LBB

PERFORATED TAPE

CE
EN 14545

TWO THICKNESSES
Simple and effective system to achieve floor bracing. It is available in thicknesses of 1,5 and 3,0 mm.

CLIPSET
Simply and effortlessly secures the ends of the tape in many applications of floor and roof bracing.

SPECIAL STEEL
Made with S350 GD high strength steel. The 1,5 mm thick version offers extreme resistance to tensile forces with minimal thickness.

CHARACTERISTICS

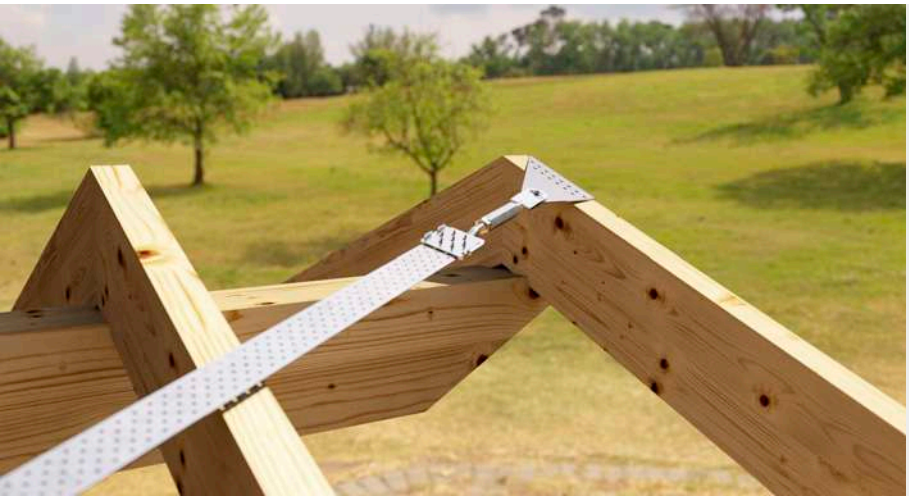
FOCUS	tension fastening
WIDTH	from 40 to 80 mm
THICKNESS	1,5 | 3,0 mm
FASTENERS	LBA, LBS

MATERIAL

Carbon steel with bright zinc plated perforated tape.

FIELD OF USE

Timber-to-timber joints
- solid timber and glulam
- CLT, LVL
- timber based panels



BRACINGS

This system is ideal for creating safe, quick and effective bracing. The use of high quality steel ensures that the tapes reduced thickness does not compromise the tensile strength.

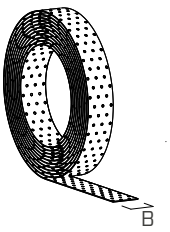
STABILITY

The CLIPSET can be added to the ends of the 60 mm version to achieve secure and safe fastening on any structure.

CODES AND DIMENSIONS

LBB 1,5 mm

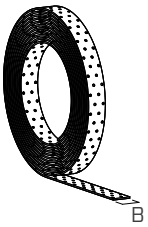
CODE	B [mm]	H [m]	n Ø5 pcs	s [mm]		pcs
LBB40	40	50	75 / m	1,5	●	1
LBB60	60	50	125 / m	1,5	●	1
LBB80	80	25	175 / m	1,5	●	1



S350 GALV

LBB 3,0 mm

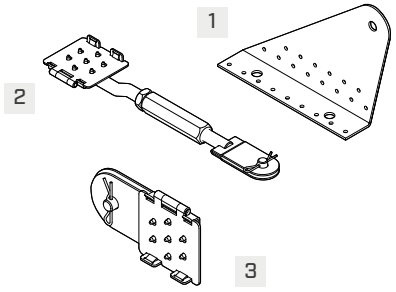
CODE	B [mm]	H [m]	n Ø5 pcs	s [mm]		pcs
LBB4030	40	50	75 / m	3	●	1



S250 GALV

CLIPSET

CODE	LBB type	LBB width	pcs
CLIPSET60	perforated tape LBB60	B=60 mm	1



SET COMPRISED OF:	B [mm]	H [mm]	L [mm]	n Ø5 pcs	n Ø13 pcs	s [mm]	pcs
1 Terminal plate	254	181	43	9 + 14	2	3	4
2 Clip-Fix tensioner	76	20	334-404	-	-	2	2
3 Clip-Fix Terminal	76	20	150	-	-	2	2

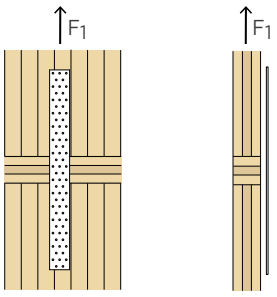
MATERIAL AND DURABILITY

LBB 1,5 mm: carbon steel S350GD+Z275.
LBB 3,0 mm: carbon steel S250GD+Z275.
CLIPSE : carbon steel DX51D+Z275.
To be used in service classes 1 and 2 (EN 1995-1-1).

FIELD OF USE

- Timber-to-timber joints

EXTERNAL LOADS

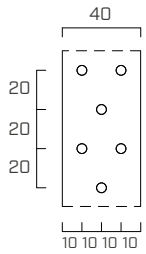


ADDITIONAL PRODUCTS - FASTENING

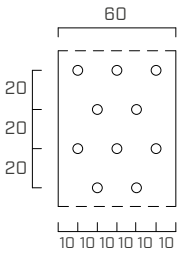
type	description		d [mm]	support	page
LBA	Anker nail		4		548
LBS	screw for plates		5		552

GEOMETRY

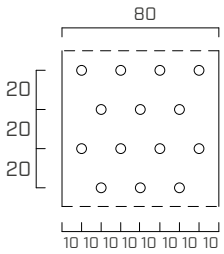
LBB40 / LBB4030



LBB60

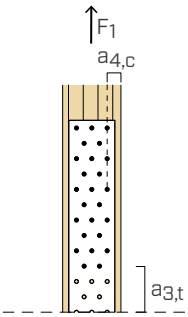


LBB80



INSTALLATION

LBB ASSEMBLING

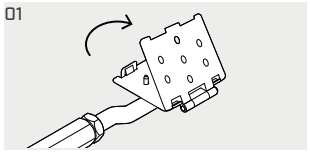


TIMBER - MINIMUM DISTANCES

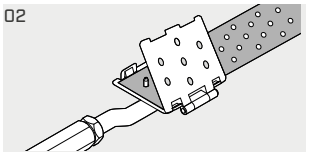
Load-to-grain angle α = 0°				**Anker nail LBA Ø4**	**screw LBA Ø4**
Lateral connector - unloaded edge	$a_{4,c}$	[mm]	≥ 5 d	≥ 20	≥ 25
Connector - loaded end	$a_{3,t}$	[mm]	≥ 15 d	≥ 60	≥ 75

CLIPSET ASSEMBLING

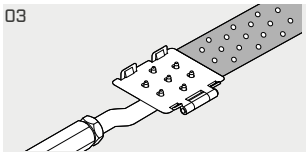
CLIP-FIX TENSIONER



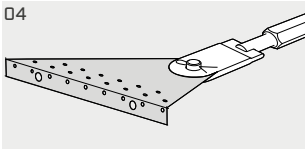
Open the Clip-Fix



Insert the perforated tape

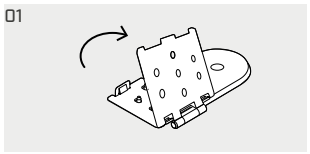


Close the Clip-Fix



Fix it to the plate

CLIP-FIX TERMINAL



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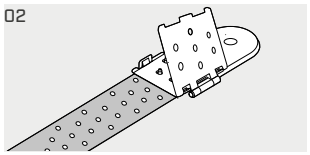
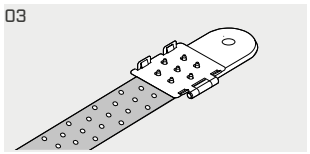
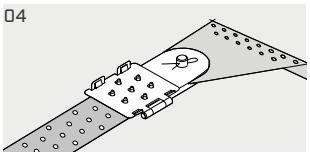


Insert the perforated tape

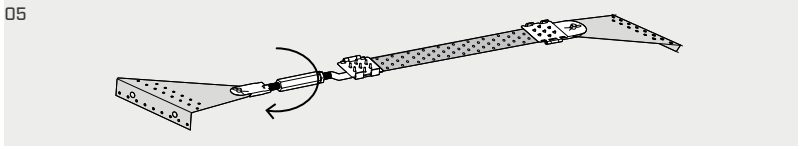


Close the Clip-Fix



Fix it to the plate

ADJUSTING THE SYSTEM

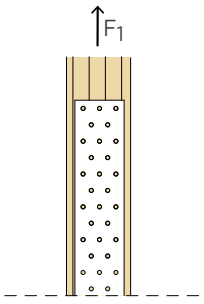


Use the tensioner to regulate the length of the bracing system

STATIC VALUES | TIMBER-TO-TIMBER TENSILE JOINT

STRENGTH OF THE SYSTEM

The tensile strength of the $R_{1,d}$ system is the minimum between the $R_{ax,d}$ plate side tensile strength and the shear resistance of the connectors used for fastening $n_{tot} \cdot R_{v,d}$.
If the connectors are placed in several consecutive rows and the load direction is parallel to the grain, the following sizing criteria must be applied.



$$R_{1,d} = min \begin{cases} R_{ax,d} \\ \sum n_i \cdot m_i^k \cdot R_{v,d} \end{cases} \qquad k = \begin{cases} 0,85 & LBA \quad Ø = 4 \\ 0,75 & LBA \quad Ø = 5 \end{cases}$$

Where m_i is the number of rows of connectors parallel to the grain and n_i is the number of connectors arranged in the same row.

TAPE -TENSILE STRENGTH

				CHARACTERISTIC VALUES
type	**B**	**s**	**net area holes**	**$R_{ax,k}$**
	[mm]	[mm]	pcs	[kN]
LBB 1,5 mm	40	1,5	2	**17,0**
	60	1,5	3	**25,5**
	80	1,5	4	**34,0**
LBB 3,0 mm	40	3,0	2	**26,7**

CONNECTORS SHEAR RESISTANCE

For the strength $R_{v,k}$ of the LBA Anker nails and of the LBS screws, refer to SCREWS AND NAILS FOR PLATES chapter.

NOTES FOR SEISMIC DESIGN

Particular attention has to be paid to the "capacity design" applied at different scale levels: the global structure and the connection system. Experimentally the ultimate strength of the LBA nail (and of the LBS screw) is notably larger than the characteristic strength evaluated according to EN 1995.
E.g. LBA nail Ø4 x 60 mm: $R_{v,k}$ =2,8 - 3,6 kN by experimental tests (variable according to the type of timber and plate thickness).

Experimental data derive from tests carried out within the Seismic-Rev research project and are reported in the scientific report: "Connection systems for timber buildings: experimental campaign to characterize stiffness, strength and ductility" (DICAM - Department of Civil, Environmental and Mechanical Engineering - UniTN).

GENERAL PRINCIPLES:

- Characteristic values according to EN 1993 and EN 1995-1-1 standards.
- The plate design strength values can be obtained as follows:

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

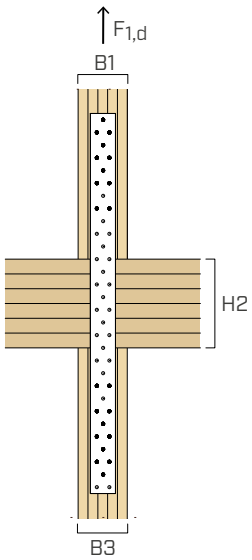
- The connectors design strength values can be obtained as follows:

$$R_{v,d} = \frac{R_{v,k} \cdot k_{mod}}{\gamma_M}$$

Coefficients γ_{M2}, γ_M and k_{mod} must be taken according to the current standard adopted for the design.

- For the calculation process a timber density ρ_k = 350 kg/m^3 has been considered.
- Dimensioning and verification of the timber elements must be carried out separately.
- It is recommended to place the connectors symmetrically with respect to the load direction.

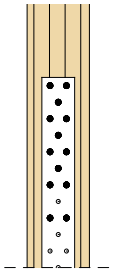
CALCULATION EXAMPLE | TIMBER-TO-TIMBER TENSIL JOINT WITH LBV AND LBB



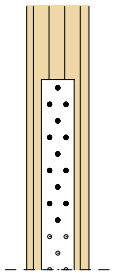
PROJECT DATA		
Strength	$F_{1,d}$	12,0 kN
Service class		2
Load duration		short
Solid timber CL24		
Element 1	**B1**	80 mm
Element 2	**H2**	140 mm
Element 3	**B3**	80 mm

USABLE PRODUCTS	
perforated tape LBB40	**perforated plate LBV401200**(2)
B = 40 mm	B = 40 mm
s = 1,5 mm	s = 2 mm
	H = 600 mm
Anker nail LBA440(1)	**Anker nail LBA440**(1)
d_1 = 4,0 mm	d_1 = 4,0 mm
L = 40 mm	L = 40 mm

EVALUATION OF THE STRENGTH OF THE SYSTEM



PERFORATED TAPE LBB4015



PERFORATED PLATE LBV401200

TAPE/PLATE - TENSILE STRENGTH

perforated tape LBB40				perforated plate LBV401200(2)			
$R_{ax,k}$	=	17,0	kN	$R_{ax,k}$	=	17,8	kN
γ_{M2}	=	1,25		γ_{M2}	=	1,25	
$R_{ax,d}$	**=**	**13,60**	**kN**	**$R_{ax,d}$**	**=**	**14,24**	**kN**

CONNECTOR - SHEAR STRENGTH

perforated tape LBB40				perforated plate LBV401200(2)			
$R_{v,k}$	=	1,89	kN	$R_{v,k}$	=	1,89	kN
n_{tot}	=	13	pcs	n_{tot}	=	13	pcs
n_1	=	5	pcs	n_1	=	4	pcs
m_1	=	2	lines	m_1	=	2	lines
n_2	=	3	pcs	n_2	=	5	pcs
m_2	=	1	lines	m_2	=	1	lines
k_{LBA}	=	0,85		k_{LBA}	=	0,85	
k_{mod}	=	0,90		k_{mod}	=	0,90	
γ_M	=	1,30		γ_M	=	1,30	
$R_{v,d}$	=	1,31	kN	$R_{v,d}$	=	1,31	kN
$\sum m_i \bullet n_i^k \bullet R_{v,d}$	**=**	**13,61**	**kN**	**$\sum m_i \bullet n_i^k \bullet R_{v,d}$**	**=**	**13,64**	**kN**

STRENGTH OF THE SYSTEM

$$R_{1,d} = min \begin{cases} R_{ax,d} \\ \sum n_i \cdot m_i^k \cdot R_{v,d} \end{cases}$$

	perforated tape LBB40				perforated plate LBV401200(2)			
	$R_{1,d}$	=	13,61	kN	$R_{1,d}$	=	13,64	kN
VERIFICATION $R_{1,d} \geq F_{1,d}$	**13,6 kN**	**≥**	**12,0**	**kN** ✓	**13,64**	**≥**	**12,0**	**kN** ✓
	verification passed				**verification passed**			

NOTES:

(1) In the calculation example LBA Anker nails are used. The fastening can also be made with LBS screws (page 552).

(2) Plate LBV401200 is considered cut to length 600 mm.

GENERAL PRINCIPLES:

- To optimize the connection system, it is recommended to use a number of connectors which can provide a shear capacity that does not exceed the tensile strength of the tape/plate.
- It is recommended to place the connectors symmetrically with respect to the load direction.