SLOT

CONNECTOR FOR STRUCTURAL PANELS

VIDEO | MY PROJECT SOFTWARE | PATENTED | DESIGN REGISTERED | CE ETA-19/0167

MONOLITHIC PANEL
It allows very high stiff joints and can transfer exceptional shear stresses between the panels. Ideal for walls and floors.

TOLERANCE
The wedge shape makes the insertion easy into the groove. It is possible to increase the thickness of the routing cut to handle all kinds of tolerances using shims.

FAST INSTALLATION
Possibility of assembly with inclined auxiliary screws that make tightening between panels easy. The honeycomb geometry and lightweight aluminium ensure excellent performance: one connector can replace up to 60 Ø6 | *0.24"* screws.

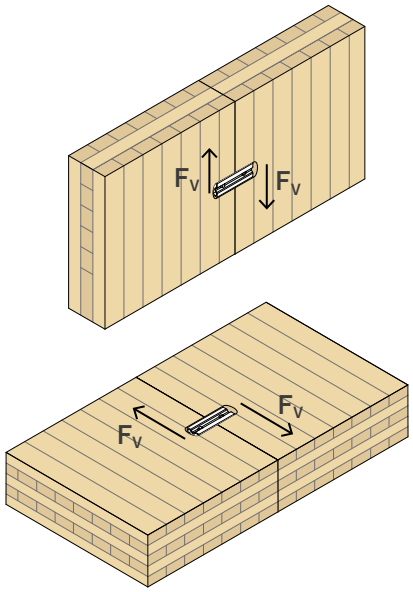
USA DESIGN VALUES
CANADA, EU and more design values available online.

SERVICE CONDITION DRY

MATERIAL

alu 6005A — EN AW-6005A aluminium alloy

EXTERNAL LOADS

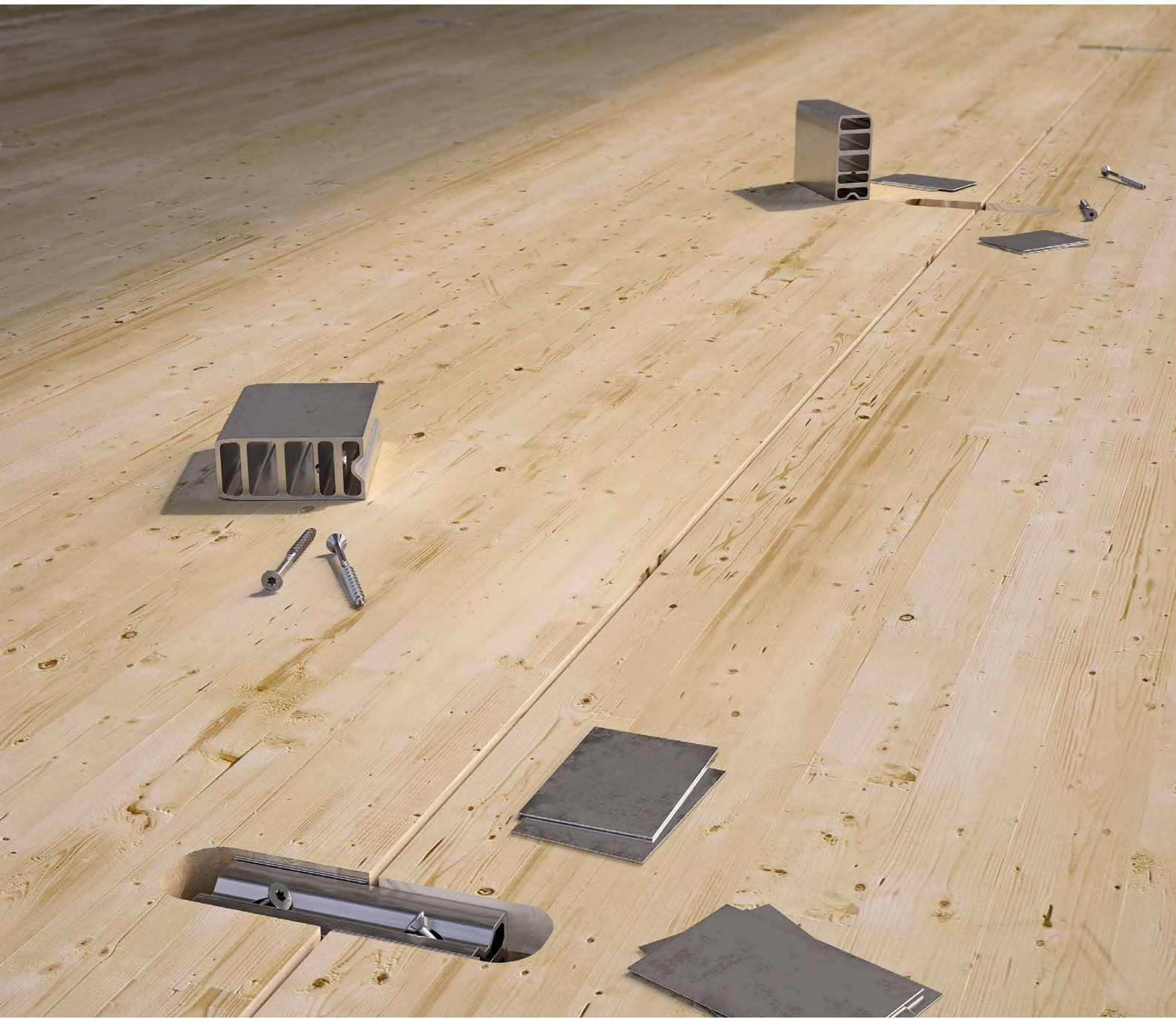


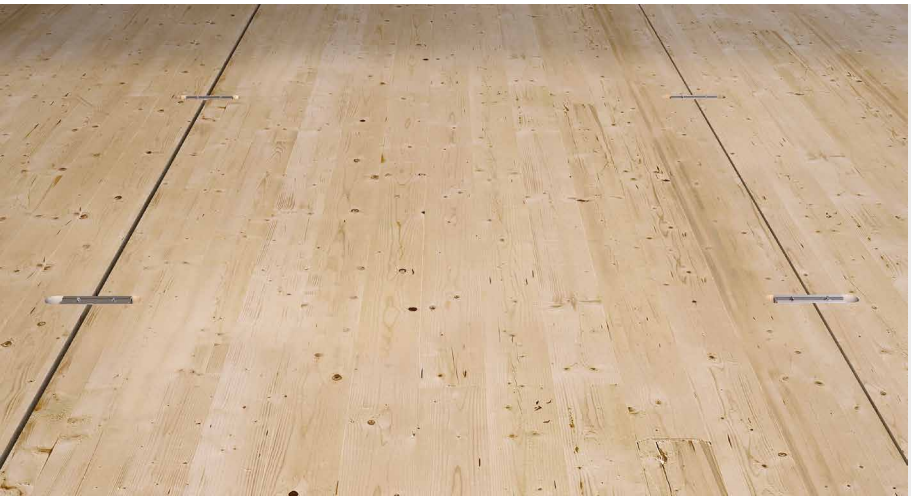
VIDEO
Scan the QR Code and watch the video on our YouTube channel

FIELDS OF USE

Panel-to-panel shear connections.
High-stiffness connections in rigid diaphragm floors or in multi-panel walls with monolithic behaviour.
The connector also serves as an installation tool to close the gap between panels.

Can be applied to:
- CLT, LVL or glulam panel floors and walls





MONOLITHIC BEHAVIOUR

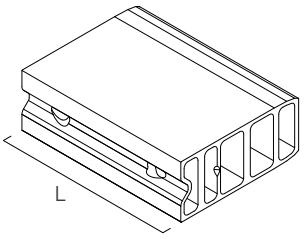
Ideal for panel wall and floor joints. It enables monolithic behaviour to be created between panels cut in the factory with small dimensions for transportation needs.

GLULAM, CLT, LVL

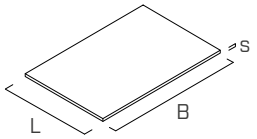
CE mark according to ETA. Values tested, certified and calculated also on glulam, CLT, LVL Softwood and LVL Hardwood.

CODES AND DIMENSIONS

CODE	L [mm]	*L* *[in]*	pcs
SLOT90	120	*4 3/4*	10



CODE	B [mm]	L [mm]	s [mm]	*B* *[in]*	*L* *[in]*	*s* *[in]*	pcs
SHIMS609005	89	60	0,5	*3 1/2*	*2 3/8*	*0.02*	100
SHIMS609010	89	60	1	*3 1/2*	*2 3/8*	*0.04*	50



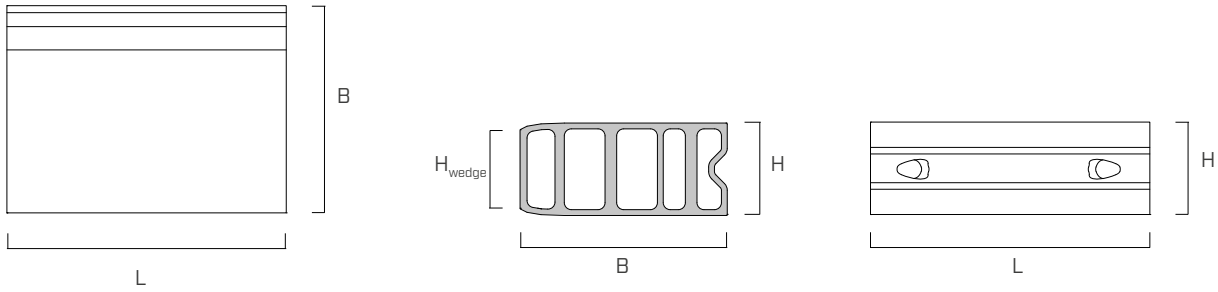
Material: bright zinc plated carbon steel

FASTENERS

type	description	d [mm]	L [mm]	*d* *[in]*	*L* *[in]*	support
HBS	countersunk screw	6	120	*0.236*	*4 3/4*	
HBS	countersunk screw	8	140	*0.315*	*5 1/2*	

For further details please see the "TIMBER SCREWS AND DECK FASTENING" catalogue.

GEOMETRY

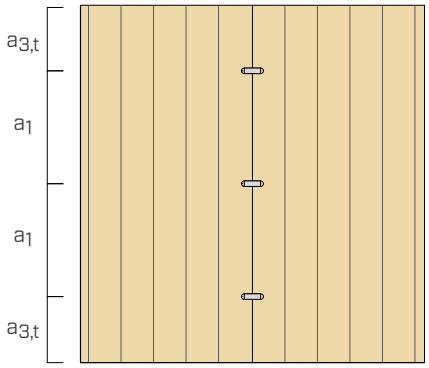


B [mm]	B *[in]*	H [mm]	H *[in]*	H_{wedge} [mm]	H_{wedge} *[in]*	L [mm]	L *[in]*	n_{screws} [pcs]
89	*3 1/2*	40	*1 9/16*	34	*1 5/16*	120	*4 3/4*	2

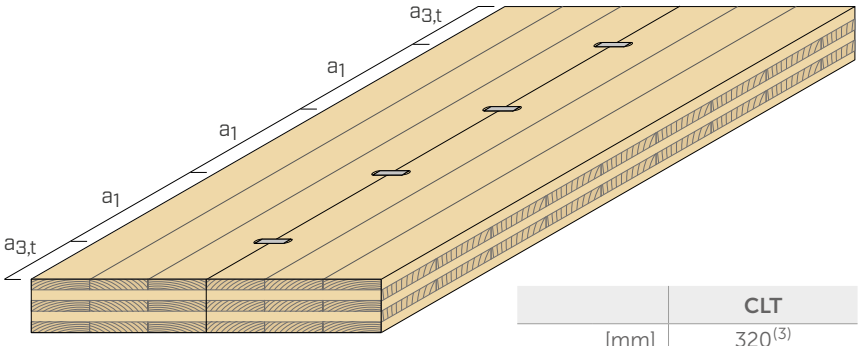
The screws are optional and not included in the package.

MINIMUM DISTANCES

SHEAR WALL



FLOOR SLAB

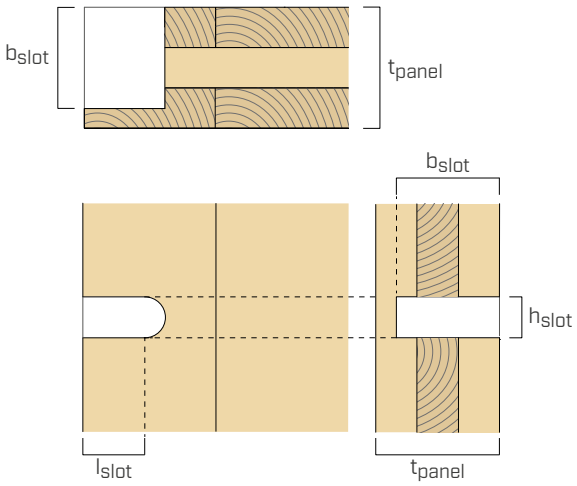


		CLT
a_1	[mm]	$320^{(3)}$
	[in]	*12 5/8*
$a_{3,t}$	[mm]	$320^{(3)}$
	[in]	*12 5/8*

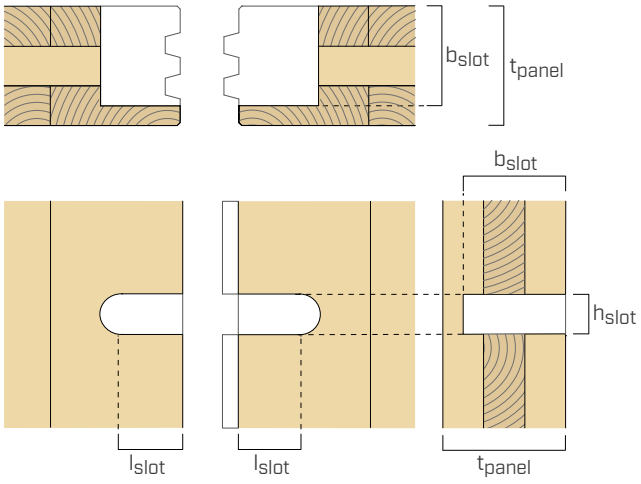
GEOMETRY

ROUTING IN THE PANEL

PANEL WITH FLAT EDGE



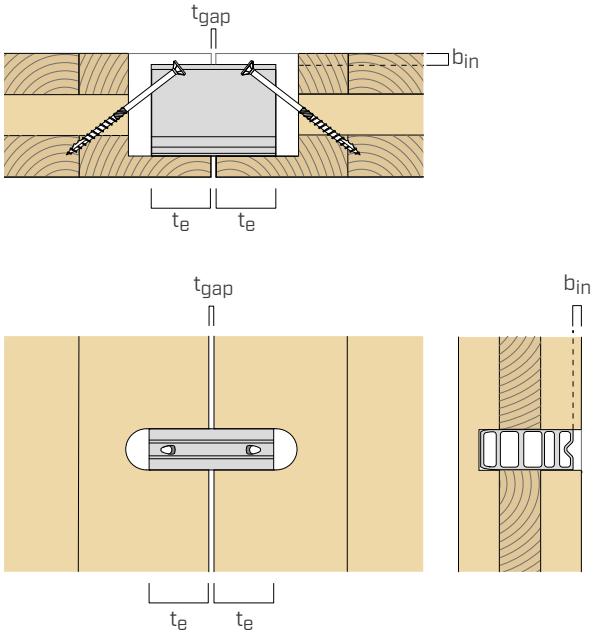
TONGUE-AND-GROOVE JOINT



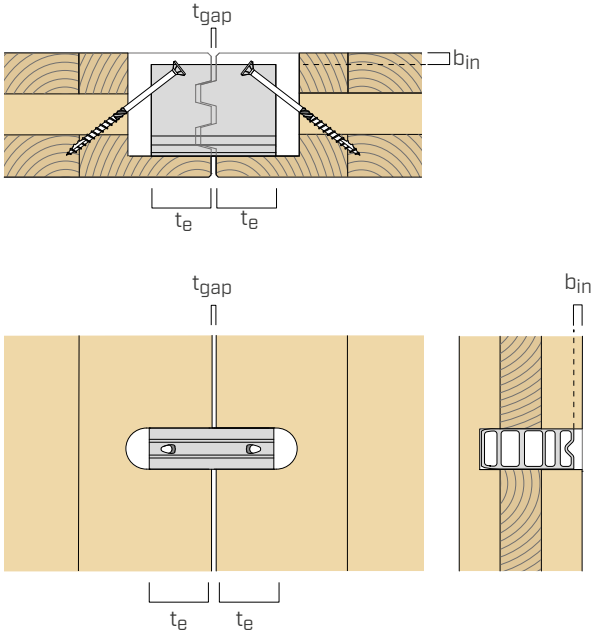
$b_{slot,min}$		$l_{slot,min}$		$t_{panel,min}$		h_{slot} (1)	
[mm]	*[in]*	[mm]	*[in]*	[mm]	*[in]*	[mm]	*[in]*
90	*3 1/2*	60	*2 3/8*	90	*3 1/2*	40,5	*1 3/5*

INSTALLATION

PANEL WITH FLAT EDGE



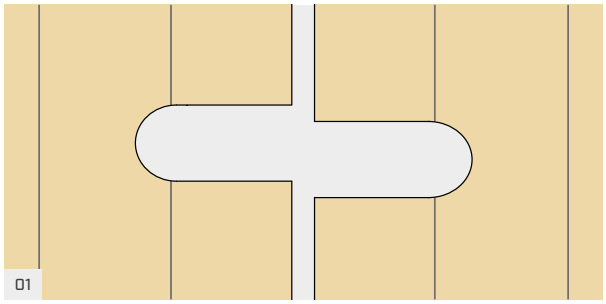
TONGUE-AND-GROOVE JOINT

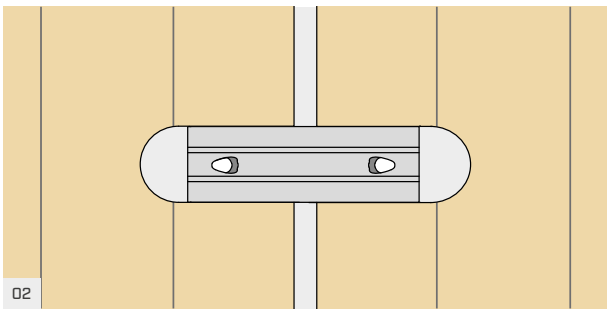


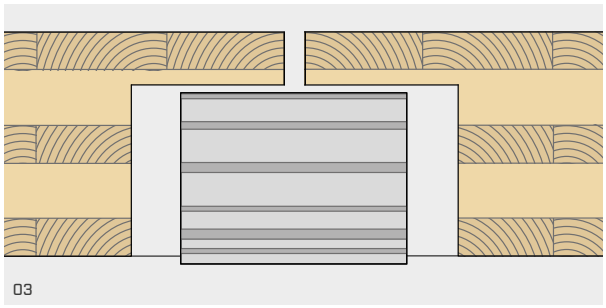
$t_{gap,max}$ (2)		$b_{in,max}$		$t_{e,min}$	
[mm]	*[in]*	[mm]	*[in]*	[mm]	*[in]*
5	*3/16*	90	*3 1/2*	57,5	*2 1/4*

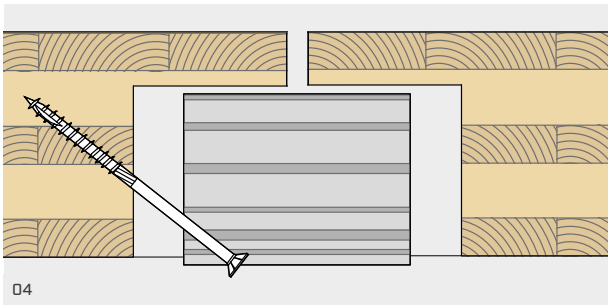
USE OF THE CONNECTOR AS ASSEMBLY EQUIPMENT

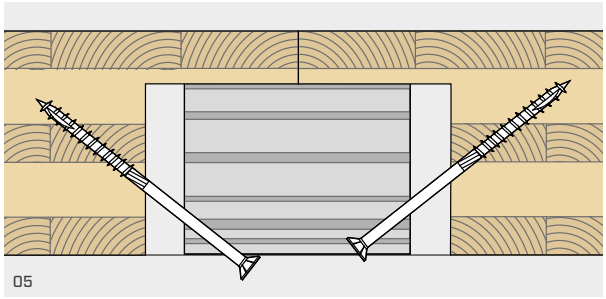
The connector can also be used as assembly equipment, thanks to its wedge shape and the presence of screws.

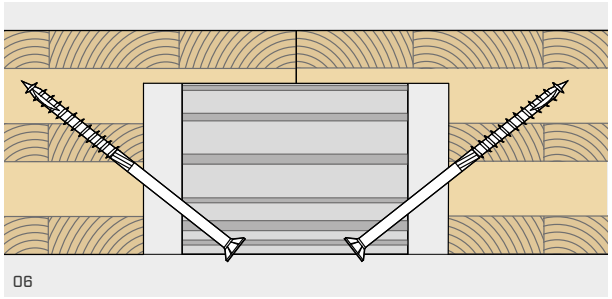










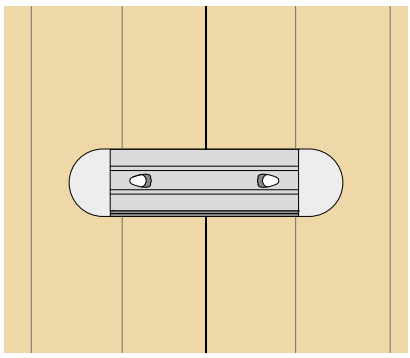


USE OF SHIM ACCESSORIES

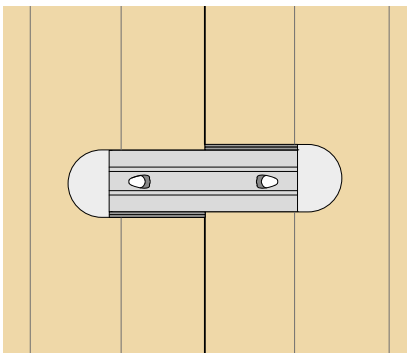
The connector is designed for a h_{slot} thickness of 40.5 mm | *1 3/5 in* but a different nominal h_{slot} size can be set. For example, by using an oversized routing, all tolerances in the connection can be compensated for:

- tolerance on total routing thickness h_{slot}.
- tolerance on the reciprocal positioning of the two grooves on the opposing panels.

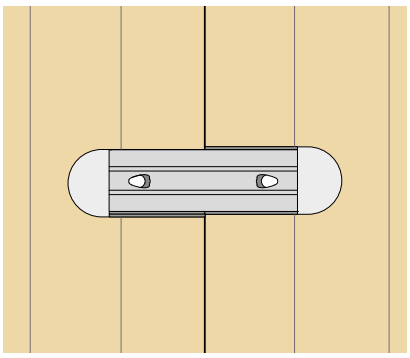
Depending on the actual situation on site, the different spacer models can be combined.



Spacers positioned on one side only, to compensate for the thickness of the routing.



Spacers positioned on opposite sides, to compensate for a misalignment of the two grooves.



Combination of spacers for use in intermediate situations.

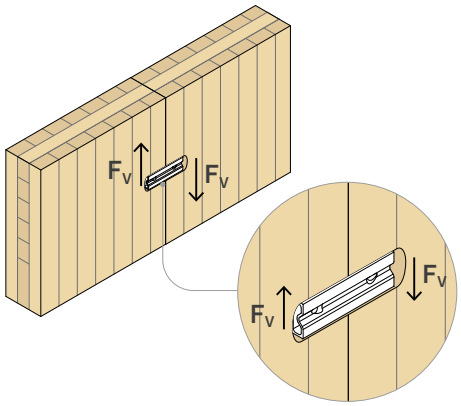
STRUCTURAL VALUES

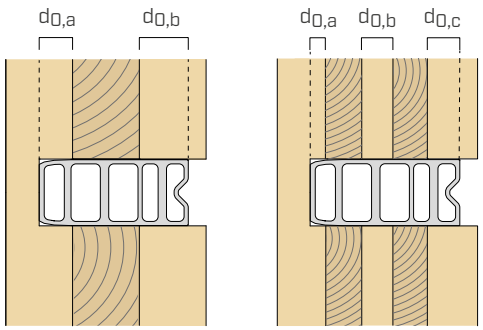
ALLOWABLE STRESS DESIGN (ASD)

CLT type	Accumulated layer thickness of CLT		Stress Grade	Layup	P_r [3][4] [lbf]	k_{ser} [kip/in]
CLT by ANSI/APA PRG 320-2018	$\sum d_0$[in]	2 1/8	E1	4 1/8, 6 7/8, 9 5/8, 12 3/8	4653.9	98.1
		2 1/8	E2	4 1/8, 6 7/8, 9 5/8, 12 3/8	4376.0	114.4
		2 1/8	E3	4 1/8, 6 7/8, 9 5/8, 12 3/8	3612.0	81.6
		2 1/8	V1	4 1/8, 6 7/8, 9 5/8, 12 3/8	3473.0	114.4
		2 1/8	V2	4 1/8, 6 7/8, 9 5/8, 12 3/8	2986.8	98.1
CLT by Nordic Structures	$\sum d_0$[in]	2 3/4	E1	3-1/2, 5-5/8, 7-3/4	6022.3	98.1
		2 1/8	E1	4-1/8, 6-7/8, 9-5/8	4653.9	98.1
		2 3/4	E1	8-3/8, 9-5/8, 10-1/2	6036.2	98.1

LOAD AND RESISTANCE FACTOR DESIGN (LRFD)

CLT type	Accumulated layer thickness of CLT		Stress Grade	Layup	P_r [3][4] [lbf]	k_{ser} [kip/in]
CLT by ANSI/APA PRG 320-2018	$\sum d_0$[in]	2 1/8	E1	4 1/8, 6 7/8, 9 5/8, 12 3/8	6294.9	98.1
		2 1/8	E2	4 1/8, 6 7/8, 9 5/8, 12 3/8	5947.6	114.4
		2 1/8	E3	4 1/8, 6 7/8, 9 5/8, 12 3/8	4905.7	81.6
		2 1/8	V1	4 1/8, 6 7/8, 9 5/8, 12 3/8	4732.0	114.4
		2 1/8	V2	4 1/8, 6 7/8, 9 5/8, 12 3/8	3994.0	98.1
CLT by Nordic Structures	$\sum d_0$[in]	2 3/4	E1	3-1/2, 5-5/8, 7-3/4	8135.6	98.1
		2 1/8	E1	4-1/8, 6-7/8, 9-5/8	6286.2	98.1
		2 3/4	E1	8-3/8, 9-5/8, 10-1/2	8144.3	98.1





$$\sum d_0 = d_{0,a} + d_{0,b} + d_{0,c}$$

NOTES

(1) The h_{slot} thickness of 40.5 mm | *1 3/5 in.* is to be regarded as indicative and depends on the precision of the specific machine used to cut the panels. When using the connector for the first time, it is recommended that 41.0 mm | *1 5/8 in.* be grooved and to shim the joints, if any, using SHIM. For subsequent uses, it may be considered whether to reduce to 40.5 mm | *1 3/5 in.*

(2) The calculated values considered no gap between panels and a bearing width of 22 mm | *7/8 in.*

(3) For CLT and LVL with cross grain veneer, in case of installation with a1 < 480 mm | 19 in or a3,t < 480 mm | 19 in, the strength is reduced with a ka1 coefficient in mm, as provided by ETA-19/0167.

$$k_{a1} = 1 - 0{,}001 \cdot \left(480 - min\left\{ a_1 ; a_{3,t} \right\}\right)$$

(4) All resistances are factored and according to NDS 2.3, 3.7, and 10.3 related to the axial resistance of the longitudinal layers. The product shall be used in dry service conditions. C_D=1.6 (short term), other factors were all assumed to be equal to 1.0

(5) The connector can be installed in any position within the panel thickness as long as the cumulative longitudinal layers in contact with the SLOT connector are the same as the tabulated values. The strength values are based on the surface mount installation where b_{in}=0.

GENERAL PRINCIPLES

- The contact surface between the panels can be flat or "male-female" shaped, see the image in the INSTALLATION section.
- A minimum of two connectors must be used within one connection. The resistance is proportional to the number of slots with the same cumulative thickness.
- The connectors must be inserted with the same pull-through depth (t_e) into both elements to be fastened.
- The two inclined screws are optional and have no influence on the strength and stiffness calculation.
- The modulus of elasticity, E (psi), and the compression parallel to the grain of the panels, f_c (psi) were obtained from the Nordic X-LAM design guide and ANSI/PRG 320-2018 documents.
- Slip modulus according to ETA-19/0167 and converted to kip/in. Density conversion values according to the Technical Design Guide Canada.

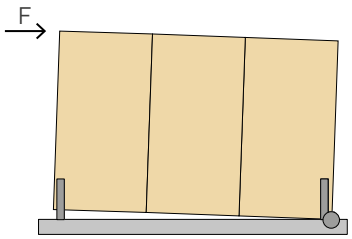
INTELLECTUAL PROPERTY

- The SLOT connector is protected by the following patents: EN102018000005662 | US11.274.436.
- It is also protected by the following Registered Community Designs: RCD 005844958-0001 | RCD 005844958-0002.

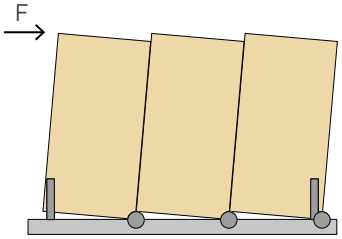
SHEAR CONNECTIONS BETWEEN CLT PANELS | STIFFNESS

CLT MULTI-PANEL WALLS WITH HOLD-DOWN AT THE ENDS

SINGLE-WALL BEHAVIOUR



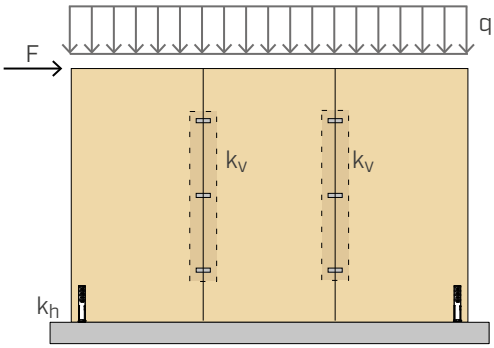
COUPLED PANEL BEHAVIOUR



There are two possible rotational behaviours of the multi-panel CLT wall, determined by multiple parameters. At equal conditions, it can be stated that the k_v/k_h stiffness ratio determines the rotational behaviour of the wall, where:

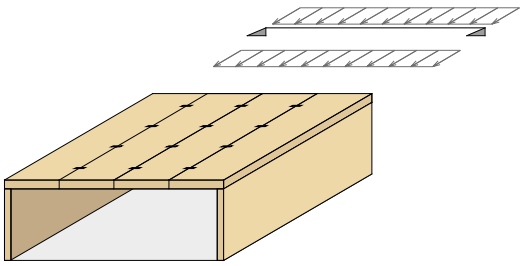
- k_v total shear stiffness of the connection between panels;
- k_h tensile strength of the hold-down.

At equal conditions, it can be stated that for high k_v/k_h values (i.e. for high k_v values) the kinematic behaviour of the wall tends to be similar to the single wall behaviour. This type of wall is much easier to design than a wall with coupled panel behaviour, due to the simplicity of modelling.



MULTIPANEL CLT FLOORS

The distribution of horizontal loads (earthquake or wind) from the floor to the lower walls depends on the stiffness of the floor in its own plane. A stiff floor allows the transmission of horizontal external loads to the underlying walls with diaphragm behaviour. The stiff diaphragm behaviour is much easier to design than a deformable floor in its own plane, due to the simplicity in the structural outline of the floor. In addition, many international seismic regulations, require the presence of a stiff diaphragm as a requirement to obtain the building plan regularity and therefore a better seismic response of the building.



THE ADVANTAGE OF HIGH STIFFNESS CERTIFIED BY TEST

The use of the SLOT connector, characterized by high stiffness and strength values, leads to undoubted advantages, both in the case of multi-panel CLT wall and in the case of the diaphragm floor. These strength and stiffness values are experimentally validated and are certified according to ETA-19/0167; this means that the designer is provided with certified, precise and reliable data.