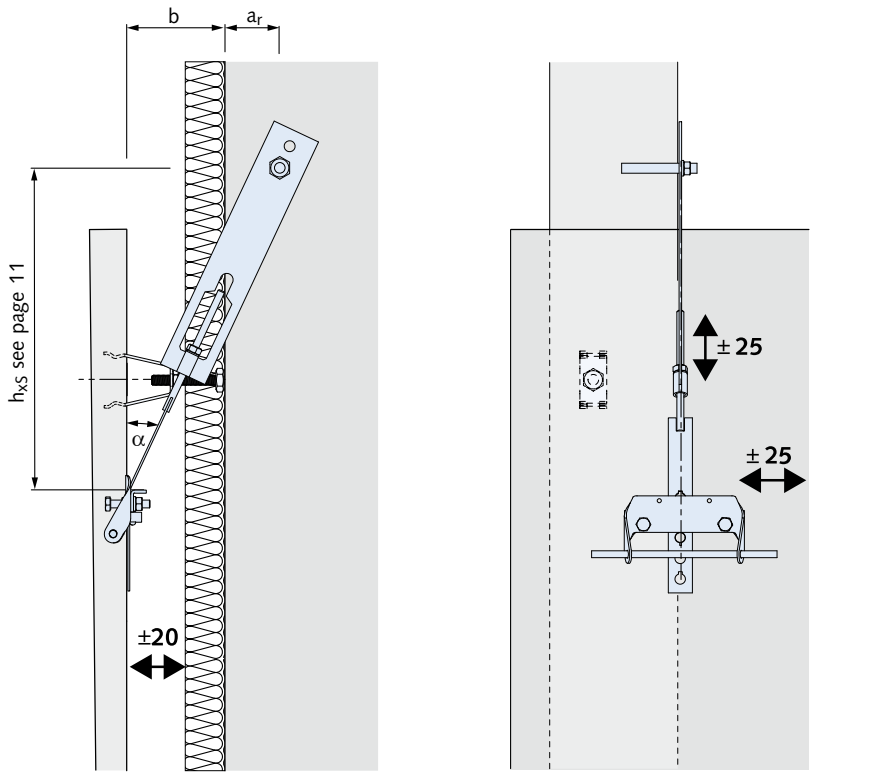
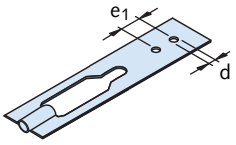
FPA-5S-SL30 Façade Panel Anchor



Dimensions in [mm]



FPA-5S Top bracket

Material: A4/L4
(Material specifications, see page 5)

Scope of delivery FPA-5S-SL30

FPA - 5S - M (Installation component)**:**
Perforated strap, nut, washer, locking bolt and top bracket

FPA - E - SL30 (Cast-in component):
Bracket element with angled bracket, cross bar and recess former

FPA - 5S - G - SL30 (set):
FPA - 5S - M
+ **FPA - E -SL30**

Please order spacer bolts and sleeves separately, see page 15

Order example

FPA - 5S - M - 5,0 - 200

❶ ❷ ❸ ❹ ❺

① Type
② Version
③ Scope of delivery
④ Load class
⑤ Wall spacing b

Specifications FPA-5S

Load group	Load capacity $F_{V,Rd}$ ①	Nominal angle α ②	Hole diameter, installation component	Hole spacing	Edge spacing
	[kN]	with walls spacing b = 80 - 350mm	d [mm]	e_1 [mm]	a_r [mm]
5,0	6,75	25,0°	Ø 11	24	100

① See general building authority approval no. Z-21.8-2067 for edge spacings < 60 cm (b_r) or < 75 cm (c_r),
② More information about the perforated strap can be found on page 11

Calculating the anchor loads

To install a concrete façade panel two façade panel anchors are required as support anchors for the vertical loads (dead load), and four horizontal anchors to ensure correct wall spacing (Standard is two spacer bolts at the top of the panel and two at the bottom).

In stacked suspended façade panels the bottom spacer bolts can be replaced with HFV dowels. Depending on the expected wind loads, and the shape and size of the slab, additional suction protection may be required for horizontal anchors (for example, compression bolts and Adjustable restraint).

Actions:
G = Vertical weight from the proportionate weight of the façade panel
For symmetrically suspended anchors, G per anchor = ½ slab weight
wd = Wind pressure load per horizontal anchor
ws = Wind suction load per horizontal anchor

No more than two façade panel anchors may be installed in a single precast element!

Partial safety factor for load actions:
γ_G = 1.35 permanent loads (dead load)
γ_Q = 1.50 variable actions (wind load)

Anchor loads:
V_d = Vertical load in the anchor = $G \times \gamma_G$
H_d = Horizontal load in the anchor = $V_d \times \tan \alpha$
R_d = Resulting diagonal load in the anchor = $\sqrt{V_d^2 + H_d^2}$

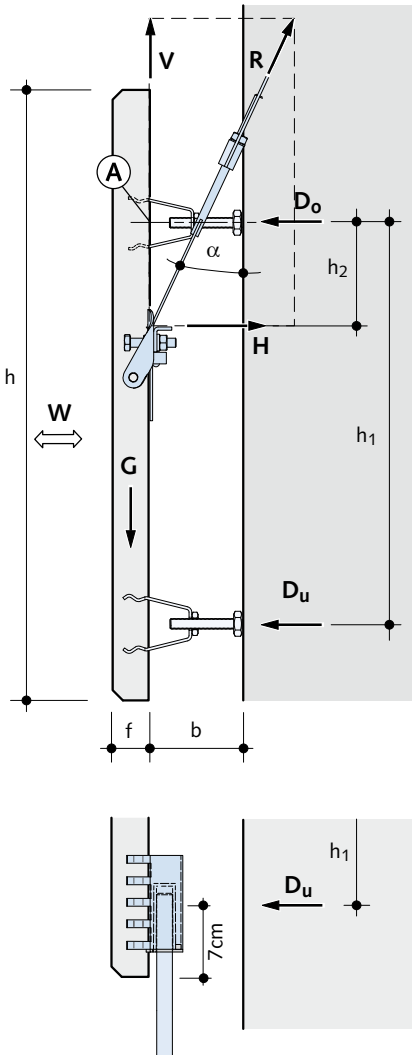
Do_d = Horizontal load, top (from $Do_{g,d} + Do_{w,d}$)
Du_d = Horizontal load, bottom (from $Du_{g,d} + Du_{w,d}$)

$Do_{g,d}$ = Horizontal load, top, from dead load $\times \gamma_G$
max. $Do_{w,d}$ = Horizontal load, top, wind load (wd $\times \gamma_Q$)
min. $Do_{w,d}$ = Horizontal load, top, wind load (ws $\times \gamma_Q$)
$Du_{g,d}$ = Horizontal load, bottom, from dead load $\times \gamma_G$
max. $Du_{w,d}$ = Horizontal load, bottom, wind load (wd $\times \gamma_Q$)
min. $Du_{w,d}$ = Horizontal load, bottom, wind load (ws $\times \gamma_Q$)

Requirements:
If min $Do_d < 0 \rightarrow$
If min $Du_d < 0 \rightarrow$
} Suction restraint required (e.g. Adjustable restraint)

Verification:
$\Sigma M_A \rightarrow$ $Du_{g,d} = (H_d \times h_2 + V_d \times f/2) / h_1$
max. $Du_d = Du_{g,d}$ + max $Du_{w,d}$
min. $Du_d = Du_{g,d}$ – min $Du_{w,d}$

$\Sigma H \rightarrow$ $Do_{g,d} = H_d - Du_{g,d}$
max. $Do_d = Do_{g,d}$ + max $Do_{w,d}$
min. $Do_d = Do_{g,d}$ – min $Do_{w,d}$



Verifiying suction restraint:
If min. Do_d i.e. min $Du_d < 0 \rightarrow$ Suction restraint required (for example, adjustable restraint)
According to Expert's report; global safety factor of 1.2 to prevent lift-off (mandatory)
→ min. Do_d, Sog = $Do_{g,k}$ - min. Do,w,k × 1,2
→ min. Du_d, Sog = $Du_{g,k}$ - min. Du,w,k × 1,2

α = Angle of inclination
(see tables on page 7-9)

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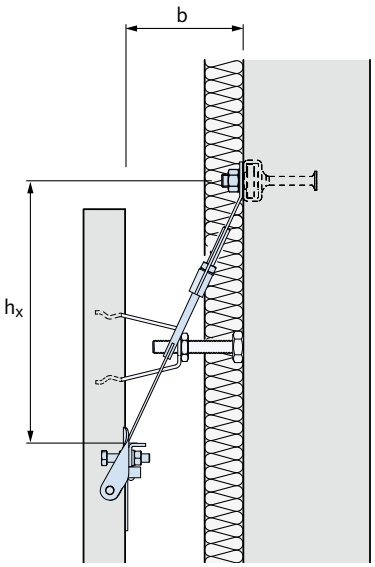
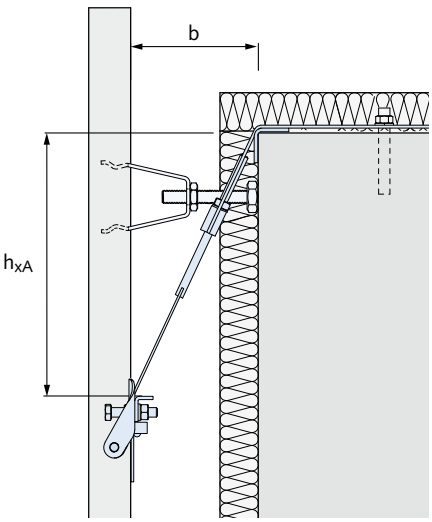
Perforated strap for the FPA-SL30 Façade Panel Anchor

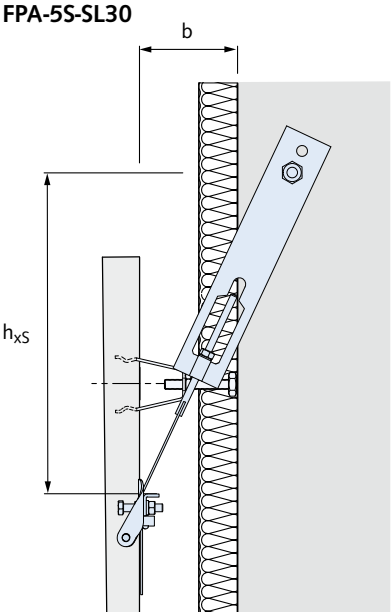
FPA-5-SL30



FPA-5A-SL30

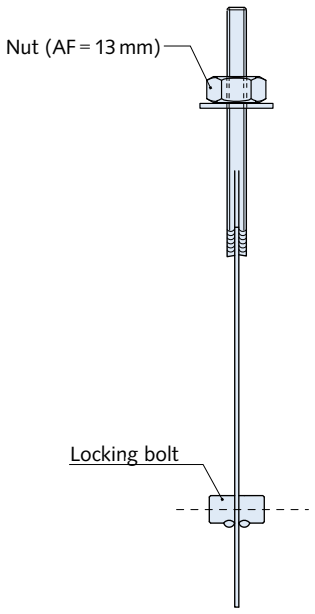


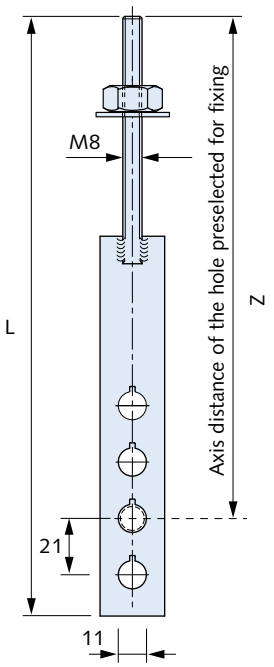
FPA-5S-SL30



Specifications Perforated strap for FPA-5/ -5A/ -5S -SL30					
Load group	5.0				
Wall spacing b [mm]	h_x	h_{xA}	h_{xS}	L ①	Z
80	190	175	390	246 (4/S)	188
90	210	195	410		209
100	230	215	430	435 (12/ M)	230
110	255	240	455		251
120	275	260	475		272
130	295	280	495		293
140	315	305	520		314
150	340	325	540		356
160	360	345	560		377
170	380	365	580		398
180	405	390	605	645 (12/ L)	419
190	425	410	625		440
200	445	430	645		461
210	470	455	670		482
220	490	475	690		524
230	510	495	710		545
240	530	515	730		566
250	555	540	755		587
260	575	560	775		608
270	595	580	795	855 (12/ XL)	629
280	620	605	820		650
290	640	625	840		671
300	660	645	860		692
310	680	665	880		734
320	705	690	905		755
330	725	710	925		776
340	745	730	945		797
350	770	755	970		818

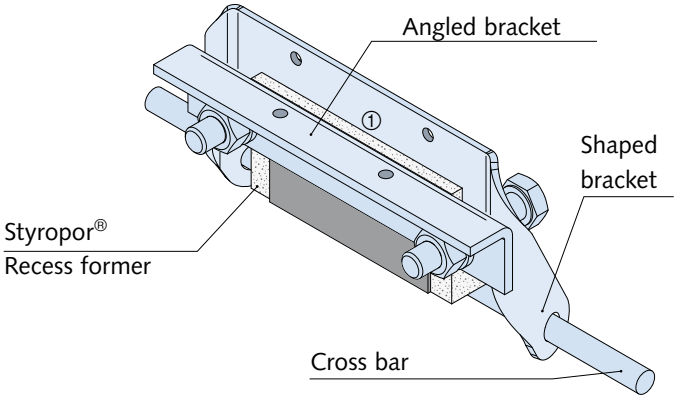
① Number of slots/Type of perforated strap (S/M/L/XL) see values in bracket





Note: Perforated straps for larger wall spacings are available on request

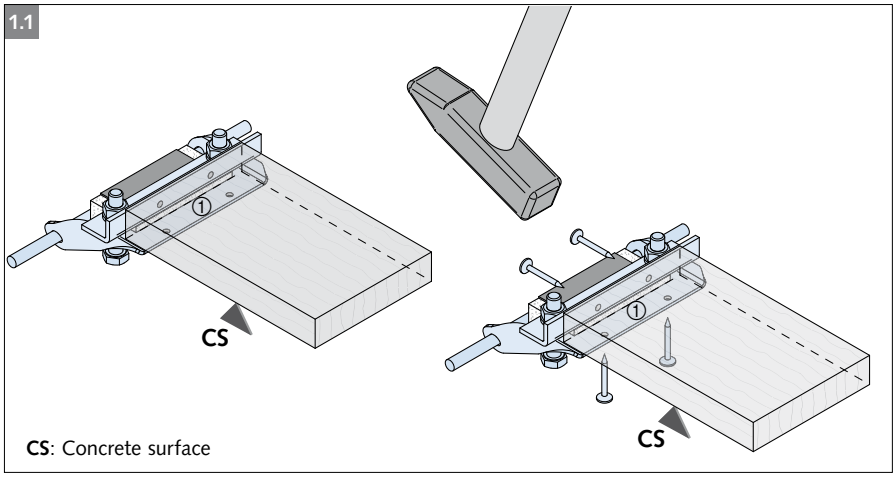
1. Installation of the FPA-E-SL30 Cast-in component



The FPA-E-SL30 Cast-in component is delivered preassembled.

1.1 Fix the cast-in element (shaped bracket) with nails to the auxiliary aid. Nail holes are provided in the shaped bracket and in the angled bracket.

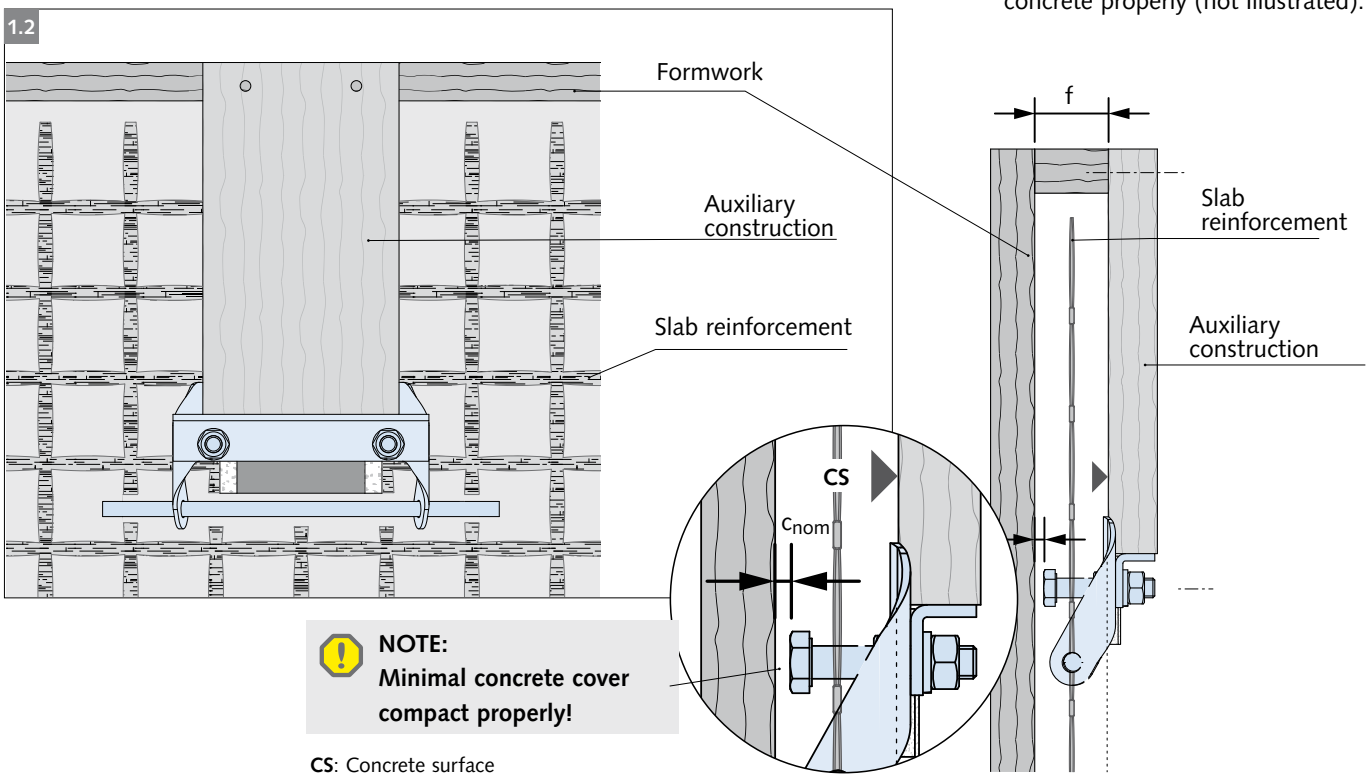
The auxiliary aid must be flush with the final concrete surface! ① **CS = bottom surface auxiliary aid!**



1.2 Fix the auxiliary aid to the formwork. Planned concrete cover at the (hexagon) bolts; **nom = f – 26 mm.**

Install the slab reinforcement over the cast-in element up to the edge.

1.3 Pour the concrete for the precast component and compact the concrete properly (not illustrated).



NOTE:
Minimal concrete cover compact properly!

CS: Concrete surface

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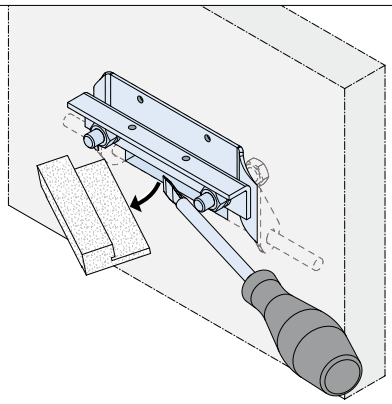
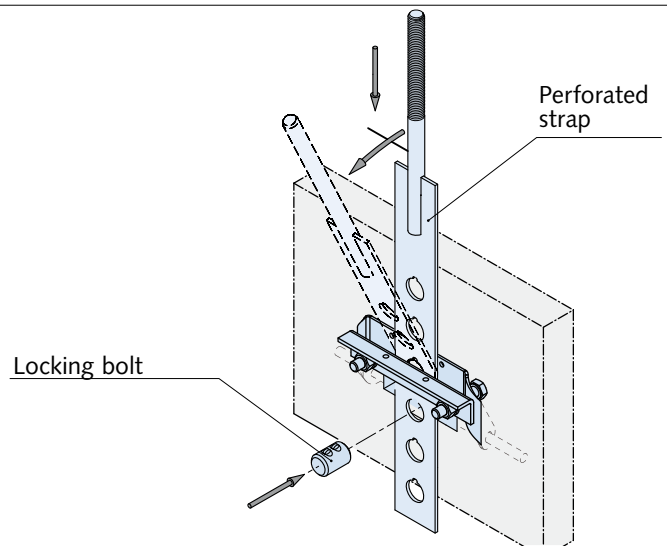
2. Fixing the façade panel to the load-bearing component

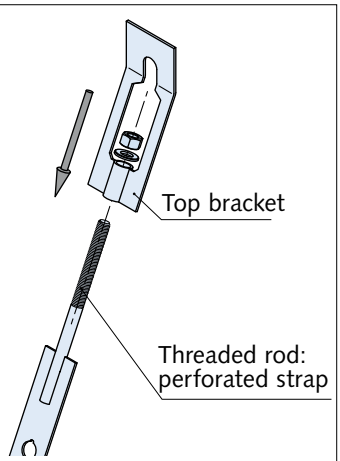
2.1



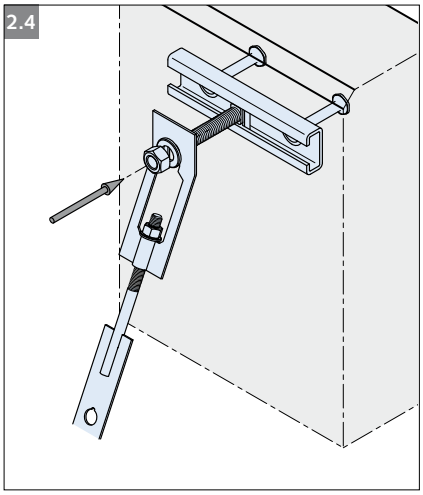
2.2



2.3



2.4



2.1 Before installation of the panel remove the polystyrene recess former. Any polystyrene left in the gap between the shaped bracket and the angled bracket can be removed using the perforated strap.
Retightened any loosened nuts (nut size 13 mm) with a torque wrench set to 5 Nm.

2.2 Insert the perforated strap between the shaped bracket and angled bracket. Pre-assemble the perforated strap to the required length according to the specified length.Secure the perforated strap using the locking bolt (rotate the bolt half a turn = 180°) and bend the strap over the angled bracket.

2.3 Attach the top bracket to the threaded rod of the perforated strap using washers and nuts. For type FPA-5A-SL30 we recommend using the top bracket as a template to facilitate correct positioning of the drill holes for assembly.

2.4 Fasten the precast façade panel with the fitted, pre-assembled FPA-5-SL30 to the load bearing structure (on site drilled dowel or cast-in HALFEN Channel). Adjust the precast element by turning the nut on the perforated strap.

During adjustment the precast panel remains suspended from the crane hook.

The hexagon nuts in the FPA-system are factory coated with Molykote® HSC-Spray.
In some cases, for example after pro-longed outside storage, it may be necessary to renew this coating.

Notes:

We provide two different building authority approved systems for transferring horizontal pressure and tensile loads and adjusting correct wall spacings:

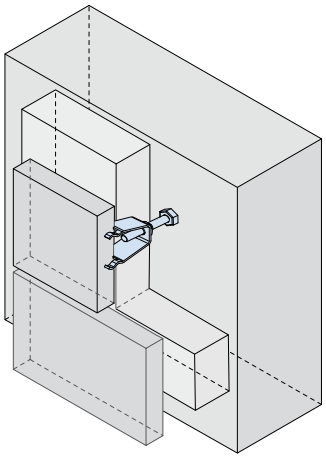
- DS13-SL30 spacer bolts with tensile/compressive sockets are installed at the upper edge of the panel to transfer compression from dead load an wind pressure.
- To facilitate assembly, dowels are commonly used to connect façade panels together which are installed one on top of another. This is done with HFV-SL30 anchoring elements installed close to the edges of adjacent panel edges and connected to each other using HFV 3 dowels and grout.

Appropriate anchors may be required to account for wind suction due to the low dead weight of thin façade panels.
The LD and LD-A Adjustable restraints used together with DS13-SL30 tension/pressure anchorage provide an effective solution.

Tension and pressure-resistant connections in the spacing between parallel elements

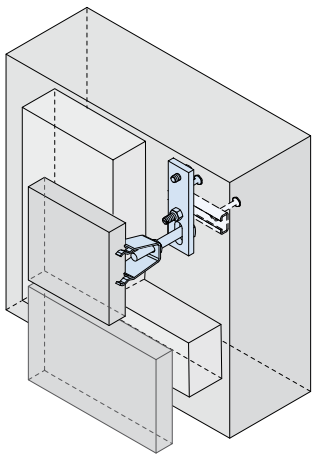
Spacer bolt Page 15
DS13-SL30

- Anchorage in concrete is building authority approved
- type-tested spacer bolt for wall spacing ≤ 500 mm



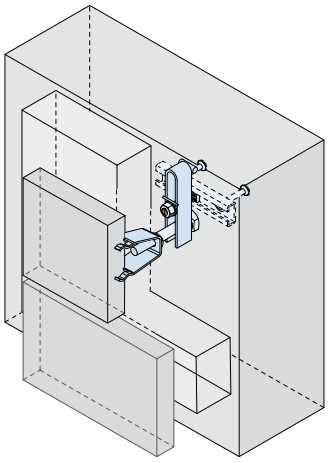
Adjustable restraint Page 18
LD

- for wall spacing ≥ 10cm
- tension load capacity F_{Rd} = 5.25kN



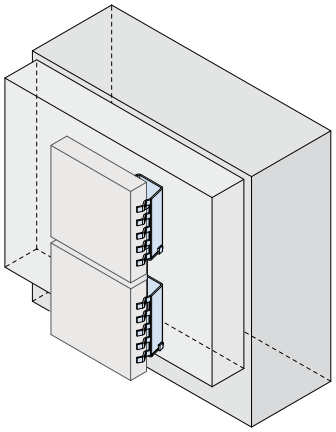
Adjustable restraint Page 19
LD-A

- for wall spacing ≥ 12cm
- tension load capacity F_{Rd} = 5.25kN



HFV-SL30 Dowel System Page 20

- building authority approved
- shear load capacity F_{Rd} = 2.7kN



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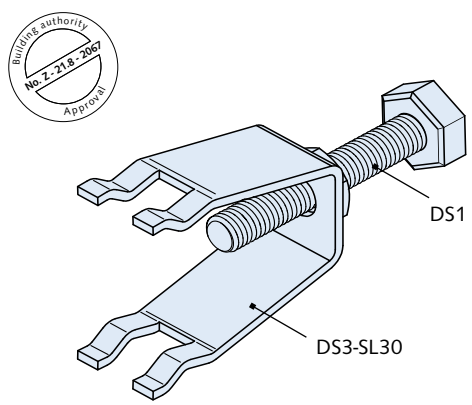
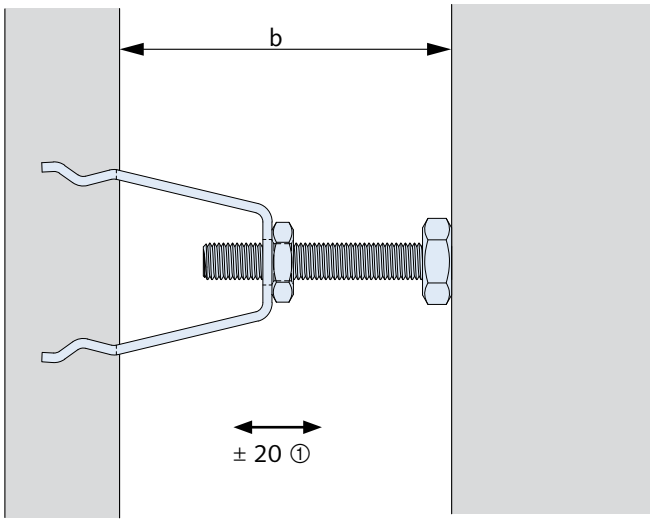
HALFEN DS13-SL30 Spacer bolt

DS13-SL30

Type tested

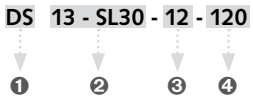




DS13-SL30 Spacer bolt
includes:
DS1 Spacer bolt and DS3-SL30 Tension/pressure sleeve

① Reduced adjustment range for b=80mm (+20/-14mm)

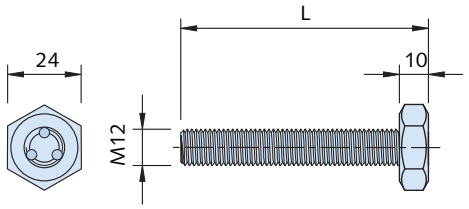
Order example



① Type
② Version
③ Thread
④ Wall spacing

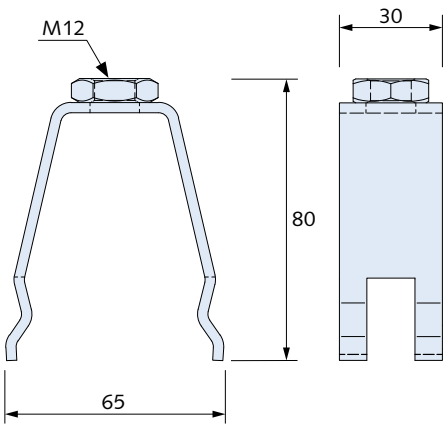
Material: A4/L4
(Material specifications, see page 5)

DS1 dimensions



Spacer bolt lengths											
b [mm]	80	90 - 100	110 - 120	130 - 140	150 - 160	170 - 180	190 - 200	210 - 220	230 - 240	250 - 260	270 - 280
L [mm]	52	72	92	112	132	152	172	192	212	232	252
futher lengths are available on request											

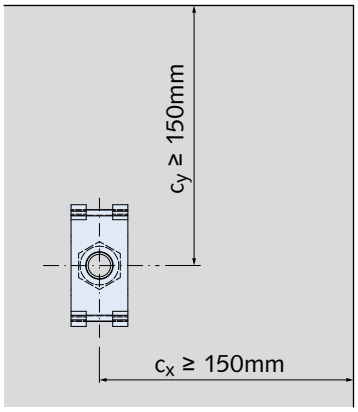
DS3-SL30 dimensions

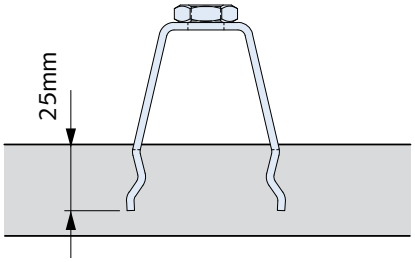


Edge distances, anchoring depth

The following specification must be observed for installation

An axial distance of ≥ 150 mm to both edges of the panel.

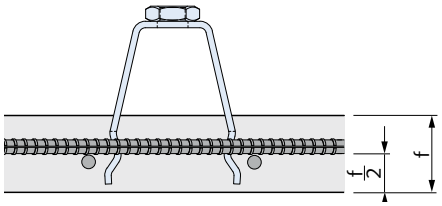


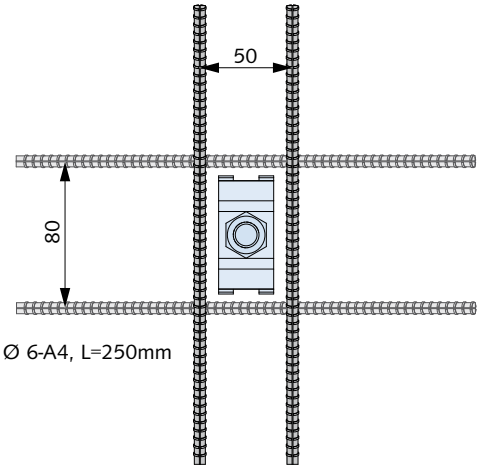


DS3-SL30 are installed with an anchoring depth of 25 mm.

Required additional reinforcement

To avoid splitting failure, each DS3-SL30 tension/pressure sleeve must be reinforced with 4 rebars B500 A/B-Ø 6-A4, L=250mm arranged as shown:

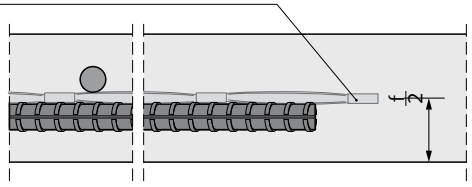


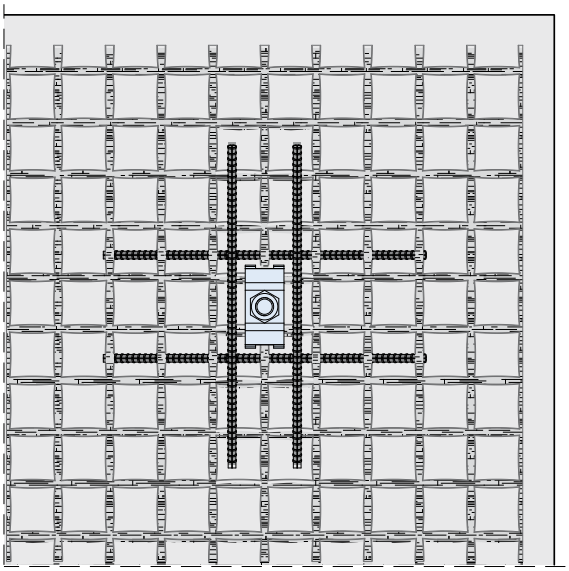


Slab Reinforcement

In accordance with the static requirements of the slab design, at least one single-layer of steel or non-steel mesh reinforcement must be installed in the area of the anchors. An installation with a solidian GRID Q121/121-AAE-38 mesh reinforcement is shown exemplarily.

solidian GRID Q121/121-AAE-38





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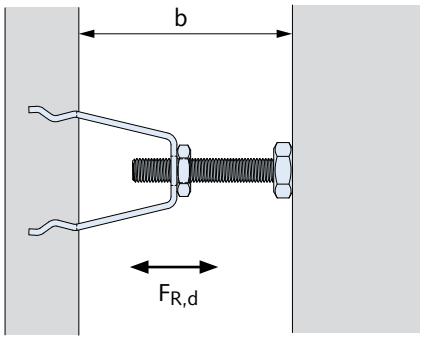
Load capacities DS13-SL30

The minimum strength of the two DS3-SL30 und DS1 components determines the compressive strength of the DS13-SL30. For tensile loads the load capacities of the DS3-SL30 apply.



Tension load capacities F_{Rd} [kN] DS3-SL30		
Condition	for edge spacing cx,cy ≥ 150	for edge spacing cx,cy ≥ 250
noncracked	4.5	6.6
cracked	2.6	3.8

Pressure load capacities F_{Rd} [kN] DS3-SL30		
Condition	for edge spacing cx,cy ≥ 150	for edge spacing cx,cy ≥ 250
noncracked	7.0	7.5
cracked	5.0	5.4

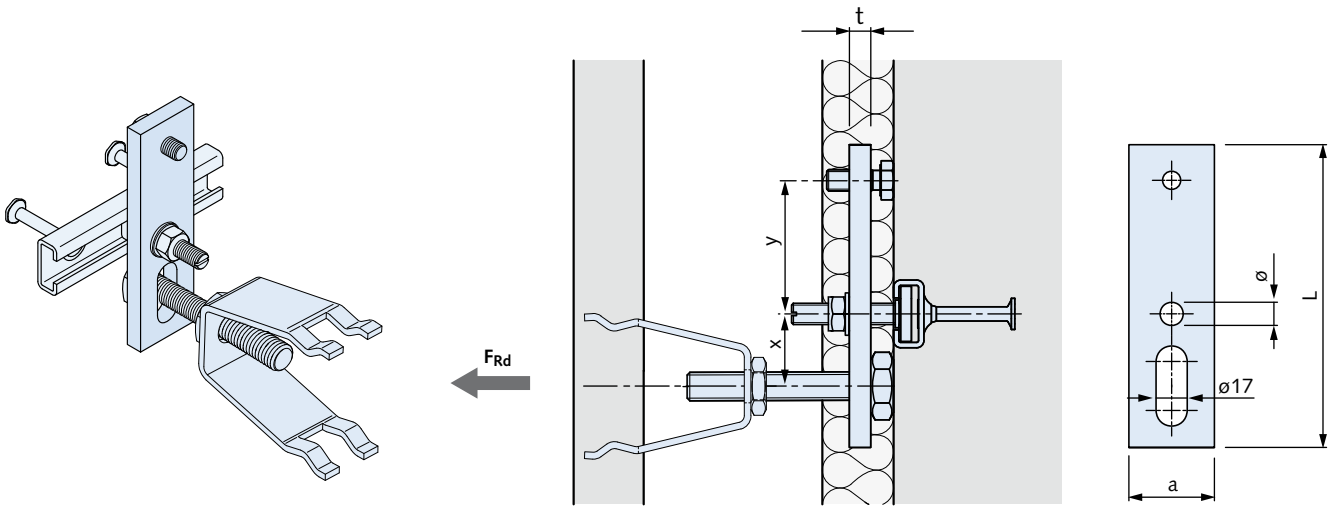
Pressure load capacities F_{Rd} [kN] DS1							
Wall spacing b [mm]							
80 - 250	**280**	**300**	**320**	**340**	**360**	**380**	**400**
≥ 7.5	6.3	5.7	4.8	4.3	3.6	3.3	3.0

The load capacities have been reduced compared to the values in the type test to take unfavourable influences during assembly into account.

We recommend using the FPA Calculation software for the exact calculation of loads and resistances.

HALFEN LD Adjustable restraint

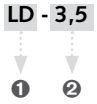
Application: For tension and compression loads



Material: A4/L4
(Material specifications, see page 5)

Order example

Description:



① Type
② Load group

Scope of delivery

Adjustable restraint with adjustment bolt

Approved dowels can also be used instead of the HALFEN Cast-in channel and T-bolt.

Order spacer bolt separately, see page 15

Installation

1. Insert the spacer bolt through the slot in the lug.
2. Screw the spacer bolt into the DS3-SL30 and adjust.
3. Roughly place the assembly in the HALFEN Channel.
4. Adjust the adjustment bolt so that the lug is parallel to the main support structure.
5. Tighten the HALFEN T-bolt.

HALFEN LD Adjustable restraint

Type	Load group	Load capacity F_{Rd} [kN]	L [mm]	a [mm]	t [mm]	x ± 15 [mm]	y [mm]	Ø [mm]	Recommended fixing ①	HALFEN T-bolt ②
LD	2.0	3.00	161	40	10	38	75	11	HTA-CE 28/15	HS 28/15 M10x40
	3.5	5.25	170	48	12	40	75	13	HTA-CE 38/17	HS 38/17 M12x50

① 150, 200 and 250 mm short pieces must be ordered separately.
Verification of the anchorage must be provided taking the respective boundary conditions. into account
② Please order the HALFEN T-bolt separately

See tables on page 17 for allowable load capacities for the DS13-SL30

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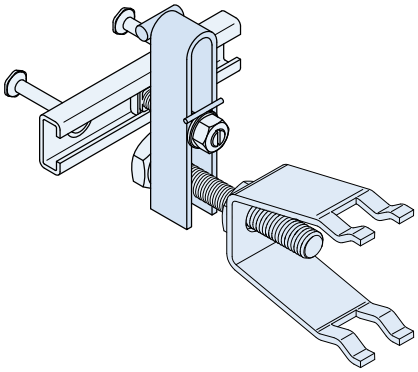
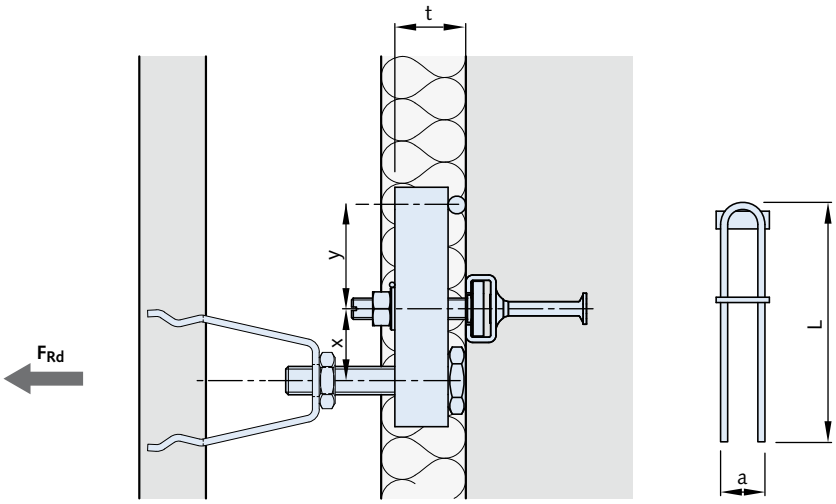
HALFEN LD-A Adjustable restraint

Application: For tension and compression loads

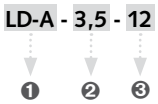




Material: A4/L4
(Material specifications, see page 5)

Order example

Description:



① Type
② Load group
③ Spacer bolt thread size

Scope of delivery

Fork clamp

Order spacer bolt separately,
see page 15

Application

Tension- and pressure-resistant connection of façade panels with the main support structure.
Adjustable in three directions.

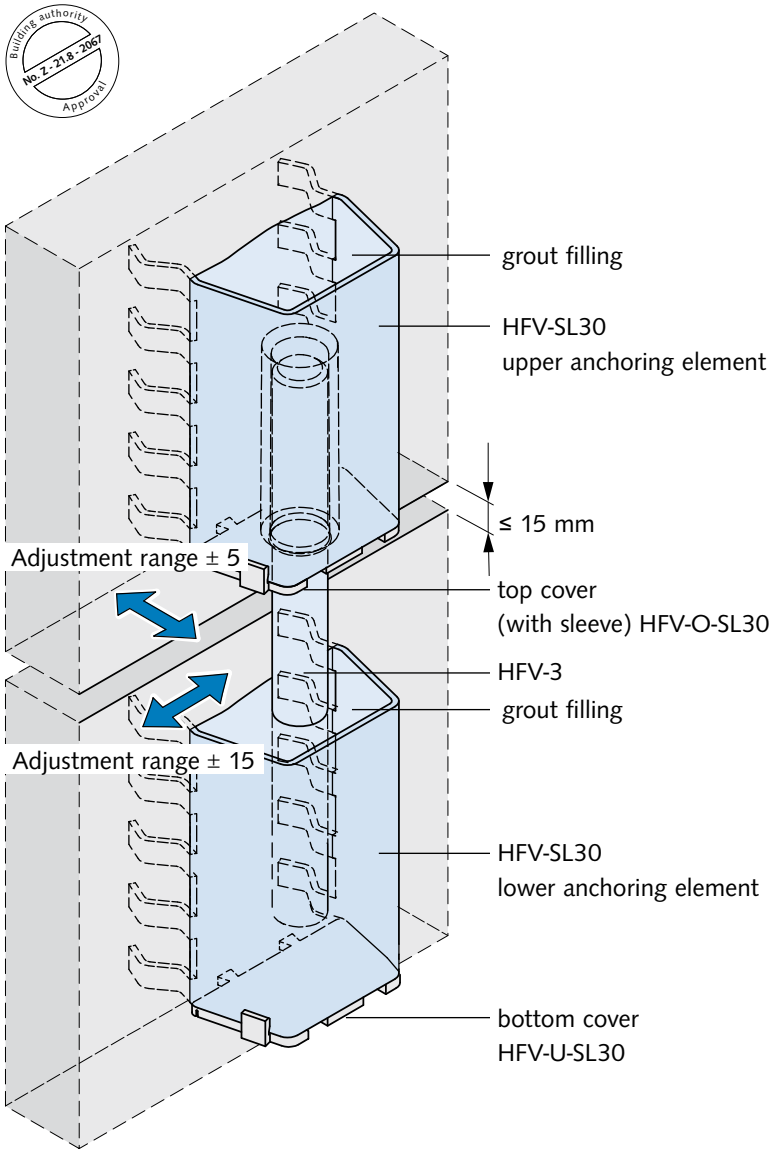
HALFEN LD-A Adjustable restraint

Type	Load group	Load capacity F_{Rd} [kN]	L [mm]	a [mm]	t [mm]	x ±15 [mm]	y [mm]	Spacer bolt	Recommended fixing ①	HALFEN T-bolt ②	Washer DIN
LD-A	1,8	2,70	130	21	33	40	60	M12	HTA-CE 28/15	HS 28/15 M10×50	DIN 9021
	3,5	5,25	135	21	41	40	60	M12	HTA-CE 38/17	HS 38/17 M12×80	DIN 125

① 150, 200 and 250 mm short pieces must be ordered separately.
Verification of the anchorage must be provided taking the respective boundary conditions into account
② Please order the HALFEN T-bolt separately

See tables on page 17 for allowable load capacities for the DS13-SL30

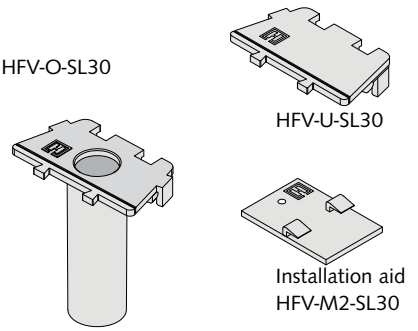
Overview



The HFV-SL30 system is used for dowel connection of thin façade panels with a joint gap of ≤15 mm.

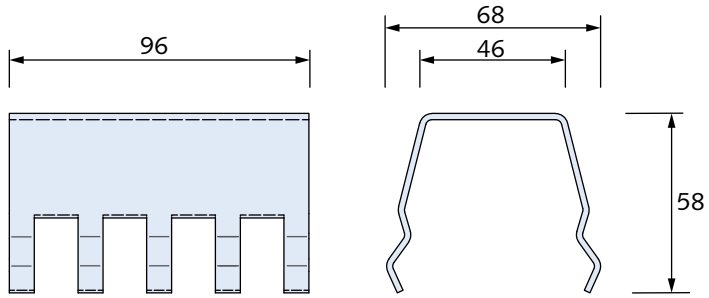
For the load transmission from the upper to the lower anchoring element, both HFV-SL30 must be filled with grout for example; PAGEL V1®/50 (see the general building authority approval or the our assembly instructions for grout specifications).
The upper anchoring body, which is sealed with a cover cap with fitted sleeve, can be previously filled with grout in the precast plant.
The lower anchoring body is filled with grout directly before assembly, so that the HFV 3 dowel which is inserted from above can be fixed in the specified position within the processing time of the grout.

HFV-Z-SL30 Set



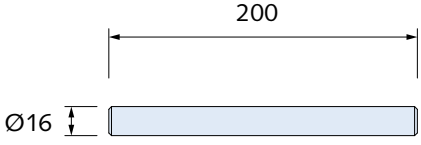
Material: Plastic

HFV-SL30 Anchoring body



Material: A4/L4 (Material specification see page 5)

HFV-3 Dowel



Material: A4/L4
(Material specification see page 5)

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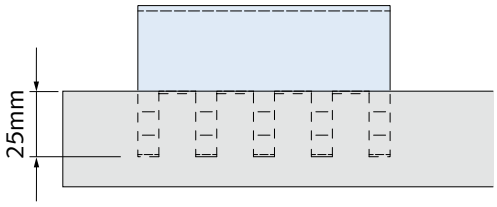
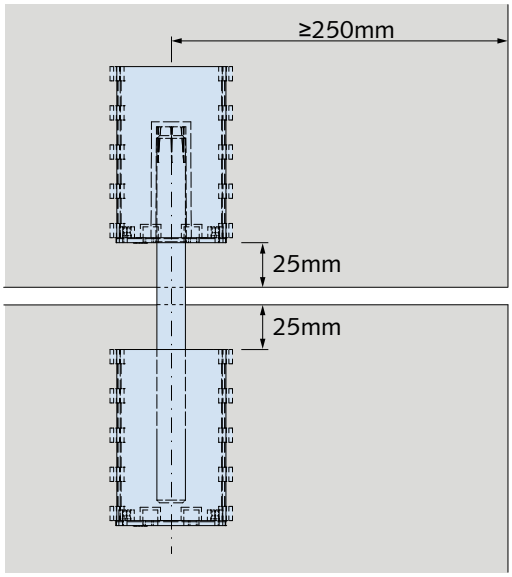
Edge distances, anchoring depth

The following must be observed:

The design of the system requires an edge distance of 25 mm in the dowel direction. In the orthogonal direction a minimum edge distance of 250 mm must be maintained.

The anchoring element HFV-SL30 must be installed with a anchorage depth of 25 mm.

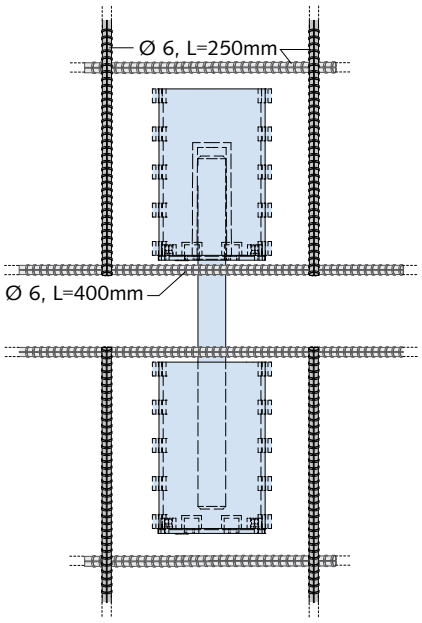


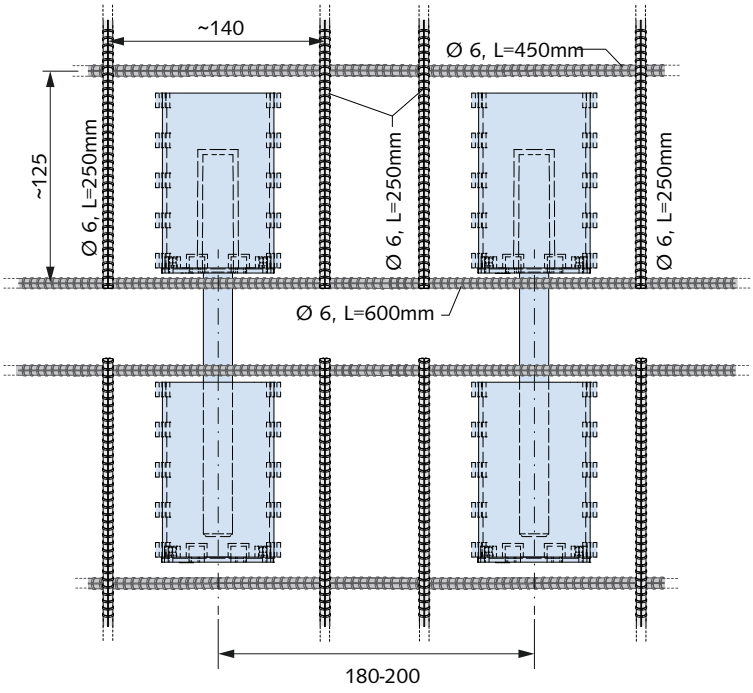


Required additional reinforcement

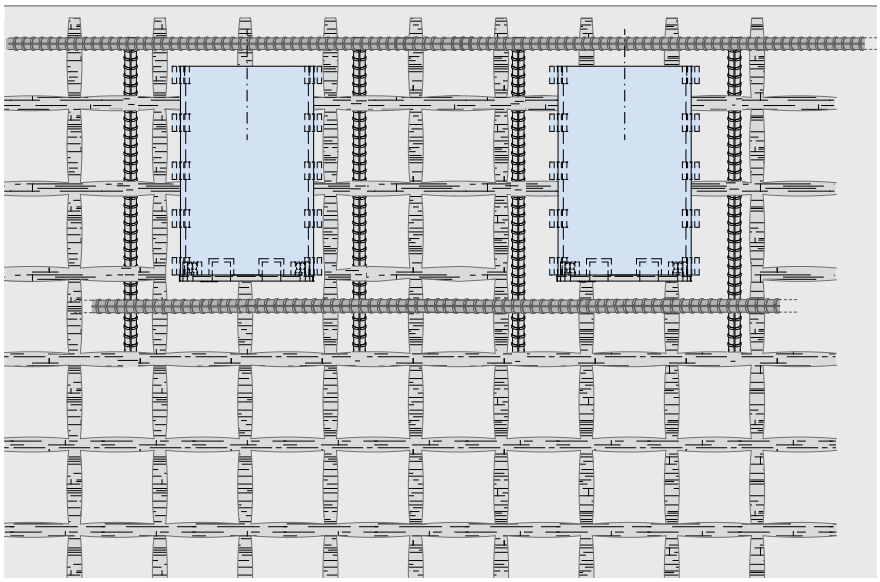
To avoid splitting failure, four B500 A/B rebars Ø 6-A4 (3 x L =250 mm, 1 x L = 400 mm) must be arranged centrally at each HFV-SL30 anchoring element.

Double dowels must be installed with a axial spacing of 180 - 200 mm. Dimensions and spacings of the centrally arranged A4 additional reinforcement bars are shown in the following diagram:

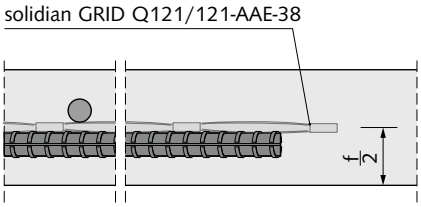




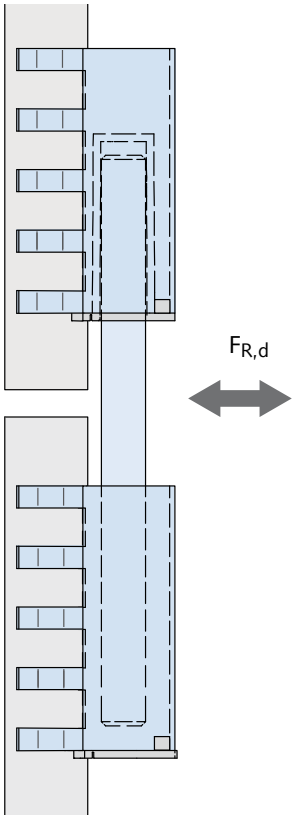
Slab Reinforcement



In accordance with the static requirements of the slab design, at least one single-layer of steel or non-steel mesh reinforcement must be installed in the area of the anchors. An installation with a solidian GRID Q121/121-AAE-38 mesh reinforcement is shown exemplarily.



Load capacities HFV-SL30



Load capacities F_{Rd} [kN]		
Condition	Standard dowel	Double dowel
cracked/ noncracked	2.7	4.3

We recommend using our FPA software for precise calculation of loads and resistances.

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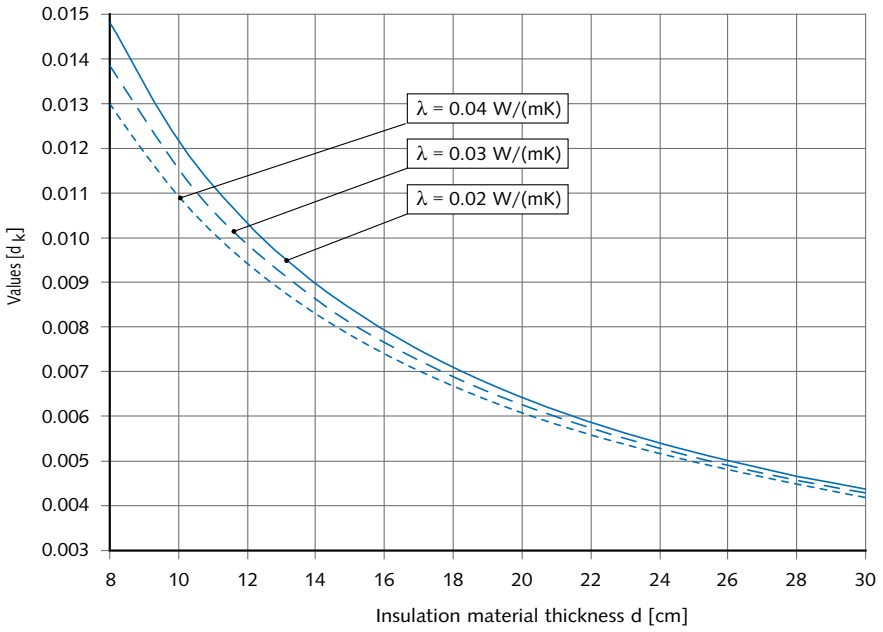
Calculation form - thermal transfer coefficient

The calculation of the heat transfer coefficient for HALFEN façade panel anchors and spacer bolts is based on the method shown.

Confirmed by expert opinion, Certificate 18C096Y.

Diagram: Insulation material value d_k

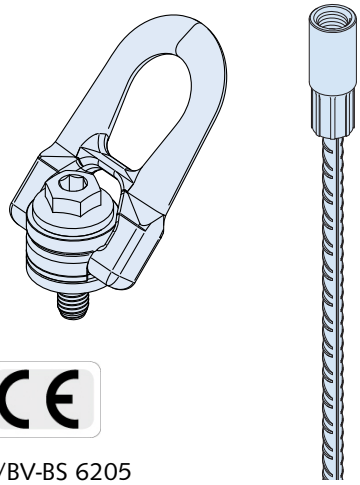


Anchor value A_{eq}	
HALFEN FPA	A_{eq}
FPA-SL30	0,65
HALFEN Horizontal anchorage	A_{eq}
DS13-SL30	1,5

Insulation	
d [cm]	
λ [W/(mK)]	
d_k [-]	

Calculation factor U Value;				
	A_{eq}	$\chi_i = A_{eq} \times d_k$	n_a Number of FPA / spacer bolts req. for each m²	$\Delta U_i = \chi_i \times n_a$
FPA -SL30				
DS13-SL30				
U Value; calculation factor for the exterior wall $\Sigma\Delta U_i = \chi_i \times n_a$				

Lifting anchor system for thin façade panels



VDI/BV-BS 6205

The HALFEN HD-SL30 Lifting anchor system in load group 0.8 was developed for reliable lifting and transporting of thin prefabricated concrete elements with a thickness of ≥ 3.0 cm.
As with all our Lifting anchor systems, the HD-SL30 system also complies with the requirements of the European Machinery Directive (MD) 2006/42/EC.
To ensure the load-bearing capacity when embedded, the HALFEN Lifting anchor systems are additionally subject to the requirements of VDI/BV-BS* guideline 6205.

VDI/BV-BS* = Bundesverband Bausysteme e.V. Association of structural systems

Get more information about **HALFEN Lifting anchor systems** at www.halfen.com ► Products ► Lifting systems

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