

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-13/0211
of 28 August 2018

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

Sandwich-panel screws IPEX CF, BI, SA and SAX

Product family
to which the construction product belongs

Fastening screws for sandwich panels

Manufacturer

IPEX Beheer B.V.
Vonderweg 14
7468 DC ENTER
NIEDERLANDE

Manufacturing plant

IPEX Beheer B.V.
Vonderweg 14
7468 DC ENTER
NIEDERLANDE

This European Technical Assessment
contains

15 pages including 11 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

**European Technical Assessment
ETA-13/0211**

English translation prepared by DIBt

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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	Fastening screw	Description of product	Application
4	IPEX - 0321BI - 6,5-7,0 x L	Self-drilling screw with hexagon head and seal washer $\geq \varnothing 19$ mm	Steel / Timber
5	IPEX - 0321CF - 6,5-7,0 x L	Self-drilling screw with hexagon head and seal washer $\geq \varnothing 19$ mm	Steel / Timber
6	IPEX - 0323BI - 5,5-6,3 x L	Self-drilling screw with hexagon head and seal washer $\geq \varnothing 19$ mm	Steel / Steel
7	IPEX - 0323CF - 5,5-6,3 x L	Self-drilling screw with hexagon head and seal washer $\geq \varnothing 19$ mm	Steel / Steel
8	IPEX - 0325BI - 5,5-6,3 x L	Self-drilling screw with hexagon head and seal washer $\geq \varnothing 19$ mm	Steel / Steel
9	IPEX - 0325CF - 5,5-6,3 x L	Self-drilling screw with hexagon head and seal washer $\geq \varnothing 19$ mm	Steel / Steel
10	IPEX - 0321SAX - 6,5-7,0 x L	Self-drilling screw with hexagon head and seal washer $\geq \varnothing 16$ mm	Steel / Steel
11	IPEX - 0467SA - 6,5 x L	Self-tapping screw with hexagon head and seal washer $\geq \varnothing 16$ mm	Steel / Timber

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 $\geq C2$ 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 Annexes (1-11).

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

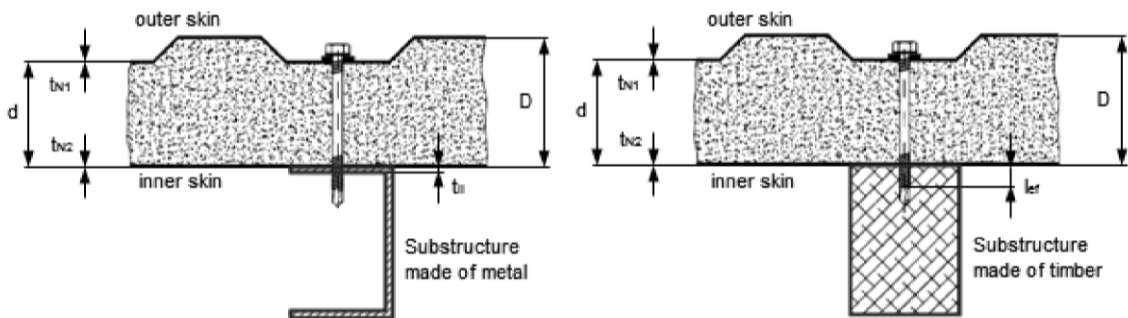
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 28 August 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Schult

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_{pd} 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

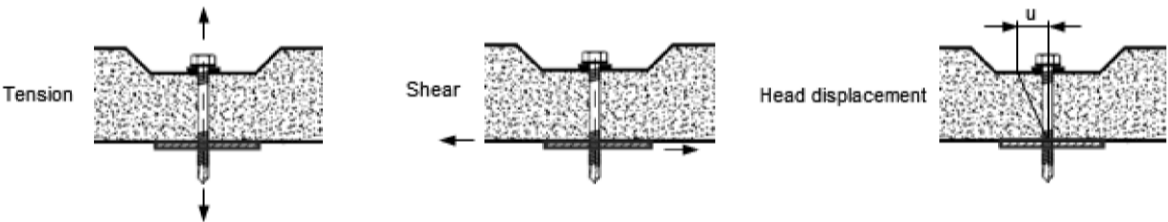
- $M_{y,Rk}$ Characteristic value of yield moment
 $f_{ax,k}$ Characteristic value of withdrawal strength
 $f_{h,k}$ Characteristic value of embedding strength
 ρ_k Characteristic value of raw density of structural timber in kg/m^3
 ρ_a Existing value of raw density of structural timber in kg/m^3

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 $t_{II} < 5.0$ 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 u of the fastening screw according to the Annexes.

Installation conditions

- The installation is carried out according to the manufacturer's instructions.
- The load-bearing screw-in length of the fastening screw given by the manufacturer shall be considered.
- The fastening screws are screwed-in with electric screw driver with depth stop. 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	Annex 2
Fastening screws for sandwich panels	

Timber substructures

Characteristic values of tension and shear resistance of the connection for $k_{mod} \neq 0.9$ and / or $\rho_k > 350 \text{ kg/m}^3$ can be determined as follows:

$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ N_{R,II,k} \cdot k_{mod} / 0.9 \cdot (\rho_a / 350)^{0.8} \end{array} \right. \quad V_{R,k} = \min \left\{ \begin{array}{l} V_{R,I,k} \\ V_{R,II,k} \cdot k_{mod} / 0.9 \cdot (\rho_a / 350)^{0.8} \end{array} \right.$$

$N_{R,I,k}$ und $V_{R,I,k}$ are given in the corresponding Annex of the fastening screw.

As far as $N_{R,II,k}$ and $V_{R,II,k}$ are not given in the corresponding Annex of the fastening screw applies:

$$N_{R,II,k} = f_{ax,k} \cdot d \cdot l_{ef} \cdot k_{mod}$$

$$V_{R,II,k} = F_{v,Rk} \cdot k_{mod}$$

$F_{v,Rk}$ has to be determined according to EN 1995-1-1:2004 + A1:2008, equation (8.9) with $M_{y,Rk}$ and $f_{h,k}$ given in the corresponding Annex of the fastening screw and $f_{h,k}$ according to:

$$f_{h,k} = 0.082(1 - 0.01 \cdot d) \cdot \rho_k$$

with $\rho_k = 350 \text{ kg/m}^3$ as far as no specific value is known.

The characteristic values of resistance of the connection shall be determined as follows:

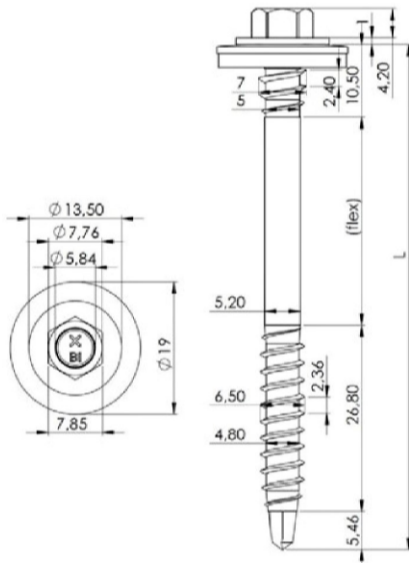
$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ N_{R,II,k} \end{array} \right.$$

$$V_{R,k} = \min \left\{ \begin{array}{l} V_{R,I,k} \\ V_{R,II,k} \end{array} \right.$$

Specific notes for timber substructures

Fastening screws for sandwich panels

Annex 3



Materials:

Fastener: stainless steel (1.4301) - EN 10088

Washer: stainless steel (1.4301) - EN 10088

Component I: S280GD, S320GD or S350GD - EN 10346

Component II: structural timber - EN 14081, \geq C24

Drilling capacity: $\Sigma t_i \leq 2.00$ mm

Timber substructures:
performance determined with

$M_{y,Rk} = 11.800$ Nm

$f_{ax,k} = 9.800$ N/mm² for $l_{ef} \geq 26.0$ mm

t_{N1}, t_{N2} [mm]		d, D [mm]								
		30	40	50	60	70	80	100	120	≥ 140
$V_{R,k}$ [kN]	0.40	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
	0.50	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
	0.55	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
	0.63	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
	0.75	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
	0.88	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
	1.00	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
$N_{R,k}$ [kN]	0.40	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
	0.50	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97
	0.55	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32
	0.63	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
	0.75	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
	0.88	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40
	1.00	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08
u [mm]		4.0	5.0	6.0	7.0	8.0	8.0	8.0	8.0	8.0

For t_{N1} from S320GD or S350GD the values $N_{R,k}$ may be increased by 8.0%.

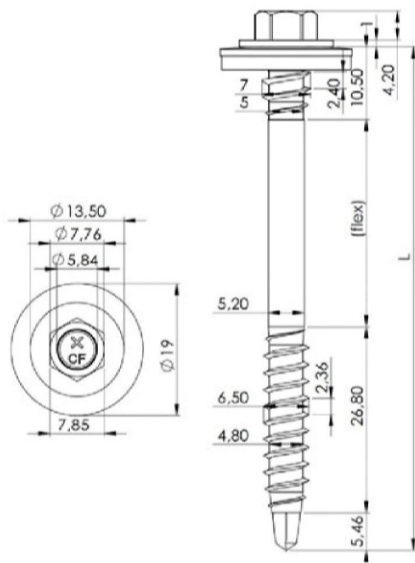
For t_{N2} from S320GD or S350GD the values $V_{R,k}$ may be increased by 8.0%.

The values listed above are valid for $k_{mod} = 0.90$ and timber strength grade C24 ($\rho_k = 350$ kg/m³). For other combinations of k_{mod} and timber strength grades see annex 3.

Self drilling screw with hexagon head and sealing washer $\geq \varnothing 19$ mm

IPEX - 0321BI – 6,5-7,0 x L

Annex 4



Materials:

Fastener: carbon steel
quenched, tempered and galvanized

Washer: stainless steel (1.4301) - EN 10088

Component I: S280GD, S320GD or S350GD - EN 10346

Component II: structural timber - EN 14081, \geq C24

Drilling capacity: $\Sigma t_i \leq 2.00$ mm

Timber substructures:
performance determined with

$M_{y,Rk} = 13.650$ Nm
 $f_{ax,k} = 9.800$ N/mm² for $l_{ef} \geq 26.0$ mm

t_{N1}, t_{N2} [mm]	d, D [mm]								
	30	40	50	60	70	80	100	120	≥ 140
$V_{R,k}$ [kN]	0.40	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
	0.50	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
	0.55	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
	0.63	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
	0.75	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
	0.88	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
	1.00	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
$N_{R,k}$ [kN]	0.40	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
	0.50	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97
	0.55	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32
	0.63	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
	0.75	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
	0.88	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40
	1.00	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08
u [mm]	2.0	2.8	3.5	4.3	5.0	5.0	5.0	5.0	5.0

For t_{N1} from S320GD or S350GD the values $N_{R,k}$ may be increased by 8.0%.

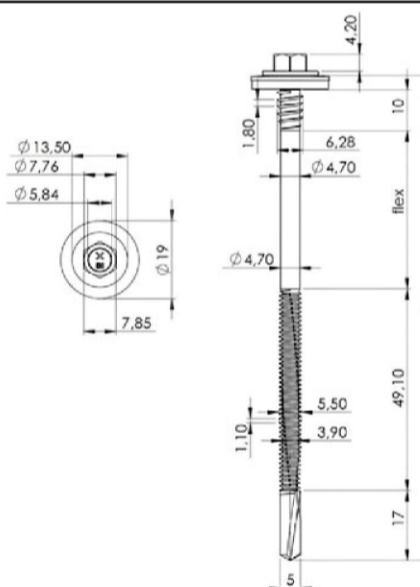
For t_{N2} from S320GD or S350GD the values $V_{R,k}$ may be increased by 8.0%.

The values listed above are valid for $k_{mod} = 0.90$ and timber strength grade C24 ($\rho_k = 350$ kg/m³). For other combinations of k_{mod} and timber strength grades see annex 3.

Self drilling screw with hexagon head and sealing washer $\geq \varnothing 19$ mm

IPEX – 0321CF – 6,5-7,0 x L

Annex 5



Materials:

Fastener: stainless steel (1.4301) - EN 10088

Washer: stainless steel (1.4301) - EN 10088

Component I: S280GD, S320GD or S350GD - EN 10346

Component II: S235 - EN 10025-1
S280GD or S320GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 13.00$ mm

Timber substructures:

no performance determined

t_{N1}, t_{N2}, d, D [mm]	3.00	4.00	5.00	6.00	8.00	10.0	12.0	13.0	≥ 14.0
$V_{R,k}$ [kN]	-	0.66	0.66	0.66	0.66	0.66	0.66	-	-
$N_{R,k}$ [kN]	-	0.98	0.98	0.98	0.98	0.98	0.98	-	-
u [mm]	-	1.17	1.18	1.20	1.22	1.22	1.22	-	-
	-	1.46	1.49	1.52	1.59	1.59	1.59	-	-
	-	1.93	2.00	2.06	2.19	2.19	2.19	-	-
	-	1.93	2.00	2.06	2.19	2.19	2.19	-	-
	-	1.93	2.00	2.06	2.19	2.19	2.19	-	-
	-	1.66	1.66	1.66	1.66	1.66	1.66	-	-
	-	2.41	2.41	2.41	2.41	2.41	2.41	-	-
	-	2.77	2.77	2.77	2.77	2.77	2.77	-	-
	-	3.31	3.31	3.31	3.31	3.31	3.31	-	-
	-	4.20	4.20	4.20	4.20	4.20	4.20	-	-
	-	4.98	4.98	4.98	4.98	4.98	4.98	-	-
	-	5.75	5.75	5.75	5.75	5.75	5.75	-	-
	-	2.0	2.0	2.0	2.0	2.0	2.0	-	-
	-	3.7	3.7	3.7	3.7	3.7	3.7	-	-
	-	5.5	5.5	5.5	5.5	5.5	5.5	-	-
	-	7.2	7.2	7.2	7.2	7.2	7.2	-	-
	-	9.0	9.0	9.0	9.0	9.0	9.0	-	-
	-	9.0	9.0	9.0	9.0	9.0	9.0	-	-
	-	9.0	9.0	9.0	9.0	9.0	9.0	-	-
	-	9.0	9.0	9.0	9.0	9.0	9.0	-	-
	-	9.0	9.0	9.0	9.0	9.0	9.0	-	-
	-	9.0	9.0	9.0	9.0	9.0	9.0	-	-

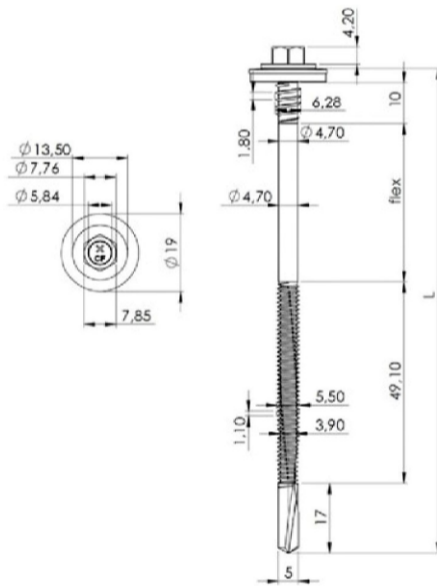
For t_{N1} from S320GD or S350GD the values $N_{R,k}$ may be increased by 8.0%.

For t_{N2} from S320GD or S350GD the values $V_{R,k}$ may be increased by 8.0%.

Self drilling screw with hexagon head and sealing washer $\geq \varnothing 19$ mm

IPEX - 0325BI - 5,5-6,3 x L

Annex 8



Materials:

Fastener: carbon steel
quenched, tempered and galvanized

Washer: stainless steel (1.4301) - EN 10088

Component I: S280GD, S320GD or S350GD - EN 10346

Component II: S235 - EN 10025-1
S280GD or S320GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 13.00$ mm

Timber substructures:

no performance determined

t_{N1}, t_{N2}, d, D [mm]	t_{ii} [mm]								
	3.00	4.00	5.00	6.00	8.00	10.0	12.0	13.0	≥ 14.0
$V_{R,k}$ [kN]	0.40	-	0.66	0.66	0.66	0.66	0.66	-	-
	0.50	-	0.98	0.98	0.98	0.98	0.98	-	-
	0.55	-	1.17	1.18	1.20	1.22	1.22	-	-
	0.63	-	1.46	1.49	1.52	1.59	1.59	-	-
	0.75	-	1.93	2.00	2.06	2.19	2.19	-	-
	0.88	-	1.93	2.00	2.06	2.19	2.19	-	-
	1.00	-	1.93	2.00	2.06	2.19	2.19	-	-
$N_{R,k}$ [kN]	0.40	-	1.66	1.66	1.66	1.66	1.66	-	-
	0.50	-	2.41	2.41	2.41	2.41	2.41	-	-
	0.55	-	2.77	2.77	2.77	2.77	2.77	-	-
	0.63	-	3.31	3.31	3.31	3.31	3.31	-	-
	0.75	-	4.20	4.20	4.20	4.20	4.20	-	-
	0.88	-	4.98	4.98	4.98	4.98	4.98	-	-
	1.00	-	5.75	5.75	5.75	5.75	5.75	-	-
u [mm]	30	-	2.0	1.3	1.3	1.3	1.3	-	-
	40	-	2.5	1.9	1.9	1.9	1.9	-	-
	50	-	3.0	2.6	2.6	2.6	2.6	-	-
	60	-	3.5	3.3	3.3	3.3	3.3	-	-
	70	-	4.0	4.0	4.0	4.0	4.0	-	-
	80	-	4.0	4.0	4.0	4.0	4.0	-	-
	100	-	4.0	4.0	4.0	4.0	4.0	-	-
	120	-	4.0	4.0	4.0	4.0	4.0	-	-
	≥ 140	-	4.0	4.0	4.0	4.0	4.0	-	-

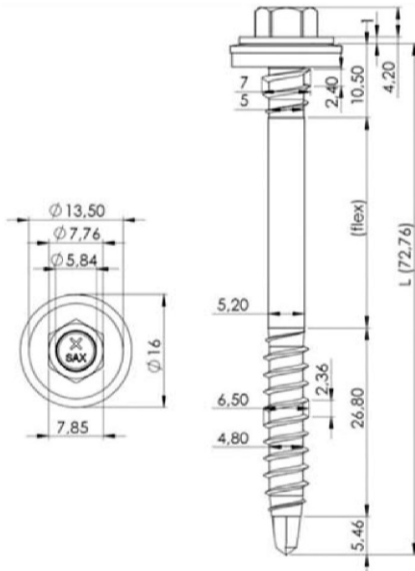
For t_{N1} from S320GD or S350GD the values $N_{R,k}$ may be increased by 8.0%.

For t_{N2} from S320GD or S350GD the values $V_{R,k}$ may be increased by 8.0%.

Self drilling screw with hexagon head and seal washer $\geq \varnothing 19$ mm

IPEX - 0325CF - 5,5-6,3 x L

Annex 9



Materials:

Fastener: stainless steel (1.4301) - EN 10088

Washer: stainless steel (1.4301) - EN 10088

Component I: S280GD or S320GD - EN 10346

Component II: S235 - EN 10025-1
S280GD or S320GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 2.00$ mm

Timber substructures:

no performance determined

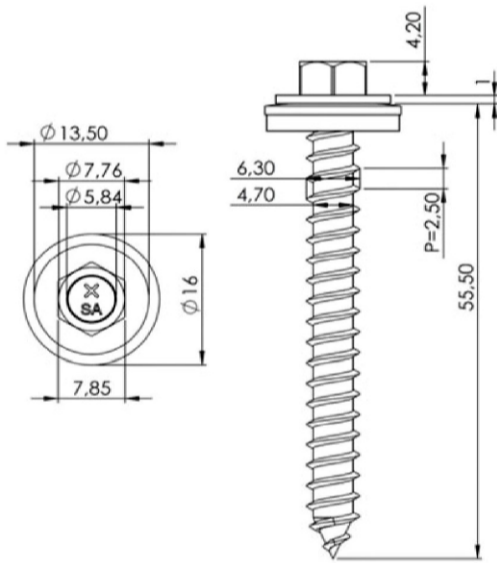
t_{N1}, t_{N2}, d, D [mm]		t_{II} [mm]								
		0.75	1.00	1.25	1.50	2.00	2.5	3.0	5.0	6.00
$V_{R,k}$ [kN]	0.40	-	-	-	-	-	-	-	-	-
	0.50	1.06	1.06	1.06	1.06	-	-	-	-	-
	0.55	1.06	1.06	1.06	-	-	-	-	-	-
	0.63	1.06	1.06	1.06	-	-	-	-	-	-
	0.75	1.06	1.06	1.06	-	-	-	-	-	-
	0.88	1.06	1.06	-	-	-	-	-	-	-
	1.00	1.06	1.06	-	-	-	-	-	-	-
$N_{R,k}$ [kN]	0.40	0.99	0.99	0.99	0.99	-	-	-	-	-
	0.50	0.99	0.99	0.99	0.99	-	-	-	-	-
	0.55	0.99	0.99	0.99	-	-	-	-	-	-
	0.63	0.99	0.99	0.99	-	-	-	-	-	-
	0.75	0.99	0.99	0.99	-	-	-	-	-	-
	0.88	0.99	0.99	-	-	-	-	-	-	-
	1.00	0.99	0.99	-	-	-	-	-	-	-
u [mm]	30	14.00	-	-	-	-	-	-	-	-
	40	14.00	-	-	-	-	-	-	-	-
	50	14.00	-	-	-	-	-	-	-	-
	60	14.00	-	-	-	-	-	-	-	-
	70	14.00	-	-	-	-	-	-	-	-
	80	14.00	-	-	-	-	-	-	-	-
	100	14.00	-	-	-	-	-	-	-	-
	120	14.00	-	-	-	-	-	-	-	-
	≥ 140	14.0	-	-	-	-	-	-	-	-

No further specifications.

Self drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm

IPEX - 0321SAX - 6,5-7,0 x L

Annex 10



Materials:

Fastener: stainless steel (1.4301) - EN 10088

Washer: stainless steel (1.4301) - EN 10088

Component I: S280GD, S320GD or S350GD - EN 10346

Component II: structural timber - EN 14081, \geq C24

Predrill diameter: see Table below

Timber substructures:
performance determined with

$M_{y,Rk} = 15.020 \text{ Nm}$

$f_{ax,k} = 11.718 \text{ N/mm}^2$ for $l_{ef} \geq 60.0 \text{ mm}$

t_{N1}, t_{N2} [mm]	d, D [mm]								
	30	40	50	60	70	80	100	120	≥ 140
$V_{R,k}$ [kN]	0.40	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
	0.50	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
	0.55	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	0.63	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
	0.75	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
	0.88	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
	1.00	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
$N_{R,k}$ [kN]	0.40	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38
	0.50	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
	0.55	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	0.63	2.41	2.41	2.41	2.41	2.41	2.41	2.41	2.41
	0.75	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37
	0.88	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
	1.00	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85
u [mm]	4.0	5.6	7.2	8.8	12.0	12.0	12.0	12.0	12.0
d_{pd} [mm]	Ø 4.8								

For t_{N1} from S320GD or S350GD the values $N_{R,k}$ may be increased by 8.0%.

For t_{N2} from S320GD or S350GD the values $V_{R,k}$ may be increased by 8.0%.

The values listed above are valid for $k_{mod} = 0.90$ and timber strength grade C24 ($\rho_k = 350 \text{ kg/m}^3$). For other combinations of k_{mod} and timber strength grades see annex 3.

Self tapping screw with hexagon head and sealing washer $\geq \varnothing 16 \text{ mm}$

IPEX - 0467SA - 6,5 x L

Annex 11