

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

ETA-13/0180  
of 4 July 2019

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Fastening Screws DILLNOX DF

Product family  
to which the construction product belongs

Fastening Screws for Sandwich Panels

Manufacturer

ETANCO SAS  
Parc des Érables - Bât.1  
66 Route de Sartrouville - BP 49  
78231 Le PECQ Cedex  
FRANKREICH

Manufacturing plant

Plant F1  
Plant F2  
Plant F8  
Plant F9

This European Technical Assessment  
contains

10 pages including 6 annexes which form an integral part  
of this assessment

This European Technical Assessment is  
issued in accordance with Regulation (EU)  
No 305/2011, on the basis of

EAD 330047-01-0602

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

## Specific part

### 1 Technical description of the product

The fastening screws (table 1) are self-drilling or self-tapping screws made from austenitic stainless steel. The fastening screws are equipped with sealing washers consisting of a metal washer with EPDM seal.

**Table 1 – Fastening screws for sandwich panels**

| Annex                 | Fastening screw           | Description   |
|-----------------------|---------------------------|---|
| Annex 4               | Drillnox 4 DF A4 5,5 x L  | Self drilling screw with hexagon head and sealing washer $\geq \text{Ø}19$ mm |
| Annex 5               | Drillnox 12 DF A4 5,5 x L | Self drilling screw with hexagon head and sealing washer $\geq \text{Ø}19$ mm |
| Annex 6 <sup>*)</sup> | Drillnox BDF 6,5 x L      | Self drilling screw with hexagon head and sealing washer $\geq \text{Ø}19$ mm |

<sup>\*)</sup> for timber substructures

### 2 Specification of the intended use in accordance with the applicable European Assessment Document

The fastening screws are intended to be used for fastening sandwich panels to metal or timber substructures. The sandwich panel can either be used as wall or roof cladding or as load bearing wall and roof element. The intended use comprises fastening screws and connections for indoor and outdoor applications. Fastening screws which are intended to be used in external environments of corrosivity categories  $\geq \text{C2}$  according to EN ISO 12944-2 are made from stainless steel. Furthermore the screws are intended to be used in connections under predominantly static actions (e. g. self-weight or wind). The fastening screws are not suitable for re-use.

The performances given in Section 3 are only valid if the fastening screws are used in compliance with the specifications and conditions given in annexes 1 to 6.

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastening screws of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

**3 Performance of the product and references to the methods used for its assessment**

**3.1 Mechanical resistance and stability (BWR 1)**

| Essential characteristic   | Performance             |
|--|-------------------------|
| Shear resistance of the connection   | see annexes to this ETA |
| Tension resistance of the connection   | see annexes to this ETA |
| Design resistance in case of combined tension and shear forces (interaction) | see annexes to this ETA |
| Bending capacity in case of restraints due to temperature                    | see annexes to this ETA |
| Durability   | no performance assessed |

**3.2 Safety in case of fire (BWR 2)**

| Essential characteristic | Performance          |
|--------------------------|----------------------|
| Reaction to fire         | Performance Class A1 |

**4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base**

In accordance with EAD No. 330047-01-0602, the applicable European legal act is: Commission Decision 1998/214/EC, amended by 2001/596/EC.

The system to be applied is: 2+

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

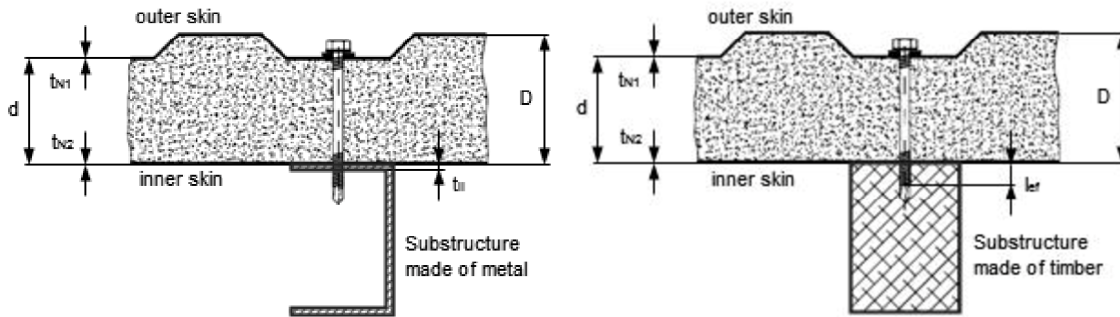
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 4 July 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow  
Head of Department

*beglaubigt:*  
Jensky

### Examples of execution of a connection



### Terms for materials

|              |  |
|--------------|--|
| Fastener     | Material of the fastening screw                            |
| Washer       | Material of the sealing washer                             |
| Component I  | Material of the sandwich panel (outer skin and inner skin) |
| Component II | Material of the substructure                               |

### Terms for dimensions

|          |  |
|----------|--|
| $D, d$   | Total thickness of component I   |
| $t_{N1}$ | Thickness of the outer skin of component I                                     |
| $t_{N2}$ | Thickness of the inner skin of component I                                     |
| $t_{II}$ | Thickness of component II made of metal  |
| $l_{ef}$ | Effective screw-in length in component II made of timber (without drill point) |
| $d_{dp}$ | Pre-drill diameter of component I and component II                             |

### Terms for performances

|              |   |
|--------------|---|
| $V_{R,k}$    | Characteristic value of shear resistance of the connection                            |
| $N_{R,k}$    | Characteristic value of tension resistance of the connection                          |
| $V_{R,I,k}$  | Characteristic value of shear resistance of metal member or sheeting                  |
| $N_{R,I,k}$  | Characteristic value of tension resistance (pull-through) of metal member or sheeting |
| $N_{R,II,k}$ | Characteristic value of tension resistance (pull-out) of the substructure             |
| $u$          | Maximum allowed head displacement of the fastening screw                              |

Additionally for timber substructure the following terms are used:

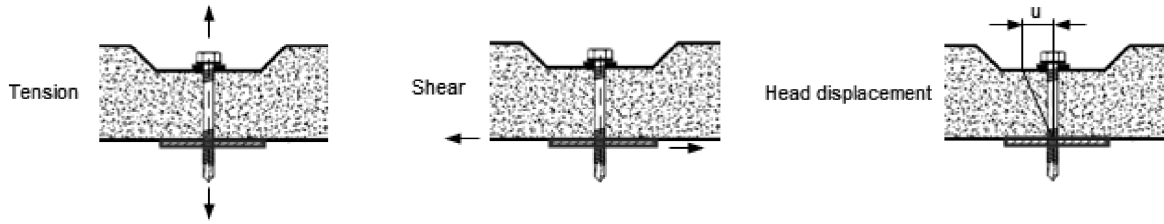
|            |   |
|------------|---|
| $M_{y,Rk}$ | Characteristic value of yield moment        |
| $f_{ax,k}$ | Characteristic value of withdrawal strength |

### Used terms in the Annexes

Fastening screws for sandwich panels

### Annex 1

### Types of connection and occurred loadings



### Determination of Design Values

The design value of tension and shear resistance has to be determined as follows:

$$N_{R,d} = \frac{N_{R,k}}{\gamma_M} \qquad V_{R,d} = \frac{V_{R,k}}{\gamma_M}$$

The characteristic values  $N_{R,k}$  and  $V_{R,k}$  are given in the Annexes. For intermediate dimension of metal member or sheeting or substructure the characteristic value of the thinner dimension is used.

The recommended partial safety factor  $\gamma_M = 1,33$  is used, provided no partial safety factor is given in national regulations or national Annexes to Eurocode 3.

For asymmetric metal substructures with thickness  $t_{II} < 5$  mm (for instance Z- or C-shaped profiles), the characteristic value  $N_{R,k}$  given in the Annexes has to be reduced to 70%.

In case of combined tension and shear forces the following interaction equation is taken into account:

$$\frac{N_{S,d}}{N_{R,d}} + \frac{V_{S,d}}{V_{R,d}} \leq 1,0$$

$N_{S,d}$  and  $V_{S,d}$  indicate the design values of applied tension and shear forces.

### Head displacement

The head displacement of the fastening screw as a result of thermal expansion of the outer skin of the sandwich panel may not exceed the maximum allowed head displacement of the fastening screw.

### Installation conditions

The installation is carried out according to the manufacturer's instructions.

The fastening screws are screwed-in with electric screw driver. The use of impact wrenches is not allowed.

The fastening screws are fixed rectangular to the surface of the metal member or sheeting.

The metal member or sheeting and substructure are in contact to each other. The use of compression resistant thermal insulation strips up to a thickness of 3 mm is allowed.

The load bearing length of the screw, provided by the manufacturer, has to be taken into account.

## Basics for the design

Fastening screws for sandwich panels

## Annex 2

### Timber substructures

Characteristic values of tension and shear resistance of the connection for other  $k_{mod}$  or  $\rho_k$  as indicated in the Annexes can be determined as follows:

$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ F_{ax,Rk} * k_{mod} \end{array} \right. \quad V_{R,k} = \min \left\{ \begin{array}{l} V_{R,I,k} \\ F_{v,Rk} * k_{mod} \end{array} \right.$$

The characteristic values  $N_{R,I,k}$  and  $V_{R,I,k}$  are given in the corresponding Annex of the fastening screw.

$F_{ax,Rk}$  indicates the characteristic value of tension resistance of timber substructure. The value has to be determined according to EN 1995-1-1:2004 + A1:2008, equation (8.40a) with  $f_{ax,k}$  given in the corresponding Annex of the fastening screw.

$F_{v,Rk}$  indicates the characteristic shear resistance of timber substructure. The value has to be determined according to EN 1995-1-1:2004 + A1:2008, equation (8.9) with  $M_{y,Rk}$  given in the corresponding Annex of the fastening screw.

|                                      |                |
|--------------------------------------|----------------|
| <b>Specific notes to the Annexes</b> | <b>Annex 3</b> |
| Fastening screws for sandwich panels |                |

English translation prepared by DIBt

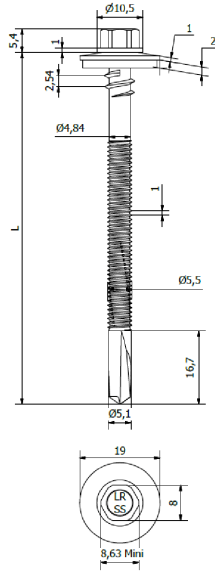
|  |  |
|--|--|
|  | <p><b>Materials</b></p> <p>Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506</p> <p>Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM-seal</p> <p>Component I: S280GD to S350GD - EN 10346</p> <p>Component II: S280GD to S320GD - EN 10346<br/>S235 – EN 10025-1</p> |
|  | <p><b>Drilling-capacity</b> <math>\Sigma(t_i) \leq 5.00</math> mm</p>  |
|  | <p><b>Timber substructures</b></p> <p>-</p>  |

|   |                      | Component II<br>t II [mm] |      |      |      |      |      |
|---|----------------------|---------------------------|------|------|------|------|------|
|   |                      | 1,50                      | 2,00 | 2,50 | 3,00 | 4,00 |      |
| Component I                                   | t <sub>N2</sub> [mm] | 0,50                      | 0,95 | 0,95 | 0,95 | 0,95 | 0,95 |
|   |                      | 0,55                      | 1,16 | 1,17 | 1,17 | 1,17 | 1,17 |
|   |                      | 0,63                      | 1,41 | 1,43 | 1,43 | 1,43 | 1,43 |
|   |                      | 0,75                      | 1,83 | 1,88 | 1,88 | 1,88 | 1,88 |
|   |                      | 0,88                      | 2,27 | 2,50 | 2,50 | 2,59 | 2,76 |
|   | t <sub>N1</sub> [mm] | 1,00                      | 2,67 | 3,08 | 3,08 | 3,24 | 3,57 |
|   |                      | 0,50                      | 1,51 | 1,51 | 1,51 | 1,51 | 1,51 |
|   |                      | 0,55                      | 1,73 | 1,92 | 1,92 | 1,92 | 1,92 |
|   |                      | 0,63                      | 1,73 | 2,40 | 2,40 | 2,40 | 2,40 |
|   |                      | 0,75                      | 1,73 | 2,46 | 3,22 | 3,22 | 3,22 |
| N <sub>R,k</sub> [kN]                         | 0,88                 | 1,73                      | 2,46 | 3,40 | 3,72 | 3,72 |      |
|   | 1,00                 | 1,73                      | 2,46 | 3,40 | 4,19 | 4,19 |      |
|   | N <sub>R,k,II</sub>  | 1,73                      | 2,46 | 3,40 | 4,19 | 4,19 |      |
| D, d [mm]<br>max. head displacement<br>u [mm] | 40                   | 12,0                      | 10,0 | 8,5  | 7,0  | 5,0  |      |
|   | 50                   | 15,0                      | 12,5 | 11,0 | 9,5  | 7,0  |      |
|   | 60                   | 18,0                      | 15,0 | 13,5 | 11,5 | 8,5  |      |
|   | 70                   | 21,0                      | 17,5 | 16,0 | 14,0 | 10,5 |      |
|   | 80                   | 24,0                      | 20,0 | 18,0 | 16,0 | 12,0 |      |
|   | 100                  | 24,0                      | 20,0 | 18,0 | 16,0 | 12,0 |      |
|   | 120                  | 24,0                      | 20,0 | 18,0 | 16,0 | 12,0 |      |
| ≥ 140   | 24,0                 | 20,0                      | 18,0 | 16,0 | 12,0 |      |      |

For component t<sub>N1</sub> or t<sub>N2</sub> made of S320GD or S350GD, the grey highlighted values may be increased by 8%.

|  |                |
|--|----------------|
| <b>Sandwich screw</b>  | <b>Annex 4</b> |
| Drillnox 4 DF A4 5,5 x L<br>with hexagon head and sealing washer ≥ Ø 19 mm |                |





Materials

Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506  
 Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM-seal  
 Component I: S280GD to S350GD - EN 10346  
 Component II: S280GD to S320GD - EN 10346  
 S235 – EN 10025-1

Drilling-capacity

$\Sigma(t_i) \leq 13.00$  mm

Timber substructures

-

|             |   | Component II<br>t II [mm] |      |      |      |      |      |
|-------------|---|---------------------------|------|------|------|------|------|
|             |   | 4,00                      | 5,00 | 6,00 | 8,00 | 12,0 |      |
| Component I | t <sub>N2</sub> [mm]<br>V <sub>R,k</sub> [kN] | 0,50                      | 1,06 | 1,06 | 1,06 | 1,06 |      |
|             |   | 0,55                      | 1,27 | 1,27 | 1,27 | 1,27 |      |
|             |   | 0,63                      | 1,52 | 1,52 | 1,52 | 1,52 |      |
|             |   | 0,75                      | 2,28 | 2,28 | 2,28 | 2,28 |      |
|             |   | 0,88                      | 3,23 | 3,23 | 3,23 | 3,23 |      |
|             |   | 1,00                      | 4,11 | 4,11 | 4,11 | 4,11 |      |
|             | t <sub>N1</sub> [mm]<br>N <sub>R,k</sub> [kN] | 0,50                      | 1,93 | 1,93 | 1,93 | 1,93 |      |
|             |   | 0,55                      | 2,28 | 2,28 | 2,28 | 2,28 |      |
|             |   | 0,63                      | 2,69 | 2,69 | 2,69 | 2,69 |      |
|             |   | 0,75                      | 3,40 | 3,40 | 3,40 | 3,40 |      |
|             |   | 0,88                      | 3,94 | 3,94 | 3,94 | 3,94 |      |
|             |   | 1,00                      | 4,43 | 4,43 | 4,43 | 4,43 |      |
|             | N <sub>R,k,II</sub>                           |                           | 4,43 | 4,43 | 4,43 | 4,43 | 4,43 |
|             | D, d [mm]<br>max. head displacement u [mm]    | 30                        | 6,0  | 4,0  | 3,0  | 3,0  | 3,0  |
| 40          |   | 8,0                       | 4,6  | 4,5  | 4,5  | 4,5  |      |
| 50          |   | 10,5                      | 5,8  | 6,0  | 6,0  | 6,0  |      |
| 60          |   | 12,5                      | 7,5  | 7,0  | 7,0  | 7,0  |      |
| 70          |   | 14,5                      | 8,5  | 8,5  | 8,5  | 8,5  |      |
| 80          |   | 17,0                      | 10,0 | 10,0 | 10,0 | 10,0 |      |
| 100         |   | 21,0                      | 13,0 | 13,0 | 13,0 | 13,0 |      |
| 120         |   | 25,0                      | 15,0 | 15,0 | 15,0 | 15,0 |      |
| ≥ 140       |   | 29,0                      | 18,0 | 18,0 | 18,0 | 18,0 |      |

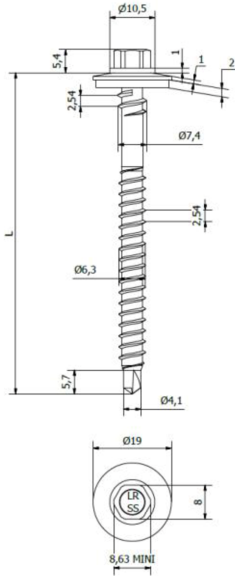
For component t<sub>N1</sub> or t<sub>N2</sub> made of S320GD or S350GD, the grey highlighted values may be increased by 8%.

**Sandwich screw**

Drillnox 12 DF A4 5,5 x L  
with hexagon head and sealing washer ≥ Ø 19 mm

**Annex 5**

English translation prepared by DIBt



Materials

Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506  
Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM-seal  
Component I: S280GD to S350GD - EN 10346  
Component II: Structural timber – EN 14081

Drilling-capacity  $\Sigma(t_i) \leq 1.00$  mm

Timber substructures

$M_{y,Rk} = 9.742$  Nm  
 $f_{ax,k} = 8.575$  N/mm<sup>2</sup> for  $l_{ef} \geq 50.0$  mm

|                               |                      | Component II<br>t II [mm] |      |      |      |      |      |      |       |      |
|-------------------------------|----------------------|---------------------------|------|------|------|------|------|------|-------|------|
|                               |                      | 40                        | 50   | 60   | 70   | 80   | 100  | 120  | ≥ 140 |      |
| Component I                   | t <sub>N2</sub> [mm] | 0,50                      | 1,03 | 1,03 | 1,03 | 1,03 | 1,03 | 1,03 | 1,03  | 1,03 |
|                               |                      | 0,55                      | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14  | 1,14 |
|                               |                      | 0,63                      | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26  | 1,26 |
|                               |                      | 0,75                      | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26  | 1,26 |
|                               |                      | 0,88                      | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26  | 1,26 |
|                               |                      | 1,00                      | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26 | 1,26  | 1,26 |
|                               | t <sub>N1</sub> [mm] | 0,50                      | 2,02 | 2,02 | 2,02 | 2,02 | 2,02 | 2,02 | 2,02  | 2,02 |
|                               |                      | 0,55                      | 2,26 | 2,26 | 2,26 | 2,26 | 2,26 | 2,26 | 2,26  | 2,26 |
|                               |                      | 0,63                      | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53  | 2,53 |
|                               |                      | 0,75                      | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53  | 2,53 |
|                               |                      | 0,88                      | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53  | 2,53 |
|                               |                      | 1,00                      | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53  | 2,53 |
|                               | N <sub>R,k,II</sub>  | 2,53                      | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53 | 2,53  |      |
| max. head displacement u [mm] |                      | 5,0                       | 7,0  | 9,0  | 10,5 | 12,0 | 15,0 | 15,0 | 15,0  |      |

For component t<sub>N1</sub> or t<sub>N2</sub> made of S320GD or S350GD, the grey highlighted values may be increased by 8%. The values listed above in dependence on the screw in length l<sub>ef</sub> are valid for k<sub>mod</sub> = 0,90 and ρ<sub>k</sub> = 350 kg/m<sup>3</sup>. For other combinations of k<sub>mod</sub> and timber densities see Annex 3.

**Sandwich screw**

Drillnox BDF 6,5 x L  
with hexagon head and sealing washer ≥ Ø 19 mm

**Annex 6**