HALFEN Natural stone façades – many advantages from one source

Natural stone has numerous advantages when used for designing façades. It is a durable, low maintenance material which improves a building’s sound insulation. Natural stone façades also contribute to the aesthetic appearance of your project and makes it "standout".

Its heat storage properties make it an excellent material for insulating against summer heat. The heat is kept away from the core of the building, reducing the necessity to cool the building. These are just a few of the many 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 this type of ventilated curtain façade.

HALFEN has numerous years of experience and competence in façade construction, as our highly experienced project engineers have proven time and time again in various major projects with which we have been entrusted.

We offer customers a comprehensive package of planning and engineering services to reliably plan and realise their natural stone façades as reliably and as efficiently as possible.

Certified HALFEN quality

Quality assurance and safety are of ever increasing importance in the construction of buildings. The HALFEN Body anchors and HALFEN Grout-in anchors 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”, Germany’s renowned, independent and neutral, safety and quality testing organisation. The quality certificate is the first independent quality certificate awarded for the production and the construction of façade systems of this type.

The precondition for a quality-seal award are comprehensive tests 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.

Steel structures

A4: Steel, corrosion resistance class (CRC) III acc. to EN 1993-1-4: 2015-10, Table A.3 (group 1.4362, 1.4571...)

A2: Steel, corrosion resistance class (CRC) II acc. to EN 1993-1-4: 2015-10, Table A.3 (group 1.4311, 1.4307...)

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HALFEN NATURAL STONE SUPPORT SYSTEMS

Introduction

Thermal bridges with HALFEN Natural stone support systems

To meet the requirements for calculating thermal bridges, HALFEN provides the thermal bridge coefficient $\chi$ for their body anchors, HALFEN SUK Sub-structures elements and grout-in anchors.

The $\chi$-value defines 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. The values are dependent on both the thickness and thermal conductivity of the insulation, and the material of the main structure (concrete/brickwork).

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Technical Support

HALFEN Engineering Support
HALFEN engineering can provide planning and design service plus complementary consultation for your individual projects. Please contact us: see page 28 for contact information. Alternatively, simply scan the QR Code to visit our mobile website.
**HALFEN NATURAL STONE SUPPORT SYSTEMS**

**Introduction**

**Thermal bridge coefficient $\chi$ [W/K] for $\lambda_{\text{ins}} = 0.035$ (thermal conductivity of the insulation) for grout-in anchors in perforated brick**

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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 to the load-bearing structure are manufactured from stainless steel.

Stainless steel has a fourteen times lower thermal conductivity than aluminium. 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 thermal bridging and therefore heat loss.

**Thermal bridge coefficient $\chi$ [W/K] for $\lambda_{\text{ins}} = 0.035$ (thermal conductivity of the insulation) for SUK individual parts anchored in concrete**

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**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 transfer the vertical loads on pages 13 and 15 in all three load directions. With appropriate design all HALFEN Natural stone anchors can be adapted to meet safety requirements for the relevant earthquake zones.
HALFEN NATURAL STONE SUPPORT SYSTEMS

Introduction

Custom solutions

Construction project: Allerhuset, Denmark

The unique design of natural stone façades demands 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 are the 90 degrees projecting natural stone strips. These strips are attached to the precast sub structure of the building using HALFEN Natural stone anchors.

Construction project: Multihuset, Denmark

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

References

More references can be found on our website www.halfen.com. Or simply scan the QR Code.
HALFEN NATURAL STONE SUPPORT SYSTEMS

Applications

HALFEN Body anchors

Features
HALFEN Body anchors used together with HALFEN HTA/HZA Cast-in channels 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
• three-dimensional adjustability
• flexible fixing methods
• vertical anchor adjustment (using a serrated plate or wedge plate)
• horizontal anchor adjustment (using a spade bolt)
• anchors are adjustable by 15°
• TÜV/LGA quality tested
• can be subjected to load immediately after installation → fast construction
• natural stone panel with pin support
• quantifiable thermal bridge coefficient $\chi$ [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 makes them suitable for both horizontal and vertical joints in natural stone panel façades.

Adjustment is by casting the anchors in a sufficiently large, pre-drilled mortar filled 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 the drillhole using cement based mortar
• can be used for large stand-off installations and high loads
• suitable for seismic loads in earthquake regions
• natural stone panel with pin support
• quantifiable thermal bridge coefficient $\chi$ [W/K]
HALFEN NATURAL STONE SUPPORT SYSTEMS

Applications

HALFEN SUK Stainless steel support structure

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

It can be used for installation of large, varying stand-off 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
• height of suspended channel system freely adjustable
• horizontal adjustment (using a spade bolt)
• fast assembly and therefore faster construction times
• proven in numerous projects
• spans non-load-bearing sub structures
• panel/slab support with pin bearing
• suitable for custom designed constructions
• high corrosion resistance
• high load bearing 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 sub structures
• 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
HALFEN NATURAL STONE SUPPORT SYSTEMS
HALFEN Body Anchors

HALFEN Body anchor

The HALFEN Body anchors product range provides solutions for all installation requirements for natural stone façades.

Body anchors are three-dimensionally 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 of the natural stone slab is adjusted using a spade bolt. It is also possible to swivel the anchor by 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.

HALFEN BA Body anchor

- stand-off distances between 60 and 120 mm
- max. permissible load 600 N to 1300 N
- material; stainless steel A4 or A2

HALFEN DT Body anchor

- stand-off distances between 140 and 300 mm
- spade bolt secured with a locking bolt
- material; stainless steel A4 or A2

HALFEN DH Body anchor

- restraint anchor only, not suitable for carrying dead load of element
- stand-off distances between 60 and 320 mm
- max. permissible load 850 N to 1300 N
- material; stainless steel A4 or A2

HALFEN Scaffolding anchors for natural stone façades

See page 23. More informationen about HALFEN Scaffold anchors can be found in Technical Product Information "HALFEN Scaffold anchors". Complimentary download at: www.halfen.com/brochures/Catalogues/accessories
HALFEN NATURAL STONE SUPPORT SYSTEMS

HALFEN Body Anchors

HALFEN BA Body anchor

Material:
Stainless steel A4 or A2
Material specifications → page 2

HALFEN BA Body anchors are designed for 60 to 120 mm stand-off distances with a maximum load of 1300 N.

The anchors consist of a sturdy base element, a serrated plate and a spade bolt.

Ordering example

Pin dimensions of all HALFEN Body anchors:

- Loose anchor pin with collar for designs 1, 3 and 7
  ∅ 5 × 70 mm
- Fixed half-pin for designs 2 and 4
  ∅ 5 × 35 mm
- Sleeve
  ∅ 7.5 × 40 mm

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 the whole unit.

Note
Please order fixings separately (→ page 20). Select by RZ, ∅ and type of material in which anchored.

HALFEN Body Anchors

HALFEN BA Body anchor

<table>
<thead>
<tr>
<th>Body anchors BA</th>
<th>Perm. load Fv [N]</th>
<th>Stand-off distance k [mm]</th>
<th>min k [mm]</th>
<th>max k [mm]</th>
<th>Support body x [mm]</th>
<th>L [mm]</th>
<th>h [mm]</th>
<th>e [mm]</th>
<th>Spade bolt d [mm]</th>
<th>c [mm]</th>
<th>l [mm]</th>
<th>z [mm]</th>
<th>Connection</th>
<th>Material</th>
<th>Design*</th>
<th>Version</th>
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<td>52</td>
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<td>12</td>
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<td>70</td>
<td>100</td>
<td>65</td>
<td>47</td>
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<td>74</td>
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<td>8.5 × 28</td>
<td>A2</td>
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<tr>
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<td>1,300</td>
<td>100</td>
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<td>8.5 × 28</td>
<td>A2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

perm. Fh = actual Fv
HALFEN Body Anchor

**HALFEN DT Body anchor**

HALFEN DT Body anchors are suitable for large stand-off distances of 140 mm up 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 for installation. 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 adaptable for right to left installation. After aligning each natural stone panel the clamping bolts are tightened with a torque of 5 Nm.

**Ordering example**

```plaintext
Anchor type  | DT - 414 - 1 - A4
Version      |                
Design*      |                
Material     |                
* see page 12
```

**Body anchors DT**

<table>
<thead>
<tr>
<th>Type</th>
<th>Perm. load Fv[N]</th>
<th>Stand-off distance [mm]</th>
<th>Support body [mm]</th>
<th>Spade bolt [mm]</th>
<th>Connection [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>k</td>
<td>min k</td>
<td>max k</td>
<td>x</td>
<td>L</td>
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<td>414</td>
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<td>433</td>
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<td>360</td>
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<td>390</td>
<td>105</td>
</tr>
</tbody>
</table>

**Note**

Please order fixings separately (→ page 20). Select by RZ, ∅ and type of material in which anchored.

HALFEN Body Anchors is supplied ready for installation. 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 adaptable for right to left installation. After aligning each natural stone panel the clamping bolts are tightened with a torque of 5 Nm.
HALFEN NATURAL STONE SUPPORT SYSTEMS

HALFEN Body Anchors

HALFEN DH Body anchor

Material:
Stainless steel A4 or A2
Material specifications → page 2

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

The anchor is mainly used at slab edges and corners or for parapet elements. It is designed for stand-off installation of 60 to 320 mm and horizontal loads of up to 1,300 N. The stand-off distance from the main load-bearing structure is adjusted using the spade bolt.

Vertical adjustment is with the 9 × 30 mm slot. This anchor is also laterally adjustable by swivelling the whole unit. The body anchor is delivered with an additional counter nut, which additionally locks the spade bolt.

Standard designs for BA, DT and DH:

- Design 1: Spade bolt with loose pin and sleeve
- Design 2: Spade bolt with fixed half-pin
- Design 3: Spade bolt with 2 loose pins and 2 sleeves
- Design 4: Spade bolt with 2 fixed half-pins

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

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

Body anchors DH

<table>
<thead>
<tr>
<th>Type including locking nut</th>
<th>Perim. load (F_h) [N]</th>
<th>Stand-off distance [mm]</th>
<th>Support body [mm]</th>
<th>Spade bolt [mm]</th>
<th>Connection [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(k)</td>
<td>min</td>
<td>max</td>
<td>(x)</td>
<td>(h)</td>
</tr>
<tr>
<td>1006</td>
<td>850</td>
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<td>1008</td>
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<td>88</td>
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<tr>
<td>1010</td>
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<td>100</td>
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</tr>
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<td>1732</td>
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<td>320</td>
<td>334</td>
<td>25</td>
<td>80</td>
</tr>
</tbody>
</table>

Note
Please order fixings separately (→ page 20). Select by \(R_z\), \(\varnothing\) and type of material in which anchored.

HALFEN Body Anchors
HALFEN DH Body anchor

Material:
Stainless steel A4 or A2
Material specifications → page 2

The anchor is mainly used at slab edges and corners or for parapet elements. It is designed for stand-off installation of 60 to 320 mm and horizontal loads of up to 1,300 N. The stand-off distance from the main load-bearing structure is adjusted using the spade bolt.

Vertical adjustment is with the 9 × 30 mm slot. This anchor is also laterally adjustable by swivelling the whole unit. The body anchor is delivered with an additional counter nut, which additionally locks the spade bolt.

Standard designs for BA, DT and DH:

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- Design 2: Spade bolt with fixed half-pin
- Design 3: Spade bolt with 2 loose pins and 2 sleeves
- Design 4: Spade bolt with 2 fixed half-pins

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

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

Body anchors DH

<table>
<thead>
<tr>
<th>Type including locking nut</th>
<th>Perim. load (F_h) [N]</th>
<th>Stand-off distance [mm]</th>
<th>Support body [mm]</th>
<th>Spade bolt [mm]</th>
<th>Connection [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(k)</td>
<td>min</td>
<td>max</td>
<td>(x)</td>
<td>(h)</td>
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<td>1726</td>
<td>1,300</td>
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<td>1,300</td>
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<td>334</td>
<td>25</td>
<td>80</td>
</tr>
</tbody>
</table>

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HALFEN NATURAL STONE SUPPORT SYSTEMS
HALFEN Grout-in Anchors

HALFEN UMA Support anchor

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 installations of up to 300 mm with maximum vertical loads of 4300 N are possible. A sufficiently dimensioned drill hole, filled with cement mortar, allows three-dimensional adjustability of the anchor. The anchors are type tested and are available in various designs.

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 countersink screw (from UMA-16) incl. 2 × EPDM washers

Ordering example

<table>
<thead>
<tr>
<th>Anchor type</th>
<th>Diameter d [mm]</th>
<th>Design</th>
<th>Anchor length [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>UMA-16 - 3 - 210</td>
<td>16</td>
<td>3</td>
<td>210</td>
</tr>
</tbody>
</table>

Material:
Stainless steel A4 or A2 → page 2

Separate serviceability certificates for anchor bending are required.

**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 countersink screw (only for UHA-10) incl. 2 × EPDM washers

Material:
Stainless steel A4 or A2 → page 2

Independent serviceability certificate for anchor flexing is required.

HALFEN UMA Support anchor

<table>
<thead>
<tr>
<th>Type</th>
<th>UMA-10</th>
<th>UMA-12</th>
<th>UMA-16</th>
<th>UMA-18</th>
<th>UMA-22</th>
<th>UMA-25</th>
<th>UMA-28</th>
<th>UMA-33</th>
<th>UMA-5</th>
<th>UMA-7</th>
<th>UMA-10</th>
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<td>22</td>
<td>25</td>
<td>28</td>
<td>33</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>c [mm]</td>
<td>5.0</td>
<td>5.5</td>
<td>7.0</td>
<td>7.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>1.6</td>
<td>2.5</td>
<td>5.0</td>
</tr>
</tbody>
</table>

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 in horizontal joints

<table>
<thead>
<tr>
<th>Cantilever k [mm]</th>
<th>Anchoring substrate: Concrete ≥ C20/25</th>
<th>Support anchor</th>
<th>Anchoring in horizontal joints</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concrete ≥ C12/15</td>
<td>Anchor type</td>
<td>UMA 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø 20</td>
<td>Ø 22</td>
</tr>
<tr>
<td>Bonding depth t₀ ≥ 90</td>
<td>FV = perm. vertical load per anchor [N]</td>
<td>H₄</td>
<td>H₄</td>
</tr>
<tr>
<td></td>
<td>h = min. component thickness [mm]</td>
<td>H₄</td>
<td>H₄</td>
</tr>
<tr>
<td></td>
<td>k = cantilever</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>z = 21 mm</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>c = → table on page 13</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

1. When determining the vertical load Fᵥ 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.

2. Concrete C12/15 is possible; req. pull-out resistance tests.

3. min t₀ ≥ 80 mm; acc. to type test reports higher loads are possible if more bonding depth

4. according to procedure A, DIN 18516-3, 6.3.7.2.

5. according to procedure C, DIN 18516-3, 6.3.7.4.
HALFEN NATURAL STONE SUPPORT SYSTEMS
HALFEN Grout-in Anchors in Brickwork

Anchoring substrate: Brickwork min. M 12/IIa

Notes on anchor selection for pages 14 and 15:
1. Select cantilever size k
2. Select suitable vertical load FV (for each anchor) from the column, taking HH and HV into consideration
3. Select anchor type and length L and enter as shown in the ordering example (→ page 13)

<table>
<thead>
<tr>
<th>Brickwork M 12/IIa</th>
<th>Support anchor</th>
<th>Restraint anchor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchor type</td>
<td>UMA 10</td>
<td>UMA 12</td>
</tr>
<tr>
<td>Drill hole ∅i [mm]</td>
<td>φ 20</td>
<td>φ 22</td>
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<td>Component thickness h ≥ 240 mm</td>
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</table>

- FV 275 420 800 1380
- HH 649 992 1067 1067
- HV 325 496 944 1067
- L 180 180 180 180

The maximal horizontal load must always be verified through tests in accordance with section 8 of DIN18516-3. According to DIN18516-3, 6.3.6, for static verification of a single anchor a maximum of H = 1067 N (F₀k = 4.0 kN) can be assumed.

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Advantages of the HALFEN Support structure systems

The standard HALFEN Support structure system consists of a series of vertical channels between floors. Fixings are only required at comparatively large intervals. This reduces the number of required connections to the underlying main support structure.

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.

Two main categories of support structures for different requirements are available from HALFEN:

- 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 channel support structure is very easy to install and a cost effective alternative.

For detailed information about HALFEN Support structure systems please contact us.

For more information please visit www.halfen.com

Applications

mima – Middlesbrough Institute of Modern Art/England

HALFEN SUK Channel support structure
The HALFEN SUK System is an adjustable suspended channel system with support and restraint anchors that can easily be adjusted to any height for façade stand-off installations > 160mm.

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.

The system is made up of a small number of easy to install components and is therefore increases ease of installation. Non-load-bearing areas and recesses can be spanned.

The necessity for fewer anchor points allows quick installation of the stainless steel support structure and therefore faster façade element installation.

**Material:**
Stainless steel A4
Material specifications → page 2

Please contact our technical office for planning and ordering services. → see page 28 for contact information.

**SUK types and their applications**

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

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

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

4. SUK-SV - 0,8 - 8
   - Threaded connection with countersink screw M12

5. SUK-HS - 1,6 - 1
   - Restraint anchor with 1 loose pin

6. SUK-TSG - 0,8 - 1 - M12
   - Support anchor with 1 loose pin

7. SUK-TSG - 0,8 - 2 - M12
   - Support anchor with 2 fixed half-pins

8. SUK-TSG - 1,5 - 2 - M16
   - Support anchor with 2 fixed half-pins

9. SUK-TSG - 0,8 - 1 - M12
   - Support anchor with 1 loose pin

10. SUK-TSG - 1,5 - 1 - M16
    - Support anchor with 1 loose pin
Support structure with body anchors, system UKB

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

The type 606 HALFEN BA Body anchors are fixed to the front of the vertical channels.

The UKB Support structure allows for stand-off installation between 130 and 320 mm and three-dimensional adjustments of ± 20 mm.

The support brackets are made of stainless steel A4.

They are either fastened to HALFEN Cast-in channels or to the load-bearing main structure using HALFEN Anchor bolts. Depending on environmental conditions, protection against surface corrosion must be taken into account, for example with barrier tape.

Material:
Aluminium (EN-A W6060)
stainless steel A4

material specifications → page 2

For smaller stand-off sizes and exact details please contact us.
→ see page 28 for contact information.

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HALFEN NATURAL STONE SUPPORT SYSTEMS
HALFEN Support structure

References

Museum of Liverpool/England

mima – Middlesbrough Institute of Modern Art/England
HALFEN NATURAL STONE SUPPORT SYSTEMS
HALFEN Fixing Material

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

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<td>HTA-CE 38/17</td>
<td>- A4</td>
<td>M10</td>
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Fixing the body anchors with HALFEN HB-B Wedge anchor

HALFEN HB-B Wedge anchor for non-cracked concrete

<table>
<thead>
<tr>
<th>HALFEN HB-B Wedge anchor</th>
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<tbody>
<tr>
<td>HB-8 - 8-10-19/ 75-A4</td>
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<td>- BA 606 to BA 1312</td>
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<td>- SOF 805 to SOF 819</td>
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<td>HB-8-10-30-36/105-A4</td>
<td>0432.060-00029</td>
<td>- DT 1314 to DT 1318</td>
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<td>HB-8-12-50-65/145-A4</td>
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Fixing the HALFEN Body anchors with HALFEN HB-BZ Wedge anchor

HALFEN HB-BZ Wedge anchor for cracked concrete

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<td>- DT 1320 to DT 1330</td>
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</table>
HALFEN LW-ALU 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 non DIN compliant pin and glue process can be omitted. The façade slabs can be installed quickly, simply and efficiently in the precast factory or 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.

**HALFEN NATURAL STONE SUPPORT SYSTEMS**

*Fixing Material for Natural Stone*

**HALFEN LW-ALU Soffit angles**

The non DIN compliant pin and glue process can be omitted. The façade slabs can be installed quickly, simply and efficiently in the precast factory or 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.

**HALFEN LW Jamb/recess bracket: dimensions**

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**Material:**

Aluminium

**Further details**

Please contact our technical team for inquiries concerning specific detailing.

**Contact information:** see page 28.
### HALFEN LW Soffit angles and LW-J Adjustable soffit angles

**Dimensions**
LW -1/-2 and LW J-1/J-2, adjustable

**Material:**
Stainless steel A4
Material specifications → page 2

### HALFEN SOF Soffit anchor

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

**Dimensions**
HALFEN SOF Soffit anchor

**Material:**
Stainless steel A4
Material specifications → page 2

**SOF Soffit anchor**

<table>
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<tr>
<th>Type</th>
<th>k [mm]</th>
<th>min k [mm]</th>
<th>max k [mm]</th>
<th>X [mm]</th>
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</table>
Scaffolding used in the construction industry must be planned in accordance with DIN EN 12810 and DIN EN 12811. These standards include type specific requirements for initial scaffolding for building and also for façade installations and maintenance work. To connect to the supporting structure of the buildings, scaffolding anchors are used which must be technically capable of securing the scaffolding reliably through the thickness of the façade. This is the only safe method to install the insulation and façade elements for the building from the scaffolding.

The position, fixing method and load-bearing capacity of the scaffold anchors must be taken into account when planning the façade and included in the building’s documentation. The choice of anchors depends on the type of scaffolding selected, the anchor grid of the scaffolding and the distribution of the joints in the façade. HALFEN manufactures the scaffold anchors and also specifies the maximum working loads for each anchor both vertically and horizontally to the façade to ensure the required reliability in planning and application.

Loads from the scaffold are transferred to the HALFEN Scaffold anchors using reusable straps or ringbolts. HALFEN Scaffold anchors remain in the building after dismantling the scaffold and are concealed so not to disrupt the façade appearance. This ensures that a scaffold can be re-erected later without additional anchoring measures.

To meet the ever-increasing demands on thermal insulation HALFEN HGA-F Scaffold anchors can be installed with a thermal separation strip between the building and the anchor. The thermal separation strips reduce the heat loss caused by the scaffold anchors and improves the heat transmission efficiency of the building.
Installation Sequence

Anchoring in horizontal joints

Installation direction:
from left → right or from right → left
always from bottom → top

- Ensure the façade is measured correctly 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 second row of slabs, ensure correct hole diameter and minimum drill hole depth.
- 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.
  - Note: Always use the supplied washer when using HALFEN Bolts or HALFEN Dowels to attach the HALFEN DH Body anchor to the main load bearing structure.
- Replace the previously removed thermal insulation.
- Fill the pin holes above the anchor with mortar.
- Place the first row of slabs onto the support anchors.
- Fix and align the support anchors for the second row of slabs with approved anchor bolts i.e. HALFEN HB-BZ.
- Make any fine adjustments to the first row of slabs: allow at least a 2 mm gap between the top edge of the lower row of façade slabs 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 in the slab below.
- Dimensions acc. to the detail “Pin, fixing hole and joint dimensions [mm]” (see right) must be observed!
- The second 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 countersink screws and anchor bolts using a torque wrench adjusted to the correct torque!

**Detail**
Pin, fixing hole and joint dimensions [mm]
Anchoring in vertical joints

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

**Example installation direction:**
- from left → right
- always from bottom → top

- Ensure the façade 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.

**Note:** Always use the supplied washer when using HALFEN Bolts or HALFEN Dowels to attach the HALFEN DH Body anchor to the main load bearing structure.

- Replace the previously removed thermal insulation.
- Place the natural stone slab on the first support anchor and place a wedge under the right edge.
- Fix support and restraint anchor for the first 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.
- Fill the lower fixing holes (support anchor) of the second natural stone slab with mortar.
- Push the second natural stone slab against the first slab.
- Dimensions acc. to the detail below “Pin, fixing hole and joint dimensions [mm]” must be observed!
- Fix the support and the restraint anchors for the second vertical joint; then finely adjust the slab; repeat the procedure for the next anchors.

**Installation of the last natural stone slab of the row**

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

**Important:**
- Tighten all countersink screws and anchor bolts with the correct torque!

---

**Detail:**
**Pin, fixing hole and joint dimensions [mm]**

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<th>A</th>
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<td>be necessary</td>
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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 resistant class III material, according to EN 1993-1-4: 2015. For detailed steel material specifications see page 2.

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

Anchor pins

Fv

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) Installation of natural stone anchors in vertical or horizontal joints

Calculating the panel weight:

Panel weight:
\[ F_v = b \times h \times d \times g \]
HALFEN NATURAL STONE SUPPORT SYSTEMS
Tender Specifications/Examples

HALFEN Body anchor type BA 1308
HALFEN BA Body anchor, support anchor for connecting façade elements 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 TÜV/LGA certification of quality,

Type BA 1308-D-A4 with
1308 = permitted load F_V = 1300 N, with a stand-off installation k = 80 mm
D = design alternative .......... (1 = with loose pin and sliding sleeve, 2 = with press-fit half-pin)
A4 = stainless steel, corrosion resistance class (CRC) III acc. to EN 1993-1-4: 2015-10, Table A.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 elements 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 TÜV/LGA certification of quality,

Type UMA 16-D-L-A4 with
16 = anchor diameter 16 mm,
D = design alternative .......... (1 = with loose pin and sliding sleeve, 2 = with press-fit half-pin)
L = anchor length (120 / 150 / 180 / 210 / 240 / 270 mm)
A4 = stainless steel, corrosion resistance class (CRC) III acc. to EN 1993-1-4: 2015-10, Table A.3

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

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

Tender specifications on the Internet
Further tender specifications can be found at www.halfen.de/Service/Tender texts.
Or just scan the QR code. Tender texts are only available in German.
### CONTACT HALFEN WORLDWIDE

HALFEN is represented by subsidiaries in the following countries, please contact us!

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>Phone</th>
<th>E-Mail</th>
<th>Internet</th>
<th>Fax</th>
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<tbody>
<tr>
<td>Austria</td>
<td>HALFEN Gesellschaft m.b.H. Leonard-Bernstein-Str. 10 1220 Wien</td>
<td>+43-1-2596770</td>
<td><a href="mailto:office@halfen.at">office@halfen.at</a></td>
<td><a href="http://www.halfen.at">www.halfen.at</a></td>
<td></td>
</tr>
<tr>
<td>Belgium/Luxembourg</td>
<td>HALFEN N.V. Borkestraat 131 2900 Schoten</td>
<td>+32-3-6580720</td>
<td><a href="mailto:info@halfen.be">info@halfen.be</a></td>
<td><a href="http://www.halfen.be">www.halfen.be</a></td>
<td>+32-3-6581533</td>
</tr>
<tr>
<td>China</td>
<td>HALFEN Construction Accessories Distribution Co.Ltd. Room 601 Tower D, Vantone Centre No. A6 Chao Yang Wen Wai Street Chaoyang District Beijing · P.R. China 100020</td>
<td>+86-10 5907 3200</td>
<td><a href="mailto:info@halfen.cn">info@halfen.cn</a></td>
<td><a href="http://www.halfen.cn">www.halfen.cn</a></td>
<td>+86-10 5907 3218</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>HALFEN s.r.o. Business Center Šafránkova Šafránkova 1238/1 155 00 Praha 5</td>
<td>+420-311-690 060</td>
<td><a href="mailto:info@halfen.cz">info@halfen.cz</a></td>
<td><a href="http://www.halfen.cz">www.halfen.cz</a></td>
<td>+420-235-314 308</td>
</tr>
<tr>
<td>France</td>
<td>HALFEN S.A.S. 18, rue Goubet 75019 Paris</td>
<td>+33-1-44523100</td>
<td><a href="mailto:halfen@halfen.fr">halfen@halfen.fr</a></td>
<td><a href="http://www.halfen.fr">www.halfen.fr</a></td>
<td>+33-1-44523152</td>
</tr>
<tr>
<td>Germany</td>
<td>HALFEN Vertriebsgesellschaft mbH Liebigstr. 14 40764 Langenfeld</td>
<td>+49-2173-970-0</td>
<td><a href="mailto:info@halfen.de">info@halfen.de</a></td>
<td><a href="http://www.halfen.de">www.halfen.de</a></td>
<td>+49-2173-970 225</td>
</tr>
<tr>
<td>Italy</td>
<td>HALFEN S.r.l. Soc. Unipersonale Via F.Ili Bronzetti N° 28 24124 Bergamo</td>
<td>+39-035-0760711</td>
<td><a href="mailto:tecnico@halfen.it">tecnico@halfen.it</a></td>
<td><a href="http://www.halfen.it">www.halfen.it</a></td>
<td>+39-035-0760799</td>
</tr>
<tr>
<td>Netherlands</td>
<td>HALFEN b.v. Oostermaat 3 7623 CS Borne</td>
<td>+31-74-267 14 49</td>
<td><a href="mailto:info@halfen.nl">info@halfen.nl</a></td>
<td><a href="http://www.halfen.nl">www.halfen.nl</a></td>
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<td>HALFEN AS Postboks 2080 4095 Stavanger</td>
<td>+47-5182 34 00</td>
<td><a href="mailto:post@halfen.no">post@halfen.no</a></td>
<td><a href="http://www.halfen.no">www.halfen.no</a></td>
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<tr>
<td>Poland</td>
<td>HALFEN Sp. z o.o. Ul. Obornicka 287 60-691 Poznan</td>
<td>+48-61-622 14 14</td>
<td><a href="mailto:info@halfen.pl">info@halfen.pl</a></td>
<td><a href="http://www.halfen.pl">www.halfen.pl</a></td>
<td>+48-61-622 14 15</td>
</tr>
<tr>
<td>Spain</td>
<td>HALFEN IBERICA, S.L. Poligono Industrial Santa Ana c/ Ignacio Zuloaga 20 28522 Rivas-Vaciamadrí</td>
<td>+34 916 669 181</td>
<td><a href="mailto:info@halfen.es">info@halfen.es</a></td>
<td><a href="http://www.halfen.es">www.halfen.es</a></td>
<td>+34 916 669 661</td>
</tr>
<tr>
<td>Sweden</td>
<td>Halfen AB Vädersgatan 5 412 50 Göteborg</td>
<td>+46-31-985 800</td>
<td><a href="mailto:info@halfen.se">info@halfen.se</a></td>
<td><a href="http://www.halfen.se">www.halfen.se</a></td>
<td>+46-31-985 801</td>
</tr>
<tr>
<td>Switzerland</td>
<td>HALFEN Swiss AG Hertistrasse 25 8304 Wallisellen</td>
<td>+41-44-849 787</td>
<td><a href="mailto:info@halfen.ch">info@halfen.ch</a></td>
<td><a href="http://www.halfen.ch">www.halfen.ch</a></td>
<td>+41-44-849 789</td>
</tr>
<tr>
<td>United Kingdom/</td>
<td>HALFEN Ltd. A1/A2 Portland Close Houghton Regis LU5 5AW</td>
<td>+44-1582-470300</td>
<td><a href="mailto:info@halfen.co.uk">info@halfen.co.uk</a></td>
<td><a href="http://www.halfen.co.uk">www.halfen.co.uk</a></td>
<td>+44-1582-470304</td>
</tr>
<tr>
<td>Ireland</td>
<td>HALFEN USA Inc. PO Box 18687 San Antonio TX 78218</td>
<td>+1800.423.9140</td>
<td><a href="mailto:info@halfenusa.com">info@halfenusa.com</a></td>
<td><a href="http://www.halfenusa.com">www.halfenusa.com</a></td>
<td>+1 877.683.4910</td>
</tr>
<tr>
<td>United States of America</td>
<td>HALFEN International GmbH Liebigstr. 14 40764 Langenfeld / Germany</td>
<td>+49-2173-970-0</td>
<td><a href="mailto:info@halfen.com">info@halfen.com</a></td>
<td><a href="http://www.halfen.com">www.halfen.com</a></td>
<td>+49-2173-970-849</td>
</tr>
</tbody>
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