ELC-4645 ESR-4645 UKTA-0836 22/6195 ETA-11/0030

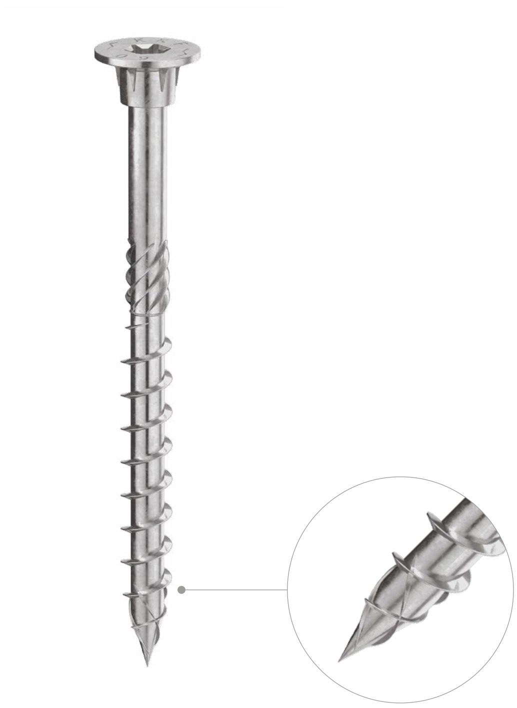
KKF AISI410

PAN HEAD SCREW

PAN HEAD
The flat under-head accompanies absorption of the shavings, preventing the wood from cracking and thus ensuring excellent surface finish.

LONGER THREAD
Special asymmetric "umbrella" thread with increased length (60%) for higher grip. Fine thread for the utmost precision when tightening is complete.

OUTDOOR APPLICATIONS ON ACID WOOD
Martensitic stainless steel. This stainless steels offers the highest mechanical performance compared to the other available stainless steels. Suitable for outdoor applications and on acid wood, but away from corrosive agents (chlorides, sulphides, etc.).



BIT INCLUDED

DIAMETER [mm]

3,5 | 4 – 6 | 8

LENGTH [mm]

20 | 20 – 120 | 320

SERVICE CLASS

SC1 SC2 SC3

ATMOSPHERIC CORROSIVITY

C1 C2

WOOD CORROSIVITY

T1 T2 T3 T4

MATERIAL

410 AISI — AISI410 martensitic stainless steel

FIELDS OF USE

Outdoor use.
Wooden boards with density < 780 kg/m^3 (without pre-drill).
WPC boards (with pre-drill).

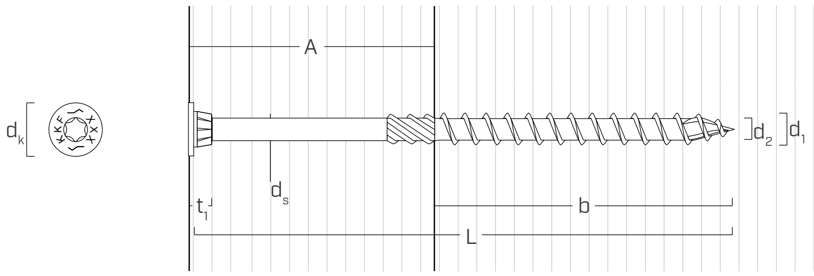
CODES AND DIMENSIONS

d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
4 TX 20	**KKF430**	30	18	12	500
	KKF435	35	20	15	500
	KKF440	40	24	16	500
	KKF445	45	30	15	200
	KKF450	50	30	20	200
4,5 TX 20	**KKF4520**(*)	20	15	5	200
	KKF4540	40	24	16	200
	KKF4545	45	30	15	200
	KKF4550	50	30	20	200
	KKF4560	60	35	25	200
	KKF4570	70	40	30	200

d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
5 TX 25	**KKF540**	40	24	16	200
	KKF550	50	30	20	200
	KKF560	60	35	25	200
	KKF570	70	40	30	100
	KKF580	80	50	30	100
	KKF590	90	55	35	100
	KKF5100	100	60	40	100
6 TX 30	**KKF680**	80	50	30	100
	KKF6100	100	60	40	100
	KKF6120	120	75	45	100

(*) Not holding CE marking.

GEOMETRY AND MECHANICAL CHARACTERISTICS



GEOMETRY

Nominal diameter	d_1	**[mm]**	**4**	**4,5**	**5**	**6**
Head diameter	d_K	[mm]	7,70	8,70	9,65	11,65
Thread diameter	d_2	[mm]	2,60	3,05	3,25	4,05
Shank diameter	d_S	[mm]	2,90	3,35	3,60	4,30
Head thickness	t_1	[mm]	5,00	5,00	6,00	7,00
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	2,5	2,5	3,0	4,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	-	-	3,5	4,0

(1) Pre-drilling valid for softwood.
(2) Pre-drilling valid for hardwood and beech LVL.

CHARACTERISTIC MECHANICAL PARAMETERS

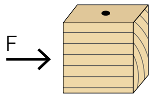
Nominal diameter	d_1	**[mm]**	**4**	**4,5**	**5**	**6**
Tensile strength	$f_{tens,k}$	[kN]	5,0	6,4	7,9	11,3
Yield moment	$M_{y,k}$	[Nm]	3,0	4,1	5,4	9,5

			softwood *(softwood)*	**LVL softwood** *(LVL softwood)*	**hardwood predrilled** *(hardwood predrilled)*
Withdrawal resistance parameter	$f_{ax,k}$	[N/mm²]	11,7	15,0	29,0
Head-pull-through parameter	$f_{head,k}$	[N/mm²]	16,5	-	-
Associated density	ρ_a	[kg/m³]	350	500	730
Calculation density	ρ_k	*[kg/m³]*	*≤ 440*	*410 ÷ 550*	*590 ÷ 750*

For applications with different materials please see ETA-11/0030.

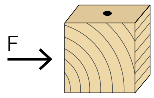
MINIMUM DISTANCES FOR SHEAR LOADS

screws inserted **WITHOUT pre-drilled hole** — **$\rho_k \leq 420\ kg/m^3$**



α=0°

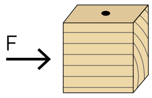
d_1	[mm]		4	4,5		5	6
a_1	[mm]	**10·d**	40	45	**12·d**	60	72
a_2	[mm]	**5·d**	20	23	**5·d**	25	30
$a_{3,t}$	[mm]	**15·d**	60	68	**15·d**	75	90
$a_{3,c}$	[mm]	**10·d**	40	45	**10·d**	50	60
$a_{4,t}$	[mm]	**5·d**	20	23	**5·d**	25	30
$a_{4,c}$	[mm]	**5·d**	20	23	**5·d**	25	30



α=90°

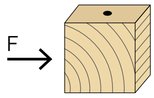
d_1	[mm]		4	4,5		5	6
a_1	[mm]	**5·d**	20	23	**5·d**	25	30
a_2	[mm]	**5·d**	20	23	**5·d**	25	30
$a_{3,t}$	[mm]	**10·d**	40	45	**10·d**	50	60
$a_{3,c}$	[mm]	**10·d**	40	45	**10·d**	50	60
$a_{4,t}$	[mm]	**7·d**	28	32	**10·d**	50	60
$a_{4,c}$	[mm]	**5·d**	20	23	**5·d**	25	30

screws inserted **WITHOUT pre-drilled hole** — **$420\ kg/m^3 < \rho_k \leq 500\ kg/m^3$**



α=0°

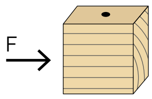
d_1	[mm]		4	4,5		5	6
a_1	[mm]	**15·d**	60	68	**15·d**	75	90
a_2	[mm]	**7·d**	28	32	**7·d**	35	42
$a_{3,t}$	[mm]	**20·d**	80	90	**20·d**	100	120
$a_{3,c}$	[mm]	**15·d**	60	68	**15·d**	75	90
$a_{4,t}$	[mm]	**7·d**	28	32	**7·d**	35	42
$a_{4,c}$	[mm]	**7·d**	28	32	**7·d**	35	42



α=90°

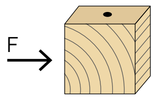
d_1	[mm]		4	4,5		5	6
a_1	[mm]	**7·d**	28	32	**7·d**	35	42
a_2	[mm]	**7·d**	28	32	**7·d**	35	42
$a_{3,t}$	[mm]	**15·d**	60	68	**15·d**	75	90
$a_{3,c}$	[mm]	**15·d**	60	68	**15·d**	75	90
$a_{4,t}$	[mm]	**9·d**	36	41	**12·d**	60	72
$a_{4,c}$	[mm]	**7·d**	28	32	**7·d**	35	42

screws inserted **WITH pre-drilled hole**



α=0°

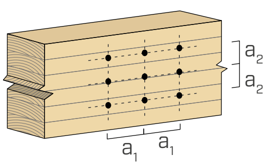
d_1	[mm]		4	4,5		5	6
a_1	[mm]	**5·d**	20	23	**5·d**	25	30
a_2	[mm]	**3·d**	12	14	**3·d**	15	18
$a_{3,t}$	[mm]	**12·d**	48	54	**12·d**	60	72
$a_{3,c}$	[mm]	**7·d**	28	32	**7·d**	35	42
$a_{4,t}$	[mm]	**3·d**	12	14	**3·d**	15	18
$a_{4,c}$	[mm]	**3·d**	12	14	**3·d**	15	18



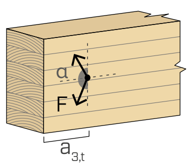
α=90°

d_1	[mm]		4	4,5		5	6
a_1	[mm]	**4·d**	16	18	**4·d**	20	24
a_2	[mm]	**4·d**	16	18	**4·d**	20	24
$a_{3,t}$	[mm]	**7·d**	28	32	**7·d**	35	42
$a_{3,c}$	[mm]	**7·d**	28	32	**7·d**	35	42
$a_{4,t}$	[mm]	**5·d**	20	23	**7·d**	35	42
$a_{4,c}$	[mm]	**3·d**	12	14	**3·d**	15	18

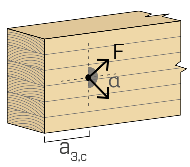
α = load-to-grain angle
d = nominal screw diameter



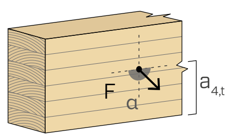
stressed end
-90° < α < 90°



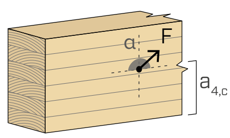
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°

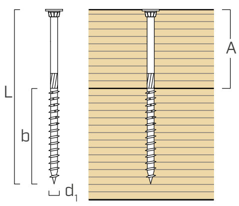
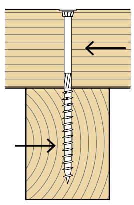
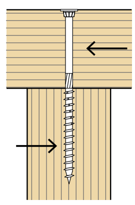
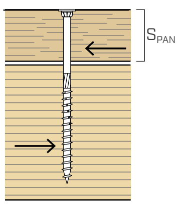
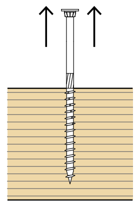
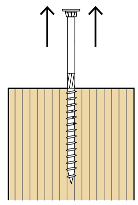
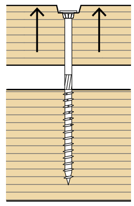


NOTES

- The minimum distances comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- The minimum spacing for all steel-to-timber connections (a_1, a_2) can be multiplied by a coefficient of 0,7.
- The minimum spacing for all panel-to-timber connections (a_1, a_2) can be multiplied by a coefficient of 0,85.
- In the case of joints with elements in Douglas fir (Pseudotsuga menziesii), the minimum spacing and distances parallel to the grain must be multiplied by a coefficient of 1.5.
- For a row of n screws arranged parallel to the direction of the grain at a distance a_1, the characteristic effective shear bearing capacity $R_{ef,V,k}$ can be calculated by means of the effective number n_{ef} (see page 34).

STRUCTURAL VALUES

CHARACTERISTIC VALUES
EN 1995:2014

geometry				SHEAR				TENSION		
geometry				timber-to-timber ε=90°	timber-to-timber ε=0°	panel-to-timber		thread withdrawal ε=90°	thread withdrawal ε=0°	head pull-through
										
d_1	L	b	A	$R_{V,90,k}$	$R_{V,0,k}$	S_{PAN}	$R_{V,k}$	$R_{ax,90,k}$	$R_{ax,0,k}$	$R_{head,k}$
[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
4	30	18	12	0,76	0,38	15	0,75	0,91	0,27	1,06
	35	20	15	0,87	0,45		0,83	1,01	0,30	1,06
	40	24	16	0,91	0,51		0,83	1,21	0,36	1,06
	45	30	15	0,89	0,56		0,83	1,52	0,45	1,06
	50	30	20	1,00	0,62		0,83	1,52	0,45	1,06
4,5	20	15	5	0,45	0,28	15	0,45	0,85	0,26	1,35
	40	24	16	1,08	0,55		1,05	1,36	0,41	1,35
	45	30	15	1,07	0,61		1,05	1,70	0,51	1,35
	50	30	20	1,17	0,69		1,05	1,70	0,51	1,35
	60	35	25	1,29	0,79		1,05	1,99	0,60	1,35
	70	40	30	1,33	0,86		1,05	2,27	0,68	1,35
5	40	24	16	1,21	0,60	15	1,15	1,52	0,45	1,66
	50	30	20	1,36	0,75		1,19	1,89	0,57	1,66
	60	35	25	1,48	0,88		1,19	2,21	0,66	1,66
	70	40	30	1,59	0,96		1,19	2,53	0,76	1,66
	80	50	30	1,59	1,11		1,19	3,16	0,95	1,66
	90	55	35	1,59	1,11		1,19	3,47	1,04	1,66
	100	60	40	1,59	1,11		1,19	3,79	1,14	1,66
6	80	50	30	2,08	1,37	15	1,63	3,79	1,14	2,42
	100	60	40	2,27	1,58		1,63	4,55	1,36	2,42
	120	75	45	2,27	1,65		1,63	5,68	1,70	2,42

ε = screw-to-grain angle

GENERAL PRINCIPLES

- Characteristic values comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- Design values can be obtained from characteristic values as follows:

$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_M}$$

The coefficients γ_M and k_{mod} should be taken according to the current regulations used for the calculation.

- For the mechanical resistance values and the geometry of the screws, reference was made to ETA-11/0030.
- Sizing and verification of the timber elements and panels must be done separately.
- The screws must be positioned in accordance with the minimum distances.
- The characteristic shear resistances are calculated for screws inserted without pre-drilling hole. In the case of screws inserted with pre-drilling hole, greater resistance values can be obtained.
- Shear strengths were calculated considering the threaded part fully inserted in the second element.
- The characteristic panel-timber shear strengths are calculated considering an OSB3 or OSB4 panel, as per EN 300, or a particle board panel, as per EN 312, with thickness S_{PAN} and density ρ_k = 500 kg/m^3.
- The thread withdrawal characteristic strength has been evaluated considering a fixing length equal to b.
- The characteristic resistance to head pull-through was calculated using timber elements.

NOTES

- The characteristic timber-to-timber shear strengths were evaluated considering both an ε angle of 90° ($R_{V,90,k}$) and 0° ($R_{V,0,k}$) between the grains and the connector in the second element.
- The characteristic panel-timber shear strengths were evaluated considering an angle ε of 90° between the grains and the connector in the timber element.
- The characteristic thread withdrawal resistances were evaluated considering both an ε angle of 90° ($R_{ax,90,k}$) and of 0° ($R_{ax,0,k}$) between the grains and the connector.
- For the calculation process a timber characteristic density ρ_k = 385 kg/m^3 has been considered.
For different ρ_k values, the strength on the table (timber-to-timber shear and tensile) can be converted by the k_{dens} coefficient.

$$R'_{V,k} = k_{dens,v} \cdot R_{V,k}$$
$$R'_{ax,k} = k_{dens,ax} \cdot R_{ax,k}$$
$$R'_{head,k} = k_{dens,ax} \cdot R_{head,k}$$

ρ_k [kg/m^3]	350	380	**385**	405	425	430	440
C-GL	*C24*	*C30*	*GL24h*	*GL26h*	*GL28h*	*GL30h*	*GL32h*
$k_{dens,v}$	0,90	0,98	1,00	1,02	1,05	1,05	1,07
$k_{dens,ax}$	0,92	0,98	1,00	1,04	1,08	1,09	1,11

Strength values thus determined may differ, for higher safety standards, from those resulting from an exact calculation.