Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-11/0174 of 22 February 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Fastening screws 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	33 pages including 28 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 330046-01-0602

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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 ≥ ø 16 mm	Steel / Steel
9	E-X Bohr 3 5,5 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Steel / Steel
10	E-X Bohr 5 5,5 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Steel / Steel
11	E-X Bohr RS 6,3 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Steel / Steel
12	E-X Bohr RS 6,3 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Steel / Steel
13	E-X Bohr RS 5,5 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 14 mm	Steel / Steel
14	E-X RS 4,8 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 14 mm	Steel / Steel
15	E-X RS 4,8 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 14 mm	Steel / Steel
16	E-X Bohr RS 4,8 x 20	Self-drilling screw with hexagon head and sealing washer ≥ ø 14 mm	Steel / Steel
	E-X T25 Bohr RS 4,8 x 20	Self-drilling screw with torx drive and Sealing washer ≥ ø 12 mm	
17	E-X Bohr RS 4,8 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 14 mm	Steel / Steel Steel / Timber
	E-X T25 Bohr RS 4,8 x L	Self-drilling screw with torx drive and Sealing washer ≥ ø 12 mm	
18	E-X BZ 6,3 x L E-X 8 BZ 6,3 x L	Self-tapping screw with hexagon head and sealing washer ≥ ø 16 mm	Steel / Steel
19	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer ≥ ø 16 mm	Steel / Steel Steel / Timber
20	E-X Bohr RS 6,5 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Steel / Timber
21	E-X Bohr 2 5,5 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Aluminium / Steel
	E-X T25 Bohr 2 5,5 x L	Self-drilling screw with torx drive and Sealing washer ≥ ø 12 mm	

Table 1 - continued

Annex	Fastening screw	Description of product	Application
22	E-X Bohr RS 4,8 x 20	Self-drilling screw with hexagon head and sealing washer ≥ ø 14 mm	Aluminium / Steel
	E-X T25 Bohr RS 4,8 x 20	Self-drilling screw with torx drive and Sealing washer ≥ ø 12 mm	
23	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer ≥ ø 16 mm	Aluminium / Steel
24	E-X Bohr 2 5,5 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Aluminium / Aluminium
	E-X T25 Bohr 2 5,5 x L	Self-drilling screw with torx drive and Sealing washer ≥ ø 12 mm	
25	E-X Bohr RS 4,8 x 20	Self-drilling screw with hexagon head and sealing washer ≥ ø 14 mm	Aluminium / Aluminium
	E-X T25 Bohr RS 4,8 x 20	Self-drilling screw with torx drive and Sealing washer ≥ ø 12 mm	
26	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer ≥ ø 16 mm	Aluminium / Aluminium
27	E-X Bohr RS 6,5 x L	Self-drilling screw with hexagon head and sealing washer ≥ ø 16 mm	Aluminium / Timber
28	E-X A 6,5 x L E-X 8 A 6,5 x L	Self-tapping screw with hexagon head and sealing washer ≥ ø 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 ≥ 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 22 February 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Hahn

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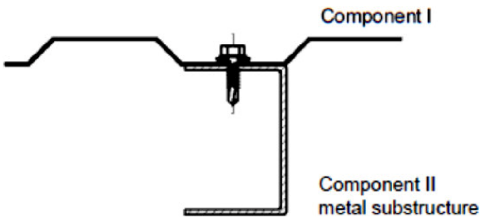
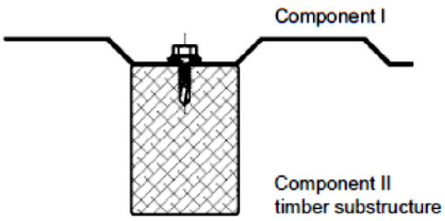
Examples of execution of a connection





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/m³
ρ_a	Existing value of raw density of structural timber in kg/m³

Used terms in the Annexes	Annex 1
Fastening screws for metal members and sheeting	

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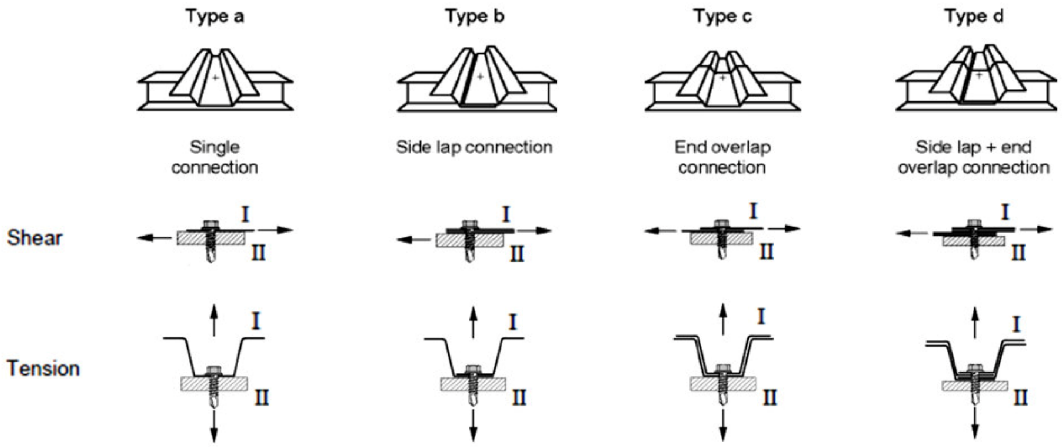
Types of connection and occurring loadings



Determination of Design Values

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

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

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

The recommended partial safety factor $\gamma_M = 1.33$ is used, provided no partial safety factor is given in national regulations or national Annexes to Eurocode 3.

For 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:

$$\frac{N_{S,d}}{N_{R,d}} + \frac{V_{S,d}}{V_{R,d}} \le 1.0$$

$N_{S,d}$ 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	Annex 2
Fastening screws for metal members and sheeting	

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Timber substructures

Characteristic values of tension and shear resistance of the connection for $k_{mod} \neq 0{,}9$ and / or $\rho_k > 350$ kg/m³ can be determined as follows:

$$N_{R,k} = \min \begin{cases} N_{R,I,k} \\ N_{R,II,k} \cdot k_{mod} / 0{,}9 \cdot (\rho_a / 350)^{0,8} \end{cases} \qquad V_{R,k} = \min \begin{cases} V_{R,I,k} \\ V_{R,II,k} \cdot k_{mod} / 0{,}9 \cdot (\rho_a / 350)^{0,8} \end{cases}$$

$N_{R,I,k}$ 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 ρ_k = 350 kg/m³ as far as no specific value is known.

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

$$N_{R,k} = \min \begin{cases} N_{R,I,k} \\ N_{R,II,k} \end{cases}$$

$$V_{R,k} = \min \begin{cases} V_{R,I,k} \\ V_{R,II,k} \end{cases}$$

Aluminium members and sheeting

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

$$N_{R,k} = \min \begin{cases} N_{R,I,k} \\ N_{R,II,k} \end{cases}$$

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:

$$N_{R,k} = \min \begin{cases} N_{R,I,k} \\ N_{R,II,k} \end{cases} \qquad V_{R,k} = \min \begin{cases} V_{R,I,k} \\ V_{R,k} \end{cases}$$

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	Annex 3
Fastening screws for metal members and sheeting	

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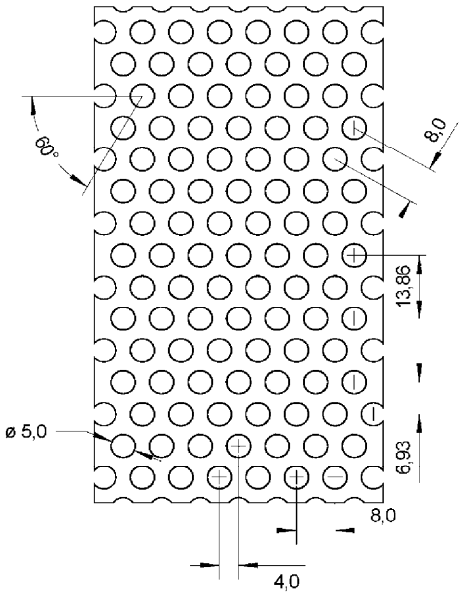

Fastener

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 t_I [mm]	$V_{R,I,k}$ [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

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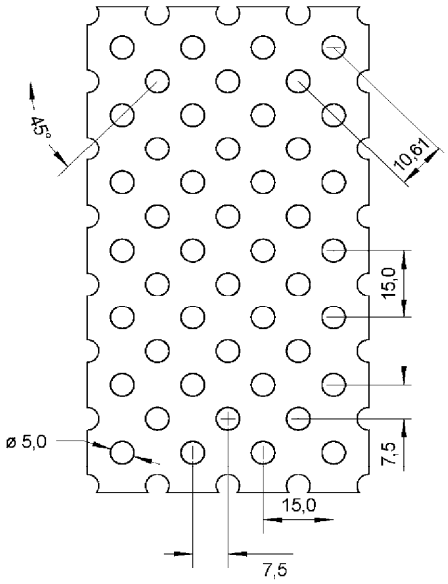

Fastener

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

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

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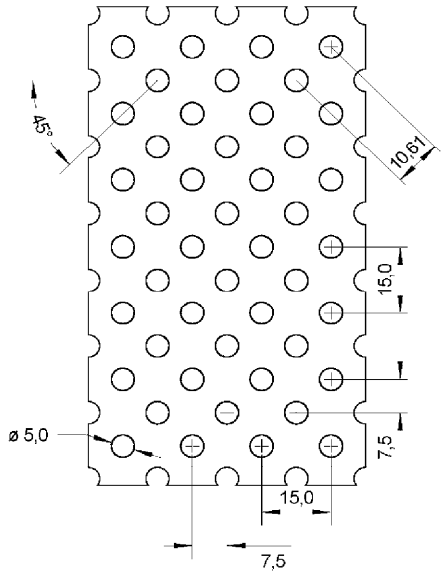

Fastener

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

Self drilling screw from Ø 5,5 mm to Ø 6,5 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 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	2,68	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
Component I t_I [mm] $N_{R,I,k}$ [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

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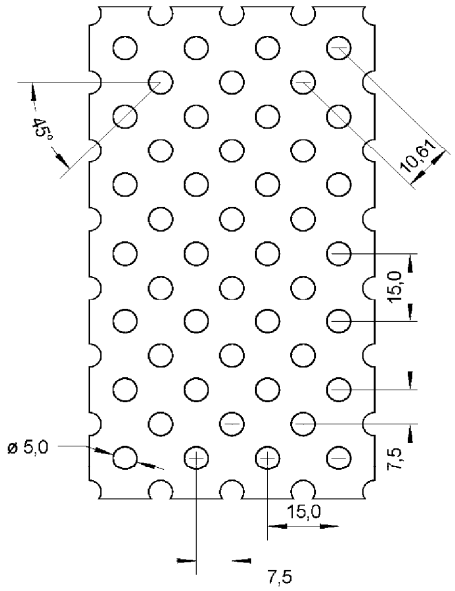

Fastener

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

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

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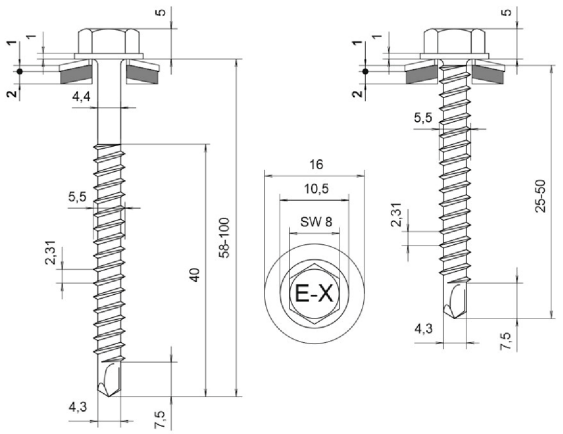


Material:

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: $\Sigma t_i \leq 3.5$ 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 -	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 -	- -

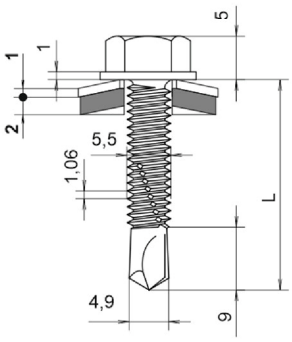
No further specifications.

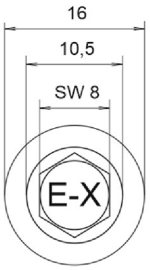
Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm

E-X Bohr 2 5,5 x L

Annex 8

Deutsches Institut für Bautechnik DIBt





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: $\Sigma t_i \leq 5.25$ 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	-	-	-	-	-	-	-	-	-

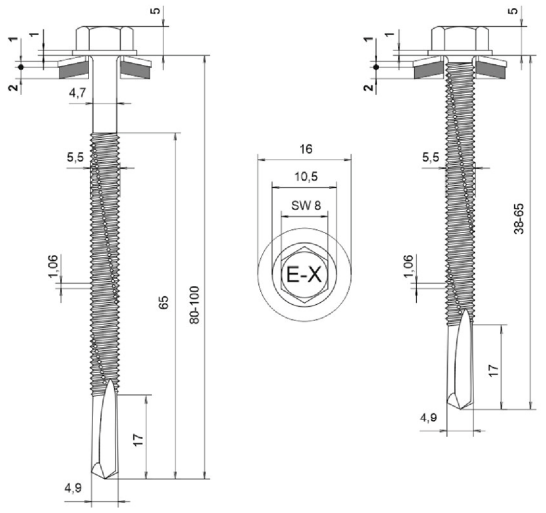
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm

E-X Bohr 3 5,5 x L

Annex 9

Deutsches Institut für Bautechnik DIBt



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: $\Sigma t_i \leq 12.50$ 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	-	-	-	-	-	-	-

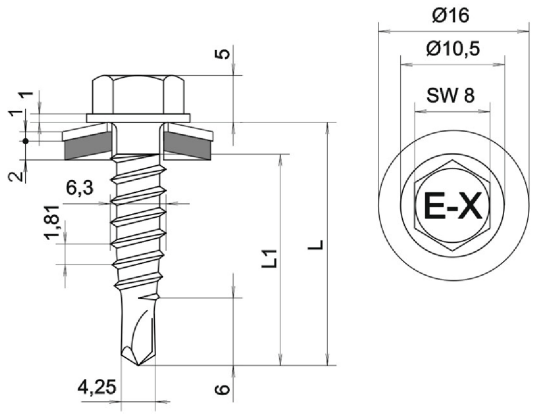
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm

E-X Bohr 5 5,5 x L

Annex 10

Deutsches Institut für Bautechnik DIBt



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: $\Sigma t_i \leq 2.50$ 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 -	1.17 -	1.17 -	1.17 -	1.17 -
	0.55	0.89 -	1.05 -	1.17 -	1.37 -	1.42 -	1.47 -	1.47 -	1.47 -	1.47 -
	0.63	0.89 -	1.05 -	1.34 -	1.69 -	1.83 -	1.96 -	1.96 -	1.96 -	1.96 -
	0.75	0.89 -	1.05 -	1.34 -	1.83 -	2.17 -	2.48 -	2.48 -	2.59 -	2.81 -
	0.88	0.89 -	1.05 -	1.34 -	1.83 -	2.43 -	2.78 -	2.78 -	2.83 -	2.95 -
	1.00	0.89 -	1.05 -	1.34 -	1.83 -	2.43 -	3.05 -	3.05 -	3.06 -	3.07 -
	1.13	0.89 -	1.05 -	1.34 -	1.83 -	2.43 -	3.05 -	3.05 -	3.06 -	- -
	1.25	0.89 -	1.05 -	1.34 -	1.83 -	2.43 -	3.05 -	3.05 -	3.06 -	- -
	1.50	0.89 -	1.05 -	1.34 -	1.83 -	2.43 -	3.05 -	- -	- -	- -
	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 -	1.48 -	1.76 -	2.05 -	2.26 -
	0.55	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	1.76 -	2.05 -	2.61 -
	0.63	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	1.76 -	2.05 -	2.70 -
	0.75	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	1.76 -	2.05 -	2.70 -
	0.88	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	1.76 -	2.05 -	2.70 -
	1.00	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	1.76 -	2.05 -	2.70 -
	1.13	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	1.76 -	2.05 -	- -
	1.25	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	1.76 -	2.05 -	- -
	1.50	0.55 -	0.63 -	0.76 -	0.98 -	1.23 -	1.48 -	- -	- -	- -
	1.75	0.55 -	0.63 -	0.76 -	0.98 -	- -	- -	- -	- -	- -

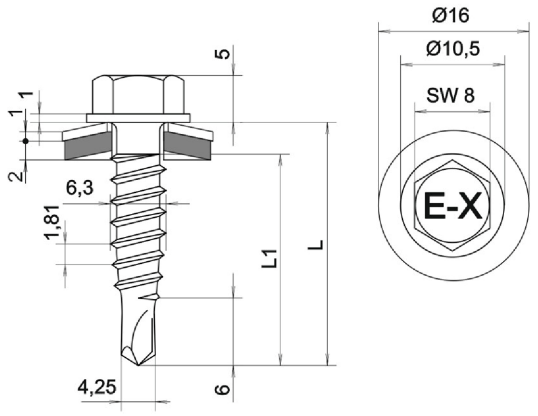
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm

E-X Bohr RS 6,3 x L

Annex 11

Deutsches Institut für Bautechnik DIBt



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: $\Sigma t_i \leq 2.50$ 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 -	1.26 -	1.26 -	1.26 -	1.26 -
	0.55	0.96 -	1.15 -	1.27 -	1.48 -	1.54 -	1.60 -	1.60 -	1.60 -	1.60 -
	0.63	0.96 -	1.15 -	1.46 -	1.84 -	1.99 -	2.13 -	2.13 -	2.13 -	2.13 -
	0.75	0.96 -	1.15 -	1.46 -	1.99 -	2.33 -	2.64 -	2.64 -	2.77 -	3.05 -
	0.88	0.96 -	1.15 -	1.46 -	1.99 -	2.61 -	2.96 -	2.96 -	3.04 -	3.19 -
	1.00	0.96 -	1.15 -	1.46 -	1.99 -	2.61 -	3.25 -	3.25 -	3.28 -	3.33 -
	1.13	0.96 -	1.15 -	1.46 -	1.99 -	2.61 -	3.25 -	3.25 -	3.28 -	- -
	1.25	0.96 -	1.15 -	1.46 -	1.99 -	2.61 -	3.25 -	3.25 -	3.28 -	- -
	1.50	0.96 -	1.15 -	1.46 -	1.99 -	2.61 -	3.25 -	- -	- -	- -
	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 -	1.58 -	1.90 -	2.21 -	2.26 -
	0.55	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	2.61 -
	0.63	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	2.93 -
	0.75	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	2.93 -
	0.88	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	2.93 -
	1.00	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	2.93 -
	1.13	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	- -
	1.25	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	- -
	1.50	0.61 -	0.69 -	0.82 -	1.05 -	1.31 -	1.58 -	1.90 -	2.21 -	- -
	1.75	0.61 -	0.69 -	0.82 -	1.05 -	- -	- -	- -	- -	- -

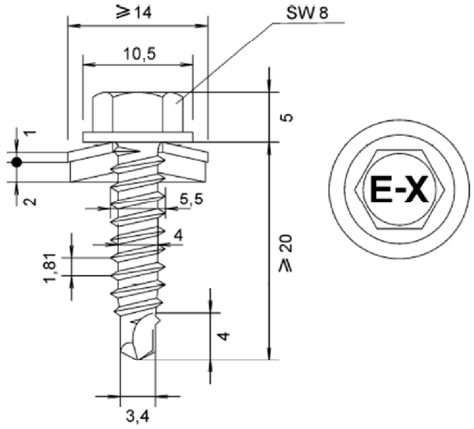
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm

E-X Bohr RS 6,3 x L

Annex 12

Deutsches Institut für Bautechnik DIBt



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: $\Sigma t_i \leq 2.0$ 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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

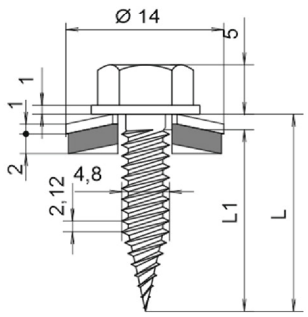
No further specifications.

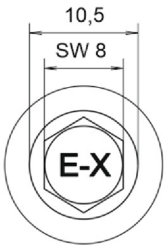
Self-drilling screw with hexagon head and sealing washer ≥ Ø 14 mm

E-X Bohr RS 5,5 x L

Annex 13

Deutsches Institut für Bautechnik DIBt





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: $\Sigma t_i \leq 2.0$ 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	-	0.97	-	0.97	-	0.97	-	0.97	-
	0.55	0.97	-	1.15	-	1.15	-	1.15	-	1.15	-	1.15	-	1.15	-	1.15	-	-	-
	0.63	0.97	-	1.15	-	1.47	-	1.47	-	1.47	-	1.47	-	1.47	-	1.47	-	-	-
	0.75	0.97	-	1.15	-	1.47	-	2.00	-	2.00	-	2.00	-	2.00	-	2.00	-	-	-
	0.88	0.97	-	1.15	-	1.47	-	2.00	-	2.64	-	2.64	-	-	-	-	-	-	-
	1.00	0.97	-	1.15	-	1.47	-	2.00	-	2.64	-	3.30	-	-	-	-	-	-	-
	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	-	1.99	-	1.99	-	1.99	-	1.99	-
	0.55	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-	1.99	-	1.99	-	1.99	-	-	-
	0.63	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-	1.99	-	1.99	-	1.99	-	-	-
	0.75	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-	1.99	-	1.99	-	1.99	-	-	-
	0.88	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-	1.99	-	-	-	-	-	-	-
	1.00	0.58	-	0.71	-	0.92	-	1.25	-	1.63	-	1.99	-	-	-	-	-	-	-
	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

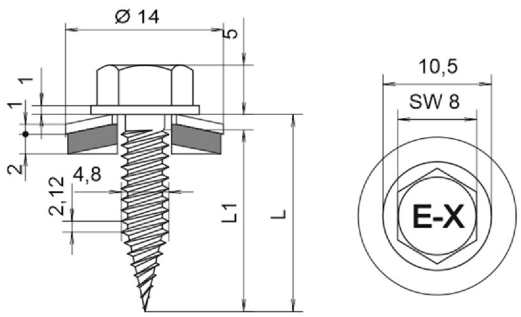
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 14 mm

E-X RS 4,8 x L

Annex 14

Deutsches Institut für Bautechnik DIBt



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: $\Sigma t_i \leq 2.00$ 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	- -	- -	- -	- -	- -	- -	- -	- -	- -

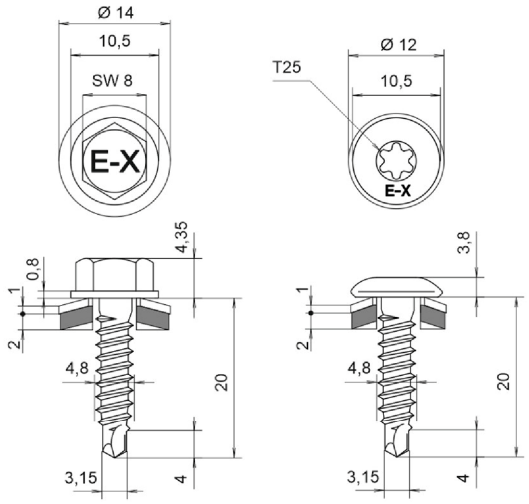
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 14 mm

E-X RS 4,8 x L

Annex 15

Deutsches Institut für Bautechnik DIBt



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: $\Sigma t_i \leq 2.0$ 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	- -	- -	- -	- -	- -	- -	- -	- -

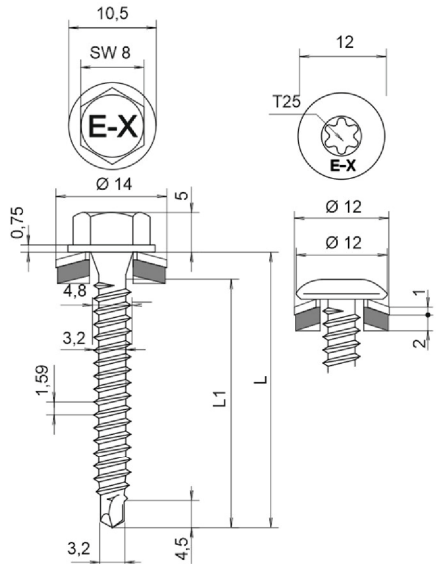
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 14 mm
Self-drilling screw with torx drive and sealing washer ≥ Ø 12 mm

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

Annex 16

Deutsches Institut für Bautechnik DIBt



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, ≥ 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] 0.63	0.75	0.88	1.00	1.13	1.25	1.50	2.00	$V_{R,I,k}$ [kN] / $N_{R,I,k}$ [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	- -	-	-	- -	- -	- -	- -	- -	-	

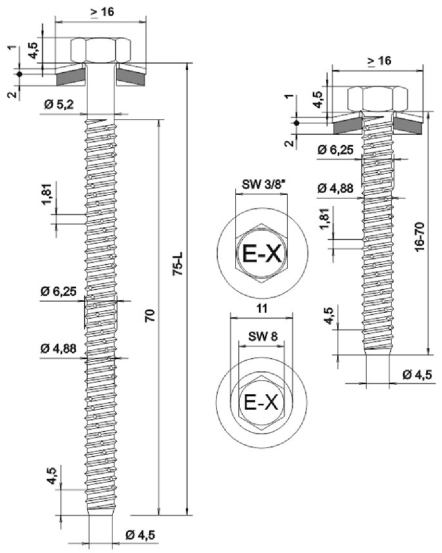
The given values are valid for k_{mod} = 0.90 and timber strength class C24 (ρ_k = 350 kg/m³). For other values of k_{mod} and strength class see Annex 3.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 14 mm
Self-drilling screw with torx drive and sealing washer ≥ Ø 12 mm

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

Annex 17

Deutsches Institut für Bautechnik DIBt



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_I [mm]	t_{II} [mm]															
		1.25		1.50		2.00		3.00		4.00		6.00		≥ 7.00		-	
	d_{pd} [mm]	Ø 5.0				Ø 5.3						Ø 5.5		Ø 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	3.10	abcd	3.10	abcd	-	-
	0.75	2.60	ac	3.10	ac	3.30	ac	3.60	ac	3.70	abcd	3.70	abcd	3.70	abcd	-	-
	0.88	2.80	ac	3.20	ac	3.80	ac	4.10	ac	4.30	ac	4.40	ac	4.40	ac	-	-
	1.00	3.20	-	3.60	ac	4.10	ac	4.80	ac	4.90	ac	5.10	ac	5.10	ac	-	-
	1.13	3.40	-	4.00	-	4.60	ac	5.40	ac	5.60	ac	5.80	ac	5.80	ac	-	-
	1.25	3.60	-	4.20	-	5.00	ac	6.10	ac	6.30	ac	6.50	ac	6.50	ac	-	-
	1.50	3.70	-	4.40	-	5.70	-	6.80	-	7.10	-	7.30	-	7.30	-	-	-
	1.75	3.70	-	4.70	-	6.20	-	7.60	-	7.70	-	8.10	-	8.10	-	-	-
	2.00	3.80	-	4.90	-	6.90	-	7.80	-	7.90	-	8.10	-	8.10	-	-	-
$N_{R,k}$ [kN]	0.50	0.97	ac	1.35	ac	1.51	abcd	1.51	abcd	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	1.91	abcd	1.91	abcd	-	-
	0.63	1.80	ac	2.50	ac	2.80	abcd	2.80	abcd	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	3.60	abcd	3.60	abcd	-	-
	0.88	2.00	ac	2.70	ac	3.30	ac	3.80	ac	3.80	ac	3.80	ac	3.80	ac	-	-
	1.00	2.00	-	2.70	ac	3.40	ac	4.00	ac	4.00	ac	4.00	ac	4.00	ac	-	-
	1.13	2.00	-	2.70	-	3.60	ac	4.40	ac	4.40	ac	4.40	ac	4.40	ac	-	-
	1.25	2.00	-	2.70	-	3.60	ac	4.80	ac	4.90	ac	4.90	ac	4.90	ac	-	-
	1.50	2.00	-	2.70	-	3.60	-	5.60	-	5.90	-	5.90	-	5.90	-	-	-
	1.75	2.00	-	2.70	-	3.60	-	5.80	-	6.90	-	7.10	-	7.10	-	-	-
	2.00	2.00	-	2.70	-	3.60	-	6.00	-	7.30	-	7.60	-	7.60	-	-	-

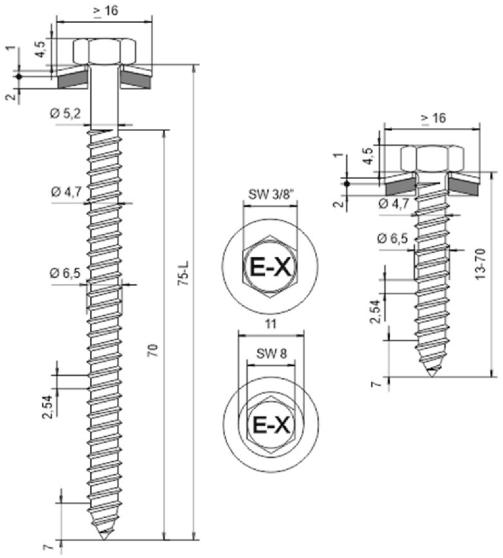
No further specifications.

Self-tapping screw with hexagon head and sealing washer ≥ Ø 16 mm

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

Annex 18

Deutsches Institut für Bautechnik DIBt



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, ≥ C24

Predrill diameter: see Table below

Timber substructures:
performance determined with

$M_{y,Rk}$ = 9.742 Nm
$f_{ax,k}$ = 8.575 N/mm² for l_{ef} ≥ 26.0 mm

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

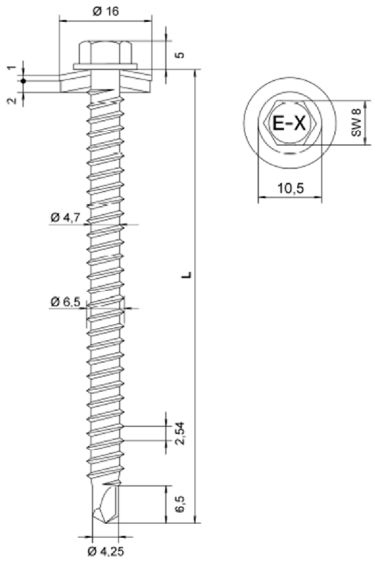
The given values are valid for k_{mod} = 0.90 and timber strength class C24 (ρ_k = 350 kg/m³). For other values of k_{mod} and strength class see Annex 3.

Self-tapping screw with hexagon head and sealing washer ≥ Ø 16 mm

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

Annex 19

Deutsches Institut für Bautechnik DIBt



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, ≥ 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] 30	35	40	45	50	55	60	65	$V_{R,I,k}$ [kN] / $N_{R,I,k}$ [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	
	0.75					2.91				2.91	
	0.88					2.95				2.95	
	1.00										
	1.13										
	1.25										
	1.50										
	1.75										
	2.00										

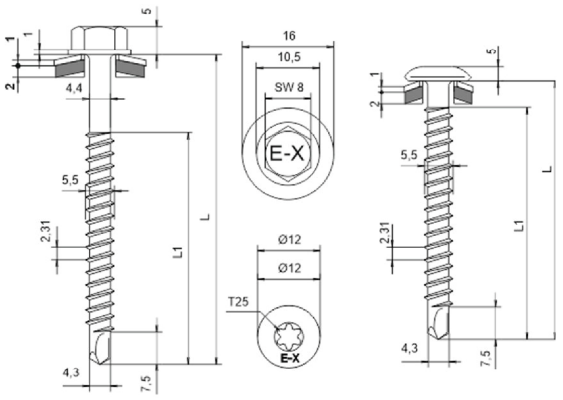
The values listed above in dependence on the screw- in length l_{ef} are valid for k_{mod} = 0.90 and timber strength class C24 (ρ_k = 350 kg/m³). For other values of k_{mod} and strength class see Annex 3.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm

E-X Bohr RS 6,5 x L

Annex 20

Deutsches Institut für Bautechnik DIBt



Material:

Fastener: stainless Steel (1.4301) - EN 10088

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

Component I: Aluminium
with $R_m \geq 165$ N/mm² - EN 573
with $R_m \geq 215$ N/mm² - EN 573

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

Drilling capacity: $\Sigma t_i \leq 5.00$ mm

Timber substructures:
no performance determined

Component I, t_I [mm] Aluminium with $R_m \geq 165$ N/mm² $V_{R,k}$ [kN]	Component II, Steel t_{II} [mm] 1.00	1.25	1.50	2.00	2.50	3.00
0.50	-	-	0.71	0.71	0.71	0.71
0.70	-	-	1.14	1.14	1.14	1.14
0.80	-	-	1.35	1.35	1.35	1.35
0.90	-	-	1.47	1.47	1.53	1.59
1.00	1.60	1.60	1.60	1.60	1.71	1.83
1.10	1.60	1.68	1.74	1.74	1.90	2.06
1.20	1.60	1.75	1.88	1.88	2.09	3.29
1.50	1.60	1.96	2.31	2.31	2.65	2.99
2.00	1.60	1.96	2.31	3.28	3.28	3.28
$N_{R,II,k}$ [kN]	-	-	1.80	1.80	1.80	1.80

Component I, t_I [mm] Aluminium with $R_m \geq 215$ N/mm² $V_{R,k}$ [kN]	Component II, Steel t_{II} [mm] 1.00	1.25	1.50	2.00	2.50	3.00
0.50	-	-	0.92	0.92	0.92	0.92
0.70	-	-	1.44	1.44	1.44	1.44
0.80	-	-	1.70	1.70	1.70	1.70
0.90	-	-	1.89	1.89	1.96	2.03
1.00	2.08	2.08	2.08	2.08	2.22	2.37
1.10	2.08	2.16	2.25	2.25	2.45	2.65
1.20	2.08	2.24	2.42	2.42	2.67	2.94
1.50	2.08	2.50	2.92	2.92	3.35	3.79
2.00	2.08	2.50	2.92	4.09	4.09	4.09
$N_{R,II,k}$ [kN]	-	-	1.80	1.80	1.80	1.80

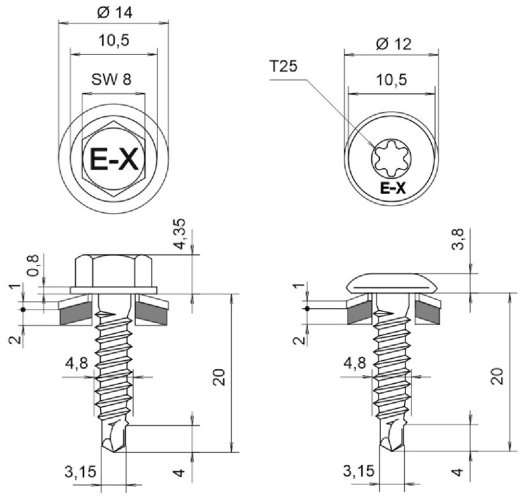
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm
Self-drilling screw with torx drive and sealing washer ≥ Ø 12 mm

E-X Bohr 2 5,5 x L, E-X T25 Bohr 2 5,5 x L

Annex 21

Deutsches Institut für Bautechnik DIBt



Material:

Fastener:	stainless Steel (1.4301) - EN 10088
Washer:	stainless Steel (1.4301) - EN 10088 with EPDM- seal
Component I:	Aluminium with $R_m \geq 165$ N/mm² - EN 573 with $R_m \geq 215$ N/mm² - EN 573
Component II:	S235 – EN 10025-1 S280GD, S320GD, S350GD – EN 10346

Drilling capacity: $\Sigma t_i \leq 2.50$ mm

Timber substructures:
no performance determined

Component I, t_I [mm] Aluminium with $R_m \geq 165$ N/mm² $V_{R,k}$ [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 $R_m \geq 215$ N/mm² $V_{R,k}$ [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

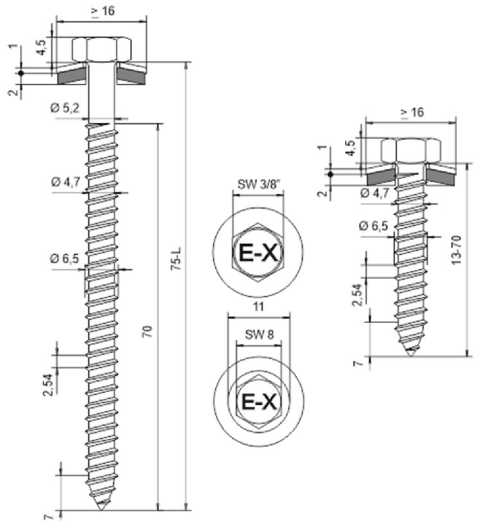
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 14 mm
Self-drilling screw with torx drive and sealing washer ≥ Ø 12 mm

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

Annex 22

Deutsches Institut für Bautechnik DIBt



Material:

Fastener:	stainless Steel (1.4301) - EN 10088
Washer:	stainless Steel (1.4301) - EN 10088 with EPDM- seal
Component I:	Aluminium with $R_m \geq 165$ N/mm² - EN 573 with $R_m \geq 215$ N/mm² - 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 $R_m \geq 165$ N/mm² $V_{R,k}$ [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 $R_m \geq 215$ N/mm² $V_{R,k}$ [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

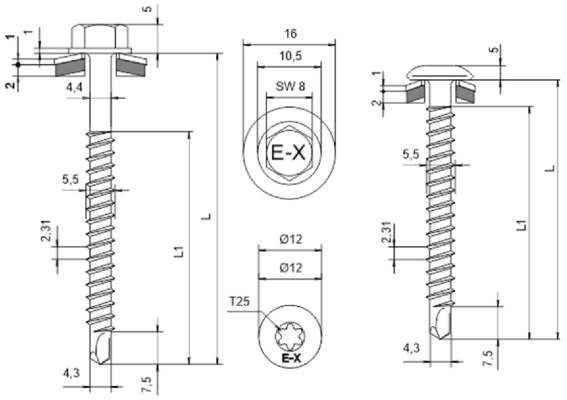
No further specifications.

Self-tapping screw with hexagon head and sealing washer ≥ Ø 16 mm

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

Annex 23

Deutsches Institut für Bautechnik DIBt



Material:

Fastener:	stainless Steel (1.4301) - EN 10088
Washer:	stainless Steel (1.4301) - EN 10088 with EPDM- seal
Component I:	Aluminium with $R_m \geq 165$ N/mm² - EN 573 with $R_m \geq 215$ N/mm² - EN 573
Component II:	Aluminium with $R_m \geq 165$ N/mm² - EN 573 with $R_m \geq 215$ N/mm² - EN 573

Drilling capacity: $\Sigma t_i \leq 7.00$ mm

Timber substructures:
no performance determined

Component I, t_I [mm] Aluminium with $R_m \geq 165$ N/mm² $V_{R,k}$ [kN]	Component II, Aluminium with $R_m \geq 165$ N/mm² t_{II} [mm] 1.50	2.00	3.00	4.00	5.00
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
$N_{R,II,k}$ [kN]	0.78	1.29	2.45	3.64	3.64

Component I, t_I [mm] Aluminium with $R_m \geq 215$ N/mm² $V_{R,k}$ [kN]	Component II, Aluminium with $R_m \geq 215$ N/mm² t_{II} [mm] 1.50	2.00	3.00	4.00	5.00
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
$N_{R,II,k}$ [kN]	0.99	1.61	3.21	4.42	4.42

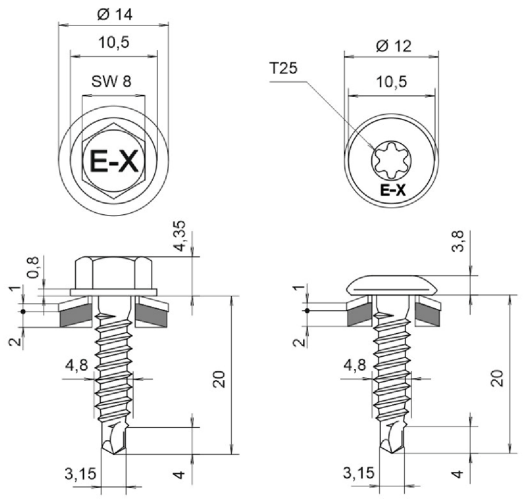
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm
Self-drilling screw with torx drive and sealing washer ≥ Ø 12 mm

E-X Bohr 2 5,5 x L, E-X T25 Bohr 2 5,5 x L

Annex 24

Deutsches Institut für Bautechnik DIBt



Material:

Fastener:	stainless Steel (1.4301) - EN 10088
Washer:	stainless Steel (1.4301) - EN 10088 with EPDM- seal
Component I:	Aluminium with $R_m \geq 165$ N/mm² - EN 573 with $R_m \geq 215$ N/mm² - EN 573
Component II:	Aluminium with $R_m \geq 165$ N/mm² - EN 573 with $R_m \geq 215$ N/mm² - EN 573

Drilling capacity: $\Sigma t_i \leq 2.50$ mm

Timber substructures:
no performance determined

Component I, t_I [mm] Aluminium with $R_m \geq 165$ N/mm² $V_{R,k}$ [kN]	Component II, Aluminium with $R_m \geq 165$ N/mm² t_{II} [mm]				
	0.50	**0.70**	**0.80**	**0.90**	**1.00**
0.50	0.19	0.35	0.43	0.51	0.59
0.70	0.31	0.57	0.70	0.73	0.77
0.80	0.37	0.68	0.83	0.84	0.86
0.90	0.37	0.68	0.84	0.94	1.04
1.00	0.37	0.70	0.86	1.04	1.23
$N_{R,II,k}$ [kN]	0.19	0.42	0.53	0.63	0.72

Component I, t_I [mm] Aluminium with $R_m \geq 215$ N/mm² $V_{R,k}$ [kN]	Component II, Aluminium with $R_m \geq 215$ N/mm² t_{II} [mm]				
	0.50	**0.70**	**0.80**	**0.90**	**1.00**
0.50	0.25	0.46	0.56	0.67	0.78
0.70	0.40	0.72	0.88	0.96	1.05
0.80	0.47	0.85	1.04	1.08	1.12
0.90	0.47	0.86	1.06	1.21	1.36
1.00	0.48	0.88	1.08	1.34	1.60
$N_{R,II,k}$ [kN]	0.25	0.53	0.67	0.81	0.94

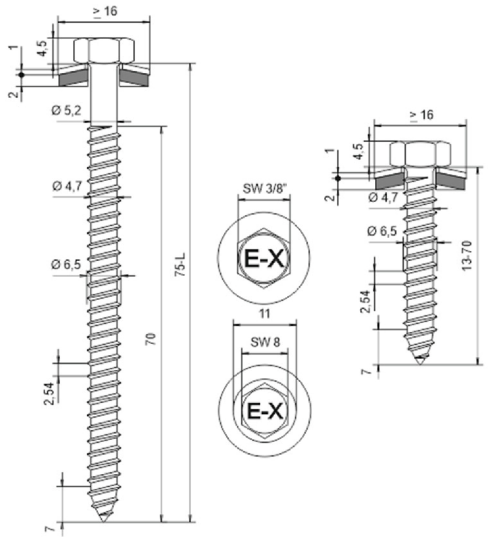
No further specifications.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 14 mm
Self-drilling screw with torx drive and sealing washer ≥ Ø 12 mm

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

Annex 25

Deutsches Institut für Bautechnik DIBt



Material:

Fastener: stainless Steel (1.4301) - EN 10088

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

Component I: Aluminium
with $R_m \geq 165$ N/mm² - EN 573
with $R_m \geq 215$ N/mm² - EN 573

Component II: Aluminium
with $R_m \geq 165$ N/mm² - EN 573
with $R_m \geq 215$ N/mm² - EN 573

Predrill diameter: see Table below

Timber substructures:
no performance determined

		Component II, Aluminium with $R_m \geq 165$ N/mm²									
		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]		Ø 3.5		Ø 4.0	Ø 4.5				Ø 5.0		
Component I, t_I [mm] Aluminium with $R_m \geq 165$ N/mm² $V_{R,k}$ [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	2.36

		Component II, Aluminium with $R_m \geq 215$ N/mm²									
		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]		Ø 3.5		Ø 4.0	Ø 4.5				Ø 5.0		
Component I, t_I [mm] Aluminium with $R_m \geq 215$ N/mm² $V_{R,k}$ [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	3.10

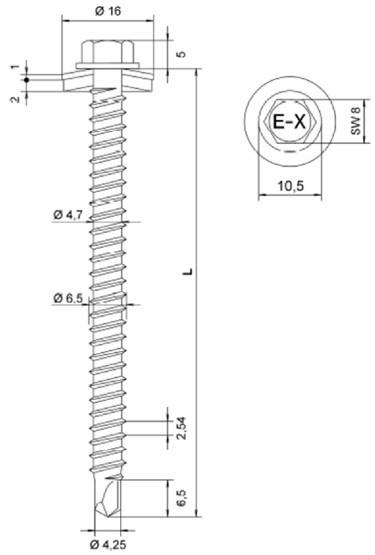
No further specifications.

Self-tapping screw with hexagon head and sealing washer ≥ Ø 16 mm

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

Annex 26

Deutsches Institut für Bautechnik DIBt



Material:

Fastener: stainless Steel (1.4301) - EN 10088

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

Component I: Aluminium
with $R_m \geq 165$ N/mm² - EN 573
with $R_m \geq 215$ N/mm² - EN 573

Component II: Structural timber - EN 14081, ≥ C24

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

Timber substructures:
performance determined with

$M_{y,k}$ = 9.74 Nm
$f_{ax,k}$ = 9.80 N/mm² for $l_{ef} \geq 26.0$ mm

Component I, t_I [mm]		26	31	37	43	49	55	61	67	73	$V_{R,I,k}$ [kN]	
Aluminium with $R_m \geq 165$ N/mm²	0.50	1.63	1.94	2.32	2.52	2.61	2.70	2.78	2.87	2.95	0.56	Shear resistance (load bearing) of component I
	0.60										0.69	
	0.70										0.81	
	0.80										0.92	
	0.90										1.02	
	1.00										1.12	
	1.20										1.20	
	1.50										1.27	
	2.00										1.45	
$V_{R,II,k}$ [kN]	$N_{R,II,k}$ [kN]	1.49	1.78	2.12	2.47	2.81	3.15	3.50	3.84	4.19	-	-

Component I, t_I [mm]		26	31	37	43	49	55	61	67	73	$V_{R,I,k}$ [kN]	
Aluminium with $R_m \geq 215$ N/mm²	0.50	1.63	1.94	2.32	2.52	2.61	2.70	2.78	2.87	2.95	0.75	Shear resistance (load bearing) of component I
	0.60										0.90	
	0.70										1.03	
	0.80										1.15	
	0.90										1.25	
	1.00										1.34	
	1.20										1.41	
	1.50										1.47	
	2.00										1.60	
$V_{R,II,k}$ [kN]	$N_{R,II,k}$ [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 $R_m \geq 185$ N/mm² the for $R_m \geq 165$ N/mm² 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.

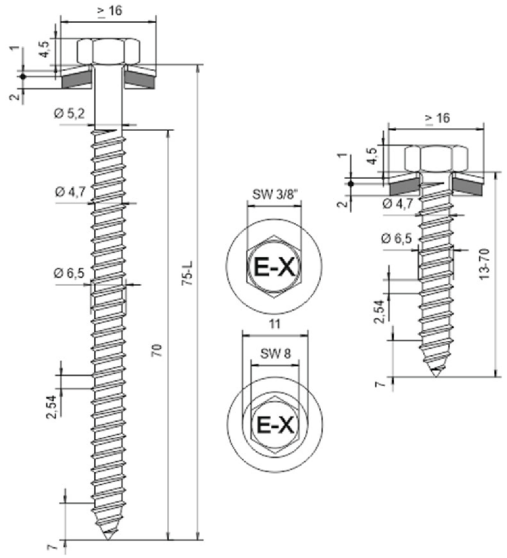
The values listed above in dependence on the screw- in length l_{ef} are valid for k_{mod} = 0.90 and timber strength class C24 (ρ_k = 350 kg/m³). For other values of k_{mod} and strength class see Annex 3.

Self-drilling screw with hexagon head and sealing washer ≥ Ø 16 mm

E-X Bohr RS 6,5 x L

Annex 27

Deutsches Institut für Bautechnik DIBt



Material:

Fastener: stainless Steel (1.4301) - EN 10088

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

Component I: Aluminium
with $R_m \geq 165$ N/mm² - EN 573
with $R_m \geq 215$ N/mm² - EN 573

Component II: Structural timber - EN 14081, ≥ C24

Predrill diameter: see Table below

Timber substructures:
performance determined with

$M_{y,Rk}$ = 18.39 Nm
$f_{ax,k}$ = 11.8 N/mm² for $l_{ef} \geq 26.0$ mm

Component I, t_I [mm] Aluminium with $R_m \geq 165$ N/mm² $V_{R,II,k}$ [kN]	26	31	37	43	49	55	61	67	73	$V_{R,I,k}$ [kN]	Shear resistance (load bearing) of component I
0.50	1.63	1.94	2.32	2.70	2.94	3.05	3.15	3.26	3.26	0.63	
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	2.55	2.97	3.38	3.8	4.21	4.63	4.63	-	-

Component I, t_I [mm] Aluminium with $R_m \geq 215$ N/mm² $V_{R,II,k}$ [kN]	26	31	37	43	49	55	61	67	73	$V_{R,I,k}$ [kN]	Shear resistance (load bearing) of component I
0.50	1.63	1.94	2.32	2.70	2.94	3.05	3.15	3.26	3.26	0.82	
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	2.14	2.55	2.97	3.38	3.8	4.21	4.63	4.63	-	-

For component I of aluminium with a tensile strength of $R_m \geq 245$ N/mm² the for $R_m \geq 215$ N/mm² 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 (ρ_k = 350 kg/m³). For other values of k_{mod} and strength class see Annex 3.

Self-tapping screw with hexagon head and sealing washer ≥ Ø 16 mm

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

Annex 28