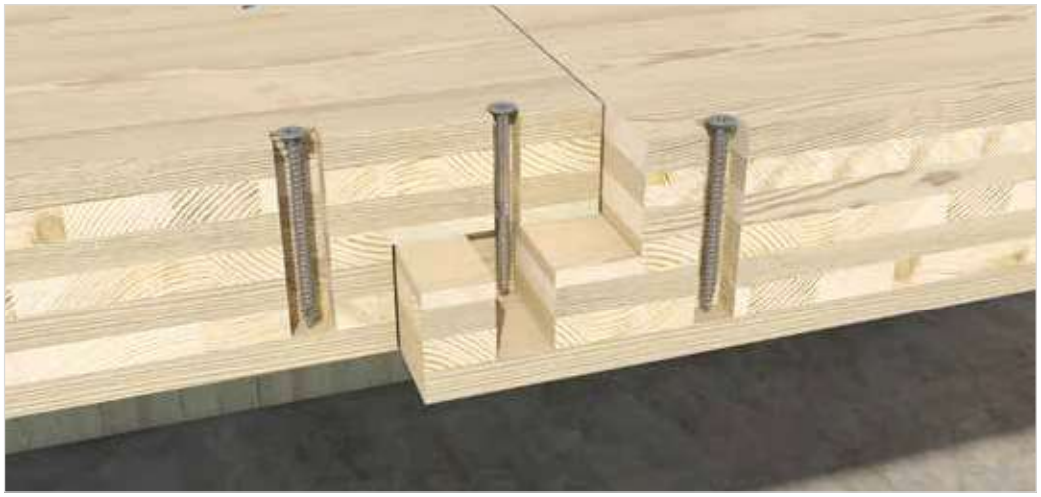
WKFS

Screw for wooden constructions with full thread and countersunk head

Diameters: ⌀8 mm | ⌀10 mm
Length range: from 120 to 600 mm



Construction countersunk head screws with full thread and TX drive for structural connections and reinforcements of wooden members.

TX DRIVE

Zn
WHITE

EUROPEAN TECHNICAL ASSESSMENT
ETA-18/0817

SCREW MATERIAL - Carbon steel
ANTI-CORROSION PROTECTION - Galvanized steel (white)

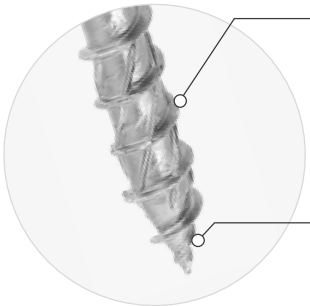
PRODUCT ADVANTAGES:

FULL THREAD - Without elements being over tighten to each other.

HIGH TORQUE - Allows screws to be installed without pre-drilling, even in hardwood substrates.

COUNTERSUNK HEAD - Allows quick and flush installation of the screw in the wooden member.

WAX COATING - Wax coating applied during the production process significantly reduces the torque.



NEW CUTTING EDGE / SERRATED THREAD
New special design of cutting edge with added milling reduces screwing resistance by 20%. This helps to extend the life of batteries and power tools. Special cutting notches integrated on the thread cut wood fibres structure while screwing in.

DOUBLE THREAD
Additional recessed second thread improves remarkably the speed of timber penetration and reaction time of first grip into the wood.

EXAMPLES OF USE

Reinforcement with screws in roof ridge area

Protection against failure of notched beam

Reinforcement in the point of support

Reinforcement by coupling of beams

Reinforcement of beam in the point weakened by drill hole

Joint between two girders

Joint between two passing-by beams

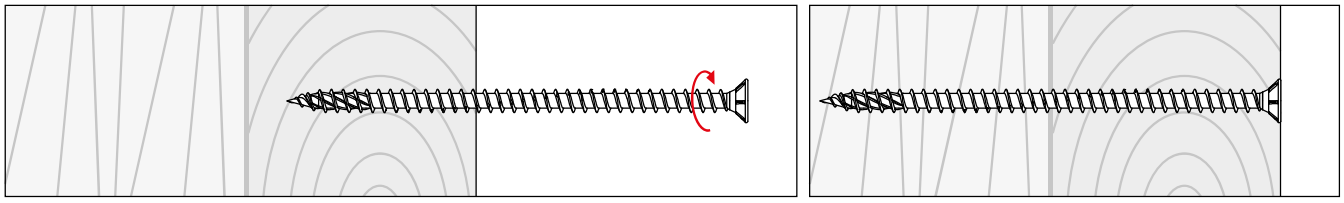
SUBSTRATES

Solid timber

Glued laminated timber
CLT, KVH, BSH/GLT

Laminated Veneer Lumber - LVL

INSTALLATION INSTRUCTIONS



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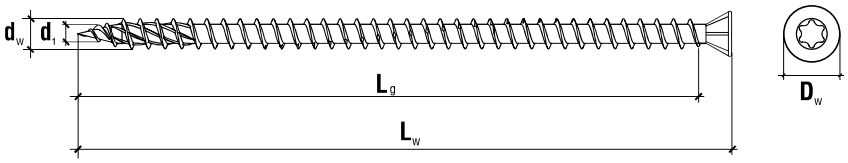


Codes and dimensions					
	Product code	Dimensions	Thread length	Type of drive	Quantity
	Galvanized - white	d_w x L_w [mm]	L_g [mm]	[-]	[pcs]
WKFS-8					
⌀8	WKFS-08120-B	8x120	108	TX 40	50
	WKFS-08140-B	8x140	128	TX 40	50
	WKFS-08160-B	8x160	148	TX 40	50
	WKFS-08180-B	8x180	168	TX 40	50
	WKFS-08200-B	8x200	188	TX 40	50
	WKFS-08220-B	8x220	208	TX 40	50
	WKFS-08240-B	8x240	228	TX 40	50
	WKFS-08260-B	8x260	248	TX 40	50
	WKFS-08280-B	8x280	268	TX 40	50
	WKFS-08300-B	8x300	288	TX 40	50
	WKFS-08350-B	8x350	338	TX 40	50
	WKFS-08400-B	8x400	388	TX 40	50
	WKFS-08450-B	8x450	438	TX 40	50
	WKFS-08500-B	8x500	488	TX 40	50
WKFS-10					
⌀10	WKFS-10300-B	10x300	285	TX 50	25
	WKFS-10330-B	10x330	315	TX 50	25
	WKFS-10360-B	10x360	345	TX 50	25
	WKFS-10400-B	10x400	385	TX 50	25
	WKFS-10450-B	10x450	435	TX 50	25
	WKFS-10500-B	10x500	485	TX 50	25
	WKFS-10550-B	10x550	535	TX 50	25
	WKFS-10600-B	10x600	585	TX 50	25

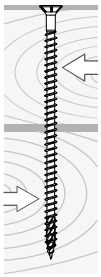
Geometry				
Product	Outer thread diameter	Inner thread diameter	Head diameter	Length range
	d_w [mm]	d_1 [mm]	D_w [mm]	L_w [mm]
WKFS ⌀8	8	4,95	14	120-500
WKFS ⌀10	10	6,00	18	300-600

Mechanical characteristics								
Product	Characteristic yield moment	Characteristic withdrawal resistance parameter - softwood	Characteristic withdrawal resistance parameter - LVL	Characteristic head-pull-through resistance parameter - softwood	Characteristic head-pull-through resistance parameter - LVL	Characteristic tensile strength	Characteristic torsional strength	Characteristic yield strength
	$M_{y,k}$ [N*m]	$f_{ax,k}$ [N/mm^2]	$f_{ax,k}$ [N/mm^2]	$f_{head,k}$ [N/mm^2]	$f_{head,k}$ [N/mm^2]	$f_{tens,k}$ [kN]	$f_{tor,k}$ [N*m]	$f_{y,k}$ [N/mm^2]
WKFS ⌀8	25,0	12,0	13,0	14,7	14,7	25,0	27,0	1000,0
WKFS ⌀10	43,0	11,0	13,0	13,0	13,0	36,0	45,0	1000,0

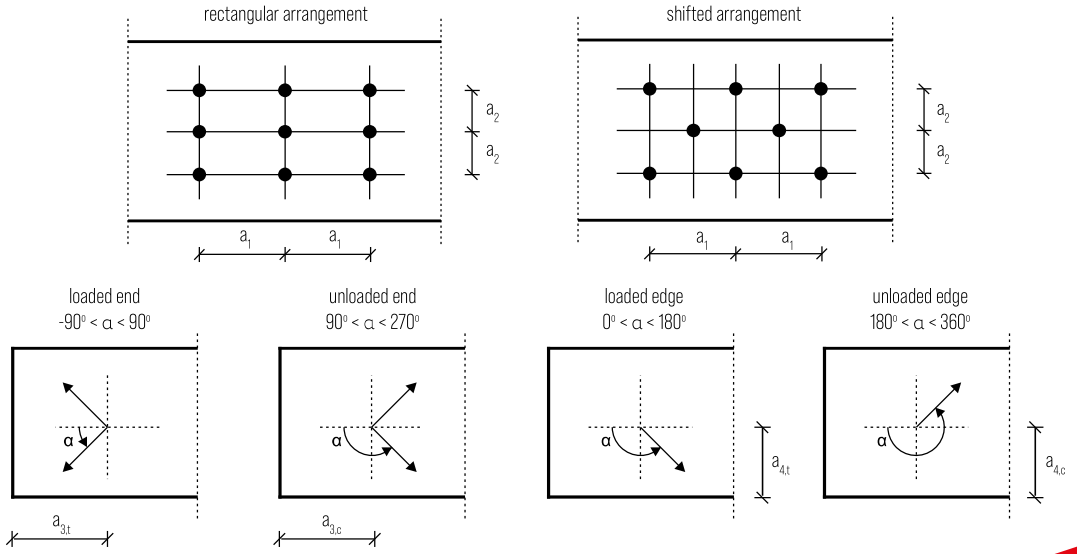
1. Characteristic withdrawal and head-pull-through resistance based on reference density of timber p_a = 350 kg/m^3
2. Characteristic withdrawal and head-pull-through resistance based on reference density of LVL p_a = 480 kg/m^3

WKFS - Screw for wooden constructions with full thread and countersunk head

TIMBER

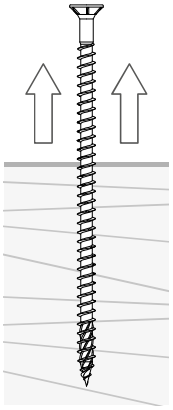
Minimum distances for laterally loaded screws - timber					
Angle between force and fiber direction α = 0 °			Angle between force and fiber direction α = 90 °		
					
WITHOUT PRE-DRILLED HOLE			**WITHOUT PRE-DRILLED HOLE**		
d_w [mm]	**Ø 8**	**Ø 10**	**d_w [mm]**	**Ø 8**	**Ø 10**
a_1 [mm]	96	120	**a_1 [mm]**	40	50
a_2 [mm]	40	50	**a_2 [mm]**	40	50
$a_{3,t}$ [mm]	120	150	**$a_{3,t}$ [mm]**	80	100
$a_{3,c}$ [mm]	80	100	**$a_{3,c}$ [mm]**	80	100
$a_{4,t}$ [mm]	40	50	**$a_{4,t}$ [mm]**	80	100
$a_{4,c}$ [mm]	40	50	**$a_{4,c}$ [mm]**	40	50
WITH PRE-DRILLED HOLE			**WITH PRE-DRILLED HOLE**		
d_w [mm]	**Ø 8**	**Ø 10**	**d_w [mm]**	**Ø 8**	**Ø 10**
d_0 [mm]	5	6	**d_0 [mm]**	5	6
a_1 [mm]	40	50	**a_1 [mm]**	32	40
a_2 [mm]	24	30	**a_2 [mm]**	32	40
$a_{3,t}$ [mm]	96	120	**$a_{3,t}$ [mm]**	56	70
$a_{3,c}$ [mm]	56	70	**$a_{3,c}$ [mm]**	56	70
$a_{4,t}$ [mm]	24	30	**$a_{4,t}$ [mm]**	56	70
$a_{4,c}$ [mm]	24	30	**$a_{4,c}$ [mm]**	24	30

1. Minimum distances in accordance with EN 1995 and ETA-18/0817
2. Minimum distances is valid for timber characteristic density of $\rho_k \leq 420$ kg/m^3
3. In case of connection panel-timber minimum distances (a_1, a_2) should be multiplied by a factor of 0,85
4. In case of connection steel-timber minimum distances (a_1, a_2) should be multiplied by a factor of 0,7
5. Hole diameter d_0 is valid for softwood



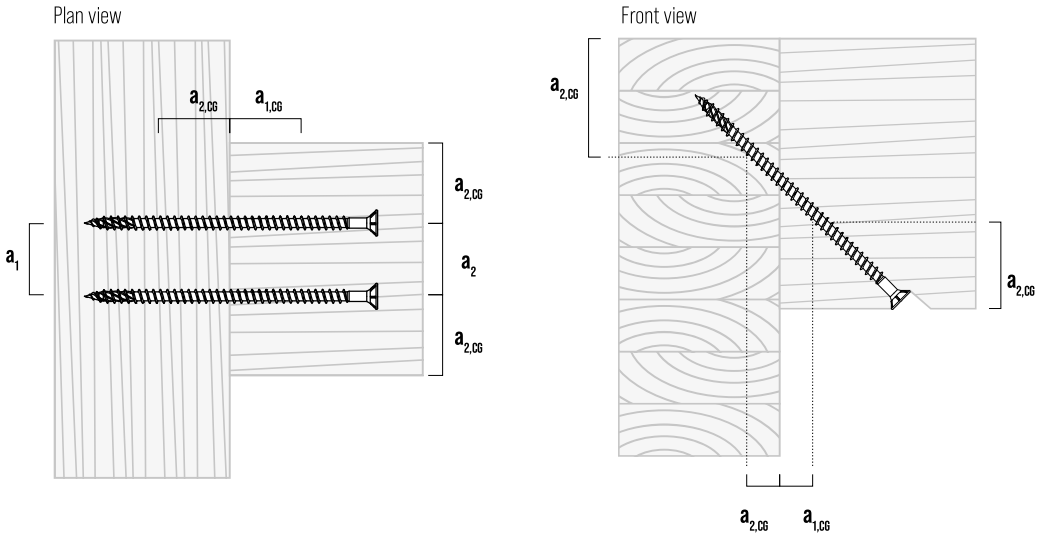
WKFS - Screw for wooden constructions with full thread and countersunk head

TIMBER

Minimum distances for axially loaded screws - timber		
		
WITH AND WITHOUT PRE-DRILLED HOLE		
d_w [mm]	**Ø 8**	**Ø 10**
a_1 [mm]	56	70
a_2 [mm]	40	50
$a_{1,CG}$ [mm]	80	100
$a_{2,CG}$ [mm]	32	40
a_{CROSS} [mm]	12	15
e [mm]	28	35

1. Minimum distances in accordance with EN 1995 and ETA-18/0817

Screws under tension placed at an angle α to the grain



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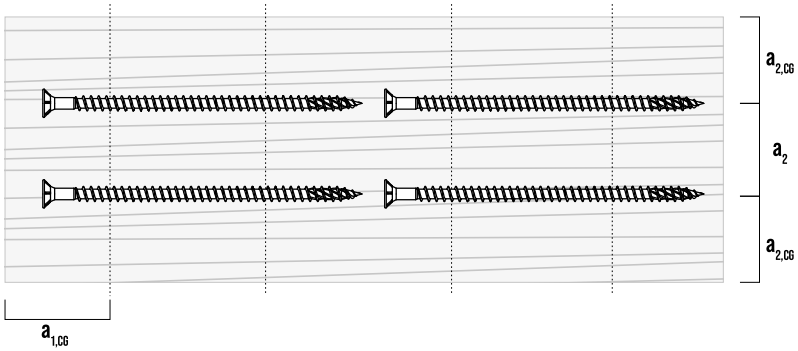
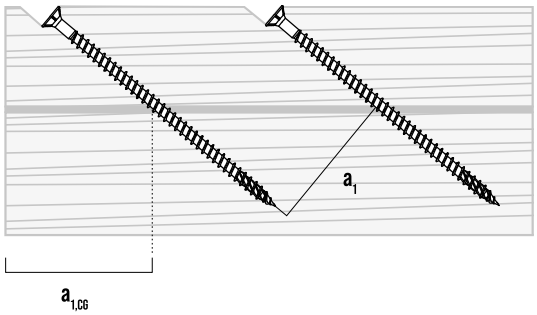
Screws under tension placed at an angle α to the grain

Plan view

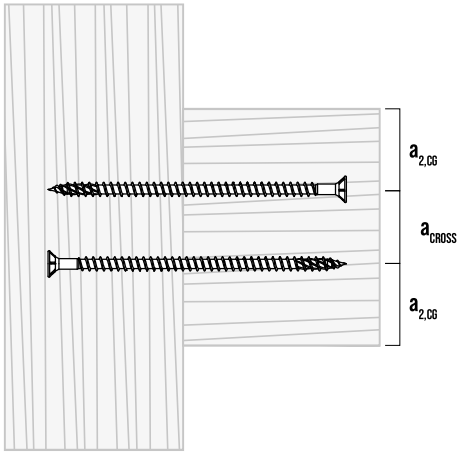


Front view

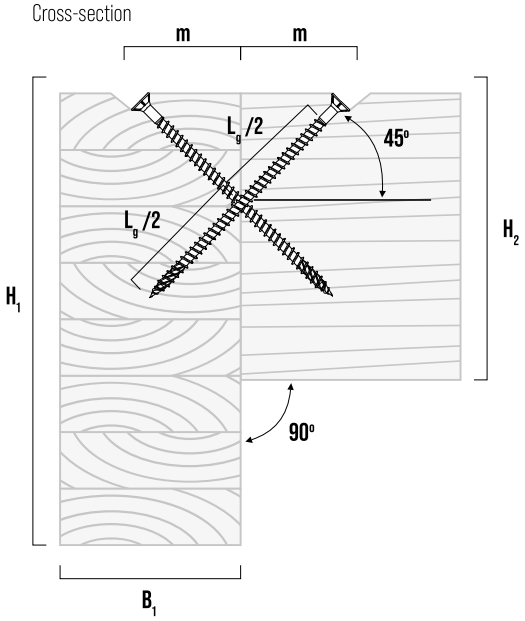


Crossed screws placed at an angle α to the grain - 1 pair

Plan view

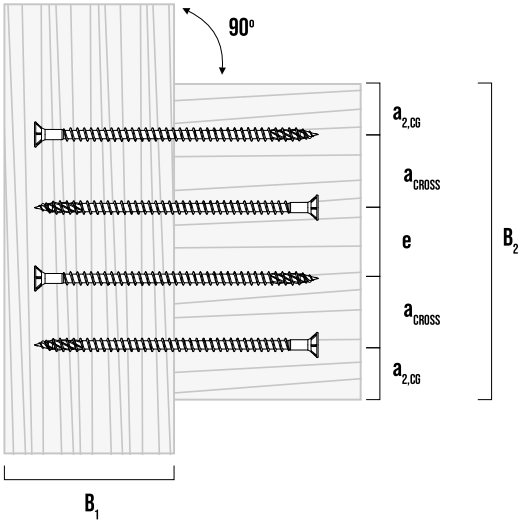


Cross-section

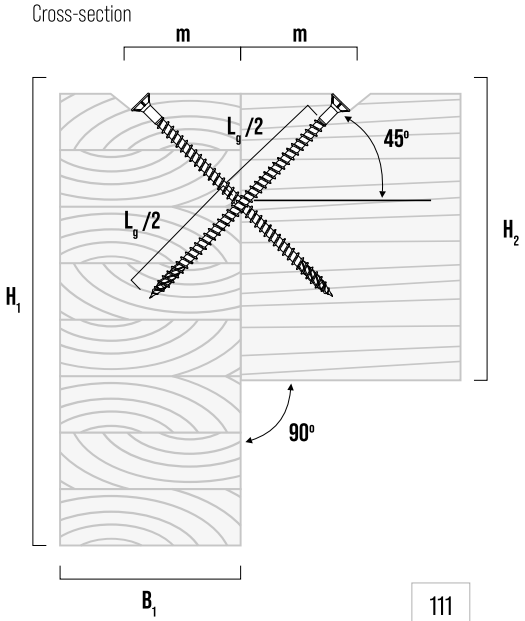


Crossed screws placed at an angle α to the grain - 2 pairs and more

Plan view



Cross-section



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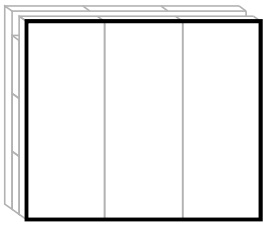
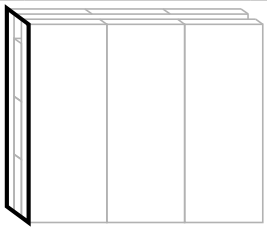
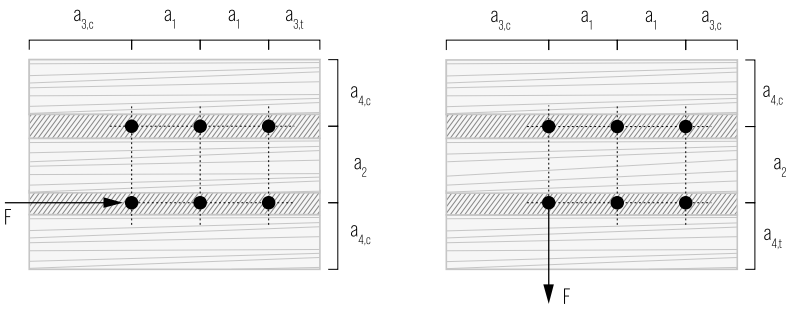
CLT

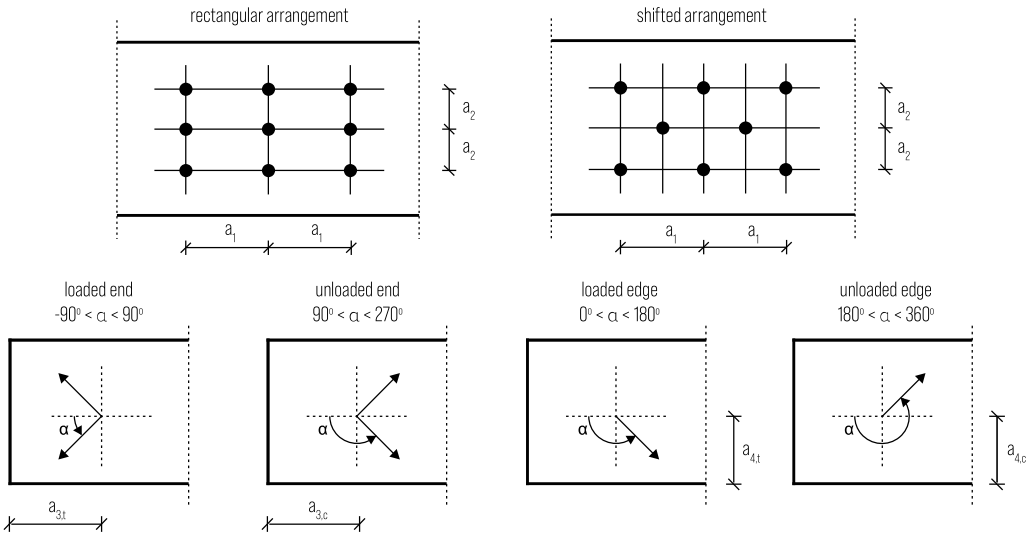
Minimum distances for laterally and/or axially loaded screws - CLT					
WIDE FACE			NARROW FACE		
					
WITHOUT PRE-DRILLED HOLE			**WITHOUT PRE-DRILLED HOLE**		
d_w [mm]	**Ø 8**	**Ø 10**	**d_w [mm]**	**Ø 8**	**Ø 10**
a_1 [mm]	32	40	**a_1 [mm]**	80	100
a_2 [mm]	20	25	**a_2 [mm]**	32	40
$a_{3,t}$ [mm]	48	60	**$a_{3,t}$ [mm]**	96	120
$a_{3,c}$ [mm]	48	60	**$a_{3,c}$ [mm]**	56	70
$a_{4,t}$ [mm]	48	60	**$a_{4,t}$ [mm]**	48	60
$a_{4,c}$ [mm]	20	25	**$a_{4,c}$ [mm]**	24	30

1. Minimum distances in accordance with ETA-18/0817
2. Minimum CLT thickness $t_{min} = 10d_w$
3. Minimum penetration depth in CLT narrow face $L_{ef} = 10d_w$

NARROW FACE



WIDE FACE



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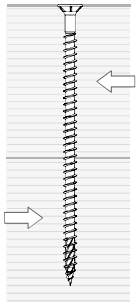
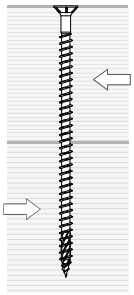
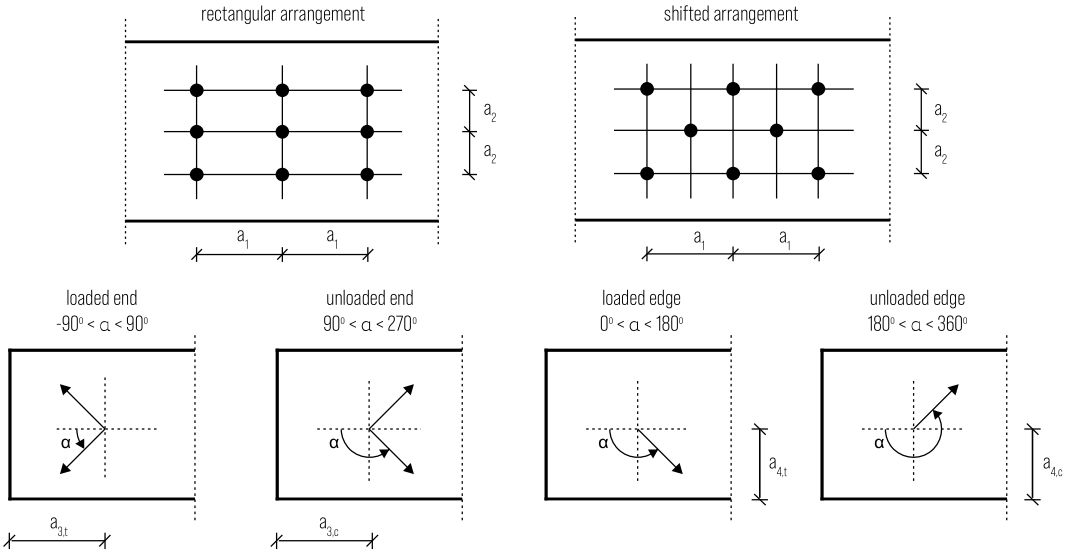
LVL

Minimum distances for laterally loaded screws - LVL					
Angle between force and fiber direction α = 0 °			Angle between force and fiber direction α = 90 °		
					
WITHOUT PRE-DRILLED HOLE			**WITHOUT PRE-DRILLED HOLE**		
d_w [mm]	**Ø 8**	**Ø 10**	**d_w [mm]**	**Ø 8**	**Ø 10**
a_1 [mm]	120	150	**a_1 [mm]**	56	70
a_2 [mm]	56	70	**a_2 [mm]**	56	70
$a_{3,t}$ [mm]	160	200	**$a_{3,t}$ [mm]**	120	150
$a_{3,c}$ [mm]	120	150	**$a_{3,c}$ [mm]**	120	150
$a_{4,t}$ [mm]	56	70	**$a_{4,t}$ [mm]**	96	120
$a_{4,c}$ [mm]	56	70	**$a_{4,c}$ [mm]**	56	70
WITH PRE-DRILLED HOLE			**WITH PRE-DRILLED HOLE**		
d_w [mm]	**Ø 8**	**Ø 10**	**d_w [mm]**	**Ø 8**	**Ø 10**
d_0 [mm]	5	6	**d_0 [mm]**	5	6
a_1 [mm]	40	50	**a_1 [mm]**	32	40
a_2 [mm]	24	30	**a_2 [mm]**	32	40
$a_{3,t}$ [mm]	96	120	**$a_{3,t}$ [mm]**	56	70
$a_{3,c}$ [mm]	56	70	**$a_{3,c}$ [mm]**	56	70
$a_{4,t}$ [mm]	24	30	**$a_{4,t}$ [mm]**	56	70
$a_{4,c}$ [mm]	24	30	**$a_{4,c}$ [mm]**	24	30

1. Minimum distances in accordance with EN 1995 and ETA-18/0817
2. Minimum distances is valid for LVL characteristic density in range of 420 kg/m^3 < ρ_k ≤ 500 kg/m^3
3. Hole diameter d_0 is valid for softwood LVL



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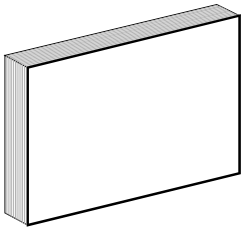
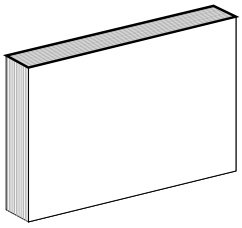
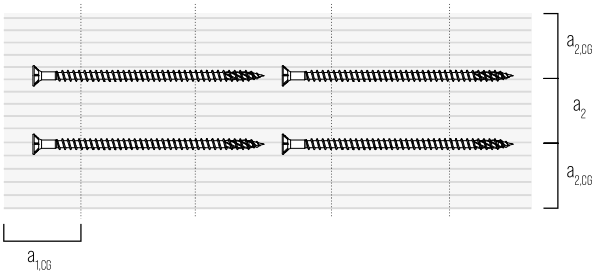
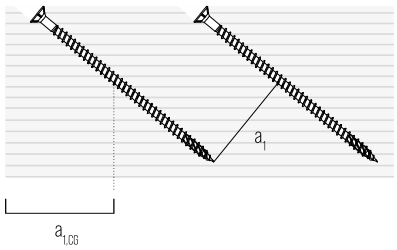
LVL

Minimum distances for axially loaded screws - LVL							
WIDE FACE				EDGE FACE			
							
WITHOUT PRE-DRILLED HOLE				WITHOUT PRE-DRILLED HOLE			
d_w [mm]	Ø 6	Ø 8	Ø 10	d_w [mm]	Ø 6	Ø 8	Ø 10
a_1 [mm]	42	56	70	a_1 [mm]	60	80	100
a_2 [mm]	30	40	50	a_2 [mm]	30	40	50
$a_{1,CG}$ [mm]	60	80	100	$a_{1,CG}$ [mm]	72	96	120
$a_{2,CG}$ [mm]	24	32	40	$a_{2,CG}$ [mm]	24	32	40

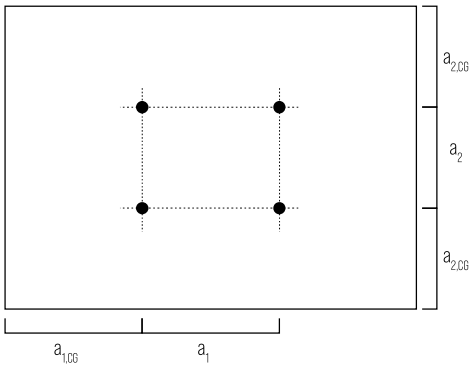
1. Minimum distances in accordance with EN 1995 and ETA-18/0817

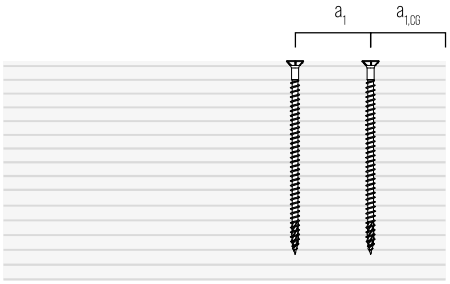
Screws under tension placed at an angle α to the grain (wide face)



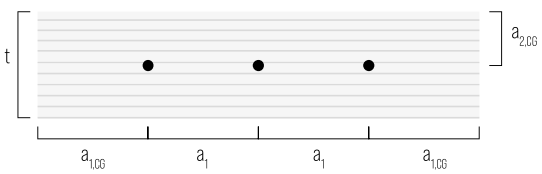


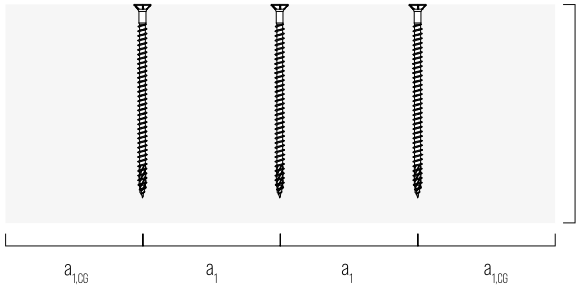
Screws placed at an angle α=90° to the grain (wide face)





Screws placed at an angle α=90° to the grain (edge face)





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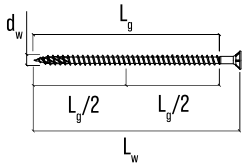
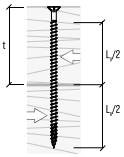
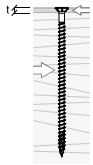
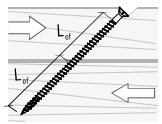
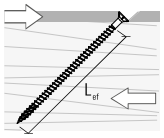
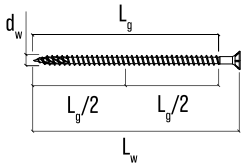
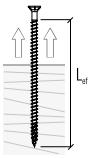
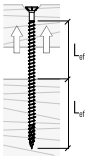
TIMBER

Characteristic resistances for laterally and axially loaded screws - timber

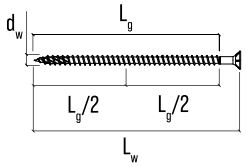
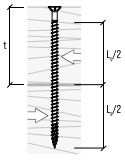
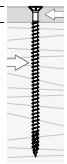
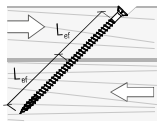
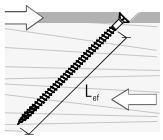
DIMENSIONS				SHEAR						SLIDING			
Diameter	Length	Thread length	Partial thread length	timber-timber		steel-timber (thin plate)		steel-timber (thick plate)		timber-timber		steel-timber	
													
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	t [mm]	$R_{V,k}$ [kN]	$R_{V,k}$ [kN]		$R_{V,k}$ [kN]		$L_{ef} = L_g/2$ [mm]	$R_{ax,45,k}$ [kN]	$L_{ef} = L_g$ [mm]	$R_{ax,45,k}$ [kN]
WKFS 8													
ø8	120	108	54	66	4,08	t = 4 mm	5,44	t = 8 mm	6,63	54	3,67	108	7,33
	140	128	64	76	4,39		5,70		7,11	64	4,34	128	8,69
	160	148	74	86	4,63		5,70		7,59	74	5,02	148	10,05
	180	168	84	96	4,87		5,70		8,07	84	5,70	168	11,40
	200	188	94	106	5,11		5,70		8,07	94	6,38	188	12,76
	220	208	104	116	5,35		5,70		8,07	104	7,06	208	14,12
	240	228	114	126	5,59		5,70		8,07	114	7,74	228	15,48
	260	248	124	136	5,70		5,70		8,07	124	8,42	248	16,83
	280	268	134	146	5,70		5,70		8,07	134	9,10	268	18,19
	300	288	144	156	5,70		5,70		8,07	144	9,78	288	19,55
	350	338	169	181	5,70		5,70		8,07	169	11,47	338	22,94
	400	388	194	206	5,70		5,70		8,07	194	13,17	388	26,34
	450	438	219	231	5,70		5,70		8,07	219	14,87	438	29,73
	500	488	244	256	5,70		5,70		8,07	244	16,56	488	33,13

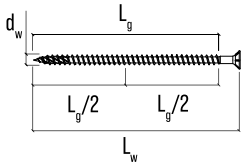
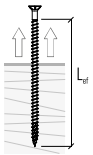
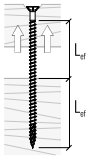
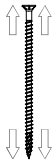
DIMENSIONS				TENSION					
Diameter	Length	Thread length	Partial thread length	Withdrawal-full thread		Withdrawal-partial thread		Tension	
									
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	$L_{ef} = L_g$ [mm]	$R_{ax,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,k}$ [kN]	$R_{tens,k}$ [kN]	$R_{tens,45,k}$ [kN]
WKFS 8									
ø8	120	108	54	108	10,37	54	5,18	25,00	17,68
	140	128	64	128	12,29	64	6,14	25,00	17,68
	160	148	74	148	14,21	74	7,10	25,00	17,68
	180	168	84	168	16,13	84	8,06	25,00	17,68
	200	188	94	188	18,05	94	9,02	25,00	17,68
	220	208	104	208	19,97	104	9,98	25,00	17,68
	240	228	114	228	21,89	114	10,94	25,00	17,68
	260	248	124	248	23,81	124	11,90	25,00	17,68
	280	268	134	268	25,73	134	12,86	25,00	17,68
	300	288	144	288	27,65	144	13,82	25,00	17,68
	350	338	169	338	32,45	169	16,22	25,00	17,68
	400	388	194	388	37,25	194	18,62	25,00	17,68
	450	438	219	438	42,05	219	21,02	25,00	17,68
	500	488	244	488	46,85	244	23,42	25,00	17,68

WKFS - Screw for wooden constructions with full thread and countersunk head

TIMBER

Characteristic resistances for laterally and axially loaded screws - timber

DIMENSIONS				SHEAR				SLIDING			
Diameter	Length	Thread length	Partial thread length	timber-timber		steel-timber (thin plate)	steel-timber (thick plate)	timber-timber		steel-timber	
											
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	t [mm]	$R_{V,k}$ [kN]	$R_{V,k}$ [kN]	$R_{V,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,45,k}$ [kN]	$L_{ef} = L_g$ [mm]	$R_{ax,45,k}$ [kN]
WKFS 10											
ø10	300	285	142,5	157,5	7,96	t = 5 mm	8,09	t = 10 mm	11,44	142,5	11,08	285	22,17
	330	315	157,5	172,5	8,09		8,09		11,44	157,5	12,25	315	24,50
	360	345	172,5	187,5	8,09		8,09		11,44	172,5	13,42	345	26,83
	400	385	192,5	207,5	8,09		8,09		11,44	192,5	14,97	385	29,95
	450	435	217,5	232,5	8,09		8,09		11,44	217,5	16,92	435	33,84
	500	485	242,5	257,5	8,09		8,09		11,44	242,5	18,86	485	37,72
	550	535	267,5	282,5	8,09		8,09		11,44	267,5	20,81	535	41,61
	600	585	292,5	307,5	8,09		8,09		11,44	292,5	22,75	585	45,50

DIMENSIONS				TENSION					
Diameter	Length	Thread length	Partial thread length	Withdrawal-full thread		Withdrawal-partial thread		Tension	
									
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	$L_{ef} = L_g$ [mm]	$R_{ax,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,k}$ [kN]	$R_{tens,k}$ [kN]	$R_{tens,45,k}$ [kN]
WKFS 10									
ø10	300	285	142,5	285	31,35	142,5	15,68	36,00	25,46
	330	315	157,5	315	34,65	157,5	17,33	36,00	25,46
	360	345	172,5	345	37,95	172,5	18,98	36,00	25,46
	400	385	192,5	385	42,35	192,5	21,18	36,00	25,46
	450	435	217,5	435	47,85	217,5	23,93	36,00	25,46
	500	485	242,5	485	53,35	242,5	26,68	36,00	25,46
	550	535	267,5	535	58,85	267,5	29,43	36,00	25,46
	600	585	292,5	585	64,35	292,5	32,18	36,00	25,46

NOTES:

1. Characteristic resistances in accordance with EN 1995 and ETA-18/0817
2. In order to obtain a design resistance, use the following formula : $$R_d = \frac{R_k * k_{mod}}{\gamma_M}$$

Factors γ_M and k_{mod} should be taken in accordance with EN 1995

3. Design resistance for tension is smaller value of the following : $$R_{ax,d} = min\begin{cases}\frac{R_{ax,k} * k_{mod}}{\gamma_M} \\ \frac{R_{tens,k}}{\gamma_{M2}}\end{cases}$$

Factors γ_M and k_{mod} should be taken in accordance with EN 1995. Factor γ_{M2} should be taken in accordance with EN 1993

4. Design resistance for sliding is smaller value of the following : $$R_{V,d} = min\begin{cases}\frac{R_{ax,45,k} * k_{mod}}{\gamma_M} \\ \frac{R_{tens,45,k}}{\gamma_{M2}}\end{cases}$$

Factors γ_M and k_{mod} should be taken in accordance with EN 1995. Factor γ_{M2} should be taken in accordance with EN 1993

5. Characteristic resistances were calculated for a characteristic density of timber ρ_k = 350 kg/m^3
6. Characteristic shear resistances were calculated for connections without pre-drilled holes
7. Characteristic shear resistances for timber-timber connections were calculated for timber thickness t [mm]
8. Characteristic shear resistances for steel-timber connections were calculated for thin steel plate with thickness t ≤ 0,5d_w
9. Characteristic shear resistances for steel-timber connections were calculated for thick steel plate with thickness t ≥ d_w
10. Characteristic resistances to withdrawal were calculated assuming an angle of 90° between screw and grain direction and for effective penetration length equal $L_{ef} = L_g$ and $L_{ef} = L_g/2$
11. Characteristic resistances to sliding were calculated assuming an angle of 45° between screw and grain direction and for effective penetration length equal $L_{ef} = L_g$ and $L_{ef} = L_g/2$

WKFS - Screw for wooden constructions with full thread and countersunk head

TIMBER

Characteristic resistances for crossed screws - main beam/secondary beam												
DIMENSIONS				CONNECTION GEOMETRY						CHARACTERISTIC RESISTANCES		
Diameter	Length	Thread length	Partial thread length	Width of the main beam	Height of the main beam	Width of the secondary beam	Height of the secondary beam	Mounting distance	Number of screw pairs	Withdrawal	Buckling	Tension
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	B_1 [mm]	H_1 [mm]	B_2 [mm]	H_2 [mm]	m [mm]	n	$R_{ax,45,k}$ [kN]	$R_{ki,45,k}$ [kN]	$R_{tens,45,k}$ [kN]
WKFS 8												
ø8	240	228	114	99	180	76	180	89	1	15,48	15,58	35,36
						116			2	28,88	29,08	65,98
						156			3	41,79	42,07	95,46
	260	248	124	106	194	76	194	96	1	16,83	15,58	35,36
						116			2	31,41	29,08	65,98
						156			3	45,45	42,07	95,46
	280	268	134	113	208	76	208	103	1	18,19	15,58	35,36
						116			2	33,95	29,08	65,98
						156			3	49,12	42,07	95,46
	300	288	144	120	222	76	222	110	1	19,55	15,58	35,36
						116			2	36,48	29,08	65,98
						156			3	52,79	42,07	95,46
	350	338	169	138	257	76	257	128	1	22,94	15,58	35,36
						116			2	42,82	29,08	65,98
						156			3	61,95	42,07	95,46
	400	388	194	156	293	76	293	146	1	26,34	15,58	35,36
						116			2	49,15	29,08	65,98
						156			3	71,11	42,07	95,46
	450	438	219	173	328	76	328	163	1	29,73	15,58	35,36
						116			2	55,48	29,08	65,98
						156			3	80,28	42,07	95,46
	500	488	244	191	364	76	364	181	1	33,13	15,58	35,36
						116			2	61,82	29,08	65,98
						156			3	89,44	42,07	95,46

WKFS - Screw for wooden constructions with full thread and countersunk head

TIMBER

Characteristic resistances for crossed screws - main beam/secondary beam

DIMENSIONS				CONNECTION GEOMETRY						CHARACTERISTIC RESISTANCES		
Diameter	Length	Thread length	Partial thread length	Width of the main beam	Height of the main beam	Width of the secondary beam	Height of the secondary beam	Mounting distance	Number of screw pairs	Withdrawal	Buckling	Tension
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	B_1 [mm]	H_1 [mm]	B_2 [mm]	H_2 [mm]	m [mm]	n	$R_{ax,45,k}$ [kN]	$R_{ki,45,k}$ [kN]	$R_{tens,45,k}$ [kN]
WKFS 10												
⌀10	300	285	142,5	121	222	95	222	111	1	22,17	23,35	50,91
						145			2	41,37	43,57	95,00
						195			3	59,85	63,04	137,46
	330	315	157,5	132	243	95	243	122	1	24,50	23,35	50,91
						145			2	45,72	43,57	95,00
						195			3	66,15	63,04	137,46
	360	345	172,5	143	265	95	265	133	1	26,83	23,35	50,91
						145			2	50,08	43,57	95,00
						195			3	72,45	63,04	137,46
	400	385	192,5	157	293	95	293	147	1	29,95	23,35	50,91
						145			2	55,88	43,57	95,00
						195			3	80,85	63,04	137,46
	450	435	217,5	174	328	95	328	164	1	33,84	23,35	50,91
						145			2	63,14	43,57	95,00
						195			3	91,35	63,04	137,46
	500	485	242,5	192	364	95	364	182	1	37,72	23,35	50,91
						145			2	70,40	43,57	95,00
						195			3	101,86	63,04	137,46
	550	535	267,5	210	399	95	399	200	1	41,61	23,35	50,91
						145			2	77,65	43,57	95,00
						195			3	112,36	63,04	137,46
	600	585	292,5	227	434	95	434	217	1	45,50	23,35	50,91
						145			2	84,91	43,57	95,00
						195			3	122,86	63,04	137,46

NOTES:

1. Characteristic resistances in accordance with EN 1995 and ETA-18/0817
2. In order to obtain a design resistance, use the following formula :

$$R_{V,d} = min\begin{cases} \frac{R_{ax,45,k} * k_{mod}}{\gamma_M} \\ \frac{R_{ki,45,k}}{\gamma_{M1}} \\ \frac{R_{tens,45,k}}{\gamma_{M2}} \end{cases}$$

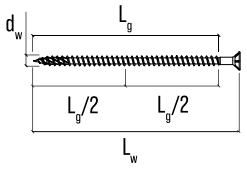
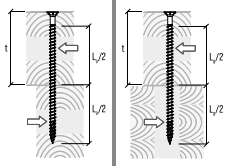
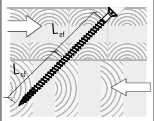
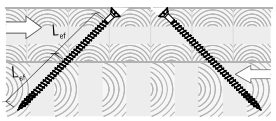
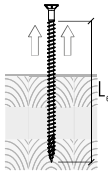
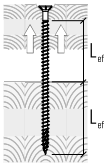
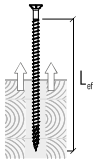
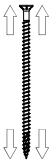
Factors γ_M and kmod should be taken in accordance with EN 1995. Factor γ_{M1} and γ_{M2} should be taken in accordance with EN 1993

4. Characteristic resistances were calculated for a characteristic density of timber ρ_k = 350 kg/m^3
5. Characteristic resistances to withdrawal were calculated assuming an angle of 45° to the shear plane and effective penetration length equal $L_{ef} = L_g/2$
6. Characteristic resistances to withdrawal were calculated assuming symmetrical installation of screws
7. Characteristic resistances were calculated assuming a minimum distance $a_{1,CG} \geq 5d$. According to ETA-18/0817 minimum distance $a_{1,CG} \geq 10d$

WKFS - Screw for wooden constructions with full thread and countersunk head

CLT

Characteristic resistances for laterally and axially loaded screws - CLT

DIMENSIONS				SHEAR				SLIDING					TENSION							
Diameter	Length	Thread length	Partial thread length	CLT-CLT (wide face-wide face)		CLT-CLT (wide face-narrow face)		CLT - CLT (wide face-narrow face)		CLT - CLT (wide face-narrow face)			Withdrawal - full thread (wide face)		Withdrawal - partial thread (wide face)		Withdrawal - full thread (narrow face)		Tension	
																				
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	t [mm]	$R_{V,k}$ [kN]	t [mm]	$R_{V,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,45,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,45,k}$ [kN]	$R_{ki,45,k}$ [kN]	$L_{ef} = L_g$ [mm]	$R_{ax,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,k}$ [kN]	$L_{ef} = L_g$ [mm]	$R_{ax,k}$ [kN]	$R_{tens,k}$ [kN]	$R_{tens,45,k}$ [kN]
WKFS 8																				
⌀8	120	108	54	66	4,08	66	2,66	54	2,70	54	5,41	15,58	108	10,37	54	5,18	108	7,14	25,00	17,68
	140	128	64	76	4,39	76	2,97	64	3,15	64	6,30	15,58	128	12,29	64	6,14	128	8,32	25,00	17,68
	160	148	74	86	4,63	86	3,29	74	3,59	74	7,18	15,58	148	14,21	74	7,10	148	9,48	25,00	17,68
	180	168	84	96	4,87	96	3,62	84	4,03	84	8,05	15,58	168	16,13	84	8,06	168	10,62	25,00	17,68
	200	188	94	106	5,11	106	3,84	94	4,45	94	8,91	15,58	188	18,05	94	9,02	188	11,76	25,00	17,68
	220	208	104	116	5,35	116	3,99	104	4,88	104	9,76	15,58	208	19,97	104	9,98	208	12,88	25,00	17,68
	240	228	114	126	5,59	126	4,14	114	5,30	114	10,60	15,58	228	21,89	114	10,94	228	13,98	25,00	17,68
	260	248	124	136	5,70	136	4,28	124	5,72	124	11,43	15,58	248	23,81	124	11,90	248	15,08	25,00	17,68
	280	268	134	146	5,70	146	4,43	134	6,13	134	12,26	15,58	268	25,73	134	12,86	268	16,17	25,00	17,68
	300	288	144	156	5,70	156	4,53	144	6,54	144	13,08	15,58	288	27,65	144	13,82	288	17,26	25,00	17,68
	350	338	169	181	5,70	181	4,53	169	7,55	169	15,10	15,58	338	32,45	169	16,22	338	19,93	25,00	17,68
	400	388	194	206	5,70	206	4,53	194	8,55	194	17,10	15,58	388	37,25	194	18,62	388	22,57	25,00	17,68
	450	438	219	231	5,70	231	4,53	219	9,54	219	19,07	15,58	438	42,05	219	21,02	438	25,17	25,00	17,68
	500	488	244	256	5,70	256	4,53	244	10,51	244	21,02	15,58	488	46,85	244	23,42	488	27,74	25,00	17,68
WKFS 10																				
⌀10	300	285	142,5	157,5	7,96	157,5	5,90	142,5	7,74	142,5	15,49	23,35	285	31,35	142,5	15,68	285	20,44	36,00	25,46
	330	315	157,5	172,5	8,09	172,5	6,16	157,5	8,47	157,5	16,95	23,35	315	34,65	157,5	17,33	315	22,36	36,00	25,46
	360	345	172,5	187,5	8,09	187,5	6,32	172,5	9,20	172,5	18,39	23,35	345	37,95	172,5	18,98	345	24,27	36,00	25,46
	400	385	192,5	207,5	8,09	207,5	6,32	192,5	10,15	192,5	20,30	23,35	385	42,35	192,5	21,18	385	26,79	36,00	25,46
	450	435	217,5	232,5	8,09	232,5	6,32	217,5	11,33	217,5	22,66	23,35	435	47,85	217,5	23,93	435	29,90	36,00	25,46
	500	485	242,5	257,5	8,09	257,5	6,32	242,5	12,50	242,5	24,99	23,35	485	53,35	242,5	26,68	485	32,98	36,00	25,46
	550	535	267,5	282,5	8,09	282,5	6,32	267,5	13,65	267,5	27,30	23,35	535	58,85	267,5	29,43	535	36,02	36,00	25,46
	600	585	292,5	307,5	8,09	307,5	6,32	292,5	14,79	292,5	29,58	23,35	585	64,35	292,5	32,18	585	39,04	36,00	25,46

NOTES:

1. Characteristic resistances in accordance with EN 1995 and ETA-18/0817
2. In order to obtain a design resistance, use the following formula : $$R_d = \frac{R_k * k_{mod}}{\gamma_M}$$

Factors γ_M and kmod should be taken in accordance with EN 1995

3. Design resistance for tension is smaller value of the following : $$R_{ax,d} = min\begin{cases} \frac{R_{ax,k} * k_{mod}}{\gamma_M} \\ \frac{R_{tens,k}}{\gamma_{M2}} \end{cases}$$

Factors γ_M and kmod should be taken in accordance with EN 1995. Factor γ_{M2} should be taken in accordance with EN 1993

4. Design resistance for sliding is smaller value of the following : $$R_{V,d} = min\begin{cases} \frac{R_{ax,45,k} * k_{mod}}{\gamma_M} \\ \frac{R_{ki,45,k}}{\gamma_{M1}} \\ \frac{R_{tens,45,k}}{\gamma_{M2}} \end{cases}$$

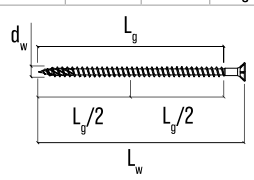
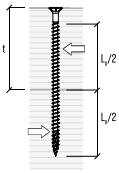
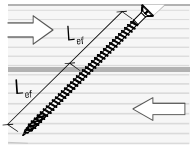
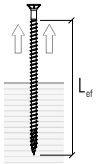
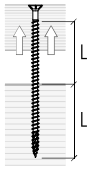
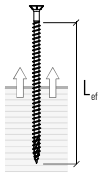
Factors γ_M and k_{mod} should be taken in accordance with EN 1995. Factors γ_{M1} and γ_{M2} should be taken in accordance with EN 1993

5. Characteristic resistances were calculated for a characteristic density of CLT ρ_k = 350 kg/m^3
6. Characteristic shear resistances were calculated for connections without pre-drilled holes
7. Characteristic shear resistances for CLT-CLT connections were calculated for timber thickness t [mm]
8. Characteristic withdrawal resistances of CLT wide face were calculated assuming an angle of 90° between screw and grain direction and for effective penetration length equal $L_{ef} = L_g$ and $L_{ef} = L_g/2$
9. Characteristic withdrawal resistances of CLT narrow face were calculated for minimum thickness $t_{min} = 10d_w$ and for effective penetration length equal $L_{ef} = L_g$
10. Characteristic resistances to sliding were calculated assuming an angle of 45° between screw and grain direction and for effective penetration length equal $L_{ef} = L_g/2$

WKFS - Screw for wooden constructions with full thread and countersunk head

CLT

Characteristic resistances for laterally and axially loaded screws - LVL

DIMENSIONS				SHEAR		SLIDING		TENSION							
Diameter	Length	Thread length	Partial thread length	LVL - LVL (wide face-wide face)		LVL - LVL (wide face-wide face)		Withdrawal - full thread (wide face)		Withdrawal - partial thread (wide face)		Withdrawal - full thread (edge face)		Tension	
															
d_w [mm]	L_w [mm]	L_g [mm]	$L_g/2$ [mm]	t [mm]	$R_{V,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,45,k}$ [kN]	$L_{ef} = L_g$ [mm]	$R_{ax,k}$ [kN]	$L_{ef} = L_g/2$ [mm]	$R_{ax,k}$ [kN]	$L_{ef} = L_g$ [mm]	$R_{ax,k}$ [kN]	$R_{tens,k}$ [kN]	$R_{tens,45,k}$ [kN]
WKFS 8															
ø8	120	108	54	66	4,74	54	3,18	108	11,23	54	5,62	108	7,49	25,00	17,68
	140	128	64	76	5,00	64	3,77	128	13,31	64	6,66	128	8,87	25,00	17,68
	160	148	74	86	5,26	74	4,35	148	15,39	74	7,70	148	10,26	25,00	17,68
	180	168	84	96	5,52	84	4,94	168	17,47	84	8,74	168	11,65	25,00	17,68
	200	188	94	106	5,78	94	5,53	188	19,55	94	9,78	188	13,03	25,00	17,68
	220	208	104	116	6,04	104	6,12	208	21,63	104	10,82	208	14,42	25,00	17,68
	240	228	114	126	6,30	114	6,71	228	23,71	114	11,86	228	15,81	25,00	17,68
	260	248	124	136	6,56	124	7,30	248	25,79	124	12,90	248	17,19	25,00	17,68
	280	268	134	146	6,68	134	7,88	268	27,87	134	13,94	268	18,58	25,00	17,68
	300	288	144	156	6,68	144	8,47	288	29,95	144	14,98	288	19,97	25,00	17,68
	350	338	169	181	6,68	169	9,94	338	35,15	169	17,58	338	23,43	25,00	17,68
	400	388	194	206	6,68	194	11,41	388	40,35	194	20,18	388	26,90	25,00	17,68
	450	438	219	231	6,68	219	12,88	438	45,55	219	22,78	438	30,37	25,00	17,68
	500	488	244	256	6,68	244	14,35	488	50,75	244	25,38	488	33,83	25,00	17,68
WKFS 10															
ø10	300	285	142,5	157,5	9,37	142,5	10,48	285	37,05	142,5	18,53	285	24,70	36,00	25,46
	330	315	157,5	172,5	9,47	157,5	11,58	315	40,95	157,5	20,48	315	27,30	36,00	25,46
	360	345	172,5	187,5	9,47	172,5	12,69	345	44,85	172,5	22,43	345	29,90	36,00	25,46
	400	385	192,5	207,5	9,47	192,5	14,16	385	50,05	192,5	25,03	385	33,37	36,00	25,46
	450	435	217,5	232,5	9,47	217,5	15,99	435	56,55	217,5	28,28	435	37,70	36,00	25,46
	500	485	242,5	257,5	9,47	242,5	17,83	485	63,05	242,5	31,53	485	42,03	36,00	25,46
	550	535	267,5	282,5	9,47	267,5	19,67	535	69,55	267,5	34,78	535	46,37	36,00	25,46
	600	585	292,5	307,5	9,47	292,5	21,51	585	76,05	292,5	38,03	585	50,70	36,00	25,46

NOTES:

1. Characteristic resistances in accordance with EN 1995 and ETA-18/0817
2. In order to obtain a design resistance, use the following formula :

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

Factors γ_M and k_{mod} should be taken in accordance with EN 1995

3. Design resistance for tension is smaller value of the following :

$$R_{ax,d} = min \begin{cases} \frac{R_{ax,k} * k_{mod}}{\gamma_M} \\ \frac{R_{tens,k}}{\gamma_{M2}} \end{cases}$$

Factors γ_M and k_{mod} should be taken in accordance with EN 1995. Factor γ_{M2} should be taken in accordance with EN 1993

4. Design resistance for sliding is smaller value of the following :

$$R_{V,d} = min \begin{cases} \frac{R_{ax,45,k} * k_{mod}}{\gamma_M} \\ \frac{R_{tens,45,k}}{\gamma_{M2}} \end{cases}$$

Factors γ_M and k_{mod} should be taken in accordance with EN 1995. Factor γ_{M2} should be taken in accordance with EN 1993

5. Characteristic resistances were calculated for a characteristic density of LVL ρ_k = 480 kg/m^3
6. Characteristic shear resistances were calculated for connections without pre-drilled holes
7. Characteristic shear resistances for LVL-LVL connections were calculated for timber thickness t [mm]
8. Characteristic resistances to withdrawal were calculated assuming an angle of 90° between screw and grain direction and for effective penetration length equal L_{ef} = L and $L_{ef} = L_g/2$
9. Characteristic resistances to sliding were calculated assuming an angle of 45° between screw and grain direction and for effective penetration length equal $L_{ef} = L_g/2$