

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-11/0174
of 23 November 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 E-X

Product family
to which the construction product belongs

Fastening screws for metal members and sheeting

Manufacturer

Guntram End GmbH
Untertürkheimer Straße 20
66117 Saarbrücken
DEUTSCHLAND

Manufacturing plant

Guntram End GmbH
Untertürkheimer Strasse 20
D-66117 Saarbrücken

This European Technical Assessment
contains

34 pages including 29 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

330046-01-0602

This version replaces

ETA-11/0174 issued on 22 February 2019

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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 normally completed with sealing washers consisting of metal washer and EPDM-seal.

Table 1 – Fastening screws for metal members and sheeting

Annex	Fastening screw	Description of product	Application
8	E-X Bohr 2 5,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel
9	E-X Bohr 3 5,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel
10	E-X Bohr 5 5,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel
11	E-X Bohr RS 6,3 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel
12	E-X Bohr RS 6,3 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel
13	E-X Bohr RS 5,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14$ mm	Steel / Steel
14	E-X RS 4,8 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14$ mm	Steel / Steel
15	E-X RS 4,8 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14$ mm	Steel / Steel
16	E-X RS 6,0 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel
		Self-drilling screw with torx drive and sealing washer $\geq \varnothing 16$ mm	
17	E-X Bohr RS 4,8 x 20	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14$ mm	Steel / Steel
	E-X T25 Bohr RS 4,8 x 20	Self-drilling screw with torx drive and sealing washer $\geq \varnothing 12$ mm	
18	E-X Bohr RS 4,8 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14$ mm	Steel / Steel Steel / Timber
	E-X T25 Bohr RS 4,8 x L	Self-drilling screw with torx drive and sealing washer $\geq \varnothing 12$ mm	
19	E-X BZ 6,3 x L E-X 8 BZ 6,3 x L	Self-tapping screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel
20	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Steel Steel / Timber
21	E-X Bohr RS 6,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16$ mm	Steel / Timber

Table 1 – continued

Annex	Fastening screw	Description of product	Application
22	E-X Bohr 2 5,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing$ 16 mm	Aluminium / Steel
	E-X T25 Bohr 2 5,5 x L	Self-drilling screw with torx drive and sealing washer $\geq \varnothing$ 12 mm	
23	E-X Bohr RS 4,8 x 20	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing$ 14 mm	Aluminium / Steel
	E-X T25 Bohr RS 4,8 x 20	Self-drilling screw with torx drive and sealing washer $\geq \varnothing$ 12 mm	
24	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer $\geq \varnothing$ 16 mm	Aluminium / Steel
25	E-X Bohr 2 5,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing$ 16 mm	Aluminium / Aluminium
	E-X T25 Bohr 2 5,5 x L	Self-drilling screw with torx drive and sealing washer $\geq \varnothing$ 12 mm	
26	E-X Bohr RS 4,8 x 20	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing$ 14 mm	Aluminium / Aluminium
	E-X T25 Bohr RS 4,8 x 20	Self-drilling screw with torx drive and sealing washer $\geq \varnothing$ 12 mm	
27	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer $\geq \varnothing$ 16 mm	Aluminium / Aluminium
28	E-X Bohr RS 6,5 x L	Self-drilling screw with hexagon head and sealing washer $\geq \varnothing$ 16 mm	Aluminium / Timber
29	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer $\geq \varnothing$ 16 mm	Aluminium / 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 metal sheeting to metal or timber substructures. The sheeting can either be used as wall or roof cladding or as load bearing wall and roof element. The fastening screws can also be used for the fastening of any other thin gauge metal members. 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 Annex (1-28).

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 combination of tension and shear forces (interaction)	see Annexes to this ETA
Check of Deformation Capacity in case of constraining forces due to temperature	No performance assessed
Durability	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

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

In accordance with EAD 330046-01-0602, 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

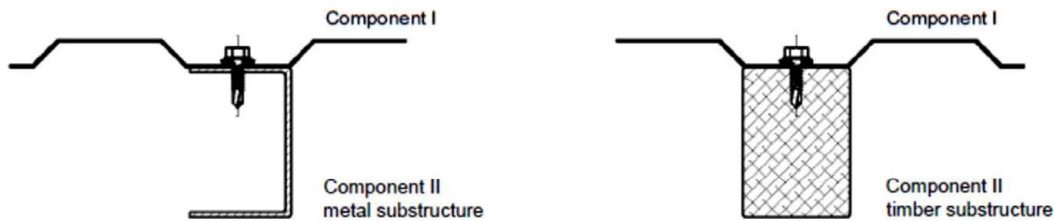
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 23 November 2023 by Deutsches Institut für Bautechnik

Dr.-Ing. Ronald Schwuchow
Head of Section

beglaubigt:
Ortmann

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 metal member or sheeting with contact to the screw head
Component II	Material of the substructure

Terms for dimensions

t_I	Thickness of component I
t_{II}	Thickness of component II
$\Sigma(t_i)$	Sum of the thicknesses of all components
l_{ef}	Effective screw-in length in timber substructure (without drill point)
d_{pd}	Pre-drill diameter of component I and component II
$d_{pd,I}$	Pre-drill diameter of component I

Terms for performances

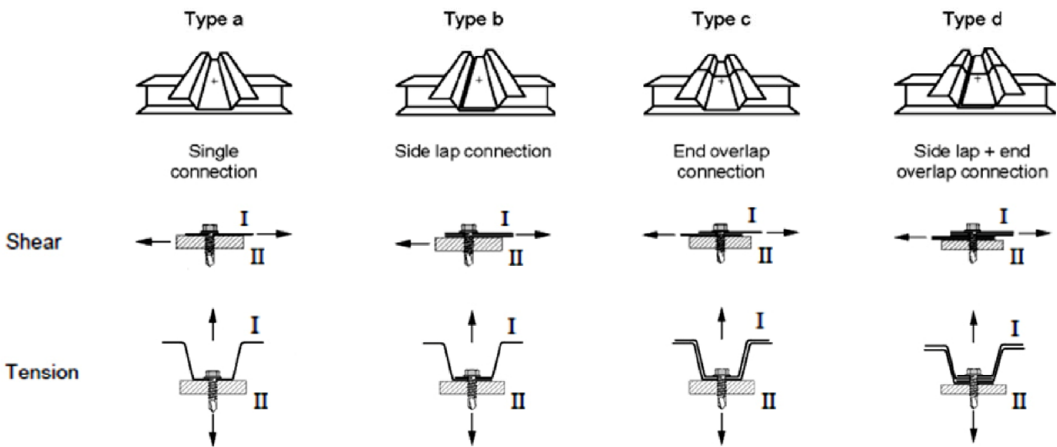
$V_{R,k}$	Characteristic value of shear resistance of the connection
$N_{R,k}$	Characteristic value of tension resistance of the connection
$V_{R,I,k}$	Characteristic value of shear resistance (load bearing) of component I
$N_{R,I,k}$	Characteristic value of tension resistance (pull-through) of component I
$N_{R,II,k}$	Characteristic value of tension resistance (pull-out) of component II

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 metal members and sheeting	Annex 1

Types of connection and occurring 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 the types of connection (a, b, c, d) listed in the Annexes it is not necessary to take into account the effect of constrains due to temperature. Otherwise this has to be considered unless constrains due to temperature do not occur or are not significant (e.g. sufficient flexibility of the substructure).

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

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

Fastening screws for metal members and sheeting

Annex 2

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:

$$f_{h,k} = 0,082(1 - 0,01 \cdot d) \cdot \rho_k$$

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:

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

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

Aluminium members and sheeting

Characteristic values of tension resistance of the connection can be determined as follows:

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

The characteristic value $N_{R,I,k}$ has to be determined according to EN 1999-1-4:2007 + AC:2009, equation (8.13).

The characteristic value $N_{R,II,k}$ is given in the corresponding Annex of the fastening screw.

Perforated steel members and sheeting

Characteristic values of tension and shear resistance of the connection can be determined as follows:

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

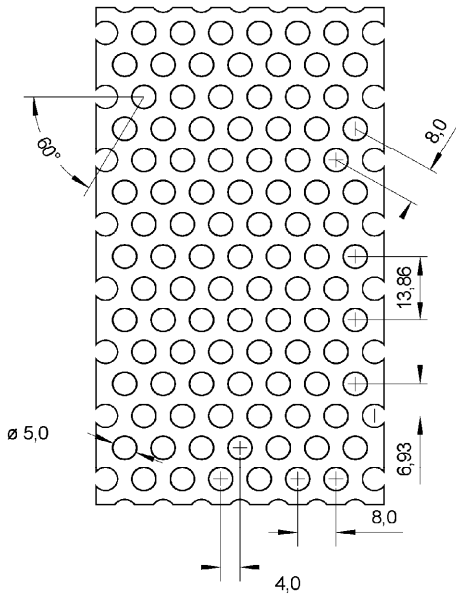
The characteristic values $N_{R,I,k}$ and $V_{R,I,k}$ are given in Annex 4 to 7.

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

Specific notes to the Annexes

Fastening screws for metal members and sheeting

Annex 3



Fastener

Self tapping screw from Ø 6,3 mm to Ø 6,5 mm

Self drilling screw from Ø 5,5 mm to Ø 6,3 mm

Materials

Component I: S280GD to S350GD - EN 10346

Component II: According to the Annex of the corresponding fastener

sheet		perforated sheet made of S280GD				perforated sheet made of S320GD				perforated sheet made of S350GD				
washer Ø [mm]		16	19	22	25	16	19	22	25	16	19	22	25	
Component I	$V_{R,I,k}$ [kN]	0,75	2,16	2,22	2,24	2,38	2,34	2,40	2,44	2,58	2,54	2,60	2,62	2,78
		0,88	2,56	2,64	2,64	2,78	2,78	2,86	2,86	3,02	3,00	3,10	3,10	3,26
		1,00	2,92	3,04	3,02	3,16	3,16	3,30	3,26	3,42	3,42	3,56	3,52	3,68
		1,13	3,32	3,48	3,42	3,56	3,60	3,76	3,70	3,86	3,88	4,10	4,00	4,16
		1,25	3,70	3,88	3,80	3,94	4,00	4,20	4,10	4,26	4,32	4,54	4,42	4,60
		1,50	4,46	4,74	4,56	4,72	4,84	5,12	4,96	5,10	5,22	5,54	5,34	5,50
	$N_{R,I,k}$ [kN]	0,75	1,40	1,94	2,14	2,22	1,52	2,08	3,32	2,42	1,64	2,26	2,50	2,60
		0,88	1,82	2,34	2,62	2,70	1,96	2,54	2,82	2,92	2,12	2,74	3,04	3,14
		1,00	2,24	2,74	3,06	3,14	2,44	2,96	3,32	3,42	2,62	3,20	3,58	3,68
		1,13	2,74	3,18	3,58	3,64	2,98	3,44	3,88	3,96	3,20	3,70	4,18	4,26
		1,25	3,24	3,58	4,08	4,12	3,52	3,88	4,40	4,46	3,78	4,18	4,76	4,80
		1,50	4,36	4,46	5,12	5,12	4,74	4,84	5,56	5,56	5,10	5,22	5,98	5,98

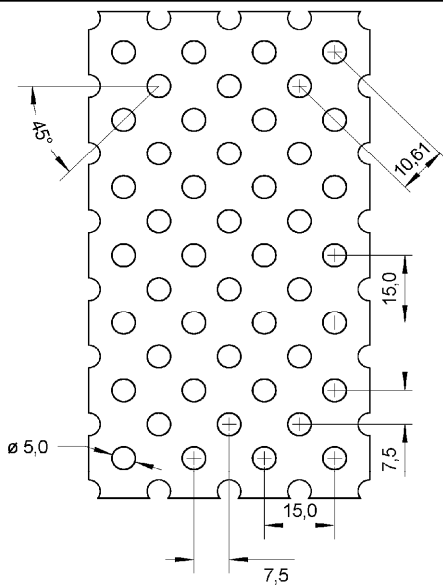
The characteristic load bearing capacity of component II is according to the Annex of the corresponding fastener.

The thickness of the perforated sheets which are exposed to wind loads shall be at least 1,00 mm.

Fastening of perforated sheets

Load bearing capacity of component I

Annex 4



Fastener

Self tapping screw from Ø 6,3 mm to Ø 6,5 mm

Self drilling screw from Ø 5,5 mm to Ø 6,3 mm

Materials

Component I: S280GD - EN 10346

Component II: According to the Annex of the corresponding fastener

sheet		perforated sheet made of S280GD							
Fastener		self drilling screws Ø 5,5 mm to Ø 6,0 mm				self tapping screws Ø 6,3 mm to Ø 6,5 mm			
washer Ø [mm]		16	19	22	25	16	19	22	25
Component I t_i [mm]	$V_{R,i,k}$ [kN]								
	0,75	2,48	2,52	2,84	2,76	2,38	2,64	3,16	3,24
	0,88	3,04	3,12	3,42	3,32	3,02	3,28	3,78	3,88
	1,00	3,56	3,70	3,84	3,84	3,64	3,96	4,36	4,50
	1,13	4,14	4,26	4,40	4,40	4,36	4,70	5,00	5,18
	1,25	4,68	5,84	4,92	4,94	5,06	5,40	5,60	5,84
	1,50	5,76	6,04	5,90	6,10	6,62	6,94	6,88	7,16
	$N_{R,i,k}$ [kN]								
	0,75	2,88	3,16	3,24	3,14	2,86	3,46	3,72	3,92
	0,88	3,42	3,72	3,76	3,70	3,40	4,02	4,30	4,46
	1,00	3,92	4,28	4,28	4,20	3,90	4,56	4,82	4,96
	1,13	4,46	4,86	4,88	4,72	4,44	5,12	5,38	5,48
	1,25	4,96	5,42	5,42	5,26	4,94	5,66	5,88	5,94
	1,50	6,04	6,60	6,60	6,38	6,00	6,74	6,92	6,90

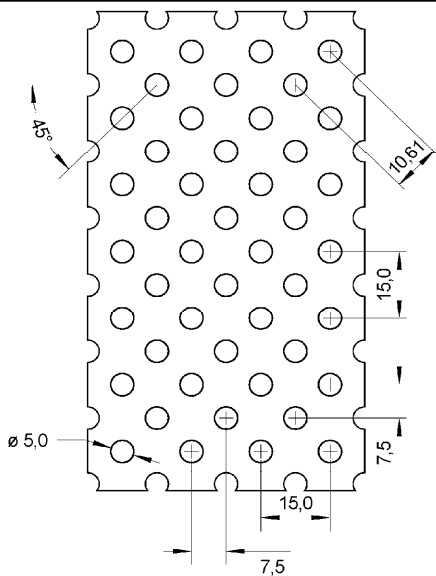
The characteristic load bearing capacity of component II is according to the Annex of the corresponding fastener.

The thickness of the perforated sheets which are exposed to wind loads shall be at least 1,00 mm.

Fastening of perforated sheets

Load bearing capacity of component I

Annex 5



Fastener

Self tapping screw from $\varnothing 6,3$ mm to $\varnothing 6,5$ mm

Self drilling screw from $\varnothing 5,5$ mm to $\varnothing 6,3$ mm

Materials

Component I: S320GD - EN 10346

Component II: According to the Annex of the corresponding fastener

sheet		perforated sheet made of S320GD							
Fastener		self drilling screws $\varnothing 5,5$ mm to $\varnothing 6,0$ mm				self tapping screws $\varnothing 6,3$ mm to $\varnothing 6,5$ mm			
washer \varnothing [mm]		16	19	22	25	16	19	22	25
Component I t_i [mm]	$V_{R,i,k}$ [kN]								
	0,75	2,68	2,74	3,08	3,00	2,68	2,88	3,42	3,50
	0,88	3,30	3,38	3,70	3,60	3,36	3,60	4,10	4,22
	1,00	3,86	4,00	4,16	4,16	4,02	4,30	4,72	4,88
	1,13	4,48	4,62	4,76	4,76	4,76	5,08	5,42	5,60
	1,25	5,06	5,24	5,32	5,36	5,50	5,84	6,08	6,30
	1,50	6,24	6,54	6,40	6,60	7,10	7,52	7,46	7,76
	$N_{R,i,k}$ [kN]								
	0,75	3,12	3,42	3,50	3,40	3,12	3,68	4,06	4,26
	0,88	3,70	4,04	4,08	4,00	3,70	4,32	4,68	4,86
	1,00	4,24	4,64	4,64	4,54	4,24	4,92	5,24	5,40
	1,13	4,84	5,26	5,28	5,12	4,84	5,54	5,86	5,96
	1,25	5,38	5,88	5,88	5,70	5,38	6,14	6,40	6,48
	1,50	6,54	7,16	7,16	6,92	6,54	7,38	7,54	7,52

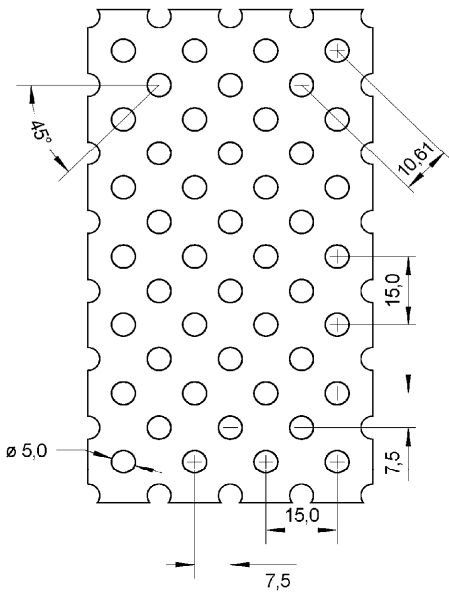
The characteristic load bearing capacity of component II is according to the Annex of the corresponding fastener.

The thickness of the perforated sheets which are exposed to wind loads shall be at least 1,00 mm.

Fastening of perforated sheets

Load bearing capacity of component I

Annex 6



Fastener

Self tapping screw from Ø 6,3 mm to Ø 6,5 mm

Self drilling screw from Ø 5,5 mm to Ø 6,3 mm

Materials

Component I: S350GD - EN 10346

Component II: According to the Annex of the corresponding fastener

sheet		perforated sheet made of S350GD							
Fastener		self drilling screws Ø 5,5 mm to Ø 6,0 mm				self tapping screws Ø 6,3 mm to Ø 6,5 mm			
washer Ø [mm]		16	19	22	25	16	19	22	25
Component I t_i [mm]	$V_{R,I,k}$ [kN]								
	0,75	2,88	2,92	3,30	3,20	2,98	3,20	3,72	3,92
	0,88	3,54	3,62	3,96	3,86	3,62	3,88	4,42	4,54
	1,00	4,14	4,28	4,46	4,46	4,24	4,52	5,08	5,12
	1,13	4,80	4,94	5,10	5,10	4,92	5,24	5,78	5,74
	1,25	5,44	5,62	5,70	5,72	5,56	5,92	6,46	6,32
	1,50	6,24	6,54	6,40	7,02	6,94	7,36	7,86	7,48
	$N_{R,I,k}$ [kN]								
	0,75	3,34	3,66	3,76	3,64	3,52	4,16	4,52	4,64
	0,88	3,96	4,36	4,38	4,28	3,98	4,76	5,04	5,24
	1,00	4,54	4,98	4,96	4,86	4,40	5,24	5,50	5,76
	1,13	5,16	5,64	5,64	5,48	4,86	5,76	5,96	6,32
	1,25	5,80	6,28	6,28	6,14	5,38	6,24	6,40	6,80
	1,50	6,54	7,16	7,16	7,46	6,54	7,38	7,54	7,80

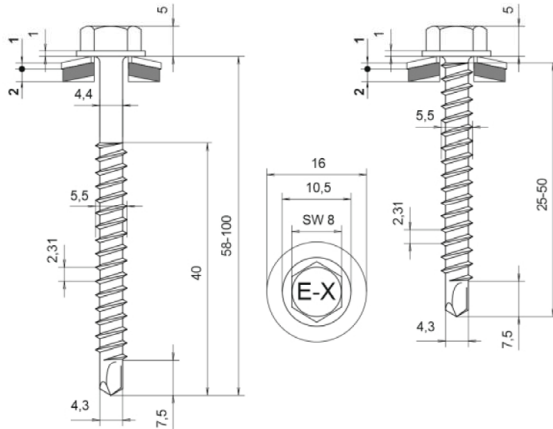
The characteristic load bearing capacity of component II is according to the Annex of the corresponding fastener.

The thickness of the perforated sheets which are exposed to wind loads shall be at least 1,00 mm.

Fastening of perforated sheets

Load bearing capacity of component I

Annex 7



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD - EN 10346

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

Drilling capacity: $\Sigma t_i \leq 3.5 \text{ mm}$

Timber substructures:

no performance determined

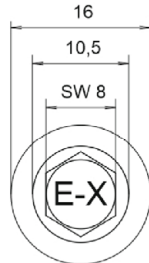
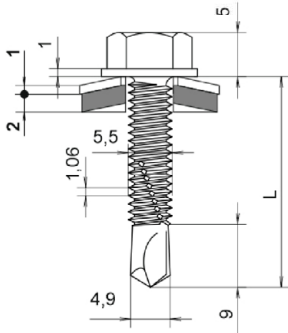
t_i [mm]		t_{li} [mm]									
		0.63	0.75	0.88	1.00	1.13	1.25	1.50	2.00		
$V_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-	-	-	-
	0.63	-	-	-	1.20	1.50	1.70	1.70	abc	1.70	abc
	0.75	-	-	-	1.60	1.80	2.00	2.00	ac	2.00	ac
	0.88	-	-	-	2.00	2.20	2.30	2.40	-	2.40	a
	1.00	-	-	-	2.20	2.60	2.70	2.70	-	2.70	a
	1.13	-	-	-	2.20	2.60	2.70	2.70	-	2.70	a
	1.25	-	-	-	2.20	2.60	2.70	2.70	-	2.70	a
	1.50	-	-	-	2.20	2.60	2.70	2.70	-	2.70	a
	1.75	-	-	-	2.20	2.60	2.70	2.70	-	-	-
	2.00	-	-	-	2.20	2.60	2.70	2.70	-	-	-
$N_{R,k}$ [kN]	0.50	-	-	-	0.38	0.43	0.54	0.76	abc	1.19	abc
	0.55	-	-	-	0.48	0.55	0.68	0.95	abc	1.50	abc
	0.63	-	-	-	0.70	0.80	1.00	1.40	abc	2.20	abc
	0.75	-	-	-	0.70	0.80	1.00	1.40	ac	2.20	abc
	0.88	-	-	-	0.70	0.80	1.00	1.40	-	2.20	ac
	1.00	-	-	-	0.70	0.80	1.00	1.40	-	2.20	a
	1.13	-	-	-	0.70	0.80	1.00	1.40	-	2.20	a
	1.25	-	-	-	0.70	0.80	1.00	1.40	-	2.20	a
	1.50	-	-	-	0.70	0.80	1.00	1.40	-	2.20	a
	1.75	-	-	-	0.70	0.80	1.00	1.40	-	-	-
	2.00	-	-	-	0.70	0.80	1.00	1.40	-	-	-

No further specifications.

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

E-X Bohr 2 5,5 x L

Annex 8



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD, S350GD - EN 10346

Component II: S235, S275, S355 - EN 10025-1
S280GD, S320GD, S350GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 5.25 \text{ mm}$

Timber substructures:

no performance determined

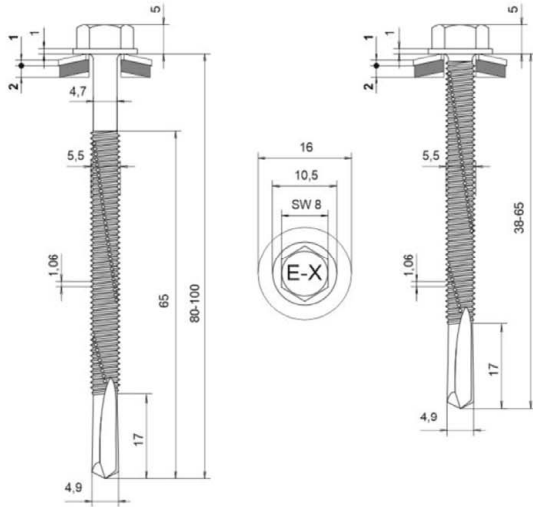
t _i [mm]		t _{ii} [mm]															
		1.50		2.00		2.50		3.00		4.00		5.00		6.00		7.00	
V _{R,k} [kN]	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.63	2.40	ac	2.40	ac	2.40	ac	2.40	abcd	2.40	abc	-	-	-	-	-	-
	0.75	2.70	ac	2.80	ac	2.80	ac	3.30	ac	3.30	ac	-	-	-	-	-	-
	0.88	3.00	-	3.50	-	3.50	-	4.20	-	4.20	-	-	-	-	-	-	-
	1.00	3.20	-	3.60	-	3.60	-	4.30	-	4.30	-	-	-	-	-	-	-
	1.13	3.20	-	3.60	-	3.60	-	4.30	-	4.30	-	-	-	-	-	-	-
	1.25	3.20	-	3.60	-	3.60	-	4.30	-	4.30	-	-	-	-	-	-	-
	1.50	3.20	-	3.60	-	3.60	-	4.30	-	-	-	-	-	-	-	-	-
	1.75	3.20	-	3.60	-	3.60	-	4.30	-	-	-	-	-	-	-	-	-
2.00	3.20	-	3.60	-	3.60	-	4.30	-	-	-	-	-	-	-	-	-	
N _{R,k} [kN]	0.50	0.54	ac	0.97	ac	0.97	ac	1.57	abcd	1.57	abc	-	-	-	-	-	-
	0.55	0.68	ac	1.23	ac	1.23	ac	1.98	abcd	1.98	abc	-	-	-	-	-	-
	0.63	1.00	ac	1.80	ac	1.80	ac	2.90	abcd	2.90	abc	-	-	-	-	-	-
	0.75	1.00	ac	1.80	ac	1.80	ac	3.50	ac	3.50	ac	-	-	-	-	-	-
	0.88	1.00	-	1.80	-	1.80	-	4.10	-	4.10	-	-	-	-	-	-	-
	1.00	1.00	-	1.80	-	1.80	-	4.60	-	4.70	-	-	-	-	-	-	-
	1.13	1.00	-	1.80	-	1.80	-	4.60	-	5.40	-	-	-	-	-	-	-
	1.25	1.00	-	1.80	-	1.80	-	4.60	-	6.00	-	-	-	-	-	-	-
	1.50	1.00	-	1.80	-	1.80	-	4.60	-	-	-	-	-	-	-	-	-
	1.75	1.00	-	1.80	-	1.80	-	4.60	-	-	-	-	-	-	-	-	-
	2.00	1.00	-	1.80	-	1.80	-	4.60	-	-	-	-	-	-	-	-	-

No further specifications.

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

E-X Bohr 3 5,5 x L

Annex 9



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD, S350GD - EN 10346

Component II: S235, S275, S355 - EN 10025-1

Drilling capacity: $\Sigma t_i \leq 12.50 \text{ mm}$

Timber substructures:

no performance determined

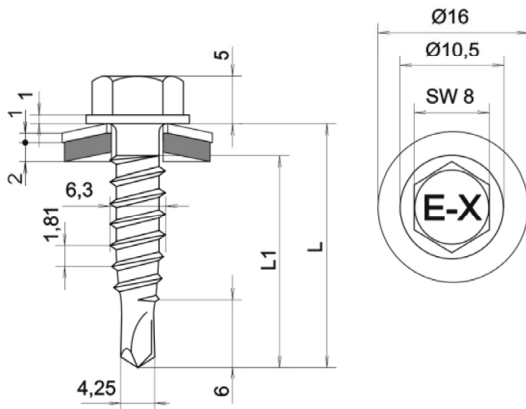
t_i [mm]	t_{ii} [mm]							
	4.00	5.00	6.00	8.00	10.00	12.00	13.00	14.00
$V_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-
	0.63	-	-	4.00 abcd	4.00 abcd	4.00 abcd	-	-
	0.75	-	-	4.50 ac	4.50 ac	4.50 ac	-	-
	0.88	-	-	4.90 ac	5.00 ac	5.00 ac	-	-
	1.00	-	-	5.30 ac	5.40 ac	5.50 ac	-	-
	1.13	-	-	5.70 -	5.90 ac	6.00 ac	-	-
	1.25	-	-	6.10 -	6.30 ac	6.50 ac	-	-
	1.50	-	-	6.10 -	6.30 -	6.50 -	-	-
	1.75	-	-	6.10 -	6.30 -	6.50 -	-	-
	2.00	-	-	6.10 -	6.30 -	6.50 -	-	-
$N_{R,k}$ [kN]	0.50	-	-	1.84 abcd	1.84 abcd	1.84 abcd	-	-
	0.55	-	-	2.32 abcd	2.32 abcd	2.32 abcd	-	-
	0.63	-	-	3.40 abcd	3.40 abcd	3.40 abcd	-	-
	0.75	-	-	3.90 ac	3.90 ac	3.90 ac	-	-
	0.88	-	-	4.40 ac	4.40 ac	4.40 ac	-	-
	1.00	-	-	4.90 ac	4.90 ac	4.90 ac	-	-
	1.13	-	-	5.40 -	5.40 -	5.40 -	-	-
	1.25	-	-	5.80 -	5.80 -	5.80 -	-	-
	1.50	-	-	6.60 -	6.60 -	6.60 -	-	-
	1.75	-	-	6.60 -	6.60 -	6.60 -	-	-
	2.00	-	-	6.60 -	6.60 -	6.60 -	-	-

No further specifications.

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

E-X Bohr 5 5,5 x L

Annex 10



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD - EN 10346

Component II: S280GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 2.50 \text{ mm}$

Timber substructures:

no performance determined

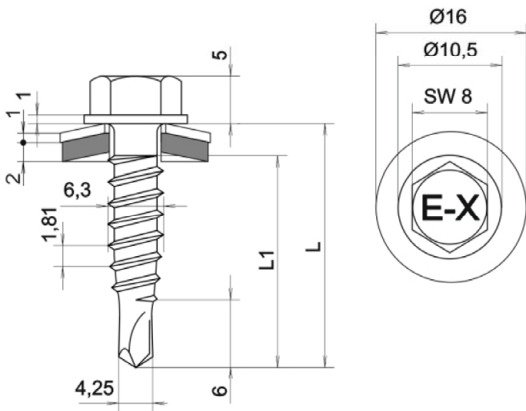
t_i [mm]		t_{II} [mm]									
		0.50	0.55	0.63	0.75	0.88	1.00	1.13	1.25	1.50	
$V_{R,k}$ [kN]	0.50	0.89	-	0.95	-	1.06	-	1.17	-	1.17	-
	0.55	0.89	-	1.05	-	1.17	-	1.37	-	1.42	-
	0.63	0.89	-	1.05	-	1.34	-	1.69	-	1.83	-
	0.75	0.89	-	1.05	-	1.34	-	1.83	-	2.17	-
	0.88	0.89	-	1.05	-	1.34	-	1.83	-	2.43	-
	1.00	0.89	-	1.05	-	1.34	-	1.83	-	2.43	-
	1.13	0.89	-	1.05	-	1.34	-	1.83	-	2.43	-
	1.25	0.89	-	1.05	-	1.34	-	1.83	-	2.43	-
	1.50	0.89	-	1.05	-	1.34	-	1.83	-	2.43	-
	1.75	0.89	-	1.05	-	1.34	-	1.83	-	-	-
$N_{R,k}$ [kN]	0.50	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	0.55	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	0.63	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	0.75	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	0.88	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	1.00	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	1.13	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	1.25	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	1.50	0.55	-	0.63	-	0.76	-	0.98	-	1.23	-
	1.75	0.55	-	0.63	-	0.76	-	0.98	-	-	-

No further specifications.

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

E-X Bohr RS 6,3 x L

Annex 11



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S320GD, S350GD, S390GD - EN 10346

Component II: S320GD, S350GD, S390GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 2.50 \text{ mm}$

Timber substructures:

no performance determined

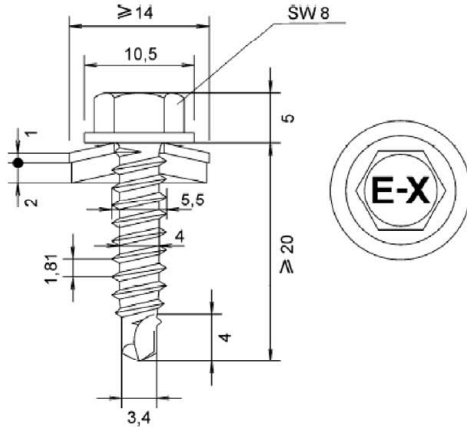
t_i [mm]		t_{ii} [mm]									
		0.50	0.55	0.63	0.75	0.88	1.00	1.13	1.25	1.50	
$V_{R,k}$ [kN]	0.50	0.96	-	1.03	-	1.15	-	1.26	-	1.26	-
	0.55	0.96	-	1.15	-	1.27	-	1.48	-	1.54	-
	0.63	0.96	-	1.15	-	1.46	-	1.84	-	1.99	-
	0.75	0.96	-	1.15	-	1.46	-	1.99	-	2.33	-
	0.88	0.96	-	1.15	-	1.46	-	1.99	-	2.61	-
	1.00	0.96	-	1.15	-	1.46	-	1.99	-	2.61	-
	1.13	0.96	-	1.15	-	1.46	-	1.99	-	2.61	-
	1.25	0.96	-	1.15	-	1.46	-	1.99	-	2.61	-
	1.50	0.96	-	1.15	-	1.46	-	1.99	-	2.61	-
	1.75	0.96	-	1.15	-	1.46	-	1.99	-	-	-
$N_{R,k}$ [kN]	0.50	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	0.55	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	0.63	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	0.75	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	0.88	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	1.00	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	1.13	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	1.25	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	1.50	0.61	-	0.69	-	0.82	-	1.05	-	1.31	-
	1.75	0.61	-	0.69	-	0.82	-	1.05	-	-	-

No further specifications.

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

E-X Bohr RS 6,3 x L

Annex 12



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD - EN 10346

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

Drilling capacity: $\Sigma t_i \leq 2.0 \text{ mm}$

Timber substructures:

no performance determined

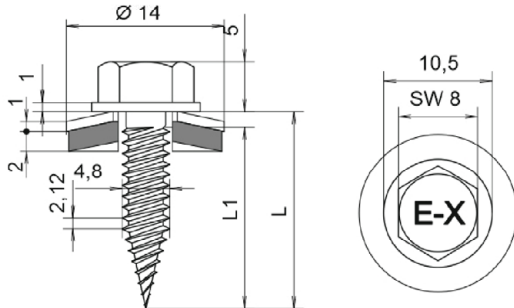
t_i [mm]	t_{II} [mm]															
	0.63		0.75		0.88		1.00		1.13		1.25		1.50		2.00	
$V_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.63	-	-	1.20	ac	1.30	ac	1.80	a	2.10	a	2.80	a	-	-	-
	0.75	-	-	1.30	-	1.60	-	2.00	-	2.40	-	3.00	-	-	-	-
	0.88	-	-	1.40	-	1.80	-	2.20	-	2.70	-	-	-	-	-	-
	1.00	-	-	1.50	-	2.00	-	2.40	-	-	-	-	-	-	-	-
	1.13	-	-	1.60	-	2.00	-	-	-	-	-	-	-	-	-	-
	1.25	-	-	1.70	-	-	-	-	-	-	-	-	-	-	-	-
	1.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$N_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.63	0.50	-	0.70	ac	0.90	ac	0.90	a	0.90	a	0.90	a	-	-	-
	0.75	0.50	-	0.70	-	1.00	-	1.00	-	1.00	-	1.00	-	-	-	-
	0.88	0.70	-	0.90	-	1.10	-	1.20	-	1.30	-	-	-	-	-	-
	1.00	0.70	-	0.90	-	1.10	-	1.40	-	-	-	-	-	-	-	-
	1.13	0.80	-	1.00	-	1.30	-	-	-	-	-	-	-	-	-	-
	1.25	0.80	-	1.00	-	-	-	-	-	-	-	-	-	-	-	-
	1.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

No further specifications.

Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14 \text{ mm}$

E-X Bohr RS 5,5 x L

Annex 13



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD - EN 10346

Component II: S280GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 2.0 \text{ mm}$

Timber substructures:

no performance determined

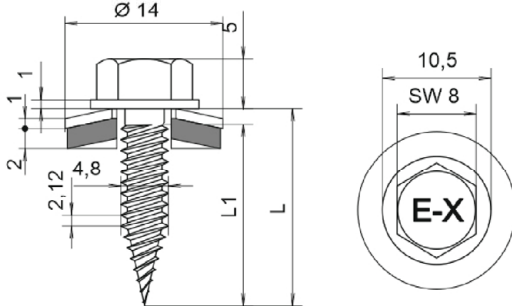
	t_i [mm]	t_{ii} [mm]									
		0.50	0.55	0.63	0.75	0.88	1.00	1.13	1.25	1.50	
$V_{R,k}$ [kN]	0.50	0.97	-	0.97	-	0.97	-	0.97	-	0.97	-
	0.55	0.97	-	1.15	-	1.15	-	1.15	-	1.15	-
	0.63	0.97	-	1.15	-	1.47	-	1.47	-	1.47	-
	0.75	0.97	-	1.15	-	1.47	-	2.00	-	2.00	-
	0.88	0.97	-	1.15	-	1.47	-	2.00	-	2.64	-
	1.00	0.97	-	1.15	-	1.47	-	2.00	-	2.64	-
	1.13	0.97	-	1.15	-	1.47	-	2.00	-	-	-
	1.25	0.97	-	1.15	-	1.47	-	2.00	-	-	-
	1.50	0.97	-	-	-	-	-	-	-	-	-
	1.75	-	-	-	-	-	-	-	-	-	-
$N_{R,k}$ [kN]	0.50	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-
	0.55	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-
	0.63	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-
	0.75	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-
	0.88	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-
	1.00	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-
	1.13	0.58	-	0.71	-	0.92	-	1.25	-	-	-
	1.25	0.58	-	0.71	-	0.92	-	1.25	-	-	-
	1.50	0.58	-	-	-	-	-	-	-	-	-
	1.75	-	-	-	-	-	-	-	-	-	-

No further specifications.

Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14 \text{ mm}$

E-X RS 4,8 x L

Annex 14



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S320GD, S350GD, S390GD - EN 10346

Component II: S320GD, S350GD, S390GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 2.00 \text{ mm}$

Timber substructures:

no performance determined

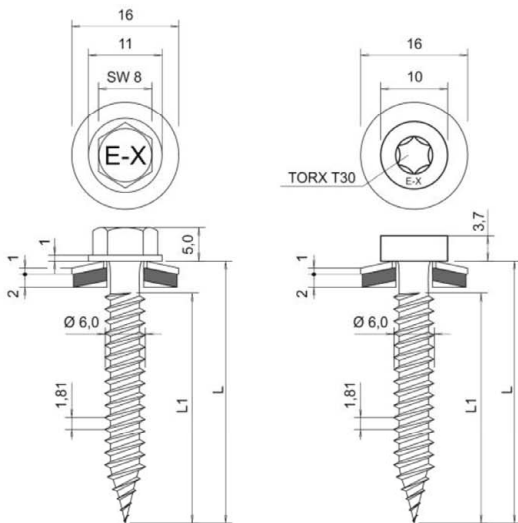
t _i [mm]		t _{II} [mm]																	
		0.50		0.55		0.63		0.75		0.88		1.00		1.13		1.25		1.50	
V _{R,k} [kN]	0.50	1.05	-	1.05	-	1.05	-	1.05	-	1.05	-	1.05	-	1.05	-	1.05	-	1.05	-
	0.55	1.05	-	1.25	-	1.25	-	1.25	-	1.25	-	1.25	-	1.25	-	1.25	-	-	-
	0.63	1.05	-	1.25	-	1.60	-	1.60	-	1.60	-	1.60	-	1.60	-	1.60	-	-	-
	0.75	1.05	-	1.25	-	1.60	-	2.16	-	2.16	-	2.16	-	2.16	-	2.16	-	-	-
	0.88	1.05	-	1.25	-	1.60	-	2.16	-	2.84	-	2.84	-	-	-	-	-	-	-
	1.00	1.05	-	1.25	-	1.60	-	2.16	-	2.84	-	3.52	-	-	-	-	-	-	-
	1.13	1.05	-	1.25	-	1.60	-	2.16	-	-	-	-	-	-	-	-	-	-	
	1.25	1.05	-	1.25	-	1.60	-	2.16	-	-	-	-	-	-	-	-	-	-	
	1.50	1.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
N _{R,k} [kN]	0.50	0.63	-	0.77	-	1.00	-	1.36	-	1.75	-	2.12	-	2.12	-	2.12	-	2.12	-
	0.55	0.63	-	0.77	-	1.00	-	1.36	-	1.75	-	2.12	-	2.12	-	2.12	-	-	-
	0.63	0.63	-	0.77	-	1.00	-	1.36	-	1.75	-	2.12	-	2.12	-	2.12	-	-	-
	0.75	0.63	-	0.77	-	1.00	-	1.36	-	1.75	-	2.12	-	2.12	-	2.12	-	-	-
	0.88	0.63	-	0.77	-	1.00	-	1.36	-	1.75	-	2.12	-	-	-	-	-	-	-
	1.00	0.63	-	0.77	-	1.00	-	1.36	-	1.75	-	2.12	-	-	-	-	-	-	-
	1.13	0.63	-	0.77	-	1.00	-	1.36	-	-	-	-	-	-	-	-	-	-	
	1.25	0.63	-	0.77	-	1.00	-	1.36	-	-	-	-	-	-	-	-	-	-	
	1.50	0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

No further specifications.

Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14 \text{ mm}$

E-X RS 4,8 x L

Annex 15



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD- EN 10346

Component II: S235 – EN 10025-1
S280GD, S320GD - EN 10346

Drilling capacity: $\Sigma t_i \leq 2.50 \text{ mm}$

Timber substructures:

no performance determined

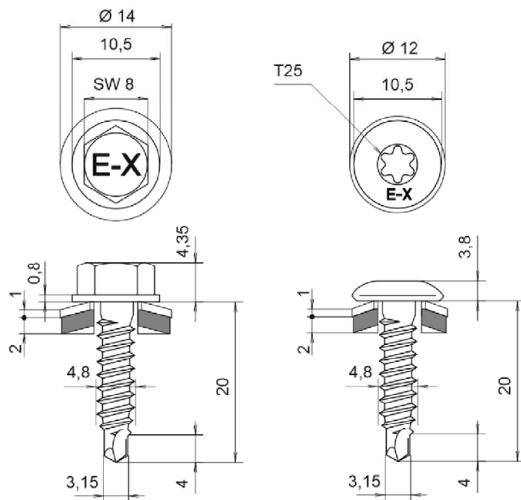
	t_i [mm]	t_{ii} [mm]									
		0.40	0.50	0.63	0.75	0.88	1.00	1.13	1.25	1.50	
$V_{R,k}$ [kN]	0.40	0.95	-	0.95	-	0.95	-	0.95	-	0.95	-
	0.50	0.95	-	1.53	-	1.53	-	1.53	-	1.53	-
	0.55	0.95	-	1.53	-	1.75	-	1.75	-	1.75	-
	0.63	0.95	-	1.53	-	2.10	-	2.10	-	2.10	-
	0.75	0.95	-	1.53	-	2.10	-	2.62	-	2.62	-
	0.88	0.95	-	1.53	-	2.10	-	2.62	-	3.21	-
	1.00	0.95	-	1.53	-	2.10	-	2.62	-	3.21	-
	1.13	0.95	-	1.53	-	2.10	-	2.62	-	3.21	-
	1.25	0.95	-	1.53	-	2.10	-	2.62	-	3.21	-
	1.50	0.95	-	1.53	-	2.10	-	2.62	-	3.21	-
$N_{R,k}$ [kN]	0.40	0.46	-	0.74	-	0.74	-	0.74	-	0.74	-
	0.50	0.46	-	0.76	-	1.12	-	1.22	-	1.22	-
	0.55	0.46	-	0.76	-	1.12	-	1.46	-	1.59	-
	0.63	0.46	-	0.76	-	1.12	-	1.46	-	1.81	-
	0.75	0.46	-	0.76	-	1.12	-	1.46	-	1.81	-
	0.88	0.46	-	0.76	-	1.12	-	1.46	-	1.81	-
	1.00	0.46	-	0.76	-	1.12	-	1.46	-	1.81	-
	1.13	0.46	-	0.76	-	1.12	-	1.46	-	1.81	-
	1.25	0.46	-	0.76	-	1.12	-	1.46	-	1.81	-
	1.50	0.46	-	0.76	-	1.12	-	1.46	-	1.81	-

No further specifications.

Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16 \text{ mm}$
Self-drilling screw with torx drive and sealing washer $\geq \varnothing 16 \text{ mm}$

E-X RS 6.0 x L

Annex 16



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD - EN 10346

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

Drilling capacity: $\Sigma t_i \leq 2.0 \text{ mm}$

Timber substructures:

no performance determined

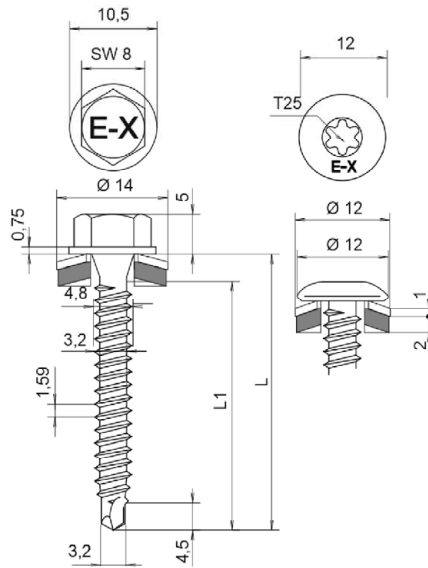
t_i [mm]	t_{II} [mm]															
	0.63		0.75		0.88		1.00		1.13		1.25		1.50		2.00	
$V_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.63	-	-	1.13	ac	1.29	ac	1.45	a	1.45	a	1.45	a	-	-	-
	0.75	-	-	1.31	-	1.47	-	1.62	-	1.62	-	1.70	-	-	-	-
	0.88	-	-	1.50	-	1.66	-	1.81	-	2.00	-	-	-	-	-	-
	1.00	-	-	1.50	-	1.66	-	2.00	-	-	-	-	-	-	-	-
	1.13	-	-	1.50	-	1.80	-	-	-	-	-	-	-	-	-	-
	1.25	-	-	1.60	-	-	-	-	-	-	-	-	-	-	-	-
	1.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$N_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.63	0.40	-	0.50	ac	0.60	ac	0.70	a	0.90	a	0.90	a	-	-	-
	0.75	0.40	-	0.50	-	0.60	-	0.70	-	0.90	-	1.00	-	-	-	-
	0.88	0.40	-	0.50	-	0.60	-	0.80	-	1.10	-	-	-	-	-	-
	1.00	0.40	-	0.50	-	0.60	-	0.80	-	-	-	-	-	-	-	-
	1.13	0.40	-	0.50	-	0.70	-	-	-	-	-	-	-	-	-	-
	1.25	0.40	-	0.50	-	0.70	-	-	-	-	-	-	-	-	-	-
	1.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

No further specifications.

Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14 \text{ mm}$
Self-drilling screw with torx drive and sealing washer $\geq \varnothing 12 \text{ mm}$

E-X Bohr RS 4,8 x 20. EX T25 Bohr RS 4,8 x 20

Annex 17



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD - EN 10346

Component II: S235 - EN 10025-1
S280GD, S320GD - EN 10346
Structural timber - EN 14081, \geq C24

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

Timber substructures:

performance determined with

$M_{y,Rk} = 6.55$ Nm

$f_{ax,k} = 9.8$ N/mm² for $l_{ef} \geq 20.0$ mm

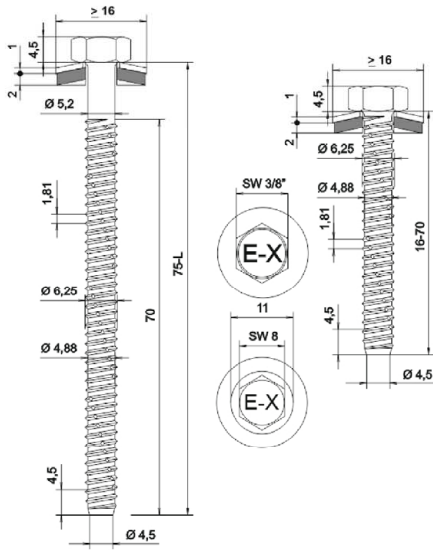
t_i [mm]	t_{II} [mm]								$V_{R,I,k}$ [kN]	
	0.63	0.75	0.88	1.00	1.13	1.25	1.50	2.00	$N_{R,I,k}$ [kN]	
$V_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	Shear resistance (load bearing) of component I
	0.55	-	-	-	-	-	-	-	-	
	0.63	-	1.13 ac	1.29 ac	1.45 a	1.45 a	1.45 a	-	2.40	
	0.75	-	1.31 -	1.47 -	1.62 -	1.62 -	1.70 -	-	3.05	
	0.88	-	1.50 -	1.66 -	1.81 -	2.00 -	-	-	3.65	
	1.00	-	1.50 -	1.66 -	2.00 -	-	-	-	3.65	
	1.13	-	1.50 -	1.80 -	-	-	-	-	3.65	
	1.25	-	1.50 -	-	-	-	-	-	3.65	
	1.50	-	-	-	-	-	-	-	-	
	1.75	-	-	-	-	-	-	-	-	
	2.00	-	-	-	-	-	-	-	-	
$N_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	Tension resistance (pull-through) of component I
	0.55	-	-	-	-	-	-	-	-	
	0.63	0.40 -	0.50 ac	0.60 ac	0.70 a	0.90 a	0.90 a	-	3.30	
	0.75	0.40 -	0.50 -	0.60 -	0.70 -	0.90 -	1.00 -	-	3.95	
	0.88	0.40 -	0.50 -	0.60 -	0.80 -	1.10 -	-	-	4.65	
	1.00	0.40 -	0.50 -	0.60 -	0.80 -	-	-	-	5.90	
	1.13	0.40 -	0.50 -	0.70 -	-	-	-	-	5.90	
	1.25	0.40 -	0.50 -	0.70 -	-	-	-	-	5.90	
	1.50	-	-	-	-	-	-	-	-	
	1.75	-	-	-	-	-	-	-	-	
	2.00	-	-	-	-	-	-	-	-	

The given values are valid for $k_{mod} = 0.90$ and timber strength class C24 ($\rho_k = 350$ kg/m³). For other values of k_{mod} and strength class see Annex 3.

Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14$ mm
Self-drilling screw with torx drive and sealing washer $\geq \varnothing 12$ mm

E-X Bohr RS 4,8 x L, E-X T25 Bohr RS 4,8 x L

Annex 18



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD - EN 10346

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

Predrill diameter: see Table below

Timber substructures:

no performance determined

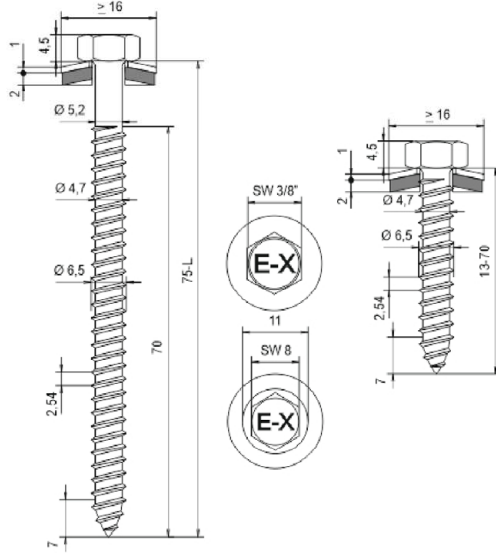
t_f [mm]		t_{fl} [mm]									
		1.25	1.50	2.00	3.00	4.00	6.00	≥ 7.00	-		
d_{pd} [mm]		$\varnothing 5.0$		$\varnothing 5.3$				$\varnothing 5.5$	$\varnothing 5.7$	-	
$V_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	-	-
	0.55	-	-	-	-	-	-	-	-	-	-
	0.63	2.50	ac	2.70	ac	2.90	abcd	3.00	abcd	3.10	abcd
	0.75	2.60	ac	3.10	ac	3.30	ac	3.60	ac	3.70	abcd
	0.88	2.80	ac	3.20	ac	3.80	ac	4.10	ac	4.30	ac
	1.00	3.20	-	3.60	ac	4.10	ac	4.80	ac	4.90	ac
	1.13	3.40	-	4.00	-	4.60	ac	5.40	ac	5.60	ac
	1.25	3.60	-	4.20	-	5.00	ac	6.10	ac	6.30	ac
	1.50	3.70	-	4.40	-	5.70	-	6.80	-	7.10	-
	1.75	3.70	-	4.70	-	6.20	-	7.60	-	7.70	-
	2.00	3.80	-	4.90	-	6.90	-	7.80	-	7.90	-
$N_{R,k}$ [kN]	0.50	0.97	ac	1.35	ac	1.51	abcd	1.51	abcd	1.51	abcd
	0.55	1.23	ac	1.71	ac	1.91	abcd	1.91	abcd	1.91	abcd
	0.63	1.80	ac	2.50	ac	2.80	abcd	2.80	abcd	2.80	abcd
	0.75	2.00	ac	2.60	ac	3.10	ac	3.60	ac	3.60	abcd
	0.88	2.00	ac	2.70	ac	3.30	ac	3.80	ac	3.80	ac
	1.00	2.00	-	2.70	ac	3.40	ac	4.00	ac	4.00	ac
	1.13	2.00	-	2.70	-	3.60	ac	4.40	ac	4.40	ac
	1.25	2.00	-	2.70	-	3.60	ac	4.80	ac	4.90	ac
	1.50	2.00	-	2.70	-	3.60	-	5.60	-	5.90	-
	1.75	2.00	-	2.70	-	3.60	-	5.80	-	6.90	-
	2.00	2.00	-	2.70	-	3.60	-	6.00	-	7.30	-

No further specifications.

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

E-X BZ 6,3 x L, E-X 8 BZ 6,3 x L

Annex 19



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD - EN 10346

Component II: S235 - EN 10025-1
S280GD, S320GD - EN 10346
Structural timber - EN 14081, \geq C24

Predrill diameter: see Table below

Timber substructures:

performance determined with

$$M_{y,Rk} = 9.742 \text{ Nm}$$

$$f_{ax,k} = 8.575 \text{ N/mm}^2 \text{ for } l_{ef} \geq 26.0 \text{ mm}$$

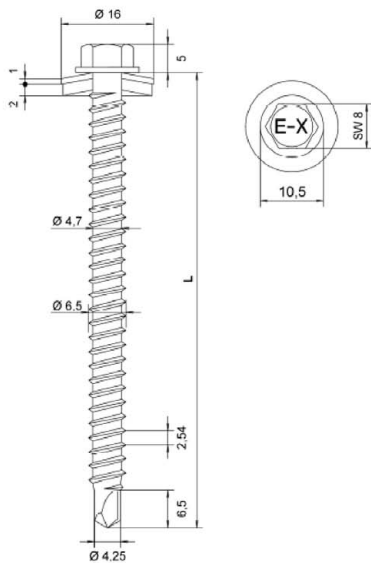
t_i [mm]	t_{II} [mm]								$V_{R,I,k}$ [kN] $N_{R,I,k}$ [kN]	
d_{pd} [mm]	0.63	0.75	0.88	1.00	1.13	1.25	1.50	2.00		
	$\varnothing 3.5$	$\varnothing 4.0$	$\varnothing 4.5$				$\varnothing 5.0$			
$V_{R,k}$ [kN]	0.50	-	-	-	-	-	-	-	-	Shear resistance (load bearing) of component I
	0.55	-	-	-	-	-	-	-	-	
	0.63	1.30	1.50	1.80	2.00	2.30	2.50	2.90	2.90	
	0.75	1.40	1.60	1.90	2.20	2.50	2.70	3.10	3.10	
	0.88	1.50	1.70	2.00	2.30	2.60	2.80	3.20	3.20	
	1.00	1.50	1.80	2.10	2.50	2.80	3.10	3.60	3.60	
	1.13	1.60	1.80	2.20	2.60	2.90	3.20	3.80	3.80	
	1.25	1.60	1.90	2.30	2.70	3.00	3.30	4.00	4.00	
	1.50	1.60	1.90	2.40	2.80	3.20	3.50	4.00	4.00	
	1.75	1.60	1.90	2.40	2.80	3.20	3.50	4.00	4.00	
	2.00	1.60	1.90	2.40	2.80	3.20	3.50	4.00	4.00	
$N_{R,k}$ [kN]	0.50	0.49	0.59	0.70	0.76	0.86	0.97	1.13	1.13	Tension resistance (pull-through) of component I
	0.55	0.61	0.75	0.89	0.95	1.09	1.23	1.43	1.43	
	0.63	0.90	1.10	1.30	1.40	1.60	1.80	2.10	2.10	
	0.75	0.90	1.10	1.30	1.40	1.60	1.80	2.10	2.10	
	0.88	0.90	1.10	1.30	1.40	1.60	1.80	2.10	2.10	
	1.00	0.90	1.10	1.30	1.40	1.60	1.80	2.20	2.20	
	1.13	1.00	1.20	1.40	1.50	1.70	1.90	2.30	2.30	
	1.25	1.00	1.20	1.40	1.50	1.70	1.90	2.30	2.30	
	1.50	1.00	1.20	1.40	1.50	1.70	1.90	2.30	2.30	
	1.75	1.00	1.20	1.40	1.50	1.70	1.90	2.30	2.30	
	2.00	1.00	1.20	1.40	1.50	1.70	1.90	2.30	2.30	

The given values are valid for $k_{mod} = 0.90$ and timber strength class C24 ($\rho_k = 350 \text{ kg/m}^3$). For other values of k_{mod} and strength class see Annex 3.

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

E-X A 6,5 x L, E-X 8 A 6,5 x L

Annex 20



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: S280GD, S320GD - EN 10346

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

Drilling capacity: $\Sigma t_i \leq 2.0$ mm

Timber substructures:

performance determined with

$M_{y,Rk} = 9.742$ Nm

$f_{ax,k} = 8.800$ N/mm² for $l_{ef} \geq 30.0$ mm

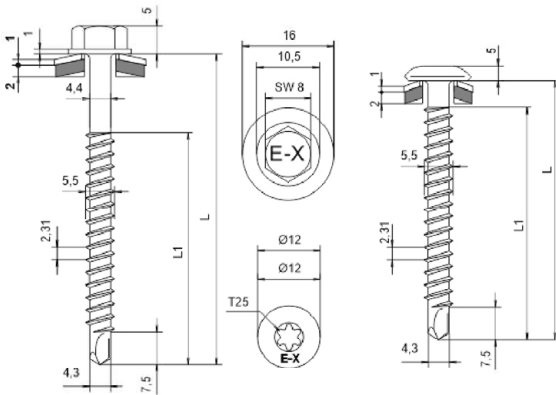
t _i [mm]	l _{ef} [mm]								V _{R,I,k} [kN]	
	30	35	40	45	50	55	60	65	N _{R,I,k} [kN]	
V _{R,k} [kN]	0.50	-							-	Shear resistance (load bearing) of component I
	0.55	-							-	
	0.63	1.16							1.28	
	0.75	1.30							1.44	
	0.88	1.39							1.55	
	1.00	1.46							1.62	
	1.13	1.49							1.66	
	1.25	1.51							1.68	
	1.50	1.53							1.70	
	1.75	1.59							1.77	
	2.00	1.78							1.97	
N _{R,k} [kN]	0.50	-							-	Tension resistance (pull-through) of component I
	0.55	-							-	
	0.63	1.68	1.99	2.30	2.61	2.87		2.87		
	2.91					2.91				
	2.95					2.95				
	1.25									
	1.50									
1.75										
2.00										

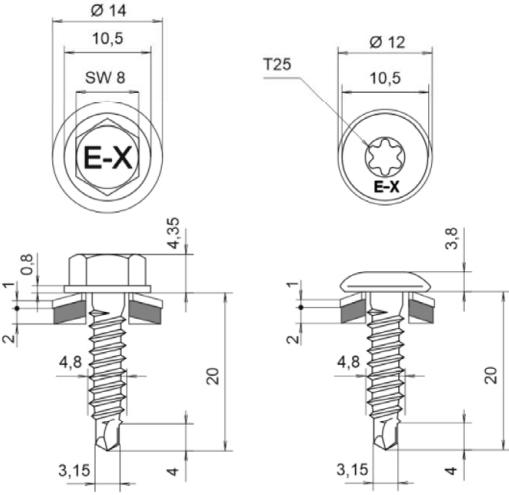
The values listed above in dependence on the screw- in length l_{ef} are valid for $k_{mod} = 0.90$ and timber strength class C24 ($\rho_k = 350$ kg/m³). For other values of k_{mod} and strength class see Annex 3.

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

E-X Bohr RS 6,5 x L

Annex 21

		<p><u>Material:</u></p> <p>Fastener: stainless Steel (1.4301) - EN 10088</p> <p>Washer: stainless Steel (1.4301) - EN 10088 with EPDM- seal</p> <p>Component I: Aluminium with $R_m \geq 165 \text{ N/mm}^2$ - EN 573 with $R_m \geq 215 \text{ N/mm}^2$ - EN 573</p> <p>Component II: S235 – EN 10025-1 S280GD, S320GD, S350GD – EN 10346</p>					
		<p><u>Drilling capacity:</u> $\Sigma t_i \leq 5.00 \text{ mm}$</p>					
		<p><u>Timber substructures:</u> no performance determined</p>					
<p>Component I, t_i [mm]</p> <p>Aluminium with $R_m \geq 165 \text{ N/mm}^2$</p> <p>$V_{R,k}$ [kN]</p> <p>0.50 0.70 0.80 0.90 1.00 1.10 1.20 1.50 2.00</p> <p>$N_{R,II,k}$ [kN]</p>		<p>Component II, Steel</p> <p>t_{ti} [mm]</p> <p>1.00 1.25 1.50 2.00 2.50 3.00</p>					
		-	-	0.71	0.71	0.71	0.71
		-	-	1.14	1.14	1.14	1.14
		-	-	1.35	1.35	1.35	1.35
		-	-	1.47	1.47	1.53	1.59
		1.60	1.60	1.60	1.60	1.71	1.83
		1.60	1.68	1.74	1.74	1.90	2.06
		1.60	1.75	1.88	1.88	2.09	3.29
		1.60	1.96	2.31	2.31	2.65	2.99
		1.60	1.96	2.31	3.28	3.28	3.28
		-	-	1.80	1.80	1.80	1.80
<p>Component I, t_i [mm]</p> <p>Aluminium with $R_m \geq 215 \text{ N/mm}^2$</p> <p>$V_{R,k}$ [kN]</p> <p>0.50 0.70 0.80 0.90 1.00 1.10 1.20 1.50 2.00</p> <p>$N_{R,II,k}$ [kN]</p>		<p>Component II, Steel</p> <p>t_{ti} [mm]</p> <p>1.00 1.25 1.50 2.00 2.50 3.00</p>					
		-	-	0.92	0.92	0.92	0.92
		-	-	1.44	1.44	1.44	1.44
		-	-	1.70	1.70	1.70	1.70
		-	-	1.89	1.89	1.96	2.03
		2.08	2.08	2.08	2.08	2.22	2.37
		2.08	2.16	2.25	2.25	2.45	2.65
		2.08	2.24	2.42	2.42	2.67	2.94
		2.08	2.50	2.92	2.92	3.35	3.79
		2.08	2.50	2.92	4.09	4.09	4.09
		-	-	1.80	1.80	1.80	1.80
No further specifications.							
<p>Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16 \text{ mm}$ Self-drilling screw with torx drive and sealing washer $\geq \varnothing 12 \text{ mm}$</p>						Annex 22	
E-X Bohr 2 5,5 x L, E-X T25 Bohr 2 5,5 x L							

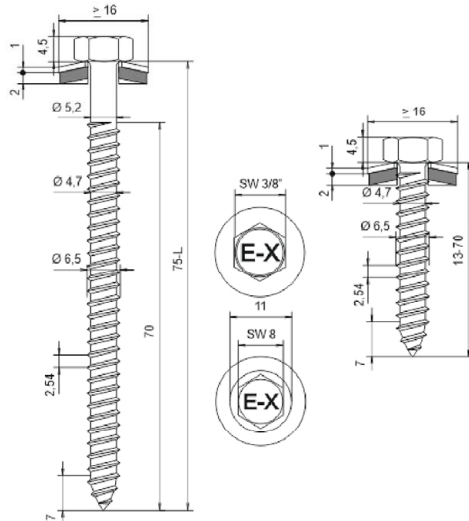
	<p>Material:</p> <p>Fastener: stainless Steel (1.4301) - EN 10088</p> <p>Washer: stainless Steel (1.4301) - EN 10088 with EPDM- seal</p> <p>Component I: Aluminium with $R_m \geq 165 \text{ N/mm}^2$ - EN 573 with $R_m \geq 215 \text{ N/mm}^2$ - EN 573</p> <p>Component II: S235 – EN 10025-1 S280GD, S320GD, S350GD – EN 10346</p> <p>Drilling capacity: $\Sigma t_i \leq 2.50 \text{ mm}$</p> <p>Timber substructures: no performance determined</p>
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Component I, t_i [mm] Aluminium with $R_m \geq 165 \text{ N/mm}^2$ $V_{R,k}$ [kN]	Component II, Steel				
	t_{II} [mm]				
	0.50	0.63	0.75	0.88	1.00
0.50	0.28	0.48	0.67	0.71	0.74
0.70	0.47	0.73	0.98	1.09	1.19
0.80	0.57	0.86	1.14	1.28	1.42
0.90	0.58	0.87	1.16	1.38	1.60
1.00	0.59	0.89	1.19	1.49	1.79
$N_{R,II,k}$ [kN]	0.46	0.71	0.95	1.16	1.37

Component I, t_i [mm] Aluminium with $R_m \geq 215 \text{ N/mm}^2$ $V_{R,k}$ [kN]	Component II, Steel				
	t_{II} [mm]				
	0.50	0.63	0.75	0.88	1.00
0.50	0.60	0.62	0.87	0.92	0.96
0.70	0.60	0.93	1.24	1.38	1.51
0.80	0.72	1.08	1.43	1.61	1.78
0.90	0.74	1.12	1.49	1.64	1.78
1.00	0.77	1.16	1.55	1.67	1.79
$N_{R,II,k}$ [kN]	0.46	0.71	0.95	1.16	1.37

No further specifications.

<p>Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 14 \text{ mm}$ Self-drilling screw with torx drive and sealing washer $\geq \varnothing 12 \text{ mm}$</p>	Annex 23
E-X Bohr RS 4,8 x 20, E-X T25 Bohr RS 4,8 x 20	



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: Aluminium
with $R_m \geq 165 \text{ N/mm}^2$ - EN 573
with $R_m \geq 215 \text{ N/mm}^2$ - EN 573

Component II: S235 – EN 10025-1
S280GD, S320GD, S350GD – EN 10346

Predrill diameter: see Table below

Timber substructures:
no performance determined

		Component II, Steel									
		t _{II} [mm]									
		0.50	0.63	0.75	0.88	1.00	1.13	1.25	1.50	2.00	3.00
d _{pd} [mm]		Ø 3.5		Ø 4.0	Ø 4.5			Ø 5.0			
Component I, t _I [mm] Aluminium with R _m ≥ 165 N/mm ² V _{R,k} [kN]	0.50	0.68	0.71	0.74	0.76	0.78	0.78	0.78	0.78	0.78	0.78
	0.70	0.68	0.88	1.07	1.09	1.10	1.10	1.10	1.10	1.10	1.10
	0.80	0.69	0.97	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
	0.90	0.70	0.99	1.28	1.28	1.28	1.28	1.28	1.40	1.40	1.40
	1.00	0.71	1.02	1.32	1.32	1.32	1.36	1.41	1.57	1.57	1.57
	1.10	0.71	1.02	1.32	1.32	1.32	1.38	1.45	1.63	1.74	1.74
	1.20	0.71	1.02	1.32	1.32	1.32	1.41	1.50	1.70	1.91	1.91
	1.50	0.71	1.02	1.32	1.32	1.32	1.47	1.61	1.89	2.41	2.41
	2.00	0.71	1.02	1.32	1.32	1.32	1.47	1.61	1.89	3.25	3.25
	N _{R,II,k} [kN]	0.66	0.88	1.09	1.21	1.32	1.69	2.03	2.03	2.03	2.03

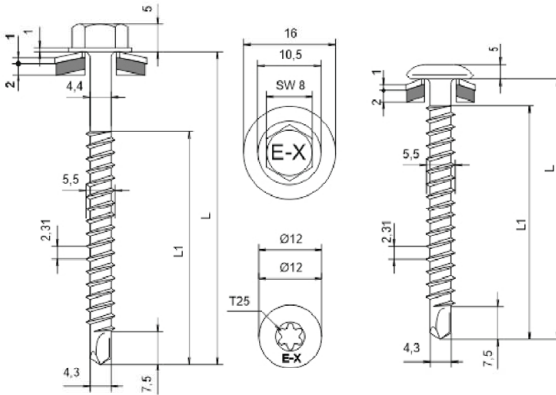
		Component II, Steel									
		t _{II} [mm]									
		0.50	0.63	0.75	0.88	1.00	1.13	1.25	1.50	2.00	3.00
d _{pd} [mm]		Ø 3.5		Ø 4.0	Ø 4.5			Ø 5.0			
Component I, t _I [mm] Aluminium with R _m ≥ 215 N/mm ² V _{R,k} [kN]	0.50	0.88	0.93	0.97	0.99	1.01	1.01	1.01	1.01	1.01	1.01
	0.70	0.88	1.04	1.20	1.21	1.22	1.22	1.22	1.22	1.22	1.22
	0.80	0.88	1.22	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55
	0.90	0.89	1.26	1.62	1.63	1.63	1.63	1.63	1.79	1.79	1.79
	1.00	0.91	1.31	1.70	1.70	1.70	1.79	1.87	2.03	2.03	2.03
	1.10	0.91	1.31	1.70	1.70	1.70	1.81	1.91	2.10	2.24	2.24
	1.20	0.91	1.31	1.70	1.70	1.70	1.32	1.95	2.17	2.45	2.45
	1.50	0.91	1.31	1.70	1.70	1.70	1.87	2.05	2.39	3.04	3.04
	2.00	0.91	1.31	1.70	1.70	1.70	1.87	2.05	2.39	4.06	4.06
	N _{R,II,k} [kN]	0.66	0.88	1.09	1.21	1.32	1.69	2.03	2.03	2.03	2.03

No further specifications.

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

Annex 24

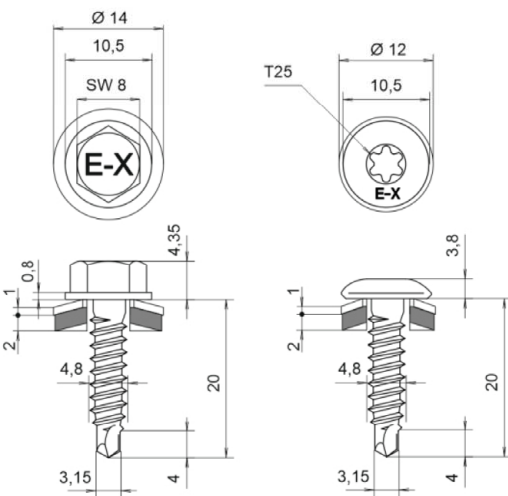
E-X A 6,5 x L, E-X 8 A 6,5 x L

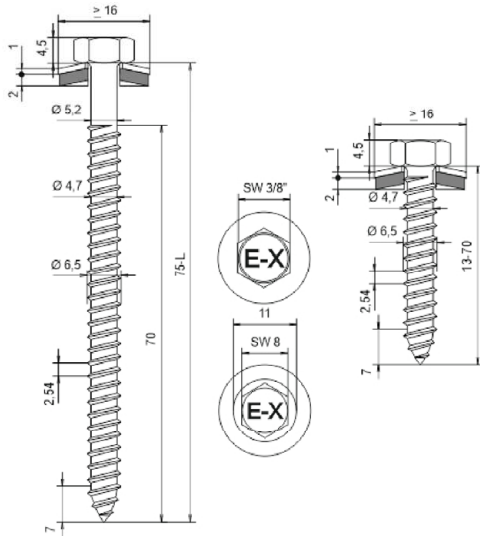
		<u>Material:</u>	
		Fastener:	stainless Steel (1.4301) - EN 10088
		Washer:	stainless Steel (1.4301) - EN 10088 with EPDM- seal
		Component I:	Aluminium with $R_m \geq 165 \text{ N/mm}^2$ - EN 573 with $R_m \geq 215 \text{ N/mm}^2$ - EN 573
Component II:	Aluminium with $R_m \geq 165 \text{ N/mm}^2$ - EN 573 with $R_m \geq 215 \text{ N/mm}^2$ - EN 573		
		<u>Drilling capacity:</u> $\Sigma t_i \leq 7.00 \text{ mm}$	
		<u>Timber substructures:</u> no performance determined	

		Component II, Aluminium with $R_m \geq 165 \text{ N/mm}^2$				
		$t_{II} \text{ [mm]}$				
		1.50	2.00	3.00	4.00	5.00
Component I, t_i [mm] Aluminium with $R_m \geq 165 \text{ N/mm}^2$ $V_{R,k} \text{ [kN]}$	0.50	0.70	0.72	0.72	0.72	0.72
	0.70	0.82	1.16	1.16	1.16	1.16
	0.80	0.98	1.38	1.38	1.38	1.38
	0.90	1.06	1.38	1.61	1.61	1.61
	1.00	1.15	1.38	1.85	1.85	1.85
	1.10	1.27	1.51	1.99	1.99	1.99
	1.20	1.39	1.64	2.12	2.12	2.12
	1.50	1.76	2.02	2.53	2.53	2.53
	2.00	1.76	2.31	2.43	3.54	3.54
	$N_{R,II,k} \text{ [kN]}$	0.78	1.29	2.45	3.64	3.64

		Component II, Aluminium with $R_m \geq 215 \text{ N/mm}^2$				
		$t_{II} \text{ [mm]}$				
		1.50	2.00	3.00	4.00	5.00
Component I, t_i [mm] Aluminium with $R_m \geq 215 \text{ N/mm}^2$ $V_{R,k} \text{ [kN]}$	0.50	0.92	0.93	0.93	0.93	0.93
	0.70	1.13	1.46	1.46	1.46	1.46
	0.80	1.23	1.73	1.73	1.73	1.73
	0.90	1.36	1.76	2.06	2.06	2.06
	1.00	1.49	1.79	2.40	2.40	2.40
	1.10	1.64	1.94	2.56	2.56	2.56
	1.20	1.79	2.08	2.72	2.72	2.72
	1.50	2.23	2.56	3.21	3.21	3.21
	2.00	2.23	2.88	3.64	4.41	4.41
	$N_{R,II,k} \text{ [kN]}$	0.99	1.61	3.21	4.42	4.42

No further specifications.					
Self-drilling screw with hexagon head and sealing washer $\geq \varnothing 16 \text{ mm}$ Self-drilling screw with torx drive and sealing washer $\geq \varnothing 12 \text{ mm}$					Annex 25
E-X Bohr 2 5,5 x L, E-X T25 Bohr 2 5,5 x L					

		<p><u>Material:</u></p> <p>Fastener: stainless Steel (1.4301) - EN 10088</p> <p>Washer: stainless Steel (1.4301) - EN 10088 with EPDM- seal</p> <p>Component I: Aluminium with $R_m \geq 165 \text{ N/mm}^2$ - EN 573 with $R_m \geq 215 \text{ N/mm}^2$ - EN 573</p> <p>Component II: Aluminium with $R_m \geq 165 \text{ N/mm}^2$ - EN 573 with $R_m \geq 215 \text{ N/mm}^2$ - EN 573</p>						
		<p><u>Drilling capacity:</u> $\Sigma t_i \leq 2.50 \text{ mm}$</p>						
		<p><u>Timber substructures:</u> no performance determined</p>						
<p>Component I, t_i [mm]</p> <p>Aluminium with $R_m \geq 165 \text{ N/mm}^2$</p> <p>$V_{R,k}$ [kN]</p> <p>0.50</p> <p>0.70</p> <p>0.80</p> <p>0.90</p> <p>1.00</p> <p>$N_{R,II,k}$ [kN]</p>		<p>Component II, Aluminium with $R_m \geq 165 \text{ N/mm}^2$</p>						
		<p>t_{II} [mm]</p>						
		0.50	0.70	0.80	0.90	1.00		
		0.19	0.35	0.43	0.51	0.59		
		0.31	0.57	0.70	0.73	0.77		
		0.37	0.68	0.83	0.84	0.86		
0.37	0.68	0.84	0.94	1.04				
0.37	0.70	0.86	1.04	1.23				
		0.19	0.42	0.53	0.63	0.72		
				<p>Component II, Aluminium with $R_m \geq 215 \text{ N/mm}^2$</p>				
<p>Component I, t_i [mm]</p> <p>Aluminium with $R_m \geq 215 \text{ N/mm}^2$</p> <p>$V_{R,k}$ [kN]</p> <p>0.50</p> <p>0.70</p> <p>0.80</p> <p>0.90</p> <p>1.00</p> <p>$N_{R,II,k}$ [kN]</p>		<p>t_{II} [mm]</p>						
		0.50	0.70	0.80	0.90	1.00		
		0.25	0.46	0.56	0.67	0.78		
		0.40	0.72	0.88	0.96	1.05		
		0.47	0.85	1.04	1.08	1.12		
		0.47	0.86	1.06	1.21	1.36		
0.48	0.88	1.08	1.34	1.60				
		0.25	0.53	0.67	0.81	0.94		
				<p>No further specifications.</p>				
<p>Self-drilling screw with hexagon head and sealing washer $\geq \text{Ø } 14 \text{ mm}$ Self-drilling screw with torx drive and sealing washer $\geq \text{Ø } 12 \text{ mm}$</p>				<p>Annex 26</p>				
<p>E-X Bohr RS 4,8 x 20, E-X T25 Bohr RS 4,8 x 20</p>								



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: Aluminium
with $R_m \geq 165 \text{ N/mm}^2$ - EN 573
with $R_m \geq 215 \text{ N/mm}^2$ - EN 573

Component II: Aluminium
with $R_m \geq 165 \text{ N/mm}^2$ - EN 573
with $R_m \geq 215 \text{ N/mm}^2$ - EN 573

Predrill diameter: see Table below

Timber substructures:
no performance determined

		Component II, Aluminium with $R_m \geq 165 \text{ N/mm}^2$									
		t_{II} [mm]									
		0.50	0.70	0.80	0.90	1.00	1.10	1.20	1.50	2.00	3.00
d_{pd} [mm]		$\varnothing 3.5$		$\varnothing 4.0$	$\varnothing 4.5$			$\varnothing 5.0$			
Component I, t_i [mm] Aluminium with $R_m \geq 165 \text{ N/mm}^2$ $V_{R,k}$ [kN]	0.50	0.36	0.48	0.54	0.59	0.63	0.63	0.63	0.63	0.63	0.63
	0.70	0.36	0.58	0.69	0.71	0.73	0.73	0.73	0.73	0.73	0.73
	0.80	0.36	0.63	0.76	0.77	0.78	0.78	0.78	0.78	0.78	0.78
	0.90	0.36	0.64	0.78	0.80	0.81	0.81	0.81	0.87	0.87	0.87
	1.00	0.36	0.65	0.80	0.82	0.83	0.86	0.88	0.96	0.96	0.96
	1.10	0.36	0.67	0.82	0.83	0.84	0.87	0.91	1.01	0.99	0.99
	1.20	0.36	0.68	0.84	0.84	0.85	0.89	0.94	1.07	1.02	1.02
	1.50	0.36	0.70	0.88	0.88	0.89	0.96	1.03	1.23	1.11	1.11
	2.00	0.36	0.70	0.88	0.88	0.89	0.96	1.03	1.23	1.25	1.25
	$N_{R,II,k}$ [kN]		0.23	0.40	0.48	0.53	0.58	0.66	0.74	0.98	1.51

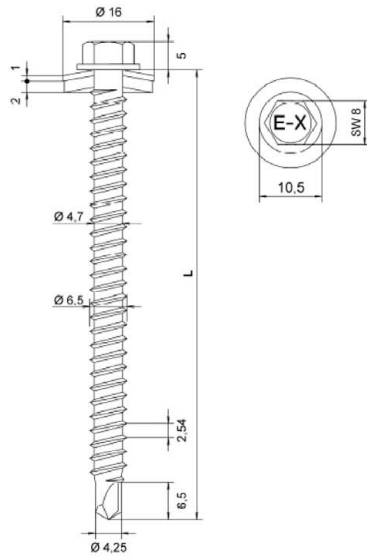
		Component II, Aluminium with $R_m \geq 215 \text{ N/mm}^2$									
		t_{II} [mm]									
		0.50	0.70	0.80	0.90	1.00	1.10	1.20	1.50	2.00	3.00
d_{pd} [mm]		$\varnothing 3.5$		$\varnothing 4.0$	$\varnothing 4.5$			$\varnothing 5.0$			
Component I, t_i [mm] Aluminium with $R_m \geq 215 \text{ N/mm}^2$ $V_{R,k}$ [kN]	0.50	0.46	0.62	0.70	0.78	0.82	0.82	0.82	0.82	0.82	0.82
	0.70	0.46	0.73	0.87	0.90	0.93	0.93	0.93	0.93	0.93	0.93
	0.80	0.46	0.79	0.96	1.02	0.98	0.98	0.98	0.98	0.98	0.98
	0.90	0.46	0.82	1.00	1.03	1.03	1.03	1.03	1.09	1.09	1.09
	1.00	0.46	0.85	1.04	1.06	1.08	1.13	1.17	1.21	1.21	1.21
	1.10	0.47	0.86	1.05	1.07	1.09	1.15	1.20	1.28	1.28	1.28
	1.20	0.47	0.87	1.07	1.09	1.11	1.17	1.23	1.35	1.35	1.35
	1.50	0.48	0.90	1.11	1.13	1.15	1.23	1.31	1.56	1.56	1.56
	2.00	0.48	0.90	1.11	1.13	1.15	1.23	1.31	1.56	1.56	1.56
	$N_{R,II,k}$ [kN]		0.29	0.50	0.60	0.68	0.75	0.85	0.95	1.24	1.86

No further specifications.

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

E-X A 6,5 x L, E-X 8 A 6,5 x L

Annex 27



Material:

Fastener: stainless Steel (1.4301) - EN 10088

Washer: stainless Steel (1.4301) - EN 10088
with EPDM- seal

Component I: Aluminium
with $R_m \geq 165 \text{ N/mm}^2$ - EN 573
with $R_m \geq 215 \text{ N/mm}^2$ - EN 573

Component II: Structural timber - EN 14081, $\geq \text{C24}$

Drilling capacity: $\Sigma t_i \leq 2.00 \text{ mm}$

Timber substructures:
performance determined with

$M_{y,k} = 9.74 \text{ Nm}$

$f_{ax,k} = 9.80 \text{ N/mm}^2$ for $l_{ef} \geq 26.0 \text{ mm}$

			26	31	37	43	49	55	61	67	73	V _{R,I,k} [kN]	
Component I, t _i [mm] Aluminium with R _m ≥ 165 N/mm ² V _{R,II,k} [kN]	0.50											0.56	Shear resistance (load bearing) of component I
	0.60											0.69	
	0.70											0.81	
	0.80											0.92	
	0.90	1.63	1.94	2.32	2.52	2.61	2.70	2.78	2.87	2.95	1.02		
	1.00										1.12		
	1.20										1.20		
	1.50										1.27		
	2.00										1.45		
	N _{R,II,k} [kN]		1.49	1.78	2.12	2.47	2.81	3.15	3.50	3.84	4.19	-	

			26	31	37	43	49	55	61	67	73	V _{R,I,k} [kN]	
Component I, t _i [mm] Aluminium with R _m ≥ 215 N/mm ² V _{R,II,k} [kN]	0.50											0.75	Shear resistance (load bearing) of component I
	0.60											0.90	
	0.70											1.03	
	0.80											1.15	
	0.90	1.63	1.94	2.32	2.52	2.61	2.70	2.78	2.87	2.95	1.25		
	1.00										1.34		
	1.20										1.41		
	1.50										1.47		
	2.00										1.60		
	N _{R,II,k} [kN]	1.49	1.78	2.12	2.47	2.81	3.15	3.50	3.84	4.19	-	-	

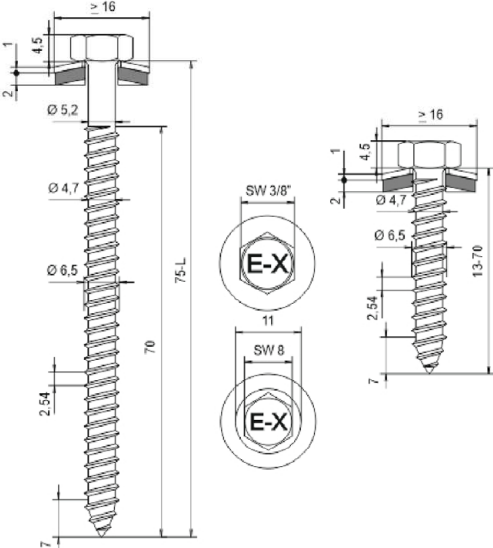
For component I of aluminium with a tensile strength of $R_m \geq 185 \text{ N/mm}^2$ the for $R_m \geq 165 \text{ N/mm}^2$ given values for load bearing resistance $V_{R,I,k}$ may be increased by 12%. The lower value of $V_{R,II,k}$ and load bearing resistance $V_{R,I,k}$ shall be used for further calculation.

The values listed above in dependence on the screw- in length l_{ef} are valid for $k_{mod} = 0.90$ and timber strength class C24 ($\rho_k = 350 \text{ kg/m}^3$). For other values of k_{mod} and strength class see Annex 3.

Self-drilling screw with hexagon head and sealing washer $\geq \text{Ø } 16 \text{ mm}$

E-X Bohr RS 6,5 x L

Annex 28

	<p>Material:</p> <p>Fastener: stainless Steel (1.4301) - EN 10088</p> <p>Washer: stainless Steel (1.4301) - EN 10088 with EPDM- seal</p> <p>Component I: Aluminium with $R_m \geq 165 \text{ N/mm}^2$ - EN 573 with $R_m \geq 215 \text{ N/mm}^2$ - EN 573</p> <p>Component II: Structural timber - EN 14081, $\geq \text{C24}$</p>
Predrill diameter: see Table below	
<p>Timber substructures: performance determined with</p> <p>$M_{y,Rk} = 18.39 \text{ Nm}$ $f_{ax,k} = 11.8 \text{ N/mm}^2 \text{ for } l_{ef} \geq 26.0 \text{ mm}$</p>	

		26	31	37	43	49	55	61	67	73	V _{R,I,k} [kN]		
Component I, t _i [mm] Aluminium with R _m ≥ 165 N/mm ² V _{R,II,k} [kN]	0.50	1.63	1.94	2.32	2.70	2.94	3.05	3.15	3.26	3.26	0.63	Shear resistance (load bearing) of component I	
	0.60										0.73		
	0.70										0.78		
	0.80										0.87		
	0.90										0.96		
	1.00										0.99		
	1.20										1.02		
	1.50										1.11		
	2.00										1.25		
	N _{R,II,k} [kN]										1.79		2.14

		26	31	37	43	49	55	61	67	73	V _{R,I,k} [kN]	
Component I, t _i [mm] Aluminium with R _m ≥ 215 N/mm ² V _{R,II,k} [kN]	0.50	1.63	1.94	2.32	2.70	2.94	3.05	3.15	3.26	3.26	0.82	Shear resistance (load bearing) of component I
	0.60										0.93	
	0.70										0.98	
	0.80										1.09	
	0.90										1.21	
	1.00										1.28	
	1.20										1.35	
	1.50										1.56	
	2.00										1.56	
	N _{R,II,k} [kN]										1.79	

For component I of aluminium with a tensile strength of $R_m \geq 245 \text{ N/mm}^2$ the for $R_m \geq 215 \text{ N/mm}^2$ given values for load bearing resistance $V_{R,I,k}$ may be increased by 14%. The lower value of $V_{R,II,k}$ and load bearing resistance $V_{R,I,k}$ shall be used for further calculation.

The values listed above in dependence on the screw- in length l_{ef} are valid for $k_{mod} = 0.90$ and timber strength class C24 ($\rho_k = 350 \text{ kg/m}^3$). For other values of k_{mod} and strength class see Annex 3.

Self-tapping screw with hexagon head and sealing washer ≥ Ø 16 mm	Annex 29
E-X A 6,5 x L, E-X 8 A 6,5 x L	