

#### **DECLARATION OF PERFORMANCE**



DoP: 0154

for fischer Power-Fast screws and fischer construction screws (Screws for use in timber constructions) - EN

- 1. Unique identification code of the product-type: DoP: 0154
- 2. Intended use/es: For connections in load bearing timber constructions or for fixing of thermal insulation on rafters
- 3. Manufacturer: fischerwerke GmbH & Co. KG, Klaus-Fischer-Straße 1, 72178 Waldachtal, Germany
- 4. Authorised representative: --
- 5. System/s of AVCP: 3
- 6. European Assessment Document: EAD 130118-00-0603

European Technical Assessment: ETA-11/0027; 2019-01-02

Technical Assessment Body: ETA-Danmark A/S

Notified body/ies: 1343 - MPA Darmstadt

7. Declared performance/s:

Mechanical resistance and stability (BWR 1), Safety in use (BWR 4)

Tensile strength
Screws made of carbon steel

Characteristic value f<sub>tens,k</sub>:

Screw d = 3,0 mm: 2,7 kN Screw d = 3,5 mm: 3,7 kN Screw d = 4,0 mm: 4,8 kN Screw d = 4,5 mm: 6,0 kN Screw d = 5,0 mm: 7,5 kN Screw d = 6,0 mm: 10,7 kN Screw d = 8,0 mm: 19,1 kN Screw d = 10,0 mm: 29,8 kN Screw d = 12,0 mm: 32,7 kN

Screws made of stainless steel

Screw d = 3,0 mm: 1,6 kN Screw d = 3,5 mm: 2,1 kN Screw d = 4,0 mm: 2,8 kN Screw d = 4,5 mm: 3,5 kN Screw d = 5,0 mm: 4,3 kN Screw d = 6,0 mm: 6,2 kN Screw d = 8,0 mm: 13,0 kN

Insertion moment

Ratio of the characteristic torsional strength to the mean insertion moment:

 $f_{tor,k}$  /  $R_{tor,mean} \ge 1.5$ 

Torsional strength
Screws made of carbon steel

Characteristic value f<sub>tor,k</sub>:

Screw d = 3,0 mm: 1,3 Nm Screw d = 3,5 mm: 2,0 Nm Screw d = 4,0 mm: 3,0 Nm Screw d = 4,5 mm: 4,3 Nm Screw d = 5,0 mm: 6,0 Nm Screw d = 6,0 mm: 9,5 Nm Screw d = 8,0 mm: 25,0 Nm Screw d = 10,0 mm: 40,0 Nm Screw d = 12,0 mm: 55,0 Nm

#### Screws made of stainless steel

Screw d = 3,0 mm: 0,9 Nm Screw d = 3,5 mm: 1,3 Nm Screw d = 4,0 mm: 1,9 Nm Screw d = 4,5 mm: 2,6 Nm Screw d = 5,0 mm: 3,7 Nm Screw d = 6,0 mm: 6,5 Nm Screw d = 8,0 mm: 16,0 Nm

#### Safety in case of fire (BWR 2)

• Reaction to fire: Anchorages satisfy requirements for Class A 1

Sustainable use of natural resources (BWR 7) NPD

8. Appropriate Technical Documentation and/or Specific Technical Documentation: ---

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

1. V. A. Bull i. V. W. Mylal

Signed for and on behalf of the manufacturer by:

Andreas Bucher, Dipl.-Ing.

Wolfgang Hengesbach, Dipl.-Ing., Dipl.-Wirtsch.-Ing.

Tumlingen, 2019-01-09

- This DoP has been prepared in different languages. In case there is a dispute on the interpretation the english version shall always prevail.
- The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.



ETA-Danmark A/S Göteborg Plads 1 DK-2150 Nordhavn Tel. +45 72 24 59 00 Fax +45 72 24 59 04 Internet www.etadanmark.dk Appendix and notified according to Article 29 of the Regulation (EU)
No 305/2011 of the European
Parliament and of the Council of 9
March 2011



# European Technical Assessment ETA-11/0027 of 2019/01/02

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

fischer Power-Fast screws and fischer construction screws

Product family to which the above construction product belongs:

Screws for use in timber constructions

Manufacturer:

fischerwerke GmbH & Co. KG Klaus-Fischer-Str. 1 72178 Waldachtal GERMANY

**Manufacturing plant:** 

fischerwerke

This European Technical Assessment contains:

41 pages including 4 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of: European Assessment document (EAD) no. EAD 130118-00-0603 "Screws for timber constructions"

This version replaces:

The previous ETA with the same number issued on 2013-06-26 and expiry on 2018-06-26

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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# II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

# 1 Technical description of product and intended use

### Technical description of the product

"fischer Power-Fast" and "fischer construction screws" are self-tapping screws to be used in timber structures. "fischer Power-Fast" screws shall be threaded over a part or over the full length. "fischer construction screws" shall be threaded over a part of the length. The screws shall be produced from carbon steel wire for nominal diameters of 3,0 mm to 12,0 mm and from stainless steel wire for nominal diameters of 3,0 mm to 8,0 mm. The material specification of the stainless steel screws is deposited with ETA-Danmark. Where corrosion protection is required, the material or coating shall be declared in accordance with the relevant specification given in Annex A of EN 14592.

## **Geometry and Material**

The nominal diameter (outer thread diameter), d, shall not be less than 3,0 mm and shall not be greater than 12,0 mm. The overall length, L, of screws shall not be less than 20 mm and shall not be greater than 600 mm. Other dimensions are given in Annex A1 to Annex A19.

The ratio of inner thread diameter to outer thread diameter  $d_i/d$  ranges from 0,59 to 0,69.

The screws are threaded over a minimum length  $\ell_g$  of 4,0·d (i.e.  $\ell_g \ge 4,0$ ·d).

The lead p (distance between two adjacent thread flanks) ranges from 0,50·d to 0,67·d.

No breaking of screws shall be observed at a bend angle,  $\alpha$ , of less than  $(45/d^{0.7}+20)$  degrees.

The material specification of the of the stainless steel screws is deposited with ETA-Danmark.

# 2 Specification of the intended use in accordance with the applicable EAD

The screws are used for connections in load bearing timber structures between members of solid timber (softwood and hardwood). Furthermore, all kinds of processed timber products (all softwood and hardwood as well), such as glued laminated timber, cross-laminated timber, laminated veneer lumber, similar glued members, wood-based panels or steel.

Furthermore "fischer Power-Fast" screws with diameter of 6 mm, 8 mm, 10 mm and 12 mm may also be used for the fixing of heat insulation on rafters and on vertical facades.

Steel plates and wood-based panels except solid wood panels, Egger OSB Eurostrand 4 TOP and cross laminated timber shall only be located on the side of the screw head. The following wood-based panels may be used:

- Plywood according to EN 636 or ETA
- Particleboard according to EN 312 or ETA
- Oriented Strand Board, Type OSB/3 and OSB/4 according to EN 300 or ETA
- Fibreboard according to EN 622-2 and 622-3 or ETA (minimum density 650 kg/m³)
- Cement bonded particleboard according to ETA
- Solid wood panels according to EN 13353 and EN 13986, and cross laminated timber according to ETA
- Laminated Veneer Lumber according to EN 14374 or ETA
- Engineered wood products according to ETA if the ETA of the product includes provisions for the use of self-tapping screws, the provisions of the ETA of the engineered wood product apply

The screws shall be screwed into softwood without predrilling or after pre-drilling with a diameter not larger than the inner thread diameter for the length of the threaded part and with a maximum of the smooth shank diameter for the length of the smooth shank. The screws shall be driven into hardwood after pre-drilling with a suitable diameter according to section 3.11.

The screws are intended to be used in timber connections for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation 305/2011 shall be fulfilled.

Form and dimensions of washers are given in Annex A20. Washers must be made of steel.

The design of the connections shall be based on the characteristic load-carrying capacities of the screws. The design capacities shall be derived from the characteristic capacities in accordance with Eurocode 5 or an appropriate national code (e.g. DIN 1052:2008-12). Regarding environmental conditions, national provisions at the building site shall apply.

The screws are intended for use for connections subject to static or quasi static loading.

The zinc-coated screws are for use in timber structures subject to the dry, internal conditions defined by the service classes 1 and 2 of EN 1995-1-1:2008 (Eurocode 5).

The screws made of stainless steel meet the requirements of Eurocode 5 (EN 1995-1-1:2008), for use in structures subject to the wet conditions defined as service class 3.

The scope of the screws regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the screws of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, 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

Characteristi	ic	Assessment of characteristic
3.1 Mech	nanical resistance and stability*) (BWR1)	
	strength made from carbon steel	$\begin{array}{llllllllllllllllllllllllllllllllllll$
Screws	from stainless steel	Screw d = 3,0 mm: 1,6 kN Screw d = 3,5 mm: 2,1 kN Screw d = 4,0 mm: 2,8 kN Screw d = 4,5 mm: 3,5 kN Screw d = 5,0 mm: 4,3 kN Screw d = 6,0 mm: 6,2 kN Screw d = 8,0 mm: 13,0 kN
Insertio	on moment	Ratio of the characteristic torsional strength to the mean insertion moment: $f_{tor,k} \ / \ R_{tor,mean} \ge 1,5$
	nal strength from carbon steel	Characteristic value $f_{tor,k}$ :  Screw d = 3,0 mm: 1,3 Nm  Screw d = 3,5 mm: 2,0 Nm  Screw d = 4,0 mm: 3,0 Nm  Screw d = 4,5 mm: 4,3 Nm  Screw d = 5,0 mm: 6,0 Nm  Screw d = 6,0 mm: 9,5 Nm  Screw d = 8,0 mm: 25,0 Nm  Screw d = 10,0 mm: 40,0 Nm  Screw d = 12,0 mm: 55,0 Nm
Screws	from stainless steel	Screw d = 3,0 mm:       0,9 Nm         Screw d = 3,5 mm:       1,3 Nm         Screw d = 4,0 mm:       1,9 Nm         Screw d = 4,5 mm:       2,6 Nm         Screw d = 5,0 mm:       3,7 Nm         Screw d = 6,0 mm:       6,5 Nm         Screw d = 8,0 mm:       16,0 Nm
3.2 Safety	y in case of fire (BWR2)	
React	cion to fire	The screws are made from steel classified as <b>Euroclass A1</b> in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364.

Char	racteristic	Assessment of characteristic							
3.7	Sustainable use of natural resources (BR7)		No Performance Assessed						
3.8	General aspects related to the performance the product	of	The screws have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service classes 1, 2 and 3						
	Identification		See Annex A						

<sup>\*)</sup> See additional information in section 3.9 – 3.12.

\*\*) In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

#### 3.9 Mechanical resistance and stability

The load-carrying capacities for "fischer Power-Fast" and "fischer construction screws" are applicable to the wood-based materials mentioned in paragraph 1 even though the term timber has been used in the following.

The characteristic lateral load-carrying capacities and the characteristic axial withdrawal capacities of "fischer Power-Fast" and "fischer construction screws" screws should be used for designs in accordance with Eurocode 5 or an appropriate national code.

Pointside penetration length of the threaded part must be  $\ell_{\rm ef} \ge 4 \cdot d$ , where d is the outer thread diameter of the screw. For the fixing of rafters, point side penetration must be at least 40 mm,  $\ell_{\rm ef} > 40$  mm.

ETA's for structural members may be considered if applicable.

For wood-based panels the relevant ETAs must be considered where applicable.

### Lateral load-carrying capacity

The characteristic lateral load-carrying capacity of "fischer Power-Fast" and "fischer construction screws" screws shall be calculated according to EN 1995-1-1:2008 (Eurocode 5) using the outer thread diameter d as the nominal diameter of the screw. The contribution from the rope effect may be considered.

The characteristic yield moment shall be calculated from:

Screws from carbon steel for 3,0 mm  $\leq$  d  $\leq$  5,0 mm and 12,0 mm:

$$M_{y,k} = 0.15 \cdot 500 \text{ (N/mm}^2) \cdot d^{2.6}$$
 [Nmm]

Screws from carbon steel for 6,0 mm  $\leq$  d  $\leq$  10,0 mm:  $M_{y,k} = 0.15 \cdot 600 \; (N/mm^2) \cdot d^{2,6} \qquad \qquad [Nmm]$ 

Screws from stainless steel for 3,0 mm < d < 6,0 mm:  $M_{v,k} = 0.15 \cdot 350 \text{ (N/mm}^2) \cdot d^{2.6}$  [Nmm]

Screws from stainless steel for d = 8,0 mm:  $M_{y,k} = 0.15 \cdot 400 \; (N/mm^2) \cdot d^{2.6} \eqno [Nmm]$ 

where

d outer thread diameter [mm]

The embedding strength for screws in non-pre-drilled holes arranged at an angle between screw axis and grain direction,  $0^{\circ} \le \alpha \le 90^{\circ}$  is:

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot d^{-0.3}}{2.5 \cdot \cos^2 \alpha + \sin^2 \alpha}$$
 [N/mm<sup>2</sup>]

and accordingly, for screws in pre-drilled holes:

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot (1 - 0.01 \cdot d)}{2.5 \cdot \cos^2 \alpha + \sin^2 \alpha}$$
 [N/mm<sup>2</sup>]

Where

 $\rho_k$  characteristic timber density [kg/m<sup>3</sup>];

d outer thread diameter [mm];

α angle between screw axis and grain direction.

The embedding strength for screws arranged parallel to the plane surface of cross laminated timber, independent of the angle between screw axis and grain direction,  $0^{\circ} \le \alpha \le 90^{\circ}$ , may be calculated from:

$$f_{h,k} = 20 \cdot d^{-0,5} \end{[N/mm^2]}$$

Where

d outer thread diameter [mm]

The embedding strength for screws in the plane surface of cross laminated timber should be assumed as for solid timber based on the characteristic density of the outer layer. If relevant, the angle between force and grain direction of the outer layer should be taken into account.

The direction of the lateral force shall be perpendicular to the screw axis and parallel to the plane surface of the cross laminated timber.

### Axial withdrawal capacity

The characteristic axial withdrawal capacity of "fischer Power-Fast" and "fischer construction screws" in solid timber (softwood and ash, beech or oak hardwood), glued laminated timber (softwood and hardwood, ash, beech or oak), laminated veneer lumber (softwood or hardwood beech) or cross-laminated timber members at an angle of  $0^{\circ} \leq \alpha \leq 90^{\circ}$  to the grain or in Egger Eurostrand OSB 4 TOP at an angle of  $\alpha = 90^{\circ}$  to the panel surface shall be calculated from:

$$F_{ax,\alpha,Rk} = n_{ef} \cdot k_{ax} \cdot f_{ax,k} \cdot d \cdot \ell_{ef} \cdot \left(\frac{\rho_k}{350}\right)^{0.8}$$
 [N]

Where

 $F_{ax,\alpha,RK}$  Characteristic withdrawal capacity of the connection at an angle  $\alpha$  to the grain [N]

n<sub>ef</sub> Effective number of screws according to EN 1995-1-1

For inclined screws:  $n_{ef} = \max \{ n^{0.9}; 0.9 \cdot n \}$ 

 $k_{ax}$  Factor, taking into account the angle  $\alpha$  between screw axis and grain direction  $k_{ax}=1.0$  for  $45^{\circ} \leq \alpha < 90^{\circ}$ 

$$k_{ax} = 0.3 + \frac{0.7 \cdot \alpha}{45} \ \text{ for } 0^{\circ} \leq \alpha < 45^{\circ}$$

 $f_{ax,k}$  Characteristic withdrawal parameter [N/mm<sup>2</sup>] for timber members

for Egger Eurostrand OSB 4 TOP with minimum thickness t = 12 mm: screw 5,0 mm  $\leq d \leq 10,0$  mm:

 $f_{ax,k} = 10,0 \text{ N/mm}^2$ 

d Outer thread diameter [mm]

 $\ell_{\rm ef}$  Point side penetration length of the threaded part according to EN 1995-1-1:2008 [mm]

α Angle between grain and screw axis [°]

 $\rho_k$  Characteristic density [kg/m³], for hardwoods the assumed characteristic density shall not exceed 730 kg/m³

For screws arranged under an angle between screw axis and grain direction of less than 90°, the minimum threaded penetration length is:

 $\ell_{\rm ef} \ge \min (4 \cdot d/\sin \alpha ; 20 \cdot d)$ 

For screws penetrating more than one layer of cross laminated timber, the different layers may be taken into account proportionally.

The axial withdrawal capacity is limited by the head pullthrough capacity and the tensile strength of the screw.

For axially loaded screws in tension, where the external force is parallel to the screw axes, the rules in EN 1995-1-1, 8.7.2 (8) should be applied.

For inclined screws in timber-to-timber or steel-to-timber shear connections, where the screws are arranged under an angle  $30^{\circ} \le \alpha \le 60^{\circ}$  between the shear plane and the screw axis, the effective number of screws  $n_{ef}$  should be determined as follows:

For one row of n screws parallel to the load, the load-carrying capacity should be calculated using the effective number of fasteners nef, where

$$n_{ef} = max \{n^{0.9}; 0.9 \cdot n\}$$

and n is the number of inclined screws in a row. If crossed pairs of screws are used in timber-to-timber connections, n is the number of crossed pairs of screws in a row.

Note: For inclined screws as fasteners in mechanically

jointed beams or columns or for the fixing of thermal insulation material,  $n_{ef} = n$ .

# Head pull-through capacity

The characteristic head pull-through capacity of "fischer Power-Fast" and "fischer construction screws" shall be calculated according to EN 1995-1-1:2008 from:

$$F_{ax,\alpha,Rk} = n_{ef} \cdot f_{head,k} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350}\right)^{0.8}$$
 [N]

where:

 $F_{ax,\alpha,Rk}$  characteristic head pull-through capacity of the connection at an angle  $\alpha \ge 30^{\circ}$  to the grain [N]

n<sub>ef</sub> effective number of screws according to EN 1995-1-1

For inclined screws:  $n_{ef} = max \{ n^{0.9} ; 0.9 \cdot n \}$ 

(see axial withdrawal capacity)

 $f_{head,k}$  characteristic head pull-through parameter  $\lceil N/mm^2 \rceil$ 

d<sub>h</sub> diameter of the screw head [mm]

 $\rho_k$  characteristic density [kg/m<sup>3</sup>], for wood-

based panels  $\rho_k = 380 \text{ kg/m}^3$ 

Characteristic head pull-through parameter for screws with head diameter  $\leq 21$  mm in connections with timber and with wood-based panels with thicknesses above 20 mm:  $f_{head,k} = 12 \text{ N/mm}^2$ 

Characteristic head pull-through parameter for screws with head diameter 21 mm  $< d_h \le 35$  mm in connections with timber and with wood-based panels with thicknesses above 20 mm:

 $f_{head,k} = 10 \text{ N/mm}^2$ 

Characteristic head pull-through parameter for screws in connections with wood-based panels with thicknesses between 12 mm and 20 mm:

 $f_{head,k} = 8 \text{ N/mm}^2$ 

Screws in connections with wood-based panels with a thickness below 12 mm (minimum thickness of the wood based panels of 1,2·d with d as outer thread diameter):

 $f_{head.k} = 8 \text{ N/mm}^2$ 

limited to  $F_{ax,\alpha,Rk} = 400 \text{ N}$ 

The head diameter  $d_h$  shall be greater than  $1.8 \cdot d_s$ , where  $d_s$  is the smooth shank or the wire diameter. Otherwise the characteristic head pull-through capacity  $F_{ax,\alpha,Rk} = 0$ .

Outer diameter of washers  $d_h > 35$  mm shall not be considered.

The minimum thickness of wood-based panels according to the clause 3.9 must be observed.

In steel-to-timber connections the head pull-through capacity is not decisive.

#### **Tensile capacity**

The characteristic tensile strength ftens,k of "fischer Power-Fast" and "fischer construction screws" is:

#### Screws from carbon steel:

Screw d = 3.0 mm: 2,7 kNScrew d = 3.5 mm: 3,7 kNScrew d = 4.0 mm: 4,3 kN Screw d = 4.5 mm: 5,5 kN Screw d = 5.0 mm: 6,8 kN Screw d = 6.0 mm:  $10.7 \,\mathrm{kN}$ Screw d = 8.0 mm: 19,1 kN Screw d = 10.0 mm: 29,8 kN Screw d = 12,0 mm: 32,7 kN

#### Screws from stainless steel:

Screw d = 3.0 mm: 1,6 kN 2,1 kN Screw d = 3.5 mm: Screw d = 4.0 mm: 2,8 kN Screw d = 4.5 mm: 3.5 kN Screw d = 5.0 mm: 4,3 kN Screw d = 6.0 mm: 6,2 kNScrew d = 8.0 mm: 13,0 kN

For screws used in combination with steel plates, the tearoff capacity of the screw head should be greater than the tensile strength of the screw.

# **Compressive capacity**

The characteristic compressive capacity  $F_{ax,Rk}$  of fischer Power-Fast screws with the head fixed between two aluminium-, carbon steel- or stainless steel plates according to Annex D and the thread driven completely into timber perpendicular to the grain shall be calculated from:

$$F_{ax,Rk} = min \left\{ f_{ax,k} \cdot d \cdot \ell_{ef} \cdot \left( \frac{\rho_k}{350} \right)^{0.8} ; \kappa_c \cdot N_{pl,k} \right\} [N]$$

Where

$$\kappa_{c} = \begin{cases} 1 & \text{for } \overline{\lambda}_{k} \leq 0, 2\\ \frac{1}{k + \sqrt{k^{2} - \overline{\lambda}_{k}^{2}}} & \text{for } \overline{\lambda}_{k} > 0, 2 \end{cases}$$

$$k = 0.5 \cdot \left\lceil 1 + 0.49 \cdot (\overline{\lambda}_k - 0.2) + \overline{\lambda}_k^2 \right\rceil$$

The relative slenderness ratio shall be calculated from:

$$\overline{\lambda}_{k} = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$$

$$N_{pl,k} = \pi \cdot \frac{d_s^2}{4} \cdot f_{y,k}$$

is the characteristic value for the axial capacity in case of plastic analysis referred to the smooth shank cross-section.

$$N_{ki,k} = \frac{\pi^2 \cdot EI_S}{\ell_{ef}^2}$$
 [N]

is the characteristic ideal elastic buckling load.

Characteristic yield strength for screws made of carbon steel:

$$f_{v,k} = 1000$$
 [N/mm<sup>2</sup>]

Characteristic yield strength for screws made of stainless steel:

$$f_{y,k} = 500 \qquad [N/mm^2]$$

Modulus of elasticity for screws made of carbon steel:

=210000 $E_{\rm s}$  $[N/mm^2]$ 

Modulus of elasticity for screws made of stainless steel:  

$$E_s = 160000$$
 [N/mm<sup>2</sup>]

Second moment of area:

$$\begin{split} I_S = & \frac{\pi}{64} \cdot d_s^4 \\ d_s = & \text{smooth shank diameter} \\ \ell_{ef} = & 0,7 \cdot \ell \quad \text{buckling length} \end{split} \qquad \begin{bmatrix} mm^4 \\ [mm] \end{bmatrix}$$

 $\ell$  = free screw length protruding from the timber

member including the screw head Note: When determining design values of the compressive capacity it should be considered that  $f_{ax,d}$  is to be calculated using  $k_{mod}$  and  $\gamma_M$  for timber according to EN 1995 while  $N_{pl,d}$  is calculated using  $\gamma_{M,1}$  for steel buckling according to EN 1993.

[mm]

## Combined laterally and axially loaded screws

For screwed connections subjected to a combination of axial load and lateral load, the following expression should be satisfied:

$$\left(\frac{F_{ax,Ed}}{F_{ax,Rd}}\right)^2 + \left(\frac{F_{la,Ed}}{F_{la,Rd}}\right)^2 \leq 1$$

where

 $F_{ax,Ed}$ axial design load of the screw  $F_{\text{la.Ed}}$ lateral design load of the screw

 $F_{ax.Rd}$ design load-carrying capacity of an axially

loaded screw

design load-carrying capacity of a laterally  $F_{la,Rd}$ 

loaded screw

#### Slip modulus

The axial slip modulus  $K_{ser}$  of a screw for the serviceability limit state should be taken independent of angle  $\alpha$  to the grain as:

$$C = K_{ser} = 780 \cdot d^{0.2} \cdot \ell_{ef}^{0.4}$$
 [N/mm]

Where

outer thread diameter [mm] d

penetration length in the structural member [mm]  $\ell_{\mathrm{ef}}$ 

#### Thermal insulation material on top of rafters

"fischer Power-Fast" screws with an outer thread diameter of d = 6 mm, 8 mm, 10 mm and 12 mm may be used for the fixing of thermal insulation material on top of rafters.

The thickness of the insulation ranges up to 400 mm. The rafter insulation must be placed on top of solid timber or glued laminated timber rafters or cross-laminated timber members and be fixed by battens placed parallel to the rafters or by wood-based panels on top of the insulation layer. The insulation of vertical facades is also covered by the rules given here.

Screws must be screwed in the rafter through the battens or panels and the insulation without pre-drilling in one sequence.

The angle  $\alpha$  between the screw axis and the grain direction of the rafter should be between 30° and 90°.

The battens must be from solid timber (softwood) according to EN 338:2003-04. The minimum thickness of the battens is 80 mm and the minimum width 100 mm for screws with outer thread diameter d=12 mm. The minimum thickness of the battens is 40 mm and the minimum width 60 mm for screws with outer thread diameter d=10 mm. For screws with outer thread diameter d=6 mm and 8 mm the minimum thickness of the battens is 30 mm and the minimum width 50 mm.

Alternatively, to the battens, boards with a minimum thickness of 20 mm from plywood according to EN 636, particle board according to EN 312, oriented strand board OSB/3 and OSB/4 according to EN 300 or ETA and solid wood panels according to EN 13353 may be used.

The rafter consists of solid timber (softwood) according to EN 338, glued laminated timber according to EN 14081, cross-laminated timber, laminated veneer lumber according to EN 14374 or to ETA or similar glued members according to ETA and has a minimum width of 60 mm.

The insulation must comply with a ETA.

The insulation must have a minimum compressive stress of  $\sigma_{10\%} = 0.05 \text{ N/mm}^2$  at 10 % deformation according to EN 826:1996-05.

The analysis of the fixing of the insulation and battens or boards, respectively, may be carried out using the static model in Annex B. The battens or boards, respectively, must have sufficient strength and stiffness. The maximum pressure between the battens or boards, respectively, and the insulation shall not exceed  $1,1\cdot\sigma_{10\%}$ .

The characteristic axial withdrawal capacity of the screws for rafter or facade insulation shall be calculated from:

$$F_{ax,\alpha,Rk} = min \begin{cases} k_{ax} \cdot f_{ax,k} \cdot d \cdot \ell_{ef} \cdot k_{1} \cdot k_{2} \left(\frac{\rho_{k}}{350}\right)^{0.8} \\ f_{head,k} \cdot d_{h}^{2} \cdot \left(\frac{\rho_{k}}{350}\right)^{0.8} \end{cases}$$

$$[N]$$

where

 $F_{ax,\alpha,RK}$  Characteristic withdrawal capacity of the connection at an angle  $\alpha$  to the grain [N]

 $k_{ax}$  Factor, taking into account the angle  $\alpha$  between screw axis and grain direction

 $k_{ax} = 1.0$  for  $45^{\circ} \le \alpha < 90^{\circ}$ 

 $k_{ax}=~0,3+\frac{0,7\cdot\alpha}{45}~~for~0^{\circ}\leq\alpha<45^{\circ}$ 

 $f_{ax,k}$  Characteristic withdrawal parameter  $\lceil N/mm^2 \rceil$ 

D Outer thread diameter [mm]

Point side penetration length of the threaded part according to EN 1995-1-1:2008 [mm]

 $\alpha$  Angle between grain and screw axis ( $\alpha \ge 30^{\circ}$ )

 $k_1 \quad \min\{1; 220/t_{HI}\}$ 

 $k_2 \qquad \min \{1; \sigma_{10\%}/0,12\}$ 

t<sub>HI</sub> Thickness of the thermal insulation [mm]

 $\sigma_{10\%}$  Compressive stress of the thermal insulation

under 10 % deformation [N/mm<sup>2</sup>]

 $\sigma_{10\%} \ge 0.05 \text{ N/mm}^2$ 

 $f_{head,k}$  Characteristic head pull-through parameter

 $[N/mm^2]$ 

d<sub>h</sub> Outer diameter of the screw head [mm]

ρ<sub>k</sub> Characteristic density [kg/m³]

 $f_{\text{tens,d}} \qquad \text{Characteristic tensile capacity of the screw}$ 

[N]

Friction forces shall not be considered for the design of the characteristic axial withdrawal capacity of the screws.

The anchorage of wind suction forces as well as the bending stresses of the battens or the boards, respectively, shall be considered in design. Additional screws perpendicular to the grain of the rafter (angle  $\alpha = 90^{\circ}$ ) may be arranged if necessary.

Screws for the anchorage of rafter insulation shall be arranged according to Annex B.

The maximum screw spacing is  $e_S = 1,75$  m.

# 3.10 Aspects related to the performance of the product

3.10.1 Corrosion protection in service class 1, 2 and 3. The fischer Power-Fast and fischer construction screws are produced from carbon wire. Screws made from carbon steel

are electrogalvanised and yellow or blue chromate. The mean thickness of the zinc coating is 5µm.

The material specification of the stainless steel screws is deposited with ETA-Danmark.

# 3.11 General aspects related to the intended use of the product

The screws are manufactured in accordance with the provisions of the European Technical Assessment using the automated manufacturing process and laid down in the technical documentation.

The installation shall be carried out in accordance with Eurocode 5 or an appropriate national code unless otherwise is defined in the following. Instructions from fischerwerke GmbH & Co. KG should be considered for installation.

The screws are used for connections in load bearing timber structures between members of solid timber (softwood and hardwood), glued laminated timber (softwood and hardwood), cross-laminated timber (minimum diameter d = 6,0 mm, softwood and hardwood), laminated veneer lumber (softwood and hardwood), similar glued members (softwood and hardwood), wood-based panels or steel members.

The screws may be used for connections in load bearing timber structures with structural members according to an associated ETA, if according to the ETA of the structural member a connection in load bearing timber structures with screws according to an ETA is allowed.

Furthermore, the screws with diameters between 6 mm and 12 mm may also be used for the fixing of insulation on top of rafters or at vertical facades.

A minimum of two screws should be used for connections in load bearing timber structures. A single screw may be used in structural connections if the penetration length of the screw including an unthreaded part of the shank is at least  $20 \cdot d$  and the screw is only axially loaded. The load-bearing capacity of the single screw in this case shall be reduced by 50 %.

A single screw per connection may also be used, if the member is fixed with at least two screws and the screws are used for the fixing of boards, battens and wind braces, or for the fixing of rafters, purlins or similar on main beams or top plates.

The minimum penetration depth in structural members made of solid, glued or cross-laminated timber is 4·d.

Wood-based panels - except Egger Eurostrand OSB 4 TOP - and steel plates should only be arranged on the side of the

screw head. The minimum thickness of wood-based panels should be 1,2·d. Furthermore, the minimum thickness for following wood-based panels should be:

- Plywood, Fibreboards: 6 mm
- Particleboards, OSB, Cement Particleboards: 8 mm
- Solid wood panels: 12 mm

For structural members according to ETA's the terms of the ETA's must be considered.

If screws with an outer thread diameter  $d \ge 8$  mm are used in load bearing timber structures, the structural solid or glued laminated timber, laminated veneer lumber and similar glued members must be from spruce, pine or fir. This does not apply for screws in pre-drilled holes.

The minimum angle between the screw axis and the grain direction is  $\alpha = 0^{\circ}$ .

The screws shall be driven into softwood without predrilling or after pre-drilling. The screws shall be driven into hardwood with a maximum characteristic density of 730 kg/m³ after predrilling.

The drill hole diameters are:

Outer thread	Drill hole	diameter
diameter	Softwood	Hardwood
4,0	2,5	3,0
4,5	2,5	3,0
5,0	3,0	3,0
6,0	4,0	4,0
8,0	5,0	6,0
10,0	6,0	7,0
12,0	7,0	8,0

The hole diameter in steel members must be predrilled with a suitable diameter.

Only the equipment prescribed by fischerwerke GmbH & Co. KG shall be used for driving the screws.

In connections with screws with countersunk head according to Annexes A1, A5, A6, A7, A11, A13 and A18, the head must be flush with the surface of the connected structural member. A deeper countersink is not allowed.

Screws from carbon steel and stainless steel with countersunk head according to Annex A1, A2, A5, A6, A7, A11, A13, A14 and A18 may be used together with washers according to Annex A20. Washers according to EN ISO 7094 may be used together with washers according to Annex A20.

Screws according to Annex A3, A4, A8, A9, A10, A12 A16, A17 and A19 may be used together with washers according to EN ISO 7094.

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Washers from carbon steel should be used with screws from carbon steel and screws from stainless steel with washers from stainless steel. Washers should have a full bearing area.

For structural timber members, minimum spacing and distances for screws in predrilled holes are given in EN 1995-1-1:2008 (Eurocode 5) clause 8.3.1.2 and table 8.2 as for nails in predrilled holes. Here, the outer thread diameter d must be considered.

For screws in non-predrilled holes, minimum spacing and distances are given in EN 1995-1-1:2008 (Eurocode 5) clause 8.3.1.2 and table 8.2 as for nails in non-predrilled holes.

Alternatively, minimum distances and spacing for exclusively axially loaded "fischer Power-Fast" screws in non-predrilled holes in members of solid timber (softwood and hardwood), glued laminated timber or similar glued products (softwood and hardwood) with a minimum thickness  $t=12\cdot d$  and a minimum width of  $8\cdot d$  or 60 mm, whichever is the greater, may be taken as:

Spacing a <sub>1</sub> parallel to the grain	$a_1 = 5 \cdot d$
Spacing a <sub>2</sub> perpendicular to the grain	$a_2 = 5 \cdot d$
Distance a <sub>3,c</sub> from centre of the screw-part in	
timber to the end grain	$a_{3,c} = 9 \cdot d$
Distance a <sub>4,c</sub> from centre of the screw-part in	
timber to the edge	$a_{4,c} = 4 \cdot d$

Spacing  $a_2$  perpendicular to the grain may be reduced from 5·d to 2,5·d, if the condition  $a_1 \cdot a_2 \ge 25 \cdot d^2$  is fulfilled.

For Douglas fir members minimum spacing and distances parallel to the grain shall be increased by 50%.

Minimum distances from loaded or unloaded ends must be  $15 \cdot d$  for screws in non-predrilled holes with outer thread diameter  $d \ge 8$  mm and timber thickness  $t < 5 \cdot d$ .

Minimum distances from the unloaded edge perpendicular to the grain may be reduced to  $3 \cdot d$  also for timber thickness  $t < 5 \cdot d$ , if the spacing parallel to the grain and the end distance is at least  $25 \cdot d$ .

Unless specified otherwise in the technical specification (ETA or hEN) of cross laminated timber, minimum distances and spacing for screws in the plane surface of cross laminated timber members with a minimum thickness  $t = 10 \cdot d$  may be taken as (see Annex C):

Spacing a <sub>1</sub> parallel to the grain	$a_1 = 4 \cdot d$
Spacing a <sub>2</sub> perpendicular to the grain	$a_2 = 2.5 \cdot d$
Distance a <sub>3,c</sub> from centre of the screw-part in	
timber to the unloaded end grain of	
the plane surface	$a_{3,c} = 6 \cdot d$
Distance a <sub>3,t</sub> from centre of the screw-part in	
timber to the loaded end grain	

of the plane surface	$a_{3,t} = 6 \cdot d$
Distance a <sub>4,c</sub> from centre of the screw-part in	
timber to the unloaded edge	$a_{4,c}=2,5\cdot d$
Distance a <sub>4,t</sub> from centre of the screw-part in	
timber to the loaded edge	$a_{4,t} = 6 \cdot d$

Unless specified otherwise in the technical specification (ETA or hEN) of cross laminated timber, minimum distances and spacing for screws in the edge surface of cross laminated timber members with a minimum thickness  $t = 10 \cdot d$  and a minimum penetration depth perpendicular to the edge surface of 10·d may be taken as (see Annex C): Spacing a<sub>1</sub> parallel to the CLT plane surface  $a_1 = 10 \cdot d$ Spacing a<sub>2</sub> perpendicular to the CLT plane surface  $a_2 = 4 \cdot d$ Distance a<sub>3,c</sub> from centre of the screw-part in timber to the unloaded end  $a_{3,c} = 7 \cdot d$ Distance a<sub>3,t</sub> from centre of the screw-part in timber to the loaded end  $a_{3,t} = 12 \cdot d$ Distance a<sub>4,c</sub> from centre of the screw-part in timber to the unloaded edge  $a_{4,c} = 3 \cdot d$ Distance a<sub>4,t</sub> from centre of the screw-part in timber to the loaded edge  $a_{4,t} = 6 \cdot d$ 

For a crossed screw couple the minimum spacing between the crossing screws is 1,5·d.

Minimum thickness for structural members is t=24 mm for screws with outer thread diameter d < 8 mm, t=30 mm for screws with outer thread diameter d=8 mm, t=40 mm for screws with outer thread diameter d=10 mm and t=80 mm for screws with outer thread diameter d=12 mm.

# 4 Attestation and verification of constancy of performance (AVCP)

# 4.1 AVCP system

According to the decision 97/176/EC of the European Commission1, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 3.

# 5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

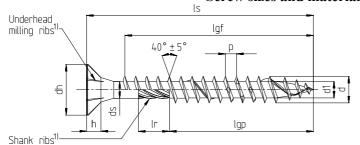
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

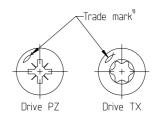
Issued in Copenhagen on 2019-01-02 by

Thomas Bruun
Managing Director, ETA-Danmark

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# Screw sizes and material





1) optional

Power-Fast self-drilling screw - Countersunk head with full- or partial thread

<ul> <li>Carbo</li> </ul>	n Steel ole surface tro		•	•								•			brass	nlated
Nominal diameter			3,0 3,5			4,0 4,5		5,0		6,0		Orass I	Juica			
	Outer diame			00		50	4,0	00		50		5,00 6,00				
_	Allow. devi				, ,			±0	,		,					
	Core diamet		2,	00	2,	20	2,:	50	2,	70	3,	00	4,	00		
$d_1$	Allow. devi	ation				-0,25 /	+0,10					±0	,20			
, I	Head diame	ter	6,	00	7,	00	8,0	00	9,	00	10.	,00	12.	,00		
$d_h$	Allow. devi	ation						-0,50 /	+0,10							
4 5	Shank diam	eter	2,	25	2,	60	2,9	90	3,	25	3,	60	4,	20		
$d_s$	Allow. devi	ation						-0,30 /	+0,10							
h I	Head height			90		10	2,:		2,	70	3,	00		80		
	Thread pitch		1,:	50	1,	80	2,0	00	2,	20	2,	50	3,00-	-4,50		
p A	Allow. devi	ation							0%							
$l_r^{(1)}$	Shank ribs l	ength	3,	75	4,	25	4,	75	5,	50	6,	00	7,	00		
I <sub>r</sub> ′	Allow. devi	ation			±0	,75					±1,	,00				
	Drive TX			1	0		20				20	25	3	0		
	Drive PZ		]	1 2 3												
S	crew length	$l_{\rm s}$	S	Standard thread length   $l_{gf}$ = Full thread   $l_{gp}$ =Partial thread   Tolerance										$: \pm 2,0$	2)	
Nominal	min	max	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$		
length			Ŭ	1gp	- C	1gp	Ŭ	-gp	Ŭ	-gp	1gi	*gp	-gı	-gp	<u> </u>	
20	18,95	21,05	16		16		16		16						<u> </u>	
25	23,75	26,25	21		21	18	20	18	20						<u> </u>	-
30	28,75	31,25	26	18	26	18	25	18	25	18	24		•		<u> </u>	
35	33,50	36,50	31	24	31	24	30	24	30	24	29	24	28	2.4		
40	38,50	41,50	36	24	36	24	35	24	35	24	34	24	33	24	<u> </u>	
45 50	43,50	46,50	41	30	41	30	40	30	40	30	39 44	30	38 43	30	<del>                                     </del>	
55	48,50	51,50			46	30	45 50	36	50	36	44	36	43	30	<u> </u>	$\vdash$
60	53,50 58,50	56,50 61,50					30	36	30	36	49	36	53	36	<del>                                     </del>	
70	68,50	71,50						42		42		42	63	42		
80	78,50	81,50						50		50		50	73	50		<b>†</b>
90	88,25	91,75						50		50		60	13	60		
100	98,25	101,75										60		60		<b>+</b>
110	108,25	111,75										70		70		
120	118,25	121,75										70		70		
	steps of 10r											, 0		, 0		
	1 <sub>s</sub> -2,00													70		
130-300   I <sub>S</sub> -2,00   I <sub>S</sub> +2,00															zec in n	

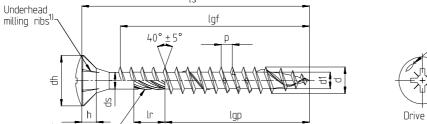
All sizes in mm

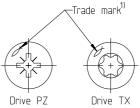
- Intermediate lengths at l<sub>s</sub> are possible
- Screws with partial thread > 50 mm length with shank ribs
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $\begin{array}{c} ^{2)} \ 10mm \geq l_g \leq \! 18mm \triangleq \pm 1,\! 5mm \\ 18mm \geq l_g \leq 30mm \triangleq \pm 1,\! 7mm \end{array}$ 

fischer Power-Fast and Construction Screws	Annex A1 of European Technical Assessment
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Shank ribs<sup>1).</sup>

Power-Fast self-drilling screw - Raised countersunk head with full- or partial thread

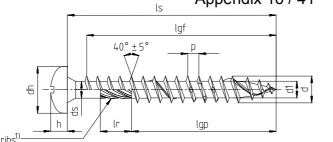
	Power-Fast self-drilling screw - Raised countersunk head with full- or partial thread  Carbon steel														ad		
■ Po	ssibl	e surface ti	eatments: y	yellow (	or blue	-zinc-p	lated, b	lue zinc	-plated	l≥12µr	n, bonu	s- zince	ed, buri	nished,	nickel-	/brass p	plated
N	Nominal diameter			3,	,0	3	,5	4,	,0	4,	,5	5,	,0	6,	,0		
1	O	uter diame	eter	3,	00	3,	50	4,	00	4,	50	5,	00	6,	00		
d	A	llow. devi	ation						±0	,30							
$d_1$	C	ore diame	ter	2,	00	2,	20	2,	50	2,	70	3,	00	4,	00		
uı		llow. devi					-0,25	'+0,10					±0	,20			
$d_h$		ead diame		6,	00	7,	00	,	00	9,		10	,00	12,	,00		
u <sub>h</sub>		llow. devi								'+0,10							
$d_{s}$		nank diam		2,	25	2,	60	2,		,	25	3,	60	4,	20		
		llow. devi								+0,10							
h		ead height			90		10	2,		,	70	,	00		40		
р		nread pitcl		1,	50	1,	80	2,	00		20	2,	50	3,00-	-4,50		
1		llow. devi						±10%									
$l_{r}^{1)}$		nank ribs l		3,	3,75 4,25			4,75 5,50			- ,	00	7,00				
•		llow. devi		±0,75			20			±1,00		20					
		Drive TX		10			20				20   25   30						
		Drive PZ	1		1 2 3 Standard thread length $  l_{gf} = Full thread   l_{gp} = Partial thread   Tolerance$										2)		
		ew length	l I <sub>s</sub>	5	standai	rd thre	ad leng	$gth \mid l_{gf}$	= Full	threac	$I \mid I_{gp} =$	Partial	thread	d   Tole	erance	$\pm 2,0$	<i>2)</i>
Nomi leng		min	max	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$	$l_{\mathrm{gf}}$	$l_{gp}$		
20		18,95	21,05	16		16		16		16							
25		23,75	26,25	21		21	18	20	18	20							
30		28,75	31,25	26	18	26	18	25	18	25	18	24					
35		33,50	36,50	31	24	31	24	30	24	30	24	29	24	28			
40		38,50	41,50	36	24	36	24	35	24	35	24	34	24	33	24		
45		43,50	46,50	41	30	41	30	40	30	40	30	39	30	38	30		
50		48,50	51,50			46	30	45	30	45	30	44	30	43	30		
55		53,50	56,50					50	36	50	36	49	36	48			
60		58,50	61,50						36		36		36	53	36	<u> </u>	
70		68,50	71,50						42		42		42	63	42	<u> </u>	
80	80 78,50 81,50							50		50		50	73	50			

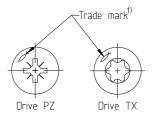
- Intermediate lengths at l<sub>s</sub> are possible
- Screws with partial thread > 50 mm length with shank ribs
- $\blacksquare \qquad \text{Threaded lengths between } 4 \times d \leq l_g \leq l_{gmax} \text{ are possible}$

2)	$10\text{mm} \ge l_g \le 18\text{mm} \triangleq \pm 1,5\text{mm}$
	$18mm \geq l_g \leq 30mm \triangleq \pm 1{,}7mm$

fischer Power-Fast and Construction Screws	Annex A2 of European Technical Assessment
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Shank ribs<sup>1).</sup>

optional

# Power-Fast self-drilling screw - Pan head with full- or partial thread

	Power-Fast self-drilling screw - Pan head with full- or partial thread  Carbon steel															
	on steel ble surface t	reatments:	yellow	or blue	zinc-pl	lated, b	lue zinc	-plated	l ≥12μn	n, bonu	s- zince	ed, burr	nished,	nickel-	/brass p	olated
Nom	inal dian	neter	3	,0	3	,5	4	,0	4.	,5	5,	,0	6	,0		
	Outer diam		3,	00	3,	50	4,	00	,	50	5,	00	6,	00		
I	Allow. devi									,30						
d	Core diame		2,	00		20		50	2,	70	3,	00	4,	00		
I	Allow. devi					-0,25	'+0,10	)				±0	,20			
d	Head diame		6,	00	7,	00		00		00	10	,00	12	,00		
I	Allow. devi				1				'+0,10		1		1			
	Shank diam		2,	25	2,	60		90	,	25	3,	60	4,	20		
	Allow. devi			20		<b>5</b> 0			+0,10			10		0.0		
	Head heigh			30		50		90		10		40		80		
10	Thread pite		1,	50	1,	80	2,	00		20	2,	50	3,00	-4,50		
- I		llow. deviation			255 1 425				0%	50		00	7	00		
	Shank ribs I Allow. devi		3,75 4,25 ±0,75				4,75 5,50				6,00 7,00 ±1,00					
	Drive TX			1	$\frac{\pm 0}{0}$	,/3		<u> </u>	0		20	25	30			
	Drive PZ			<u>1</u> 1	U		20				3					
S.	crew length	. 1		-	ed thro	ad land	~th   1		_	1   1   _	Dortio	throne	+ 2.0	2)		
	Tew length	1 1 <sub>S</sub>	r.	lanuai	u une	au ienş	gth $  l_{gf} = Full thread   l_{gp} =$			1 altia	uncac	1   1010	lance		_	
Nominal length	min	max	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$		
20	18,95	21,05	16		16		16		16							
25	23,75	26,25	21		21	18	20	18	20							
30	28,75	31,25	26	18	26	18	25	18	25	18	24					
35	33,50	36,50	31	24	31	24	30	24	30	24	29	24	28			
40	38,50	41,50		24	36	24	35	24	35	24	34	24	33	24		
45	43,50	46,50		30		30	40	30	40	30	39	30	38	30		
50	48,50	51,50				30	45	30	45	30	44	36	43	30		
55	53,50	56,50					50	36	50	36	49	36	48			
60	58,50	61,50						36		36		42	53	36		
70	68,50	71,50						42		42		50	63	42		
80	78,50	81,50						50		50		50	73	50		
90	88,25	91,75										60		60		
100	98,25	101,75										60		60		

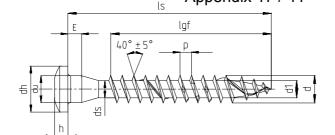
All sizes in mm

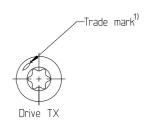
- Intermediate lengths at l<sub>s</sub> are possible
- Screws with partial thread > 50 mm length with shank ribs
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $\begin{array}{c} ^{2)} \ 10mm \geq l_g \leq \! 18mm \, \triangleq \pm 1,\! 5mm \\ 18mm \geq l_g \leq 30mm \, \triangleq \pm 1,\! 7mm \end{array}$ 

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 $^{1)}$  optional

Power-Fast self-drilling screw - Wood connector screw with full thread

	Powe	er-Fast s	en-ar	ınınş	g scre	ew - V	<u>vooa</u>	conn	ectoi	· scre	w wi	th Iui	i thre	aa																		
	rbon steel ssible surface	tua atua auta.		مداما سم	i	latad I		rimand 1	ند میاما	na mlati	.4 >12.																					
					zine-p	nated, i	Jonus-2	zincea,	blue Zi	пс-ртак	3a <u>∠1</u> 2µ	ıIII	1		Т																	
NO	minal dian			,0																												
d	Outer dian			00											<u> </u>																	
	Allow. dev									-0,30																					<u> </u>	
$d_1$	Core diam		3,	00																												
G <sub>1</sub>	Allow. dev	iation	±0	,20																												
$d_{\mathrm{u}}$	Underhead	diameter	5,	00																												
$\mathbf{u}_{\mathrm{u}}$	Allow. dev	iation	-0,	,35																												
al.	Head diam	eter	8,	25																												
$d_h$	Allow. dev	iation	±0	,40																												
E	Height		2,	50																												
	Allow. dev	iation	±0	,30																												
h	Head height		2,	60																												
	Thread pite	ch	2,	50																												
p	Allow. dev	iation	±1	0%																												
	Drive TX	-	20	25																												
	Screw lengt	h l <sub>s</sub>	Stan	dard th	read le	ength	$l_{gf} = F$	ull thre	ead   lo	<sub>p</sub> =Par	tial thr	ead   T	oleran	ice: ± 2	$2,0^{2)}$																	
Nomin	nal	400.037																														
lengt		max	$l_{\mathrm{gf}}$	$l_{gp}$																												
20	18,95	21,05	14																													
25	23,75	26,25	19																													
30	28,75	31,25	24												<u> </u>	<b>├</b>																
35	33,50	36,50	29												<u> </u>	<del>                                     </del>																
40	38,50	41,50	34												<u> </u>	+																
45	43,50	46,50	39												<u> </u>	+																
50	48,50	51,50	44												<del>                                     </del>	+																
55	53,50	56,50	49 54												<del>                                     </del>	$\vdash$																
60	58,50	61,50													<del>                                     </del>	$\vdash$																
70 80	68,50 78,50	71,50 81,50	64 74			-	-			-			-		<del>                                     </del>	$\vdash$																
80	78,30	01,30	/4											A 11 _:_	Щ_																	

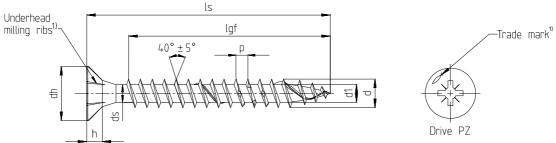
All sizes in mm

- Intermediate lengths at l<sub>s</sub> are possible
- $\blacksquare \qquad \text{Threaded lengths between } 4 \times d \leq l_g \leq l_{gmax} \text{ are possible}$

 $\begin{array}{c} ^{2)} \ 10mm \geq l_g \leq \! 18mm \triangleq \pm 1,\! 5mm \\ 18mm \geq l_g \leq \! 30mm \triangleq \pm 1,\! 7mm \end{array}$ 

	tischer Power-Fast and Construction Screws	Annex A4 of European Technical Assessment
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1) optional

Power-Fast self-drilling screw - Small countersunk head with full thread

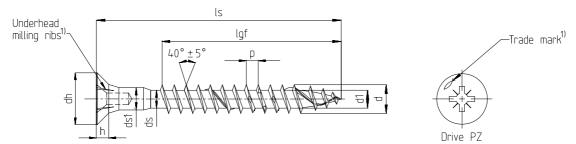
	rbon steel	treatments:		.,												
	minal dian		Ĭ	,0	_	,5		,0								
	Outer diameter		3,	00	3,	50	4,	00								
d	Allow. dev	iation			±0	,30										
	Core diame	eter	2,	00	2,	20	2,	50								
$d_1$	Allow. dev	iation			-0,25 /	+0,10	)									
1	Head diam	eter	5,	00	6,	00	7,	00								
d <sub>h</sub>	Allow. dev	iation	-0,50 / +0,10													
h	Head heigh	Head height		1,90 2,10		10	2,	50								
	Thread pito	Thread pitch		50	1,	80	2,	00								
p	Allow. dev	riation			±10%											
	Drive PZ			1		,	2									
	Screw length ls		Stand	dard th	read le	ength	$l_{gf} = F_1$	ull thre	ead   lg	,=Part	ial thr	ead   T	oleran	ce: ± 2	$2,0^{2)}$	
Nomin length	mın	max	$l_{ m gf}$	$l_{ m gp}$	$l_{ m gf}$	$l_{\mathrm{gp}}$	$l_{ m gf}$	$l_{\mathrm{gp}}$								
20	18,95	21,05	16		16		16									
25	23,75	26,25	21		21		20									
30	28,75	31,25	26													

- Intermediate lengths at ls are possible
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

2) $10 \text{mm} \ge l_g \le 18 \text{mm} \triangleq \pm 1,51$	nm
$18 \text{mm} \ge l_g \le 30 \text{mm} \triangleq \pm 1,71$	mm

tischer Power-Rast and Construction Screws	Annex A5 of European Technical Assessment
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Power-Fast self-drilling screw - Countersunk headhole screw with full thread

- C			st sen-u	1 11111115	Sort	- V	Jun	ici sui	1111	auno	ic sci		1011 10	uii tii	ıcau		
		steel	reatments:	hlue zin	c_nlate	d blue	zinc-n	lated >1	2um								
				4.	_		,5		•		Λ						
INC		nal diam							,0		,0						
d		uter diame		4,0	)()	4,	4,50 5,00			6,00							
		llow. devi				±0,30											
$d_1$		ore diame		2,5		2,		3,	00		00						
G <sub>1</sub>			w. deviation			+0,10				,20							
$d_{\rm h}$		ead diame		8,0	00	9,0			,00	12,	,00						
G <sub>II</sub>		llow. devi						+0,10		ı							
$d_{\rm s}$		ank diam		2,9	90	3,2		- )	60	4,3	30						
	Allow. deviation						,	+0,10		1							
h		ead height		2,5			70		00		80						
n		Thread pitch			00	2,2	20		50	3,00-	-4,50						
Р	Allow. deviation				$\pm 10\%$												
$d_{s1}$		Shank diameter		3,70 3,85			4,50 4,20										
usi	Allow. deviation							,10									
		Drive PZ				2	2			3	3						
	Scr	Screw length l <sub>s</sub>			Standard thread length   lgf = Full						1   1 <sub>gp</sub> =	Partial	thread	d   Tol	erance	$: \pm 2,0$	2)
Nomi	nal	min	max	1.	1	1.	1	1.	1	1.	1						
leng				$l_{ m gf}$	$l_{gp}$	$l_{ m gf}$	l <sub>gp</sub>	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$						
25		23,75	26,25	17,5													
27		25,75	28,25	19,5													
30		28,75	31,25	22,5		19											
35		33,50	36,50	27,5		24											
40		38,50	41,50	32,5		29		29									
45		43,50	46,50	37,5		34		34									
50		48,50	51,50	42,5		39		39		41							
55		53,50	56,50	47,5		44		44		46							
60		58,50	61,50	50,0		49		49		51							
70		68,50	71,50			59		60		60							
80		78,50	81,50			59		60		60							
90		88,25	91,75			59		60		60							
100	)	98,25	101,75					60		60					. 11 .		

All sizes in mm

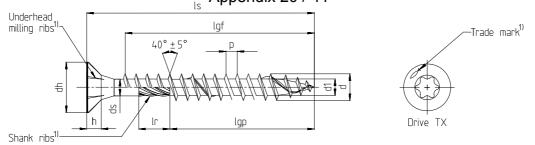
 $\begin{array}{c} ^{2)} \ 10mm \geq l_g \leq \! 18mm \triangleq \pm 1,\! 5mm \\ 18mm \geq l_g \leq \! 30mm \triangleq \pm 1,\! 7mm \end{array}$ 

tischer Power-Fast and Construction Screws	Annex A6 of European Technical Assessment
Sizes and Material	ETA-11/0027

<sup>■</sup> Intermediate lengths at l<sub>s</sub> are possible

 $<sup>\</sup>blacksquare \qquad \text{Threaded lengths between } 4 \times d \leq l_g \leq l_{gmax} \text{ are possible}$ 

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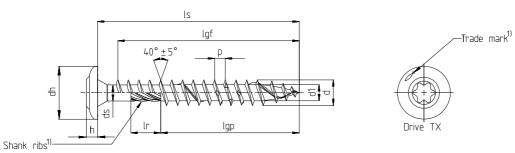
Power-Fast wood construction screw - Countersunk head with full- or partial thread

■ Ca	rbon steel												pure			
	ssible surface minal dia			or blue <b>,0</b>		ated, b. $0$		e-plated <b>).0</b>	l ≥12μn <b>12</b>	-	ıs-zince	d				
110	Outer dian			00		00		,00		,00					1	
d	Allow. dev		0,		,30	00		,00 .40		,00 ,50						
	Core diam		1	00		40		, -		60						
$d_1$	Allow. dev		٦,	00		,20	6,40			,30						
	Head diam		12	,00		, <u>40</u>	1 2	,40		,30 ,40						
d <sub>h</sub>				/+0.10	17		.40	,+0		,50						
	Allow. deviation Shank diameter		- )	30	5	90		10		30 30						
ds	Allow. dev		_ /	/+0,10	5,	90		,20	0,.	30						
h	Head heigh			80	5	10		10	7	20						
- 11	Thread pite		- /	-4,50	,	00	0,		50	20						
p	Allow. dev		5,00	т, ЭО	<u>0</u> ,		0%	/,-								
$\overline{}$	Shank ribs		Q	00		-1		,00								
l <sub>r</sub> 1)	Allow. dev		0,	00		-2.		,00								
	Drive T		3	0					5	0						
	Direc 12	·		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							-Dortio	l thron	d   Tal	larona	· + 2 0	١
NT.	. 1			Stanua	na uno	eau iei	ıgın   1 <sub>9</sub>	gf – Ful	i unea	iu   Igp-	-r ai ua	lunea	u   101	lerance	z. ⊥ ∠,∪ T	,
Nomin lengt	mın	max	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$						
60	58,50	61,50	50	36												
80	78,50	81,50	70	50	70	50		52								
90	88,25	91,75		60	80	50										
100	98,25	101,75		60	80	50		52		60						
120	118,25	121,75		70	100	75		80		80						
140	138,00	142,00		70		75		80		80						
160	158,00	162,00		70		75		80		80						
180		182,00		70		75		100		100						
200		202,00		70		100		100		100						
220	218,00	222,00		70		100		100		100					1	
240 260		242,00 262,00		70 70		100		100		120 120						
280		282,00		70		100		115		120						
300		302,00		70		100		115		120						
320	317,00	323,00		70		100		115		120						
330		333,00				100		115								
340	337,00	343,00				100		115								
350	347,00	353,00				100		110		145						
360		363,00				100		115		1.0						
380		383,00				100		115								
400		403,00														
450/50		_				100		115		145						
550/60										145					1	

- Intermediate lengths at l<sub>s</sub> are possible
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

fischer Power-Fast and Construction Screws	Annex A7 of European Technical Assessment
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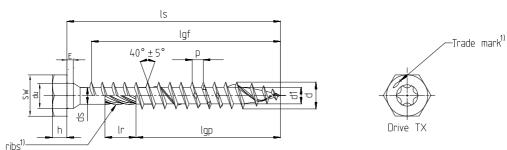
Power-Fast wood construction screw - Flange head with full- or partial thread

	arbon steel	ast wood						•					ı tıaı		<u></u>	
	ossible surface				zinc-p	olated, b					ıs-zince	d	ı			
N	ominal dia	meter	6	,0	8	3,0	10	0,0	12	2,0						
d	Outer diam	eter	6,	00	8.	,00	10	,00	12	,00						
u	Allow. dev				,30			,40		,50						
$d_1$	Core diame		4,	00	5.	,40	6,40		7,60							
u <sub>1</sub>	Allow. dev	iation			±0	,20			±0	,30						
$d_h$	Head diame		13	,70	21	,00		,70		,90						
G <sub>n</sub>	Allow. dev	iation		/+1,30		,00	-1,20/	+2,80	-1,40/	+2,60						
d.	d <sub>s</sub> Shank diameter			30	5,	,90		10		,30						
us	d <sub>s</sub> Allow. deviation		-0,30	/+0,10		±0	,20			,30						
h	Head height				50		5,	5,60 6,70 ±0,50								
	h Allow. deviation				,00											
p	Thread pitc		3,00	-4,50	6.	,00		7,	50							
Р	Allow. dev					±1										
$l_{r}^{1}$	Shank rib le		8,	00				,00								
-1	Allow. dev						,00									
	Drive TX			0			.0			50						
	Screw lengt	th l <sub>s</sub>	Stand	Standard thread length   $l_{gf}$ = Full thread   $l_{gp}$ =Partial thread   Tolerance:									rance:	± 2,0		
Nomin lengtl	mın	max	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$						
60	58,50	61,50	50	36												
80	78,50	81,50	70	50	70	50		52								
90	88,25	91,75		60	80	50										
100	98,25	101,75		60	80	50		52		60						
120	118,25	121,75		70	100	75		80		80						
140	138,00	142,00		70		75		80		80						
160		162,00		70		75		80		80						
180		182,00		70		75		100		100						
200		202,00		70		100				100						
220		222,00		70		100		100		100						
240		242,00		70		100		100		100						
260		262,00		70		100		100		100						
280		282,00		70		100		115		120						
300		302,00		70		100		115		120						
320		323,00				100		115								
330		333,00						115								
340		343,00				100		115								
350		353,00								145						
	in steps of 10															
	00 l <sub>s</sub> -3,00	l <sub>s</sub> +3,00				100		115								
	in steps of 50															
550-60	$l_{\rm s}$ -3,00	$l_s +3,00$								145					oc in m	

- Intermediate lengths at l<sub>s</sub> are possible
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

tischer Power-Fast and Construction Screws	Annex A8 of European Technical Assessment
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Shank ribs<sup>1).</sup>

1) optional Power-Fast wood construction screw - Hexagon head with full- or partial thread

	Power-Fast wood construction screw - Hexagon head with full- or partial thread															
	<ul> <li>Carbon steel</li> <li>Possible surface treatments: yellow or blue zinc-plated, blue zinc-plated ≥12µm, bonus-zinced</li> </ul>															
No	ominal diar	neter	6	,0	8	,0	10	),0	12	2,0						
d	Outer dian		6,	00	8,	00	10	,00	12	,00						
a	Allow. dev	iation		±0	,30		±0	,40		,50						
$d_1$	Core diame		4,	00		40	6,	40		60						
u <sub>1</sub>	Allow. dev					,20			±0,30							
$d_{\mathrm{u}}$	Underhead		6,	25		25		10,30		,40						
Gu	Allow. dev			-0, 90	80			,90		,00						
SW		Wrench size			12	,80		,80	16	,80						
5,,		Allow. deviation				$\pm 0,30$										
Е	Height		2,	00	2,	10		30	3,	30						
	Allow. dev						,50									
$d_{\rm s}$	Shank dian			30	5,	90		10	8,	30						
	Allow. dev			+0,10				,20	_							
h	Head heigh			00		50	5,	20		70						
	Allow. dev			,30		,40			,50 50							
р	Thread pite		3,00	-4,50	6,	00	00/	7,	50							
•	Allow. dev			0	00	±1	0%	1.2	00							
$1_{r}^{1)}$	1 <sub>r</sub> <sup>1)</sup> Shank rib length			8,	00		00	13	,00							
	Allow. deviation			0			00,00			· n						
	Drive TX								0				2)			
	Screw lengt	n Is	Stanc	lard thi	ead le	ngth   l	<sub>gf</sub> = Ful	l threa	d   l <sub>gp</sub> =	Partial	thread	Tole	rance:	$\pm 2,0^{2}$	,	
Nomin	min	max	$l_{\mathrm{gf}}$	l <sub>gp</sub>	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{gf}$	$l_{\rm gp}$	$l_{gf}$	$l_{gp}$						
lengt	th		Ŭ		-gı	*sp	1g1	-sp	1gi	*sp						
60	58,5	61,5	50	30												
80	78,5	81,5	70	50	70	50		52								
90	88,25	91,75		60	80	50										
100		101,75		60	80	50		52		60						
120		121,75		70	100	75 75		80 80		80				-		
140/16		1 <sub>s</sub> +2,00		70 70		75		100		80 100						
200/22		$l_s + 2,00$		70		100		100		100						
240/26		$l_s + 2,00$ $l_s + 2,00$		70		100		100		120						
280/30		$l_s + 2,00$ $l_s + 2,00$		70		100		115		120						
320		323,00		70		100		115		120						
330		333,00				100		115								
340		343,00				100		115								
350		353,00				100		110		145						
	$\frac{360}{380}$ $\frac{1_s - 3,00}{1_s + 3,00}$					100		115		1.0						
	in steps of 50mm								t	t						
400-50		$l_s + 3,00$				100		115		145						
550/60										145						

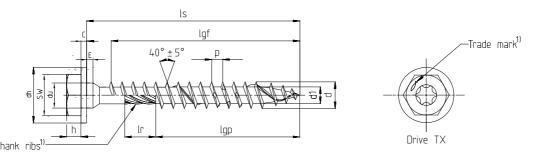
All sizes in mm

- Intermediate lengths at  $l_{\rm s}$  are possible
- Threaded lengths between  $4{\times}d \leq l_g \leq l_{gmax}$  are possible

 $^{2)}$  18mm  $\geq l_g \leq$  30mm  $\triangleq \pm 1{,}7mm$ 

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Power-Fast wood construction screw - Hexagon head with washer and full- or partial thread

Power-Fast wood construction screw - Hexagon head with washer and full- or partial thread																
	oon steel sible surface	treatments:	yellow	or blue	zinc-p	lated, b	olue zin	c-plate	d ≥12μ	m, bonı	ıs-zinc	ed				
Non	ninal dian	ieter	6	,0	8	,0	10	),0	12	2,0						
.1	Outer diame	ter	6,	00	8,	00	10	,00	12	,00						,
d	Allow. devia	ation		±0,	,30		±0	,40	±0	,50						
d	Core diamet		4,	00	5,	40	6,	40	7,	60						
	Allow. devia					,20				,30						
d,	Head diamet		15	,00		,00	21	,50		,40						
	Allow. devia			1,2			- 10		50	10						
d	Underhead of	6,	25		25		,30		,40							
	Allow. devia	0	-0,		90		,90		,00,							
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Wrench size Allow. devia	9,90 12,80 ±0,,					,80	10	,80							
	Washer heig		1	80	2	00		20	2	50						
	Washer herg Height	,111		00		10		30		30						
	Allow. devia	ation		00			,50	50	٥,	50						
	Shank diame		4,	30	5.	90		10	8,	30						
	Allow. devia		_	+0,10	,			,20								,
	Head height		4,	00	4,	50	5,	20	5,	70						
h	Allow. devia	ation	±0	,30	±0	,40		$\pm 0$	,50							
n	Thread pitch	3,00	-4,50	6,	00		7,	50								
	Allow. devia				±10	0%										
	Shank rib le	8,00					13	,00								
-1	Allow. deviation			•		-2,			ı _							
	Drive TX	1	30				0		50				2)			
	Screw length	ı l <sub>s</sub>	Standard thre		ead length   lgf=		Full th	read   l <sub>gr</sub>	=Partia	al threac	l   Tole	rance:	$\pm 2,0^{2}$	ı	1	
Nomina	mın	max	$l_{\mathrm{gf}}$	$l_{\rm gp}$	$l_{\rm gf}$	$l_{\rm gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\rm gf}$	$l_{gp}$						
length 60	58,50	61,50	50	30		-				-						+
80	78,50	81,50	70	50	70	50		52								+
90	88,25	91,75	70	60	80	50		32								+
100	98,25	101,75		60	80	50		52		60						
120	118,25	121,75		70	100	75		80		80						
140/160		$l_s + 2,00$		70		75		80		80						
180	178,00	182,00		70		75		100		100						
200/220	$l_{\rm s}$ $-2,00$	$l_s + 2,00$		70		100		100		100						
240/260		$l_s + 2,00$		70		100		100		120						
280/300		$l_s + 2,00$		70		100		115		120						
320	317,00	323,00				100		115								<b>↓</b>
330	327,00	333,00				100		115								+
340	337,00	343,00				100		115		1.4.7			1			<del>                                     </del>
350	347,00 353,00					100		115		145						+
360/380	$l_s = 3,00$ steps of 50r	l <sub>s</sub> +3,00				100		115					-			+-
400-500		$\frac{\text{nm}}{l_{\text{s}} + 3,00}$				100		115		145						+
550/600		$l_s + 3,00$ $l_s + 3,00$				100		113		145						+
220/000	$I_S = 3,00$	1s + 3,00				ļ	<u> </u>			177		<u> </u>	1		l	

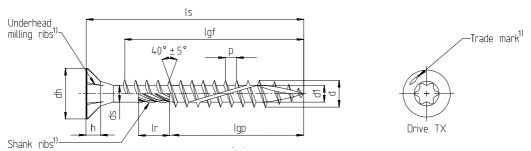
All sizes in mm

- Intermediate lengths at l<sub>s</sub> are possible
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $^{2)}~18mm \geq l_g \leq 30mm \triangleq \pm 1,7mm$ 

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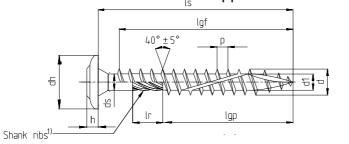
FCS wood construction screw - Countersunk head with full- or partial thread

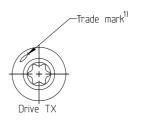
			constru	iction	scre	w - C	ount	ersui	ік пе	au w	ıııı ıu	11- 01	part	ıaı uı	reau		
	<ul> <li>Carbon steel</li> <li>Possible surface treatments: yellow or blue zinc-plated, blue zinc-plated ≥12μm, bonus-zinced</li> </ul>																
								lue zin	c-plate	a ≥12μ 	m, bon	us-zinc	ea			1	
INC		nal dian			,0		),0										
d		uter diame			00	10	,00										
u		llow. devi			,30		,40										
$d_1$		ore diame		5,	40		35										
uı	Allow. deviation			-0,30/+0,20													
$d_h$		ead diame		14	,40		,40										
$\mathbf{u}_{\mathrm{h}}$	A.	llow. devi	ation		±0	,40											
$d_s$	Sł	nank diam	eter	5,	90		10										
$\mathbf{u}_{\mathrm{s}}$		llow. devi			-0,30/+0,												
h	h Head height		6,00	-7,00	7,50	-8,50											
n		Thread pitch			20		60										
p		llow. devi			±1	0%											
$1_{r}^{1}$		nank rib le			13	,0											
ır '		llow. devi				00											
		Drive TX			4	0											
	Sci	rew lengtl	ı l <sub>s</sub>	Stand	dard th	read le	ength	l <sub>gf</sub> = Fi	ull thre	ead   lg	p=Part	tial thr	ead   T	oleran'	ce: ± 2	,0	
Nomir lengt		min	max	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$										
80		78,50	81,50	70	50		52										
90		88,25	91,75	80	50		52										
100	)	98,25	101,75	80	50		52										
110	)	108,25	111,75	100	75		80										
120	)	118,25	121,75		75		80										
	in st	teps of 10	mm														
130-4						80											

- Intermediate lengths at l<sub>s</sub> are possible
- $\blacksquare \qquad \text{Threaded lengths between } 4 \times d \leq l_g \leq l_{gmax} \text{ are possible}$

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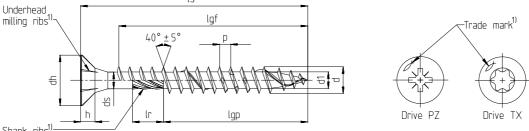
FCS wood construction screw - Flange head with partial thread

Carbon steel			1,	CS WOO	u con	su uc	tion (	SCIEN	- I la	nge	iicau	WILII	paru	iai iii	cau			
$ \begin{array}{ c c c c c c c } \hline \textbf{Nominal diameter} & \textbf{8,0} & \textbf{10,0} & & & & & & \\ \hline \textbf{d} & Outer diameter & \textbf{8,00} & 10,00 & & & & & \\ \hline \textbf{Allow. deviation} & -0.40/+0.30 & \pm 0.40 & & & & & \\ \hline \textbf{d}_1 & Core diameter & \textbf{5,40} & \textbf{6,35} & & & & & \\ \hline \textbf{Allow. deviation} & \pm 0.30 & & & & & \\ \hline \textbf{d}_h & Head diameter & 21,00 & 24,70 & & & & \\ \hline \textbf{Allow. deviation} & \pm 1.00 & -1.20/+2.80 & & & & \\ \hline \textbf{d}_s & Shank diameter & \textbf{5,90} & \textbf{7,10} & & & & \\ \hline \textbf{Shank diameter} & \textbf{5,90} & \textbf{7,10} & & & & \\ \hline \textbf{Allow. deviation} & -0.30/+0.20 & & & & & \\ \hline \textbf{Head height} & \textbf{2,50-4,50} & \textbf{3,70-5,70} & & & & \\ \hline \textbf{Thread pitch} & \textbf{5,20} & \textbf{5,60} & & & \\ \hline \textbf{Allow. deviation} & \pm 1.0\% & & & & \\ \hline \textbf{Shank rib length} & \textbf{12,00} & & & & \\ \hline \textbf{Allow. deviation} & \pm 1.00 & & & & \\ \hline \textbf{Screw length l}_s & \textbf{Standard thread length} & \textbf{l}_{gr} = \textbf{Full thread} & \textbf{l}_{gp} = \textbf{Partial thread} & \textbf{Tolerance:} \pm 2.0 \\ \hline \textbf{Nominal length} & min & max & \textbf{l}_{gf} & \textbf{l}_{gp} & \textbf{l}_{gf} & \textbf{l}_{gp} \\ \hline \textbf{80} & \textbf{78,50} & \textbf{81,50} & \textbf{70} & \textbf{50} & \textbf{52} \\ \hline \textbf{90} & \textbf{88,25} & \textbf{91,75} & \textbf{80} & \textbf{50} & \textbf{52} \\ \hline \textbf{100} & \textbf{98,25} & \textbf{101,75} & \textbf{80} & \textbf{50} & \textbf{52} \\ \hline \textbf{101} & \textbf{108,25} & \textbf{111,75} & \textbf{100} & \textbf{75} & \textbf{80} \\ \hline \textbf{in steps pf 10mm} & \textbf{in in steps pf 10mm} \\ \hline \end{array}$																		
$\begin{array}{ c c c c c c }\hline d & Outer diameter & 8,00 & 10,00 & & & & & \\ Allow. deviation & -0,40/+0,30 & \pm0,40 & & & & \\ \hline d_1 & Core diameter & 5,40 & 6,35 & & & & \\ Allow. deviation & \pm0,30 & & & & \\ \hline d_h & Head diameter & 21,00 & 24,70 & & & & \\ Allow. deviation & \pm1,00 & -1,20/+2,80 & & & & \\ \hline d_s & Shank diameter & 5,90 & 7,10 & & & \\ Shank diameter & 5,90 & 7,10 & & & \\ Allow. deviation & -0,30/+0,20 & & & & \\ \hline h & Head height & 2,50-4,50 & 3,70-5,70 & & & \\ \hline p & Thread pitch & 5,20 & 5,60 & & & \\ \hline Allow. deviation & \pm10\% & & & \\ \hline l_r^{11} & Shank rib length & 12,00 & & & \\ \hline Nominal & min & max & l_{gf} & l_{gp} & l_{gf} & l_{gp} & Partial thread   Tolerance: \pm2,0 \\ \hline \hline Nominal & min & max & l_{gf} & l_{gp} & l_{gf} & l_{gp} \\ \hline 80 & 78,50 & 81,50 & 70 & 50 & 52 & & & \\ \hline 90 & 88,25 & 91,75 & 80 & 50 & 52 & & & \\ \hline 100 & 98,25 & 101,75 & 80 & 50 & 52 & & & \\ \hline 110 & 108,25 & 111,75 & 100 & 75 & 80 & & \\ \hline in steps pf 10mm & & & & & \\ \hline \end{array}$					r e				olue zinc	e-plate	d ≥12μ	m			1		Т	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	No	omina	al diam	ieter	8	,0	10	),0										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	a	Oute	er diame	eter	8,	00	10	,00										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	a	Allo	w. devi	ation	-0,40	+0,30	±0	,40										
$\begin{array}{ c c c c c }\hline Allow. deviation & \pm 0,30 & & & & \\\hline d_h & Head diameter & 21,00 & 24,70 & & & \\\hline Allow. deviation & \pm 1,00 & -1,20/+2,80 & & & \\\hline d_s & Shank diameter & 5,90 & 7,10 & & & \\\hline Allow. deviation & -0,30/+0,20 & & & & \\\hline h & Head height & 2,50-4,50 & 3,70-5,70 & & & \\\hline p & Thread pitch & 5,20 & 5,60 & & & \\\hline Allow. deviation & \pm 10\% & & & & \\\hline l_r^1) & Shank rib length & 12,00 & & & & \\\hline & Allow. deviation & \pm 1,00 & & & \\\hline & Drive TX & 40 & & & \\\hline & Screw length l_s & Standard thread length   l_{gf} = Full thread   l_{gp} = Partial thread   Tolerance: \pm 2,0 \\\hline Nominal length & min & max & l_{gf} & l_{gp} & l_{gf} & l_{gp} \\\hline & 80 & 78,50 & 81,50 & 70 & 50 & 52 & & & \\\hline & 90 & 88,25 & 91,75 & 80 & 50 & 52 & & & \\\hline & 100 & 98,25 & 101,75 & 80 & 50 & 52 & & & \\\hline & 110 & 108,25 & 111,75 & 100 & 75 & 80 \\\hline & in steps pf 10mm & & & & & \\\hline \end{array}$	d.	d		ter	5,	40	6,	35										
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\mathbf{u}_1$	Allo	w. devi	ation		$\pm 0$	,30											
$ \frac{\text{Allow. deviation}}{\text{ds}} = \frac{\pm 1,00}{\text{Shank diameter}} = \frac{5,90}{5,90} = \frac{7,10}{7,10} = \frac{7,10}{\text{Allow. deviation}} = \frac{5,90}{1,10} = \frac{7,10}{1,10} = \frac{7,10}{1,100} = \frac{7,100}{1,100} =$	d.	Hea	Head diameter			,00	24	,70										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	u <sub>h</sub>	Allo	w. devi	ation	±1	,00	-1,20/	/+2,80										
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	d	Shar	nk diam	eter	5,	90	7,	10										
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\mathbf{u}_{\mathrm{s}}$																	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	h																	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	n																	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Р																	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1.1)				·													
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	11			ation		±1,		,00										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Dı	rive TX			4	0											
length         min         max         lgf         lg         lg         lg         lg         lg         lg		Screv	w length	$1_{\rm s}$	Stand	dard th	read le	ength	$l_{gf} = Fu$	ll thre	ad   lg	<sub>p</sub> =Part	ial thr	ead   T	oleran	ice: ± 2	2,0	
80     78,50     81,50     70     50     52       90     88,25     91,75     80     50     52       100     98,25     101,75     80     50     52       110     108,25     111,75     100     75     80       120     118,25     121,75     75     80       in steps pf 10mm     100     100     100	min max les					$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$										
100     98,25     101,75     80     50     52       110     108,25     111,75     100     75     80       120     118,25     121,75     75     80       in steps pf 10mm     0     0	80			81,50	70	50		52										
110     108,25     111,75     100     75     80       120     118,25     121,75     75     80       in steps pf 10mm     0     0	90		88,25	91,75	80	50		52										
120 118,25 121,75 75 80 in steps pf 10mm	100	) !	98,25	101,75	80	50		52										
in steps pf 10mm	110	) 1	108,25	111,75	100	75		80										
	120	) 1	118,25	121,75		75		80										
130-400   1 -2 00   1 +2 00     75     80		in steps pf 10r		nm														
150 700 18 2500 18 2500 10 15	130-4	$130-400$ $1_s-2,00$ $1_s+2,00$				75		80										

- Intermediate lengths at l<sub>s</sub> are possible
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

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Shank ribs<sup>1)</sup>optional

# Power-Fast self-drilling screw - Countersunk head with full- or partial thread

Stainless steel																
No	minal diam	eter	3	,0	3	,5	4.	,0	4.	,5	5.	,0	6	,0		
,	Outer diame	eter	3,	00	3,	50	4,	00	4,	50	5,	00	6,00			
d	Allow. devi	ation						±0	,30							,
ı	Core diamet	er	2,	00	2,	20	2,	50	2,	70	3,	00	4,	00		
$\mathbf{d}_1$	Allow. devi	ation				-0,25 /	+0,10					±0	,20			
d <sub>h</sub>	Head diame		6,	00	7,	00						,00	12	,00		
u <sub>h</sub>	Allow. devi								'+0,10							
$d_{s}$	Shank diam		2,	25	2,	60	,	90	,	25	3,60 4,30					
	Allow. devi								+0,10							
h	Head height			90		10		50		70		00		80		
p	Thread pitch		1,	50	1,	80	2,	00		20	2,	50	3,00	-4,50		
Р	Allow. devi								0%							
1 <sub>r</sub> 1)	Shank rib le		3,	75		<u> 25</u>	4,	75	5,	50		00	7,	00		
<u> </u>	Allow. devi			1		,75	ı					,00	1 2	0		
	Drive TX				0				0		20   25   30   3					
	Drive PZ			1											2)	
	Screw length	ı l <sub>s</sub>	Stand	Standard thread length   $l_{gf}$ = Full- thread   $l_{gp}$ =Partial thread   Tolerance: $\pm 2$												
Nomin	mın	max	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$		
lengt	n		Ŭ	-gp	Ŭ	-gp		-gp		-gp	-gı	-gp	-gı	-gp		<u> </u>
20	18,95	21,05	16		16	10	16	10	16							-
25	23,75	26,25	21	1.0	21	18	20	18	20	1.0	2.4					
30	28,75	31,25	26	18	26	18	25	18	25	18	24	24	20			
40	33,50 38,50	36,50 41,50	31	24 24	31	24 24	30 35	24 24	30	24 24	29 34	24 24	28 33	24		
45	43,50	46,50	41	30	41	30	40	30	40	30	39	30	38	30		1
50	48,50	51,50	41	30	46	30	45	30	45	30	44	30	43	30		1
55	53,50	56,50			70	30	50	36	50	36	49	36	48	30		
60	58,50	61,50					50	36	50	36	コノ	36	53	36		
70	68,50	71,50						42		42		42	63	42		1
80	78,50	81,50						50		50		50	73	50		
90	88,25	91,75										60	, ,	60		
100	98,25	101,75										60		60		
110		111,75										70		70		
120		121,75										70	İ	70		
iı	n steps of 10r	nm														
	$l_{\rm s} - 2,00$													70		

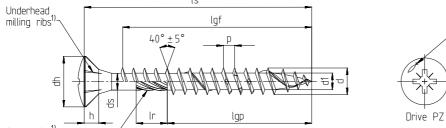
All sizes in mm

- Intermediate lengths at l<sub>s</sub> are possible
- Screws with partial thread > 50 mm length with shank ribs
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $\begin{array}{c} ^{2)} \ 10mm \geq l_g \leq \! 18mm \, \triangleq \pm 1,\! 5mm \\ 18mm \geq l_g \leq 30mm \, \triangleq \pm 1,\! 7mm \end{array}$ 

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Shank ribs<sup>1).</sup>

optional

Power-Fast self-drilling screw - Raised countersunk head with full- or partial thread

Stainless steel     Stainless steel																	
									0			T -	0		•		
No		nal dian			,0		,5		,0		,5	5,			,0		
d		uter diame		3,	00	3,	50	4,	00	4,	50	5,0	00	6,	00		
ŭ	A	llow. devi	ation						$\pm 0$	),30							
$d_1$	Co	ore diame	ter	2,	00	2,	20	2,50		2,	70	3,0	00	4,	00		
$\mathbf{u}_1$	Allow. deviation						-0,25	+0,10					$\pm 0$	,20			
	Н	ead diame	ter	6,	00	7,	00	8,	00	9,	00	10,	,00	12	,00		
$d_h$	d <sub>h</sub> Allow. deviation					ı			-0,50	/+0,10		ı					
	Sh	nank diam	2,	25	2,	60	2,	90	3,	25	3,0	60	4,	30			
$d_s$	A	llow. devi	ation							+0,10							
h		ead height		1.	90	2	10		50		70	3.0	00	3.	80		
		read pitcl			50		80		00		20	2,			-4,50		
p	p Allow. deviation		-,						0%								
		Shank ribs length			75	4	25	4	75	5,50		6,00		7,00			
$l_r^{1)}$		Allow. deviation			13		,75	т,	13	٠,٠			,00	/,	00		
		Drive TX			1	$\frac{\pm 0}{0}$	,73		2	0		20	25	2	0		
		Drive PZ				l I						20	23				
			1		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$											02)	
NT '	_	rew length	l I <sub>s</sub>	Stand	dard th	read le	ength	Igf= Fi	all thre	ad   I <sub>gr</sub>	,=Part	ial thre	ead   To	oleran	ce: ± 2	,0 <sup>2)</sup>	Т
Nomir lengt		min	max	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$		
20		18,95	21,05	16		16		16		16							
25		23,75	26,25	21		21	18	21	18	20							
30		28,75	31,25	26	18	26	18	26	18	25	18	24		•			
35		33,50	36,50	31	24	31	24	31	24	30	24	29	24	28			
40		38,50	41,50		24	36	24	36	24	35	24	34	24	33			-
45 50		43,50	46,50		30		30	41	30	40	30	39 44	30	38 43			1
55		48,50 53,50	51,50 56,50				30	40	36	43	36	44	36	43			1
60		58,50	61,50						36		36		36	53			<del>                                     </del>
70		68,50	71,50						42		42		42	63			†
80		78,50	81,50						50		50		50	73			<b>†</b>

All sizes in mm

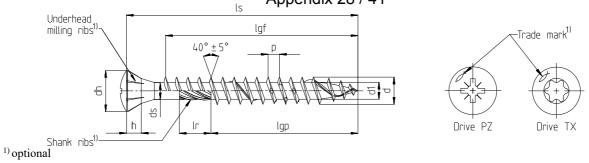
- Intermediate lengths at l<sub>s</sub> are possible
- Screws with partial thread > 50 mm length with shank ribs
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $\begin{array}{cc} ^{2)} & 10mm \geq l_g \leq \! 18mm \triangleq \pm 1,\! 5mm \\ & 18mm \geq l_g \leq 30mm \triangleq \pm 1,\! 7mm \end{array}$ 

-Trade mark<sup>1)</sup>

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Power-Fast self-drilling screw – Facade screw with full- or partial thread

	rower-	Fast sell	-urn	inig s	crew	– гас	caue	screw	WILL	ı ıuıı-	or pa	ırtıa	ı tiire	au		
<ul><li>Stain</li></ul>	less steel															
Nom	inal dian	neter	4	,0	4	,5	5	,0								
, C	uter diam	eter	4,	4,00 4,50		5,00										
$\frac{d}{A}$	llow. devi	iation	±0,30			,30										
. C	Core diameter		2,50			2,70		3,00								
$d_1$	llow. devi	iation		-0,25 /				,20								
	lead diame		6.	6,90		90		80								
dı —	llow. devi		,	,, ,	,	,50	, ,									
	hank diam		2	.90		25	3	60								
d —	llow. devi		۷,			'+0,10		00								
	lead heigh		2	50		70		00					1			
n	hread pitc		Ζ,	,00		20	۷,	50					-			
	llow. devi					0%		0.0								
1)		nank ribs length		,75	5,	50		00					1			
A	llow. devi		±0	),75		±1	,00									
Drive TX				2			20	25								
	Drive PZ				2	2										
Sc	rew lengtl	ı l <sub>s</sub>	Standard thread length				$l_{gf} = F_1$	ull thre	ad   lg	=Part	ial thre	ad   T	oleran	ce: ± 2	$,0^{2)}$	
Nominal length	min	max	$l_{\mathrm{gf}}$	$l_{\rm gp}$	$l_{\mathrm{gf}}$	$l_{\mathrm{gp}}$	$l_{\mathrm{gf}}$	$l_{\rm gp}$								
20	18,95	21,05	16		16											
25	23,75	26,25	21	18	20											
30	28,75	31,25	26	18	25	18	24									
35	33,50	36,50	31	24	30	24	29	24								
40	38,50	41,50	36	24	35	24	34	24								
45	43,50	46,50	41	30	40	30	39	30								
50	48,50	51,50	46	30	45	30	44	30								
55	53,50	56,50		36		36		36								
60	58,50	61,50		36		36		36								
70	68,50	71,50		42		42		42								
80	78,50	81,50		50		50		50								
90	88,25	91,75						60								
100	98,25	101,75						60								
110	108,25	111,75						70								
120	118,25	121,75						70								

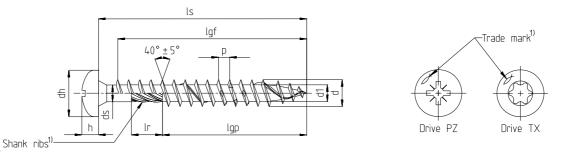
All sizes in mm

- Intermediate lengths at ls are possible
- Screws with partial thread > 50 mm length with shank ribs
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $\begin{array}{c} ^{2)} \ 10mm \geq l_g \leq \! 18mm \, \triangleq \pm 1,\! 5mm \\ 18mm \geq l_g \leq 30mm \, \triangleq \pm 1,\! 7mm \end{array}$ 

fischer Power-Fast and Construction Screws	Annex A15 of European Technical Assessment
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1) optional

Power-Fast self-drilling screw - Pan head with full- or partial thread

	1000	r-rast s	cii di	11111118	sere	W - I	an ne	au w	itii iu	111- 01	part	iai tii	ıı cau			
■ St	ainless steel															
No	ominal diar	neter	3	,0	3	,5	4	,0	4.	,5	5	,0	6	,0		
d	Outer diam	eter	3,	00	3,	50	4,	00	4,	50	5,	00	6,	00		
u	Allow. dev							±0	,30							
$d_1$	Core diame		2,00 2,20		20	2,50 2,70			3,00		4,	4,00				
uı	Allow. deviation						+0,10						,20			
$d_{\rm h}$	Head diam	eter	6,	00	7,	00		00		00	10	,00	12	,00		
$\mathbf{u}_{\mathrm{h}}$	Allow. dev	iation						-0,50 /	'+0,10	)						
$d_{\rm s}$	Shank dian	neter	2,	25	2,	60	2,	90	3,	25	3,	60	4,	30		
$\mathbf{u}_{\mathrm{s}}$	Allow. dev	iation						-0,30 /	'+0,10	)						
h	Head heigh	t	2,	30	2,	50	2,	90	3,	10	3,	40	3,	80		
n	Thread pitc		1,	50	1,	80	2,	00	2,	20	2,	50	3,00	-4,50		
р	Allow. dev	iation						±10	0%							
$l_{r}^{1)}$	Shank ribs length		3,	75	4,25		4,	75 5,50		6,00		7,00				
ır	Allow. deviation				±0	,75					±1	,00				
	Drive TX			1	0			2	0		20	25	3	0		
	Drive PZ			1 2 3								3		ĺ		
	Screw lengt	h l <sub>s</sub>	Stan	Standard thread length   $l_{gf}$ = Full thread   $l_{gp}$ =Partial thread   Tolerance: $\pm$ 2,										$,0^{2)}$		
Nomi	mın	max	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$		
leng 20	18,95	21,05	16	01	16		16	<i>S</i> 1	-	- 51		01		01		
25	23,75	26,25	21		21	18	20	18	20							
30	28,75	31,25	26	18	26	18	25	18	25	18	24					
35	33,50	36,50	31	24	31	24	30	24	30	24	29	24	28			
40	38,50	41,50		24	36	24	35	24	35	24	34	24	33	24		
45	43,50	46,50		30		30	40	30	40	30	39	30	38	30		
50	48,50	51,50				30	45	30	45	30	44	36	43	30		
55	53,50	56,50					50	36	50	36	49	36	48			
60	58,50	61,50						36		36		42	53	36		
70	68,50	71,50						42		42		50	63	42		
80	78,50	81,50						50		50		50	73	50		
90	88,25	91,75										60		60		<del>                                     </del>
100	98,25	101,75										60		60		

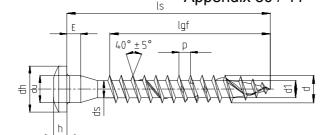
All sizes in mm

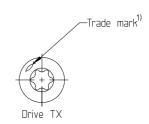
- Intermediate lengths at l<sub>s</sub> are possible
- Screws with partial thread > 50 mm length with shank ribs
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $\begin{array}{cc} ^{2)} & 10mm \geq l_g \leq \! 18mm \triangleq \pm 1,\! 5mm \\ & 18mm \geq l_g \leq \! 30mm \triangleq \pm 1,\! 7mm \end{array}$ 

fischer Power-Fast and Construction Screws	Annex A16 of European Technical Assessment
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 $^{1)}$  optional

Power-Fast self-drilling screw - Wood connector screw with full thread

■ Ct.	Stainless steel  Stainless steel															
					ı											
No	ominal dia		5,	,0												
d	Outer dian	neter	5,	00												
u	Allow. dev		-0,	,30												
$d_1$	Core diameter			3,00												
uı	Allow. dev		±0,	,20												
$d_n$	Underhead			00												
G <sub>U</sub>	Allow. dev			,35												
$d_{\rm h}$	Head diam			25												
u <sub>n</sub>	Allow. dev	riation		,40												
Е	Height			50												
	Allow. dev			,30												
h	Head heigh			60												
р	Thread pitch			50												
Р	Allow. deviation			0%												
	Drive TX	<u> </u>	20	25												
	Screw length	th l <sub>s</sub>	Stand	dard th	read le	ength	$l_{gf} = F$	ull thr	ead $  l_{gl}$	p =Part	ial thr	ead   T	oleran	ce: ± 2	$1,0^{2)}$	
Nomin lengt	mın	max	$l_{\mathrm{gf}}$	$l_{gp}$												
20	18,95	21,05	14													
25	23,75	26,25	19													
30	28,75	31,25	24													
35	33,50	36,50	29													
40	38,50	41,50	34													
45	43,50	46,50	39													
50	48,50	51,50	44													
55	53,50	56,50	49													
60	58,50	61,50	54													
70	68,50	71,50	64													
80	78,50	81,50	74													

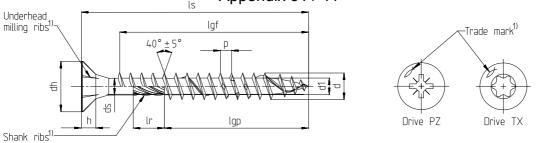
All sizes in mm

- Intermediate lengths at l<sub>s</sub> are possible
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

 $\begin{array}{c} ^{2)} \ 10mm \geq l_g \leq \! 18mm \triangleq \pm 1,\! 5mm \\ 18mm \geq l_g \leq \! 30mm \triangleq \pm 1,\! 7mm \end{array}$ 

fischer Power-Fast and Construction Screws	Annex A17 of European Technical Assessment
Sizes and Material	ETA-11/0027

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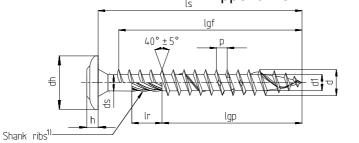
Power-Fast wood construction screw - Countersunk head with full- or partial thread

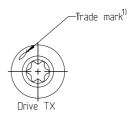
■ Stainl	ess steel															
Nomi	nal diam	eter	6	,0	8	,0										
d C	Outer diam	eter	6,	00	8,00											
a A	Allow. dev	iation		±0,30												
d <sub>1</sub>	Core diameter 4,00 5,40															
$a_1$	Allow. dev	iation		$\pm 0$	,20											
<sub>d</sub> F	Iead diam	eter	12	,00	14	,40										
$d_h = \frac{1}{A}$	Allow. dev	iation	-0,50	+0,10	±0	,40										
4	hank dian		4,	30	5,	90										
$u_s$	Allow. dev	iation	-0,30	/+0,10	±0	,20										
	Iead heigh		,	80	,	10										
	hread pito		3,00-	-	,	00										
	Allow. dev			±1												
	hank rib l		7,	00		,00										
Allow. deviation			,00		,00											
Drive TX			0	4	10											
	Drive PZ			3		-										
Sc	rew length	ı l <sub>s</sub>	Stan	dard th	read le	ength	$l_{\rm gf} = F_1$	ull thre	ead   lg	,=Part	al thr	ead   T	oleran	ice: ± 2	2,0	
Nominal	min	max	$l_{\mathrm{gf}}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$										
length			- T	0.	-gı	-gp										
60	58,50	61,50	50	36												
80	78,50	81,50	70	50	70	50								-		
90	88,25	91,75		60	80	50								-		
100	98,25	101,75		60	80	50										
120	118,25	121,75		70	100	75								1		
140	138,00	142,00		70		75								1		
160	158,00	162,00		70		75								1		
180	178,00	182,00		70		75								-		-
in steps of 20mm $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		100								-		-				
$\frac{100-300 \mid l_s - 2,00 \mid l_s + 2,00 \mid}{\text{in steps of 20mm}}$		/0		100								-		-		
	$l_s = 3,00$					100								+		+
ZU-JUU	$1_{s} - 3,00$	$I_s \pm 3,00$				100										<u> </u>

- Intermediate lengths at l<sub>s</sub> are possible
- Screws with partial thread > 50 mm length with shank ribs
- Threaded lengths between  $4 \times d \le l_g \le l_{gmax}$  are possible

fischer Power-Fast and Construction Screws	Annex A18 of European Technical Assessment
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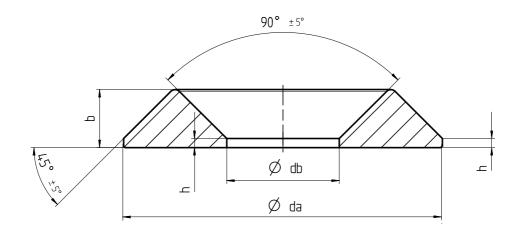
# Power-Fast wood construction screw - Flange head with full- or partial thread

	1 over-rast wood construction serew - Frange nead with run- of partial thread															
■ Stain	less steel															
Nor	ninal dia	meter	6	,0	8	,0										
d	Outer diam	eter	6,	00	8,	00										
a A	Allow. dev	iation		$\pm 0$												
d	Core diameter 4,00 5,40															
1	Allow. dev			-0,30/												
d,	Head diam			,70		,00										
1	Allow. dev			+1,30		,00										
_	Shank dian		4,	30		90										
- 1	Allow. dev				+0,10											
h —	Head heigh			3,												
1	Allow. dev				,00											
10	Thread pite		3,00	-4,50	6,00											
1	Allow. deviation ±10%															
11)	Shank rib length         8,00         13,00															
1 1	Allow. deviation			-2,												
	Drive TX			0		0									<u> </u>	
	crew length	ı l <sub>s</sub>	Standard thread length			$l_{gf} = F_1$	all thre	ead   lg	<sub>p</sub> =Part	ial thre	ead   T	oleran	ce: ± 2	.,0		
Nominal	min	max	$l_{gf}$	$l_{gp}$	$l_{\mathrm{gf}}$	$l_{gp}$										
length					-gı	-gp										
60	58,50	61,50	50	36												
80	78,50	81,50	70	50	70	50										
90	88,25	91,75		60	80	50										
100	98,25	101,75		60	80	50										
120	118,25	121,75		70	100	75										
140	138,00	142,00		70		75										
160	158,00	162,00		70		75										
180	178,00	182,00		70		75										
	in steps of 20mm		100													
	$\frac{100-300}{100-300} = \frac{1}{100} = \frac{100}{100} = \frac{100}{1$		100													
	in steps of 20mm				100									-		
320-300	$320-500 \mid l_s -3,00 \mid l_s +3,00$					100										

- Intermediate lengths at l<sub>s</sub> are possible
- $\blacksquare \qquad \text{Threaded lengths between } 4\dot{\times}d \leq l_g \leq l_{gmax} \text{ are possible}$

fischer Power-Fast and Construction Screws	Annex A19 of European Technical Assessment
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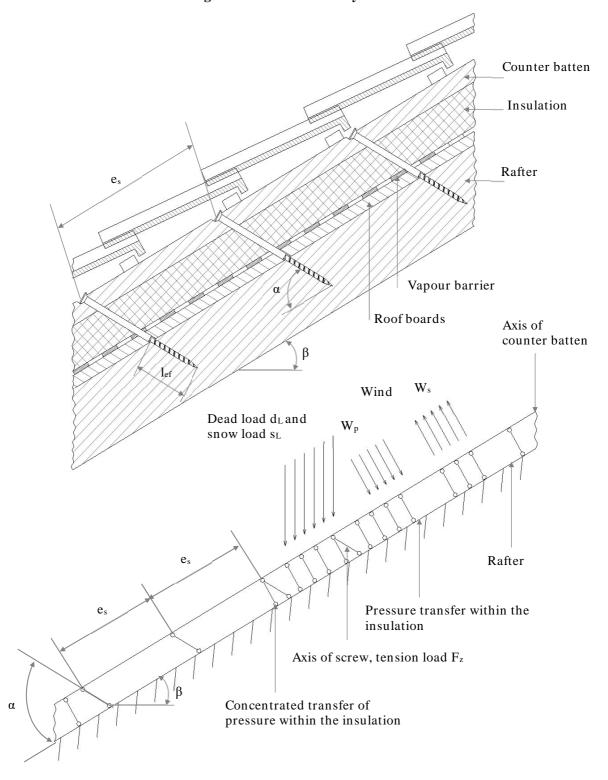


# Washer for Power-Fast and construction screws

	<ul> <li>Carbon Steel - possible surface treatments: yellow or blue zinc-plated, bonus- zinced, ≥12μm blue zinc-plated</li> <li>Stainless steel</li> </ul>								
N	lominal diameter		Tyj	pe 1		Type 2			
	Size	6	8	10	12	6	8	10	
J1.	Inner diameter	6,70	8,70	11,20	6,70	6,70	8,70	11,20	
db	Allow. deviation								
1.	Outer diameter	21	30	35	43	21	25,50	30,50	
da	Allow. deviation				±2,0				
1.	Height	4,70	5,20	6,20	8,30	4,70	5,20	6,20	
b	Allow. deviation				-0,40				
1.	Height	1,50	1,80	2,00	2,20	1,50	1,80	2,00	
h	Allow. deviation				-0,15				

tischer Power-Hast and Construction Screws	Annex A20 of European Technical Assessment
Accessories	ETA-11/0027

# Appendix 34 / 41 Annex B1 Fixing of on-roof insulation system



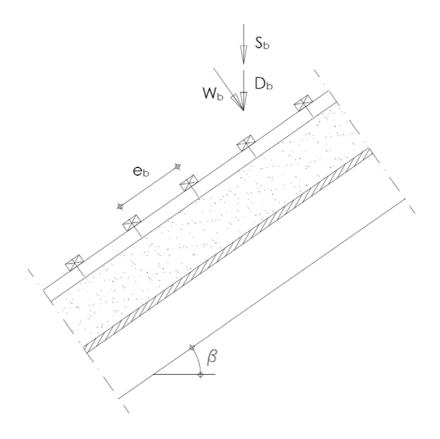
 $W_S = Wind suction W_P = Wind pressure$ 

 $e_s$  = Spacing of screws  $l_{ef}$  = Thread part part of screw in rafter

 $\beta$  = Roof inclination  $\alpha$  = Angle between axis of screw and axis of rafter

fischer Power-Bast and Construction Screws	Annex B1 of European Technical Assessment		
Accessories	ETA-11/0027		

# 



$$\begin{split} D_b &= d \cdot e_b \cdot e_r \\ S_b &= s \cdot e_b \cdot e_r \cdot \cos \beta \\ W_b &= w_p \cdot e_b \cdot e_r \\ F_b &= W_b + (D_b + S_b) \cdot \cos \beta \end{split}$$

where

 $D_b = point load by dead load$ 

 $S_b = point load by snow load$ 

W<sub>b</sub> = point load perpendicular to the batten by wind load (pressure)

 $e_b = distance$  of the battens

 $e_r$  = distance of the rafters

 $s = snow \ load \ per \ m^2 \ ground \ area$ 

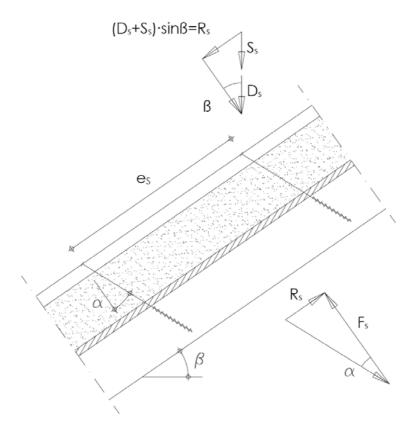
 $w_p$  = wind pressure on the roof area

 $d = dead load per m^2 roof area$ 

 $\beta$  = roof angle

tischer Power-Bast and Construction Screws	Annex B2 of European Technical Assessment		
Accessories	ETA-11/0027		

# Point loads $F_s$ perpendicular to the battens by screws



$$D_s\!=d\cdot e_s\cdot e_r$$

$$S_s = s \cdot e_s \cdot e_r \cdot \cos \beta$$

$$R_s = (D_s + S_s) \cdot \sin \beta$$

$$F_s\!=R_s\,/\,tan~\alpha$$

#### where

 $D_s$  = point load by dead load

 $S_s = point load by snow load$ 

 $R_s$  = shear load of the roof by dead load and snow load

 $e_s$  = distance of the screws

 $e_r$  = distance of the rafters

 $\alpha$  = angle between screw axis and perpendicular to rafter axis

tischer Power-Rast and Construction Screws	Annex B2 of European Technical Assessment		
Accessories	ETA-11/0027		

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### Design of the battens

The bending stresses are calculated as:

$$M = \frac{\left(F_b + F_s\right) \cdot \ell_{char}}{4}$$

Where

 $\ell_{char} = characteristic length \ \ell_{char} = \sqrt[4]{\frac{4 \cdot EI}{w_{ef} \cdot K}}$ 

EI = bending stiffness of the batten

K = coefficient of subgrade

w<sub>ef</sub>= effective width of the heat insulation

 $F_b$  = Point loads perpendicular to the battens

 $F_s$  = Point loads perpendicular to the battens, load application in the area of the screw heads

The coefficient of subgrade K may be calculated from the modulus of elasticity  $E_{HI}$  and the thickness  $t_{HI}$  of the heat insulation if the effective width  $w_{ef}$  of the heat insulation under compression is known. Due to the load extension in the heat insulation the effective width  $w_{ef}$  is greater than the width of the batten or rafter, respectively. For further calculations, the effective width  $w_{ef}$  of the heat insulation may be determined according to:

$$w_{ef} = w + t_{HI} / 2$$

where

w = minimum width of the batten or rafter, respectively

t<sub>HI</sub> = thickness of the heat insulation

$$K = \frac{E_{HI}}{t_{HI}}$$

The following condition shall be satisfied:

$$\frac{\sigma_{m,d}}{f_{m,d}} = \frac{M_d}{W \cdot f_{m,d}} \leq 1$$

For the calculation of the section modulus W the net cross section has to be considered.

The shear stresses shall be calculated according to:

$$V = \frac{(F_b + F_s)}{2}$$

The following condition shall be satisfied:

$$\frac{\tau_d}{f_{v,d}} = \frac{1,5 \cdot V_d}{A \cdot f_{v,d}} \le 1$$

For the calculation of the cross section area the net cross section has to be considered.

#### **Design of the heat insulation**

The compressive stresses in the heat insulation shall be calculated according to:

$$\sigma = \frac{1.5 \cdot F_b + F_s}{2 \cdot \ell_{char} \cdot w}$$

The design value of the compressive stress shall not be greater than 110 % of the compressive stress at 10 % deformation calculated according to EN 826.

fischer Power-Fast and Construction Screws	Annex B2 of European Technical Assessment		
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# Appendix 38 / 41

# Design of the screws

The screws are loaded predominantly axially. The axial tension force in the screw may be calculated from the shear loads of the roof R<sub>s</sub>:

$$T_S = \frac{R_S}{\cos \alpha}$$

The load-carrying capacity of axially loaded screws is the minimum design value of the axial withdrawal capacity of the threaded part of the screw, the head pull-through capacity of the screw and the tensile capacity of the screw.

In order to limit the deformation of the screw head for heat insulation thicknesses over 200 mm or with compressive strength below  $0.12 \text{ N/mm}^2$ , respectively, the axial withdrawal capacity of the screws shall be reduced by the factors  $k_1$  and  $k_2$ :

$$\begin{aligned} F_{\text{ax},\alpha,\text{Rd}} = \text{min} \begin{cases} k_{\text{ax}} \cdot f_{\text{ax},\text{d}} \cdot \text{d} \cdot \ell_{\text{ef}} \cdot k_{_{1}} \cdot k_{_{2}} \bigg(\frac{\rho_{_{k}}}{350}\bigg)^{^{0,8}} \\ \\ f_{\text{head},\text{d}} \cdot d_{_{h}}^{^{2}} \cdot \bigg(\frac{\rho_{_{k}}}{350}\bigg)^{^{0,8}} \end{cases} \end{aligned}$$

where:

f<sub>ax,d</sub> design value of the axial withdrawal parameter of the threaded part of the screw

d outer thread diameter of the screw

Point side penetration length of the threaded part of the screw in the rafter,  $l_{ef} \ge 40$  mm

 $\alpha$  Angle between grain and screw axis ( $\alpha \ge 30^{\circ}$ )

 $\rho_k$  characteristic density of the wood-based member [kg/m³]  $f_{head,d}$  design value of the head pull-through capacity of the screw

 $\begin{array}{ll} d_h & \text{head diameter} \\ k_1 & \text{min } \{1; 200/t_{HI}\} \\ k_2 & \text{min } \{1; \sigma_{10\%}/0, 12\} \end{array}$ 

thickness of the heat insulation [mm]

 $\sigma_{10\%}$  compressive stress of the heat insulation under 10 % deformation [N/mm<sup>2</sup>]

If equation  $k_1$  and  $k_2$  are considered, the deflection of the battens does not need to be considered. Alternatively to the battens, panels with a minimum thickness of 20 mm from plywood according to EN 636 or an ETA or national provisions that apply at the installation site, particle board according to EN 312 or an ETA or national provisions that apply at the installation site, oriented strand board according to EN 300 or an ETA or national provisions that apply at the installation site and solid wood panels according to EN 13353 or an ETA or national provisions that apply at the installation site or cross laminated timber according to an ETA may be used.

fischer Power-Fast and Construction Screws	Annex B2 of European Technical Assessment		
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# Thermal insulation material on rafters with parallel screws perpendicular to the roof plane

Alternatively to the battens, panels with a minimum thickness of 20 mm from plywood according to EN 636, particleboard according to EN 312, oriented strand board OSB/3 and OSB/4 according to EN 300 or European Technical Approval and solid wood panels according to EN 13353 may be used.

Characteristic load-carrying capacity of a screw loaded in shear:

$$F_{v,Rk} = min \begin{cases} f_{h,b,k} \cdot d \cdot t_{b} \\ f_{h,r,k} \cdot d \cdot t_{r} \\ \frac{f_{h,b,k} \cdot d \cdot \beta}{1+\beta} \cdot \left( \sqrt{4t_{il}^{2} + (2+\frac{1}{\beta})t_{b}^{2} + (2+\beta)t_{r}^{2} + 4t_{il}\left(t_{b} + t_{r}\right) + 2t_{b}t_{r}} - 2t_{il} - t_{b} - t_{r} \right) + \frac{F_{ax,Rk}}{4} \\ 1,05 \cdot \frac{f_{h,b,k} \cdot d \cdot \beta}{\frac{1}{2} + \beta} \left( \sqrt{t_{il}^{2} + t_{il}t_{b} + \frac{t_{b}^{2}}{2} \left(1 + \frac{1}{\beta}\right) + \frac{M_{y,k}}{f_{h,b,k}} d} \left(1 + \frac{2}{\beta}\right) - t_{il} - \frac{t_{b}}{2} \right) + \frac{F_{ax,Rk}}{4} \\ 1,05 \cdot \frac{f_{h,b,k} \cdot d \cdot \beta}{\frac{1}{2} + \beta} \left( \sqrt{t_{il}^{2} + t_{il}t_{r} + \frac{t_{r}^{2}}{2} (1 + \beta) + \frac{M_{y,k}}{f_{h,b,k}} d} \left(2 + \frac{1}{\beta}\right) - t_{il} - \frac{t_{r}}{2} \right) + \frac{F_{ax,Rk}}{4} \\ 1,15 \cdot \frac{f_{h,b,k} \cdot d}{1 + \beta} \left( \sqrt{\beta^{2}t_{il}^{2} + 4\beta(\beta + 1) \cdot \frac{M_{y,k}}{f_{h,b,k}} d} - \beta t_{il} \right) + \frac{F_{ax,Rk}}{4} \end{cases}$$

Where:

 $\begin{array}{ll} f_{h,b,k} & \quad & \text{Characteristic batten embedding strength } [N/mm^2] \\ f_{h,r,k} & \quad & \text{Characteristic rafter embedding strength } [N/mm^2] \end{array}$ 

 $\beta$   $f_{h,r,k}/f_{h,b,k}$ 

d Outer thread diameter [mm]

t<sub>b</sub> Batten thickness [mm]

t<sub>r</sub> The lower value of rafter thickness or screw penetration length [mm]

t<sub>il</sub> Interlayer thickness [mm]

M<sub>y,k</sub> Characteristic fastener yield moment [Nmm]

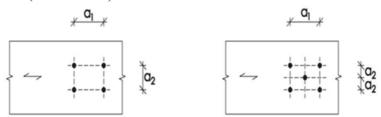
 $F_{ax,Rk}$  Characteristic axial tensile capacity of the screw [N]

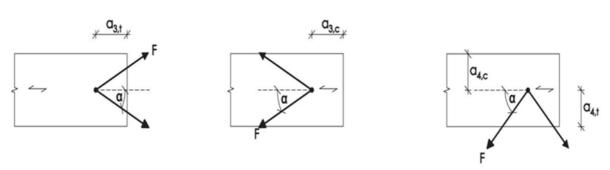
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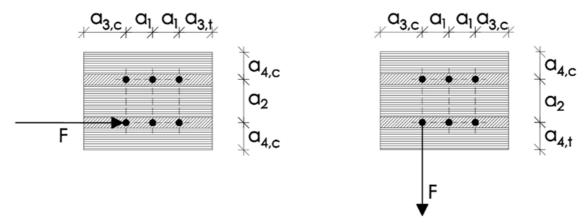
# Annex C Minimum distances and spacing

Axially or laterally loaded screws in the plane surface or edge surface of cross laminated timber Definition of spacing, end and edge distances in the plane surface unless otherwise specified in the technical specification (ETA or hEN) for the cross laminated timber:





Definition of spacing, end and edge distances in the edge surface unless otherwise specified in the technical specification (ETA or hEN) for the cross laminated timber.



For screws in the edge surface,  $a_1$  and  $a_3$  are parallel to the CLT plane surface,  $a_2$  and  $a_4$  perpendicular to CLT plane surface.

Table C1: Minimum spacing, end and edge distances of screws in the plane or edge surfaces of cross laminated timber

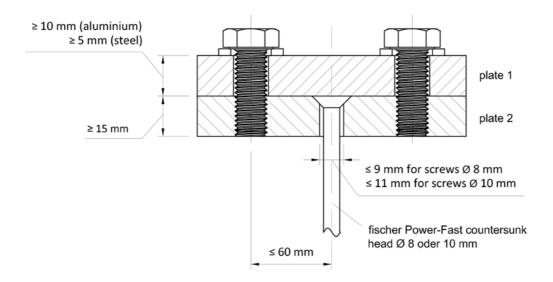
	aı	a <sub>3,t</sub>	a <sub>3,c</sub>	$a_2$	a <sub>4,t</sub>	a <sub>4,c</sub>
Plane surface (see Figure 1)	4 · d	6 · d	6 · d	2,5 · d	6 · d	2,5 · d
Edge surface (see Figure 2)	10 ⋅ d	12 · d	7 · d	4 · d	6 · d	3 · d

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# Annex D Visualisation of the Power-Fast screw head clamped between two metal plates

Metric screws with hexagon head, countersunk head or cylindric head or threaded rods with nut and washer – each according to the structural requirements – at least 2xM8 (≥4.6 respectively A2-50) for the connection of the two plates made of aluminium (mechanical properties at least like e.g. EN AW 6082, EN AW 5083, EN AW 6060 or EN AC-44100); made of carbon steel or made of stainless steel (each at least S235).



Information for the structural analysis of the metric screw connection and the metal plates are not part of this European Technical Assessment.

(Fig. not to scale)

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clamping of the screw head for compression impact	ETA-11/0027		