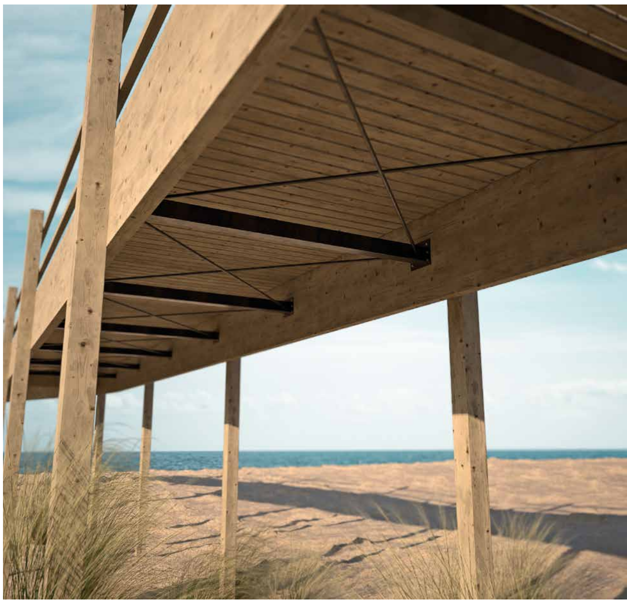
HBS PLATE A4

PAN HEAD SCREW FOR PLATES

ICC ES ELC-4645 | ICC ES ESR-4645 | CE ETA-11/0030



A4 | AISI316

HBS PLATE version in A4 | AISI316 austenitic stainless steel for high corrosion resistance. Ideal for environments adjacent to the sea in corrosivity class C5 and for insertion on the most aggressive timbers in class T5.

STEEL-TO-TIMBER CONNECTIONS

The under-head shoulder achieves an interlocking effect with the circular hole in the plate, thus guaranteeing excellent static performance. The edgeless geometry of the head reduces stress concentration points and gives the screw strength.

T5 TIMBER CORROSIVITY

Suitable for use in applications on agressive woods with an acidity (pH) level below 4 such as oak, Douglas fir and chestnut, and in wood moisture conditions above 20%.

MY PROJECT SOFTWARE | MANUALS | BIT INCLUDED

DIAMETER [mm]

3,5 — 8 – 12 — 12

LENGTH [mm]

25 — 60 – 200 — 200

SERVICE CLASS

SC1 SC2 SC3 SC4

ATMOSPHERIC CORROSIVITY

C1 C2 C3 C4 C5

WOOD CORROSIVITY

T1 T2 T3 T4 T5

MATERIAL

A4 AISI 316 — A4 | AISI316 austenitic stainless steel (CRC III)

FIELDS OF USE

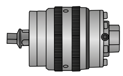
- timber based panels
- solid timber and glulam
- CLT and LVL
- ACQ, CCA treated timber

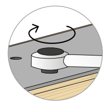
CODES AND DIMENSIONS

d_1 [mm]	CODE	L [mm]	b [mm]	A_P [mm]	pcs
8 TX 40	**HBSPL860A4**	60	52	1÷10	100
	HBSPL880A4	80	55	1÷15	100
	HBSPL8100A4	100	75	1÷15	100
	HBSPL8120A4	120	95	1÷15	100
	HBSPL8140A4	140	110	1÷20	100
	HBSPL8160A4	160	130	1÷20	100
10 TX 40	**HBSPL1080A4**	80	60	1÷10	50
	HBSPL10100A4	100	75	1÷15	50
	HBSPL10120A4	120	95	1÷15	50
	HBSPL10140A4	140	110	1÷20	50
	HBSPL10160A4	160	130	1÷20	50
	HBSPL10180A4	180	150	1÷20	50

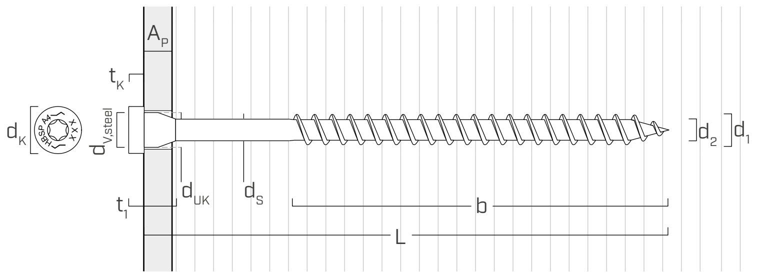
d_1 [mm]	CODE	L [mm]	b [mm]	A_P [mm]	pcs
12 TX 50	**HBSPL12100A4**	100	75	1÷15	25
	HBSPL12120A4	120	90	1÷20	25
	HBSPL12140A4	140	110	1÷20	25
	HBSPL12160A4	160	120	1÷30	25
	HBSPL12180A4	180	140	1÷30	25
	HBSPL12200A4	200	160	1÷30	25

METAL-to-TIMBER recommended use:





GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter	d_1	**[mm]**	**8**	**10**	**12**
Head diameter	d_K	[mm]	13,50	16,50	18,50
Internal thread diameter	d_2	[mm]	5,90	6,60	7,30
Shank diameter	d_S	[mm]	6,30	7,20	8,55
Head thickness	t_1	[mm]	6,50	8,20	8,20
Washer thickness	t_K	[mm]	4,50	5,00	5,50
Underhead diameter	d_{UK}	[mm]	10,00	12,00	13,00
Hole diameter on steel plate	$d_{V,steel}$	[mm]	11,00	13,00	14,00
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	5,0	6,0	7,0

(1) Pre-drilling valid for softwood.

CHARACTERISTIC MECHANICAL PARAMETERS

Nominal diameter	d_1	**[mm]**	**8**	**10**	**12**
Characteristic tensile strength	$f_{tens,k}$	[kN]	15,0	21,0	28,0
Yield moment	$M_{y,k}$	[Nm]	21,0	28,0	40,0
Recommended insertion moment	$M_{ins,rec}$	[Nm]	15,0	20,0	34,0

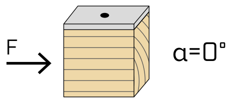
The specified insertion moment is to be considered as the maximum applicable value.
Installation must stop as soon as the screw head comes into contact with the metal element.

			softwood *(softwood)*
Withdrawal resistance parameter	$f_{ax,k}$	[N/mm^2]	11,7
Head-pull-through parameter	$f_{head,k}$	[N/mm^2]	10,5
Associated density	ρ_a	[kg/m^3]	350
Calculation density	ρ_k	*[kg/m^3]*	*≤ 440*

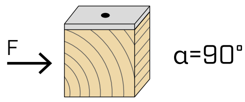
For applications with different materials please see ETA-11/0030.

MINIMUM DISTANCES FOR SHEAR LOADS | STEEL-TO-TIMBER

screws inserted **WITHOUT pre-drilled hole** $\rho_k \leq$ **420 kg/m³**

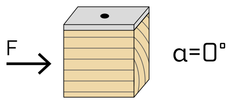


d_1	[mm]		8	10	12
a_1	[mm]	12·d·0,7	67	84	101
a_2	[mm]	5·d·0,7	28	35	42
$a_{3,t}$	[mm]	15·d	120	150	180
$a_{3,c}$	[mm]	10·d	80	100	120
$a_{4,t}$	[mm]	5·d	40	50	60
$a_{4,c}$	[mm]	5·d	40	50	60

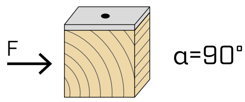


d_1	[mm]		8	10	12
a_1	[mm]	5·d·0,7	28	35	42
a_2	[mm]	5·d·0,7	28	35	42
$a_{3,t}$	[mm]	10·d	80	100	120
$a_{3,c}$	[mm]	10·d	80	100	120
$a_{4,t}$	[mm]	10·d	80	100	120
$a_{4,c}$	[mm]	5·d	40	50	60

screws inserted **WITH pre-drilled hole**

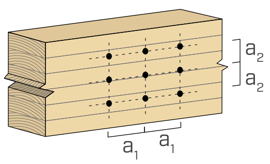


d_1	[mm]		8	10	12
a_1	[mm]	5·d·0,7	28	35	42
a_2	[mm]	3·d·0,7	17	21	25
$a_{3,t}$	[mm]	12·d	96	120	144
$a_{3,c}$	[mm]	7·d	56	70	84
$a_{4,t}$	[mm]	3·d	24	30	36
$a_{4,c}$	[mm]	3·d	24	30	36

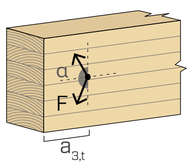


d_1	[mm]		8	10	12
a_1	[mm]	4·d·0,7	22	28	34
a_2	[mm]	4·d·0,7	22	28	34
$a_{3,t}$	[mm]	7·d	56	70	84
$a_{3,c}$	[mm]	7·d	56	70	84
$a_{4,t}$	[mm]	7·d	56	70	84
$a_{4,c}$	[mm]	3·d	24	30	36

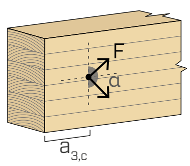
α = load-to-grain angle
d = d_1 = nominal screw diameter



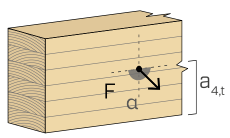
stressed end
-90° < α < 90°



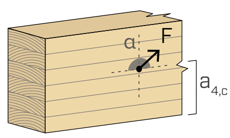
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°



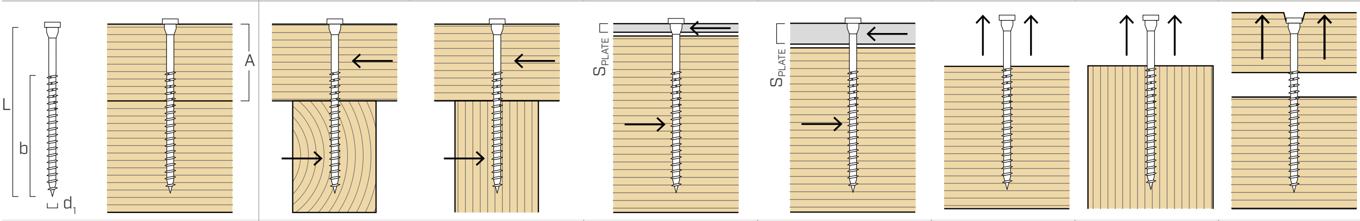
NOTES

- The minimum distances comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- In the case of timber-to-timber joints, the minimum spacing (a_1, a_2) can be multiplied by a coefficient of 1,5.

rothoblaas

STRUCTURAL VALUES

CHARACTERISTIC VALUES
EN 1995:2014



geometry				SHEAR						TENSION		
geometry				timber-to-timber ε=90°	timber-to-timber ε=0°	steel-to-timber thin plate		steel-to-timber thick plate		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_{PLATE}	$R_{V,90,k}$	S_{PLATE}	$R_{V,90,k}$	$R_{ax,90,k}$	$R_{ax,0,k}$	$R_{head,k}$
[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
8	60	52	8	1,08	1,08	4	3,03	8	4,78	5,25	1,58	2,07
	80	55	25	2,46	1,70		4,11		5,27	5,56	1,67	2,07
	100	75	25	2,46	2,06		4,64		5,77	7,58	2,27	2,07
	120	95	25	2,46	2,06		5,14		6,28	9,60	2,88	2,07
	140	110	30	2,60	2,18		5,48		6,66	11,11	3,33	2,07
	160	130	30	2,60	2,18		5,48		7,16	13,13	3,94	2,07
10	80	60	20	3,04	2,07	5	4,75	10	6,74	7,58	2,27	3,09
	100	75	25	3,15	2,59		5,79		7,21	9,47	2,84	3,09
	120	95	25	3,15	2,65		6,42		7,84	12,00	3,60	3,09
	140	110	30	3,30	2,78		6,85		8,31	13,89	4,17	3,09
	160	130	30	3,30	2,78		6,85		8,94	16,42	4,92	3,09
	180	150	30	3,30	2,78		6,85		9,58	18,94	5,68	3,09
12	100	75	25	3,92	2,99	6	6,76	12	9,01	11,36	3,41	3,88
	120	95	25	3,92	3,28		7,96		9,77	14,39	4,32	3,88
	140	110	30	4,06	3,42		8,53		10,33	16,67	5,00	3,88
	160	120	40	4,44	3,76		8,72		10,71	18,18	5,45	3,88
	180	140	40	4,44	3,76		8,72		11,47	21,21	6,36	3,88
	200	160	40	4,44	3,76		8,72		12,23	24,24	7,27	3,88

ε = screw-to-grain angle

STRUCTURAL VALUES

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, panels and metal plates 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 thread withdrawal characteristic strength has been evaluated considering a fixing length equal to b.
- The head pull-through characteristic strength was calculated using timber elements.
  In the case of steel-to-timber connections, generally the steel tensile strength is binding with respect to head separation or pull-through.

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 of the second element and the connector.
- The characteristic steel-timber shear strengths were evaluated considering an angle ε of 90° between the grains of the timber element and the connector.
- The characteristic plate shear strengths are evaluated considering the case of thin plate (S_{PLATE} = 0.5 d_1) and thick plate (S_{PLATE} = d_1).
- 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 of the timber element and the connector.
- For the calculation process a timber characteristic density ρ_k = 385 kg/m^3 has been considered.
  For different values of ρ_k, the strength values in the table (timber-to-timber shear, steel-to-timber shear and tensile) can be converted by means of the coefficient k_{dens}.

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

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.