StarDrive GPR

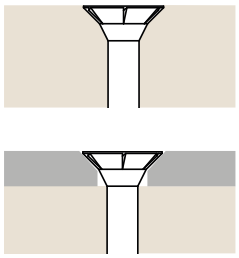
Highest quality – innovative technology

Head types

90° countersunk head with milling fins

> Underhead fins for optimal countersinking in timber

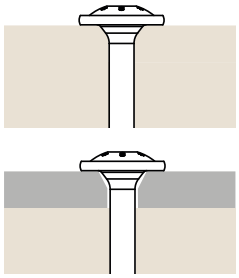
> Reduce tearing and splitting in the wood



Washer head

> Highest permissible head pull-through values for sturdy joints pulled tightly together

> No washers required, which makes processing faster



Thread geometry

Lower screw-in resistance

> The friction part reduces the screw-in resistance by reaming the wood around the shaft

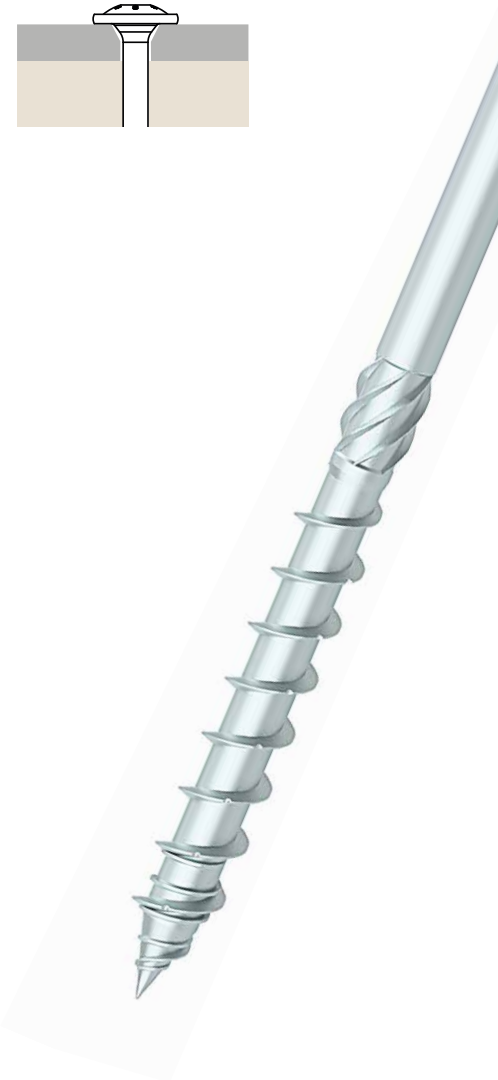
Fast screwing processes

> Coarse thread including patented follower thread, rolled out to the tip

> Low screw-in torque

Patented follower thread tip – no pre-drilling necessary

> Ensures that screw bites quickly with low splitting



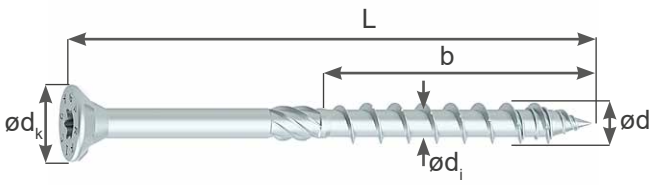
Dimensions & surfaces

		Countersunk head	Washer head	A2 countersunk head	A2 washer head
					
Ø 4.0	Drive	T 20	–	–	–
	Length	30-70 mm	–	–	–
	Thread	Coarse thread	–	–	–
	Underhead	Underhead ribs	–	–	–
Ø 4.5	Drive	T 20	–	–	–
	Length	50-80 mm	–	–	–
	Thread	Coarse thread	–	–	–
	Underhead	Underhead ribs	–	–	–
Ø 5.0	Drive	T 25	–	–	–
	Length	50-120 mm	–	–	–
	Thread	Coarse thread	–	–	–
	Underhead	Underhead ribs	–	–	–
Ø 6.0	Drive	T 30	T 30	–	–
	Length	60-300 mm	60–200 mm	–	–
	Thread	Coarse thread	Coarse thread	–	–
	Underhead	Underhead ribs	Cone	–	–
Ø 8.0	Drive	T 40	T 40	T 40	T 40
	Length	80–400 mm	80–400 mm	100–140 mm	100–140 mm
	Thread	Coarse thread	Coarse thread	Coarse thread	Coarse thread
	Underhead	Underhead ribs	Cone	Underhead ribs	Cone
Ø 10.0	Drive	T 40	T 50	–	–
	Length	80–400 mm	100–400 mm	–	–
	Thread	Coarse thread	Coarse thread	–	–
	Underhead	Underhead ribs	Cone	–	–
	Surface	galvanised blue, Cr[VI] free		Stainless steel A2	

ETA-12/0373

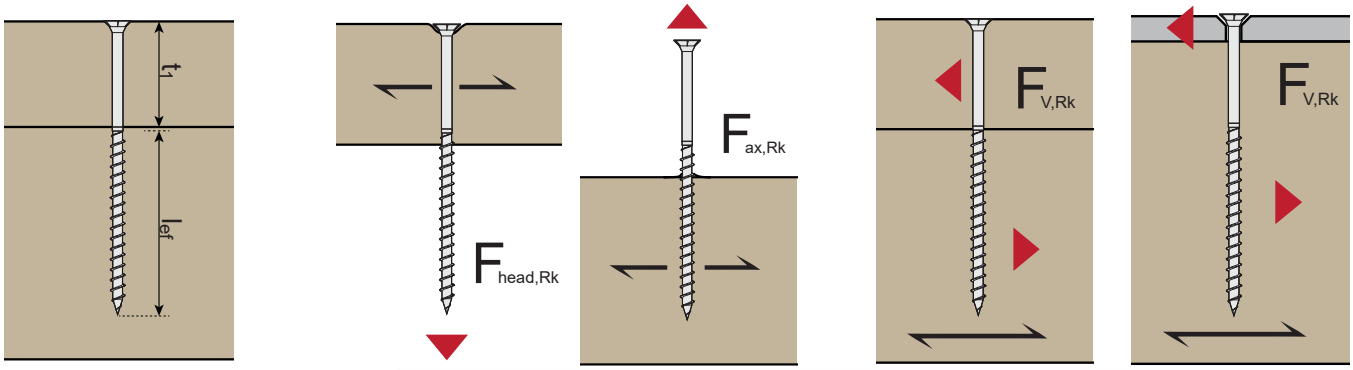
StarDrive GPR
partial thread countersunk head

CHARACTERISTICS AND VALUES FOR C24							
D	**[mm]**	**ø 4**	**ø 4.5**	**ø 5**	**ø 6**	**ø 8**	**ø 10**
d_k	[mm]	8.0	9.0	10.0	12.0	15.0	18.5
d_i	[mm]	2.50	2.70	3.25	3.95	5.30	6.20
$f_{ax,90,k}$	[N/mm²]	14.8	13.8	12.8	12.1	10.7	9.5
$f_{head,k}$	[N/mm²]	17.1	17.6	14.6	14.6	12.4	12.2
$F_{tens,k}$	[kN]	5.0	5.8	8.5	12.4	22.0	32.0
$M_{y,k}$	[Nmm]	3 200	4 900	6 500	10 100	21 000	33 000



				AXIAL		SHEAR		
				HEAD PULL THROUGH	WITHDRAWAL	TIMBER-TIMBER	METAL-TIMBER	
	ø	L/b	$t_{1,min}$	$F_{head,Rk}$	$F_{ax,Rk}$	$F_{v,Rk}$	$F_{V,Rk,thin}$	$F_{V,Rk,thick}$
	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]
ø 4.0	4.0	**30**/24	-	1.09	1.42	-	0.79	1.34
	4.0	**35**/24	-	1.09	1.42	-	0.94	1.47
	4.0	**40**/30	-	1.09	1.78	-	1.09	1.58
	4.0	**50**/30	-	1.09	1.78	-	1.24	1.58
	4.0	**60**/35	25	1.09	2.07	1.06	1.32	1.65
	4.0	**70**/35	25	1.09	2.07	1.06	1.32	1.65
ø 4.5	4.5	**40**/24	-	1.43	1.49	-	1.17	1.77
	4.5	**45**/24	-	1.43	1.49	-	1.33	1.83
	4.5	**50**/29	-	1.43	1.80	-	1.48	1.91
	4.5	**60**/29	30	1.43	1.80	1.38	1.48	1.91
	4.5	**70**/39	30	1.43	2.42	1.38	1.64	2.07
	4.5	**80**/39	30	1.43	2.42	1.38	1.64	2.07
ø 5.0	5.0	**50**/30	-	1.46	1.92	-	1.59	2.22
	5.0	**60**/30	30	1.46	1.92	1.47	1.71	2.22
	5.0	**70**/37	30	1.46	2.37	1.51	1.83	2.34
	5.0	**80**/37	35	1.46	2.37	1.60	1.83	2.34
	5.0	**90**/55	35	1.46	3.52	1.60	2.11	2.62
	5.0	**100**/55	35	1.46	3.52	1.60	2.11	2.62
	5.0	**110**/55	35	1.46	3.52	1.60	2.11	2.62
	5.0	**120**/55	35	1.46	3.52	1.60	2.11	2.62
ø 6.0	6.0	**60**/36	24	2.10	2.92	1.77	2.17	3.05
	6.0	**70**/36	30	2.10	2.92	1.91	2.37	3.05
	6.0	**80**/48	30	2.10	3.89	1.91	2.61	3.29
	6.0	**90**/48	40	2.10	3.89	2.16	2.61	3.29
	6.0	**100**/48	40	2.10	3.89	2.16	2.61	3.29
	6.0	**110**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**120**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**130**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**140**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**150**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**160**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**180**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**200**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**220**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**240**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**260**/64	40	2.10	5.18	2.16	2.94	3.61

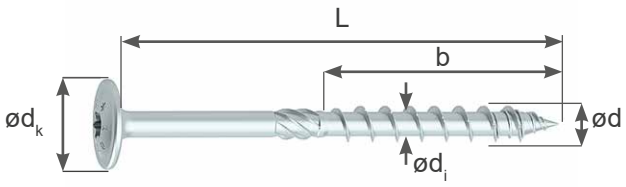
StarDrive GPR PT CS



				AXIAL		SHEAR		
				HEAD PULL THROUGH	WITHDRAWAL	TIMBER-TIMBER	METAL-TIMBER	
	ø	L/b	$t_{1,min}$	$F_{head,Rk}$	$F_{ax,Rk}$	$F_{v,Rk}$	$F_{V,Rk,thin}$	$F_{V,Rk,thick}$
	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]
ø 6.0	6.0	**280**/64	40	2.10	5.18	2.16	2.94	3.61
	6.0	**300**/64	40	2.10	5.18	2.16	2.94	3.61
ø 8.0	8.0	**80**/54	-	2.79	5.66	0.00	3.54	5.11
	8.0	**100**/54	45	2.79	5.66	3.10	4.03	5.11
	8.0	**120**/54	55	2.79	5.66	3.31	4.03	5.11
	8.0	**140**/84	55	2.79	8.80	3.31	4.82	5.90
	8.0	**160**/84	55	2.79	8.80	3.31	4.82	5.90
	8.0	**180**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**200**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**220**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**240**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**260**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**280**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**300**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**320**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**340**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**360**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**380**/100	55	2.79	10.48	3.31	5.23	6.32
	8.0	**400**/100	55	2.79	10.48	3.31	5.23	6.32
ø 10.0	10.0	**80**/60	-	4.18	6.75	-	4.03	6.51
	10.0	**100**/60	45	4.18	6.75	4.02	5.18	6.70
	10.0	**120**/60	55	4.18	6.75	4.41	5.23	6.70
	10.0	**140**/60	55	4.18	10.50	4.41	6.17	7.64
	10.0	**160**/100	60	4.18	10.50	4.59	6.17	7.64
	10.0	**180**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**200**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**220**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**240**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**260**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**280**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**300**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**320**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**340**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**360**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**380**/100	60	4.18	12.50	4.59	6.67	8.14
	10.0	**400**/100	60	4.18	12.50	4.59	6.67	8.14

StarDrive GPR partial thread washer head

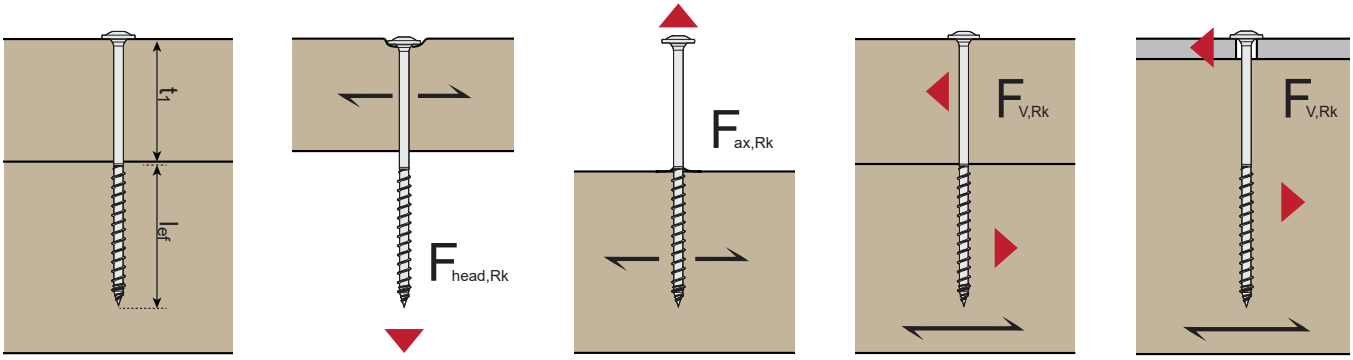
CHARACTERISTICS AND VALUES FOR C24				
D	**[mm]**	**ø 6**	**ø 8**	**ø 10**
d_k	[mm]	14.0	20.0	25.0
d_i	[mm]	3.95	5.30	6.20
$f_{ax,90,k}$	[N/mm²]	13.5	13.1	12.5
$f_{head,k}$	[N/mm²]	16.7	17.6	15.2
$F_{tens,k}$	[kN]	12.4	22.0	32.0
$M_{y,k}$	[Nmm]	10 100	21 000	33 000



				AXIAL		SHEAR		
				HEAD PULL THROUGH	WITHDRAWAL	TIMBER-TIMBER	METAL-TIMBER	
	ø [mm]	L/b [mm]	$t_{1,min}$ [mm]	$F_{head,Rk}$ [kN]	$F_{ax,Rk}$ [kN]	$F_{v,Rk}$ [kN]	$F_{V,Rk,thin}$ [kN]	$F_{V,Rk,thick}$ [kN]
ø 6.0	6.0	**60**/36	24	3.27	2.92	1.97	2.17	3.05
	6.0	**80**/48	30	3.27	3.89	2.20	2.61	3.29
	6.0	**100**/48	40	3.27	3.89	2.46	2.61	3.29
	6.0	**120**/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**140**/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**160**/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**180**/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**200**/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**220***/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**240***/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**260***/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**280***/64	40	3.27	5.18	2.46	2.94	3.61
	6.0	**300***/64	40	3.27	5.18	2.46	2.94	3.61
ø 8.0	8.0	**80**/54	-	7.04	5.66	-	3.54	5.11
	8.0	**100**/54	45	7.04	5.66	3.82	4.03	5.11
	8.0	**120**/54	55	7.04	5.66	4.03	4.03	5.11
	8.0	**140**/84	55	7.04	8.80	4.37	4.82	5.90
	8.0	**160**/84	55	7.04	8.80	4.37	4.82	5.90
	8.0	**180**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**200**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**220**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**240**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**260**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**280**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**300**/100	55	7.04	10.48	4.37	5.23	6.32

*available by request

StarDrive GPR PT WH



				AXIAL		SHEAR		
				HEAD PULL THROUGH	WITHDRAWAL	TIMBER-TIMBER	METAL-TIMBER	
	ø	L/b	$t_{1,min}$	$F_{head,Rk}$	$F_{ax,Rk}$	$F_{v,Rk}$	$F_{V,Rk,thin}$	$F_{V,Rk,thick}$
	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]
ø 8.0	8.0	**320**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**340**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**360**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**380**/100	55	7.04	10.48	4.37	5.23	6.32
	8.0	**400**/100	55	7.04	10.48	4.37	5.23	6.32
ø 10.0	10.0	**100**/60	40	9.50	7.50	4.68	5.18	6.89
	10.0	**120**/60	60	9.50	7.50	5.42	5.42	6.89
	10.0	**140**/60	60	9.50	7.50	5.42	5.42	6.89
	10.0	**160**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**180**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**200**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**220**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**240**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**260**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**280**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**300**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**320**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**340**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**360**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**380**/100	60	9.50	12.50	5.92	6.67	8.14
	10.0	**400**/100	60	9.50	12.50	5.92	6.67	8.14

Values for C24 (ρ_k=350kg/m³), axial axis to grain: 30° - 90°, $F_{ax,Rk}$ = thread withdrawal, $F_{head,Rk}$ = head pull through, $F_{v,Rk}$ = shear (// to grain 0° – ⊥ to grain 90°), wood/steel plate: l_{ef} = thread length b, t_1 min= minimum wood thickness, t_1 max= maximum wood thickness add-on part (L-b), $F_{V,Rk,thin}$= steel sheet t ≤ d/2, $F_{V,RK,thick}$= steel sheet t ≥ d

Minimum spacing

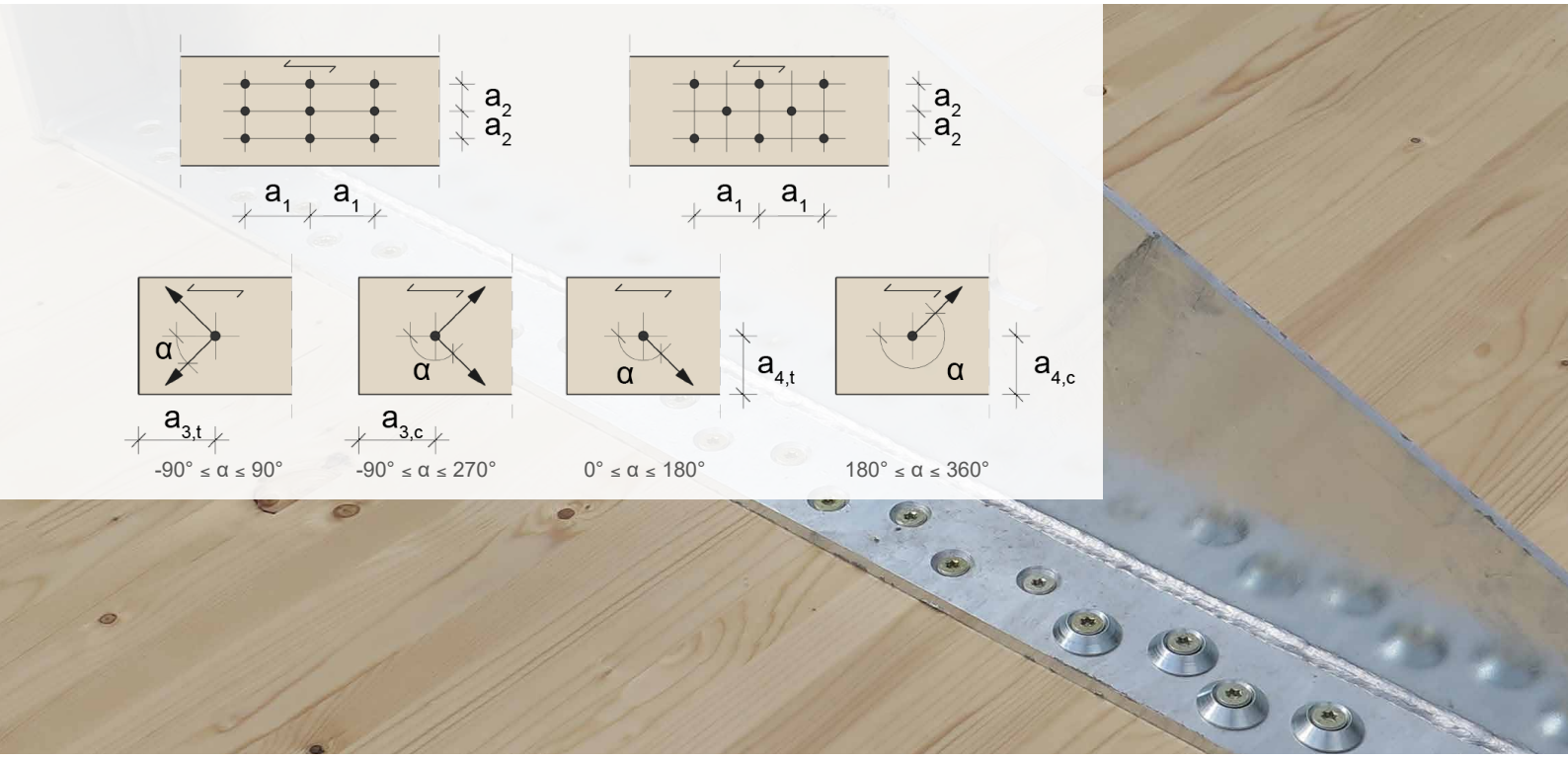
for self-drilling screws RAPID©, StarDrive GPR and for screws with drill bit

		Axial loaded screws		Subjected to axial and shear or only shear stress							
		Softwood and softwood based materials (predrilled, not-predrilled) and Hardwood (predrilled)		Cross laminated timer		Softwood and softwood based materials (predrilled, not-predrilled) and Hardwood (predrilled)					
		end-grain and side-grain		wide face	narrow face	end-grain and side-grain					
Conditions	a1 x a2	≥ 25 x d²	≥ 21 x d²	-	-	α	Screwing in pre-drilled coniferous wood, deciduous wood and LVL deciduous wood*		Screwing **without pre-drilling**			
							d < 5mm	d> 5 mm	Screws d < 5 mm in coniferous wood**	Screws d ≥ 5 mm in coniferous wood**	Screws d ≥ 5 mm with HSP in coniferous wood*	RAPID® Hardwood d=8 mm in deciduous wood and LVL beech**
Axial spacing	a1	5 x d	7 x d	4 x d	10 x d	0°	5 x d		10 x d	12 x d	5 x d	15 x d
						90°	4 x d		5 x d	5 x d	4 x d	7 x d
Edge distance	a1, c	5 x d		-	-	0°			-	-	-	-
						90°						
Axial spacing ⊥	a2	2.5 x d	3 x d	2.5 x d	3 x d	0°	3 x d		5 x d		3 x d	7 x d
						90°	4 x d				4 x d	
Edge distance ⊥	a2, c	4 x d		-	-	0°	-		-	-	-	-
						90°						
Edge distance // loaded	a3, t	-	-	6 x d	12 x d	0°	12 x d		15 x d		12 x d	20 x d
						90°	7 x d		10 x d (15 x d if screw d ≥ 8 and timber thickness t < 5d)		7 x d	15 x d
Edge distance // unloaded	a3, c	-	-	6 x d	7 x d	0°	7 x d				7 x d	15 x d
						90°						
Edge distance ⊥ loaded	a4, t	-	-	6 x d	5 x d	0°	3 x d		5 x d	5 x d	3 x d	7 x d
						90°	5 x d	7 x d	7 x d	10 x d	7 x d	12 x d
Edge distance ⊥ unloaded	a4, c	-	-	2.5 x d	3 x d	0°	3 x d		5 x d (3 x d if a1 and a3 min. 25 x d, even if timber thickness t < 5d)		3 x d	7 x d
						90°						
Distance between screws in screw cross	a cross	1.5 x d										
Minimum timber thickness	t	12d		10d								

Screw diameter	< 8	8	10	12
Minimum thickness t for load-bearing timber parts [mm]	24	30	40	80

- If the timber does not meet the minimum thickness, it should generally be pre-drilled
- Pre-drilling diameter: di (-0.5/+1.0) for coniferous wood di (-0/+0.5) for deciduous wood and LVL
- Woods at risk of splintering (e.g. Douglas fir, silver fir) should be pre-drilled or use a higher minimum thickness according to EN1995-1-1
- Drilled holes for positioning, guidance or orientation are NOT PRE-DRILLED
- All screws (d ≥ 5 mm) may be screwed into deciduous wood and LVL beech up to 10d in length without pre-drilling; the distances for RAPID® Hardwood should be observed
- The minimum binding anchoring depth for screws is 4d, or 20d in end wood.
- The minimum anchoring depth for CLT is 4d on the face side and 10d on the narrow edge (front face)

d = outer thread diameter, d_1 = thread core diameter,
α = angle between direction of force and direction of grain
*See EN1995-1-1, table 8.2 how nails are pre-drilled
**See EN1995-1-1, table 8.2 how nails are not pre-drilled



Information

- Geometry and mechanical properties correspond to ETA 12/0373.
- In connections between main and secondary beams, the main beam must be able to adequately with stand torsion and fixed with fork support.
- The values stated for main/secondary beam connections only apply to vertically oriented loads. Any transverse stress must be verified separately.
- The rope effect has been factored into the calculation of shear-off values.
partial thread, Z-9.1-435 for StarDrive GPR, Z-9.1-656 for RAPID® fullthread, these lower values are only intended as guidance.
- Characteristic values F_{Rk}: Design according to EC5 and ETA 12/0373, these values should be used for calculations
- The design value of the ultimate limit state $F_{v,Rd}$ for the final design of the timber connection is taken from the characteristic values as follows:

$$F_{Rd} = \frac{F_{Rk} \cdot k_{mod}}{\gamma_m}$$

F_{Rd} ... Design value of ultimate limit state subjected to shear-off stress or tension depending on connection
F_{Rk} ... characteristic value of ultimate limit state subjected to shear-off stress or tension depending on connection
γ_m , k_{mod} ... Additional values from corresponding national norms