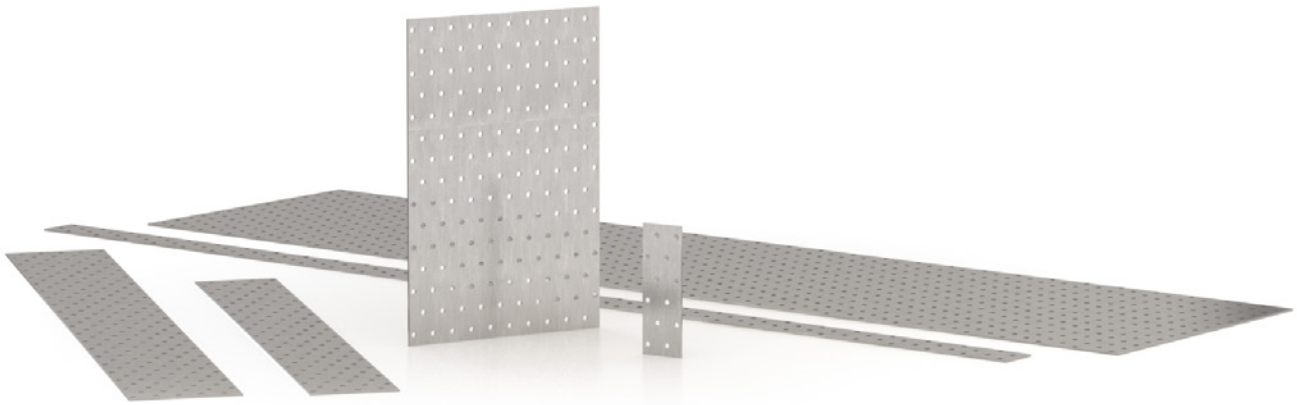
LBV

CE
EN14545

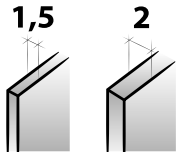
Perforated plates

Bright zinc plated carbon steel strap ties



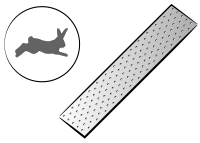
TWO THICKNESSES

Simple and effective system, commercialized in numerous versions 1,5 mm or 2,0 mm thick



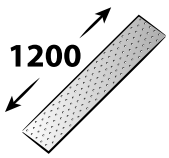
READY FOR USE

The formats respond to all the most common needs and minimize the installation time. Optimal cost/performance ratio.



1,2 m LENGTH

Product range of 1200 mm long plates, ideal for multistorey timber buildings or for the design in seismic or windy areas



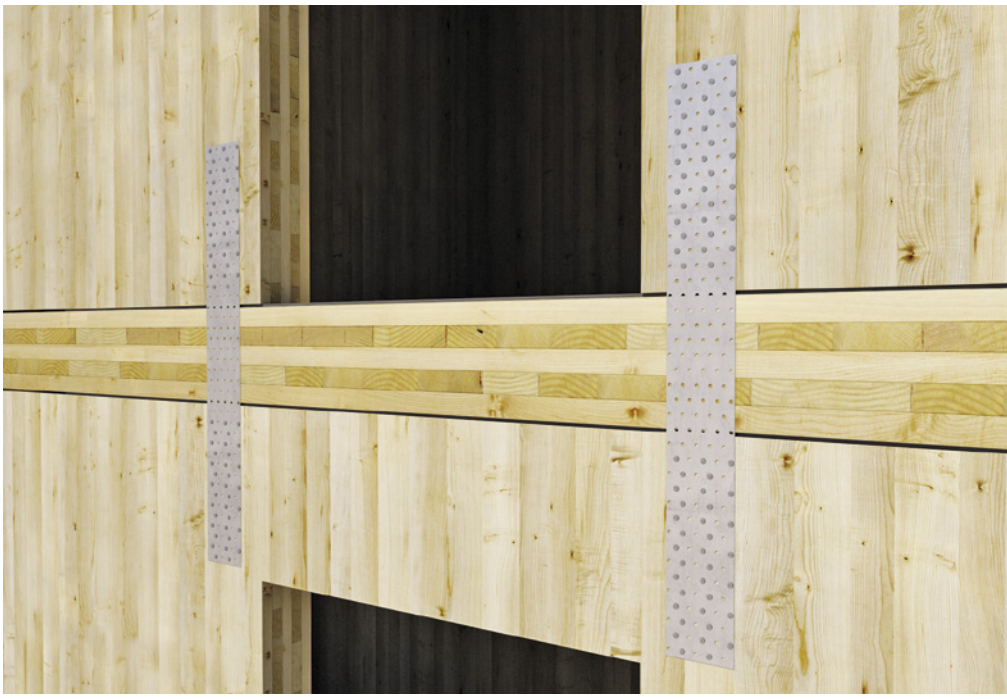
CERTIFIED

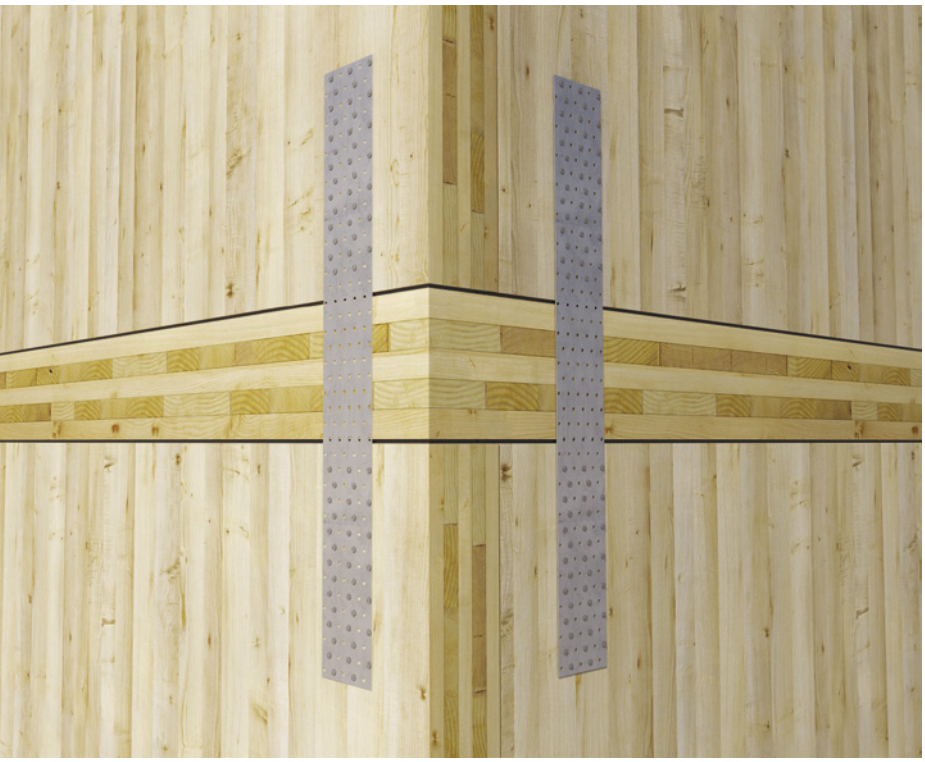
Ideal for structural joints requiring tensile strength. Geometry and material guaranteed by CE marking

FIELD OF USE

Timber-to-timber joints

- solid timber
- glulam timber
- XLAM (Cross Laminated Timber)
- LVL
- wood-based panels





WIDE PRODUCT RANGE

Available in several versions, designed to face any construction need, from simple beam/joist joints to the most important interstorey connections

TIMBER TO TIMBER

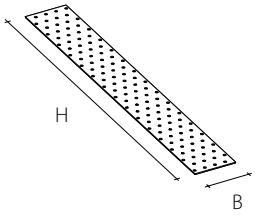
Ideal to solve particular situations requiring the transfer of tensile forces between timber elements such as beams, structural panels and claddings

TENSION

Formats dimensioned for the most common timber joints and for all those applications requiring tensile capacity. 1200 mm long versions, ideal for structural joints

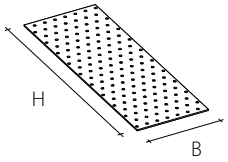
CODES AND DIMENSIONS

LBV 1,5 mm



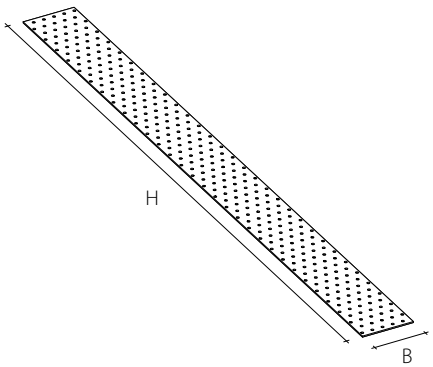
code	type	B [mm]	H [mm]	n Ø5 [pcs]	s [mm]		pcs/box
PF703100	**LBV60600**	60	600	75	1,5	•	10
PF703105	**LBV60800**	60	800	100	1,5	•	10
PF703110	**LBV80600**	80	600	105	1,5	•	10
PF703115	**LBV80800**	80	800	140	1,5	•	10
PF703120	**LBV100800**	100	800	180	1,5	•	10
PF703125	**LBV1001000**	100	1000	250	1,5	•	10

LBV 2,0 mm



code	type	B [mm]	H [mm]	n Ø5 [pcs]	s [mm]		pcs/box
PF703000	**LBV40120**	40	120	9	2	•	200
PF703005	**LBV40160**	40	160	12	2	•	50
PF703010	**LBV60140**	60	140	18	2	•	50
PF703015	**LBV60200**	60	200	25	2	•	100
PF703020	**LBV60240**	60	240	30	2	•	100
PF703025	**LBV80200**	80	200	35	2	•	50
PF703030	**LBV80240**	80	240	42	2	•	50
PF703035	**LBV80300**	80	300	53	2	•	50
PF703040	**LBV100140**	100	140	32	2	•	50
PF703045	**LBV100200**	100	200	45	2	•	50
PF703050	**LBV100240**	100	240	54	2	•	50
PF703055	**LBV100300**	100	300	68	2	•	50
PF703060	**LBV100400**	100	400	90	2	•	20
PF703065	**LBV100500**	100	500	112	2	•	20
PF703070	**LBV120200**	120	200	55	2	•	50
PF703075	**LBV120240**	120	240	66	2	•	50
PF703080	**LBV120300**	120	300	83	2	•	50
PF703085	**LBV140400**	140	400	130	2	•	15
PF703090	**LBV160400**	160	400	150	2	•	15
PF703095	**LBV200300**	200	300	142	2	•	15

LBV 2,0 mm x 1200 mm



code	type	B [mm]	H [mm]	n Ø5 [pcs]	s [mm]		pcs/box
PF704010	**LBV401200**	40	1200	90	2	•	20
PF704015	**LBV601200**	60	1200	150	2	•	20
PF704020	**LBV801200**	80	1200	210	2	•	20
PF704025	**LBV1001200**	100	1200	270	2	•	10
PF704030	**LBV1201200**	120	1200	330	2	•	10
PF704035	**LBV1401200**	140	1200	390	2	•	10
PF704040	**LBV1601200**	160	1200	450	2	•	10
PF704045	**LBV1801200**	180	1200	510	2	•	10
PF704050	**LBV2001200**	200	1200	570	2	•	5
PF704055	**LBV2201200**	220	1200	630	2	•	5
PF704060	**LBV2401200**	240	1200	690	2	•	5
PF704065	**LBV2601200**	260	1200	750	2	•	5
PF704070	**LBV2801200**	280	1200	810	2	•	5
PF704075	**LBV3001200**	300	1200	870	2	•	5
PF704080	**LBV4001200**	400	1200	1200	2	•	5

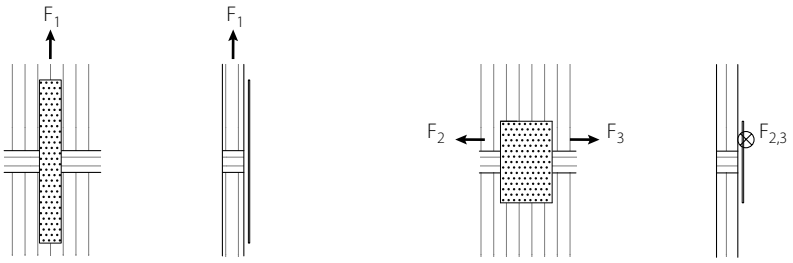
MATERIAL AND DURABILITY

LBV: Z275 bright zinc plated S250GD carbon steel.
To be used in Service class 1 and 2 (EN 1995:2008).

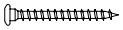
FIELD OF USE

Timber to timber joints

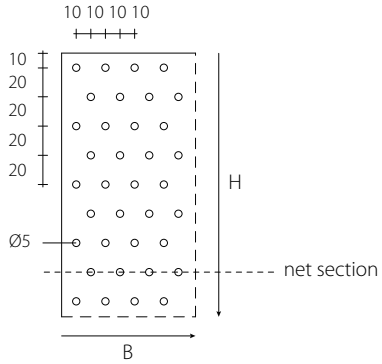
EXTERNAL LOADS



ADDITIONAL PRODUCTS - FASTENERS

type	description		d [mm]	support	p.
LBA	Anker nail		4		340
LBS	screw for plates		5		340

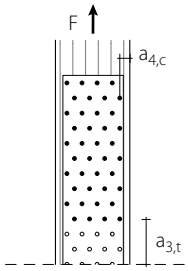
GEOMETRY



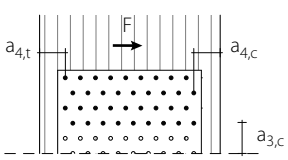
B [mm]	net area holes [pcs]	B [mm]	net area holes [pcs]	B [mm]	net area holes [pcs]
40	2	140	7	240	12
60	3	160	8	260	13
80	4	180	9	280	14
100	5	200	10	300	15
120	6	220	11	400	20

INSTALLATION

TIMBER - MINIMUM DISTANCES



Angle of load to grain α = 0°			anker nail LBA Ø4	screw LBS Ø5
Lateral fastener-Unloaded edge	$a_{4,c}$	[mm]	≥ 20	≥ 25
Fastener-Loaded end	$a_{3,t}$	[mm]	≥ 60	≥ 75



Angle of load to grain α = 90°			anker nail LBA Ø4	screw LBS Ø5
Lateral fastener-Loaded edge	$a_{4,t}$	[mm]	≥ 28	≥ 50
Lateral fastener-Unloaded edge	$a_{4,c}$	[mm]	≥ 20	≥ 25
Fastener-Loaded end	$a_{3,c}$	[mm]	≥ 40	≥ 50

STATIC VALUES - TENSILE JOINT - TIMBER-TO-TIMBER

STRENGTH OF THE SYSTEM

The tensile strength of the system $R_{1,d}$ is the minimum between the plate tensile strength $R_{ax,d}$ and the shear strength of the fasteners $n \cdot R_{v,d}$.
In case of connectors placed in rows, the correction coefficient m_{ef} shall be applied.

$$R_{1,d} = \min \begin{cases} R_{ax,d} \\ n \cdot m_{ef} \cdot R_{V,d} \end{cases}$$

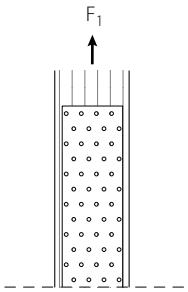


PLATE - TENSILE STRENGTH

				CHARACTERISTIC VALUES	*ADMISSIBLE VALUES*
TYPE	B [mm]	s [mm]	net area holes [pcs]	$R_{ax,k}$ [kN]	*N_{amm} [kg]*
LBV 1,5 mm	60	1,5	3	**20,0**	*1023*
	80	1,5	4	**26,7**	*1364*
	100	1,5	5	**33,4**	*1705*
LBV 2,0 mm	40	2,0	2	**17,8**	*909*
	60	2,0	3	**26,7**	*1364*
	80	2,0	4	**35,6**	*1818*
	100	2,0	5	**44,6**	*2273*
	120	2,0	6	**53,5**	*2727*
	140	2,0	7	**62,4**	*3182*
	160	2,0	8	**71,3**	*3636*
	180	2,0	9	**80,2**	*4091*
	200	2,0	10	**89,1**	*4545*
	220	2,0	11	**98,0**	*5000*
	240	2,0	12	**106,9**	*5455*
	260	2,0	13	**115,8**	*5909*
	280	2,0	14	**124,7**	*6364*
	300	2,0	15	**133,7**	*6818*
	400	2,0	20	**178,2**	*9091*

GENERAL PRINCIPLES

- Characteristic values according to EN 1993 and EN1995:2008.
- The plate design strength values can be obtained as follows:

$$R_{ax,d} = \frac{R_{ax,k}}{\gamma_{m2}}$$

The fasteners design strength values can be obtained as follows:

$$R_{V,d} = \frac{R_{V,k} \cdot k_{mod}}{\gamma_m}$$

Coefficients γ_{m2}, γ_m and k_{mod} must be taken according to the current Standard adopted for the design.

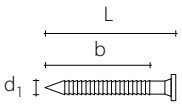
- For calculations, a timber density $\rho_k = 380$ kg/m^3 has been considered.
- Dimensioning and verification of timber elements must be carried out separately.
- The characteristic shear strengths are evaluated for nails/screws inserted without predrilling; in case of nails / screws inserted in predrilled holes it is possible to obtain higher strength values.
- Admissible values are obtained according to DIN 1052:1988.
- It is recommended to place the fasteners symmetrically with respect to the load direction.

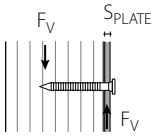
NOTES

(1) The characteristic shear strength of LBA Ø4 nails is evaluated assuming plates of thickness = S_{PLATE}, always referring to the thick plate condition ($S_{PLATE} \geq 1,5$ mm) as suggested by ETA.

(2) The characteristic shear strength of LBS Ø5 screws is evaluated assuming plates of thickness = S_{PLATE}, always referring to the thin plate condition ($S_{PLATE} \leq 0,5\ d_1$).

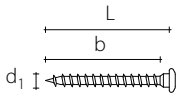
FASTENERS - SHEAR STRENGTH OF STEEL-TO-TIMBER JOINTS

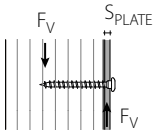




LBA NAILS

			CHARACTERISTIC VALUES (1)		ADMISSIBLE VALUES
			$R_{v,k}$ [kN]		
d_1 [mm]	L [mm]	b [mm]	LBV 1,5 mm	LBV 2,0 mm	V_{adm} [kg]
4	40	30	2,02	2,01	71
	50	40	2,32	2,32	71
	60	50	2,48	2,48	71
	75	60	2,64	2,64	71
	100	80	2,96	2,96	71

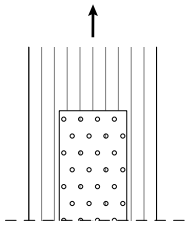
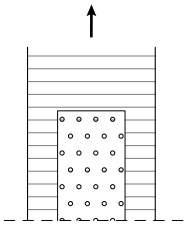




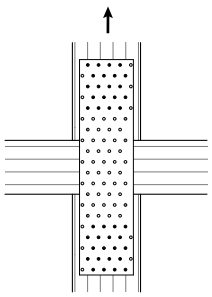
LBS SCREWS

			CHARACTERISTIC VALUES (2)		ADMISSIBLE VALUES
			$R_{v,k}$ [kN]		
d_1 [mm]	L [mm]	b [mm]	LBV 1,5 mm	LBV 2,0 mm	V_{adm} [kg]
5	40	36	1,48	1,46	53
	50	46	1,86	1,85	53
	60	56	2,05	2,05	53
	70	66	2,20	2,20	53

CORRECTION COEFFICIENT m_{ef}

LOAD ANGLE TO THE GRAIN α = 0°				LOAD ANGLE TO THE GRAIN α = 90°			
	number of nailed rows	m_{ef} nails LBA	m_{ef} screws LBS		number of nailed rows	m_{ef} nails LBA	m_{ef} screws LBS
	≤ 2	1,00	1,00		≥ 1	1,00	1,00
	≤ 4	0,90	0,84				
	≤ 6	0,85	0,76				
	≤ 8	0,81	0,71				
	≤ 10	0,79	0,67				
	≤ 12	0,76	0,64				
	≤ 14	0,75	0,61				
	≤ 16	0,73	0,59				
	≤ 18	0,72	0,58				
	≤ 20	0,71	0,56				

C ALCULATION EXAMPLE - TIMBER-TO-TIMBER JOINTS



The joint can be realized either with perforated plate (LBV) or perforated tape (LBB).
A calculation example is reported at p. 237 .