

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

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.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

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 ℓ_g of 4,0[.]d (i.e. $\ell_g \ge 4,0^.$ d).

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

No breaking of screws shall be observed at a bend angle, α , 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.

Cha	racteristic	Assessment of characteristic
3.1	Mechanical resistance and stability*) (BWR1)	
	Tensile strength Screws made from carbon steel	$\begin{array}{llllllllllllllllllllllllllllllllllll$
	Screws from stainless steel	Screw d = 3,0 mm: $1,6 \text{ kN}$ Screw d = 3,5 mm: $2,1 \text{ kN}$ Screw d = 4,0 mm: $2,8 \text{ kN}$ Screw d = 4,5 mm: $3,5 \text{ kN}$ Screw d = 5,0 mm: $4,3 \text{ kN}$ Screw d = 6,0 mm: $6,2 \text{ kN}$ Screw d = 8,0 mm: $13,0 \text{ kN}$
	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 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 Performance of the product and references to the methods used for its assessment

3.2 Safety in case of fire (BWR2)

Reaction to fire

The screws are made from steel classified as **Euroclass A1** in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364.

Page 6 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 6 / 41

Char	acteristic	Assessment of characteristic
3.7	Sustainable use of natural resources (BR7)	No Performance Assessed
3.8	General aspects related to the performance of the product	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

*) 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.

Page 7 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 7 / 41

3.9 Mechanical resistance and stability

The load-carrying capacities for "fischer Power-Fast" and "fischer construction screws" are applicable to the woodbased 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 $\ell_{ef} \ge 4$ ·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, $\ell_{ef} \ge 40$ 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/mm²) \cdot d^{2,6} [Nmm]

Screws from stainless steel for 3,0 mm < d < 6,0 mm: $M_{y,k} = 0,15 \cdot 350 \text{ (N/mm^2)} \cdot d^{2,6}$ [Nmm]

Screws from stainless steel for d = 8,0 mm: $M_{y,k} = 0,15 \cdot 400 \text{ (N/mm^2)} \cdot d^{2.6} \text{ [Nmm]}$

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/mm²]

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/mm²]

Where

 ρ_k characteristic timber density [kg/m³];

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:

$$f_{h,k} = 20 \cdot d^{-0.5}$$
 [N/mm²]

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

- $\begin{array}{ll} F_{ax,\alpha,RK} & \mbox{Characteristic withdrawal capacity of the} \\ & \mbox{connection at an angle α to the grain [N]} \\ n_{ef} & \mbox{Effective number of screws according to EN} \\ & \mbox{1995-1-1} \\ & \mbox{For inclined screws: } n_{ef} = max \left\{ n^{0,9} \ ; 0,9 \cdot n \right\} \\ k_{ax} & \mbox{Factor, taking into account the angle α} \end{array}$
- 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 $0^{\circ} \le \alpha < 45^{\circ}$

fax,k	Characteristic withdra	awal parameter [N/mm ²]
	for timber members	
	screw $d = 3,0$ mm:	$f_{ax,k} = 13,8 \text{ N/mm}^2$
	screw $d = 3,5$ mm:	$f_{ax,k} = 13,4 \text{ N/mm}^2$
	screw $d = 4,0$ mm:	$f_{ax,k} = 13,0 \text{ N/mm}^2$
	screw $d = 4,5$ mm:	$f_{ax,k} = 12,6 \text{ N/mm}^2$
	screw $d = 5,0$ mm:	$f_{ax,k} = 12,2 \text{ N/mm}^2$
	screw $d = 6,0$ mm:	$f_{ax,k} = 11,6 \text{ N/mm}^2$
	screw $d \ge 8,0$ mm:	$f_{ax,k} = 10,0 \text{ N/mm}^2$

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]
- ℓ_{ef} Point side penetration length of the threaded part according to EN 1995-1-1:2008 [mm]
- α Angle between grain and screw axis [°]
- ρ_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 loadcarrying capacity should be calculated using the effective number of fasteners $n_{\rm ef}$, 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 _{ef}	effective number of screws according to EN 1995-1-1
	For inclined screws: $n_{ef} = max \left\{ n^{0.9}; 0, 9 \cdot n \right\}$
	(see axial withdrawal capacity)
f _{head,k}	characteristic head pull-through parameter
	$[N/mm^2]$
$d_{\rm h}$	diameter of the screw head [mm]
Pk	characteristic density [kg/m3], for wood-
	based panels $\rho_k = 380 \text{ kg/m}^3$
Character	istic based and the descent and a second state for a second state of the second state

Characteristic head pull-through parameter for screws with head diameter ≤ 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·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 $d_{\rm h} > 35 \mbox{ mm}$ 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 $f_{tens,k}$ of "fischer Power-Fast" and "fischer construction screws" is:

Screws from carbon steel:

Screw $d = 3,0$ mm:	2,7 kN
Screw $d = 3,5 \text{ mm}$:	3,7 kN
Screw $d = 4,0$ 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 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

Screws from stainless	steel:
Screw $d = 3,0$ mm:	1,6 kN
Screw $d = 3,5 \text{ mm}$:	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

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:

$$\mathbf{F}_{ax,Rk} = \min \left\{ \mathbf{f}_{ax,k} \cdot \mathbf{d} \cdot \ell_{ef} \cdot \left(\frac{\boldsymbol{\rho}_{k}}{350}\right)^{0.8} ; \kappa_{e} \cdot \mathbf{N}_{pl,k} \right\} [N]$$

Where

$$\begin{split} \kappa_{\rm c} &= \begin{cases} 1 & \text{for } \overline{\lambda}_k \leq 0, 2 \\ \\ \frac{1}{k + \sqrt{k^2 - \overline{\lambda}_k^2}} & \text{for } \overline{\lambda}_k > 0, 2 \end{cases} \\ k &= 0, 5 \cdot \left[1 + 0, 49 \cdot (\overline{\lambda}_k - 0, 2) + \overline{\lambda}_k^2 \right] \end{split}$$

The relative slenderness ratio shall be calculated from:

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

Where

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

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:

 $f_{y,k} = 1000$ [N/mm²] Characteristic yield strength for screws made of stainless steel:

$f_{y,k} = 500$	$[N/mm^2]$
Modulus of elasticity for screws made	of carbon steel:
$E_{s} = 210000$	$[N/mm^2]$
Modulus of elasticity for screws made	of stainless steel:
$E_{s} = 160000$	$[N/mm^2]$
Second moment of area:	

$I_{\rm S} = \frac{\pi}{64} \cdot d_{\rm S}^4$	$[mm^4]$
$d_s =$ smooth shank diameter	[mm]
$\ell_{\rm ef} = 0.7 \cdot \ell$ buckling length	[mm]

 ℓ = free screw length protruding from the timber

member including the screw head [mm] 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 γ_M for timber according to EN 1995 while N_{pl,d} is calculated using $\gamma_{M,1}$ for steel buckling according to EN 1993.

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:

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

where

Fax,Ed	axial design load of the screw
Fla,Ed	lateral design load of the screw
F _{ax,Rd}	design load-carrying capacity of an axially loaded screw
F _{la,Rd}	design load-carrying capacity of a laterally loaded screw

Slip modulus

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

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

Where

[N]

d outer thread diameter [mm]

 ℓ_{ef} penetration length in the structural member [mm]

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 α 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:

$$F_{ax,\alpha,Rk} = \min \begin{cases} k_{ax} \cdot f_{ax,k} \cdot d \cdot \ell_{ef} \cdot k_1 \cdot k_2 \left(\frac{\rho_k}{350}\right)^{0.8} \\ f_{head,k} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350}\right)^{0.8} \\ f_{tens,d} \end{cases}$$
[N]

where

kax

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

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 $0^{\circ} \le \alpha \le 45^{\circ}$

f_{ax,k} Characteristic withdrawal parameter [N/mm²]

D Outer thread diameter [mm]

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

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

k₂ min {1; $\sigma_{10\%}/0, 12$ }

t_{HI} Thickness of the thermal insulation [mm] $\sigma_{10\%}$ Compressive stress of the thermal insulation under 10 % deformation [N/mm²]

	under 10 % deformation [N/mm ²]
	$\sigma_{10\%} \ge 0.05 \text{ N/mm}^2$
fhead,k	Characteristic head pull-through parameter
	[N/mm ²]
d_{h}	Outer diameter of the screw head [mm]
Pk	Characteristic density [kg/m3]

f_{tens,d} Characteristic tensile capacity of the screw

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 5μ m.

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 loadbearing 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 $1,2 \cdot d$. 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.

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 ₁ parallel to the grain	$a_1 = 5 \cdot d$
Spacing a2 perpendicular to the grain	$a_2 = 5 \cdot d$
Distance a _{3,c} from centre of the screw-part in	
timber to the end grain	$a_{3,c} = 9 \cdot d$
Distance a _{4,c} 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·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 ₁ parallel to the grain	$a_1 = 4 \cdot d$
Spacing a2 perpendicular to the grain	$a_2 = 2,5 \cdot d$
Distance a3,c 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 _{3,t} from centre of the screw-part in	
timber to the loaded end grain	

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

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 a1 parallel to the CLT plane surface $a_1 = 10 \cdot d$ Spacing a2 perpendicular to the CLT plane surface $a_2 = 4 \cdot d$ Distance a_{3,c} from centre of the screw-part in timber to the unloaded end $a_{3,c} = 7 \cdot d$ Distance a_{3,t} from centre of the screw-part in timber to the loaded end $a_{3,t} = 12 \cdot d$ Distance a_{4,c} from centre of the screw-part in timber to the unloaded edge $a_{4,c} = 3 \cdot d$ Distance a4,t 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

Page 14 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02





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

Nom	inal diam	eter	3,	,0	3	,5	4,	,0	4	,5	5	,0	6	,0		
d C	Outer diame	eter	3,	00	3,	50	4,0	00	4,	50	5,					
A	llow. devia			±0,30												
d ₁	Core diamet	ter	2,	00	2,	20	2,50 2,70				3,00 4,00					
A	llow. devia	ation				-0,25 /	+0,10					±0	,20			
d _h H	lead diame	ter	6,	00	7,	00	8,00 9,00				10	,00	12	,00		
u _h A	llow. devia	ation						-0,50/	+0,10)						
d _s S	hank diam	eter	2,	25	2,	60	2,	90	3,	25	3,	60	4,	20		
us A	llow. devia	ation		-0,30 / +0,10												
h E	lead height		1,	90	2,	10	2,	50	2,	70	3,	00	3,	80		
П	hread pitch	1	1,	50	1,	80	2,	00	2,	20	2,	50	3,00	-4,50		
P A	llow. devia	ation						±1	0%							
1 ¹⁾ S	hank ribs l	ength	3,75 4,25					75	5,	50	6,	00	7,	00		
Allow. deviation			±0,75								±1	,00				
Drive TX				1	0			2	0		20	25	3	0		
	Drive PZ]	l				1	2					3		
Sc	crew length	l ls	S	tandar	d threa	ad leng	gth l _{gf}	= Full	thread	1 l _{gp} =	Partia	l threa	d Tol	erance	: ± 2,0	2)
Nominal					,		1									
length	min	max	l _{gf}	l_{gp}	lgf	l _{gp}	l _{gf}	l _{gp}	lgf	lgp	lgf	lgp	lgf	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	0	
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		
70	68,50	71,50						42		42		42	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		
110	108,25	111,75										70		70		
120	118,25	121,75										70		70		
in s	steps of 10r															
130-300	$l_{s} - 2,00$	$l_s + 2,00$												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

.

 $\label{eq:lg_sigma_lg} \begin{array}{l} 2) \quad 10mm \geq l_g \leq \!\! 18mm \triangleq \pm \! 1,\! 5mm \\ 18mm \geq l_g \leq 30mm \triangleq \pm \! 1,\! 7mm \end{array}$

tischer Power-Kast and Construction Screws	Annex A1 of European Technical Assessment
	ETA-11/0027

Page 15 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 ls Appendix 15 / 41



Shank ribs¹⁾ ¹⁾ optional

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

Nom	inal diam	leter	3,	,0	3	,5	4	,0	4,	5	5,	,0	6	,0		
1 (Outer diame	eter	3,0	00	3,	50	4,	00	4,5	50	5,	00	6,00		-	
d A	Allow. devi	ation		±0,30												
d ₁	Core diame	ter	2,	00	2,	20	2,	50	2,70		3,	00	4,00			
	Allow. devi	ation				-0,25	+0,10					±0,	20			
d H	Iead diame	ter	6,0	00									,00			
d _h	Allow. devi	ation		-0,50 / +0,10												
1 8	hank diam	eter	2,2	25	2,	60	2,	90	3,2	25	3,	60	4,	20		
d _s	Allow. devi	ation						-0,30/	+0,10							
h I	lead height	t	1,9	90	2,	10	2,	50	2,7	70	3,	00	3,	40		
П	Thread pitch			50) 1,80			00	2,2	20	2,	50	3,00			
p A	Allow. devi	ation						±1	0%							
in S	hank ribs l	ength	3,	75	4,	25	4,	75	5,5	50	6,	00	7,	00		
$l_r^{(1)}$	Allow. devi	ation			±0	,75	S				±1.	,00,				
	Drive TX			1	0			2	0		20	25	3	0		
	Drive PZ]	L.				1	2					3		
Sc	crew length	ı l _s	S	Standard thread length lgf = Full					thread	1 _{gp} =	Partial	Tol	erance:	$\pm 2,0^{2)}$		
Nominal length	min	max	lgf	lgp	lgf	lgp	lgf	lgp	lgf	$l_{\rm gp}$	lgf	lgp	$l_{\rm gf}$	lgp		
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		
70	68,50	71,50						42		42		42	63	42		
80	78,50	81,50						50		50		50	73	50		

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

All sizes in mm

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

fischer Power-Fast and Construction Screws	Annex A2 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 16 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 16 / 41 ls





Shank ribs

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

Nor	ninal dian	neter	3,0		3.	3,5		,0	4,	,5	5	,0	6,0			
4	Outer diam	eter	3,	00	3,	3,50 4,00			4,50 5,00			00	6,		_	
d	Allow. devi	iation							±0.	,30						
4	Core diame	ter	2,	00	2,	20	2,	50	2,70		3,00		4,00			
d1	Allow. devi	iation				-0,25	+0,10)				±0,	20			
d	Head diame	eter	6,	00	7,	00	8,	00	9,	00	10	,00	12	,00		_
dh	Allow. devi	iation						-0,50	+0,10							_
d,	Shank diam	neter	2,	2,25 2,60 2,90 3,25 3,60 4,20							20	8				
u _s	Allow. devi	iation						-0,30	/ +0,10	1						
h	Head heigh	2,	30	2,	50	2,	90	3,	10	3,	40	3,	80	3		
	Thread pitc	1,	50	1,	80	2,	00	2,2	20	2,	50	3,00	4,50			
р	Allow. devi								0%							
l _r 1)	Shank ribs length			3,75 4,25			4,	4,75 5,50			6,	00	7,	00		
II.	Allow. devi	iation			±0	,75					±1	,00				
	Drive TX			-	0				.0		20	25		0		_
	Drive PZ		1	l					2					3		
5	Screw length	n ls	5	Standar	d threa	ad leng	$gth \mid l_{gf} = Full thread \mid l_{gp} = Particular Part$					thread	Tol	erance:	$\pm 2,0^{2)}$	
Iomina	1 min	max	1.	1	1.	1	1.	1	1.	1	1.	1	1.	1		
length			l _{gf}	l _{gp}	l _{gf}	lgp	lgf	l _{gp}	l _{gf}	l _{gp}	l _{gf}	l _{gp}	l_{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		_
	48,50	51,50				30	45	30	45	30	44	36	43	30		_
50	E2 50	56,50					50	36	50	36	49	36	48	26		_
50 55	53,50							36	I	36		42	53	36		
50 55 60	58,50	61,50								40						_
50 55 60 70	58,50 68,50	61,50 71,50						42		42		50	63	42		_
50 55 60	58,50	61,50								42 50						_

.

Intermediate lengths at l_s 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 .

All sizes in mm

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

fischer Power-Fast and Construction Screws	Annex A3 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 17 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 17 / 41 ls



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

No	minal	diam	eter	5.	,0														
	Oute	r diam	eter	5.	00									-		\vdash			
d	Allow, deviation			-0.	30											\vdash			
	Core	diame	ter		00									<u> </u>		\vdash			
d1	Alloy	w. devi	iation		±0,20											\vdash			
	Unde	erhead	diameter		00									<u> </u>		\vdash			
du	Alloy	w. devi	iation		35									<u> </u>		\vdash			
	Head	l diame	eter	8,	25									<u> </u>		\vdash			
dh		Allow. deviation					,40											\square	
_	Heig	ht		2,	50											\vdash			
E	Allo	Allow. deviation		±0	,30														
h	Head height		2,	60											\square				
	Thread pitch		2,	50															
p	Allow. deviation		±1	0%															
	Dri	ve TX		20	25														
	Screw	length	l ls	Stand	lard th	read lo	ength	lgf=F	ull thr	ead l _s	p=Par	tial th	read []	Folerar	nce: ± 2	$2,0^{2}$			
Nomin lengtl	1	nin	max	$l_{\rm gf}$	\mathbf{l}_{gp}														
20		8,95	21,05	14															
25	_	3,75	26,25	19										L		<u> </u>	⊢		
30	_	8,75	31,25	24								<u> </u>	<u> </u>			<u> </u>	⊢		
35	_	3,50	36,50	29			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	⊢		
40	_	8,50	41,50	34 39				<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>			
45 50	_	3,50	46,50	44						<u> </u>		<u> </u>	<u> </u>			<u> </u>	⊢		
55		8,50 3,50	51,50 56,50	44 49									-			<u> </u>	\vdash		
60	_	5,50 8,50	61,50	54				<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>	+		<u> </u>	⊢		
70	_	8,50	71,50	64				<u> </u>					<u> </u>	-		<u> </u>	\vdash		
80		8,50 8,50	81,50	74										-		<u> </u>	\vdash		

.

Intermediate lengths at l_s are possible Threaded lengths between $4 \times d \leq l_g \leq l_{gmax}$ are possible .

fischer Power-Fast and Construction Screws	Annex A4 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 18 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 18 / 41



1) optional

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

	bon steel sible surface	treatments:	vellow	or blue	zinc-p	lated, b	olue zin	c-plate	d≥12ı	ım						
	minal dian			,0	3,5 4,0											
	Outer diam	ieter	3,	00	3,	50	4,	00								
d	Allow. dev	iation			±0	,30										
	Core diam	eter	2,	00	2,	50										
d1	Allow. dev	iation			-0,25 /	+0,10)									
	Head diam	eter	5,	00	6,	,00 7,00										
d _h	Allow. dev	iation	-0,50 / +0,10													
h	Head heigh	nt	1,	90	2,	10	2,	50								
	Thread pite	ch	1,	50	1,	80	2,	00								
p	Allow. dev	iation			±1	0%										
-	Drive PZ	2	1 2													
	Screw lengtl	n ls	Stand	dard th	read le	ength	$l_{gf} = F$	ull thre	ead 1	_{gp} =Par	tial thr	ead T	olerar	nce: ± 2	2,02)	
Nomin lengtł	min	max	lgf	\mathbf{l}_{gp}	$l_{\rm gf}$	lgp	lgf	lgp								
20	18,95	21,05	16		16		16									
25	23,75	26,25	21		21		20									
30	28,75	31,25	26													

.

All sizes in mm

Intermediate lengths at l_s are possible Threaded lengths between $4 \times d \leq l_g \leq l_{gmax}$ are possible .

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

fischer Power-Fast and Construction Screws	Annex A5 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 19 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 19 / 41



Power-Fast self-drilling screw - Countersunk headhole screw with full thread

Non	ninal dian	neter	4.	0	4	.5	5	.0	6.	0						
	Outer diam		4.0			50		00	6,0	-					<u> </u>	
	Allow, devi		-,,				,30	00	0,0	/0					<u> </u>	
	Core diame		2.5	50	2.	70		00	4.0)0					<u> </u>	
d ₁	Allow, devi	ation			+0,10				.20	20						
	Head diame	eter	8,0		9,00 10,00				12,	00						
dh	Allow. devi	ation				-0,50/	+0.10)	,							
	Shank diam	eter	2.9	00	3.	25	3.	60	4.3	30						
ds	Allow. devi	ation				-0,30/	+0,10)								
h	Head height			50	2,	70	3,	00	3,8	30						
	Thread pitch)0	2,	20	2,	50	3,00-	4,50						
p	Allow. devi	ation				±1	0%									
4	Shank diam	eter	3,1	70	3,	85	4,	50	4,2	20						
d _{s1}	Allow. devi	ation					10									
	Drive PZ				2	2			3							
S	Screw length ls			tandar	d threa	ad leng	gth lgf	= Full	thread	l _{gp} =	Partia	l thread	d To	lerance	: ± 2,0	2)
Nomina	1 min	max						1	lgf	1						
length	mm	max	lgf	lgp	l _{gf}	l _{gp}	lgf	l _{gp}	lgf	l _{gp}						
25	23,75	26,25	17,5													
27	25,75	28,25	19,5													
	28,75	31,25	22,5		19											
30	33,50	36,50	27,5		24											
35			32,5		29		29								<u> </u>	L
35 40	38,50	41,50					34									L
35 40 45	43,50	46,50	37,5		34		-							1		
35 40 45 50	43,50 48,50	46,50 51,50	42,5		39		39		41					+		
35 40 45 50 55	43,50 48,50 53,50	46,50 51,50 56,50	42,5 47,5		39 44		39 44		46					-		-
35 40 45 50 55 60	43,50 48,50 53,50 58,50	46,50 51,50 56,50 61,50	42,5		39 44 49		39 44 49		46 51							
35 40 45 50 55 60 70	43,50 48,50 53,50 58,50 68,50	46,50 51,50 56,50 61,50 71,50	42,5 47,5		39 44 49 59		39 44 49 60		46 51 60							
35 40 45 50 55 60	43,50 48,50 53,50 58,50	46,50 51,50 56,50 61,50	42,5 47,5		39 44 49		39 44 49		46 51							

Intermediate lengths at l_s are possible Threaded lengths between $4 \times d \leq l_g \leq l_{gmax}$ are possible .

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

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

Page 20 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 20 / 41



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

N	omi	inal dian	neter	6	,0	8,	,0	10	,0	12	2,0						
	0	uter diame	ter	6,	00	8,0	00	10	,00	12	,00						
d	A	llow. devia	ation		±0	.30		±0	,40	±0.	,50		i i				
	C	ore diamet	er	4,	00	5,4	40	6,	40	7,	60						
dı	A	llow. devia	ation			±0,	.20	±0,3			,30						
	H	ead diame	ter	12	,00	14,	40	18	,40	22,	,40						
dh	A	llow. devia	ation	-0,50	/+0,10	±0,		,40		±0,50							
ds	Sł	nank diamo	eter	4,	30	5,9	90	7,	10	8,	30						
ds	A	llow. devia	ation	-0,30	/+0,10			±0	,20								
h	H	ead height		3,	80	5,	10	6,	10	7,	20						
	T	nread pitch	1	3,00	-4,50	6,	00		7,	50							
р	A	llow. devia	ation				±1	0%									
Ir 1) Shank ribs length				8,	00			13	,00								
u.		llow. devia	ation				-2,	00									
Drive TX				3	0		4	0		5	0						
					Standa	rd thre	read length lgf = Full thread lgp=Partial thread								lerance	e: ± 2,0)
Nomi	nal	an in		1	1	1	1	1	1	1	1						
leng	th	min	max	l _{gf}	l _{gp}	l _{gf}	l_{gp}	lgf	l _{gp}	l_{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				L		└─
160	-	158,00	162,00		70		75		80		80				<u> </u>		
180	_	178,00	182,00	L	70		75		100		100				 		
200	_	198,00	202,00		70		100		100		100						
220	_	218,00	222,00	<u> </u>	70		100		100		100					<u> </u>	
240	-	238,00	242,00	<u> </u>	70 70		100		100		120					<u> </u>	
260 280	_	258,00 278,00	262,00		70		100		100 115		120 120				<u> </u>	<u> </u>	+
300	_	278,00	302,00		70		100		115		120					<u> </u>	+
320		317,00	302,00		/0		100		115		120				-	<u> </u>	\vdash
330	_	327,00	333,00				100		115								\vdash
340	_	337,00	343,00			-	100	-	115								\vdash
350	-	347,00	353,00				100				145						\vdash
360	_	357.00	363.00				100		115								\vdash
380	_	377,00	383,00				100		115								\vdash
400		397,00	403,00														
450/5	00	ls -3,00	ls +3,00				100		115		145						
550/6	00	ls -3,00	$l_{s} + 3,00$								145						

All sizes in mm

Intermediate lengths at l_s are possible Threaded lengths between $4 \times d \leq l_g \leq l_{gmax}$ are possible .

fischer Power-Fast and Construction Screws	Annex A7 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 21 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 21 / 41



1) optional

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

Carl	bon steel												 		
	sible surface t	reatments:	yellow	or blue	e zinc-p	lated, b	olue zin	c-plate	d ≥12μ	m, bon	us-zince	d			
No	minal dian	neter	6	,0	8	,0	1	0,0	12	2,0					
d	Outer diame	ter	6,	00	8,	00	10	,00	12	,00		l.			
a	Allow. devia	tion		± 0	,30		±0	,40	±0	,50					
	Core diameter		4,	00	-	40	6,	40	7,60			l.			
u	Allow. devia	tion			±0	,20			±0	,30					
	Head diamet		13	,70	21	,00	24,70 27,90								
un	Allow. devia	tion	-0,70/	+1,30		,00		+2,80	-1,40/	+2,60					
	Shank diame			30	5,	90		10		30					
	Allow. deviation			+0,10		± 0	,20			,30					
	h Head height			3,	50		5,	60		70					
Allow. deviation					,00				,50						
	p Thread pitch			-4,50	6,	00		7,	50						
-	Allow. devia					±1	0%								
	Shank rib ler		8,	00				,00							
~	Allow. devia	tion					,00								
	Drive TX		_	0			10		-	50					
	Screw length	ls	Stand	lard th	read let	ngth l	_{gf} = Ful	l threa	d l _{gp} =	Partial					
Nominal length	1 min	max	lgf	lgp	lgf	lgp	lgf	lgp	lgf	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	178,00	182,00		70		75		100		100					
200	198,00	202,00		70		100				100					
220	218,00	222,00		70		100		100		100					
240	238,00	242,00		70		100		100		100					
260	258,00	262,00		70		100		100		100					
280	278,00	282,00	-	70		100		115		120			<u> </u>		
300	298,00	302,00		70		100		115		120				<u> </u>	
320	317,00	323,00			-	100		115						<u> </u>	<u> </u>
330	327,00	333,00				100	<u> </u>	115						<u> </u>	
	340 337,00 343,00		100		115		145								
350	347,00	353,00			<u> </u>	<u> </u>	<u> </u>			145				<u> </u>	<u> </u>
	n steps of $10r$ ls -3.00	$\frac{1}{1_{s}+3.00}$				100	<u> </u>	115		<u> </u>				<u> </u>	<u> </u>
						100	<u> </u>	115		<u> </u>				<u> </u>	
	n steps of 50r	$\frac{1}{1_{s}+3,00}$				<u> </u>				145				<u> </u>	<u> </u>
550-600	ls -3,00								145						

All sizes in mm

-Trade mark¹⁾

Intermediate lengths at ls are possible

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

fischer Power-Fast and Construction Screws	Annex A8 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 22 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 22 / 41



Shank ribs¹ ¹⁾ optional

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

	ible surface			.0		.0),0		2,0						
	Outer diam			,00		00		.00		,00			-		+	
d	Allow. devi		0,		.30	00	_	,40		,50			-		+	
	Core diame		1	±0		40		40		60			-		+	
di –	Allow, devi		-4,	00		.20	0,	40		.30	-		<u> </u>		<u> </u>	
	Underhead		6	25		25	10,30 12,40					-		-		
d	Allow. devi		0,		.80	23		-0,90 -1,00			2		-		-	
	Wrench siz		0	90		,80							-		-	
SW -	Allow. devi		9,	90	12	1	,30	,00	16,80				-		+	
	Height	ation	2	00	2	10		30	2	30			<u> </u>		+	
	Allow. devi	ation	2,	00	2,		,50	50	3,	50					-	
	Shank diam		4	30	5	±0 90		10	0	30					-	
	Allow. deviation			+0,10	- ⁵ ,	90		,20	8,	50						_
				$\frac{+0,10}{00}$	4	50		20	5	70			-			
	Head height Allow, deviation			.30		,40	3 ,		.50	10						
	Thread pitch			-4,50		00			,50 50							
	p Allow. deviation			4,50	0,		0%	7,	50				<u> </u>		<u> </u>	
	Shank rib le		-	0	00	11 1	0%	12	,00,				<u> </u>		+	
	Allow. devi		<u> </u>	0,	00	2	,00	15	,00				<u> </u>		+	
	Drive TX	ation	2	0	<u> </u>		0		5	0			<u> </u>		<u> </u>	
Screw length ls			_	_			-	1.4			.1	177-1		1 2 02		
		1 Is	Stand	lard th	read le	ngth I	_{gf} =Fu	I threa	d I _{gp} =	Partial	thread	lole	rance	$\pm 2,0^{2}$		_
Nominal	min	max	lgf	lgp	lgf	lgp	1 _{ef}	lgp	lgf	lgp				1		
length	10000		-		*g.	*8P	·94	*84*	*8×	*84						L_
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							<u> </u>	+		
	98,25	101,75	<u> </u>	60	80	50		52		60				+		└─
100	118,25	121,75	<u> </u>	70	100	75		80		80			<u> </u>	+		⊢
120		ls +2,00	<u> </u>	70	<u> </u>	75	<u> </u>	80		80			<u> </u>	+		
120 140/160	ls -2,00			70	<u> </u>	75	<u> </u>	100		100			<u> </u>	+		
120 140/160 180	178,00	182,00					1	100		100						-
120 140/160 180 200/220	178,00 ls -2,00	ls +2,00		70	<u> </u>	100		100							1	
120 140/160 180 200/220 240/260	178,00 ls -2,00 ls -2,00	ls +2,00 ls +2,00		70		100		100		120			-	+	+	
120 140/160 180 200/220 240/260 280/300	$\begin{array}{c} 178,00\\ \hline l_{s}-2,00\\ \hline l_{s}-2,00\\ \hline l_{s}-2,00\\ \hline \end{array}$	$\frac{l_{s}+2,00}{l_{s}+2,00}$ $\frac{l_{s}+2,00}{l_{s}+2,00}$				100 100		115		120						
120 140/160 180 200/220 240/260 280/300 320	$\begin{array}{c} 178,00\\ l_{s}-2,00\\ l_{s}-2,00\\ l_{s}-2,00\\ 317,00\\ \end{array}$	$\frac{l_{s}+2,00}{l_{s}+2,00}$ $\frac{l_{s}+2,00}{323,00}$		70		100		115 115								
120 140/160 180 200/220 240/260 280/300 320 330	$\begin{array}{c} 178,00\\ l_{s}-2,00\\ l_{s}-2,00\\ l_{s}-2,00\\ 317,00\\ 327,00\\ \end{array}$	$\frac{l_{s}+2,00}{l_{s}+2,00}$ $\frac{l_{s}+2,00}{323,00}$ $\frac{333,00}{333,00}$		70		100 100 100		115 115 115								
120 140/160 180 200/220 240/260 280/300 320 330 340	$\begin{array}{c} 178,00\\ l_{s}-2,00\\ l_{s}-2,00\\ l_{s}-2,00\\ 317,00\\ 327,00\\ 337,00\\ \end{array}$	$\frac{l_s + 2,00}{l_s + 2,00}$ $\frac{l_s + 2,00}{323,00}$ $\frac{333,00}{343,00}$		70		100 100		115 115		120						
120 140/160 180 200/220 240/260 280/300 320 330 340 350	$\begin{array}{c} 178,00\\ l_{s}-2,00\\ l_{s}-2,00\\ \hline l_{s}-2,00\\ 317,00\\ 327,00\\ 337,00\\ 347,00\\ \end{array}$	$\frac{l_s + 2,00}{l_s + 2,00}$ $\frac{l_s + 2,00}{323,00}$ $\frac{333,00}{343,00}$ $\frac{343,00}{353,00}$		70		100 100 100 100		115 115 115 115								
120 140/160 180 200/220 240/260 280/300 320 330 340 350 360/380	$\begin{array}{c} 178,00\\ l_{s}-2,00\\ l_{s}-2,00\\ l_{s}-2,00\\ 317,00\\ 327,00\\ 337,00\\ 347,00\\ l_{s}-3,00\\ \end{array}$	$\begin{array}{c} l_{s}+2,00\\ l_{s}+2,00\\ l_{s}+2,00\\ 323,00\\ 333,00\\ 343,00\\ 353,00\\ l_{s}+3,00\\ \end{array}$		70		100 100 100		115 115 115		120						
120 140/160 180 200/220 240/260 280/300 320 330 340 350 360/380 in s	$\begin{array}{c} 178,00\\ 1_{s}-2,00\\ 1_{s}-2,00\\ 1_{s}-2,00\\ 317,00\\ 327,00\\ 337,00\\ 347,00\\ 1_{s}-3,00\\ \text{steps of 50n} \end{array}$	$\frac{l_s + 2,00}{l_s + 2,00}$ $\frac{l_s + 2,00}{323,00}$ $\frac{323,00}{343,00}$ $\frac{343,00}{353,00}$ $\frac{l_s + 3,00}{353,00}$		70		100 100 100 100 100		115 115 115 115 115 115		120						
120 140/160 180 200/220 240/260 280/300 320 330 340 350 360/380 in s 400-500	$\begin{array}{c} 178,00\\ 1_{s}-2,00\\ 1_{s}-2,00\\ 1_{s}-2,00\\ 317,00\\ 327,00\\ 337,00\\ 347,00\\ 1_{s}-3,00\\ \text{steps of 50n}\\ 1_{s}-3,00 \end{array}$	$\frac{l_s + 2,00}{l_s + 2,00}$ $\frac{l_s + 2,00}{323,00}$ $\frac{323,00}{343,00}$ $\frac{343,00}{353,00}$ $\frac{l_s + 3,00}{353,00}$		70		100 100 100 100		115 115 115 115		120						

Intermediate lengths at ls are possible

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

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

—Trade mark¹⁾

fischer Power-Fast and Construction Screws	Annex A9 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 23 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 23 / 41



1) optional

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

Nom	inal dian	neter	6.	,0	8	,0	10),0	12	2,0						
, 0	Duter diame	ter	6,	00	8,	00	10	,00	12	,00						
d A	llow. devia	ation		±0	,30			,40		,50						
1 0	ore diamet	er	4,	00	5,	40	6,	40	7,	60						
d ₁	llow. devia	ation			±0	±0,20 ±0,30										
dh H	lead diame	ter	15	00	18	,00	21	,50	23	,40						
uh A	llow. devia	ation		1,	20			1,	50							
du U	Inderhead of	liameter	6,	25	8,	25	10	,30	12	,40						
A	llow. devia				80			,90	-1,	,00						
SW -	Vrench size		9,	90	12	,80		,80	16	,80						
A	llow. devia						,30									
	Vasher heig		80		00	- /	20		50							
	leight		2,	00	2,	10		30	3,	30						
A	llow. devia				,50		-									
	hank diame		4,		5,	90		10	8,	30						
A	Allow. deviation			+0,10				±0,20							<u> </u>	
	Head height Allow. deviation			00		50	5,	20		70			<u> </u>		<u> </u>	
			±0.			,40			±0,50 7,50				<u> </u>		<u> </u>	
	hread pitch		3,00-	4,50	6,	00	0.04	7,	50		<u> </u>		<u> </u>		<u> </u>	
- P	llow. devia			0	00	±I	0%	12	00				<u> </u>		<u> </u>	
	hank rib le Allow. devia			8,	00	2	.00	13	,00				<u> </u>		<u> </u>	
P	Drive TX	ation	3	0			00		5	0	<u> </u>		<u> </u>		<u> </u>	
C.	crew length	. 1	-								1175.1		2.02)			
		1 I _S	Stand	ard thre	ad leng	th Igf=	Full th	read Ig	-Partia	al thread		rance: ±	2,0-7	-	-	-
Nominal length	min	max	lgf	$l_{\rm gp}$	lgf	lgp	lgf	lgp	lgf	lgp						
60	58,50	61,50	50	30								<u> </u>		<u> </u>	<u> </u>	+
80	78,50	81,50	70	50	70	50		52				<u> </u>	<u> </u>	<u> </u>		+
90	88,25	91,75	/0	60	80	50		52				<u> </u>	<u> </u>	<u> </u>	<u> </u>	+
100	98,25	101,75		60	80	50		52		60		<u> </u>	<u> </u>	<u> </u>	<u> </u>	\vdash
120	118,25	121,75		70	100	75		80		80						\vdash
140/160	ls -2,00	$l_s + 2,00$		70	100	75		80		80				<u> </u>	<u> </u>	
180	178,00	182,00		70		75		100		100						\vdash
200/220	$l_{s} - 2,00$	$l_{s}+2,00$		70		100		100		100						\vdash
240/260	ls -2,00	$l_{s}+2,00$		70		100		100		120						
280/300	$l_{s} - 2,00$	$l_{s}+2,00$		70		100		115		120						
320	317,00	323,00				100		115								
330	327,00	333,00						115								
340	337,00	343,00				100		115								
350	347,00	353,00								145						
360/380		ls +3,00				100		115								
ins	steps of 501	nm														
	$1_{s} - 3,00$	$l_{s} + 3,00$				100		115		145						
550/600	ls -3,00									145						

Intermediate lengths at ls are possible

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

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

All sizes in mm

fischer Power-Fast and Construction Screws	Annex A10 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 24 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 24 / 41



1) optional

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

	bon steel sible surface	treatments:	yellow	or blue	zinc-p	lated, ł	olue zinc-pla	ated ≥	12µm,	bonus	-zince	:d				
No	minal dian	neter	8	,0	10),0										
4	Outer diame	eter	8,	00	10	,00										
d –	Allow. devi	ation	±0	,30	±0	,40										
d	Core diame	ter	5,	40	6,	35										
ul	Allow. devi	ation		-0,30/	+0,20											
dh	Head diame	ter	14	,40	18	,40										
uh	Allow. devi	ation		±0	,40											
d.	Shank diam	eter	5,	90	7,	10										
us	Allow. devi	ation		-0,30/	+0,10											
h	Head heigh	t	6,00	-7,00	7,50	-8,50										
	Thread pitc	h	5,	20	5,	60										
р	Allow. devi	ation		±l	0%											
l _r 1)	Shank rib le	ength		13	3,0											
1r ·	Allow. devi			-2,	.00											
	Drive TX			4	0											
	Screw lengtl	n ls	Stand	dard th	read le	ength	lgf = Full t	hread	$ l_{gp} =$	Partia	al thre	ad T	olerar	nce: ± 2	2,0	
Nomina length	min	max	$l_{\rm gf}$	\mathbf{l}_{gp}	\mathbf{l}_{gf}	lgp										
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	120 118,25 121,75			75		80										
ir	steps of 10	mm														
130-40	$0 l_s - 2,00$	$l_s + 2,00$		75		80										

All sizes in mm

Intermediate lengths at ls are possible

• Threaded lengths between $4 \times d \le l_g \le l_{gmax}$ are possible

fischer Power-Fast and Construction Screws	Annex A11 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 25 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 25 / 41 ls





1) optional

FCS wood construction screw - Flange head with partial thread

No	minal dian	neter	8	,0	10	0,0									1	
	Outer diam	eter	8,	00	10	,00										
d	Allow. dev	iation	-0,40	+0,30	±0	,40										
dı	Core diame	ter	5,	40	6,	35										
^a 1	Allow. devi	iation		±0	,30											
d _h	Head diame	eter	21	,00	24	,70										
uh	Allow. devi	iation	±l	,00	-1,20/	/+2,80										
d.	Shank diam	neter	5,	90		10										
us	Allow. dev				+0,20											
h	Head heigh			-4,50		-5,70										
p	Thread pitc		5,	20		60										
Р	Allow. dev			±l	0%											
l ¹)	Shank rib le				,00											
AT .	Allow. dev				,00											
	Drive TX			4	0											
	Screw length	h ls	Stand	dard th	read le	ength	$l_{gf} = F$	ull thre	ad l _g	,=Part	tial thr	ead T	oleran	ice: ± 2	2,0	
Nomina	min	max	lgf	$l_{\rm gp}$	lgf	l _{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										
	1 steps pf 10															
130-40	$0 1_s - 2,00$	$l_s + 2,00$		75		80										

Intermediate lengths at l_s are possible Threaded lengths between $4{\times}d \leq l_g \leq l_{gmax}$ are possible .

fischer Power-Fast and Construction Screws	Annex A12 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 26 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 26 / 41 ls



Shank ribs¹⁾ ¹⁾ optional

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

Stain	less steel															
Nom	inal dian	neter	3	,0	3	,5	4	,0	4	,5	5	,0	6	,0		
d O	uter diame	eter	3,	00	3,	50	4,	00	4,	50	5,	00	6,	00		
d A	llow. devi	ation						±0	,30							
d	ore diame		2,	00		20		50	2,	70	3,	00		00		
A	llow. devi						/ +0,10)					,20			
d	ead diame		6,	00	7,	00		00		00	10	,00	12	,00		
- A	llow. devi						-		(+0,10							
	hank diam		2,	25	2,	60		90		25	3,	60	4,	30		
A	llow. devi								/ +0,10							
	ead height			90		10		50		70		00		80		
	hread pitcl		1,	50	1,	80	2,	00		20	2,	50	3,00	-4,50		
- A	llow. devi								0%							
	hank rib le		3,	75		25	4,	75	5,	50		00	7,	00		
- A	llow. devi					,75					-	,00				
	Drive TX			-	0				20		20	25		30		
	Drive PZ			1					2					3		
Sc	rew length	1 ls	Stan	dard th	read le	ength	l _{gf} =F	ull- th	read 1	_{gp} =Par	tial th	read]	Folera	nce: ± 2	2,02)	
Nominal length	min	max	\mathbf{l}_{gf}	\mathbf{l}_{gp}	\mathbf{l}_{gf}	l_{gp}	lgf	\mathbf{l}_{gp}	lgf	\mathbf{l}_{gp}	\mathbf{l}_{gf}	$l_{\rm gp}$	lgf	\mathbf{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		
70	68,50	71,50						42		42		42	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	<u> </u>	60		
110	108,25	111,75										70	<u> </u>	70	\vdash	
120	118,25	121,75										70	<u> </u>	70	\vdash	
	teps of 10					<u> </u>			<u> </u>				<u> </u>	70		
130-300	$l_s - 2,00$	$l_s + 2,00$												/0		

All sizes in mm

.

.

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

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

fischer Power-Fast and Construction Screws	Annex A13 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 27 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 27 / 41 ls



Shank ribs¹ ¹⁾ optional

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

• St	ainle	ess steel															
No	mi	nal dian	neter	3	,0	3	,5	4	,0	4	,5	5	,0	6	,0		
	Ou	iter diame	eter	3,	00	3,	50	4,	00	4,	50	5,	00	6,	00		
d	Al	low. devi	ation						±0	,30							
	Co	ore diame	ter	2,	00	2,	20	2,	50	2,	70	3,	00	4,	00		
d ₁	Al	low. devi	ation				-0,25	+0,10)				±0	,20			
	He	ead diame	ter	6,	00	7,	00	8,	00	9,	00	10	,00	12	,00		
dh	Al	low. devi	ation						-0,50	/+0,10							
	Sh	ank diam	eter	2,	25	2,	60	2,	90	3,	25	3,	60	4,	30		
ds	Al	low. devi	ation						-0,30/	+0,10)						
h	He	ad height	t	1,	90	2,	10	2,	50	2,	70	3,	00	3,	80		
	Th	read pitcl	h	1,	50	1,	80	2,	00	2,	20	2,	50	3,00	-4,50		
p	Al	low. devi	ation						±l	0%							
1.11	Sh	ank ribs l	ength	3,	75	4,	25	4,	75	5,	50	6,	00	7,	00		
l _r 1)	Al	low. devi	ation			±0	,75					±1	,00,				
	I	Drive TX			1	0			2	0		20	25	3	0		
	J	Drive PZ		1	1				1	2					3		
	Scr	ew length	n l _s	Stand	dard th	read le	ength	$l_{gf} = F_{f}$	ull thre	ad lg	=Part	ial thre	ead T	oleran	ce: ± 2	,0 ²⁾	
Nomir lengt		min	max	l _{gf}	\mathbf{l}_{gp}	$l_{\rm gf}$	lgp	l _{gf}	\mathbf{l}_{gp}	l_{gf}	lgp	$l_{\rm gf}$	lgp	$l_{\rm gf}$	lgp		
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	\rightarrow	33,50	36,50	31	24	31	24	31	24	30	24	29	24	28		<u> </u>	<u> </u>
40	\rightarrow	38,50	41,50		24	36	24	36	24	35	24	34	24	33		<u> </u>	<u> </u>
45	\rightarrow	43,50	46,50		30		30	41	30	40	30	39	30	38		<u> </u>	<u> </u>
50	+	48,50	51,50			-	30	46	30	45	30	44	30 36	43		<u> </u>	<u> </u>
55 60	+	53,50 58,50	56,50					-	36 36		36		36	53			-
70	+	68,50	61,50 71,50						42		42		42	63		<u> </u>	<u> </u>
80	+	78,50	81,50						50		50		50	73		<u> </u>	<u> </u>

All sizes in mm

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

.

fischer Power-Fast and Construction Screws	Annex A14 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 28 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 28 / 41 ls



Shank ribs

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

• Sta	inless steel															
No	minal dian	neter	4	,0	4	,5	5	,0								
	Outer diam	eter	4,	00	4,	50	5,	00								
d	Allow. devi	iation			±0	,30	500.									
	Core diame	ter	2,	50	2,	70	3,	00								
d_1	Allow. devi	iation		-0,25 /	+0,10)	±0	,20								
	Head diame	eter	6,	90	6,	90	7,	80								
dh	Allow. devi	iation			±0	,50										
	Shank diam	neter	2,	90	3,	25	3,	60								
d _s	Allow. devi	iation			-0,30	+0,10)									
h	Head heigh	t	2,	50		70	-	00								
	Thread pitc		2.	00	2.	20	2.	50								
p	Allow. devi				±1	0%					<u> </u>		<u> </u>		+	
	Should all a longth			4,75 5,50				00					<u> </u>		<u> </u>	
l _r ¹⁾	l _r ¹⁾ Allow. deviation			.75		±1	,00				<u> </u>		<u> </u>		+	
	Drive TX			2	0		20	25			<u> </u>		<u> </u>		+	
	Drive PZ					2					<u> </u>		1		\square	
1	Screw lengtl	n ls	Stan	dard th	read le	ength	lef=Fu	all thre	ad l	p =Part	ial thr	ead T	oleran	ce: ± 2	.0 ²⁾	
Nomina	al min	max	lef	lgp	lef	lgp	lgf	lgp							Î	Τ
length	1 18,95	21,05	16	-84	16	-84	-84	-86	<u> </u>			<u> </u>				─
20 25	23,75	26,25	21	18	20	<u> </u>	<u> </u>			-		<u> </u>		+		+
30	28,75	31,25	26	18	25	18	24			-	<u> </u>	<u> </u>		+	<u> </u>	+
35	33,50	36,50	31	24	30	24	29	24		<u> </u>		\vdash		+	<u> </u>	+-
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								

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

.

All sizes in mm

fischer Power-Fast and Construction Screws	Annex A15 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 29 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 29 / 41



-Trade mark¹⁾ Drive

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

No	minal dia	meter	3	,0	3	,5	4	,0	4,	,5	5	,0	6	,0			
d			3,	00	3,	50	4,	00	4,	50	5,	00	6,	00			
a	Allow. dev	viation						±0	,30								
d1	Core diam	eter	2,	00	2,	20	2,	50	2,	70	3,	00	4,	00			
\mathbf{u}_1	Allow. dev	viation				-0,25	+0,10					± 0	,20				
4	Head diam	leter	6,	00	7,	00	8,	00	9,	00	10	,00	12	,00			
ah	Allow. deviation Core diameter Allow. deviation Head diameter Allow. deviation Shank diameter Allow. deviation Image: Shank diameter Allow. deviation Image: Shank diameter Allow. deviation Image: Allow. deviation<							-0,50 /	+0,10	<u> </u>							
d	Shank dian	neter	2,	25	2,	60	2,	90	3,	25	3,	60	4,	30			
ds	Allow. dev	viation						-0,30 /	+0,10)	1 1 1 1 1 18 24 1 1 124 29 24 28 124 34 24 33 124 34 24 33 124 34 24 33 124 34 24 33 124 34 24 33 130 39 30 38 130 44 36 43 136 49 36 48 136 42 53 36 142 50 63 42						
h	Head heig	ht	2,	30	2,	50	2,	90	3,	10	3,	40	3,	80			
	Thread pit	ch	1,	50	1,	80	2,	00	2,	20	2,	50	3,00	-4,50			
p	Allow. dev	viation						±l	0%								
1.1)	Shank ribs	length	3,	75	4,	25	4,	75	5,	50	6,	00	7,	00			
Ir"	Allow. dev	viation			±0	,75					±1	,00,					
				1	0			2	0		20	25	3	0			
	Drive PZ			1					2					3			
			Ston	dard th	road le	math	1 = E	all three	ad 1	-Dort	ial the	adlT	alaran	co: + 2	02)		
	0	ui is	Stan	uaru m	Icau Ic	ngui	Igt - I						l	1 = 2,			
	l min	max	lgf	lgp	lgf	lgp	lgf	l_{gp}	lgf	lgp	lgf	l _{gp}	lgf	lgp			
		21,05	16		16		16								-+		
		26,25	21		21	18	20	18	20						-+		
		31,25	26	18	26	18	25	18	25	18	24				-+		
35	33,50	36,50	31	24	31	24	30	24	30	24		24	28				
40	38,50	41,50		24	36	24	35	24	35	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			2		50	36	50	36	49						
60	58,50	61,50						36		36			_				
70	68,50	71,50						42		42							
80	78,50	81,50						50		50			73		$ \rightarrow $		
90	88,25	91,75										60		60	\rightarrow		
100	98,25	101.75										60		60	- 1		

.

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

.

fischer Power-Fast and Construction Screws	Annex A16 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 30 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Is Appendix 30 / 41



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

Stair	nless steel															
Non	ninal dian	neter	5,	,0												
	Outer diame	eter	5,	5,00												
d	Allow. devi	ation	-0,	30												
d ₁	Core diame	ter	3,	00												
	Allow. devi	ation	±0	,20												
d _u	Underhead	diameter	5,	00												
uu .	Allow. devi	ation	-0,	35												
d _h	Head diame	eter	8,	25												
uh	Allow. devi	ation	±0	,40												
	Height		2,	50												
E A	Allow. devi	ation	±0	,30												
h]	Head height	t	2,	60												
	Thread pitc	h	2,	50												
p _	Allow. devi	ation	±1	0%												
	Drive TX		20	25												
S	crew length	ı l _s	Stand	lard th	read lo	ength	lgf=F	ull thre	ead lg	p =Part	tial thr	ead T	oleran	ce: ± 2	2,02)	
Nominal length	min	max	lgf	$l_{\rm gp}$												
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													

Intermediate lengths at ls are possible

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

All sizes in mm

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

Page 31 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 31 / 41



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	leter	6,	00	8,	00										
a A	Allow. dev	iation		±0	,30											
	Core diame		4,	00		40										
· A	llow. dev				0,20											
d	lead diam			12,00		14,40										
- P	llow. dev			/+0,10		,40										
d	hank dian			30		90										
A	llow. dev		-	/+0,10	-	,20							<u> </u>		<u> </u>	
	lead heigh			80		10							<u> </u>		<u> </u>	
	hread pite		3,00-			00							<u> </u>		<u> </u>	
- P	llow. dev			-	0%	0.0	<u> </u>		<u> </u>		<u> </u>				<u> </u>	
	1)			00	13,00				<u> </u>		<u> </u>					
Allow. deviation		_	,00	-2,00		<u> </u>		<u> </u>						<u> </u>		
	Drive TX Drive PZ		-	3	-	-									-	
0			<u> </u>	<i></i>			1 1			D		1.1.0				
	rew lengtl	1 l _s	Stan	dard th	read lo	ength	l _{gf} =Fi	ull thre	ead I_{i}	_{zp} =Part	hal thr	ead []	olerar	nce: ± 2	2,0	
Nominal length	min	max	$l_{\rm gf}$	$l_{\rm gp}$	$l_{\rm gf}$	$l_{\rm gp}$										
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			70		75				<u> </u>			L		<u> </u>	
180	178,00			70		75						<u> </u>	<u> </u>	 	<u> </u>	
	teps of 201			70		100						<u> </u>			<u> </u>	
	$l_{s} - 2,00$			70		100						<u> </u>	-		<u> </u>	-
	teps of 201					100						<u> </u>		+	<u> </u>	
320-500	l _s -3,00	$I_s + 3,00$				100										

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

fischer Power-Fast and Construction Screws	Annex A18 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 32 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02



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

Stain	less steel															
Non	ninal dia	meter	6	,0	8	,0										
, (Outer diam	eter	6,	00	8,	00										
d	Allow. dev	iation		±0	,30	.30										
d1 (Core diamo	eter	4,	00	5,40											
-1 1	Allow. dev			-0,30/+		/+0,20										
d _h I	Head diam	eter	13	,70	21	,00										
	Allow. dev			+1,30		,00										
ds S	Shank dian	neter	4,	30	5,	90										
	Allow. dev				+0,10											
	Head heigh			- ,	50											
- 1	Allow. dev				,00											
	Thread pite		3,00	-4,50	- ,	00										
	Allow. dev				0%											
	Shank rib l		8,	00		,00										
- I	Allow. dev				00										<u> </u>	
	Drive TX			0		0										
	crew lengtl	ı l _s	Stan	dard th	read le	ength	l _{gf} =F	ull thre	ead lg	p =Part	ial thr	ead T	oleran	ice: ± 2	2,0	
Nominal length	min	max	lgf	\mathbf{l}_{gp}	\mathbf{l}_{gf}	l _{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										
	teps of 20															
		$l_s + 2,00$		70		100										
	teps of 20															
320-500	$l_{s} - 3,00$	$l_{s} + 3,00$				100										

All sizes in mm

-Trade mark¹¹

Intermediate lengths at ls are possible

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

fischer Power-Fast and Construction Screws	Annex A19 of European Technical Assessment
Sizes and Material	ETA-11/0027

Page 33 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02 Appendix 33 / 41



Washer fo	r Power-	Fast and	construction screws
-----------	----------	----------	---------------------

N	ominal diameter		Ty	pe 1			Type 2	
	Size	6	8	10	12	6	8	10
db	Inner diameter	6,70	8,70	11,20	6,70	6,70	8,70	11,20
ab	Allow. deviation				-0,40			
de la	Outer diameter	21	30	35	43	21	25,50	30,50
da	Allow. deviation				±2,0			
	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		-	

All sizes in mm

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



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

Annex B2 Fixing of on-roof insulation system Point loads F_b perpendicular to the battens



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

where

 $\begin{array}{l} D_b = \text{point load by dead load} \\ S_b = \text{point load by snow load} \\ W_b = \text{point load perpendicular to the batten by wind load (pressure)} \\ e_b = \text{distance of the battens} \\ e_r = \text{distance of the rafters} \\ s = \text{snow load per m}^2 \text{ ground area} \\ w_p = \text{wind pressure on the roof area} \\ d = \text{dead load per m}^2 \text{ roof area} \\ \beta = \text{roof angle} \end{array}$

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

Point loads F, perpendicular to the battens by screws



$$\begin{split} & D_s = d \cdot e_s \cdot e_r \\ & S_s = s \cdot e_s \cdot e_r \cdot \cos\beta \\ & R_s = (D_s + S_s) \cdot \sin\beta \\ & F_s = R_s / \tan\alpha \end{split}$$

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

 $e_s = distance \ of \ the \ screws$

- $e_r = distance of the rafters$
- α = angle between screw axis and perpendicular to rafter axis

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

Design of the battens

The bending stresses are calculated as:

$$\mathsf{M} = \frac{(\mathsf{F}_{\mathsf{b}} + \mathsf{F}_{\mathsf{s}}) \cdot \ell_{\mathsf{char}}}{4}$$

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_{ef} = 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

 $t_{\rm HI}$ = 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 ETA-11/0027	
Accessories		

Design of the screws

Appendix 38 / 41

The screws are loaded predominantly axially. The axial tension force in the screw may be calculated from the shear loads of the roof R_s :

$$T_{S} = \frac{R_{S}}{\cos \alpha}$$

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 :

$$\mathsf{F}_{_{\mathsf{ax},\alpha,\mathsf{Rd}}} = \mathsf{min} \begin{cases} \mathsf{k}_{_{\mathsf{ax}}} \cdot \mathsf{f}_{_{\mathsf{ax},\mathsf{d}}} \cdot \mathsf{d} \cdot \ell_{_{\mathsf{ef}}} \cdot \mathsf{k}_{_{1}} \cdot \mathsf{k}_{_{2}} \left(\frac{\rho_{_{\mathsf{k}}}}{350}\right)^{\!\!\!0,\!\!\!0} \\ \mathsf{f}_{_{\mathsf{head},\mathsf{d}}} \cdot \mathsf{d}_{_{\mathsf{h}}}^{^{2}} \cdot \left(\frac{\rho_{_{\mathsf{k}}}}{350}\right)^{\!\!0,\!\!0} \end{cases}$$

where:

$\mathbf{f}_{\mathrm{ax,d}}$	design value of the axial withdrawal parameter of the threaded part of the screw
d	outer thread diameter of the screw
lef	Point side penetration length of the threaded part of the screw in the rafter, $l_{\rm ef}\!\geq\!40~mm$
α	Angle between grain and screw axis ($\alpha \ge 30^\circ$)
ρ_k	characteristic density of the wood-based member [kg/m3]
$\mathbf{f}_{\mathrm{head},\mathrm{d}}$	design value of the head pull-through capacity of the screw
$\mathbf{d}_{\mathbf{h}}$	head diameter
\mathbf{k}_1	min $\{1; 200/t_{\rm HI}\}$
\mathbf{k}_2	min {1; $\sigma_{10\%}/0, 12$ }
t _{HI}	thickness of the heat insulation [mm]
σ 10%	compressive stress of the heat insulation under 10 % deformation [N/mm2]

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-Kast and Construction Screws	Annex B2 of European Technical Assessment		
	ETA-11/0027		

Appendix 39 / 41

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:

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

Where:

- $\begin{array}{ll} f_{h,b,k} & \mbox{Characteristic batten embedding strength [N/mm^2]} \\ f_{h,r,k} & \mbox{Characteristic rafter embedding strength [N/mm^2]} \\ \beta & \mbox{f}_{h,r,k}/f_{h,b,k} \end{array}$
- d Outer thread diameter [mm]
- t_b Batten thickness [mm]
- tr The lower value of rafter thickness or screw penetration length [mm]
- til Interlayer thickness [mm]
- M_{y,k} Characteristic fastener yield moment [Nmm]
- Fax,Rk Characteristic axial tensile capacity of the screw [N]

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

Page 40 of 41 of European Technical Assessment no. ETA-11/0027, issued on 2019-01-02

Appendix 40 / 41

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

	a1	a _{3,t}	a _{3,c}	a ₂	a _{4,t}	a _{4,c}
Plane surface (see Figure 1)	$4 \cdot d$	$6 \cdot d$	$6 \cdot d$	2,5 · d	$6 \cdot d$	2,5 · d
Edge surface (see Figure 2)	10 · d	12 · d	$7 \cdot d$	$4 \cdot d$	6 · d	$3 \cdot d$

fischer Power-Fast and Construction Screws	Annex C of European Technical Assessment ETA-11/0027	
Minimum distances and spacings		

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 $2xM8 (\geq 4.6$ 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)

fischer Power-Fast and Construction Screws	Annex D of European Technical Assessment		
clamping of the screw head for compression impact	ETA-11/0027		