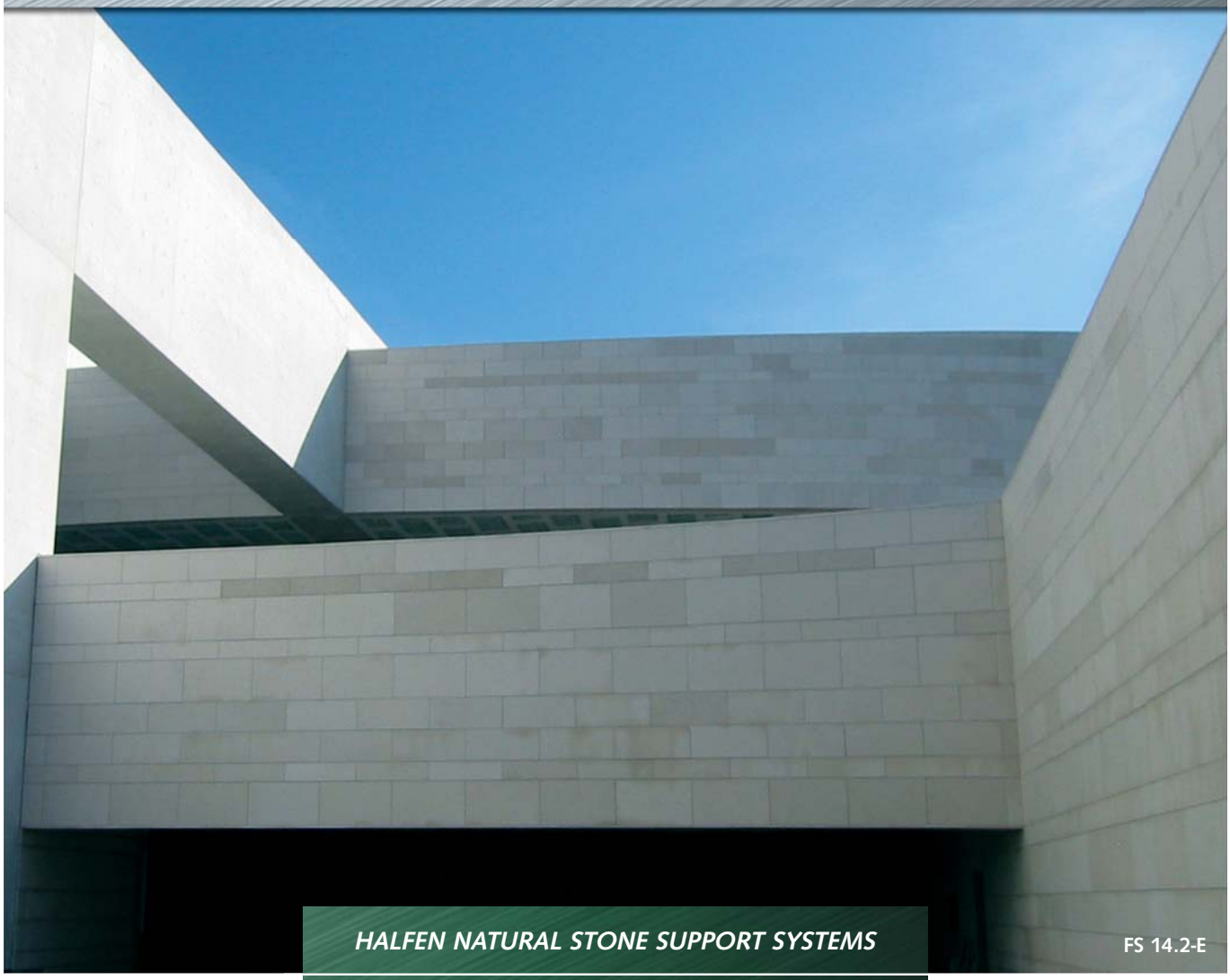
HALFEN NATURAL STONE SUPPORT SYSTEMS
TECHNICAL PRODUCT INFORMATION



HALFEN NATURAL STONE SUPPORT SYSTEMS

FS 14.2-E

FAÇADE

NEW!

RAL Quality-mark
Façade Technology
RAL-GZ 996

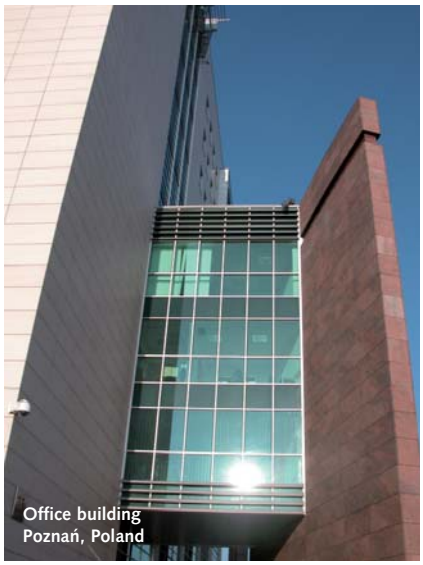
HALFEN
YOUR BEST CONNECTIONS

Introduction

Natural stone façades

Natural stone offers numerous advantages when used for designing façades. It is a durable, low maintenance material which improves the building's sound insulation. Its heat storage properties make it an excellent material for insulating against summer heat; the heat is kept away from the building core, reducing building cooling requirements. Natural stone façades also contribute to an aesthetic appearance and make your project an "attention getter". These are just two of the advantages of designing façades with natural stone.

Natural stone façades are usually designed and constructed as ventilated curtain façades. HALFEN Natural stone fixing systems are the optimal solution for realising a ventilated curtain façade. HALFEN has numerous years of experience and competence in façades construction as proven by our highly experienced project engineers. We offer our customers a comprehensive package of planning and engineering services to reliably plan and realise any natural stone façades as safely and as efficiently as possible.


Office building
Poznań, Poland


mima - Middlesbrough Institute of Modern Art
Middlesbrough, United Kingdom

Our competences are reflected in various major projects with which we have previously been entrusted.

HALFEN Natural stone support systems

Quality assurance and safety are of ever increasing importance in building construction. The HALFEN Body anchor and HALFEN Grout-in anchor have been quality tested and certified by the Nuremberg LGA Landesgewerbeanstalt (Nuremberg based independent certification agency). The LGA is part of the "TÜV Rheinland Group", Germanys well-recognised, independent and neutral, safety and quality test organisation.

The quality certificate is the first independent quality certificate awarded for the production and the construction of façade systems of this type. Precondition for a quality seal award is comprehensive testing by the LGA. This includes assessment of the manufacturing process, the static load capacities, and the complete documentation of the load-bearing anchors.
It is a **comprehensive and independent quality assurance** covering all characteristics of the product.

The RAL Quality Mark GZ 996 is only awarded to companies which fulfil the high requirements of "Quality and Control Regulations for Façades Fixing Technology". Biannual assessment by the independent experts at German Lloyd guarantees the high requirements on product quality and related services are maintained. Included in the quality control are specifications, quality management, logistics, technical support, technical documents, software, guarantee services and tender documents.

At present the following products from the HALFEN product range "Natural Stone and Scaffolding Anchors" have been RAL certified:
Body anchors • Grout-in anchors • Permanent scaffolding anchors • Soffit / Jamb support anchors

HALFEN NATURAL STONE SUPPORT SYSTEMS

Contents

Steel structures:

A4: Corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: 2006, table A.1, row 3 (group 1.4362, 1.4401, 1.4571...).
A2: Corrosion category II acc. to Z-30.3-6, or acc. to EN 1993-1-4: 2006, table A.1, row 2 (group 1.4301, 1.4311, 1.4307...).
HCR: Corrosion category IV acc. to Z-30.3-6, or acc. to EN 1993-1-4: 2006, table A.1, row 4 (group 1.4439, 1.4462...).

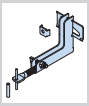
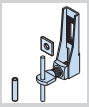
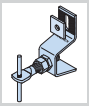
Thermal bridges with natural stone support systems

To meet the requirement for calculating thermal bridges, HALFEN provides the thermal bridge coefficient χ for their body anchors and grout-in anchors. The χ-value is the effect of a three-dimensional point thermal bridge caused by the fixing of the anchor and penetration of the thermal insulation.

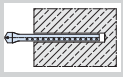
Using these values the planner can exactly calculate the effect on the thermal transfer coefficients U [W/m²×K] of the building caused by the HALFEN Natural stone support system.

It is now possible to directly include the thermal bridge components into the thermal insulation certificate according to EnEV. The values are dependent on both the thickness and thermal conductivity of the insulation, and the material of the main structure (concrete/brickwork).

Thermal bridge coefficient χ [W/K] for λ_{ins} = 0.035 (thermal conductivity of the insulation) for body anchors in concrete

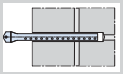
		Insulation thickness d_{ins} [cm]													
		4	6	8	10	12	14	16	18	20	22	24	26	28	30
DT-4xx		0.025	0.020	0.017	0.014	0.012	0.011	0.010	0.009	0.008	0.008	0.007	0.007	0.006	0.006
DT-13xx		0.045	0.037	0.031	0.026	0.023	0.020	0.018	0.017	0.015	0.014	0.013	0.012	0.011	0.011
BA-6xx		0.020	0.016	0.014	0.012	0.010	0.009								
BA-13xx		0.035	0.029	0.024	0.021	0.018	0.016								
DH-10xx		0.007	0.006	0.005	0.004	0.004									
DH-17xx		0.011	0.009	0.007	0.006	0.005	0.005	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.002
HRM/ HRC		0.032	0.026	0.022	0.018	0.016	0.014	0.013							

Thermal bridge coefficient χ [W/K] for λ_{ins} = 0.035 (thermal conductivity of the insulation) for grout-in anchors in concrete

	Insulation thickness d_{ins} [cm]													
	4	6	8	10	12	14	16	18	20	22	24	26	28	30
UHA - 5	0.003	0.003	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
UHA - 7	0.007	0.005	0.005	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002
UMA - 10	0.007	0.006	0.005	0.004	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002
UMA - 12	0.009	0.007	0.006	0.005	0.004	0.004	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002
UMA - 16	0.012	0.010	0.008	0.007	0.006	0.005	0.005	0.004	0.004	0.004	0.003	0.003	0.003	0.003
UMA - 18	0.018	0.014	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.005	0.005	0.005	0.004	0.004
UMA - 22	0.022	0.018	0.015	0.013	0.011	0.010	0.009	0.008	0.007	0.007	0.006	0.006	0.006	0.005
UMA - 25	0.026	0.021	0.017	0.015	0.013	0.011	0.010	0.009	0.009	0.008	0.007	0.007	0.006	0.006
UMA - 28	0.035	0.029	0.024	0.020	0.018	0.016	0.014	0.013	0.012	0.011	0.010	0.009	0.009	0.008
UMA - 33	0.046	0.038	0.031	0.027	0.023	0.021	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.011

Introduction

Thermal bridge coefficient χ [W/K] for λ_{ins} = 0.035 (thermal conductivity of the insulation) for grout-in anchors in perforated brick

	Insulation thickness d_{ins} [cm]													
	4	6	8	10	12	14	16	18	20	22	24	26	28	30
UHA - 5	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
UHA - 7	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001
UMA - 10	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001
UMA - 12	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002
UMA - 16	0.005	0.005	0.005	0.005	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.002
UMA - 18	0.008	0.008	0.007	0.007	0.006	0.006	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.004
UMA - 22	0.010	0.010	0.009	0.009	0.008	0.007	0.007	0.006	0.006	0.006	0.005	0.005	0.005	0.004
UMA - 25	0.011	0.011	0.011	0.010	0.009	0.008	0.008	0.007	0.007	0.006	0.006	0.006	0.005	0.005
UMA - 28	0.016	0.016	0.015	0.014	0.013	0.012	0.011	0.010	0.009	0.009	0.008	0.008	0.007	0.007
UMA - 33	0.021	0.021	0.019	0.018	0.016	0.015	0.014	0.013	0.012	0.012	0.011	0.010	0.010	0.009

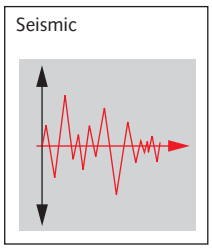
Channel support-systems are the optimal solution for reducing thermal bridges. HALFEN SUK and UKB are anchored to the building at only a few fixing points. All elements anchored in the load-bearing structure are manufactured from stainless steel.

Stainless steel has a fourteen times lower thermal conductivity than aluminium. Therefore by using stainless steel anchors thermal bridges are reduced. The higher strength of stainless steel compared to aluminium also makes it possible to design elements with a smaller cross-section.

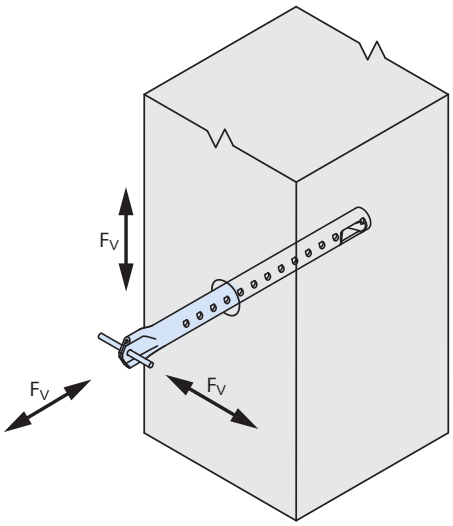
This has a positive effect on heat transmission through the anchor element. It is also possible to place a thermal separator between the anchor and the load-bearing structure. This feature reduces the thermal bridge and therefore heat-loss.

Dynamic loads with HALFEN Natural stone support systems

HALFEN Natural stone support systems can also be installed in seismic active regions.



Grout-in anchors UMA/UHA are statically designed for seismic loads and can fully support the vertical loads in the anchor for all three load directions, see tables on pages 15 and 16. With appropriate design all HALFEN Natural stone anchors can be adapted to satisfy requirements in relevant earthquake zones.



TECHNICAL SUPPORT

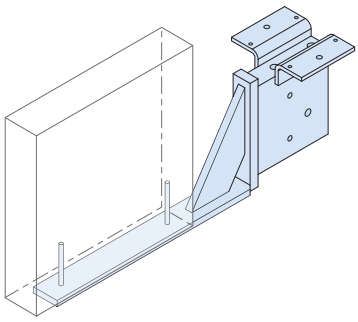
For your individual projects HALFEN engineering service can provide planning and design work plus complementary consultation.
Please contact us → see back cover for contact information.

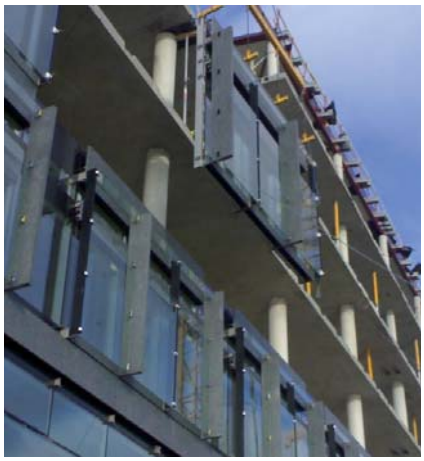
Individual solutions

Construction project: Allerhuset, Denmark

The unique design of natural stone façades demand special solutions for anchoring. The following are examples of custom solutions developed by HALFEN for natural stone façades.

An important design feature in this façade is the 90 degrees projecting natural stone strips. These strips are attached using HALFEN Natural stone anchors to the precast superstructure of the building.

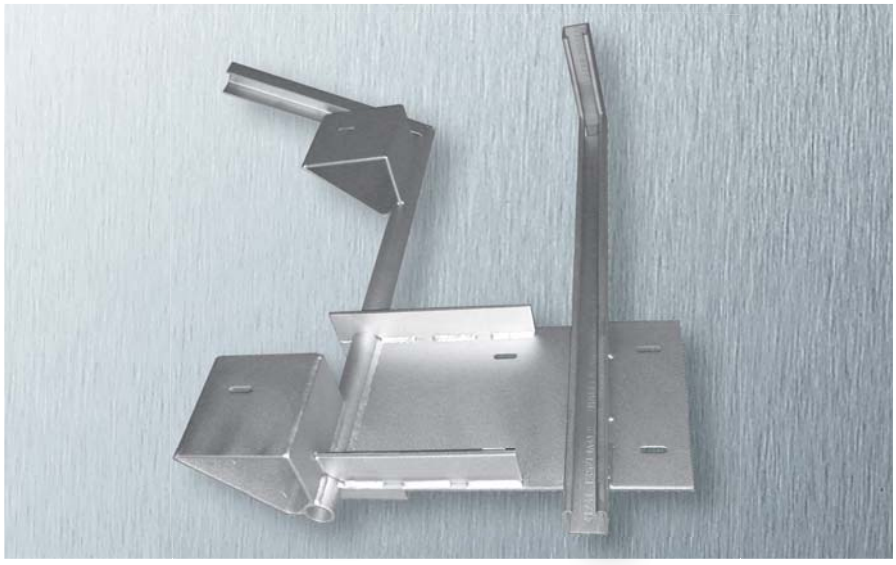


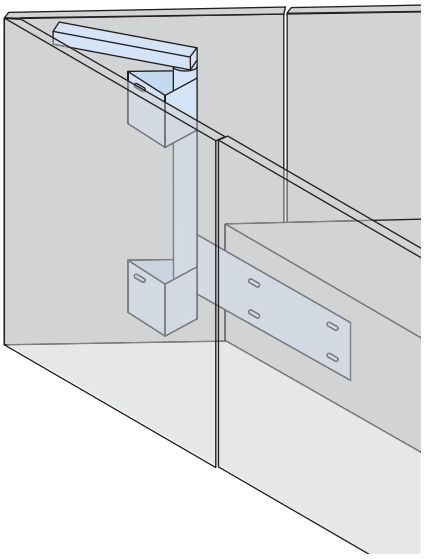


More references at www.halfen.com

Construction project: Multihuset, Denmark

Special custom element for fixing HALFEN Natural stone panels in locations where access is limited.

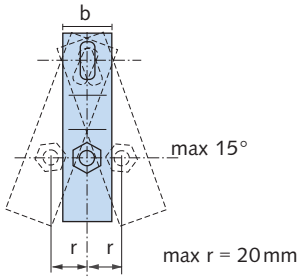




Applications

HALFEN Body anchors

Features
HALFEN Body anchors used in connection with HALFEN Cast-in channels HTA/HZA guarantee maximum adjustability to compensate for on-site tolerances. HALFEN Body anchors can also be fixed to a suitable load bearing structure using HALFEN Anchor bolt systems. HALFEN Body anchors cover a wide range of applications for fixing natural stone.



Advantages
- 3-dimensional adjustability
- flexible fixing method
- vertical anchor adjustment using a serrated plate or wedge plate
- horizontal anchor adjustment using a spade bolt
- anchors are adjustable through 15°
- TÜV/LGA quality tested
- can be subjected to load immediately after installation → fast construction
- natural stone panel with pin support
- numerically qualified thermal bridge coefficient χ [W/K]

HALFEN Grout-in anchors

Features
HALFEN Grout-in anchors are a traditional method of anchoring natural stone façades. The tubular section of the UMA / UHA anchors make them suitable for both horizontal and vertical natural stone panel joints. Adjustment is by casting the anchors in a mortar filled pre-drilled hole. The joints between the natural stone slabs must be supported with shims until the mortar has hardened and final load-bearing capacity has been reached.

Advantages
- type-tested
- one type of anchor for both horizontal and vertical joint fixing
- TÜV / LGA tested quality
- anchored in drilled holes with cement mortar
- can be used for large stand-off installations and high loads
- suitable for seismic loads
- natural stone panel with pin bearing
- numerically qualified thermal bridge coefficient χ [W/K]

Applications

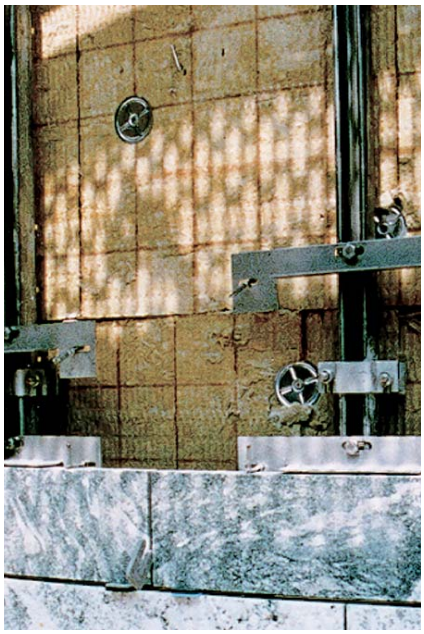
HALFEN SUK Stainless steel support structure

Features
The HALFEN SUK Stainless steel support system is ideal both for new constructions and modernization projects. Its unique characteristic is its capacity to span a non-load-bearing substrate.

It can be used for large stand-off installation in varying distances from the load-bearing structure. A4/AISI 316 grade stainless steel material guarantees a high resistance against corrosion.

Fewer required fixing points reduce installation costs for the whole support system. Fewer fixing points also reduce heat-loss resulting in very good thermal properties when using the SUK System.

Advantages
- freely height-adjustable suspended channel system
- horizontal adjustment using a spade bolt
- fast assembly and therefore faster construction times
- proven in numerous projects
- spans non-load-bearing substrate
- panel/slab support with pin bearing
- suitable for custom-designed constructions
- high corrosion resistance
- high load-carrying capacity



HALFEN UKB Support structure in stainless steel and aluminium

Features
Light-weight and easy to use support system: Support and restraint brackets in A4/AISI 316 stainless steel, vertical channels in aluminium.

HALFEN Body anchors type BA-606 are quickly and easily fixed to the aluminium profile with self-tapping screws.

This system combines the advantages of both body anchors and channel systems.

Advantages
- suspended channel system with multiple adjustment possibilities
- spans non-load-bearing substrate
- stone slabs are supported with pins
- quickly assembled and therefore faster construction times
- proven success in many projects
- aluminium channels can be drilled and cut to length on-site

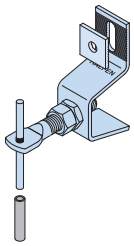
For detailed information about HALFEN Support-structure systems please contact us.
→ see back cover for contact information.

HALFEN Body anchors

The HALFEN Body anchors product range has solutions for all natural stone façades installation requirements. All body anchors are 3-dimensional adjustable and are available for various stand-off sizes and load ranges. Vertical adjustment is with a serrated or wedge plate. The stand-off distance to the natural stone slab is adjusted using a spade bolt. It is also possible to swivel the anchor up to 15°.
The anchors can be subjected to load immediately after installation to HALFEN Cast-in channels or to a suitable load-bearing structure. Pins secure the natural stone slabs to the anchors. The dowel pins are available with full pins (⌀ 5 × 70 mm), design 1, and with half-pins (⌀ 5 × 35 mm), design 2. HALFEN also provides various special custom designs. For example design 3 and 4. See page 13 for illustrations of available designs.

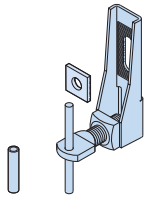
TÜVRheinland® LGA tested Quality 71712

HALFEN HRM / HRC Body anchors



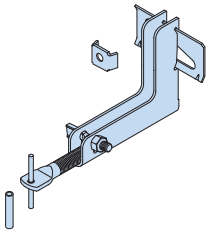
- stand-off distances between **40 and 130 mm** ①
- max. permissible load **400 N to 500 N**
- stand-off distance of previously installed stone slab can be adjusted with a rivet nut using a standard spanner
- HRM is completely pre-assembled, with secured spade bolt
- HRC is supplied in individual parts for on-site assembly
- material②: stainless steel A4 or A2

HALFEN BA Body anchors



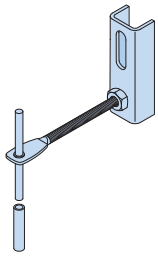
- stand-off distances between **60 and 120 mm** ①
- max. permissible load **600 N to 1300 N**
- material②: stainless steel A4 or A2

HALFEN DT Body anchors



- stand-off distances between **140 and 300 mm** ①
- max. permissible load **400 N to 1300 N**
- spade bolt secured with a locking bolt
- material②: stainless steel A4 or A2

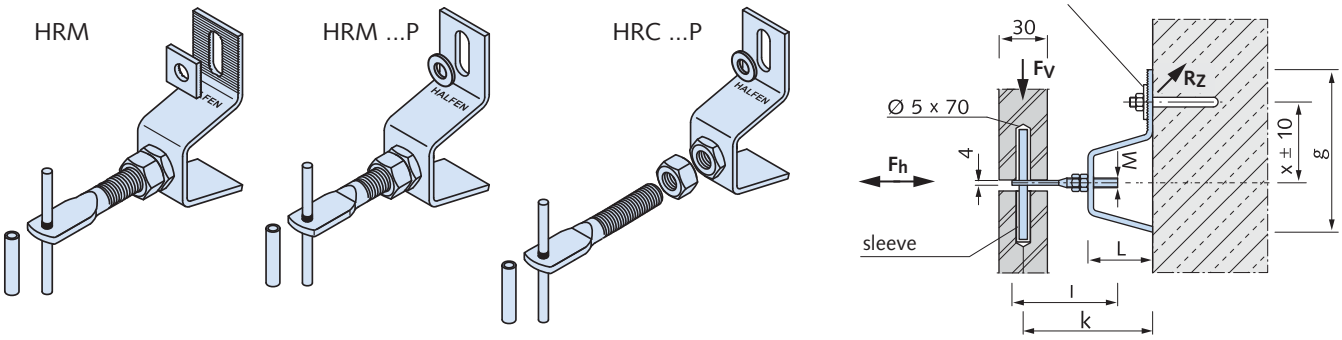
HALFEN DH Body anchors



- restraint anchor only, not suitable to carry dead load of element
- stand-off distances between **60 and 320 mm** ①
- max. permissible load **850 N to 1300 N**
- material②: stainless steel A4 or A2

① Nominal dimensions
② Material specifications → page 3

HALFEN HRM/HRC Body anchor



HALFEN Body anchors HRM/HRC are made of a specially shaped bracket, a rivet nut, a spade bolt with locking nut and a serrated washer. The difference between the types HRM/HRC is how they are supplied: The HRM is supplied to the customer pre-assembled. The spade bolt is screwed into the base plate and permanently secured so it is impossible to remove the spade bolt from the bracket. HRC is supplied in its individual parts for on-site assembly.

All anchors are serrated and have an 11 × 26 mm slot. As an alternative the HRM-P/HRC-P types are not serrated and have a 9 × 23 mm slot.

One unique advantage of the anchor is that the stand-off distance of previously installed stone slabs can be adjusted with a rivet nut using a standard spanner.

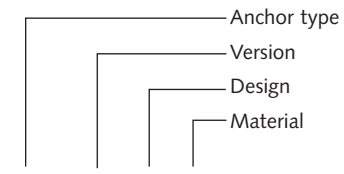
HRM / HRC Body anchor

Type	Perm. load F_V [N]	Stand-off distance [mm]			Bracket [mm]			Spade bolt [mm]			Connection [mm]
		k	min k	max k	x	L	g	M	l	z	ø
500* ①	500	40	31	48	45	4	95	10	55	15	11×26
504** ①	500	40	37	49	42	15	79	10	45	15	11×26
505 ①	500	50	47	59	42	15	79	10	55	15	11×26
506 ①	500	60	52	69	44	25	84	10	55	15	11×26
408 ②	400	80	67	101	47	40	90	10	72	15	11×26
410 ②	400	100	87	121	50	60	98	10	72	15	11×26
411 ②	400	115	102	136	53	75	102	10	72	15	11×26
413 ②	400	130	117	151	56	90	108	10	72	15	11×26

① **perm. F_h = 0.7 x actual F_V** ② **perm. F_h = 0.8 x actual F_V**
* = flat anchor fixing to be used with channels in the support structure **= can only be supplied in HRC version without locking-nut

Material:
stainless steel A4 or A2
material specifications → page 3

Ordering example:

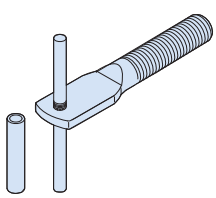


HRM - 500 - 1 - A4

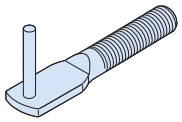
Please order fixings separately (→ page 22).
Select by R_Z, ø and type of material in which anchored.

Spade bolt versions for HRM/HRC:

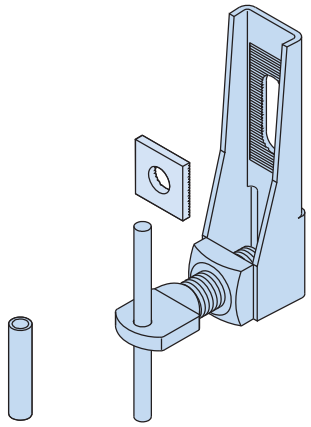
Design 1
Spade bolt with locking-nut, loose pin and sleeve



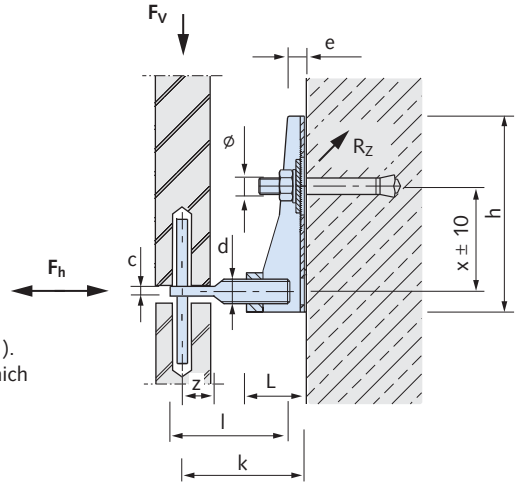
Design 2
Spade bolt with locking-nut and fixed half-pin



HALFEN BA Body anchor



Material:
stainless steel A4 or A2
material specifications → page 3



Please order fixings separately (→ page 22).
Select by R_Z, ø and type of material in which anchored.

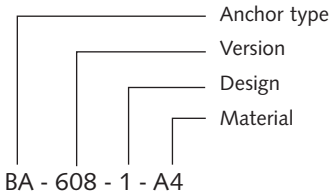
HALFEN BA Body anchors are designed for small stand-off distances from 60 to 120 mm with a maximum load of 1300 N. The anchors consist of a sturdy base element, a serrated plate and a spade bolt. The BA Body anchor is fixed, according to the installation instructions, either in the horizontal or vertical joint in load-bearing substrate to HALFEN Cast-in channels or HALFEN Anchor bolt systems. The bracket has a vertical 8.5 × 28 mm slot and a serrated plate for easy height-adjustment. As with all body anchors the distance to the load-bearing substrate is adjusted by turning the spade bolt in or out. The anchor bracket can be adjusted laterally by swivelling.

HALFEN BA Body anchor

Type	Perm. load Fv [N]	Stand-off distance [mm]			Bracket [mm]				Spade bolt [mm]				Connection [mm]
		k	min k	max k	x	L	h	e	d	c	l	z	ø
606	900	60	50	70	50	29	95	10	12	4	58	15	8.5×28
608	600	80	65	90	55	36	95	10	12	4	71	18	8.5×28
610	600	100	80	120	55	56	95	10	12	4	85	18	8.5×28
612	600	120	100	140	55	76	95	10	12	4	85	18	8.5×28
1308	1300	80	70	100	65	47	105	10	16	5	74	18	8.5×28
1310	1300	100	90	120	65	47	105	10	16	5	94	18	8.5×28
1312	1300	120	105	135	65	47	105	10	16	5	106	18	8.5×28

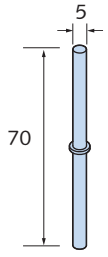
permissable F_h = actual F_V

Ordering example:

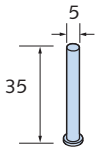


Pin dimensions of all HALFEN Body anchors:

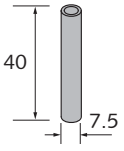
Loose dowel pin
with collar for designs
1, 3 and 7
ø 5 × 70 mm



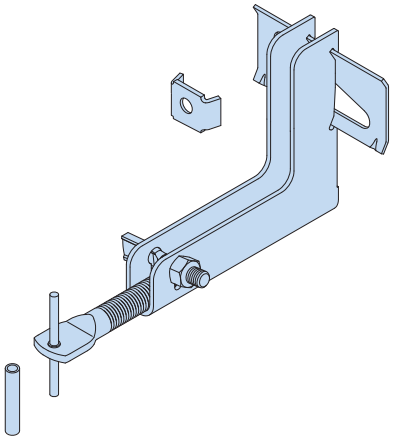
Fixed half-pin
for designs 2 and 4
ø 5 × 35 mm



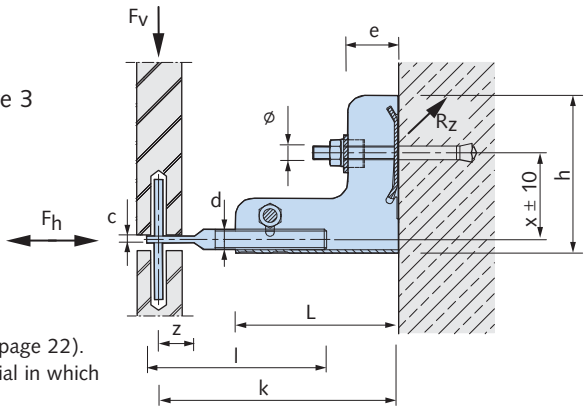
Sleeve
ø 7.5 × 40 mm



HALFEN DT Body anchor



Material:
stainless steel A4 or A2
material specifications → page 3



Please order fixings separately (→ page 22). Select by R_Z, ø and type of material in which anchored.

HALFEN DT Body anchors are suitable for large stand-off distances of 140 to 300 mm and high loads up to 1300 N. The pre-assembled anchor consisting of the bracket, the adjustable wedge plate and a clamping bolt is supplied ready to be installed.

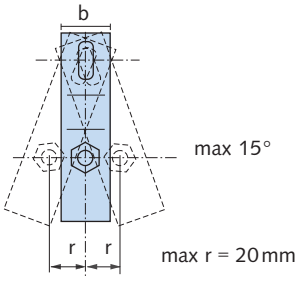
The stand-off distance is adjusted using the spade bolt. The anchor can be pivoted for lateral adjustment. The clamping bolt is pre-assembled at the factory for left to right installation but is easily adapted for right to left installation.

It is imperative that the clamping bolt is tightened with a spanner following installation of the natural stone panel with a torque of 5 Nm.

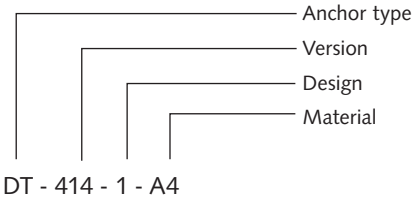
HALFEN DT Body anchor

Version	Allowable load F_V [N]	Stand-off distance [mm]			Support body [mm]				Spade bolt [mm]				Connection [mm]
		k	min k	max k	x	L	h	e	d	c	l	z	ø
414	400	140	120	170	50	95	92	30	12	4	105	21	9
416	400	160	140	190	55	115	97	30	12	4	105	21	9
418	400	180	160	210	60	135	102	30	12	4	105	21	9
420	400	200	180	230	65	155	107	30	12	4	105	21	9
422	400	220	200	250	70	175	112	30	12	4	105	21	9
424	400	240	220	270	75	195	117	30	12	4	105	21	9
426	400	260	240	290	80	215	122	30	12	4	105	21	9
428	400	280	260	310	85	235	127	30	12	4	105	21	9
430	400	300	280	330	90	255	132	30	12	4	105	21	9
1314	1300	140	120	170	80	90	130	36	16	5	115	21	11
1316	1300	160	140	190	85	110	135	36	16	5	115	21	11
1318	1300	180	160	210	95	130	145	36	16	5	115	21	11
1320	1300	200	180	230	80	150	130	36	16	5	115	21	13
1322	1300	220	200	250	90	170	140	41	16	5	115	21	13
1324	1300	240	220	270	95	190	145	41	16	5	115	21	13
1326	1300	260	240	290	100	210	150	41	16	5	115	21	13
1328	1300	280	260	310	105	230	155	41	16	5	115	21	13
1330	1300	300	280	330	110	250	160	41	16	5	115	21	13

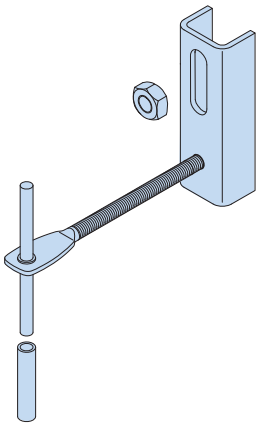
permissable F_h = actual F_V



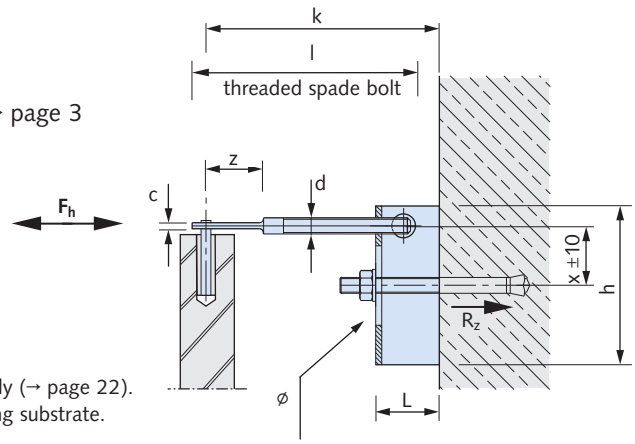
Ordering example:



HALFEN DH Body anchor



Material:
stainless steel A4 or A2
material specifications → page 3



Please order fixings separately (→ page 22).
Select by R_Z, ø and anchoring substrate.

HALFEN DH Body anchors are 3-dimensional adjustable. They are designed to carry only horizontal tension or pressure loads. DH Body anchors are used in combination with HALFEN HRM/HRC, BA and DT Body anchors.

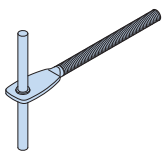
The restraint anchor is used mainly in vertical joints, for edges and corners including parapet slabs. They are designed for stand-off installations of 60 to 320 mm with a maximum load of 1300 N.

Stand-off distance from the main structure is adjusted using the spade bolt. A 9 × 30 mm slot allows vertical adjustment. The anchor is pivoted for lateral adjustment. The spade bolt is secured to the body with a locking nut (included).

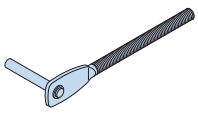
HALFEN DH Body anchor

Version including locking nut	Allowable load F_h [N]	Stand-off distance [mm]			Support body [mm]			Spade bolt [mm]				Connection [mm]
		k	min k	max k	x	h	L	d	c	l	z	ø
1006	850	60	53	68	26	80	18	6	2	60	21	9×30
1008	850	80	73	88	26	80	18	6	2	80	21	9×30
1010	850	100	93	108	26	80	18	6	2	100	21	9×30
1712	1300	120	105	134	25	80	32	8	3	112	27	9×30
1714	1300	140	125	154	25	80	32	8	3	132	27	9×30
1716	1300	160	145	174	25	80	32	8	3	152	27	9×30
1718	1300	180	165	194	25	80	32	8	3	172	27	9×30
1720	1300	200	185	214	25	80	32	8	3	192	27	9×30
1722	1300	220	205	234	25	80	32	8	3	212	27	9×30
1724	1300	240	225	254	25	80	32	8	3	232	27	9×30
1726	1300	260	245	274	25	80	32	8	3	252	27	9×30
1728	1300	280	265	294	25	80	32	8	3	272	27	9×30
1730	1300	300	285	314	25	80	32	8	3	292	27	9×30
1732	1300	320	305	334	25	80	32	8	3	312	27	9×30

Standard designs for BA, DT and DH:

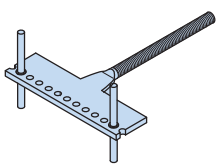


Design 1
Spade bolt with loose pin and sleeve

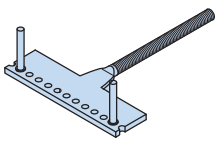


Design 2
Spade bolt with fixed half-pin

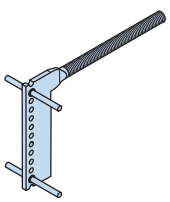
Special designs for BA, DT and DH (on request):



Design 3
Spade bolt with 2 loose pins and 2 sleeves

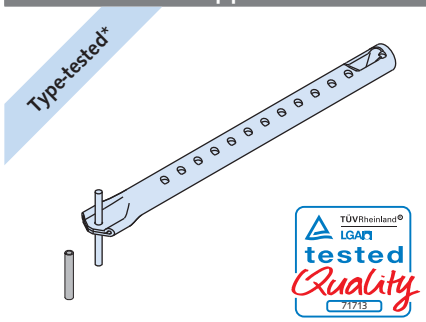


Design 4
Spade bolt with 2 fixed half-pins



Design 7
Spade bolt with L-bracket, 2 loose pins and 2 sleeves

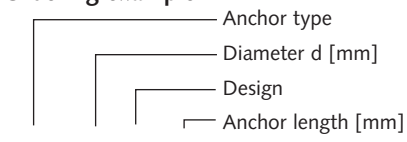
HALFEN UMA Support anchor

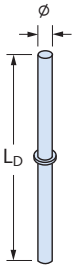


Material:
stainless steel A4 or A2
material specifications → page 3
Independent serviceability certificate for anchor flexing is required.

The round cross-section of the HALFEN UMA Grout-in anchor makes it especially suitable for grouting in brickwork (> M12/IIa) and in concrete (> C12/15). The anchor has the same load-bearing capacity in horizontal and vertical joints. Depending on the anchor type stand-off installation of up to 300 mm with maximum vertical loads of 4.300 N are possible. The anchor's 3-dimensional adjustabililty is achieved in the drill-hole which is filled with cement mortar. The anchors are type-tested and are available in various designs.

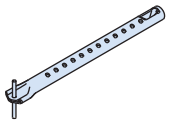
Ordering example:



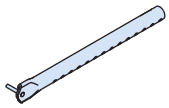


loose pin
with fixed collar
for designs 1, 3 and 7

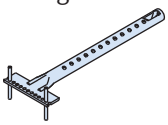
Available UMA designs:



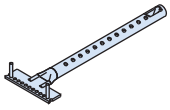
Design 1*
Support anchor with loose pin and sleeve



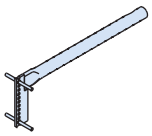
Design 2*
Support anchor with fixed half-pin



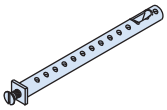
Design 3
Support anchor with 2 loose pins and 2 sleeves



Design 4
Support anchor with 2 fixed half-pins

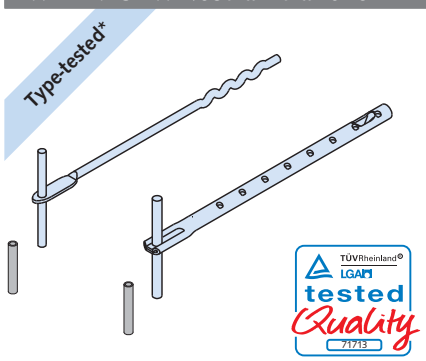


Design 7
Support anchor with L-bracket, 2 loose pins and 2 sleeves



Design 8
Threaded anchor with thread and countersunk screw (from UMA-16) incl. 2 × EPDM washers

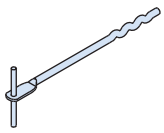
HALFEN UHA Restraint anchor



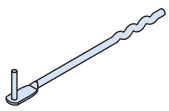
Material:
stainless steel A4 or A2
material specifications → page 3
Independent serviceability certificate for anchor flexing is required.

HALFEN UHA Restraint anchors are used to support horizontal compression and tension forces. The UHA Restraint anchor is used in combination with UMA Grout-in anchors. Restraint anchors are used mainly in vertical joints, at edges and at corners for parapets and attic slabs. The anchor is type-tested and has the same advantages as the UMA Grout-in anchor. Loads of up to 2500 N are possible. The anchor is available in three standard designs.

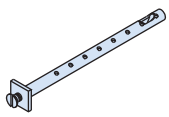
Available UHA designs:



Design 1*
Restraint anchor with loose pin and sleeve



Design 2*
Restraint anchor with fixed half-pin



Design 8
Threaded anchor with thread and countersunk screw (only for UHA-10)

	UMA Support anchor								UHA Restraint anchor		
Type	UMA-10	UMA-12	UMA-16	UMA-18	UMA-22	UMA-25	UMA-28	UMA-33	UHA-5	UHA-7	UHA-10
d [mm]	10	12	16	18	22	25	28	33	5	7	10
c [mm]	5.0	5.5	7.0	7.0	8.0	8.0	8.0	8.0	2.0	2.5	5.0
anchor pin for design 1	ø5×70	ø5×70	ø6×75	ø6×75	ø6×75	ø6×75	ø6×75	ø6×75	ø5×70	ø5×70	ø5×70
anchor pin for design 2	ø5×35	ø5×35	ø6×37	ø6×37	ø6×37	ø6×37	ø6×37	ø6×37	ø5×35	ø5×35	ø5×35

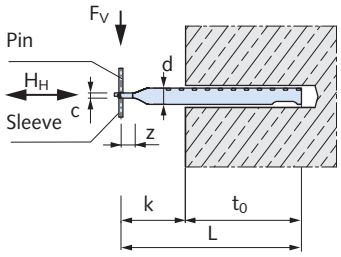
*only design 1 and 2 are type-tested

Anchoring substrate: Concrete ≥ C12/15

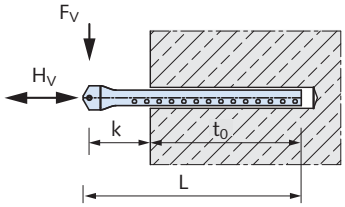
Legend (pages 15–16)

F_V = perm. vertical load per anchor [N] ①
H_H = perm. horizontal load in horizontal joint [N]
H_V = perm. horizontal load in vertical joint [N]
øi = diameter of drill-hole
t_0 = min. grout depth of anchor in drill-hole [mm]
k = cantilever [mm]
z = 21 mm
c = → see table on page 14
Anchor selection: → see notes on page 16

Anchoring in horizontal joints



Anchoring in vertical joints



① When determining the vertical load F_V it may be necessary to take into account not only the dead weight of the façade panels (plus any additional loads) but also a reaction force caused by the inclined position of the restraint anchor; in accordance with DIN 18516-3.

Concrete ≥ C12/15		UMA Support anchor								UHA Restraint anchor		
Stand-off distance k [mm]	Anchor type	UMA 10	UMA 12	UMA 16	UMA 18	UMA 22	UMA 25	UMA 28	UMA 33	UHA 5	UHA 7	UHA 10
	Drill-hole øi	ø 20	ø 22	ø 26	ø 28	ø 32	ø 35	ø 40	ø 45	ø 15	ø 17	ø 20
	Bonding depth ②	t_0 ≥ 90	t_0 ≥ 90	t_0 ≥ 90	t_0 ≥ 90	t_0 ≥ 90	t_0 ≥ 90	t_0 ≥ 110	t_0 ≥ 110	t_0 ≥ 90	t_0 ≥ 90	t_0 ≥ 90
40	**F_V**	**275**	**420**	**800**	**1380**							
50	H_H	649	880	1173	1319					2000		
60	H_V	325	496	944	1319					2000		
	L	**150**	**150**	**150**	**150**					**150**		
70	**F_V**	**215**	**325**	**620**	**1030**							
80	H_H	508	767	1173	1319					2000	2300	
90	H_V	254	384	732	1216					2000	2300	
	L	**180**	**180**	**180**	**180**					**180**	**180**	
100	**F_V**	**170**	**265**	**505**	**820**	**1330**	**1750**	**2720**	**4300**			
110	H_H	401	626	1173	1319	1613	1833	2509	2957	1600	2300	
120	H_V	201	313	596	968	1570	1833	2509	2957	1600	2300	
	L	**210**	**210**	**210**	**210**	**210**	**210**	**230**	**230**	**210**	**210**	
130	**F_V**			**425**	**690**	**1100**	**1465**	**2240**	**3540**			
140	H_H			1003	1319	1613	1833	2509	2957	1250	2300	
150	H_V			502	815	1299	1730	2509	2957	1250	2300	
	L			**240**	**240**	**240**	**240**	**260**	**260**	**240**	**240**	
160	**F_V**				**595**	**930**	**1265**	**1930**	**3005**			
170	H_H				1319	1613	1833	2509	2957	1000	2300	2450
180	H_V				702	1098	1493	2278	2957	1000	2300	2450
	L				**270**	**270**	**270**	**290**	**290**	**270**	**270**	**270**
190	**F_V**				**525**	**820**	**1100**	**1695**	**2615**			
200	H_H				1240	1613	1833	2509	2957	800	2300	2450
210	H_V				620	968	1299	2001	2957	800	2300	2450
	L				**300**	**300**	**300**	**320**	**320**	**300**	**300**	**300**
220	**F_V**				**470**	**730**	**975**	**1510**	**2335**			
230	H_H				1110	1613	1833	2509	2957		2100	2450
240	H_V				555	862	1151	1783	2757		2100	2450
	L				**330**	**330**	**330**	**350**	**350**		**330**	**330**
250	**F_V**				**420**	**660**	**875**	**1360**	**2100**			
260	H_H				992	1558	1833	2509	2957		1800	2450
270	H_V				496	779	1033	1606	2479		1800	2450
	L				**360**	**360**	**360**	**380**	**380**		**360**	**360**
280	**F_V**					**600**	**795**	**1240**	**1920**			
290	H_H					1417	1833	2509	2957			2450
300	H_V					708	939	1464	2267			2450
	L					**390**	**390**	**410**	**410**			**390**

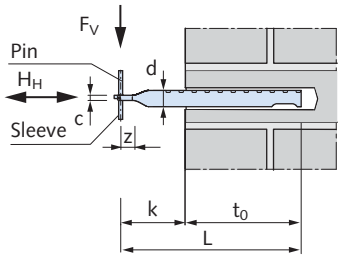
② min t_0 ≥ 80 mm; higher loads with more bonding depth are acc. to type test report possible

Anchoring substrate: Brickwork min. M 12/IIa ①

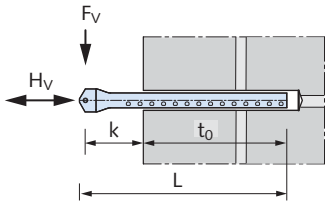
Notes on anchor selection (pages 15–16)

1. Select stand-off distance k
2. Select suitable vertical load F_V (for each anchor) from the column, taking H_H and H_V into consideration
3. Select anchor type and length L and enter as shown in the ordering example (→ page 14)

Anchoring in horizontal joints



Anchoring in vertical joints



Brickwork M 12/IIa ①		UMA Support anchor								UHA Restraint anchor		
Stand-off distance k [mm]	Anchor type	UMA 10	UMA 12	UMA 16	UMA 18	UMA 22	UMA 25	UMA 28	UMA 33	UHA 5	UHA 7	UHA 10
	Drill-hole øi	ø 20	ø 22	ø 26	ø 32	ø 40	ø 40	ø 50	ø 50	ø 15	ø 17	ø 20
	Bonding depth	$t_0 \geq 120$	$t_0 \geq 120$	$t_0 \geq 120$	$t_0 \geq 120$	$t_0 \geq 120$	$t_0 \geq 120$	$t_0 \geq 140$	$t_0 \geq 140$	$t_0 \geq 90$ ②	$t_0 \geq 90$ ②	$t_0 \geq 90$ ②
40	**F_V**	**275**	**420**	**800**	**1380**							
50	H_H	649	992	1067	1067					1250②		
60	H_V	325	496	944	1067					1250②		
	L	**180**	**180**	**180**	**180**					**150**		
70	**F_V**	**215**	**325**	**620**	**1030**							
80	H_H	508	767	1067	1067					1250②	1250②	
90	H_V	254	384	732	1067					1250②	1250②	
	L	**210**	**210**	**210**	**210**					**180**	**180**	
100	**F_V**	**170**	**265**	**505**	**820**	**1330**	**1750**	**2720**	**4300**			
110	H_H	401	626	1067	1067	1067	1067	1067	1067	1250②	1250②	
120	H_V	201	313	596	968	1067	1067	1067	1067	1250②	1250②	
	L	**240**	**240**	**240**	**240**	**240**	**240**	**260**	**260**	**210**	**210**	
130	**F_V**			**425**	**690**	**1100**	**1465**	**2240**	**3540**			
140	H_H			1003	1067	1067	1067	1067	1067	1250②	1250②	
150	H_V			502	815	1067	1067	1067	1067	1250②	1250②	
	L			**270**	**270**	**270**	**270**	**290**	**290**	**240**	**240**	
160	**F_V**				**595**	**930**	**1265**	**1930**	**3005**			
170	H_H				1067	1067	1067	1067	1067	1000②	1250②	1250②
180	H_V				702	1067	1067	1067	1067	1000②	1250②	1250②
	L				**300**	**300**	**300**	**320**	**320**	**270**	**270**	**270**
190	**F_V**				**525**	**820**	**1100**	**1695**	**2615**			
200	H_H				1067	1067	1067	1067	1067	800②	1250②	1250②
210	H_V				620	968	1067	1067	1067	800②	1250②	1250②
	L				**330**	**330**	**330**	**350**	**350**	**300**	**300**	**300**
220	**F_V**				**470**	**730**	**975**	**1510**	**2335**			
230	H_H				1067	1067	1067	1067	1067		1250②	1250②
240	H_V				555	862	1067	1067	1067		1250②	1250②
	L				**360**	**360**	**360**	**380**	**380**		**330**	**330**
250	**F_V**							**1360**	**2100**			
260	H_H							1067	1067		1250②	1250②
270	H_V							1067	1067		1250②	1250②
	L							**410**	**410**		**360**	**360**
280	**F_V**							**1240**	**1920**			
290	H_H							1067	1067			1250②
300	H_V							1067	1067			1250②
	L							**440**	**440**			**390**

① For use in other material, static verification is required. Allowable compressive strength min. 1.6 MN/m²
② min $t_0 \geq 80$ mm; higher loads with more bonding depth are acc. to type test report possible

HALFEN NATURAL STONE SUPPORT SYSTEMS

HALFEN Support-structure Systems

Advantages of HALFEN Support-structure systems

The standard HALFEN Support-structure system consists of a series of vertical channels fixed to the main superstructure. Fixings are only required at comparatively large intervals. This reduces the number of required connections to the inner main superstructure.

The advantages

- the building's weather-proofing and insulation is penetrated less
- the number of thermal bridges is reduced. This helps compliance with the German Energy-saving Regulations (EnEV)

HALFEN Support-structures are also suitable for spanning non-load-bearing constructions. Furthermore using pre-install support-construction systems permit fast and economical fixing of façade panels and slabs.

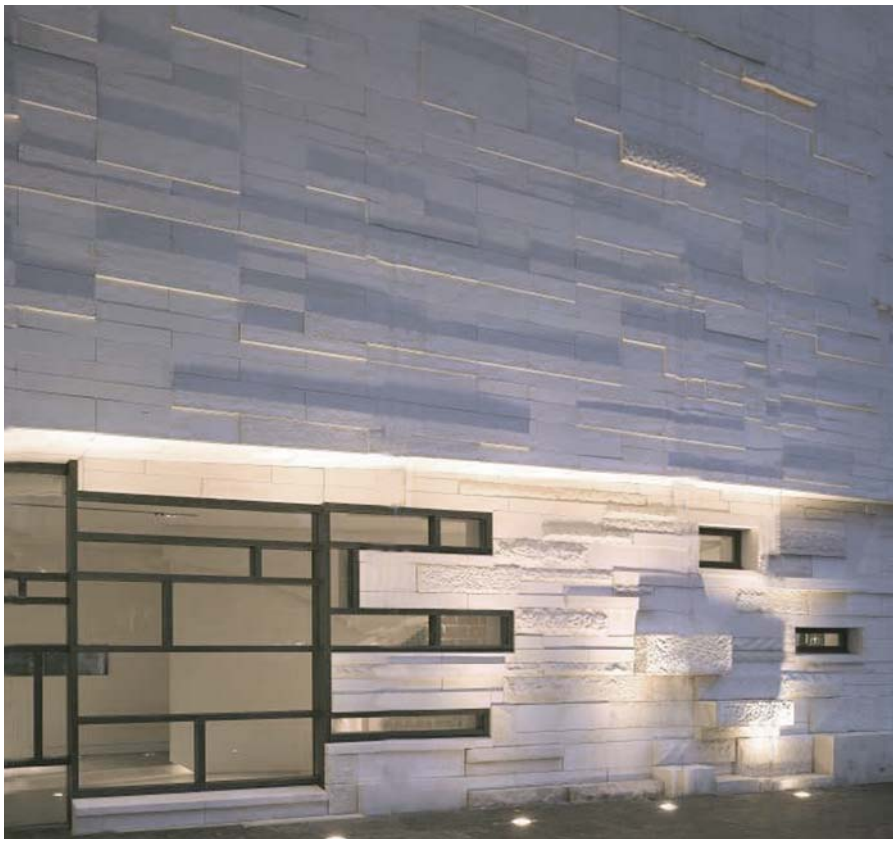
HALFEN supply two main categories of support-structures for different requirements:

- HALFEN SUK Stainless steel support-structures
- HALFEN UKB Aluminium support-structures

The **HALFEN SUK** stainless steel support-structure is suitable for durable constructions in harsh environments and for high loads.
The **HALFEN UKB System** is a very installation-friendly and cost-effective channel support-structure variant.

For detailed information about HALFEN Support-structure systems please contact us.
→ see back cover for contact information.

Applications



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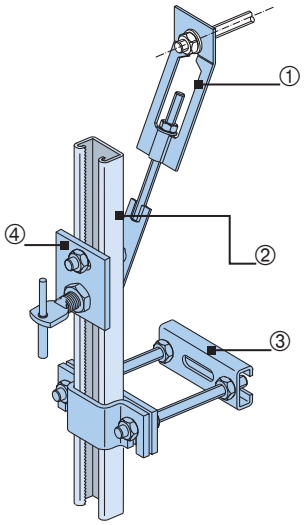
HALFEN SUK Channel support-structure

HALFEN SUK: Channel support-structure system



The HALFEN SUK System is an adjustable suspended channel system with support and restraint anchors that are freely height adjustable for façade stand-off installation > 160 mm. It is ideal for new constructions and remodelling projects. The system is especially suited for natural stone façades with large and varying distances to the load-bearing wall.

① Façade anchor fixed with bolt
② Channel
③ Compression-tension brace
④ SUK-TSG-Design 1
including installation parts

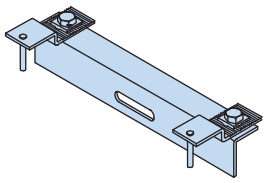
The system is made of a small number of installation-friendly components and is therefore especially easy to install. Non-load-bearing structures and recesses can be spanned.
Fewer required anchor points allow quick installation of the stainless steel support-structure and therefore faster façade element installation.

Material:
stainless steel A4 or A2
material specifications → page 3

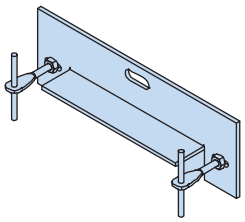
For detailed information about HALFEN SUK please contact us.
→ see back cover for contact information.

Designs and their application

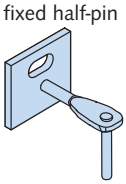
⑤ SUK-DH-0,8-2
Double restraint anchor with 2 fixed half-pins



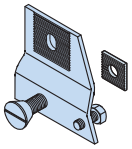
⑥ SUK-DT-1,2-1
Double support anchor with 2 loose pins



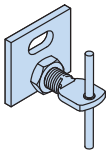
⑧ SUK-HS-1,6-2
Restraint anchor with fixed half-pin

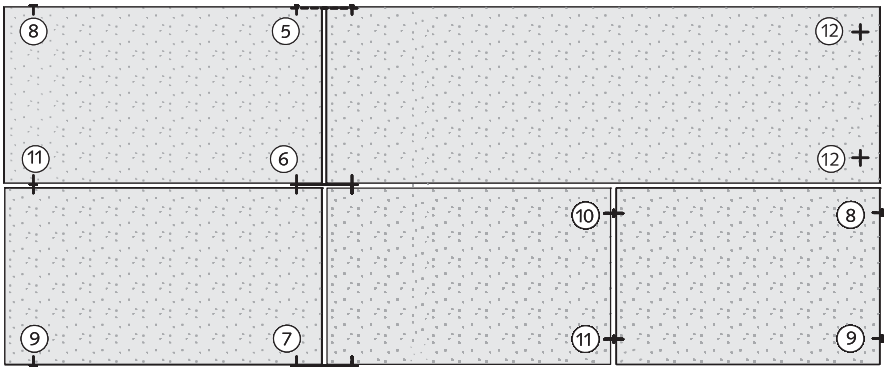


⑫ SUK-SV -0,8-8
Threaded connection with countersunk screw M12

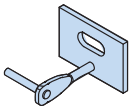


⑪ SUK-TSG-0,8-1-M12
SUK-TSG-1,5-1-M16
Support anchor with 1 loose pin

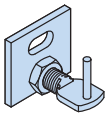




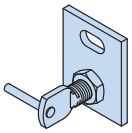
⑧ SUK-HS-1,6-2
Restraint anchor with fixed half-pin



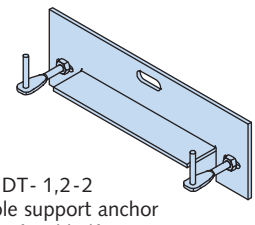
⑨ SUK-TSG-0,8-2-M12
SUK-TSG-1,5-2-M16
Support anchor with fixed half-pin



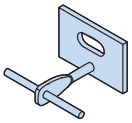
⑨ SUK-TSG-0,8-2-M12
SUK-TSG-1,5-2-M16
Support anchor with fixed half-pin



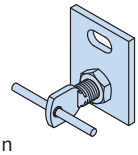
⑦ SUK-DT- 1,2-2
Double support anchor with 2 fixed half-pins



⑩ SUK-HS-1,6-1
Restraint anchor with 1 loose pin



⑪ SUK-TSG-0,8-1-M12
SUK-TSG-1,5-1-M16
Support anchor with 1 loose pin



HALFEN UKB: Aluminium support-structure with body anchor

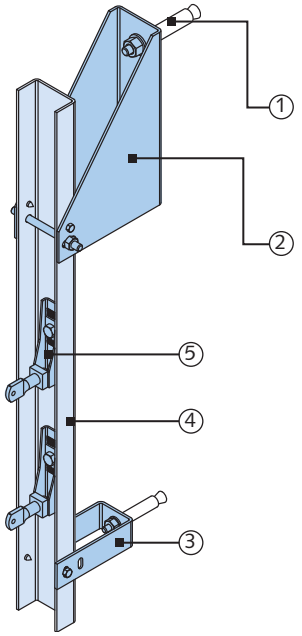
The HALFEN UKB System is a freely adjustable aluminium and stainless steel support-structure with vertical U-sections located in the ventilation gap of natural stone façades. This type of construction reduces thermal bridges to a minimum.

The HALFEN BA Body anchors are fixed to the front of the vertical channels.

The UKB Support-structure allows stand-off installation between 130 and 320 mm and 3-dimensional adjustments of ± 20 mm. The support brackets are made from stainless steel A4.
They are fastened either to HALFEN Cast-in channels or to the load-bearing superstructure using HALFEN Anchor bolts. Depending on environmental conditions, protections against surface corrosion must be taken into account, for example with barrier tape.

For smaller stand-off sizes and precise details please contact us.
→ see back cover for contact information.

Material:
aluminium (EN-A W6060)
stainless steel A4
material specifications → page 3

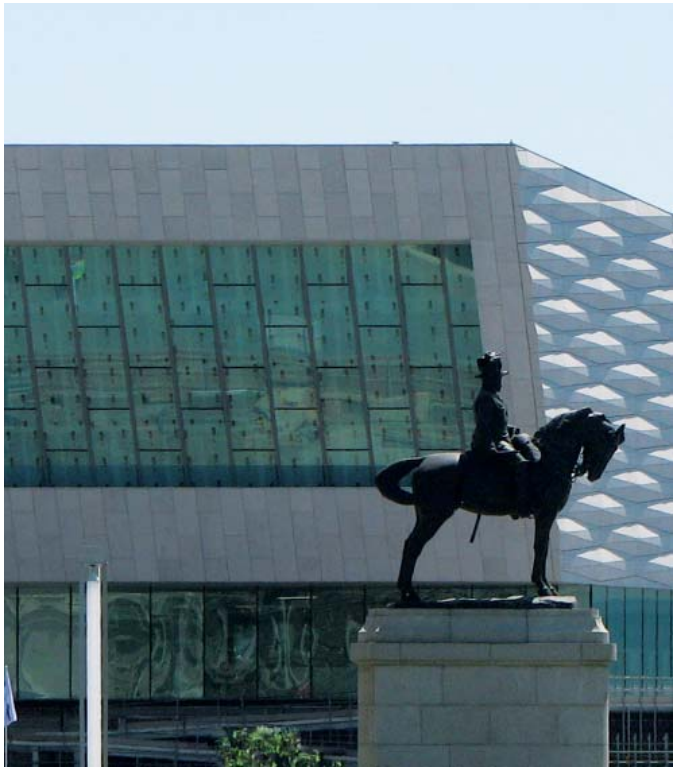


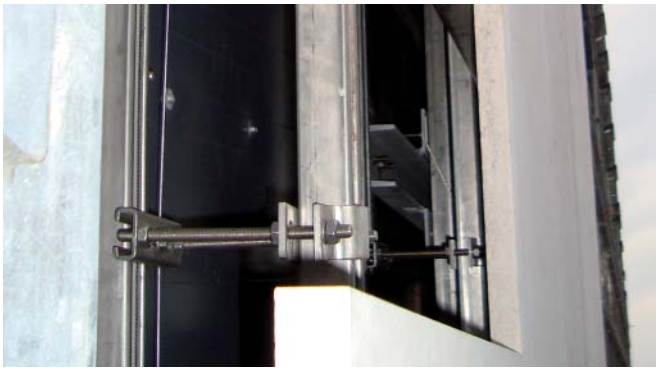
① Fastening with bolts
② Support bracket
③ Compression-tension brace
④ Vertical aluminium channel
⑤ HALFEN BA Body anchor type 606


Police station in Eberswalde, Germany

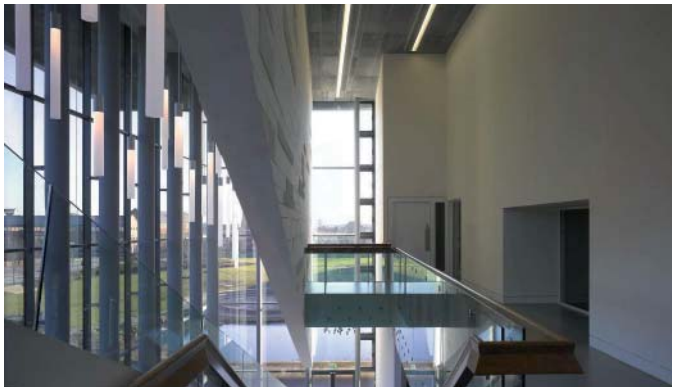

HALFEN UKB Channel support-structure

References





Museum of Liverpool/England



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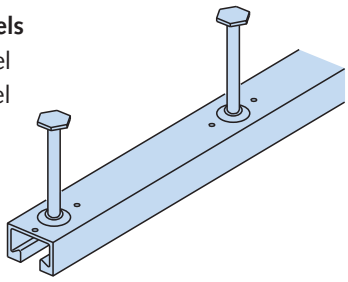
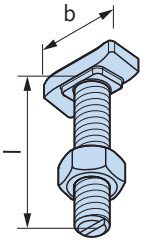
Body anchor fixing with HALFEN Cast-in channels and HALFEN T-head bolts

HALFEN HTA-CE Cast-in channels
HTA-CE 28/15-A4 stainless steel
HTA-CE 38/17-A4 stainless steel



HALFEN T-head bolts for HTA-CE
HS 28/15
HS 38/17



Body anchor fixing with HALFEN Cast-in channels

HALFEN HTA-CE Cast-in channel		with HALFEN HS T-head bolt including hexagonal nut					
		Designation	Thread		l [mm]		b [mm]
HTA-CE 28/15	- A4	HS 28/15 -	M 8 M 10	×	30	- A4	20
HTA-CE 38/17	- A4	HS 38/17 -	M 10 M 12	×	30	- A4	29

Fixing the Body anchors with HALFEN HB-B Wedge anchor

ETA-07/0247

HALFEN HB-B Wedge anchor for non-cracked concrete

HALFEN Wedge anchor	Order no.	suitable for body anchor type
HB-B - 8-10-19/75-A4	0432.060-00024	- HRM...-P / HRC...-P - BA 606 to BA 1312 - SOF 805 to SOF 819
HB-B - 8-30-39/95-A4	0432.060-00007	- DT 414 to DT 430 - DH 1006 to DH 1732
HB-B - 10-30-36/105-A4	0432.060-00029	- DT 1314 to DT 1318
HB-B - 10-10-16/85-A4	0432.060-00027	- HRM/HRC with serrated plate
HB-B - 12-50-65/145-A4	0432.060-00016	- DT 1320 to DT 1330

Fixing the HALFEN Body anchors with HALFEN HB-BZ Wedge anchor

ETA-07/0249

HALFEN HB-BZ Wedge anchor for cracked concrete

HALFEN Wedge anchor	Order no.	suitable for body anchor type
HB-BZ - 8-10/75-A4	0432.040-00001	- HRM...-P / HRC...-P - BA 606 to BA 1312 - SOF 805 to SOF 819
HB-BZ - 8-50/115-A4	0432.040-00002	- DT 414 to DT 430 - DH 1006 to DH 1732
HB-BZ - 10-50/130-A4	0432.040-00004	- DT 1314 to DT 1318
HB-BZ - 10-10/90-A4	0432.040-00003	- HRM/HRC with serrated plate
HB-BZ - 12-50/145-A4	0432.040-00006	- DT 1320 to DT 1330

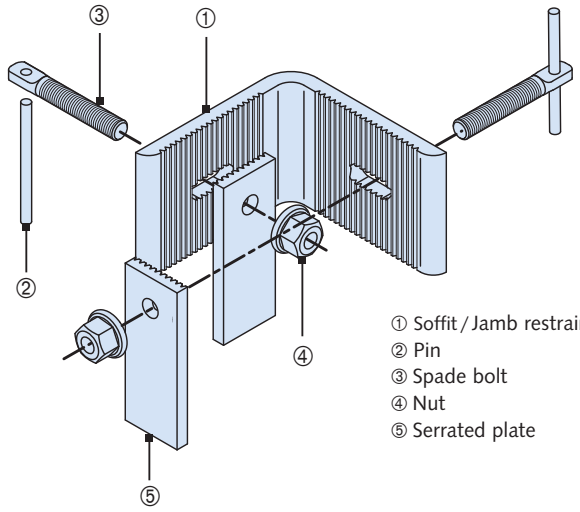
HALFEN LW Soffit angles

The soffit / jamb brackets and restraint angles significantly improve the connection between façade and soffit / jamb elements, especially when using natural stone.

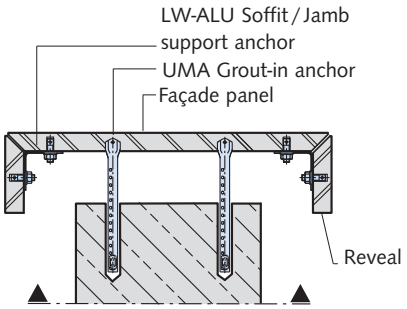
The process of pin and glue, which is not DIN compliant, can be omitted. Façade and angles can be installed quickly, simply and efficiently on-site.

The support anchors are adjustable up to ±5 mm; façade, soffit and jamb panels can also be installed with open joints. To prevent stresses the panels are fixed with support brackets and restraint anchors.

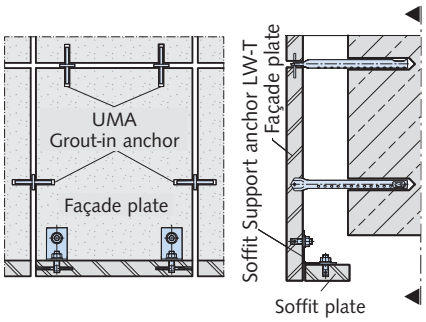
LW Soffit / Jamb anchor



① Soffit / Jamb restraint angle
② Pin
③ Spade bolt
④ Nut
⑤ Serrated plate

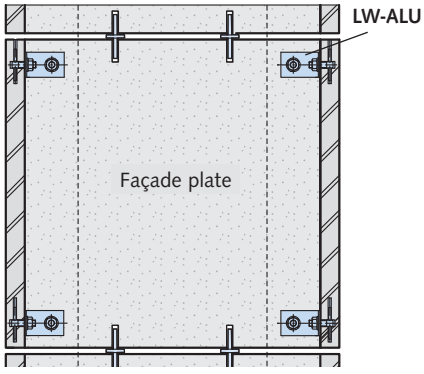


Parapet / lintels



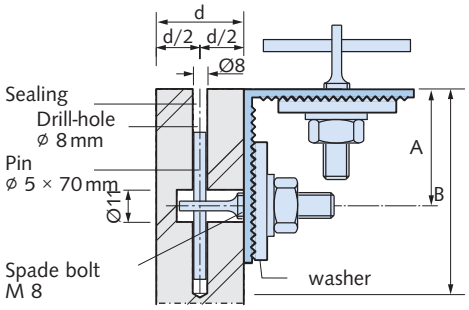
Soffit support anchors are available in stainless steel on request.

Pillar cladding



HALFEN LW Jamb, recess brackets

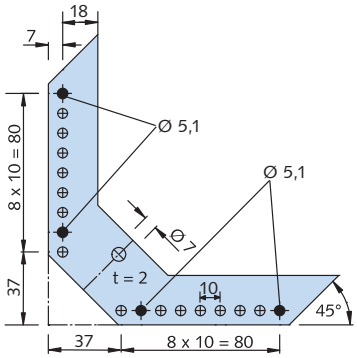
HALFEN LW Jamb / recess bracket	Dimension A [mm]	Dimension B [mm]
LW-60-ALU	35	80
LW-80-ALU	50	90
LW-90-ALU	50	90
LW-100-ALU	50	90

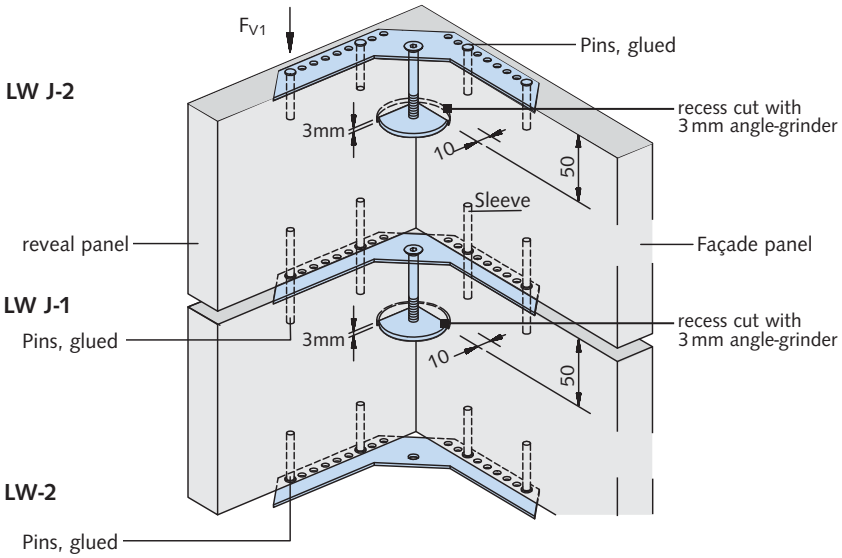


For further details, please contact us.
→ see back cover for contact information.

HALFEN LW Soffit angles and LW-J Adjustable soffit angles

Dimensions
LW J-1/J-2 and
LW-1/-2

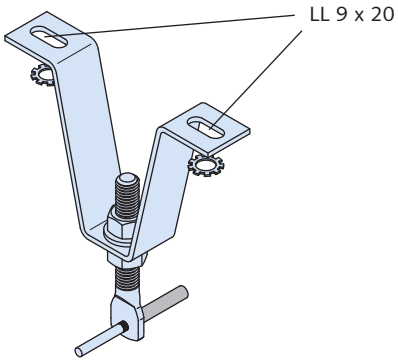




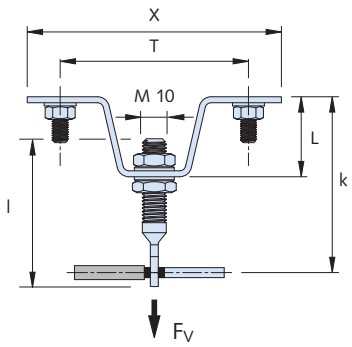
Material:
stainless steel A4
material specifications → page 3

HALFEN SOF Soffit anchor

HALFEN SOF Soffit anchors are intended for suspending natural stone slabs and panels.
Maximum loading F_V = 800 N



Dimensions
SOF Soffit anchor



Material:
stainless steel A4
material specifications → page 3

SOF Soffit anchor

Type	Stand-off distance			Body			Spade bolt M10
	k [mm]	min k [mm]	max k [mm]	X [mm]	T [mm]	L [mm]	l [mm]
SOF 805	50	48	53	115	82	15	55
SOF 806	60	50	63	120	87	25	55
SOF 807	70	65	80	120	87	25	72
SOF 808	80	65	95	127	94	40	72
SOF 810	100	85	115	136	105	60	72
SOF 813	130	115	145	150	117	90	72
SOF 816	160	145	175	164	131	120	72
SOF 819	190	175	205	178	141	150	72

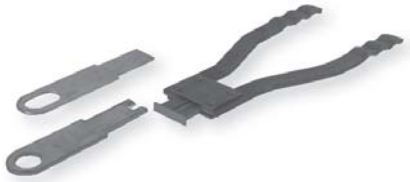
HALFEN Permanent scaffolding anchors

Pipe-scaffold system

Permanent scaffolding anchors must be designed and installed to enable maintenance-scaffolding to be quickly erected and dismantled. Anchors are available for load immediately, or for use at a later date. The position of permanent scaffolding anchors should be considered in the initial planning of the building. The positions depend on the selected type of scaffolding, the anchoring grid of the scaffolding and on the joint pattern of the façade panels.

Loads from the scaffolding are transferred through the straps to the HALFEN Permanent scaffolding anchors. Permanent scaffolding anchors are suitable for tensile and pressure loads ($F_{\perp}$ = horizontal; at right angles to the anchoring surface) and horizontal shear forces ($F_{||}$ = horizontal; parallel to the anchoring surface).

Permanent scaffolding anchors are designed to reliably carry these loads and transfer them into the main superstructure. Required anchors for future maintenance or repair work are already in-situ when using HALFEN Permanent scaffolding anchors.

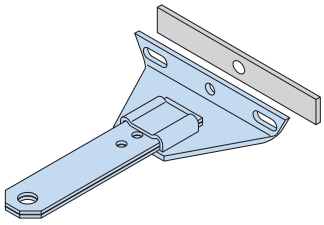


The two part straps are designed; one strap with a slot or hook, to secure it firmly in place using the other strap. HGA-F Permanent scaffolding anchors can be installed with a thermal separator to satisfy the increasing demands on thermal insulation.

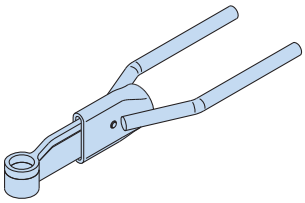
A thermal separator reduces the thermal bridge caused by the HALFEN Permanent scaffolding anchors and helps to minimise heat loss from the building. HALFEN Permanent scaffolding anchors can be used as described in DIN 4420-3 and DIN 4426.

HALFEN Permanent scaffolding anchors for natural stone façades:

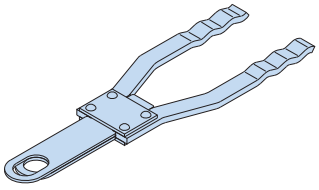
HALFEN HGA-F
Permanent scaffolding anchor



HALFEN GE-VB
Permanent scaffolding anchor



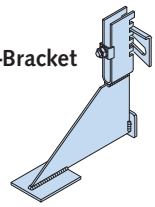
HALFEN GE-HB
Permanent scaffolding anchor



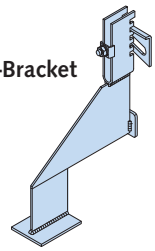
HALFEN HK4 Support brackets for brick cladding or natural stone façades with CE symbol according to EN 845-1

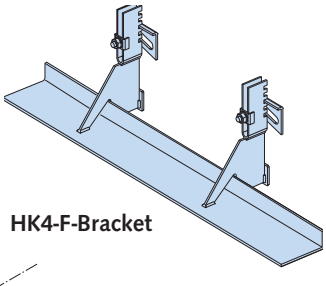
HALFEN Support brackets are used to support standard masonry cladding at the base as well as to support cladding over large openings. The support brackets carry the load from the cladding and transfer it to the load-bearing structure e.g. reinforced concrete.
The HK4 Support brackets are freely adjustable, making installation simple and safe.
Natural stone panels are normally 4 point fixed using 2 support anchors and 2 restraint anchors. Natural stone façade panels with a thickness in excess of 90 mm are constructed in a similar manner as brickwork cladding. This type of cladding only requires structural support at the base. Higher façades will require additional intermediate fixings. Natural stone cladding is additionally anchored with cavity wall ties.

HK4-U-Bracket

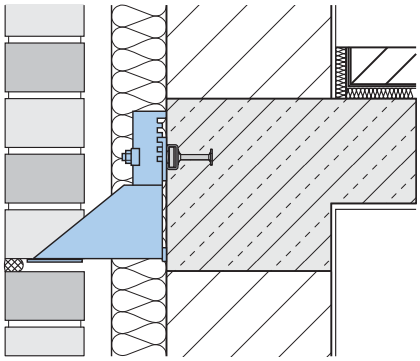


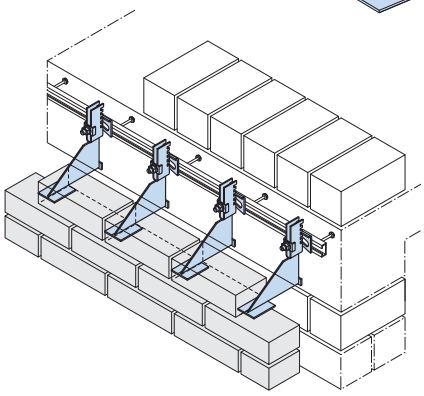
HK4-UV-Bracket





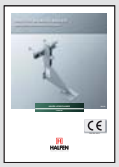
HK4-F-Bracket



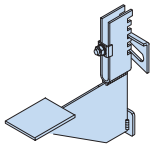


Wall structure with HK4-U standard bracket

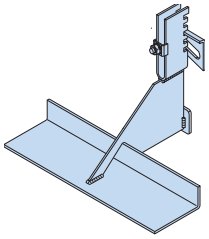
Find more details in our Technical Product Information **"HALFEN Brickwork Support".**



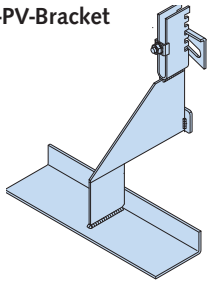
HK4-UT-Bracket



HK4-P-Bracket



HK4-PV-Bracket

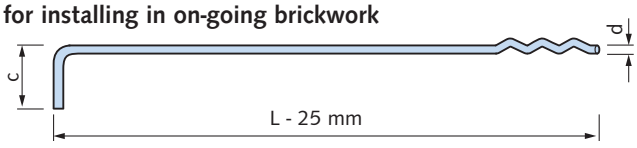


HALFEN Cavity wall ties

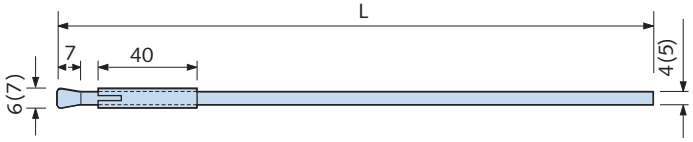
HALFEN Cavity wall ties are used to horizontally anchor masonry cladding; HALFEN Cavity wall ties comply with DIN 1053 and are building authority approved. Cavity wall ties are either placed during on-going erection of the main structure wall or subsequently fitted with bolts to solid blocks or concrete structures.

Material:
stainless steel A4
material specifications → page 3

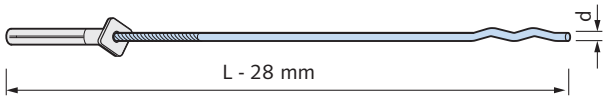
LSA-W Cavity wall ties for installing in on-going brickwork



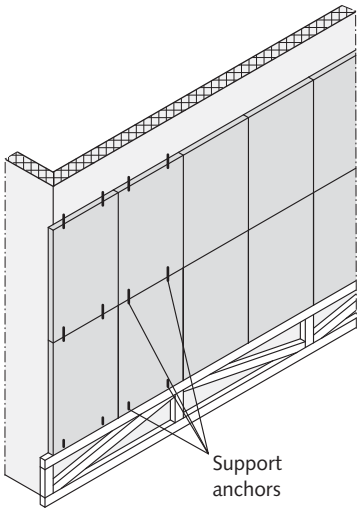
HEA Cavity wall ties for installation in a concrete wall

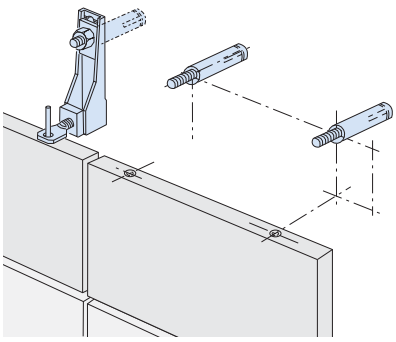


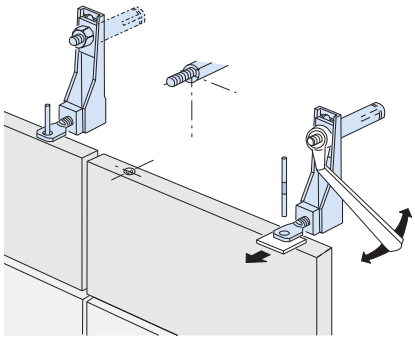
LSA-DW Cavity wall ties for dowel-fixing into concrete or solid brickwork



Anchoring in horizontal joints







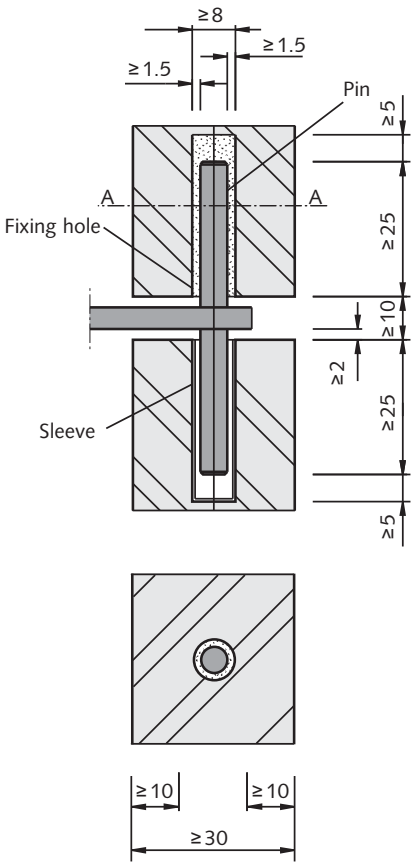
Installation direction:
from left → right *or*
from right → left
allways from bottom → top

- Ensure the facade is correctly measured and tolerances have been considered.
- Erect any required scaffolding.
- Cut and remove a section of the thermal insulation to drill the hole for the anchor bolt. The insulation is replaced after anchor installation.
- Drill the dowel holes for the first and 2nd row of slabs, ensure correct, minimum drill hole depth and diameter.
- Remove all dust from the hole.
- Fix and align the lower row of body anchors (support anchors) with approved anchor bolts i.e. HALFEN HB-BZ.
- Replace the previously removed thermal insulation.
- Fill the pin holes above the anchor with mortar.
- Place the 1st row of slabs onto the support anchors.
- Fix and align the support anchors for the 2nd row of slabs with approved anchor bolts i.e. HALFEN HB-BZ.
- Make any fine adjustments to the 1st row of slabs:
  allow at least a 2 mm gap between the top edge of the lower row and the bottom edge of the arm of the support anchor for the second slab row (see detail).
- Push the anchor pin through the hole in the spade bolt and into the sleeve below.
- Dimensions acc. to detail "Pin, fixing hole and joint dimensions [mm]" (see right) must be observed!
- The 2nd row of slabs is then installed and the procedure repeated.

Note:
Natural stone slabs are generally fixed at four points.
Thermal insulation should be cut out before drilling the fixing holes.

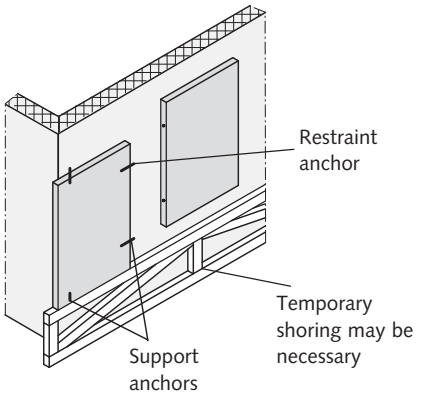
Important:
Tighten all countersunk screws and anchor bolts using a torque wrench adjusted to the correct torque!

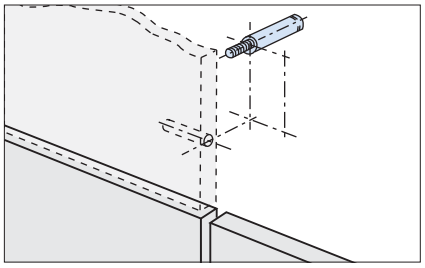
Detail
Pin, fixing hole and joint dimensions [mm]

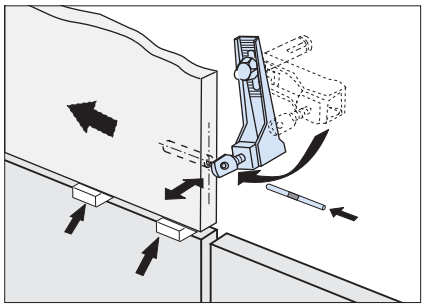


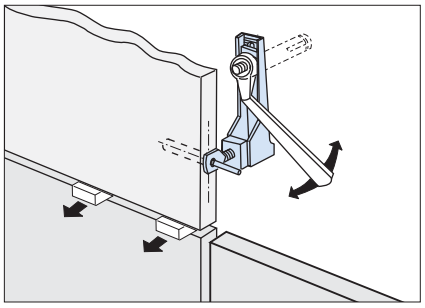
Section A-A

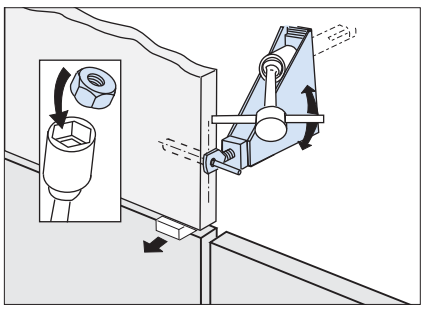
Anchoring in vertical joints









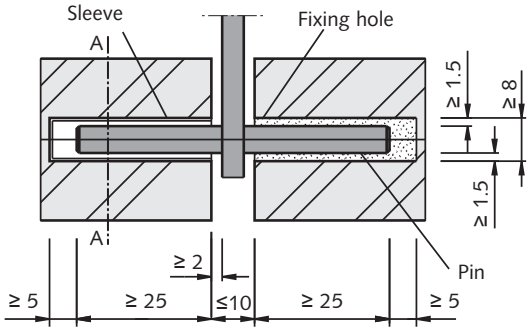


Installation starts from building edge, left to right or right to left

Example installation direction:
from left → right
allways from bottom → top

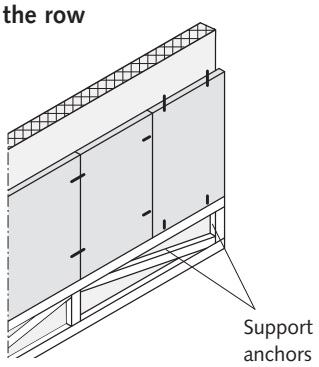
- Ensure the facade is correctly measured and tolerances have been considered.
- Erect any required scaffolding.
- Cut and remove a section of the thermal insulation to drill the hole for the anchor bolt. The insulation is replaced after anchor installation.
- Drill the dowel holes for the support and restraint anchors; ensure correct, minimum drill hole depth and diameter.
- Remove all dust from the hole.
- Fix and align the body anchors (support and restraint anchors) with approved anchor bolts i.e. HALFEN HB-BZ.
- Replace the previously removed thermal insulation.
- Place the natural stone slab on the 1st support anchor and place a wedge under the right edge.
- Fix support and restraint anchor for the 1st vertical joint with approved anchor bolts i.e. HALFEN HB-BZ and make any fine adjustments.
- Push the anchor pins through the holes in the spade bolts.

Detail
Pin, fixing hole and joint dimensions [mm]



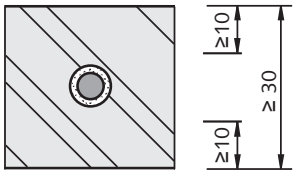
- Fill the lower fixing holes (support anchor) of the 2nd natural stone slab with mortar.
- Push the 2nd natural stone slab to the 1st slab.
- Dimensions acc. to the detail below "Pin, fixing hole and joint dimensions [mm]" must be observed!
- Fix the support and restraint anchors for the 2nd vertical joint; then finely adjust the slab; repeat the procedure for the next anchors.

Installation of the last natural stone slab of the row



- The penultimate slab is anchored using pins only on the right vertical panel edge
- The last panel at the right-hand edge of the building is installed in the horizontal joint on two support anchors.

Important: Tighten all countersunk screws and anchor bolts with the correct torque!



Section A-A

Construction details from DIN 18 516, section 3

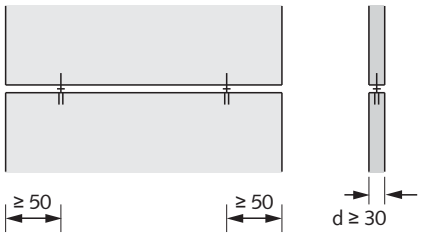
Anchor pins
The anchor pins extend into the holes drilled for the pins in the edges of the slabs. The holes are approximately 3 mm larger than the diameter of the pins.

Anchor material
Anchors and pins must be of stainless steel corrosion resistance class III, according to EN 1993-1-4: 2006.
For detailed steel material specifications see page 3.

Edge distances
The standard distance from the corner of the panel to the centre of the hole is 50 mm.

The thickness of the panel from the hole to the panel face must not be less than 10 mm.
Minimal thickness of panel ≥ 30 mm.

Concrete anchoring substrate
Where the load-bearing structures are heavily reinforced and highly stressed, for example reinforced concrete columns or lintels, the type and location of the anchors should be specified in cooperation with the structural engineer.
Anchors connected to HALFEN Cast-in channels must be installed in accordance with the approval for HALFEN HTA Channels.



For further details refer to DIN 18516, section 3 and our installation instructions.

Design and calculation

The design planning of natural stone anchor fixings is based on the details shown in a) to e). This allows fast and thorough processing for cost effective installation of natural stone panels.

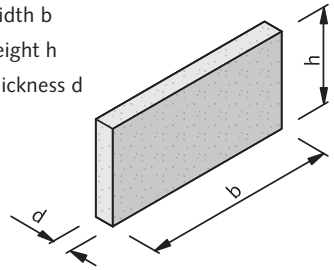
a) Weights of natural stone panels

Material	g [kN/m³]
Ceramic, volcanic stone	20
Limestone compositions, Travertine	24
Sandstone, ophiolite, greywacke	26
Limestone, dolomite, shell marl, marble	27
Granite, porphyry, syenite, slate	28
Basalt, diorite, gabbro, gneiss	30

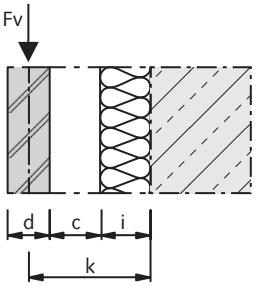
Calculating the panel weight:

Panel weight:
F_V = b [m] × h [m] × d [m] × g [kN/m³]

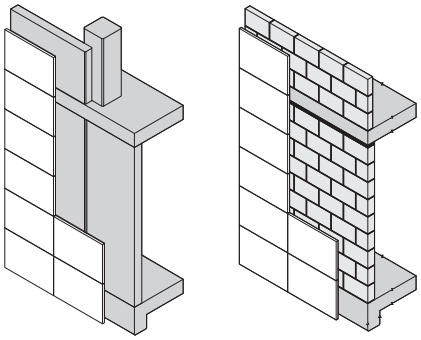
b) Dimensions of natural stone
width b
height h
thickness d



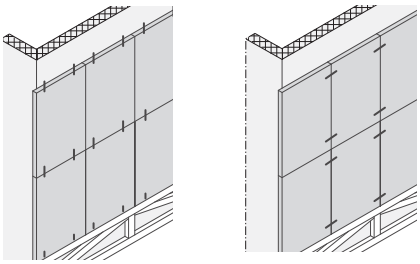
c) Wall section
d = thickness of natural stone panels
c = size of ventilation gap
i = thickness of thermal insulation
k = stand-off installation distance of natural stone anchor



d) Anchoring in concrete or masonry structures



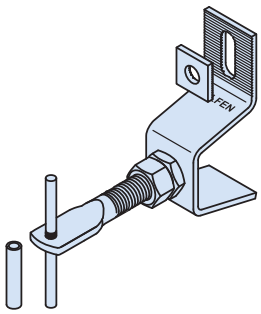
e) Assembly of natural stone anchors in vertical or horizontal joints



Support anchors for horizontal or vertical façade joints

HALFEN Body anchor type HRM 506

HALFEN HRM Body anchor, serrated,
support anchor for connecting façade-plates made of natural stone or concrete to HALFEN Cast-in channels or to approved HALFEN Dowels (both ordered separately), for use in horizontal or vertical joints in façades.



With RAL quality mark RAL-GZ 996/3 and TÜV/LGA Certification of quality,

delivered pre-assembled.

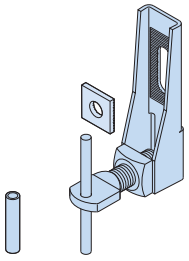
Type HRM 506-D-A4
with
506 = permitted vertical load Fv = 500 N with a stand-off installation k = 60 mm,
D = design variant (1 = design variant 1 with loose pin and sliding sleeve,
2 = design variant 2 with press-fit half-pin)
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

or equivalent; deliver and install according to manufacturer's instructions.

number of items required ..... item price ..... total .....

HALFEN Body anchor type BA 1308

HALFEN BA Body anchor,
support anchor for connecting façade-plates made of natural stone or concrete to HALFEN Cast-in channels or to approved HALFEN Dowels (both ordered separately), for use in horizontal or vertical joints in façades.



With RAL quality mark RAL-GZ 996/3 and TÜV/LGA Certification of quality.

Type BA 1308-D-A4
with
1308 = permitted load Fv = 1300 N, with a stand-off installation k = 80 mm
D = design variant (1 = design variant 1 with loose pin and sliding sleeve,
2 = design variant 2 with press-fit half-pin)
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

or equivalent; deliver and install according to manufacturer's instructions.

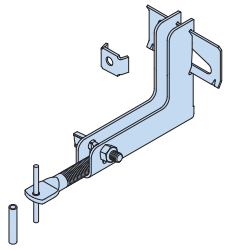
number of items required ..... item price ..... total .....

Support anchors for horizontal or vertical façade joints

HALFEN Body anchor type DT 1314

HALFEN DT Body anchor,
support anchor for connecting façade-plates made of natural stone or concrete to HALFEN Cast-in channels or to approved HALFEN Dowels (both ordered separately), for use in horizontal or vertical joints in façades.

With RAL quality mark RAL-GZ 996/3 and TÜV/LGA Certification of quality.



Type DT 1314-D-A4
with
1314 = permitted load Fv = 1300 N with a stand-off installation k = 140 mm,
D = design variant (1 = design variant 1 with loose pin and sliding sleeve, 2 = design variant 2 with press-fit half-pin)
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

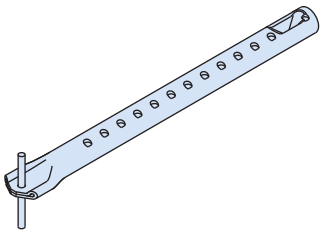
or equivalent; deliver and install according to manufacturer's instructions.

number of items required ..... item price ..... total .....

HALFEN Grout-in anchor type UMA 16

HALFEN UMA Grout-in anchor,
support anchor for connecting façade-plates made of natural stone or concrete, for grouting into concrete ≥ C12/15 or masonry M12/IIa.
For use in horizontal or vertical joints in façades.

Type tested,
with RAL quality mark RAL-GZ 996/3 and TÜV/LGA Certification of quality.



Type UMA 16-D-L-A4
with
16 = anchor diameter 16 mm,
D = design variant (1 = design variant 1 with loose pin and sliding sleeve, 2 = design variant 2 with press-fit half-pin)
L = anchor length (120 / 150 / 180 / 210 / 240 / 270 mm),
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

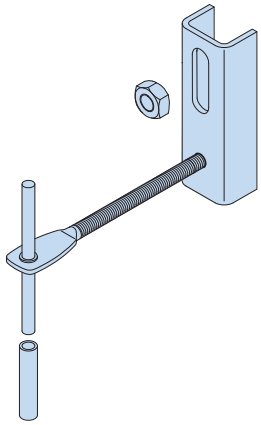
or equivalent; deliver and install according to manufacturer's instructions.

number of items required ..... item price ..... total .....

Restraint anchor for use in horizontal or vertical joints

HALFEN Body anchor type DH 1718

HALFEN DH Body anchor,
restraint anchor for connecting façade-plates made of natural stone or concrete to HALFEN Cast-in channels or to approved HALFEN Dowels (both ordered separately). For use in horizontal or vertical joints in façades.



With RAL quality mark RAL-GZ 996/3 and TÜV/LGA Certification of quality.

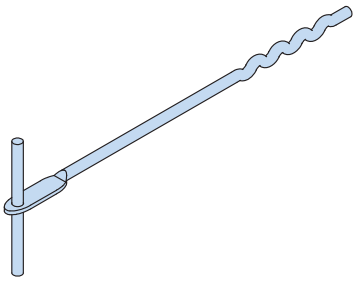
Type DH 1718-D-A4
with
1718 = permitted load Fh = 1300 N, with a stand-off installation k = 180 mm,
D = design variant (1 = design variant 1 with loose pin and sliding sleeve, 2 = design variant 2 with press-fit half-pin)
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

or equivalent; deliver and install according to manufacturer's instructions.

number of items required ..... item price ..... total .....

HALFEN Grout-in anchor type UHA 7

HALFEN UHA Grout-in anchor,
restraint anchor for connecting façade-plates made of natural stone or concrete to HALFEN Cast-in channels or to approved HALFEN Dowels (both ordered separately). For use in horizontal or vertical joints in façades.



Type tested,
with RAL quality mark RAL-GZ 996/3 and TÜV/LGA Certification of quality.

Type UHA 7-D-L-A4
with
7 = anchor diameter 7 mm,
D = design variant (1 = design variant 1 with loose pin and sliding sleeve, 2 = design variant 2 with press-fit half-pin)
L = anchor length (180 / 210 / 240 / 270 / 300 / 330 / 360 mm),
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

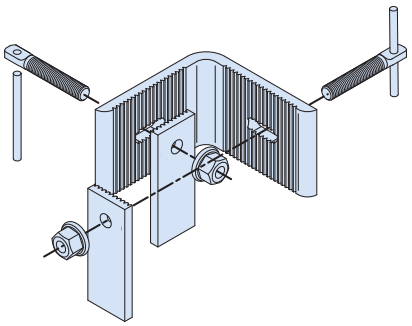
or equivalent; deliver and install according to manufacturer's instructions.

number of items required ..... item price ..... total .....

HALFEN Soffit anchors

HALFEN Soffit support anchor type LW-ALU

HALFEN LW-ALU Soffit support anchor,
support angle for pin connection according to DIN 18516-3 for mechanical connections of jamb, recess- and main-slab elements in natural- or concrete panel façades.



With RAL quality mark RAL-GZ 996/3,

including pins, spade bolts and washers.

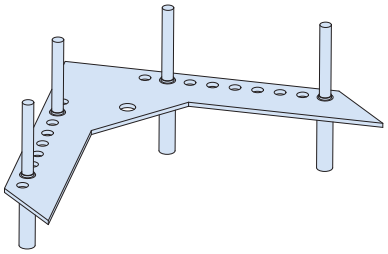
Type LW-S/H-Alu
with
S = leg length..... (60 / 80 / 90 / 100 mm),
H = angle height..... (40 / 60 mm),
ALU = Aluminium

or equivalent; deliver and install according to manufacturer's instructions.

number of items required ..... item price ..... total .....

HALFEN Soffit support anchor type LW

HALFEN LW Soffit support anchor,
support angle for mechanical connection of jamb, recess- and main-slab elements in natural stone or concrete panel façades.



With RAL quality mark RAL-GZ 996/3.

Type LW-D-A4
with
D = design variant (1 = design variant 1 with loose pin and sliding sleeve,
2 = design variant 2 with press-fit half-pin)
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

or equivalent; deliver and install according to manufacturer's instructions.

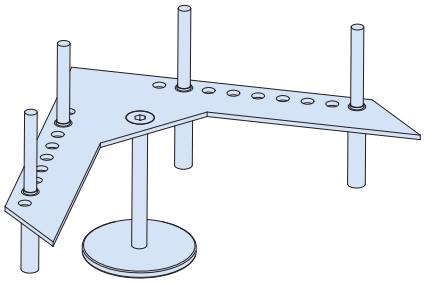
number of items required ..... item price ..... total .....

HALFEN Soffit anchors

HALFEN Soffit support anchor type LW-J

HALFEN LW-J Soffit support anchor,
adjustable support angle for mechanical connection of jamb, recess- and main-slab elements in natural stone or concrete panel façades.

With RAL quality mark RAL-GZ 996/3.



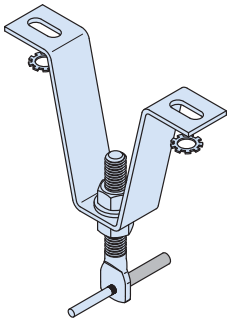
Type LW-J-D-A4
with
D = design variant (1 = design variant 1 with loose pin and sliding sleeve, 2 = design variant 2 with press-fit half-pin)
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

or equivalent; deliver and install according to manufacturer's instructions.

number of items required ..... item price ..... total .....

HALFEN Ceiling anchor

HALFEN Soffit anchor type SOF



HALFEN SOF Soffit anchor,
support anchor for connecting elements made of natural stone or concrete, to ceilings and undersides of slabs, with HALFEN Cast-in channels or with approved HALFEN Dowels (both ordered separately),

including loose steel pin and sleeve.

Type SOF 808-A4
with
808 = permitted vertical load Fv = 800 N, at stand-off installation k = 80 mm,
A4 = stainless steel corrosion category III acc. to Z-30.3-6, or acc. to EN 1993-1-4: table A.1, row 3

or equivalent; deliver and install according to manufacturer's instructions.

number of items ..... price per item ..... total .....

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 Coupler

HBT
Rebend Connections

HDB
Shear Rails

HIT
Insulated Connection

HBB
bi-Trapez-Box®

HTT/HTF
Impact Sound Insulation Elements

HCC
Column Shoe

HSC
Stud Connector

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

DEHA KKT Spherical Head Lifting Anchor
DEHA HA Socket Anchor

DEHA HD-Socket Lifting Anchor System

FRIMEDA
TPA Lifting Anchor System

FPA
Façade Panel Anchors

MVA Sleeve Anchors
FA Flat Anchors

Body Anchor

UMA
Grout-In Anchors

SUK
Sub Structure

HK4
Brickwork Support System

DETAN
Tension Rod System

HALFEN

YOUR BEST CONNECTIONS

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