IZJAVA O SVOJSTVIMA

No. 0046 – HR

1. Jedinstveni identifikator tipa proizvoda: **fischer Power-Full vijci**

2. Namjena korištenja:

Proizvod	**Namjena korištenja**
Vijci za uporabu u drvenim konstrukcijama	Za učvršćivanje u nosivim drvenim konstrukcijama,kao i vlačne i tlačne armature,ili za učvršćivanje toplinske izolacije na krovnim gredama,za statička i kvazi-statička opterećenja, vidi dodatak .

3. Proizvođač: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Straße 1, 72178 Waldachtal, Germany**

4. Ovlašteni zastupnik: **--**

5. Sistem/i od AVCP **3**

6a. Harmonizirani standardi:---

Prijavljeno tijelo/prijavljena tijela: ---

6b. Europski dokument za ocjenjivanje: **EAD 130118-00-0603**

Europska tehnička ocjena: **ETA-12/0073; 2016-05-31**

Tijelo za tehničko ocjenjivanje: **ETA-Danmark A/S**

Prijavljeno tijelo/prijavljena tijela: **1343 – MPA Darmstadt**

7. Objavljena svojstva:

Mehanička otpornost i stabilnost (BWR 1)

Bitne karakteristike	**Svojstva**
Vlačna čvrstoća Vijci izrađeni od ugljičnog čelika	Karakterisična vrijednost $f_{tens,k}$: Vijak d = 6,5 mm: 13 kN Vijak d = 8,0 mm: 20 kN Vijak d = 10,0 mm: 28 kN
Trenutak umetanja	Omjer karakteristične torzijske čvrstoće u momentu umetanja: $f_{tor,k} / R_{tor,mean} > 1,5$
Torzijska čvrstoća Vijci izrađeni od ugljičnog čelika	Karakterisična vrijednost $f_{tor,k}$: Vijak d = 6,5 mm: 12 Nm Vijak d = 8,0 mm: 22 Nm Vijak d = 10,0 mm: 40 Nm

Sigurnost u slučaju požara (BWR 2)

Bitne karakteristike	**Svojstva**
Reakcija na požar	Vijci zadovoljavaju zahtjeve za klasu A 1

8. Odgovarajuća tehnička dokumentacija i/ili specifična tehnička dokumentacija: ---

Svojstva gore navedenog proizvoda su u skladu sa skupom izjava o svojstvima. Ova izjava o svojstvima se izdaje, u skladu sa Europskom regulativom (EU) Br. 305/2011, pod punom odgovornošću gore navedenog proizvođača.

Za proizvođača i u njegovo ime potpisao:

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

Tumlingen, 2016-06-07

- Ovaj DoP je pripremljen u različitim jezicima. U slučaju da postoji spor u tumačenju, engleska verzija će uvijek prevladati.
- U aneksu se nalaze dodatni podaci na engleskom jeziku, koji ne podliježu zakonskoj regulativi

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product
Fischer Power-Full screws are self-tapping screws to be used in timber structures. The screws shall be threaded over the full length. The screws shall be produced from carbon steel wire for nominal diameters of 6,5 mm to 10,0. 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 6,5 mm and shall not be greater than 10,0 mm. The overall length, L, of screws shall not be less than 120 mm and shall not be greater than 600 mm. Other dimensions are given in Annex A.

The ratio of inner thread diameter to outer thread diameter d_i/d ranges from 0,57 to 0,72.

The screws are threaded over the full length of the screws.

The lead p (distance between two adjacent thread flanks) ranges from 0,56·d to 0,81·d.

No cracks shall be observed at a bend angle, α, of less than $(45/d^{0,7} + 10)$ degrees.

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), glued laminated timber, cross-laminated timber, and laminated veneer lumber, similar glued members, wood-based panels or steel. The screws are also used as tensile or compressive reinforcement perpendicular to the grain.

Furthermore fischer Power-Full screws with diameters between 6 mm and 10 mm may also be used for the fixing of thermal insulation on rafters.

Steel plates and wood-based panels except solid wood panels 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
- Solid wood panels according to EN 13353 and EN 13986 and cross laminated timber according to ETA
- Laminated Veneer Lumber, LVL
- Engineered wood products according to ETA, provided that the ETA for the product provides provisions for the use of self-tapping screws and these provisions are applied

The screws shall be driven into the wood without pre-drilling or after pre-drilling with a diameter not larger than the inner thread diameter for the length of the threaded part.

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 (EU) shall be fulfilled.

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.

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

Section 3.11 of this ETA contains the corrosion protection for fischerwerke screws made from carbon steel. The martensitic stainless steel screws are for use in timber structures subject to the conditions defined by the service classes 1 and 2 of EN 1995-1-1 (Eurocode 5).

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

Characteristic		Assessment of characteristic
3.1	**Mechanical resistance and stability*) (BWR1)**	
	Tensile strength	Characteristic value $f_{tens,k}$:
	Screws made of carbon steel	Screw d = 6,5 mm: 13 kN Screw d = 8,0 mm: 20 kN Screw d = 10,0 mm: 28 kN
	Insertion moment	Ratio of the characteristic torsional strength to the mean insertion moment: $f_{tor,k} / R_{tor,mean} \geq 1,5$
	Torsional strength	Characteristic value $f_{tor,k}$:
	Screws made of carbon steel	Screw d = 6,5 mm: 12 Nm Screw d = 8,0 mm: 22 Nm Screw d = 10,0 mm: 40 Nm
3.2	**Safety in case of fire (BWR2)**	
	Reaction to fire	The screws are made from steel classified as performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC, amended by EC Decision 2000/605/EC.
3.3	**Hygiene, health and the environment (BWR3)**	
	Influence on air quality	The product does not contain/release dangerous substances specified in TR 034, dated October 2015 **)
3.7	**Sustainable use of natural resources (BR7)**	No Performance Determined
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 and 2
	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.

3.9 Mechanical resistance and stability

The load-carrying capacities for E.u.r.o.Tec 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 E.u.r.o.Tec screws should be used for designs in accordance with Eurocode 5 or an appropriate national code.

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

ETA's for structural members or wood-based panels must be considered where applicable.

Lateral load-carrying capacity
The characteristic lateral load-carrying capacity of fischer Power-Full 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:

fischer Power-Full screws for 6,5 mm $\leq$ d $\leq$ 10,0 mm made of carbon steel:
$M_{y,k} = 0{,}15 \cdot 600 \cdot d^{2,6}$ [Nmm]

where
d outer thread diameter [mm]

Axial withdrawal capacity
The characteristic axial withdrawal capacity of fischer Power-Full in solid timber (softwood), glued laminated timber or cross-laminated timber members at an angle of $30° \leq \alpha \leq 90°$ to the grain shall be calculated according to EN 1995-1-1:2008 from:

$$F_{ax,\alpha,Rk} = \frac{n_{ef} \cdot f_{ax,k} \cdot d \cdot \ell_{ef}}{1{,}2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \quad [N]$$

Where

$F_{ax,\alpha,RK}$	characteristic withdrawal capacity of the screw at an angle α to the grain [N]
n_{ef}	effective number of screws according to EN 1995-1-1:2008
$f_{ax,k}$	Characteristic withdrawal parameter Screw with drill tip: $f_{ax,k}$ = 9,0 N/mm² Screws without drill tip: Screw ∅ 6,5 mm: $f_{ax,k}$ = 11,4 N/mm² Screw ∅ 8,0 mm: $f_{ax,k}$ = 11,1 N/mm² Screw ∅ 10,0 mm: $f_{ax,k}$ = 10,8 N/mm²
d	outer thread diameter [mm]
ℓ_{ef}	pointside penetration length of the threaded part according to EN 1995-1-1:2008 [mm]
α	angle between grain and screw axis ($\alpha \geq 30°$)
ρ_k	characteristic density [kg/m³]

The axial withdrawal capacity is limited by the head pull-through capacity and the tensile or compressive capacity of the screw.

Bending angle
A minimum plastic bending angle of $45°/d^{0,7} + 20°$ was reached without breaking the screws.

Head pull-through capacity
The characteristic head pull-through capacity of fischer Power-Full screws shall be calculated according to EN 1995-1-1:2008 from:

$$F_{ax,\alpha,Rk} = n_{ef} \cdot f_{head,k} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \quad [N]$$

where:

$F_{ax,\alpha,RK}$	characteristic head pull-through capacity of the connection at an angle $\alpha \geq 30°$ to the grain [N]
n_{ef}	effective number of screws according to EN 1995-1-1:2008
$f_{head,k}$	characteristic head pull-through parameter [N/mm²]
d_h	diameter of the screw head [mm]
ρ_k	characteristic density [kg/m³], for wood-based panels ρ_k = 380 kg/m³

Characteristic head pull-through parameter for fischer Power-Full screws in connections with timber and in connections with wood-based panels with thicknesses above 20 mm:
$f_{head,k}$ = 12,0 N/mm²

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 N/mm²

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 N/mm²
limited to $F_{ax,Rk}$ = 400 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 $F_{ax,\alpha,Rk} = 0$.

The minimum thickness of wood-based panels according to the clause 2.1 must be observed.

In steel-to-timber connections the head pull-through capacity may be disregarded.

Tensile capacity
The characteristic tensile strength $f_{tens,k}$ of fischer Power-Full made of carbon steel is:

Screw d = 6,5 mm: 13 kN
Screw d = 8,0 mm: 20 kN
Screw d = 10,0 mm: 28 kN

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

Compressive capacity
The characteristic buckling capacity $R_{ki,k}$ of fischer Power-Full screws embedded in timber shall be calculated from:

$$F_{ki,Rk} = \kappa_c \cdot N_{pl,k} \quad [N]$$

where

$$\kappa_c = \begin{cases} 1 & \text{for } \bar{\lambda}_k \le 0,2 \\ \dfrac{1}{k + \sqrt{k^2 - \bar{\lambda}_k^2}} & \text{for } \bar{\lambda}_k > 0,2 \end{cases}$$

$$k = 0,5 \cdot \left[1 + 0,49 \cdot (\bar{\lambda}_k - 0,2) + \bar{\lambda}_k^2\right]$$

The relative slenderness ratio shall be calculated from:

$$\bar{\lambda}_k = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$$

Where

$$N_{pl,k} = \pi \cdot \frac{d_1^2}{4} \cdot f_{y,k} \quad [N]$$

is the characteristic value for the axial capacity in case of plastic analysis referred to the inner thread cross section.

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

Characteristic ideal elastic buckling load:
$N_{ki,k} = \sqrt{c_h \cdot E_S \cdot I_S}$ [N]

Elastic foundation of the screw:
$$c_h = (0,19 + 0,012 \cdot d) \cdot \rho_k \cdot \left(\frac{\alpha}{180°} + 0,5\right) \quad [N/mm^2]$$

Modulus of elasticity:
$E_s = 205000$ [N/mm²]

Second moment of area:
$$I_S = \frac{\pi}{64} \cdot d_1^4 \quad [mm^4]$$

d_1 = inner thread diameter [mm]

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

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

where
$F_{ax,Ed}$ axial design load of the screw
$F_{la,Ed}$ 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

Mechanically jointed beams
fischer Power-Full screws with a full thread may be used for connections in structural members which are composed of several parts in mechanically jointed beams or columns.

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

$$C = K_{ser} = 780 \cdot d^{0,2} \cdot \ell_{ef}^{0,4} \quad [N/mm]$$

Where
d outer thread diameter [mm]
ℓ_{ef} penetration length in the structural member [mm] (see Annex B)

Compression reinforcement
fischer Power-Full screws with a full thread may be used for reinforcement of timber members with compression stresses at an angle α to the grain of $45° < \alpha < 90°$. The compression force must be evenly distributed over all screws.

The characteristic load-carrying capacity for a contact area with screws with a full thread at an angle α to the grain of $45° \le \alpha \le 90°$ shall be calculated from:

$$F_{90,Rk} = \min \begin{cases} k_{c,90} \cdot B \cdot \ell_{ef,1} \cdot f_{c,90,k} + n \cdot \min\left(F_{ax,Rk}; F_{ki,Rk}\right) \\ B \cdot \ell_{ef,2} \cdot f_{c,90,k} \end{cases}$$

Where
$F_{90,Rk}$ Load-carrying capacity of reinforced contact area [N]
$k_{c,90}$ factor for compression perpendicular to the grain according to EN 1995-1-1
B bearing width [mm]
$\ell_{ef,1}$ effective length of contact area according to EN 1995-1-1 [mm]
$f_{c,90,k}$ characteristic compressive strength perpendicular to the grain [N/mm²]
n number of reinforcement screws, $n = n_0 \cdot n_{90}$
n_0 number of reinforcement screws arranged in a row parallel to the grain
n_{90} number of reinforcement screws arranged in a row perpendicular to the grain
$F_{ax,Rk}$ characteristic axial withdrawal capacity [N]
$F_{ki,Rk}$ characteristic buckling capacity [N]

$\ell_{ef,2}$ effective distribution length in the plane of the screw tips [mm]
$\ell_{ef,2}$ $= \ell_{ef} + (n_0 - 1) \cdot a_1 + \min(\ell_{ef}; a_{1,c})$ for end-bearings [mm]
$\ell_{ef,2}$ $= 2 \cdot \ell_{ef} + (n_0 - 1) \cdot a_1$ for centre-bearings [mm]
ℓ_{ef} point side penetration length [mm]
a_1 spacing parallel to the grain [mm]
$a_{1,c}$ end distance [mm]

Reinforcing screws for compression shall be arranged according to Annex C.

Reinforcing screws for wood-based panels are not covered by this ETA.

Thermal insulation material on top of rafters

fischer Power-Full screws may be used for the fixing of thermal insulation material on top of rafters.

The thickness of the insulation shall not exceed 300 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 arranged 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 rafter consists of solid timber (softwood) according to EN 338, glued laminated timber according to EN 14081, cross-laminated timber, and laminated veneer lumber according to EN 14374 or to ETA or similar glued members according to ETA.

The battens must be from solid timber (softwood) according to EN 338:2003-04. The minimum thickness t and the minimum width b of the battens is given as follows:

Screws $d \leq 8{,}0$ mm: $b_{min} = 50$ mm $t_{min} = 30$ mm
Screws $d = 10$ mm: $b_{min} = 60$ mm $t_{min} = 40$ mm

The insulation must comply with a ETA.

Friction forces shall not be considered for the design of the characteristic axial 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 $\alpha = 90°$) may be arranged if necessary.

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

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

Fixing of battens with alternatively inclined screws

The analysis of the fixing of the insulation and battens, respectively, may be carried out using the static model in Annex D. The battens must have sufficient strength and stiffness.

The characteristic axial tensile capacity of the fischer Power-Full screws for rafter or facade insulation shall be calculated from:

$$F_{ax,\alpha,Rk} = \min \left\{ \begin{array}{l} \dfrac{f_{ax,k} \cdot d \cdot \ell_{ef,b}}{1{,}2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\dfrac{\rho_{b,k}}{350} \right)^{0,8} \\ \dfrac{f_{ax,k} \cdot d \cdot \ell_{ef,r}}{1{,}2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\dfrac{\rho_{r,k}}{350} \right)^{0,8} \\ f_{tens,k} \end{array} \right\}$$

The characteristic axial compressive capacity of the fischer Power-Full screws for rafter or facade insulation shall be calculated from:

$$F_{ax,\alpha,Rk} = \min \left\{ \begin{array}{l} \dfrac{f_{ax,k} \cdot d \cdot \ell_{ef,b}}{1{,}2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\dfrac{\rho_{b,k}}{350} \right)^{0,8} \\ \dfrac{f_{ax,k} \cdot d \cdot \ell_{ef,r}}{1{,}2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\dfrac{\rho_{r,k}}{350} \right)^{0,8} \\ F_{ki,Rk} \end{array} \right\}$$

Where:

$F_{ax,\alpha,RK}$	Characteristic axial capacity of the screw at an angle α to the grain [N]
d	Outer thread diameter [mm]
$\ell_{ef,r}$	Point side penetration length of the threaded part according to EN 1995-1-1:2008 [mm]
$\ell_{ef,b}$	Length of the threaded part in the batten [mm]
α	Angle between grain and screw axis ($\alpha \geq 30°$)
$\rho_{r,k}$	Characteristic density of the rafter [kg/m³]
$\rho_{b,k}$	Characteristic density of the batten [kg/m³]
$f_{tens,k}$	Characteristic tensile strength of screw [N]
$F_{ki,Rk}$	Characteristic compressive capacity of screw depending on free screw length between counter batten and rafter

Free screw	Power-Full	Power-Full 8,0 mm	Power-Full 10,0 mm

length [mm]	6,5 mm		
	$F_{ki,Rk}$ [kN]	$F_{ki,Rk}$ [kN]	$F_{ki,Rk}$ [kN]
≤ 120	2,32	4,28	6,76
140	1,75	3,27	5,21
160	1,38	2,57	4,12
180	1,10	2,08	3,33
200	0,91	1,71	2,75
220	0,76	1,43	2,31
240	0,64	1,21	1,96
260	0,55	1,04	1,69
280	0,48	0,91	1,47
300	0,42	0,79	1,29
320	0,37	0,70	1,14
340	0,33	0,62	1,01
360	0,29	0,56	0,91
380	0,26	0,50	0,82
400	0,24	0,46	0,74
420	0,22	0,42	0,68

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1, 2 and 3.
The fischer Power-Full 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.

3.12 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), glued laminated timber, cross-laminated timber, and laminated veneer lumber, similar glued members, 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 associated ETA of the structural member a connection in load bearing timber structures with screws according to a ETA is allowed.

fischer fully threaded Power-Full screws are also used as tensile or compressive reinforcement perpendicular to the grain.

Furthermore the screws with diameters of at least 6 mm may also be used for the fixing of insulation on top of rafters.

A minimum of two screws should be used for connections in load bearing timber structures.

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

Wood-based panels 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 ETAs the terms of the ETAs must be considered.

If screws with an outer thread diameter $d \geq 8$ 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 or for screws with drill tips.

The minimum angle between the screw axis and the grain direction is $\alpha = 30°$.

The screws shall be driven into the wood with or without pre-drilling. The maximum pre-drilling diameter is the inner thread diameter for the length of the threaded part and the smooth shank diameter for the depth of the smooth shank. 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 Annex A the head must be flush with the surface of the connected structural member. A deeper countersink is not allowed.

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 1995-1-1:2004 (Eurocode 5) clause 8.3.1.2 and table 8.2 as for nails in non-predrilled holes.

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 $d \geq 8$ mm and timber thickness $t < 5 \cdot d$.

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

Minimum distances and spacing for exclusively axially loaded screws in non-predrilled holes in members with a minimum thickness $t = 10 \cdot d$ and a minimum width of 8·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 a_2 perpendicular to the grain $a_2 = 5 \cdot d$

Distance $a_{1,c}$ from centre of the screw-part in timber to the end grain $a_{1,c} = 10 \cdot d$
Distance $a_{2,c}$ from centre of the screw-part in timber to the edge $a_{2,c} = 4 \cdot d$

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

Minimum distances and spacing for exclusively axially loaded screws in predrilled holes or for fischer Power-Full screws with drill tip in non-predrilled holes in members with a minimum thickness $t = 10 \cdot d$ and a minimum width of 8·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 a_2 perpendicular to the grain $a_2 = 5 \cdot d$
Distance $a_{1,c}$ from centre of the screw-part in timber to the end grain $a_{1,c} = 5 \cdot d$
Distance $a_{2,c}$ from centre of the screw-part in timber to the edge $a_{2,c} = 3 \cdot d$

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

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, and $t = 40$ mm for screws with outer thread diameter $d = 10$ 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.

Annex A
Fischer Power-Full
Carbon steel: SAE 10B21

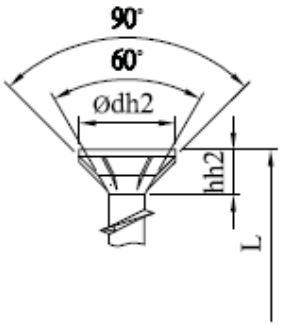
nominal size		Ø6,5	Ø8,0	Ø10,0
d	min	6,20	7,60	9,60
	max	6,80	8,30	10,20
di	min	4,20	5,00	5,70
	max	4,80	5,40	6,30
dh	min	7,70	9,50	12,50
	max	8,30	10,50	13,50
hh	min	5,20	6,60	6,00
	max	5,70	7,40	7,00
p	min	4,41	4,68	5,04
	max	5,39	5,72	6,16
dt	min	4,70	5,80	6,30
	max	5,10	6,20	6,70
ℓt	min	6,00	7,00	11,00
	max	8,00	9,00	12,00
dh2	min	11,50	14,00	15,50
	max	12,00	15,00	16,50
hh2	min	5,40	7,00	7,30
	max	5,90	7,40	7,70
dh3	min	-	21,50	19,50
	max		22,50	20,50
dm	min	-	5,40	6,80
	max		5,80	7,20
hm	min	-	4,30	3,80
	max		4,70	4,20
TX	torx size	TX30	TX40	TX30/TX40*
SW	wrench size	-	SW13	-

All specifications in mm.
* TX40 for countersunk head

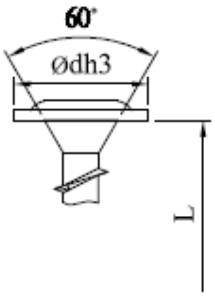
L +0/-2,0		
Ø6,5	Ø8,0	Ø10,0
120	155	200
140	195	220
160	220	240
195	245	260
-	295	280
-	330	300
-	375	330
-	400	360
-	-	400
-	-	450
-	-	500
-	-	550
-	-	600

All specifications in mm.

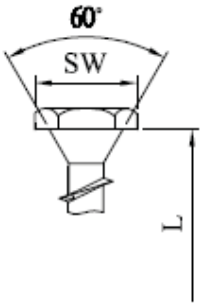
countersunk head

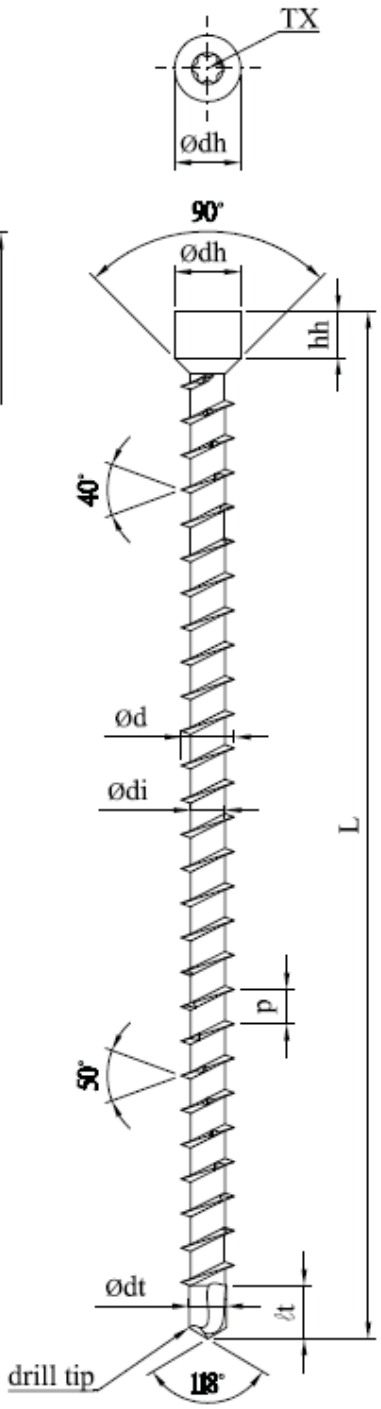


washer head

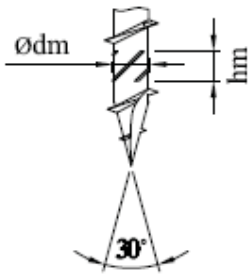


hexagon head





tip type 17M

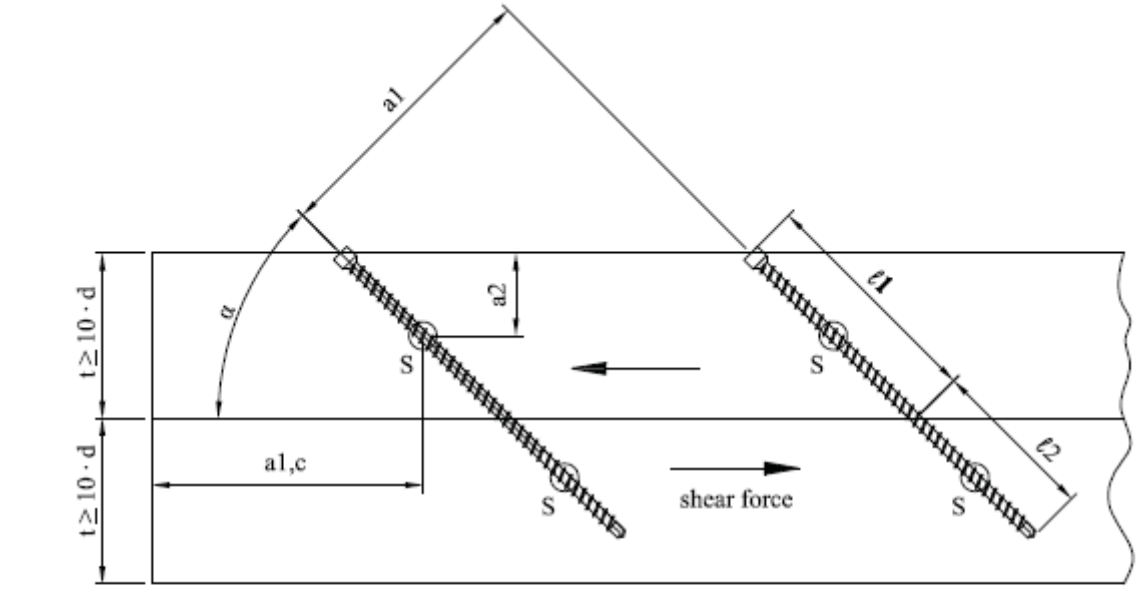


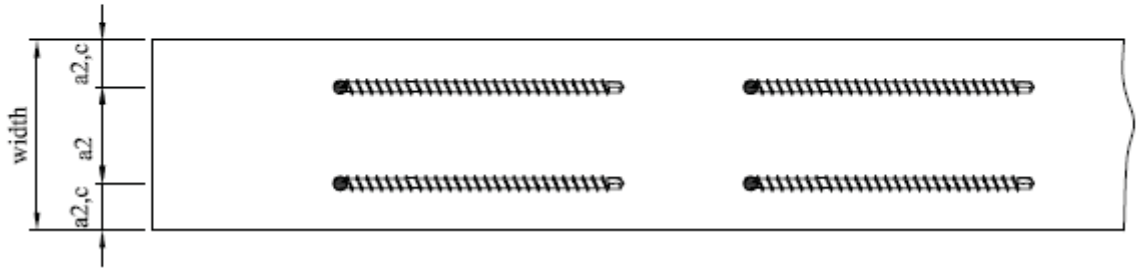
tip type 17



Annex B
Minimum distances and spacing

Axially loaded screws
Single configuration



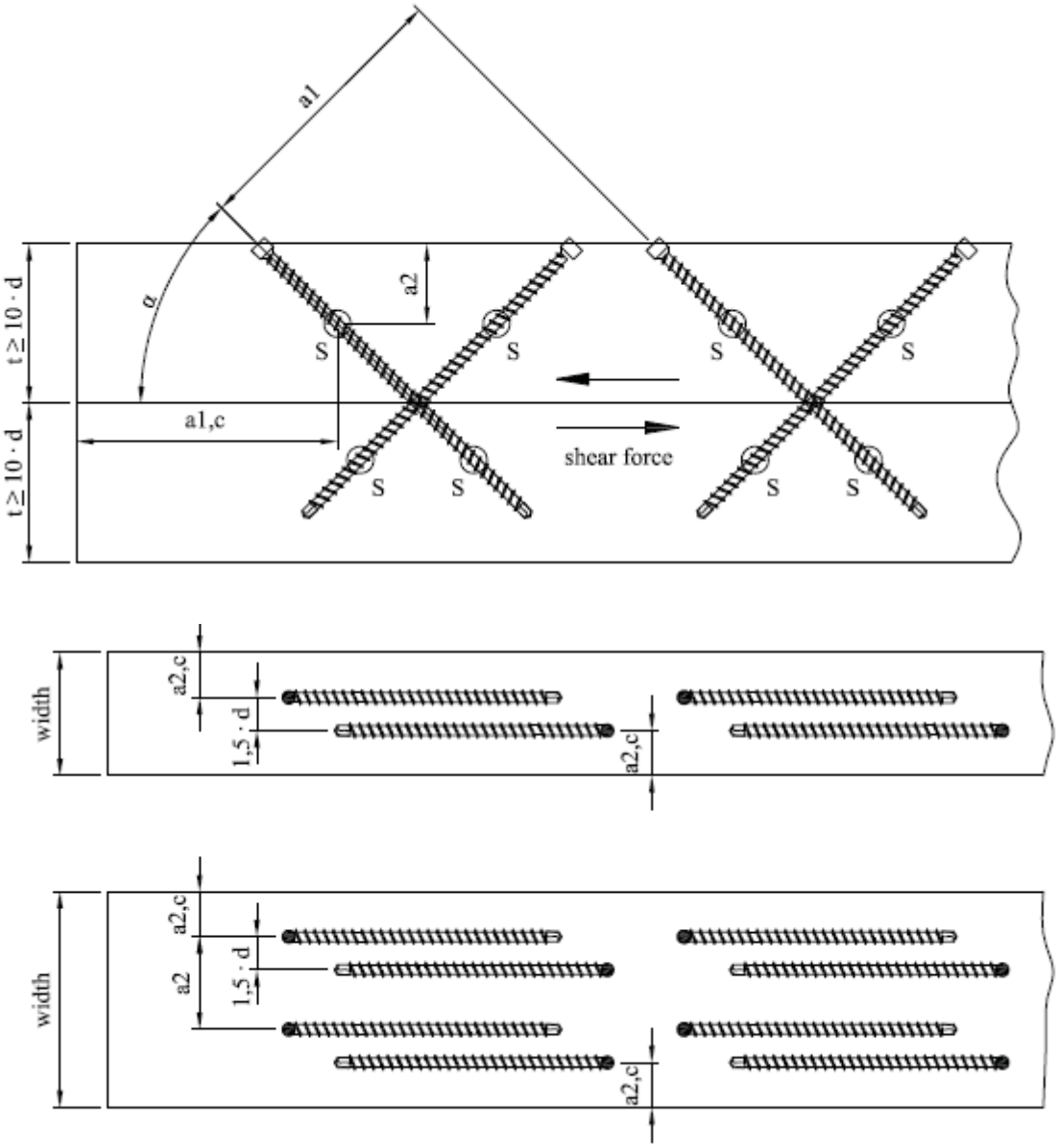


S = centroid of the part of the screw in the timber

$a_1 \geq 5 \cdot d$
$a_2 \geq 2{,}5 \cdot d$
$a_{1,c} \geq 10 \cdot d$ (for “fischer Power-Full” screws with drill tip $a_{1,c} \geq 5 \cdot d$)
$a_{2,c} \geq 4 \cdot d$ (for “fischer Power-Full” screws with drill tip $a_{2,c} \geq 3 \cdot d$)
$a_1 \cdot a_2 \geq 25 \cdot d^2$

Minimum distances and spacing see also 3.12
Minimum timber thickness $t = 10 \cdot d$, see also 3.12
Minimum timber width $w = \max(8 \cdot d; 60\ mm)$, see also 3.12
$30° \leq \alpha \leq 90°$, see also II.1

Axially loaded screws
Crosswise configuration



S = centroid of the part of the screw in the timber

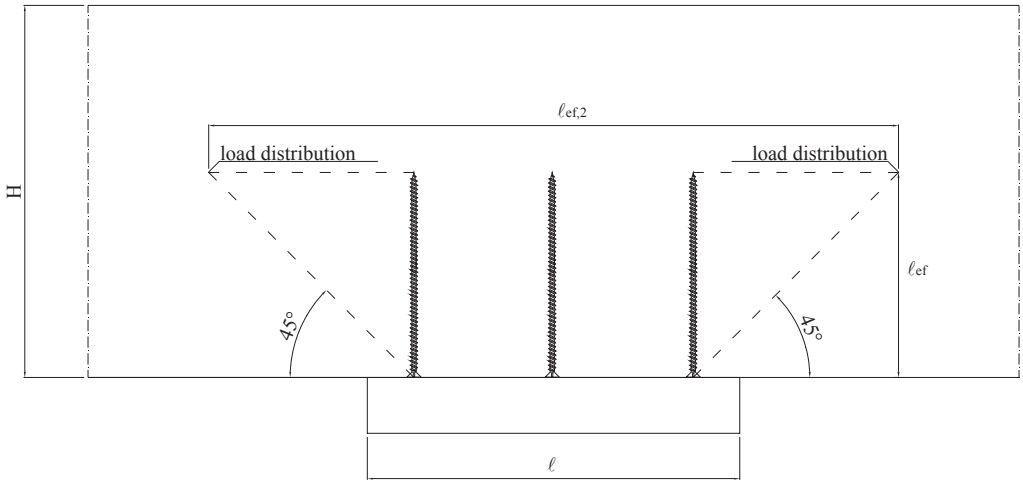
$a_1 \geq 5 \cdot d$
$a_2 \geq 2{,}5 \cdot d$
$a_{1,c} \geq 10 \cdot d$ (for “fischer Power-Full” screws with drill tip $a_{1,c} \geq 5 \cdot d$)
$a_{2,c} \geq 4 \cdot d$ (for “fischer Power-Full” screws with drill tip $a_{2,c} \geq 3 \cdot d$)
$a_1 \cdot a_2 \geq 25 \cdot d^2$

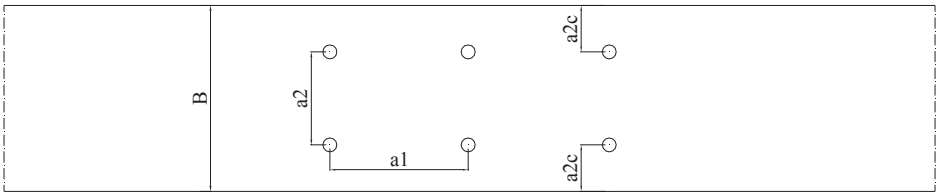
Minimum distance between crossing screws = $1{,}5 \cdot d$

Minimum distances and spacing see also 3.12
Minimum timber thickness $t = 10 \cdot d$, see also 3.12
Minimum timber width $w = \max(8 \cdot d; 60\ mm)$, see also 3.12
$30° \leq \alpha \leq 90°$, see also II.1

Annex C
Compression reinforcement
Compression reinforcement

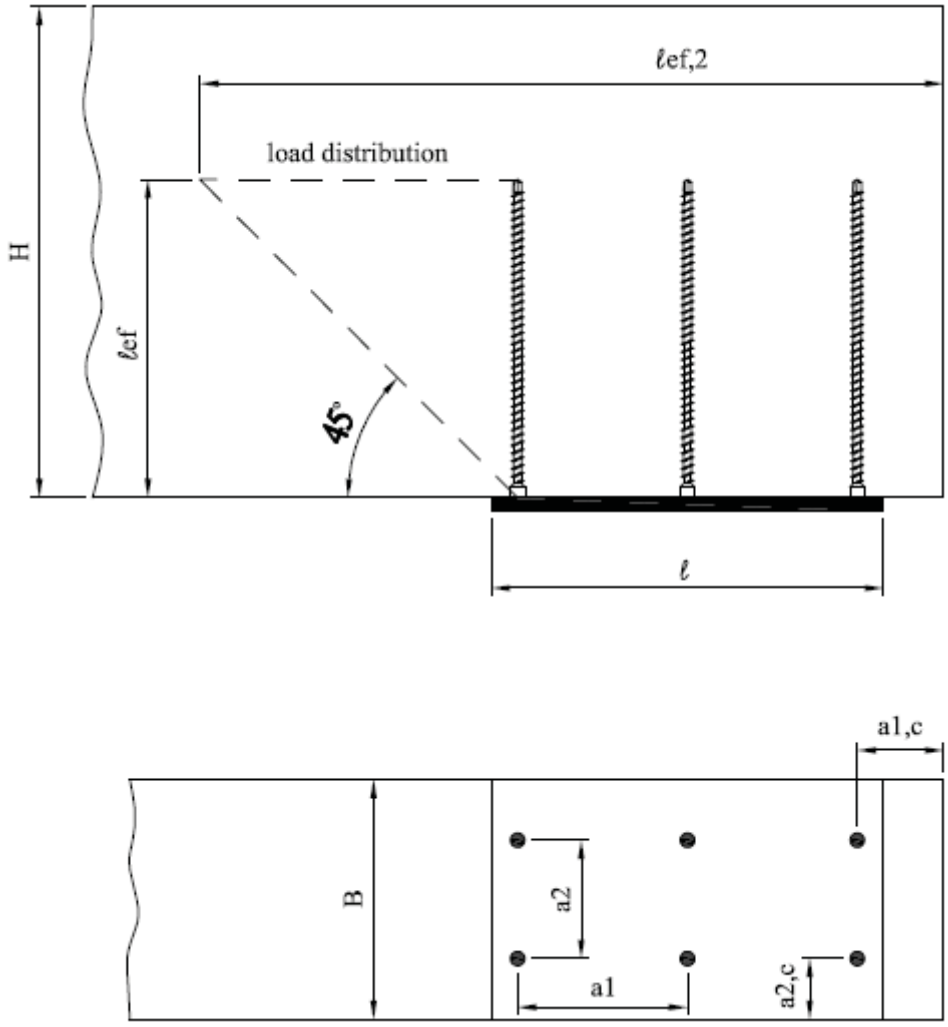
Reinforced centre-bearing





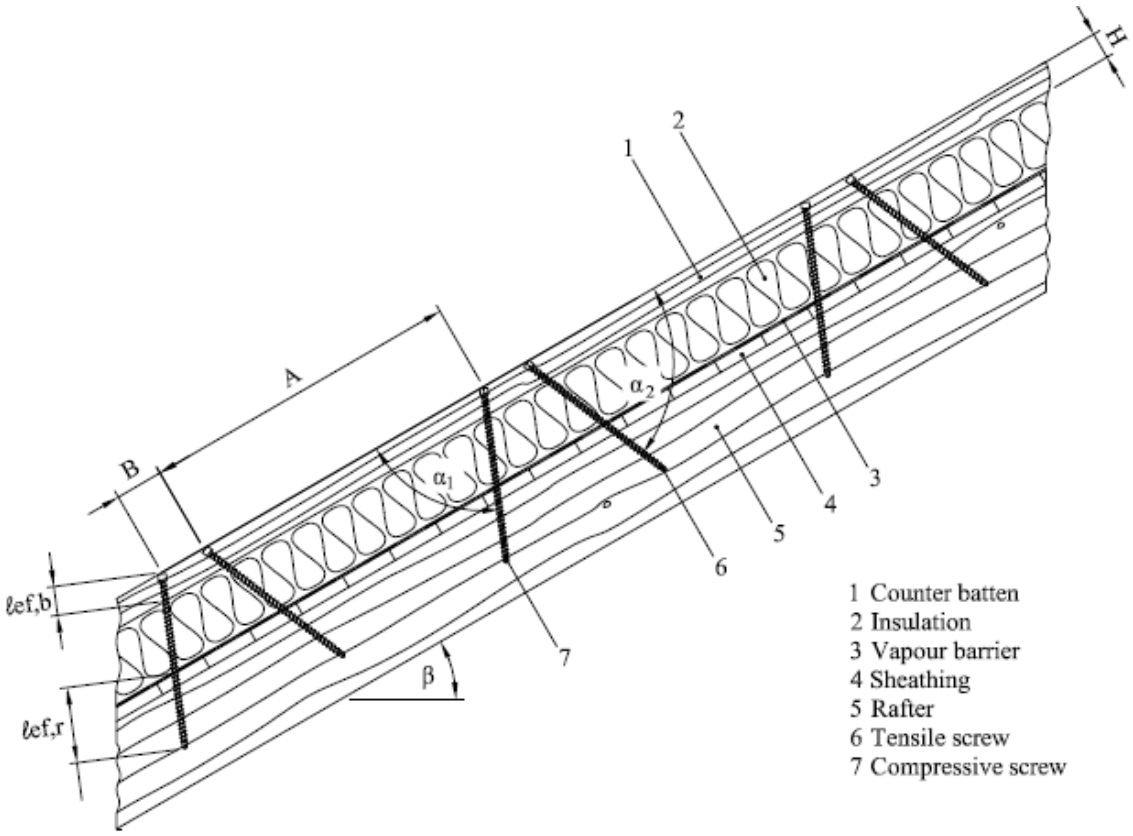
H component height [mm]
B bearing width [mm]
ℓ_{ef} point side penetration length [mm]
$\ell_{ef,2}$ effective distribution length in the plane of the screw tips [mm]
$= 2 \cdot \ell_{ef} + (n_0 - 1) \cdot a_1$ for centre-bearings

Reinforced centre bearing

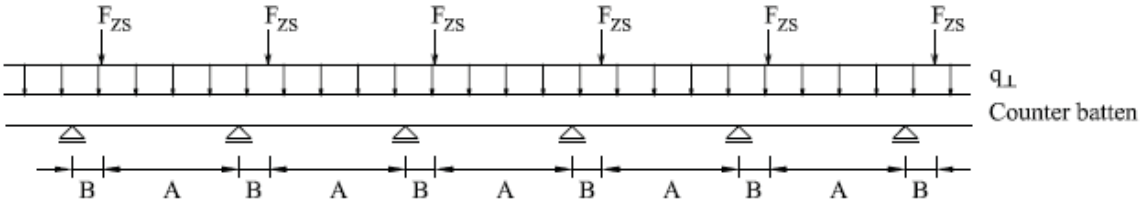


H component height [mm]
B bearing width [mm]
ℓ_{ef} point side penetration length [mm]
$\ell_{ef,2}$ effective distribution length in the plane of the screw tips [mm]
$= \ell_{ef} + (n_0 - 1) \cdot a_1 + \min(\ell_{ef}; a_{1,c})$ for end-bearings

Annex D
Thermal insulation on rafters with alternatively inclined screws



$30° \leq \alpha_1 \leq 90°$, angle between grain and compressive screw axis
$30° \leq \alpha_2 \leq 90°$, angle between grain and tensile screw axis



Compressive screw: $$F_{c,Ed} = (A + B) \cdot \left(- \frac{q_{II}}{\cos\alpha_1 + \sin\alpha_1 / \tan\alpha_2} - \frac{q_\perp \cdot \sin(90° - \alpha_2)}{\sin(\alpha_1 + \alpha_2)} \right)$$

Tensile screw: $$F_{t,Ed} = (A + B) \cdot \left(\frac{q_{II}}{\cos\alpha_2 + \sin\alpha_2 / \tan\alpha_1} - \frac{q_\perp \cdot \sin(90° - \alpha_1)}{\sin(\alpha_1 + \alpha_2)} \right)$$

Concentrated load: $$F_{ZS,Ed} = (A + B) \cdot \left(\frac{q_{II}}{1 / \tan\alpha_1 + 1 / \tan\alpha_2} - \frac{q_\perp \cdot \sin(90° - \alpha_1) \cdot \sin\alpha_2}{\sin(\alpha_1 + \alpha_2)} \right)$$

Where:

q_{II} Constant line load parallel to batten
$q_\perp$ Constant line load perpendicular to batten
α_1 Angle between compressive screw axis and grain direction
α_2 Angle between tensile screw axis and grain direction