HBS HARDWOOD

BIT INCLUDED | MY PROJECT SOFTWARE | CE ETA 11/0030

COUNTERSUNK SCREW FOR HARDWOODS

HARDWOOD CERTIFICATION

Special tip with diamond geometry and notched, serrated thread. ETA 11/0030 certification for use with high density timber without any pre-drill. Approved for structural applications subject to stresses in any direction vs. the grain (α = 0° - 90°).

LARGER DIAMETER

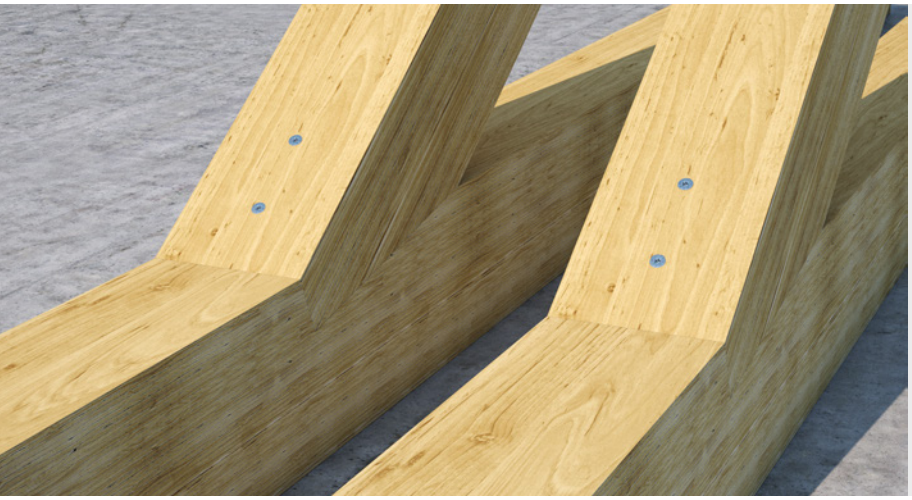
Inner tip diameter increased to ensure tightening in the highest density woods. Excellent twisting moment values. HBS H Ø6 mm, comparable to a diameter of 7 mm; HBS H Ø8 mm, comparable to a diameter of 9 mm.

60° COUNTERSUNK HEAD

Concealed head, 60°, for effective, minimally invasive insertion, even in high density woods.

CHARACTERISTICS

FOCUS	screw for hardwoods
HEAD	60° taper with under-head ribs
DIAMETER	7,0 and 9,0 mm
LENGTH	from 80 mm to 240 mm



MATERIAL

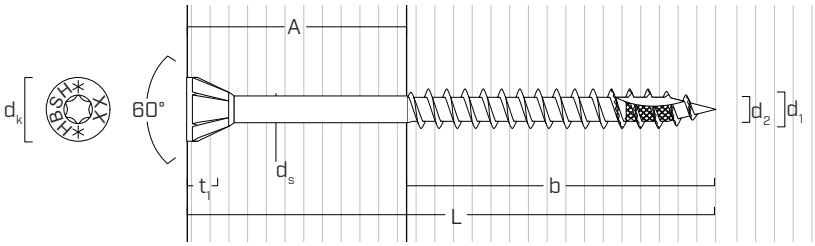
Galvanized carbon steel.

FIELDS OF USE

- wood based panels
- solid timber and glulam
- CLT, LVL
- high density woods
- beech, cypress, eucalyptus, bamboo

Service classes 1 and 2.

GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter eq.	**d_1 eq.**	**[mm]**	**7**	**9**
Nominal diameter	d_1	[mm]	6	8
Head diameter	d_k	[mm]	12,00	14,50
Tip diameter	d_2	[mm]	4,50	5,90
Shank diameter	d_s	[mm]	4,80	6,30
Pre-drilling hole diameter	d_v	[mm]	4,0	6,0
Characteristic yield moment	$M_{y,k}$	[Nmm]	18987,4	40115,0
Characteristic withdrawal-resistance parameter	$f_{ax,k,90°}$	[N/mm²]	46,0	46,0
	$f_{ax,k,0°}$	[N/mm²]	20,0	20,0
Associated density	ρ_a	[kg/m³]	730	730
Characteristic head-pull-through parameter	$f_{head,k}$	[N/mm²]	50,0	50,0
Associated density	ρ_a	[kg/m³]	730	730
Characteristic tensile strength	$f_{tens,k}$	[kN]	17,0	20,1

Mechanical parameters from experimental tests obtained from "Test Report No. 196104" of Karlsruher Institut für Technologie (KIT).

CODES AND DIMENSIONS

d_1 eq. [mm]	**CODE**	**d_1** [mm]	**L** [mm]	**b** [mm]	**A** [mm]	**pcs**
7 TX 30	**HBSH780**	6	80	50	30	100
	HBSH7100	6	100	60	40	100
	HBSH7120	6	120	70	50	100
	HBSH7140	6	140	80	60	100
	HBSH7160	6	160	90	70	100

d_1 eq. [mm]	**CODE**	**d_1** [mm]	**L** [mm]	**b** [mm]	**A** [mm]	**pcs**
9 TX 40	**HBSH9120**	8	120	70	50	100
	HBSH9140	8	140	80	60	100
	HBSH9160	8	160	90	70	100
	HBSH9180	8	180	100	80	100
	HBSH9200	8	200	100	100	100
	HBSH9220	8	220	100	120	100
	HBSH9240	8	240	100	140	100

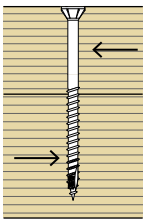
d_1 eq. = nominal diameter equivalent to a screw with the same d_s

NOTES: upon request, EVO version is available.

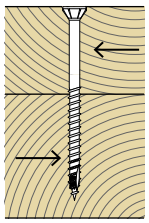
BEECH LVL

Values also tested, certified and calculated for high density woods such as beechwood Microllam® LVL. Certified for use without pre-drilling, for densities of up to 780 kg/m³. Also tested on structural woods such as beech, cypress, eucalyptus, bamboo.

MINIMUM DISTANCES FOR SHEAR LOADS



Load-to-grain angle α = 0°

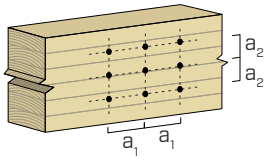


Load-to-grain angle α = 90°

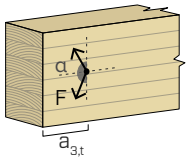
		SCREWS INSERTED WITH PRE-DRILLING HOLES			SCREWS INSERTED WITH PRE-DRILLING HOLES		
d_1 eq.			**7**	**9**		**7**	**9**
d_1			6	8		6	8
a_1	[mm]	**5·d_1**	30	40	**4·d_1**	24	32
a_2	[mm]	**3·d_1**	18	24	**4·d_1**	24	32
$a_{3,t}$	[mm]	**12·d_1**	72	96	**7·d_1**	42	56
$a_{3,c}$	[mm]	**7·d_1**	42	56	**7·d_1**	42	56
$a_{4,t}$	[mm]	**3·d_1**	18	24	**5·d_1**	42	56
$a_{4,c}$	[mm]	**3·d_1**	18	24	**3·d_1**	18	24

		SCREWS INSERTED WITHOUT PRE-DRILLING HOLE			SCREWS INSERTED WITHOUT PRE-DRILLING HOLE		
d_1 eq.			**7**	**9**		**7**	**9**
d_1			6	8		6	8
a_1	[mm]	**15·d_1**	90	120	**7·d_1**	42	56
a_2	[mm]	**7·d_1**	42	56	**7·d_1**	42	56
$a_{3,t}$	[mm]	**20·d_1**	120	160	**15·d_1**	90	120
$a_{3,c}$	[mm]	**15·d_1**	90	120	**15·d_1**	90	120
$a_{4,t}$	[mm]	**7·d_1**	42	56	**12·d_1**	72	96
$a_{4,c}$	[mm]	**7·d_1**	42	56	**7·d_1**	42	56

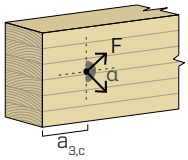
d_1 = nominal screw diameter



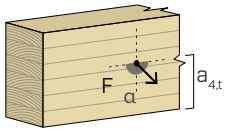
stressed end
-90° < α < 90°



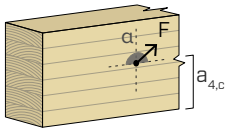
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



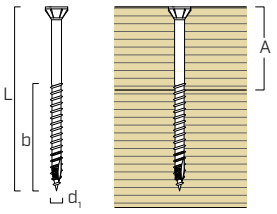
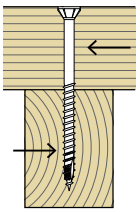
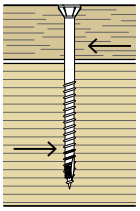
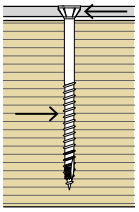
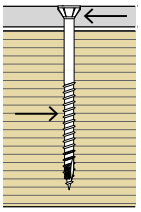
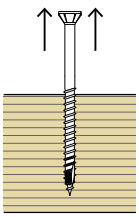
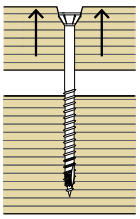
unload edge
180° < α < 360°



NOTES:

- The minimum distances are compliant with EN 1995:2014 - Table 8.2, considering a wood characteristic density of ρ_k > 420 kg/m³ and calculation diameter of d = nominal screw diameter.
- For high density wood applications (ρ_k > 500 kg/m³) please refer to 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.

Full technical data is available in the website www.rothoblaas.com.

					SHEAR						TENSION	
geometry					timber-to-timber	panel-timber [1]		thin steel-timber plate [2]		thick steel-timber plate [3]	thread withdrawal [4]	head pull-through [5]
												
d_1 eq. [mm]	d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{V,k}$ [kN]	$R_{V,k}$ [kN]		$R_{V,k}$ [kN]		$R_{V,k}$ [kN]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]
7	6	80	50	30	3,70	S_{PAN} = 12 mm	1,71	$S_{PLATE} \leq$ 3 mm	4,87	$S_{PLATE} \leq$ 6 mm	6,74	11,00	5,74
	6	100	60	40	4,12		1,71		5,64		7,29	13,20	5,74
	6	120	70	50	4,25		1,71		5,64		7,84	15,40	5,74
	6	140	80	60	4,25		1,71		5,64		7,97	17,60	5,74
	6	160	90	70	4,25		1,71		5,64		7,97	19,81	5,74
9	8	120	70	50	6,27	S_{PAN} = 15 mm	2,39	$S_{PLATE} \leq$ 4 mm	8,97	$S_{PLATE} \leq$ 8 mm	11,43	20,54	8,38
	8	140	80	60	6,62		2,39		9,06		11,43	23,47	8,38
	8	160	90	70	6,62		2,39		9,06		11,43	26,41	8,38
	8	180	100	80	6,62		2,39		9,06		11,43	29,34	8,38
	8	200	100	100	6,62		2,39		9,06		11,43	29,34	8,38
	8	220	100	120	6,62		2,39		9,06		11,43	29,34	8,38
	8	240	100	140	6,62		2,39		9,06		11,43	29,34	8,38

NOTES:

(1) The characteristic shear resistances 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}.

(2) The shear resistance characteristics are calculated considering the case of a thin plate ($S_{PLATE} \leq 0,5\ d_1$).

(3) The shear resistance characteristics are calculated considering the case of a thick plate ($S_{PLATE} \geq d_1$).

(4) The axial thread withdrawal resistance was calculated considering a 90° angle between the grain and the connector and for a fixing length of b.

(5) The axial resistance to head pull-through was calculated using wood elements.

In the case of steel-timber connections, generally the steel tensile strength is binding with respect to head separation or pull-through.

GENERAL PRINCIPLES:

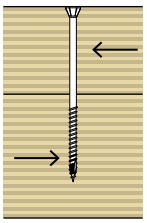
- Characteristic values comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- Design values can be obtained from characteristic values as follows:

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

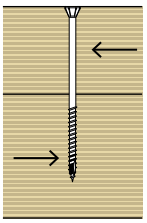
The coefficients γ_m and k_{mod} should be taken according to the current regulations used for the calculation.

- For the mechanical strength values and the geometry of the screws, reference was made to"Test Report No. 196104" of Karlsruher Institut für Technologie (KIT).
- For the calculation process a timber characteristic density ρ_k = 550 kg/m³ has been considered.
- Values were calculated considering the threaded part as being completely inserted into the wood.
- Sizing and verification of the wooden elements, panels and steel plates must be done separately.
- The shear characteristic resistances are calculated for screws inserted without pre-drilling holes. In the case of screws inserted with pre-drilling holes, greater resistance values can be obtained.

MINIMUM DISTANCES FOR SHEAR LOADS | LVL



Load-to-grain angle α = 0°

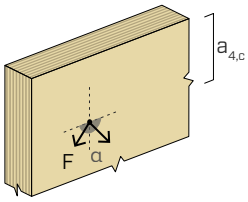


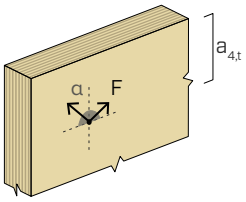
Load-to-grain angle α = 90°

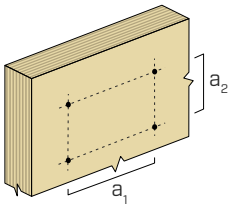
		SCREWS INSERTED WITHOUT PRE-DRILLING HOLE			SCREWS INSERTED WITHOUT PRE-DRILLING HOLE		
d_1 eq.			**7**	**9**		**7**	**9**
d_1			6	8		6	8
a_1	[mm]	**15·d_1**	90	120	**7·d_1**	42	56
a_2	[mm]	**7·d_1**	42	56	**7·d_1**	42	56
$a_{3,t}$	[mm]	**20·d_1**	120	160	**15·d_1**	90	120
$a_{3,c}$	[mm]	**15·d_1**	90	120	**15·d_1**	90	120
$a_{4,t}$	[mm]	**7·d_1**	42	56	**12·d_1**	72	96
$a_{4,c}$	[mm]	**7·d_1**	42	56	**7·d_1**	42	56

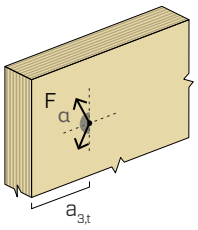
		SCREWS INSERTED WITH PRE-DRILLING HOLES			SCREWS INSERTED WITH PRE-DRILLING HOLES		
d_1 eq.			**7**	**9**		**7**	**9**
d_1			6	8		6	8
a_1	[mm]	**5·d_1**	30	40	**4·d_1**	24	32
a_2	[mm]	**3·d_1**	18	24	**4·d_1**	24	32
$a_{3,t}$	[mm]	**12·d_1**	72	96	**7·d_1**	42	56
$a_{3,c}$	[mm]	**7·d_1**	42	56	**7·d_1**	42	56
$a_{4,t}$	[mm]	**3·d_1**	18	24	**5·d_1**	42	56
$a_{4,c}$	[mm]	**3·d_1**	18	24	**3·d_1**	18	24

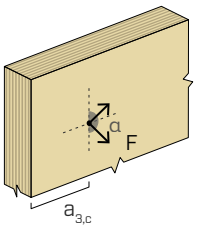
d_1 = nominal screw diameter

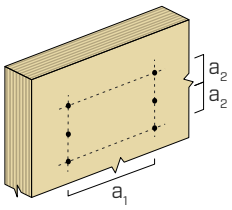










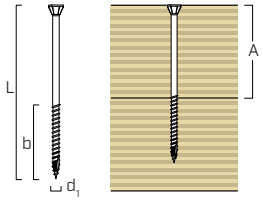
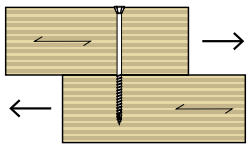
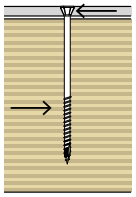
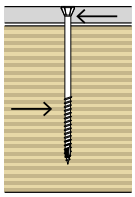


NOTES:

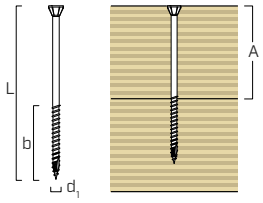
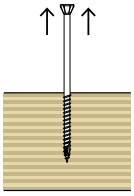
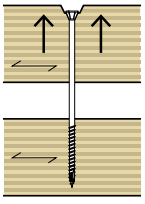
- The minimum distances are compliant with EN 1995:2014 - Table 8.2 considering a wood characteristic density of ρ_k > 420 kg/m³ and calculation diameter of d = nominal screw diameter.
- For high density wood applications (ρ_k > 500 kg/m³) please refer to ETA-11/0030.
- In the case of steel-timber joints, the minimum spacings (a_1, a_2) can be multiplied by a coefficient of 0,7.
- In the case of panel-timber joints, the minimum spacings (a_1, a_2) can be multiplied by a coefficient of 0,85.

Full technical data is available in the website www.rothoblaas.com.

SHEAR

geometry					LVL - LVL α = 0° - 0°		thin steel-LVL plate [1]				thick steel-LVL plate [2]			
														
d_1 eq. [mm]	d_1 [mm]	L [mm]	b [mm]	A [mm]	with pre-drilling hole $R_{V,k}$ [kN]	without pre-drilling hole $R_{V,k}$ [kN]	with pre-drilling hole	$R_{V,k}$ [kN]	without pre-drilling hole	$R_{V,k}$ [kN]	with pre-drilling hole	$R_{V,k}$ [kN]	without pre-drilling hole	$R_{V,k}$ [kN]
	6	80	50	8	5,92	4,62		4,12		2,82		9,27		8,04
	6	100	60	15	5,92	5,05		4,12		3,25		9,96		8,73
7	6	120	70	50	5,92	5,05	$S_{PLATE} \leq 3$ mm	4,12	$S_{PLATE} = 3$ mm	3,25	$S_{PLATE} \leq 6$ mm	10,07	$S_{PLATE} = 6$ mm	8,84
	6	140	80	60	5,92	5,05		4,12		3,25		10,07		8,84
	6	160	90	70	5,92	5,05		4,12		3,25		10,07		8,84
	8	120	70	50	9,47	7,85		6,84		5,22		14,69		12,40
	8	140	80	60	9,47	7,85		6,84		5,22		14,69		12,40
	8	160	90	70	9,47	7,85		6,84		5,22		14,69		12,40
9	8	180	100	80	9,47	7,85	$S_{PLATE} \leq 4$ mm	6,84	$S_{PLATE} = 4$ mm	5,22	$S_{PLATE} \leq 8$ mm	14,69	$S_{PLATE} = 8$ mm	12,40
	8	200	100	100	9,47	7,85		6,84		5,22		14,69		12,40
	8	220	100	120	9,47	7,85		6,84		5,22		14,69		12,40
	8	240	100	140	9,47	7,85		6,84		5,22		14,69		12,40

TENSION

geometry					thread withdrawal [3]	head pull-through [4]
						
d_1 eq. [mm]	d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]
	6	80	50	8	13,80	7,20
	6	100	60	15	16,56	7,20
7	6	120	70	50	19,32	7,20
	6	140	80	60	22,08	7,20
	6	160	90	70	24,84	7,20
	8	120	70	50	25,76	10,51
	8	140	80	60	29,44	10,51
	8	160	90	70	33,12	10,51
9	8	180	100	80	36,80	10,51
	8	200	100	100	36,80	10,51
	8	220	100	120	36,80	10,51
	8	240	100	140	36,80	10,51

NOTES:

[1] The shear resistance characteristics are calculated considering the case of a thin plate ($S_{PLATE} \leq 0,5\ d_1$).

[2] The shear resistance characteristics are calculated considering the case of a thick plate ($S_{PLATE} \geq d_1$).

[3] The axial thread withdrawal resistance was calculated considering a 90° angle between the grain and the connector and for a fixing length of b.

[4] The axial resistance to head pull-through was calculated using wood elements.

In the case of steel-timber connections, generally the steel tensile strength is binding with respect to head separation or pull-through.

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 strength values and the geometry of the screws, reference was made to "Test Report No. 196104" of Karlsruher Institut für Technologie (KIT).
- For the calculation process a timber characteristic density ρ_k = 730 kg/m³ has been considered.
- Values were calculated considering the threaded part as being completely inserted into the wood.
- Sizing and verification of the wooden elements, panels and steel plates must be done separately.