LBA

ETA-22/0002

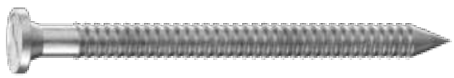
HIGH BOND NAIL

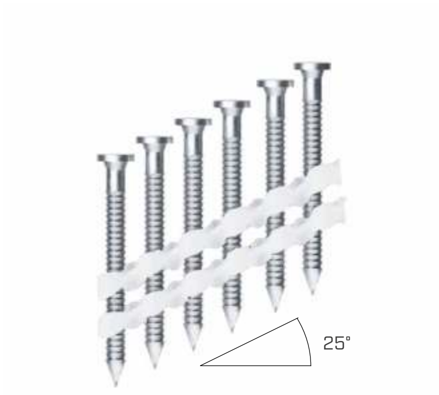
EXCELLENT PERFORMANCE
The new LBA nails have shear strength values among the highest on the market and make it possible to certify characteristic nail strengths that more closely approximate actual experimental strengths.

CERTIFIED ON CLT AND LVL
Tested and certified values for plates on CLT substrates. Its use is also certified on LVL.

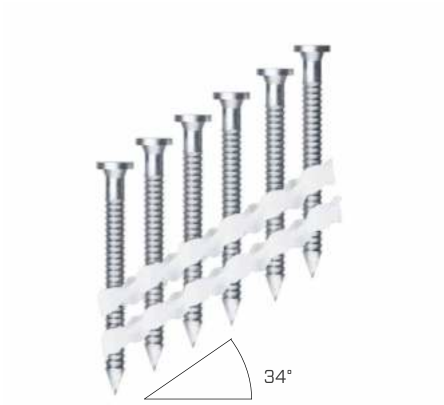
LBA BINDED
The nail is also available in a bound version with the same ETA certification and therefore the same high performance.

STAINLESS STEEL VERSION
The nails are also available with the same certification from ETA in A4|AISI316 stainless steel for outdoor applications, with very high strength values.





LBA 25 PLA



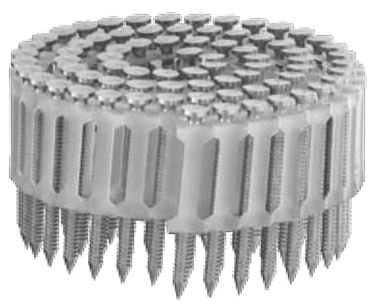
LBA 34 PLA

MY PROJECT SOFTWARE

DIAMETER [mm]	3	4	6	12
LENGTH [mm]	25	40	100	200

MATERIAL

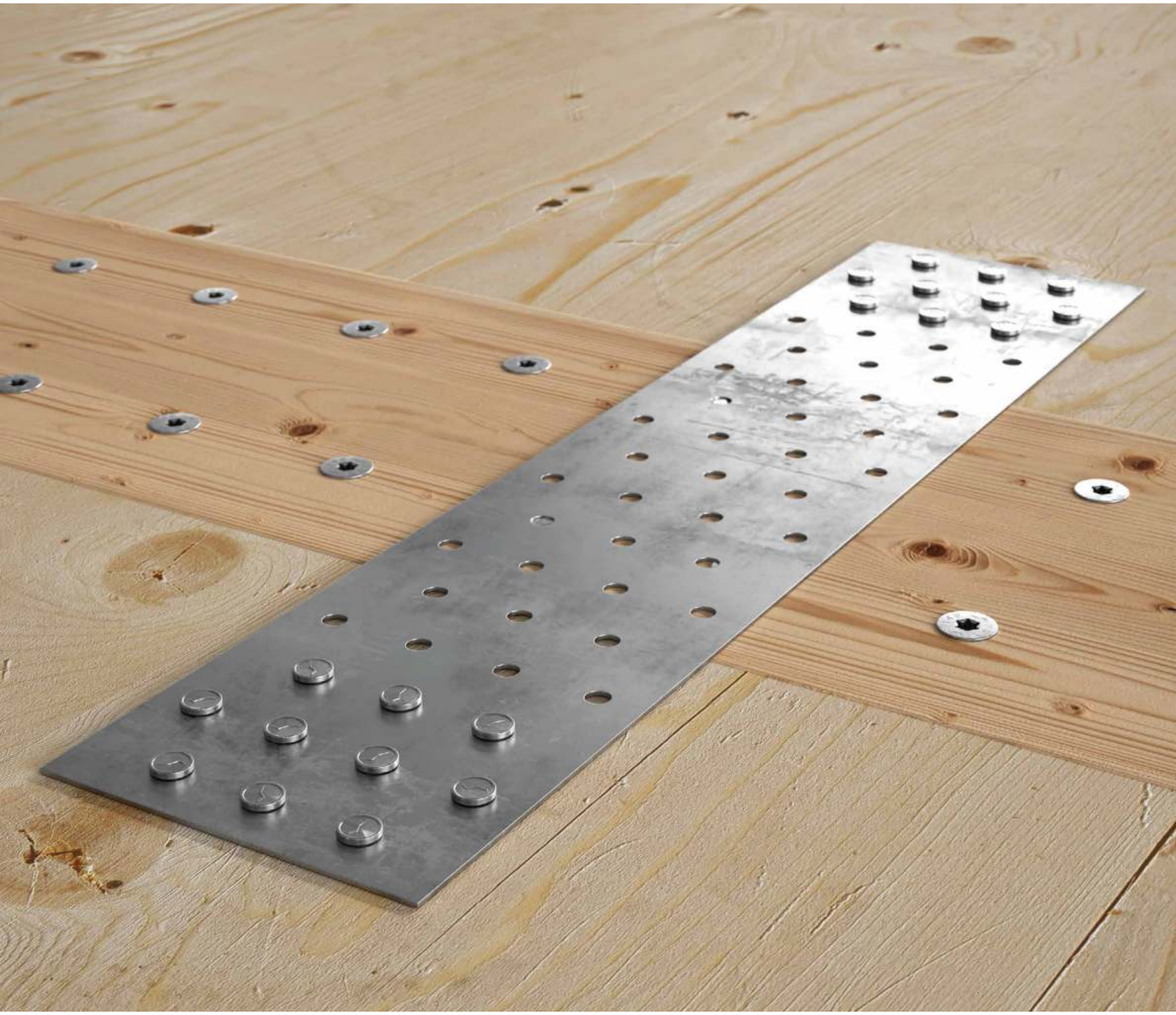
Zn ELECTRO PLATED	electrogalvanized carbon steel	SC2 C2 T2
A4 AISI 316	A4 | AISI316 austenitic stainless steel (CRC III)	SC4 C5 T5



LBA COIL

FIELDS OF USE

- timber based panels
- fibreboard and MDF panels
- solid timber
- glulam (Glued Laminated Timber)
- CLT, LVL



CAPACITY DESIGN

The strength values are much closer to the actual experimental strengths, so capacity design can be performed more reliably.

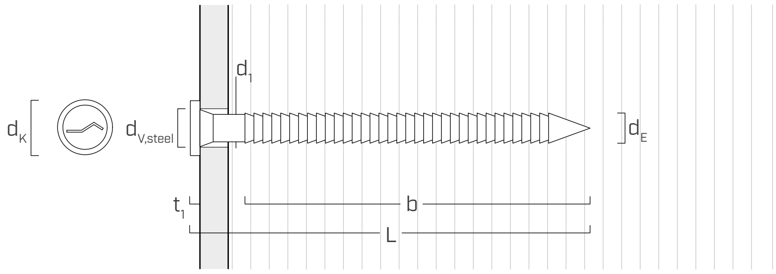
WKR

Values also tested, certified and calculated for fastening standard Rothoblaas plates. Using the nailer speeds up and facilitates installation.

Use with NINO angle brackets allows for some of the most versatile applications: even for beam-to-beam joints.

LBA achieves the highest performance together with the WKR angle brackets with the specific strength values on CLT.

GEOMETRY AND MECHANICAL CHARACTERISTICS



			LBA		LBAI
Nominal diameter	d_1	**[mm]**	**4**	**6**	**4**
Head diameter	d_K	[mm]	8,00	12,00	8,00
External diameter	d_E	[mm]	4,40	6,60	4,40
Head thickness	t_1	[mm]	1,50	2,00	1,50
Hole diameter on steel plate	$d_{V,steel}$	[mm]	5,0÷5,5	7,0÷7,5	5,0÷5,5
Pre-drilling hole diameter(1)	d_V	[mm]	3,0	4,5	3,0
Characteristic yield moment	$M_{y,k}$	[Nm]	6,68	20,20	7,18
Characteristic withdrawal-resistance parameter(2) (3)	$f_{ax,k}$	[N/mm²]	6,43	8,37	6,42
Characteristic tensile strength	$f_{tens,k}$	[kN]	6,5	17,0	6,5

(1) Pre-drilling valid for softwood.
(2) Valid for softwood - maximum density 500 kg/m^3. Associated density ρ_a = 350 kg/m^3.
(3) Valid for LBA460 | LBA680 | LBAI450. For other nail lengths refer to ETA-22/0002.

CODES AND DIMENSIONS

LOOSE NAILS

LBA

Zn ELECTRO PLATED

d_1 [mm]	CODE	L [mm]	b [mm]	pcs
4	**LBA440**	40	30	250
	LBA450	50	40	250
	LBA460	60	50	250
	LBA475	75	65	250
	LBA4100	100	85	250
6	**LBA660**	60	50	250
	LBA680	80	70	250
	LBA6100	100	85	250

LBAI A4 | AISI316

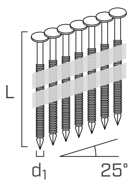
A4 AISI 316

d_1 [mm]	CODE	L [mm]	b [mm]	pcs
4	**LBAI450**	50	40	250

STRIP-BOUND NAILS

LBA 25 PLA - plastic stick binding 25°

Zn ELECTRO PLATED

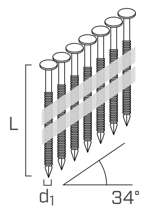


d_1 [mm]	CODE	L [mm]	b [mm]	pcs
4	**LBA25PLA440**	40	30	2000
	LBA25PLA450	50	40	2000
	LBA25PLA460	60	50	2000

Compatible with Anker 25° nailgun HH3522.

LBA 34 PLA - plastic stick binding 34°

Zn ELECTRO PLATED



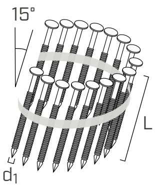
d_1 [mm]	CODE	L [mm]	b [mm]	pcs
4	**LBA34PLA440**	40	30	2000
	LBA34PLA450	50	40	2000
	LBA34PLA460	60	50	2000

Compatible with 34° strip magazine nailgun ATEU0116 and gas nailgun HH12100700.

ROLL-BOUND NAILS

LBA COIL - 15° plastic roll binding

Zn ELECTRO PLATED



d_1 [mm]	CODE	L [mm]	b [mm]	pcs
4	**LBACOIL440**	40	30	1600
	LBACOIL450	50	40	1600
	LBACOIL460	60	50	1600

Compatible with nailgun TJ100091.

NOTE: LBA, LBA 25 PLA, LBA 34 PLA and LBA COIL available in hot-dip galvanised version on request.

RELATED PRODUCTS

CODE	description	$d_{1\,NAIL}$ [mm]	L_{NAIL} [mm]	pcs
HH3731	palm nailer	4÷6	-	1
HH3522	Anker 25° nailgun	4	40÷60	1
ATEU0116	strip magazine nailgun 34°	4	40÷60	1
HH12100700	Anker 34°gas nailgun	4	40÷60	1
TJ100091	Anker coil nailgun 15°	4	40÷60	1

For more information about nailguns see page 406.

HH3731

HH3522

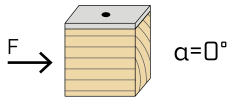
ATEU0116

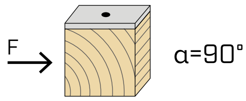
HH12100700

TJ100091

MINIMUM DISTANCES FOR NAILS SUBJECT TO SHEAR | STEEL-TO-TIMBER

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

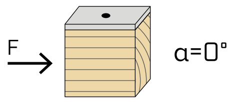


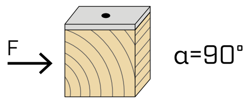


d_1	[mm]		4		6
a_1	[mm]	**10·d·0,7**	28	**12·d·0,7**	50
a_2	[mm]	**5·d·0,7**	14	**5·d·0,7**	21
$a_{3,t}$	[mm]	**15·d**	60	**15·d**	90
$a_{3,c}$	[mm]	**10·d**	40	**10·d**	60
$a_{4,t}$	[mm]	**5·d**	20	**5·d**	30
$a_{4,c}$	[mm]	**5·d**	20	**5·d**	30

d_1	[mm]		4		6
a_1	[mm]	**5·d·0,7**	14	**5·d·0,7**	21
a_2	[mm]	**5·d·0,7**	14	**5·d·0,7**	21
$a_{3,t}$	[mm]	**10·d**	40	**10·d**	60
$a_{3,c}$	[mm]	**10·d**	40	**10·d**	60
$a_{4,t}$	[mm]	**7·d**	28	**10·d**	60
$a_{4,c}$	[mm]	**5·d**	20	**5·d**	30

nails inserted **WITH pre-drilled hole**

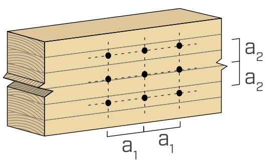




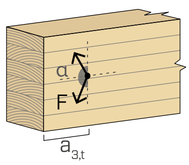
d_1	[mm]		4		6
a_1	[mm]	**5·d·0,7**	14	**5·d·0,7**	21
a_2	[mm]	**3·d·0,7**	8	**3·d·0,7**	13
$a_{3,t}$	[mm]	**12·d**	48	**12·d**	72
$a_{3,c}$	[mm]	**7·d**	28	**7·d**	42
$a_{4,t}$	[mm]	**3·d**	12	**3·d**	18
$a_{4,c}$	[mm]	**3·d**	12	**3·d**	18

d_1	[mm]		4		6
a_1	[mm]	**4·d·0,7**	11	**4·d·0,7**	17
a_2	[mm]	**4·d·0,7**	11	**4·d·0,7**	17
$a_{3,t}$	[mm]	**7·d**	28	**7·d**	42
$a_{3,c}$	[mm]	**7·d**	28	**7·d**	42
$a_{4,t}$	[mm]	**5·d**	20	**7·d**	42
$a_{4,c}$	[mm]	**3·d**	12	**3·d**	18

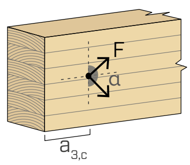
α = load-to-grain angle
d = d_1 = nominal nail diameter



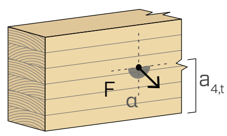
stressed end
-90° < α < 90°



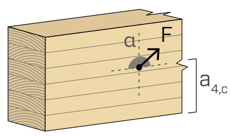
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°

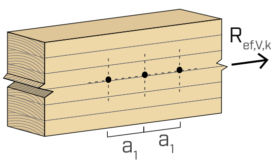


NOTES

- The minimum distances comply with the EN 1995:2014 standard in accordance with ETA-22/0002.
- In the case of timber-to-timber joints, the minimum spacing (a_1, a_2) can be multiplied by a coefficient of 1,5.

EFFECTIVE NUMBER FOR SHEAR-STRESSED NAILS

The load-bearing capacity of a connection made with several nails, all of the same type and size, may be lower than the sum of the load-bearing capacities of the individual connection system. For a row of n nails arranged parallel to the direction of the grain at a distance a_1, the characteristic effective load-bearing capacity is equal to:



$$R_{ef,V,k} = n_{ef} \cdot R_{V,k}$$

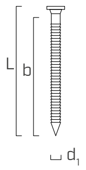
The n_{ef} value is given in the table below as a function of n and a_1.

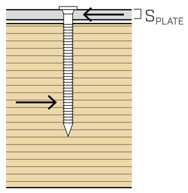
		a_1(*)										
		4·d	5·d	6·d	7·d	8·d	9·d	10·d	11·d	12·d	13·d	≥ 14·d
n	2	1,41	1,48	1,55	1,62	1,68	1,74	1,80	1,85	1,90	1,95	2,00
	3	1,73	1,86	2,01	2,16	2,28	2,41	2,54	2,65	2,76	2,88	3,00
	4	2,00	2,19	2,41	2,64	2,83	3,03	3,25	3,42	3,61	3,80	4,00
	5	2,24	2,49	2,77	3,09	3,34	3,62	3,93	4,17	4,43	4,71	5,00

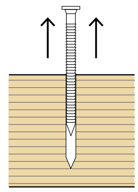
(*)For intermediate a_1 values a linear interpolation is possible.

STRUCTURAL VALUES | STEEL-TO-TIMBER

LBA Ø4-Ø6

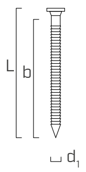


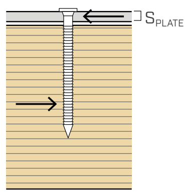


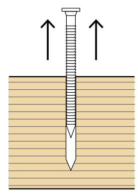


			SHEAR							TENSION
geometry			steel-to-timber							thread withdrawal
d_1 [mm]	L [mm]	b [mm]	$R_{V,k}$ [kN]							$R_{ax,k}$ [kN]
	S_{PLATE}		1,5 mm	2,0 mm	2,5 mm	3,0 mm	4,0 mm	5,0 mm	6,0 mm	-
4	40	30	2,19	2,17	2,16	2,14	2,11	2,09	2,06	0,77
	50	40	2,58	2,58	2,58	2,58	2,58	2,58	2,58	1,08
	60	50	2,83	2,83	2,83	2,83	2,83	2,83	2,83	1,39
	75	65	3,20	3,20	3,20	3,20	3,20	3,20	3,20	1,85
	100	85	3,69	3,69	3,69	3,69	3,69	3,69	3,69	2,47
	S_{PLATE}		3,0 mm	4,0 mm	5,0 mm	6,0 mm	8,0 mm	10,0 mm	12,0 mm	-
6	60	50	4,63	4,59	4,55	4,52	4,44	4,37	4,24	2,45
	80	70	5,72	5,72	5,72	5,72	5,72	5,72	5,65	3,69
	100	85	6,27	6,27	6,27	6,27	6,27	6,27	6,27	4,72

LBAI Ø4







			SHEAR							TENSION
geometry			steel-to-timber							thread withdrawal
d_1 [mm]	L [mm]	b [mm]	$R_{V,k}$ [kN]							$R_{ax,k}$ [kN]
	S_{PLATE}		1,5 mm	2,0 mm	2,5 mm	3,0 mm	4,0 mm	5,0 mm	6,0 mm	-
4	50	40	2,67	2,67	2,67	2,67	2,67	2,66	2,63	1,11

NOTES

- For the calculation process a timber characteristic density ρ_k = 385 kg/m^3 has been considered.
  For different ρ_k values, the strength values in the table can be converted by the k_{dens} coefficient.

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

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

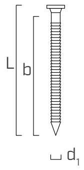
Strength values thus determined may differ, for higher safety standards, from those resulting from an exact calculation.

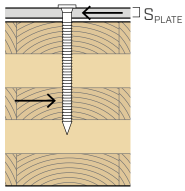
GENERAL PRINCIPLES on page 257.

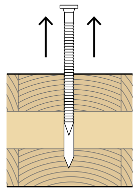
STRUCTURAL VALUES | STEEL-TO-CLT

CHARACTERISTIC VALUES
EN 1995:2014

LBA Ø4-Ø6

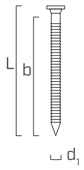


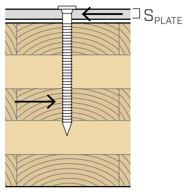


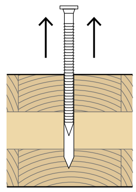


			SHEAR							TENSION
geometry			steel-to-CLT							thread withdrawal
d_1 [mm]	L [mm]	b [mm]	$R_{V,k}$ [kN]							$R_{ax,k}$ [kN]
	S_{PLATE}		1,5 mm	2,0 mm	2,5 mm	3,0 mm	4,0 mm	5,0 mm	6,0 mm	-
4	40	30	2,19	2,17	2,16	2,14	2,11	2,09	2,06	0,77
	50	40	2,58	2,58	2,58	2,58	2,58	2,58	2,58	1,08
	60	50	2,83	2,83	2,83	2,83	2,83	2,83	2,83	1,39
	75	65	3,20	3,20	3,20	3,20	3,20	3,20	3,20	1,85
	100	85	3,69	3,69	3,69	3,69	3,69	3,69	3,69	2,47
	S_{PLATE}		3,0 mm	4,0 mm	5,0 mm	6,0 mm	8,0 mm	10,0 mm	12,0 mm	-
6	60	50	4,63	4,59	4,55	4,52	4,44	4,37	4,24	2,45
	80	70	5,72	5,72	5,72	5,72	5,72	5,72	5,65	3,69
	100	85	6,27	6,27	6,27	6,27	6,27	6,27	6,27	4,72

LBAI Ø4







			SHEAR							TENSION
geometry			steel-to-CLT							thread withdrawal
d_1 [mm]	L [mm]	b [mm]	$R_{V,k}$ [kN]							$R_{ax,k}$ [kN]
	S_{PLATE}		1,5 mm	2,0 mm	2,5 mm	3,0 mm	4,0 mm	5,0 mm	6,0 mm	-
4	50	40	2,67	2,67	2,67	2,67	2,67	2,66	2,63	1,11

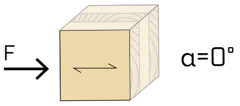
NOTES | CLT

- The characteristic values are according to the national specifications ÖNORM EN 1995 - Annex K.
- For the calculation process a mass density ρ_k = 350 kg/m^3 has been considered for of the boards constituting the CLT panel.
- The characteristic strengths in the table are valid for nails inserted into the side face of the CLT panel (wide face) penetrating more than one layer.

GENERAL PRINCIPLES on page 257.

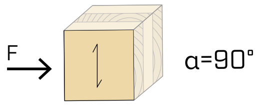
MINIMUM DISTANCES FOR NAILS SUBJECT TO SHEAR | CLT

nails inserted **WITHOUT pre-drilled hole**



lateral face

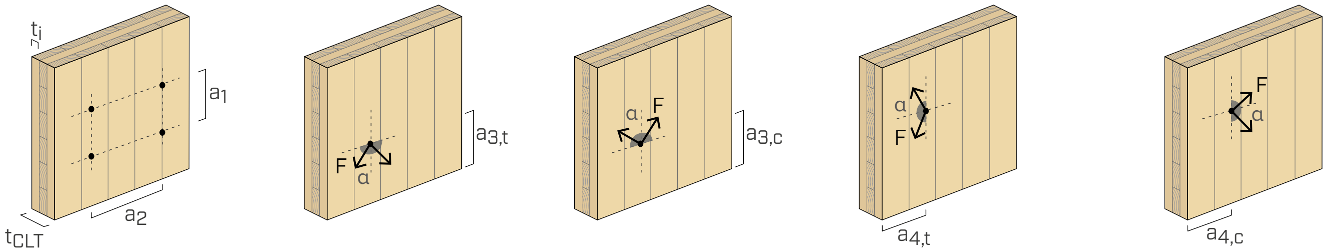
d_1	[mm]		4	6
a_1	[mm]	6·d	24	36
a_2	[mm]	3·d	12	18
$a_{3,t}$	[mm]	10·d	40	60
$a_{3,c}$	[mm]	6·d	24	36
$a_{4,t}$	[mm]	3·d	12	18
$a_{4,c}$	[mm]	3·d	12	18



lateral face

d_1	[mm]		4	6
a_1	[mm]	3·d	12	18
a_2	[mm]	3·d	12	18
$a_{3,t}$	[mm]	7·d	28	42
$a_{3,c}$	[mm]	6·d	24	36
$a_{4,t}$	[mm]	7·d	28	42
$a_{4,c}$	[mm]	3·d	12	18

α = angle between force and direction of the grain of the CLT panel outer layer.
d = d_1 = nominal nail diameter



NOTES

- The minimum distances are compliant with national specification ÖNORM EN 1995-1-1 - Annex K and are to be considered valid unless otherwise specified in the technical documents for the CLT panels.
- The minimum distances are valid for minimum CLT thickness $t_{CLT,min}$ = 10·d_1 and for minimum individual layer thickness $t_{i,min}$ = 9 mm.

STRUCTURAL VALUES

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- Characteristic values comply with the EN 1995:2014 standard in accordance with ETA-22/0002.
- Design values can be obtained from characteristic values as follows:

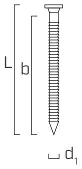
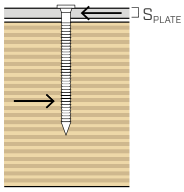
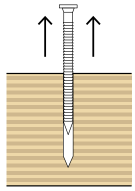
$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_M}$$

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

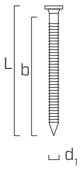
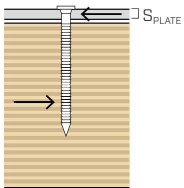
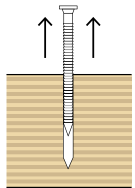
- For the mechanical strength values and the geometry of the nails, reference was made to ETA-22/0002.
- Sizing and verification of the timber elements and metal plates must be done separately.
- The characteristic shear strength are calculated for nails inserted without pre-drilled hole.
- The nails must be positioned in accordance with the minimum distances.
- The values in the table are independent of the load-to-grain angle.
- The axial withdrawal resistance values were calculated considering a 90° ε angle between the grains and the connector and a penetration length of b.
- The characteristic shear-strength value for LBA/LBAI Ø4 nails has been evaluated assuming a plate thickness = S_{PLATE}, always considering the case of thick plates according to ETA-22/0002 (S_{PLATE} ≥ 1,5 mm).
- The characteristic shear-strength value for LBA Ø6 nails has been evaluated assuming a plate thickness = S_{PLATE}, always considering the case of thick plate according to ETA-22/0002 (S_{PLATE} ≥ 2,0 mm).
- In the case of combined shear and tensile stress, the following verification must be satisfied:

$$\left(\frac{F_{v,d}}{R_{v,d}}\right)^2 + \left(\frac{F_{ax,d}}{R_{ax,d}}\right)^2 \leq 1$$

LBA Ø4-Ø6

						SHEAR				TENSION
geometry						steel-LVL				thread withdrawal
										
d_1 [mm]	L [mm]	b [mm]				$R_{V,90,k}$ [kN]				$R_{ax,90,k}$ [kN]
	S_{PLATE}		1,5 mm	2,0 mm	2,5 mm	3,0 mm	4,0 mm	5,0 mm	6,0 mm	-
4	40	30	2,63	2,61	2,60	2,58	2,54	2,51	2,47	0,92
	50	40	2,95	2,95	2,95	2,95	2,95	2,95	2,95	1,29
	60	50	3,24	3,24	3,24	3,24	3,24	3,24	3,24	1,66
	75	65	3,68	3,68	3,68	3,68	3,68	3,68	3,68	2,21
	100	85	4,27	4,27	4,27	4,27	4,27	4,27	4,27	2,94
	S_{PLATE}		3,0 mm	4,0 mm	5,0 mm	6,0 mm	8,0 mm	10,0 mm	12,0 mm	-
6	60	50	5,57	5,52	5,47	5,43	5,33	5,24	5,07	3,04
	80	70	6,56	6,56	6,56	6,56	6,56	6,56	6,48	4,53
	100	85	7,22	7,22	7,22	7,22	7,22	7,22	7,22	5,63

LBAI Ø4

						SHEAR				TENSION
geometry						steel-LVL				thread withdrawal
										
d_1 [mm]	L [mm]	b [mm]				$R_{V,0,k}$ [kN]				$R_{ax,0,k}$ [kN]
	S_{PLATE}		1,5 mm	2,0 mm	2,5 mm	3,0 mm	4,0 mm	5,0 mm	6,0 mm	-
4	50	40	3,04	3,04	3,04	3,04	3,04	3,04	3,04	1,32

NOTES | LVL

- For the calculation process a mass density equal to ρ_k = 480 kg/m^3 has been considered for softwood LVL elements.

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