Allgemeines bauaufsichtliches Prüfzeugnis

- informative translation -

No.: P–BWU02–128002-a

Object: Self-drilling screws
Hilti S-AD 01 S 5,5xL
Hilti S-AD 01 SS 5,5xL

Intended use: external wall cladding made of aluminium according to DIN 18516-1

Customer: Hilti AG
Feldkircherstraße 100
9494 Schaan
Principality of Liechtenstein

Date of issue: February 28, 2012

Period of validity until: February 28, 2017

Based on this „Allgemeines bauaufsichtliches Prüfzeugnis, the above object can be used according to the „Landesbauordnungen“. 

This „Allgemeines bauaufsichtliches Prüfzeugnis“ includes 8 pages and 4 annexes.

This „Allgemeines bauaufsichtliches Prüfzeugnis“ replaces the “Allgemeines bauaufsichtliches Prüfzeugnis” issued on February 20, 2012.
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I. General regulations

1. The „Allgemeines bauaufsichtliches Prüfzeugnis“ does not substitute approvals, acceptances and attestations required by law for performing building projects.

2. The „Allgemeines bauaufsichtliches Prüfzeugnis“ is issued notwithstanding the rights of any third party, especially of private property rights.

3. The contractor must keep the „Allgemeines bauaufsichtliches Prüfzeugnis“ available on the building site.

4. The „Allgemeines bauaufsichtliches Prüfzeugnis“ may only be reproduced in a complete version. A publication in extracts needs the written approval of the Versuchsanstalt für Stahl, Holz und Steine. Words and drawings of advertising brochures may not be contrary to the „allgemeines bauaufsichtliches Prüfzeugnis“. Translations of the „allgemeines bauaufsichtliches Prüfzeugnis“ must include the note „translation of the German original version not verified by the Versuchsanstalt für Stahl, Holz und Steine“.

5. The „Allgemeines bauaufsichtliches Prüfzeugnis“ is issued revocably. The „allgemeines bauaufsichtliches Prüfzeugnis“ can be additionally supplemented and modified, especially if new technical findings necessitate this.

6. There is the right of appeal against this decision. It must be entered within one after receipt of this decision in written form or for record at the Versuchsanstalt für Stahl, Holz und Steine, Kaiserstraße 12, 76128 Karlsruhe. The date of receipt of the appeal at the Versuchsanstalt für Stahl, Holz und Steine is decisive for the timeliness of the appeal.
II. Specific regulations

1 Object and range of application

1.1 Object

Object of the “Allgemeines bauaufsichtliches Prüfzeugnis” are the self-drilling screws Hilti S-AD S 5.5xL and Hilti S-AD 01 SS 5.5xL produced and marketed by Hilti AG.

This „Allgemeines bauaufsichtliches Prüfzeugnis“ replaces the „Allgemeines bauaufsichtliches Prüfzeugnis“ issued on February 20, 2012.

1.2 Range of application

The above mentioned object is intended for the use according to DIN 18516-1:1999-12.

2 Requirements on the building product

2.1 Properties and configuration

The indications in the annexes apply with regard to dimensions, materials and corrosion protection.

2.2 Regulations for design and dimensioning

2.2.1 Allowable forces

The verification concept given in DIN 18516-1:1999-12 applies. The characteristic values $F_{Rk}$ and the allowable values of forces $zul F$ for the connections resulting from this with $\gamma = 3,0$ according to DIN 18516-1:1999-12, section 6.3.2, are given in the attachments. Where:

$zul F_Q$ allowable shear force (load direction rectangular to the axis of the fasteners)

$zul F_Z$ allowable tensile force (load direction parallel to the axis of the fasteners)

For a combined loading by shear forces $F_Q$ from dead load and wind suction, the proof is to be furnished for each screw of the connection with the resulting effect:

$$\frac{F_Z}{zul F_Z} + \frac{F_Q}{zul F_Q} \leq 1,0.$$ 

The allowable values apply for components I made of aluminium alloys with a minimum tensile strength $R_m$ of 165 N/mm² or 245 N/mm² on components II made of aluminium alloys with a minimum tensile strength $R_m$ of 165 N/mm² or 245 N/mm².

For aluminium alloys with a minimum tensile strength $R_m$ of 165 N/mm² $\leq R_m \leq 245$ N/mm² linear interpolation is allowed between the values of the corresponding annexes. For intermediate values of the component thicknesses I or II, the allowable value of the smaller component thickness is to be chosen.
For tensile-loaded connections with the drilling screws Hilti S-AD 01 S 5,5xL and Hilti S-AD 01 SS 5,5xL, the undercut must be considered. This may result in reduced effective plate thicknesses of the substructure causing a reduction of the load-bearing capacity subjected to pull-out. For connections with the drilling screws Hilti S-AD 01 S 5,5xL and Hilti S-AD 01 SS 5,5xL loaded with shear forces, the length $X$ of the undercut must be adapted to the clamping thickness of both components to be connected so that

$$X \leq t_i + t_{ii}$$

applies.

2.2.2 Edge distances

For connections with the self-drilling screws Hilti S-AD 01 S 5,5xL and Hilti S-AD 01 SS 5,5xL, the allowable values given in the annexes are valid the for following minimum values of the distances of the fasteners:

- edge distance: 10mm
- intermediate distance of the fasteners: 25 mm

2.2.3 Eccentric tensile load

When contact forces occur between single components from eccentrically applied tensile forces, the longitudinal tensile forces are to be reduced as follows:

$$zulF_{z,exc} = \alpha \cdot zulF_z$$

with $\alpha$ according to the following table.
### 2.2.4 Predrilled connections and slotted holes

In case of an exceeded maximum drilling capacity preset by the drill bit, component I may be predrilled with $\varnothing 5.2$ mm +/- $0.2$ mm. For predrilled connections, the tabulated values of the allowable tensile forces are to be reduced as follows:

$$Q_{vorgeb} = zulF_Q \cdot 0.90$$

For connections with the self-drilling screws Hilti S-AD 01 S 5.5xL and Hilti S-AD 01 SS 5.5xL, slotted holes are allowable. For connections loaded with tensile forces, slotted holes are not allowed. If a connection with a slotted hole is designed for temperature-related expansions, the thread may not extend into component I.

The following limit dimensions apply:

- Width of the slotted hole: $5.2$ mm +/- $0.2$ mm
- Length of the slotted hole: max. $25$ mm
- Edge distance in direction of force: min. $10$ mm
- Edge distance rectangular to the direction of force: min. $10$ mm

### 2.2.5 Temperature-related constraint force

The use of the fasteners for connections not free of constraint forces is only allowable with a verification of the temperature-related constraint force (shear force), cf. DIN 18516-1:1999-12,
section 5.2.2. Without this verification, the fasteners may only be used for connections free of constraint forces.

2.3 Requirements for the design

Connections corresponding to section 1 may only be produced by firms having the necessary experience unless specialists of firms being experienced in this field are available for the instruction of the assembly personnel.

For shear-loaded connections, the components to be connected must directly lie adjacent to each other and the shear gap must be located at the contact point of component I with component II so that the fastener does not experience any additional bending.

The fasteners are to be attached rectangular to the component surface to secure a perfect load-bearing connection.

In case of substructures made of aluminium, fasteners are to be screwed in over-tightened. Both components lay in the recess. For all fasteners, screwing is realized by means of a screw driller. The application of impact drivers is not allowed.

Drilling capacities and clamping thicknesses indicated in the attachments are to be observed.

Screws in load transferring connections that had been already loaded may only be exchanged with self-tapping screws with bigger diameter where the hole for the larger screw must be drilled appropriately.

For shear-loaded connections, the components to be connected must directly lie adjacent to each other.

3 Verification of compliance

3.1 General

The confirmation regarding the compliance of the building products with the regulations of this “Allgemeines bauaufsichtliches Prüfzeugnis” must be effected with a declaration of compliance of the producer for each production plant on the basis of a factory production control according to the following regulations.

3.2 Factory production control

In each production plant, a factory production control must be organized and performed according to the principles of the “Deutsches Insitut für Bautechnik (DIBt) for the “Übereinstimmungsnachweis für Verbindungselemente im Metallleichtbau” (see issue 6/1999 of "DIBt Mitteilungen"). Factory production control is understood as continuous monitoring of the production to be performed by the producer with which he ensures that the building products manufactured by him correspond to this “Allgemeines bauaufsichtliches Prüfzeugnis”.

Within the scope of the factory production control
The results of the factory production control are to be recorded and evaluated. The records should include the following indications at least:

- name of the building product, original material and the component parts
- type of control or test
- date of production and control / test of the building product or the original material or the component parts
- result of the tests / controls and comparison with the requirements
- signature of the person responsible for the factory production control

The records must be kept for at least five years and submitted to the supervisory board engaged for the external control. They must be submitted to the "Deutsches Institut für Bautechnik", the responsible “Oberste Bauaufsichtsbehörde” and the issuing body on demand.

In case of test results not corresponding to the requirements of the standard technical specifications, the producer must immediately take the necessary measures to remedy the defect. After removal of the defect, the test in question must be immediately repeated for proving the elimination of defects. Products that are not according to specifications must be sorted and marked correspondingly. The measures taken must be documented.

4 Ü-mark

The producer must mark the building product with the sign of conformity according to the “Übereinstimmungszeichen-Verordnungen (ÜZVO)” of the states.

The Ü-mark must be attached to the building product, to an instruction leaflet to its package if, if this causes difficulties, to the delivery note or to an attachment of the delivery note with the prescribed indications according to the “Landesbauordnung” of the states.

Marking with the Ü-mark considering the number of this “Allgemeines baufachsichtliches Prüfzeugnis” may only be done if the prerequisites according to paragraph 3 are fulfilled.

5 Legal basis

This “Allgemeines baufachsichtliches Prüfzeugnis” is issued on the basis of §19 and §22 of the "Landesbauordnung für Baden-Württemberg (LBO)" as amended on August 8, 1005, last amended through the law of December 17, 2009, in connection with Bauregelliste A, Teil 2, lfd. Nr. 2.17, edition 2011/1.

According to §19, paragraph 2 in connection with §18 paragraph 7 of the “Musterbauordnung” (MBO) and the corresponding regulations of the respective “Landesbauordnungen” an issued
“Allgemeines baubaufsichtliches Prüfzeugnis” applies in all states of the Federal Republic of Germany.

The definition of the allowable forces indicated in the attachments is based upon test results that are documented in test report no. 074006 of the Versuchsanstalt für Stahl, Holz und Steine. The dissipation of allowable forces from the test results was effected according to DIN 18516-1:1999-12, and is documented in the expert report no. 074030 of the Versuchsanstalt für Stahl, Holz und Steine dokumentiert.

Karlsruhe, February 28, 2012

Official in charge: Dr.-Ing. Th. Misiek

Head of the Prüfstelle: Dipl.-Ing. J. Schmied
### Fastener
- Hilti S-AD 01 S 5,5xL
- Hilti S-AD 01 SS 5,5xL

### Material
- Screw: Stainless steel
- Similar DIN EN 10088
- Hilti S-AD 01 S 5,5xL: material No. 1.4567
- Hilti S-AD 01 SS 5,5xL: material No. 1.4578

### Producer
- Hilti AG
- Werk 6103

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### Max. Drilling Capacity

<table>
<thead>
<tr>
<th>tII in [mm]</th>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component II made of aluminium $R_m \geq 165$N/mm², tII in [mm]:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,50</td>
<td>0,54</td>
<td>0,54</td>
<td>0,54</td>
<td>0,54</td>
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<tr>
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<td>0,76</td>
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<tr>
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<td>0,79</td>
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<td>1,17</td>
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<tr>
<td>4,00</td>
<td>0,61</td>
<td>0,79</td>
<td>1,17</td>
<td>1,17</td>
</tr>
</tbody>
</table>

### Component II made of timber $\geq S10$

To be screwed with depth stop

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### Tightening Moment (Guidance Level)

<table>
<thead>
<tr>
<th>1,50</th>
<th>2,00</th>
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<th>4,00</th>
</tr>
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<tbody>
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<tr>
<td>4,00</td>
<td>0,30</td>
<td>0,48</td>
<td>0,86</td>
</tr>
</tbody>
</table>

### Allowable Shear Force $F_Q$ in [kN]

<table>
<thead>
<tr>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
</tr>
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<tbody>
<tr>
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<td>3,00</td>
<td>0,61</td>
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</tr>
<tr>
<td>4,00</td>
<td>0,61</td>
<td>0,79</td>
<td>1,17</td>
</tr>
</tbody>
</table>

### Allowable Tensile Force $F_Z$ in [kN]

<table>
<thead>
<tr>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
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<tbody>
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<td>1,50</td>
<td>0,30</td>
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<td>0,86</td>
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<tr>
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<td>0,86</td>
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<tr>
<td>3,00</td>
<td>0,30</td>
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<td>0,86</td>
</tr>
<tr>
<td>4,00</td>
<td>0,30</td>
<td>0,48</td>
<td>0,86</td>
</tr>
</tbody>
</table>

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### Further provisions:

- Self-drilling screws
- Hilti S-AD 01 S 5,5xL
- Hilti S-AD 01 SS 5,5xL

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### Allowable values of forces for fasteners

- Hilti S-AD 01 S 5,5xL
- Hilti S-AD 01 SS 5,5xL

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### Annex 1

To „Allgemeines baumaufsichtliches Prüfzeugnis“ Nr. P-BWU02-128002-a of 28.02.2012
Fastener
Hilti S-AD 01 S 5,5xL
Hilti S-AD 01 SS 5,5xL

Material
screw:
stainless steel
similar DIN EN 10088
Hilti S-AD 01 S 5,5xL: material No. 1.4567
Hilti S-AD 01 SS 5,5xL: material No. 1.4578

Producer
Hilti AG
Werk 6103

Max. drilling capacity \( t_{II} \)
4,00 mm

<table>
<thead>
<tr>
<th>( t_{II} ) in [mm]:</th>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
</tr>
</thead>
<tbody>
<tr>
<td>To be screwed with depth stop</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tightening moment (guidance level)

<table>
<thead>
<tr>
<th>( t_{II} ) in [mm]:</th>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0,80</td>
<td>0,80</td>
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</tr>
<tr>
<td>3,00</td>
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<td>1,18</td>
<td>1,74</td>
<td>1,74</td>
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<tr>
<td>4,00</td>
<td>0,90</td>
<td>1,18</td>
<td>1,74</td>
<td>1,74</td>
</tr>
</tbody>
</table>

Further provisions:

Self-drilling screws
Hilti S-AD 01 S 5,5xL
Hilti S-AD 01 SS 5,5xL

Annex 2
to „Allgemeines baubaufsichtliches Prüfzeugnis“ Nr. P-BWU02-128002-a
of 28.02.2012
Fastener
Hilti S-AD 01 S 5,5xL
Hilti S-AD 01 SS 5,5xL

material
screw:
stainless steel
similar DIN EN 10088
Hilti S-AD 01 S 5,5xL: material No. 1.4567
Hilti S-AD 01 SS 5,5xL: material No. 1.4578

producer
Hilti AG
Werk 6103

Max. drilling capacity $t_1$
4,00 mm

component II made of aluminium $R_m \geq 165 N/mm^2$, $t_1$ in [mm]:

<table>
<thead>
<tr>
<th>$t_1$ (mm)</th>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,50</td>
<td>1,61</td>
<td>1,61</td>
<td>1,61</td>
<td>1,61</td>
</tr>
<tr>
<td>2,00</td>
<td>1,68</td>
<td>2,29</td>
<td>2,29</td>
<td>2,29</td>
</tr>
<tr>
<td>3,00</td>
<td>1,82</td>
<td>2,38</td>
<td>3,51</td>
<td>3,51</td>
</tr>
<tr>
<td>4,00</td>
<td>1,82</td>
<td>2,38</td>
<td>3,51</td>
<td>3,51</td>
</tr>
</tbody>
</table>

To be screwed with depth stop

Further provisions:

Self-drilling screws
Hilti S-AD 01 S 5,5xL
Hilti S-AD 01 SS 5,5xL

Characteristic values of forces for fasteners

Annex 3
to „Allgemeines baualufichtliches Prüfzeugnis“ Nr. P-BWU02-128002-a
of 28.02.2012

Characterisitc values of shear forces $F_{Q,Rk}$ in [kN]

<table>
<thead>
<tr>
<th>$d_1$ (mm)</th>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,90</td>
<td>1,45</td>
<td>2,58</td>
<td>2,58</td>
<td>2,58</td>
</tr>
<tr>
<td>0,90</td>
<td>1,45</td>
<td>2,58</td>
<td>2,58</td>
<td>2,58</td>
</tr>
</tbody>
</table>

Characterisitc values of tensile forces $F_{Z,Rk}$ in [kN]

<table>
<thead>
<tr>
<th>$d_1$ (mm)</th>
<th>1,50</th>
<th>2,00</th>
<th>3,00</th>
<th>4,00</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,90</td>
<td>1,45</td>
<td>2,58</td>
<td>2,58</td>
<td>2,58</td>
</tr>
</tbody>
</table>
**Fastener**
- Hilti S-AD 01 S 5,5xL
- Hilti S-AD 01 SS 5,5xL

**Material**
- Screw: stainless steel
- Similar DIN EN 10088
- Hilti S-AD 01 S 5,5xL: material No. 1.4567
- Hilti S-AD 01 SS 5,5xL: material No. 1.4578

**Producer**
- Hilti AG
- Werk 6103

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<table>
<thead>
<tr>
<th>Max. drilling capacity $t_{II}$</th>
<th>Component II made of aluminium $R_m \geq 245$N/mm², $t_{II}$ in [mm]:</th>
<th>Component II made of timber ≥ S10</th>
</tr>
</thead>
</table>
| 4,00 mm                         | $\begin{array}{c}1.50 \quad 2.00 \quad 3.00 \quad 4.00 \\
|                                 | Tightening moment (guidance level)               | To be screwed with depth stop |
|                                 | 1.50                                            | 2.39 | 2.39 | 2.39 | 2.39 |
|                                 | 2.00                                            | 2.49 | 3.40 | 3.40 | 3.40 |
|                                 | 3.00                                            | 2.70 | 3.54 | 5.21 | 5.21 |
|                                 | 4.00                                            | 2.70 | 3.54 | 5.21 | 5.21 |

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**Characteristic values of shear forces $F_{Q,Rk}$ in [kN]**

<table>
<thead>
<tr>
<th>Component I made of aluminium $R_m \geq 245$N/mm², $t_{I}$ in [mm]:</th>
<th>$1.50 \quad 2.00 \quad 3.00 \quad 4.00$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predrill-diameter 5,2mm +/-0,2mm</td>
<td>Characteristic values of shear forces $F_{Q,Rk}$ in [kN]:</td>
</tr>
<tr>
<td>1.50</td>
<td>1,33</td>
</tr>
<tr>
<td>2.00</td>
<td>1,33</td>
</tr>
<tr>
<td>3.00</td>
<td>1,33</td>
</tr>
<tr>
<td>4.00</td>
<td>1,33</td>
</tr>
</tbody>
</table>

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**Characteristic values of tensile forces $F_{Z,Rk}$ in [kN]**

<table>
<thead>
<tr>
<th>Component I made of aluminium $R_m \geq 245$N/mm², $t_{I}$ in [mm]:</th>
<th>$1.50 \quad 2.00 \quad 3.00 \quad 4.00$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predrill-diameter 5,2mm +/-0,2mm</td>
<td>Characteristic values of tensile forces $F_{Z,Rk}$ in [kN]:</td>
</tr>
<tr>
<td>1.50</td>
<td>1,33</td>
</tr>
<tr>
<td>2.00</td>
<td>1,33</td>
</tr>
<tr>
<td>3.00</td>
<td>1,33</td>
</tr>
<tr>
<td>4.00</td>
<td>1,33</td>
</tr>
</tbody>
</table>

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**Further provisions:**

- Self-drilling screws
  - Hilti S-AD 01 S 5,5xL
  - Hilti S-AD 01 SS 5,5xL

**Annex 4**
- To „Allgemeines baubauaufsichtliches Prüfzeugnis“ Nr. P-BWU02-128002-a of 28.02.2012