

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

ETA-13/0178  
of 7 September 2023

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 for sandwich panels FBS  
and SP

Product family  
to which the construction product belongs

Fastening screws for sandwich panels

Manufacturer

Schäfer + Peters GmbH  
Zeilbaumweg 32  
74613 Öhringen  
DEUTSCHLAND

Manufacturing plant

plants 1 - 100

This European Technical Assessment  
contains

14 pages including 10 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

330047-01-0602

This version replaces

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## Specific part

### 1 Technical description of the product

The fastening screws are self-drilling or self-tapping screws made of austenitic stainless steel or carbon steel with anticorrosion coating (listed in Table 1). The fastening screws are completed with sealing washers consisting of metal washer and EPDM-seal.

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

Annex	Sandwich screw	Component I	Component II
4	FBS Ø 6,3 Typ BZ	S280GD to S350GD EN 10346	S280GD to S320GD - EN 10346 S235 EN 10025-2
5	FBS Ø 6,3 Typ BZ		
6	FBS Ø 6,5 Typ A		Timber ≥ C24 EN 14081
7	FBS Ø 6,5 Typ A		S280GD to S320GD - EN 10346 S235 EN 10025-2
8	SP-B2-6-5,5 x L, SP-B4-6-5,5 x L		
9	SP-B2-6-6,3 x L, SP-B4-6-6,3 x L		
10	SP-B2-12-5,5 x L, SP-B4-12-5,5 x L		

### 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 with ≥ C2 corrosion according to the standard EN ISO 12944-2 are made of stainless steel. Furthermore the intended use comprises connections with predominantly static loads (e. g. wind loads, dead loads). The fastening screws are not intended 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 Annex (1-10).

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
Check of Bending Capacity in case of constraining forces 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**

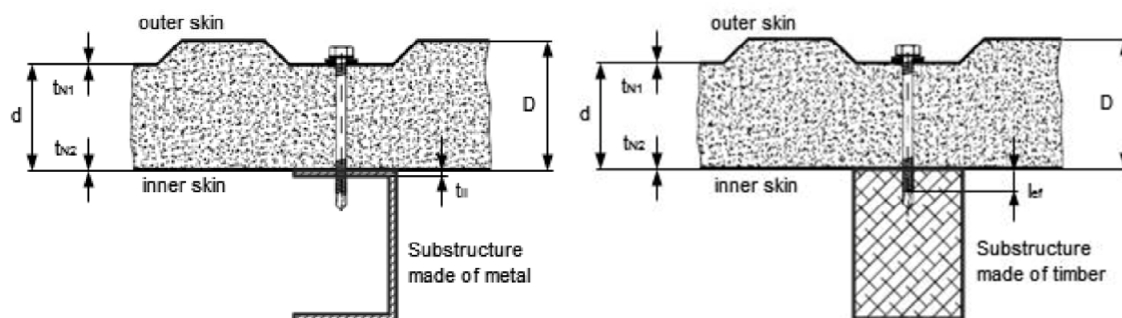
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 7 September 2023 by Deutsches Institut für Bautechnik

BD Dr.-Ing. Ronald Schwuchow  
 Head of Section

*beglaubigt:*  
 Hahn

### 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:

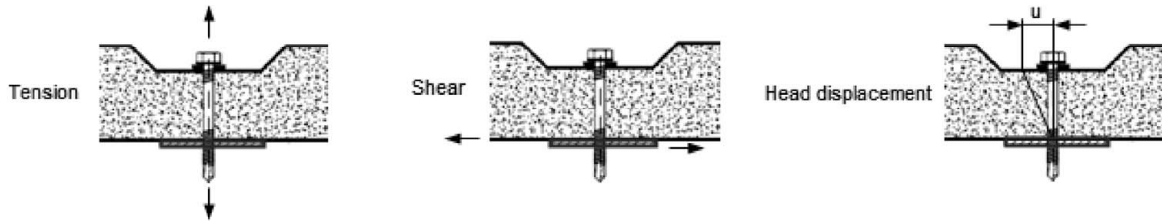
$M_{y,Rk}$	Characteristic value of yield moment
$f_{ax,k}$	Characteristic value of withdrawal strength

### 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:

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

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

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.

## 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:

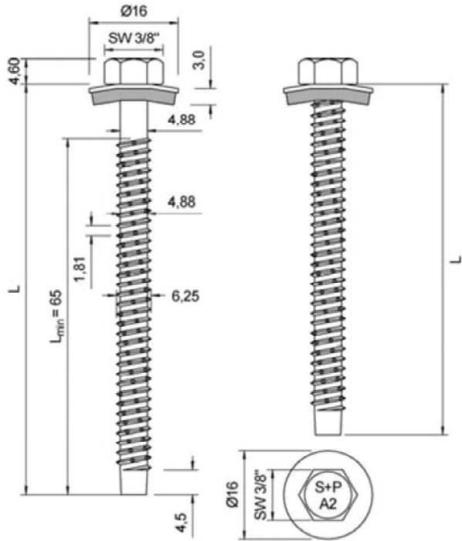
$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ F_{ax,Rk} * k_{mod} \end{array} \right. \qquad V_{R,k} = \min \left\{ \begin{array}{l} V_{R,I,k} \\ F_{v,Rk} * k_{mod} \end{array} \right.$$

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	

	<b>Materials</b>	
	Fastener:	Stainless steel A2, A4 or A5 – EN ISO 3506
	Washer:	Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM
	Component I:	S280GD to S350GD - EN 10346
	Component II:	S235 - EN 10025-1 S280GD to S320GD - EN 10346
	<b>Predrill diameter</b>	see table below
	<b>Timber substructures</b>	no performance determined

		Component II t II [mm]								
		1,50	2,00	2,50	3,00	4,00	5,00	6,00	7,00	≥ 10,0
Component I	t <sub>N2</sub> [mm] V <sub>R,k</sub> [kN]	0,40	0,49	0,49	0,49	0,49	0,49	0,49	0,49	0,49
		0,50	0,72	0,88	1,05	1,21	1,21	1,21	1,21	1,21
		0,55	0,72	0,88	1,05	1,33	1,33	1,33	1,33	1,33
		0,63	0,72	0,88	1,05	1,53	1,53	1,53	1,53	1,53
		0,75	0,72	0,88	1,05	1,82	1,82	1,82	1,82	1,82
		0,88	0,72	0,88	1,05	2,14	2,14	2,14	2,14	2,14
		1,00	0,72	0,88	1,05	2,43	2,43	2,43	2,43	2,43
	t <sub>N1</sub> [mm] N <sub>R,k</sub> [kN]	0,40	1,20	1,20	1,20	1,20	1,20	1,20	1,20	1,20
		0,50	1,27	1,27	1,27	1,27	1,27	1,27	1,27	1,27
		0,55	1,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50
0,63		1,66	1,87	1,87	1,87	1,87	1,87	1,87	1,87	
	0,75	1,66	2,38	2,42	2,42	2,42	2,42	2,42	2,42	
	0,88	1,66	2,38	3,21	3,21	3,21	3,21	3,21	3,21	
	1,00	1,66	2,38	3,52	3,94	3,94	3,94	3,94	3,94	
	N <sub>R,k,II</sub>	1,66	2,38	3,52	3,94	3,94	3,94	3,94	3,94	
D, d [mm] max. head displacement u [mm]	30	11,0	11,0	6,0	6,0	2,0	2,0	2,0	2,0	
	40	12,0	12,0	7,0	7,0	3,0	3,0	3,0	3,0	
	50	14,0	14,0	9,0	9,0	4,0	4,0	4,0	4,0	
	60	16,0	16,0	10,0	10,0	5,0	5,0	5,0	5,0	
	70	18,0	18,0	12,0	12,0	6,0	6,0	6,0	6,0	
	80	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	
	100	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	
	120	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	
	≥ 140	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	
d <sub>pd</sub> [mm]	Ø 5,0	Ø 5,3				Ø 5,5		Ø 5,7		

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

<b>Sandwich screw</b>	<b>Annex 4</b>
FBS Ø 6,3 Typ BZ with hexagon head and sealing washer ≥ Ø16 mm	



	<b>Materials</b>	
	Fastener:	Stainless steel A2, A4 or A5 – EN ISO 3506
	Washer:	Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM
Component I:	S280GD to S350GD - EN 10346	
Component II:	S235 - EN 10025-1 S280GD to S320GD - EN 10346	
<b>Predrill diameter</b>	see table below	
<b>Timber substructures</b>	no performance determined	

		Component II t II [mm]									
		1,50	2,00	2,50	3,00	4,00	5,00	6,00	7,00	≥ 10,0	
Component I	t <sub>N2</sub> [mm] V <sub>R,k</sub> [kN]	0,40	0,49	0,49	0,49	0,49	0,49	0,49	0,49	0,49	0,49
		0,50	0,72	0,88	1,05	1,21	1,21	1,21	1,21	1,21	1,21
		0,55	0,72	0,88	1,05	1,33	1,33	1,33	1,33	1,33	1,33
		0,63	0,72	0,88	1,05	1,53	1,53	1,53	1,53	1,53	1,53
		0,75	0,72	0,88	1,05	1,82	1,82	1,82	1,82	1,82	1,82
		0,88	0,72	0,88	1,05	2,14	2,14	2,14	2,14	2,14	2,14
		1,00	0,72	0,88	1,05	2,43	2,43	2,43	2,43	2,43	2,43
	t <sub>N1</sub> [mm] N <sub>R,k</sub> [kN]	0,40	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49
		0,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50
		0,55	1,66	1,77	1,77	1,77	1,77	1,77	1,77	1,77	1,77
0,63		1,66	2,20	2,20	2,20	2,20	2,20	2,20	2,20	2,20	
	0,75	1,66	2,38	2,85	2,85	2,85	2,85	2,85	2,85	2,85	
	0,88	1,66	2,38	3,43	3,43	3,43	3,43	3,43	3,43	3,43	
	1,00	1,66	2,38	3,52	3,97	3,97	3,97	3,97	3,97	3,97	
	N <sub>R,k,II</sub>	1,66	2,38	3,52	3,97	3,97	3,97	3,97	3,97	3,97	
D, d [mm] max. head displacement u [mm]	30	11,0	11,0	6,0	6,0	2,0	2,0	2,0	2,0	2,0	
	40	12,0	12,0	7,0	7,0	3,0	3,0	3,0	3,0	3,0	
	50	14,0	14,0	9,0	9,0	4,0	4,0	4,0	4,0	4,0	
	60	16,0	16,0	10,0	10,0	5,0	5,0	5,0	5,0	5,0	
	70	18,0	18,0	12,0	12,0	6,0	6,0	6,0	6,0	6,0	
	80	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	7,0	
	100	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	7,0	
	120	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	7,0	
	≥ 140	20,0	20,0	14,0	14,0	7,0	7,0	7,0	7,0	7,0	
d <sub>pd</sub> [mm]	Ø 5,0	Ø 5,3				Ø 5,5		Ø 5,7			

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

<b>Sandwich screw</b>	<b>Annex 5</b>
FBS Ø 6,3 Typ BZ with hexagon head and sealing washer ≥ Ø19 mm	

	<p><b>Materials</b></p> <p>Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506 Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM</p> <p>Component I: S280GD to S350GD - EN 10346 Component II: Structural timber – EN 14081</p>
	<p><b>Predrill diameter</b>                      Ø 4,5 mm</p>
	<p><b>Timber substructures</b></p> <p><math>M_{y,Rk} =</math>                                      11,480 Nm <math>f_{ax,k}</math>    8,575 N/mm<sup>2</sup> for <math>l_{ef} \geq 26,0</math> mm</p>

		Component II									
		t II [mm]									
		30	40	50	60	70	80	100	120	≥ 140	
Component I	$t_{N2}$ [mm]	$V_{R,k}$ [kN]	0,40	0,74	0,74	0,74	0,74	0,74	0,74	0,74	0,74
		0,50	1,14	1,14	1,14	1,14	1,14	1,14	1,14	1,14	1,14
		0,55	1,25	1,25	1,25	1,25	1,25	1,25	1,25	1,25	1,25
		0,63	1,41	1,41	1,41	1,41	1,41	1,41	1,41	1,41	1,41
		0,75	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67
		0,88	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67
		1,00	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67
	$t_{N1}$ [mm]	$N_{R,k}$ [kN]	0,40	1,20	1,20	1,20	1,20	1,20	1,20	1,20	1,20
		0,50	1,27	1,27	1,27	1,27	1,27	1,27	1,27	1,27	1,27
		0,55	1,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50
		0,63	1,87	1,87	1,87	1,87	1,87	1,87	1,87	1,87	1,87
		0,75	2,42	2,42	2,42	2,42	2,42	2,42	2,42	2,42	2,42
		0,88	3,21	3,21	3,21	3,21	3,21	3,21	3,21	3,21	3,21
		1,00	3,94	3,94	3,94	3,94	3,94	3,94	3,94	3,94	3,94
	$N_{R,k,II}$	3,94	3,94	3,94	3,94	3,94	3,94	3,94	3,94	3,94	
	max. head displacement u [mm]	4,0	5,0	7,0	8,0	10,0	12,0	12,0	12,0	12,0	

If component  $t_{N1}$  resp.  $t_{N2}$  is made of S320GD or S350GD the grey highlighted values may be increased by 8.2 %.  
He values listed above in dependence on the screw-in length  $l_{ef}$  are valid for  $k_{mod} = 0,90$  and timber strength grade C24 ( $\rho_a = 350 \text{ kg/m}^3$ ). For other combinations of  $k_{mod}$  and timber strength grades see Annex 3.

<b>Sandwich screw</b>	<b>Annex 6</b>
FBS Ø 6,5 Typ A with hexagon head and sealing washer $\geq \text{Ø}16$ mm	

	<b>Materials</b> Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506 Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM	
	Component I: S280GD to S350GD - EN 10346 Component II: Structural timber – EN 14081	
	<b>Predrill diameter</b> Ø 4,5 mm	
<b>Timber substructures</b> $M_{y,Rk} = 11,480 \text{ Nm}$ $f_{ax,k} = 8,575 \text{ N/mm}^2$ for $l_{ef} \geq 26,0 \text{ mm}$		

		Component II									
		t II [mm]									
		30	40	50	60	70	80	100	120	≥ 140	
Component I	$t_{N2}$ [mm]	$V_{R,k}$ [kN]	0,40	0,74	0,74	0,74	0,74	0,74	0,74	0,74	0,74
		0,50	1,14	1,14	1,14	1,14	1,14	1,14	1,14	1,14	1,14
		0,55	1,25	1,25	1,25	1,25	1,25	1,25	1,25	1,25	1,25
		0,63	1,41	1,41	1,41	1,41	1,41	1,41	1,41	1,41	1,41
		0,75	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67
		0,88	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67
		1,00	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67	1,67
	$t_{N1}$ [mm]	$N_{R,k}$ [kN]	0,40	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49
		0,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50	1,50
		0,55	1,77	1,77	1,77	1,77	1,77	1,77	1,77	1,77	1,77
		0,63	2,20	2,20	2,20	2,20	2,20	2,20	2,20	2,20	2,20
		0,75	2,85	2,85	2,85	2,85	2,85	2,85	2,85	2,85	2,85
		0,88	3,43	3,43	3,43	3,43	3,43	3,43	3,43	3,43	3,43
		1,00	3,97	3,97	3,97	3,97	3,97	3,97	3,97	3,97	3,97
	$N_{R,k,II}$	3,97	3,97	3,97	3,97	3,97	3,97	3,97	3,97	3,97	
max. head displacement u [mm]		4,0	5,0	7,0	8,0	10,0	12,0	12,0	12,0	12,0	

If component  $t_{N1}$  resp.  $t_{N2}$  is made of S320GD or S350GD the grey highlighted values may be increased by 8.2 %.  
 He values listed above in dependence on the screw-in length  $l_{ef}$  are valid for  $k_{mod} = 0,90$  and timber strength grade C24 ( $\rho_a = 350 \text{ kg/m}^3$ ). For other combinations of  $k_{mod}$  and timber strength grades see Annex 3.

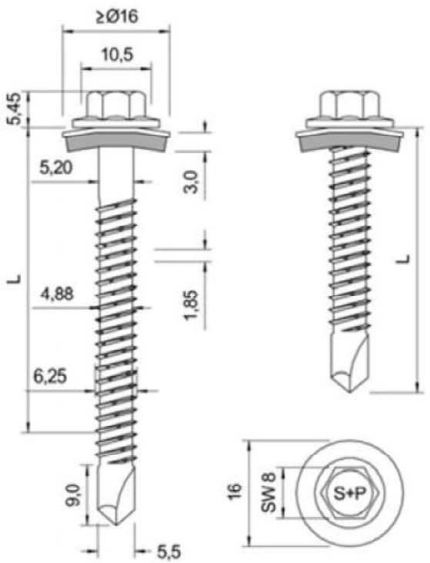
<b>Sandwich screw</b>	<b>Annex 7</b>
FBS Ø 6,5 Typ A with hexagon head and sealing washer $\geq \text{Ø}19 \text{ mm}$	

	<p><u>Materials</u></p> <p>Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506 Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM</p> <p>Component I: S280GD to S350GD - EN 10346 Component II: S235 - EN 10025-1 S280GD to S320GD - EN 10346</p>
	<p><u>Drilling capacity</u> <math>\Sigma(t_i) \leq 6.50 \text{ mm}</math></p>
	<p><u>Timber substructures</u> no performance determined</p>

		Component II t II [mm]					
		1,50	2,00	2,50	3,00	4,00	5,00
Component I	t <sub>N2</sub> [mm] V <sub>R,k</sub> [kN]	0,40	0,88	0,88	0,88	0,88	0,88
		0,50	1,12	1,12	1,12	1,12	1,12
		0,55	1,31	1,31	1,31	1,31	1,31
		0,63	1,59	1,59	1,59	1,59	1,59
		0,75	2,05	2,05	2,05	2,05	2,05
		0,88	2,05	2,05	2,05	2,05	2,05
		1,00	2,05	2,05	2,05	2,05	2,05
	t <sub>N1</sub> [mm] N <sub>R,k</sub> [kN]	0,40	1,14	1,14	1,14	1,14	1,14
		0,50	1,57	1,57	1,57	1,57	1,57
		0,55	1,96	1,96	1,96	1,96	1,96
0,63		2,07	2,56	2,56	2,56	2,56	
0,75		2,07	2,91	3,54	3,54	3,54	
0,88		2,07	2,91	4,03	4,11	4,11	
1,00		2,07	2,91	4,03	4,68	4,68	
N <sub>R,k,II</sub>		2,07	2,91	4,03	4,68	4,68	
D, d [mm] max. head displacement u [mm]	30	10,0	10,0	3,0	3,0	3,0	
	40	13,0	13,0	4,5	4,5	4,5	
	50	17,0	17,0	6,0	6,0	6,0	
	60	20,0	20,0	7,5	7,5	7,5	
	≥70	24,0	24,0	9,0	9,0	9,0	

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

<b>Sandwich screw</b>	<b>Annex 8</b>
SP-B2-6-5,5 x L, SP-B4-6-5,5 x L with hexagon head and sealing washer ≥ Ø16 mm	

	<p><b>Materials</b></p> <p>Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506 Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM</p> <p>Component I: S280GD to S350GD - EN 10346 Component II: S235 - EN 10025-1 S280GD to S320GD - EN 10346</p>
	<p><b>Drilling capacity</b> <math>\Sigma(t_i) \leq 6.50</math> mm</p>
	<p><b>Timber substructures</b> no performance determined</p>

		Component II t II [mm]				
		2,00	2,50	3,00	4,00	5,00
Component I	t <sub>N2</sub> [mm] V <sub>R,k</sub> [kN]	0,40	0,81	0,81	0,81	0,81
		0,50	1,23	1,23	1,23	1,23
		0,55	1,40	1,40	1,40	1,40
		0,63	1,67	1,67	1,67	1,67
		0,75	2,10	2,10	2,10	2,10
		0,88	2,10	2,10	2,10	2,10
		1,00	2,10	2,10	2,10	2,10
	t <sub>N1</sub> [mm] N <sub>R,k</sub> [kN]	0,40	1,31	1,31	1,31	1,31
		0,50	1,66	1,66	1,66	1,66
		0,55	1,97	1,97	1,97	1,97
		0,63	2,45	2,45	2,45	2,45
		0,75	3,02	3,23	3,23	3,23
		0,88	3,02	4,15	4,15	4,15
		1,00	3,02	4,28	5,00	5,00
	N <sub>R,k,II</sub>	3,02	4,28	5,00	5,00	5,00
D, d [mm] max. head displacement u [mm]	30	7,0	3,0	3,0	3,0	3,0
	40	10,0	4,8	4,8	4,8	4,8
	50	13,0	6,6	6,6	6,6	6,6
	60	17,0	8,4	8,4	8,4	8,4
	70	20,0	10,0	10,0	10,0	10,0
	≥80	23,0	12,0	12,0	12,0	12,0

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

<b>Sandwich screw</b>	<b>Annex 9</b>
SP-B2-6-6,3 x L, SP-B4-6-6,3 x L with hexagon head and sealing washer ≥ Ø16 mm	

	<p><u>Materials</u></p> <p>Fastener: Stainless steel A2, A4 or A5 – EN ISO 3506 Washer: Stainless steel A2, A4 or A5 – EN ISO 3506 with vulcanized EPDM</p> <p>Component I: S280GD to S350GD - EN 10346 Component II: S235 - EN 10025-1 S280GD to S320GD - EN 10346</p>
	<p><u>Drilling capacity</u> <math>\Sigma(t_i) \leq 12.0</math> mm</p>
	<p><u>Timber substructures</u> no performance determined</p>

		Component II t II [mm]				
		4,00	5,00	6,00	8,00	10,00
Component I	t <sub>N2</sub> [mm] V <sub>R,k</sub> [kN]	0,40	0,65	0,65	0,65	0,65
		0,50	0,91	0,91	0,91	0,91
		0,55	1,08	1,08	1,08	1,08
		0,63	1,34	1,34	1,34	1,34
		0,75	1,76	1,76	1,76	1,76
		0,88	1,76	1,76	1,76	1,76
		1,00	1,76	1,76	1,76	1,76
	t <sub>N1</sub> [mm] N <sub>R,k</sub> [kN]	0,40	1,14	1,14	1,14	1,14
		0,50	1,57	1,57	1,57	1,57
		0,55	1,96	1,96	1,96	1,96
		0,63	2,56	2,56	2,56	2,56
		0,75	3,54	3,54	3,54	3,54
		0,88	4,11	4,11	4,11	4,11
		1,00	4,68	4,68	4,68	4,68
	N <sub>R,k,II</sub>	4,68	4,68	4,68	4,68	4,68
D, d [mm] max. head displacement u [mm]	30	5,0	4,0	3,0	3,0	3,0
	40	6,8	5,8	4,8	4,8	4,8
	50	8,6	7,6	6,6	6,6	6,6
	60	10,4	9,4	8,4	8,4	8,4
	70	12,2	11,2	10,0	10,0	10,0
	≥80	14,0	13,0	12,0	12,0	12,0

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

<b>Sandwich screw</b>	<b>Annex 10</b>
SP-B2-12-5,5 x L, SP-B4-12-5,5 x L with hexagon head and sealing washer ≥ Ø16 mm	