HALFEN HK5
BRICKWORK SUPPORT BRACKET, Type -W
Type test S-WUE/170430
HALFEN HK5 SUPPORT BRACKETS

General Note

Use of third-party products

This approval only applies to original HALFEN products. The specifications in this approval are not transferable to other products. Users are fully liable for personal injuries and material damage caused by third-party products used instead of HALFEN products.

⚠️ Note: This translation of the original German version has not been verified by the (LGA) Landesgewerbeanstalt Bayern.
<table>
<thead>
<tr>
<th>Date</th>
<th>Ref no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>14th December 2017</td>
<td>Fk / sd</td>
</tr>
</tbody>
</table>

**Type Test**  
**Test report no.1**

**Type test number:**  
S-WUE/170430

**Object:**  
Type test HALFEN HK5-W Brickwork support bracket according to Eurocode including alternative design of the compression strut with adjustment screw

**Type test applicant:**  
HALFEN GmbH  
Liebigstraße 14, 40764 Langenfeld, Germany

**Static documents prepared by:**  
HALFEN GmbH  
Liebigstraße 14, 40764 Langenfeld, Germany

**Valid until:**  
31st December 2022

The HK5-W Brickwork support brackets were type tested with regard to structural stability on the basis of the documents listed under item 1.
1.1 Test documents

1.1.1 Static calculation:
HALFEN Brickwork support bracket, type HK5-W
Additional verification for the bracket with adjustment screw: 34 pages (pages 1 to 34)

1.1.2 Design drawings: 7 drawing (annex 1 to 7)

1.2 Further documents:

1.2.1 General building authority approval issued by the German Centre of Competence for Construction (Allgemeine bauaufsichtliche Zulassung des Deutschen Instituts für Bautechnik, Berlin), for "Products, Stainless steel components and fixings", Approval number Z-30.3-6 from 12th May 2017; Applicant: Stainless Steel Information centre, Sohnstraße 65, 40237 Düsseldorf, Germany.

1.2.2 General building authority approval issued by the German Centre of Competence for Construction (Allgemeine bauaufsichtliche Zulassung des Deutschen Instituts für Bautechnik, Berlin), for "Fixings; steel type 'Duplex' Steel type 1.4062, 1.4162, 1.4362 and 1.4482", Approval number Z-30.3-23; from 6th October 2015; Applicant: HALFEN GmbH, Liebigstraße 14, 40764 Langenfeld.

1.3 Basic documents:

Technical building regulations used as technical guidelines, in particular:

- DIN EN 1990: 2010:12 Basics of structural design
- DIN EN 1992-1-1/NA/A1 Amendment A1 to the application document
- DIN EN 1993-1-1: 2010-12 Design and construction of steel structures
- DIN EN 1993-1-1/NA: 2015-08 National application document to EC3
- DIN EN 1993-1-1/NA/A1: 2017-03 Amendment A1 to the application document
- DIN EN 1993-1-4: 2015-10 Additional regulations for the use of stainless steels
1.3 Basic documents:

- DIN EN 1993-1-8: 2010-12: Design of connections in steel structures
- DIN EN 1993-1-8/NA: 2010-12: Applicable national annex
- DIN EN 1996-1-1: 2013-02: Masonry constructed buildings

2 Component description:

The HALFEN HK5-W Brickwork support bracket consists of a bracket head, a web plate, a support plate and a pressure plate. The brackets support the dead weight of 11.5 cm thick facing brickwork renders via the support plate and transfer the load to a reinforced concrete substructure. They are designed for loads categories of 4.0 kN and 8.0 kN. Due to the horizontal tolerance of up to 15 mm variations in the ventilation gap are also accounted for. For an 11.5 cm thick render the K4 bracket head has a vertical installation tolerance of 35 mm and the K5, K5C or the K5D bracket heads have 20 mm.

Alternatively, the relevant static analyses for the brickwork support bracket are done using an adjustable screw.

3 Actions

3.1 Permanant loads according to DIN EN 1991-1-1:2010-12 with DIN EN 1991-1-1/NA:2010-12

3.2 Special loads:
Single (point) loads: 4.0 kN and 8.0 kN
These assumptions are considered to be applicable.

4 Construction material

4.1 Concrete compression strength at least C 20/25 (Support structure)

4.2 Structural steel

Lean Duplex steel; material number 1.4062, 1.4162, 1.4362 or 1.4482,
S 355 Stainless steel

4.2 Bolts; strength class 70

Note: This translation of the original German version has not been verified by the LGA.
5 Test results:

5.1 The documents listed under item 1.1 were checked for structural stability, but not for other building regulation requirements or other official requirements. They comply with currently valid technical building regulations.

5.2 The HALFEN Brickwork support bracket type K310 were additionally designed as a complete system for load category 1.35*4.0 kN /1.35*8.0 kN by independent comparative calculations as non-linear systems, taking into account the II. order theory with a pre-deformation of the compression strut of 1/200 using the Infocad program. It could be confirmed that the load capacity of this system was not exceeded.

5.3 The adjustment screw must be inserted into the sleeve to at least half the length of the weld seam.

6 Special notes

6.1 Other information included in the building authority approvals for “Products, Stainless steel components and fixings” and for “Fixings; duplex steels 1.4062, 1.4162, 1.4362 or 1.4482” in particular with regard to welding and corrosion protection must be observed.

6.2 Load application into the load-bearing structure using anchor bolts or anchor channels is not included in this calculation. See the relevant building authority approvals for applicable loads. The design of wall claddings and the connection of cladding to the support structure must be carried out using brick tie anchors according to DIN EN 1996.

7 Cases specific documents required for individual building applications

7.1 The available test report no.1, S-WUE/170430, and the design plans for the corresponding type in accordance with item 1.1

7.2 General construction plans

8 General provisions

8.1 The static type test does not release the client from the obligation to obtain a building permit for each building project, unless the applicable building regulations or other legal provisions specifically exempts him from this.

8.2 The type test may save the building supervisory authority the task of replicating the static verification in the calculation documents, but not from the obligation to check the conformity of the construction procedure with the conditions and results of the examined documents.

Note: This translation of the original German version has not been verified by the LGA.
8.3 The verified documents may only be used or published in the original version approved by the Structural Safety Body. In cases of doubt, the audited documents held by the Structural Safety Body are authoritative.

8.4 On request the period of validity of this type test can be extended by 5 years.

8.5 The applicant of the type test must notify the testing authority should significant changes occur before expiry of the type test, in particular:

- with regard to structural statics
- with regard to application method
- with regard to the technical specifications on which this static type test is based;
  building regulations, approvals or developments in engineering.

Der Bearbeiter: (Responsible engineer)  Der Leiter: (Head of Division)

Dipl.-Ing. Wolfgang Frick  Dipl.-Ing. Dieter Katz
Lfd. Baudirektor (Senior Building Manager)
HALFEN GmbH
Liebigstr. 14, 40764 Langenfeld
Tel. 02173 970 - 0, Fax. 02173 970 - 123

Note: This translation of the original German version has not been verified by the LGA.

8

Prüfamt für Standsicherheit
der Zweigstelle Würzburg

Type Test S-WUE/170430

Cladding brickwork:
Support structure:
Anchor material:
Fixing method:
Support structure:
Cladding brickwork:
Anchor material:

ANNEX 1
Type Test S-WUE/170430
HALFEN Brickwork support bracket
HK5-W-4.0; HK5-W-8.0 with bracket head K4
HALFEN GmbH
Liebigstr. 14, 40764 Langenfeld
Tel. 02173 970-0, Fax. 02173 970-123

1. For low loads \( Q_{\text{vorh}} < Q_d \) the diagonal tensile forces can be calculated in relation

\[
R_{\text{vorh}} = \frac{Q_{\text{vorh}}}{Q_d}
\]

2. The following torques must be applied when installing the fixing bolts: M10 \( \geq 15 \text{ Nm} \), M12 \( \geq 25 \text{ Nm} \), M16 \( \geq 60 \text{ Nm} \)

3. The design loads for the fixings materials used can be found in the relevant building authority approvals. If the tightening torques in the approvals are other than those specified under item 2, then these must be applied.

4. Bracket spacing is generally 25 cm, unless additional support angles are installed, then spacing distances are greater.

5. The bracket head including the slotted adjustment plate and the horizontal welding seam bracket head / web plate in section 1-1 or the connection of the bracket head / web plate using resistance projection welding are not part of this type test, these are regulated in a separate building authority approval.

<table>
<thead>
<tr>
<th>Load</th>
<th>Ventilation gap</th>
<th>Cantilever</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Q )</td>
<td>( Q_d )</td>
<td>( h )</td>
</tr>
<tr>
<td>[kN]</td>
<td>[kN]</td>
<td>[mm]</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>( \geq 80^{(1)} )</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>200</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>( \geq 90^{(2)} )</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>200</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>( \leq 100^{(3)} )</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>200</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>( \leq 110^{(3)} )</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>200</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>( \leq 120^{(2)} )</td>
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<td>10.8</td>
<td>200</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>( 120^{(1)} ) or ( 100^{(2)} )</td>
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<td>8.0</td>
<td>10.8</td>
<td>210</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>190</td>
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<tr>
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<td>10.8</td>
<td>210</td>
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<td>8.0</td>
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<td>270</td>
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</table>

Load: \( Q_d \) is the maximum acting force at the connection for the fixing.

**): The minimum edge distances of the pressure plates \( c_1 \) and \( c_2 \) were determined for a concrete strength of C20/25.

<table>
<thead>
<tr>
<th>Load</th>
<th>Load</th>
<th>( Q )</th>
<th>( Q_d )</th>
<th>( h )</th>
<th>( e )</th>
<th>( f )</th>
<th>( g )</th>
<th>( i )</th>
<th>( k )</th>
<th>( l )</th>
<th>( m )</th>
<th>( n )</th>
<th>( \text{max Rad} )</th>
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<tbody>
<tr>
<td>[kN]</td>
<td>[kN]</td>
<td>[mm]</td>
<td>[mm]</td>
<td>[mm]</td>
<td>[mm]</td>
<td>[mm]</td>
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<td>[mm]</td>
<td>[mm]</td>
<td>[mm]</td>
<td>[mm]</td>
<td>[kN]</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>43</td>
<td>3</td>
<td>3</td>
<td>12.5</td>
<td>107.5</td>
<td>22</td>
<td>13</td>
<td>M10 / M12</td>
<td>20</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>8.0</td>
<td>10.8</td>
<td>68</td>
<td>5</td>
<td>8</td>
<td>16.5</td>
<td>113.5</td>
<td>25</td>
<td>17</td>
<td>M12 / M16</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HALFEN GmbH
Liebigstr. 14, 40764 Langenfeld
Tel. 02173 970 - 0, Fax. 02173 970 - 123

HALFEN Brickwork support bracket
HK5-W-4.0; HK5-W-8.0 with bracket head K4
Resistance projection welding
HALFEN GmbH
Liebigstr. 14, 40764 Langenfeld
Tel. 02173 970-0, Fax. 02173 970-123

Note: This translation of the original German version has not been verified by the LGA.

Fixing method: Anchor bolt or anchor channel
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4462 or 1.4529/1.4547 acc. to building authority approval or ETA

Support structure: ≥ C20/25
Cladding brickwork: according to DIN 1053 or DIN EN 1996-1-1
Anchor material: Bracket head, slotted adjustment plate, U bracket:
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4462 web plate, support plate, pressure plate:
Mat. no. 1.4062/1.4162/1.4362/1.4462

Cladding brickwork:
Support structure:
Anchor material:

ANNEX 2
Type Test S-WUE/170430

Resistivity projection welding

**Note:** The minimum edge distances of the pressure plates c1 and c2 were determined for a concrete strength of C20/25.

1. For low loads (Q_{\text{min}} < Q_d) the diagonal tensile forces can be calculated in relation:
   \[ R_{\text{min}} = R_{\text{u}} \times \frac{Q_{\text{min}}}{Q_d} \]

2. The following torques must be applied when installing the fixing bolts:
   - M10 ≥ 15 Nm, M12 ≥ 25 Nm, M16 ≥ 60 Nm

3. The design loads for the fixings materials used can be found in the relevant building authority approvals. If the tightening torques in the approvals are other than those specified under item 2, then these must be applied.

4. Bracket spacing is generally 25 cm, unless additional support angles are installed, then spacing distances are greater.

5. The bracket head including the slotted adjustment plate and the horizontal welding seam bracket head / web plate in section 1-1 or the connection bracket head / web plate using resistance projection welding are not part of this type test, these are regulated in a separate building authority approval.

### Load Ventilation gap Cantilever

<table>
<thead>
<tr>
<th>Q</th>
<th>Q_d</th>
<th>h</th>
<th>K</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>i</th>
<th>j</th>
<th>k</th>
<th>m</th>
<th>n</th>
<th>max Rzd</th>
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<tbody>
<tr>
<td>4.0 5.4</td>
<td>170</td>
<td>19.5</td>
<td>150</td>
<td>206.5</td>
<td>10</td>
<td>105</td>
<td>55</td>
<td>49</td>
<td>90</td>
<td>3</td>
<td>8.73</td>
<td></td>
</tr>
<tr>
<td>6.0 7.9</td>
<td>180</td>
<td>19.5</td>
<td>150</td>
<td>206.5</td>
<td>10</td>
<td>105</td>
<td>55</td>
<td>49</td>
<td>90</td>
<td>3</td>
<td>9.09</td>
<td></td>
</tr>
<tr>
<td>8.0 10.8</td>
<td>190</td>
<td>15.5</td>
<td>150</td>
<td>206.5</td>
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<td>105</td>
<td>55</td>
<td>49</td>
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<td>4</td>
<td>14.94</td>
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<td>150</td>
<td>206.5</td>
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<td>206.5</td>
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<td>4</td>
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<td>211.5</td>
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<td>120</td>
<td>4</td>
<td>22.20</td>
<td></td>
</tr>
<tr>
<td>18.0 25.7</td>
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<td>19.5</td>
<td>210</td>
<td>217.5</td>
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<td>155</td>
<td>55</td>
<td>49</td>
<td>120</td>
<td>4</td>
<td>26.80</td>
<td></td>
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<tr>
<td>20.0 28.3</td>
<td>250</td>
<td>19.5</td>
<td>210</td>
<td>217.5</td>
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<td>49</td>
<td>120</td>
<td>4</td>
<td>29.20</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The minimum edge distances of the pressure plates c1 and c2 were determined for a concrete strength of C20/25.

1. For low loads (Q_{\text{min}} < Q_d) the diagonal tensile forces can be calculated in relation:
   \[ R_{\text{min}} = R_{\text{u}} \times \frac{Q_{\text{min}}}{Q_d} \]

2. The following torques must be applied when installing the fixing bolts:
   - M10 ≥ 15 Nm, M12 ≥ 25 Nm, M16 ≥ 60 Nm

3. The design loads for the fixings materials used can be found in the relevant building authority approvals. If the tightening torques in the approvals are other than those specified under item 2, then these must be applied.

4. Bracket spacing is generally 25 cm, unless additional support angles are installed, then spacing distances are greater.

5. The bracket head including the slotted adjustment plate and the horizontal welding seam bracket head / web plate in section 1-1 or the connection bracket head / web plate using resistance projection welding are not part of this type test, these are regulated in a separate building authority approval.
HALFEN Brickwork support bracket
HK5-W-4.0; HK5-W-8.0 with bracket head K5 (weld seam)

Fixing method: Anchor bolt or anchor channel
Mat.no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4482
or 1.4529/1.4547 acc. to building authority approval or ETA

Support structure: ≥ C20/25
Cladding brickwork: according to DIN 1053 or DIN EN 1996-1-1
Anchor material: Bracket head, slotted adjustment plate, U bracket:
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4482
web plate, support plate, pressure plate:
Mat. no. 1.4062/1.4162/1.4362/1.4482

Support structure:

≥ C20/25

Cladding brickwork:
according to DIN 1053 or DIN EN 1996-1-1

Anchor material:
Bracket head, slotted adjustment plate, U bracket:
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4482
web plate, support plate, pressure plate:
Mat. no. 1.4062/1.4162/1.4362/1.4482

Cladding brickwork:

Support structure:

Anchor material:
Bracket head, slotted adjustment plate, U bracket:
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4482
web plate, support plate, pressure plate:
Mat. no. 1.4062/1.4162/1.4362/1.4482

1. For low loads (Q_{vorh} < Q_d) the diagonal tensile forces can be calculated in relation:

R_z,vorh = \frac{Q_{z,vorh}}{Q_d}

2. The following torques must be applied when installing the fixing bolts: M10 ≥ 15 Nm, M12 ≥ 25 Nm, M16 ≥ 60 Nm

3. The design loads for the fixings materials used can be found in the relevant building authority approvals. If the tightening torques in the approvals are other than those specified under item 2, then these must be applied.

4. Bracket spacing is generally 25 cm, unless additional support angles are installed, then spacing distances are greater.

5. The bracket head including the slotted adjustment plate and the horizontal welding seam bracket head / web plate in section 1-1 or the connection bracket head / web plate using resistance projection welding are not part of this type test, these are regulated in a separate building authority approval.

ANNEX 3
Type Test S-WUE/170430

HALFEN GmbH
Liebigstr. 14, 40764 Langenfeld
Tel. 02173 970-0, Fax. 02173 970-123
Fixing method: Anchor bolt or anchor channel

Support structure: ≥ C20/25

Cladding brickwork: according to DIN 1053 or DIN EN 1996-1-1

Anchor material: Bracket head, slotted adjustment plate, U bracket:
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4482
web plate, support plate, pressure plate:
Mat. no. 1.4062/1.4162/1.4362/1.4482

**Note:** This translation of the original German version has not been verified by the LGA.

### ANNEX 4

**Type Test S-WUE/170430**

**HALFEN Brickwork support bracket**

HK5-W-4.0; HK5-W-8.0 with bracket head K5C

<table>
<thead>
<tr>
<th>Load [kN]</th>
<th>Q&lt;sub&gt;v°&lt;/sub&gt; [kN]</th>
<th>Q&lt;sub&gt;d&lt;/sub&gt; [kN]</th>
<th>Ventilation gap [mm]</th>
<th>Cantilever [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>&lt;80</td>
<td>170</td>
<td>136, 184.5, 10, 106, 55, 31, 90, 3</td>
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<td>10.8</td>
<td>&lt;80</td>
<td>180</td>
<td>136, 184.5, 10, 106, 55, 31, 90, 3</td>
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<td>4.0</td>
<td>90</td>
<td>106</td>
<td>186, 236.5, 10, 151, 75, 35, 120</td>
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<td>10.8</td>
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<tr>
<td>8.0</td>
<td>10.8</td>
<td>210</td>
<td>136, 184.5, 10, 106, 55, 31, 90, 3</td>
<td>11.20</td>
</tr>
</tbody>
</table>

**R<sub>z,vorh</sub>**

\[ \frac{K}{e} \leq \left( \frac{4}{h} \right) \]

**Table 1:**

<table>
<thead>
<tr>
<th>Load [kN]</th>
<th>Q&lt;sub&gt;v°&lt;/sub&gt; [kN]</th>
<th>Q&lt;sub&gt;d&lt;/sub&gt; [kN]</th>
<th>Ventilation gap [mm]</th>
<th>Cantilever [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>43</td>
<td>3</td>
<td>12.5</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>46</td>
<td>5</td>
<td>16.5</td>
</tr>
</tbody>
</table>

**Footnotes:**

1. For low loads (Q<sub>v°</sub> < Q<sub>d</sub>) the diagonal tensile forces can be calculated in relation to

\[ R_{z,vorh} = \frac{K}{e} \cdot \frac{Q_{v°}}{Q_{d}} \]

2. The following torques must be applied when installing the fixing bolts: M10 ≥ 15 Nm, M12 ≥ 25 Nm, M16 ≥ 60 Nm

3. The design loads for the fixings materials used can be found in the relevant building authority approvals. If the tightening torques in the approvals are other than those specified under item 2, then these must be applied.

4. Bracket spacing is generally 25 cm, unless additional support angles are installed, then spacing distances are greater.

5. The bracket head including the slotted adjustment plate and the horizontal welding seam bracket head / web plate in section 1-1 or the connection bracket head / web plate using resistance projection welding are not part of this type test, these are regulated in a separate building authority approval.
Fixing method: Anchor bolt or anchor channel
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4462 or 1.4529/1.4547 acc. to building authority approval or ETA

Support structure: \( \geq \) C20/25

Cladding brickwork: according to DIN 1053 or DIN EN 1996-1-1

Anchor material: Bracket head, slotted adjustment plate, U bracket:
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4462 web plate, support plate, pressure plate:
Mat. no. 1.4062/1.4162/1.4362/1.4482

ANNEX 5
Type Test S-WUE/170430

HALFEN Brickwork support bracket HK5-W-4.0; HK5-W-8.0 with bracket head K5D
Resistance projection welding

HALFEN GmbH
Liebigstr. 14, 40764 Langenfeld
Tel. 02173 970-0, Fax. 02173 970-123

1. For low loads \( Q_{\text{vorh}} < Q_d \), the diagonal tensile forces can be calculated in relation
\[
R_{\text{vorh}} = \frac{R_{\text{f}} \cdot Q_{\text{vorh}}}{Q_d}
\]

2. The following torques must be applied when installing the fixing bolts:
M10 \( \geq \) 15 Nm, M12 \( \geq \) 25 Nm, M16 \( \geq \) 60 Nm

3. The design loads for the fixings materials used can be found in the relevant building authority approvals. If the tightening torques in the approvals are other than those specified under item 2, then these must be applied.

4. Bracket spacing is generally 25 cm, unless additional support angles are installed, then spacing distances are greater.

5. The bracket head includes the diagonal adjustment bracket and the horizontal welding seam bracket head / web plate in section 1-1 or the connection bracket head / web plate using resistance projection welding are not part of this type test, these are regulated in a separate building authority approval.

\[
\begin{array}{ccccccccccccc}
Q_d \,[\text{kN}] & Q_{\text{vorh}} \,[\text{kN}] & h \,[\text{mm}] & R_{\text{vorh}} \,[\text{kN}] & \Delta i \,[\text{mm}] & e \,[\text{mm}] & f \,[\text{mm}] & g \,[\text{mm}] & k \,[\text{mm}] & i \,[\text{mm}] & m \,[\text{mm}] & n \,[\text{mm}] & \text{max Rad} \,[\text{kN}] \\
4.0  & 10.8 & 43 & 3 & 12.5 & 113 & 22 & 13 & M10/M12 & 20 & 1 \\
8.0 & 10.8 & 46 & 5 & 16.5 & 115 & 25 & 17 & M10/M12 & 20 & 14
\end{array}
\]
Fixing method:
Anchor bolt or anchor channel
Mat.no. 1.4401/1.4404/1.4571 or. 1.4062/1.4162/1.4362/1.4462 or 1.4529/1.4547 acc. to building authority approval or ETA

Support structure:
≥ C20/25

Cladding brickwork:
according to DIN 1053 or DIN EN 1996-1-1

Anchoring material:
Bracket head, slotted adjustment plate, U bracket:
Mat. no. 1.4401/1.4404/1.4571 or 1.4062/1.4162/1.4362/1.4482 web plate, support plate, pressure plate:
Mat. no. 1.4062/1.4162/1.4362/1.4482

Note: This translation of the original German version has not been verified by the LGA.

### Type Test S-WUE/170430

**HALFEN Brickwork support bracket**
HK5-W-4.0; HK5-W-8.0 with bracket head K5D
(weld seam)

---

<table>
<thead>
<tr>
<th>Load</th>
<th>Verrelation gap</th>
<th>Cantilever</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>r</th>
<th>s</th>
<th>M</th>
<th>min c1</th>
<th>min c2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qd</td>
<td>Qv or Qh</td>
<td>h</td>
<td>K</td>
<td>e</td>
<td>f</td>
<td>g</td>
<td>i</td>
<td>k</td>
<td>l</td>
<td>n</td>
<td>max Rzd</td>
</tr>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>± 80</td>
<td>170</td>
<td>150</td>
<td>198.5</td>
<td>10</td>
<td>105</td>
<td>55</td>
<td>45</td>
<td>90</td>
<td>3</td>
</tr>
<tr>
<td>5.0</td>
<td>6.4</td>
<td>± 90</td>
<td>180</td>
<td>200</td>
<td>200.5</td>
<td>10</td>
<td>151</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>4</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>± 100</td>
<td>190</td>
<td>200</td>
<td>200.5</td>
<td>10</td>
<td>151</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>3</td>
</tr>
<tr>
<td>6.0</td>
<td>9.4</td>
<td>± 110</td>
<td>200</td>
<td>200</td>
<td>198.5</td>
<td>10</td>
<td>105</td>
<td>55</td>
<td>45</td>
<td>90</td>
<td>3</td>
</tr>
<tr>
<td>5.0</td>
<td>10.8</td>
<td>± 120</td>
<td>210</td>
<td>150</td>
<td>198.5</td>
<td>10</td>
<td>105</td>
<td>55</td>
<td>45</td>
<td>90</td>
<td>3</td>
</tr>
<tr>
<td>4.0</td>
<td>10.4</td>
<td>± 130</td>
<td>220</td>
<td>150</td>
<td>200.5</td>
<td>10</td>
<td>151</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>4</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>± 140</td>
<td>230</td>
<td>300.5</td>
<td>10</td>
<td>201</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>4</td>
<td>16.71</td>
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<tr>
<td>8.0</td>
<td>10.8</td>
<td>± 150</td>
<td>240</td>
<td>225.5</td>
<td>10</td>
<td>155</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>4</td>
<td>18.57</td>
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<tr>
<td>6.0</td>
<td>10.8</td>
<td>± 160</td>
<td>250</td>
<td>310.5</td>
<td>10</td>
<td>241</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>5</td>
<td>15.42</td>
</tr>
<tr>
<td>4.0</td>
<td>10.8</td>
<td>± 170</td>
<td>260</td>
<td>240.5</td>
<td>10</td>
<td>181</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>5</td>
<td>15.42</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>± 180</td>
<td>270</td>
<td>340.5</td>
<td>10</td>
<td>281</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>5</td>
<td>15.65</td>
</tr>
<tr>
<td>4.0</td>
<td>10.8</td>
<td>± 190</td>
<td>280</td>
<td>260.5</td>
<td>10</td>
<td>261</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>5</td>
<td>15.65</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>± 200</td>
<td>290</td>
<td>290.5</td>
<td>10</td>
<td>301</td>
<td>75</td>
<td>49</td>
<td>120</td>
<td>5</td>
<td>15.65</td>
</tr>
</tbody>
</table>

***)The minimum edge distances of the pressure plates c1 and c2 were determined for a concrete strength of C20/25.

1. For low loads (Qv or Qh < Qd) the diagonal tensile forces can be calculated in relation:

\[ R_{z,vorh} = \frac{R_{z,d}}{Q_{d}} \times Q_{v} \]

2. The following torques must be applied when installing the fixing bolts: M10 ≥ 15 Nm, M12 ≥ 25 Nm, M16 ≥ 60 Nm

3. The design loads for the fixings materials used can be found in the relevant building authority approvals. If the tightening torques in the approvals are other than those specified under item 2, then these must be applied.

4. Bracket spacing is generally 25 cm, unless additional support angles are installed, then spacing distances are greater.

5. The bracket head including the slotted adjustment plate and the horizontal welding seam bracket head / web plate in section 1-1 or the connection bracket head / web plate using resistance projection welding are not part of this type test, these are regulated in a separate building authority approval.
The minimum edge distance $c$ was determined for a concrete strength of C20/25.

### Alternative with adjustable bolt

<table>
<thead>
<tr>
<th>Load</th>
<th>$Q$ [kN]</th>
<th>$Q_1$ [kN]</th>
<th>$D_{th}$ [mm]</th>
<th>$L_{th}$ [mm]</th>
<th>$t_{th}$ [mm]</th>
<th>$a_{th}$ [mm]</th>
<th>$l_{th}$ [mm]</th>
<th>$M_{th}$ [mm]</th>
<th>min sw [mm]</th>
<th>Bracket head K4 min $c^*$ [mm]</th>
<th>Bracket head K5 min $c^*$ [mm]</th>
<th>Bracket head K5C min $c^*$ [mm]</th>
<th>Bracket head K5D min $c^*$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>5.4</td>
<td>16</td>
<td>38</td>
<td>2.0</td>
<td>2.0</td>
<td>26</td>
<td>10</td>
<td>17.5</td>
<td>18</td>
<td>15</td>
<td>18</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>8.0</td>
<td>10.8</td>
<td>18</td>
<td>50</td>
<td>2.0</td>
<td>2.0</td>
<td>38</td>
<td>12</td>
<td>20.5</td>
<td>20</td>
<td>18</td>
<td>20</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>

*) The minimum edge distance $c$ was determined for a concrete strength of C20/25.

Sleeve material:
1) 1.4401 / 1.4404 / 1.4571 (S 355)
2) 1.4362 / 1.4482 / 1.4062 / 1.4162

Support structure $\geq$ C20/25
HALFEN Adjustment screw: Stainless steel, strength class A4-70
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Mount Druitt Sydney, NSW 2770
Tel: +61 - 2 8808 3100
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