SLOT

VIDEO

MY PROJECT SOFTWARE

ETA 19/0167

CONNECTOR FOR STRUCTURAL PANELS

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

HANDY
The wedge shape makes the insertion easy into the groove. The honeycomb geometry maximizes the resistance. Made of aluminium, it is light and easy to handle.

FAST INSTALLATION
Possibility of assembly with inclined auxiliary screws that make tightening between panels easy. Excellent performance: one connector can replace up to 60 screws with Ø6.

CHARACTERISTICS

FOCUS	walls and floors joints
PANELS	thickness from 90 to 160 mm
STRENGTH	$R_{v,k}$ from 35 to 120 kN
FASTENERS	HBS

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

MATERIAL
Aluminium alloy three dimensional perforated plate.

FIELDS OF USE
Wall and floor panels joint
- CLT, LVL
- glulam (Glued Laminated Timber)

MULTI-STOREY

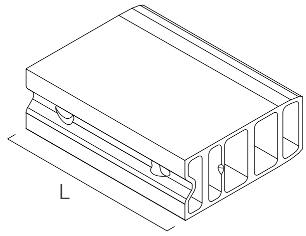
Ideal for joining walls and floors of multi-storey buildings. It allows to restore on the construction site the panels built in the factory with small dimensions for transport needs.

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

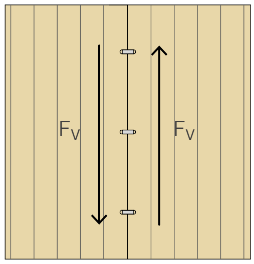
CODE	L [mm]	pcs
SLOT90	120	10



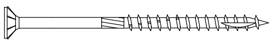
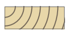
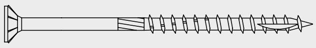
MATERIAL AND DURABILITY
SLOT: EN AW-6005A aluminium alloy.
To be used in service classes 1 and 2 (EN 1955-1-1).

FIELD OF USE
- CLT panels
- Glulam panels
- LVL softwood panels with crossed or parallel veneers
- LVL hardwood panels with crossed or parallel veneers

EXTERNAL LOADS
Shear stress in the panel plane.



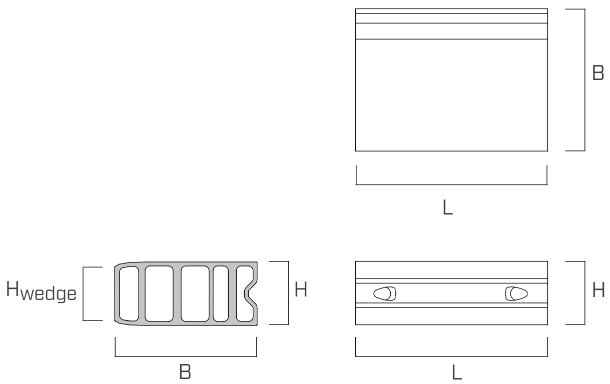
ADDITIONAL PRODUCTS - FASTENING

type	description		d [mm]	L [mm]	support
HBS	HBS screw		6	120	
HBS	HBS screw		8	140	

For further details refer to the "Screws and connectors for timber" catalogue.

GEOMETRY

CONNECTOR



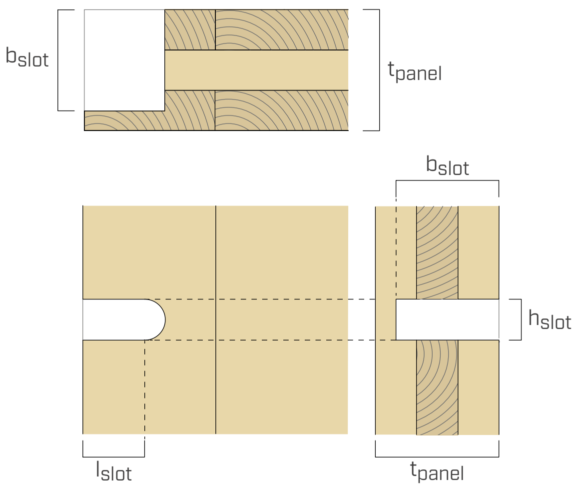
B [mm]	H [mm]	H_{wedge} [mm]	L [mm]	n_{screws} [pcs]
89	40	34	120	2

The screws are optional and not included in the package.

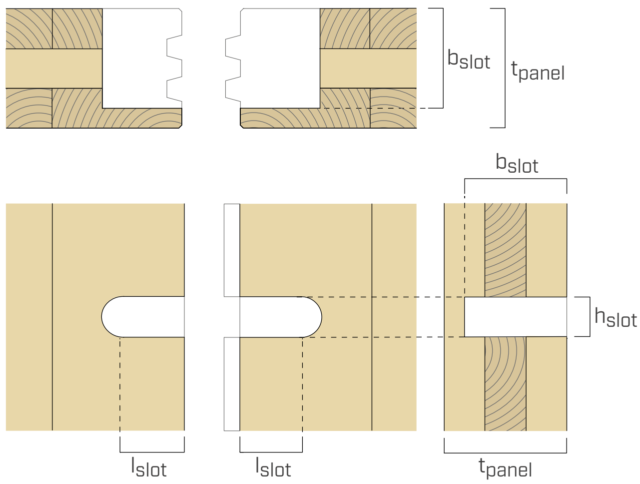
GEOMETRY

GROOVING IN THE PANEL

PANEL WITH FLAT EDGE



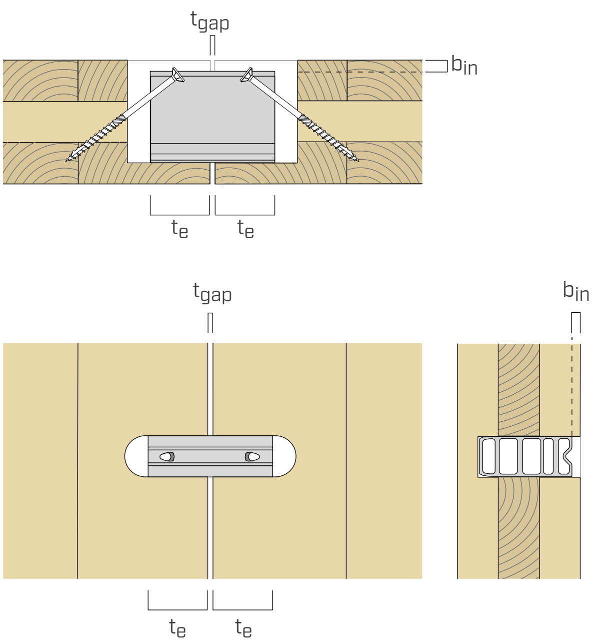
PANEL WITH TAPPED EDGE



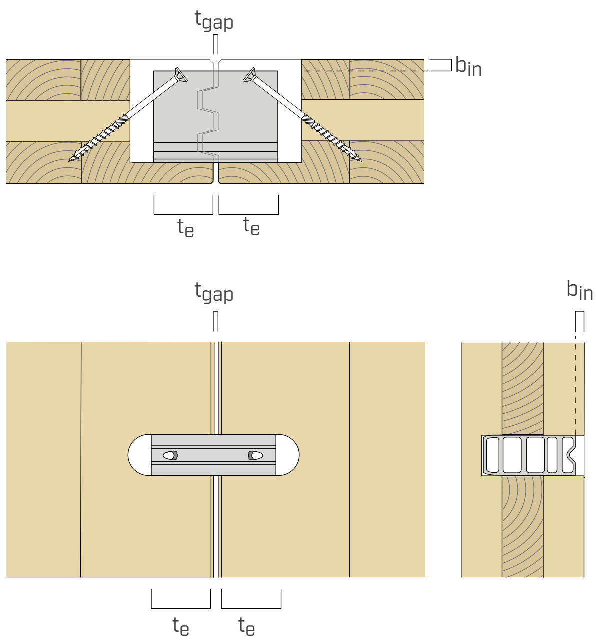
$b_{slot,min}$ [mm]	$l_{slot,min}$ [mm]	$t_{panel,min}$ [mm]	h_{slot} (1) [mm]
90	60	90	40 ± 0,5

INSTALLATION

PANEL WITH FLAT EDGE



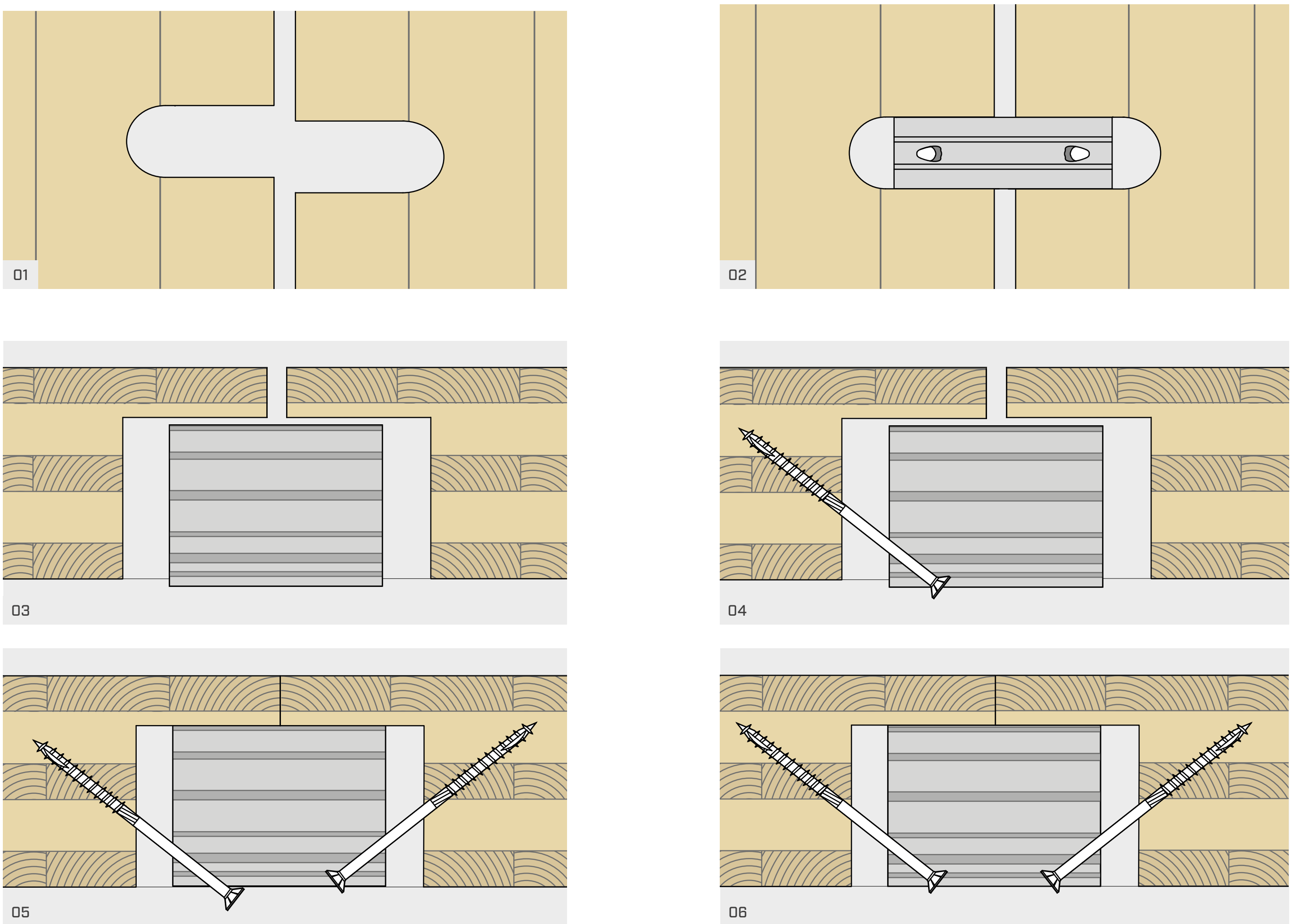
PANEL WITH TAPPED EDGE



$t_{gap,max}$ (2) [mm]	$b_{in,max}$ [mm]	$t_{e,min}$ [mm]
5	t_{panel}-90 (3)	57.5

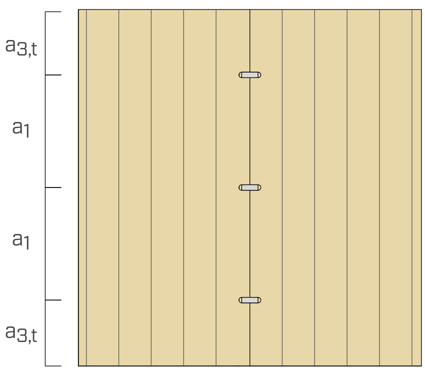
USE OF THE CONNECTOR AS ASSEMBLY EQUIPMENT

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

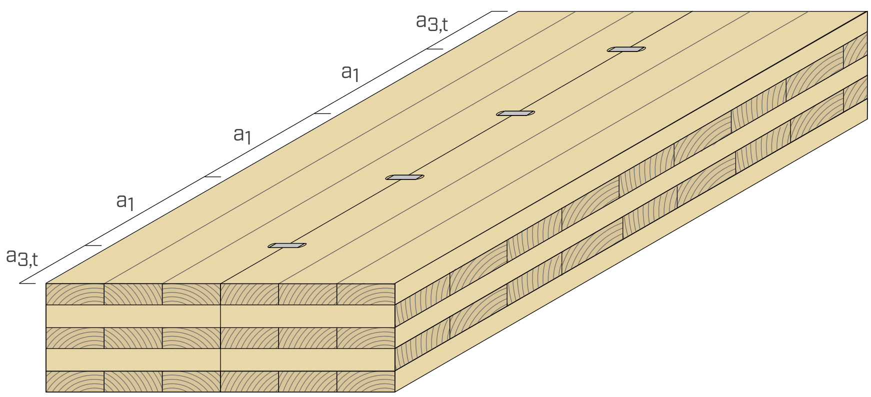


MINIMUM DISTANCES

PARETE



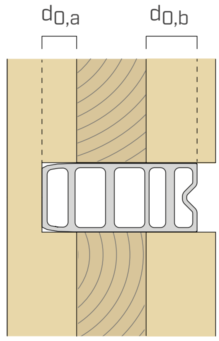
FLOOR

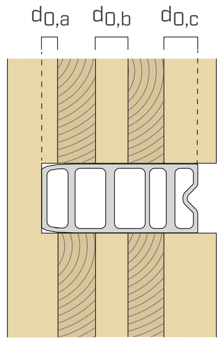


	CLT	LVL		glulam
		cross grain veneer	parallel grain veneer	
a_1 [mm]	320 (4)	320 (4)	480	480
$a_{3,t}$ [mm]	320 (4)	320 (4)	480	480

STATIC VALUES

			$R_{v,k}$ [kN]	k_{ser} [kN/mm]
CLT (5)	Σd_0 (6) =	40 [mm]	**34.37**	17,50
		45 [mm]	**37.81**	
		49 [mm]	**40.57**	
		50 [mm]	**41.26**	
		55 [mm]	**44,70**	
		59 [mm]	**47.46**	
		60 [mm]	**48.15**	
		65 [mm]	**51.59**	
		69 [mm]	**54.35**	
LVL softwood	cross grain veneer (7)		**52.72**	24,00
	parallel grain veneer (8)		**70.97**	
LVL hardwood	cross grain veneer (9)		**125.71**	48.67
	parallel grain veneer (10)		**116.59**	
glulam (11)			**68.13**	25.67





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

NOTES:

(1) The recommended tolerance of $\pm$0.5 mm is to be considered as indicative. A grooving with insufficient h_{slot} can make it difficult to insert the connector; a grooving with excessive h_{slot} can decrease the initial stiffness of the connection. Before cutting the first batch of panels, it is advisable to make test grooves in order to verify the quality of the grooves made by the specific machine used to cut the panels.

(2) The gap between the panels must be taken into account when calculating the connector strength; refer to ETA-19/0167 for the calculation. The gap between panels may contain a filling material.

(3) The connector can be installed in any position within the panel thickness.

(4) For CLT e LVL with cross grain veneer, in case of installation with $a_1 < 480$ mm or $a_{3,t} < 480$ mm, the strength is reduced with a k_{a1} coefficient, as provided by ETA-19/0167.

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

(5) Values calculated according to ETA-19/0167 and valid in Service Class 1 according to EN 1995-1-1. The following parameters were considered in the calculation: $f_{c,0k}$ = 24 MPa, ρ_k =350 kg/m^3, t_{gap}= 0 mm, $a_1 \geq$ 480 mm, $a_{3,t} \geq$ 480 mm.

(6) The parameter Σd_0 corresponds to the cumulative thickness of the layers parallel to F_v, inside the thickness B of the connector (see image).

(7) Values calculated according to ETA-19/0167. The following parameters were considered in the calculation: $f_{c,0k}$ = 26 MPa, ρ_k = 480 kg/m^3, t_{gap} = 0 mm, $a_1 \geq$ 480 mm, $a_{3,t} \geq$ 480 mm.

(8) Values calculated according to ETA-19/0167. The following parameters were considered in the calculation: $f_{c,0k}$ =35 MPa, ρ_k = 480kg/m^3, t_{gap} = 0mm.

(9) Values calculated according to ETA-19/0167. The following parameters were considered in the calculation: $f_{c,0k}$ = 62 MPa, ρ_k = 730 kg/m^3, t_{gap} = 0 mm, $a_1 \geq$ 480 mm, $a_{3,t} \geq$ 480 mm.

(10) Values calculated according to ETA-19/0167. The following parameters were considered in the calculation: $f_{c,0k}$ = 57,5 MPa, ρ_k = 730 kg/m^3, t_{gap} = 0 mm.

(11) Values calculated according to ETA-19/0167 and valid in Service Class 1 according to EN 1995-1-1. The following parameters were considered in the calculation: $f_{c,0k}$ = 24 MPa, ρ_k = 385 kg/m^3, t_{gap} = 0 mm.

GENERAL PRINCIPLES:

- Characteristic values are consistent with EN 1995-1-1 and in accordance with ETA-19/0167.
- The design values are obtained from the characteristic values as follows: The coefficients γ_M and k_{mod} should be taken according to the current regulations used for the calculation.

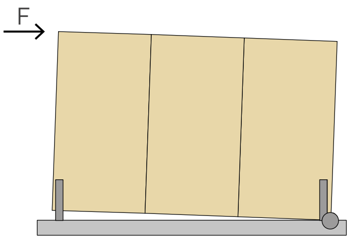
$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_M}$$

  Dimensioning and verification of the timber elements must be carried out separately.
- Resistance values for the fastening system are valid for the calculation examples shown in the table. For different calculation methods, the MyProject software is available free of charge (www.rothoblaas.com).
- The connector can be used for connections between glulam, CLT and LVL elements or similar glued elements.
- 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 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.

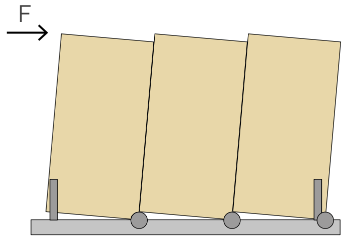
SHEAR CONNECTIONS BETWEEN CLT PANELS | STIFFNESS

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

SINGLE-WALL BEHAVIOUR



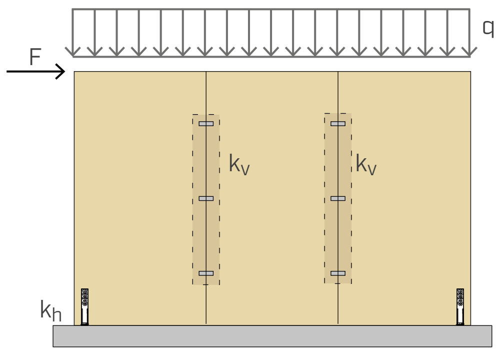
COUPLED PANEL BEHAVIOUR



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:

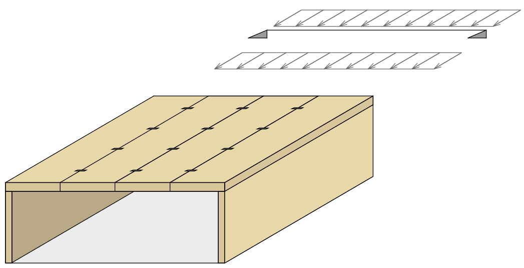
- k_v= total shear stiffness of the connection between panels;
- k_h= tensile strength of the hold-down.

At equal conditions, it can be stated that for high k_v/k_h values (i.e. for high kv $_{values}$) 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.



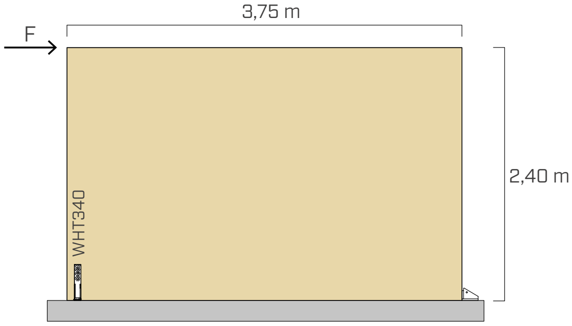
THE ADVANTAGE OF HIGH STIFFNESS CERTIFIED BY TEST

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.

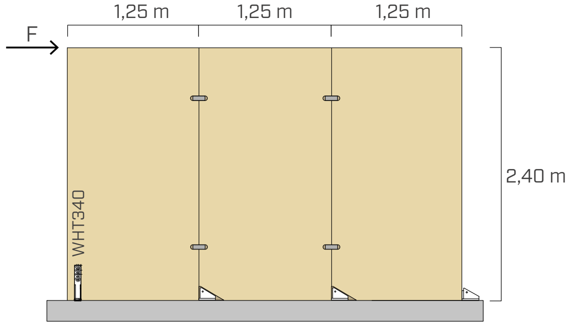
EXPERIMENTAL COMPARISON BETWEEN CONNECTION SYSTEMS

In 2019, an experimental campaign on full-scale walls was carried out at the CNR-IBE laboratories in S.Michele All'Adige. The aim of the campaign is to determine the rotational behaviour of multi-panel walls, assembled using different connection systems. The tests are monotonic in displacement control.

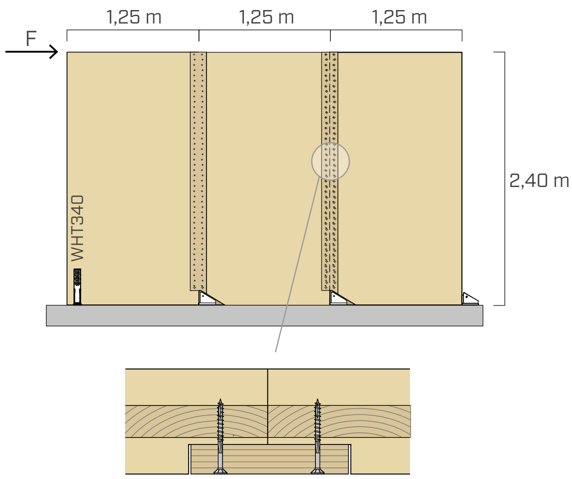
TEST 1A: SINGLE PANEL WHT340



TEST 2A: 2 SLOT CONNECTORS

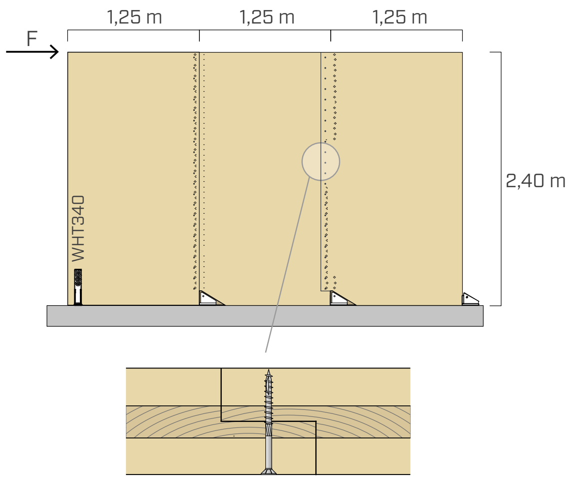


TEST 3: SPLINE JOINT



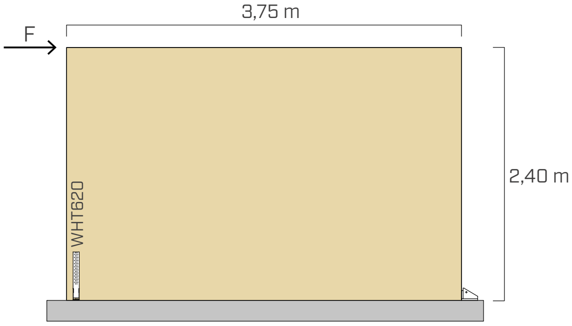
2 x HBS Ø6 x 70 spacing 50 mm

TEST 4: HALF-LAP JOINT

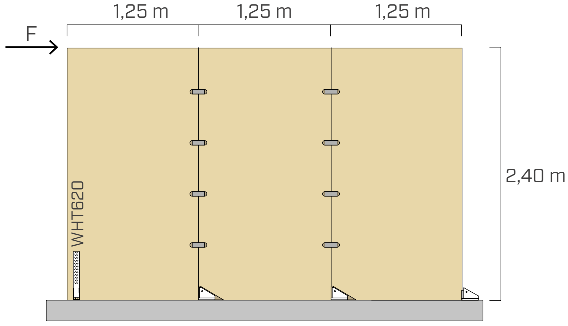


HBS Ø8 x 100 spacing 100 mm

TEST 1B: SINGLE PANEL WHT620



TEST 2B: 4 SLOT CONNECTORS



Two series of tests were carried out, the first one fastening the wall to the ground using 1 WHT340 with washer and 20 Anker Ø4 x 60 nails:

- TEST 1A: full panel.
- TEST 2A: three panels connected together with 2 SLOT connectors.
- TEST 3: three panels connected to each other with LVL joint covers and pairs of HBS Ø6 x 70 screws with 50 mm spacing (88 screws for each connection).
- TEST 4: three panels connected to each other with half lap joint and HBS Ø8 x 100 screws with 100 mm spacing (22 screws for each connection).

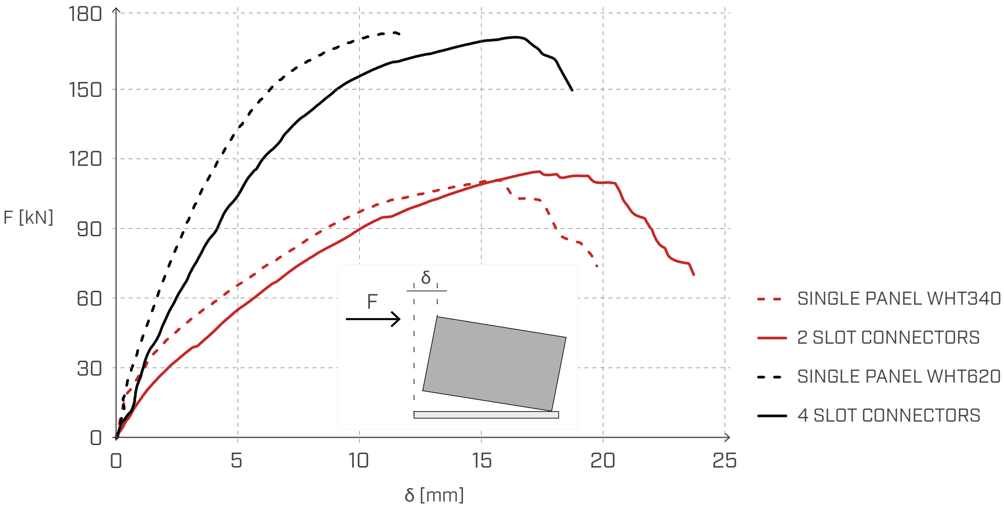
In the second series of tests, the walls are fastened to the ground using 1 WHT620 with washer and 55 Anker Ø4 x 60 nails:

- TEST 1B: full panel.
- TEST 2B: three panels connected together with 4 SLOT connectors for each connection.

Experimental comparisons are shown on the following page.

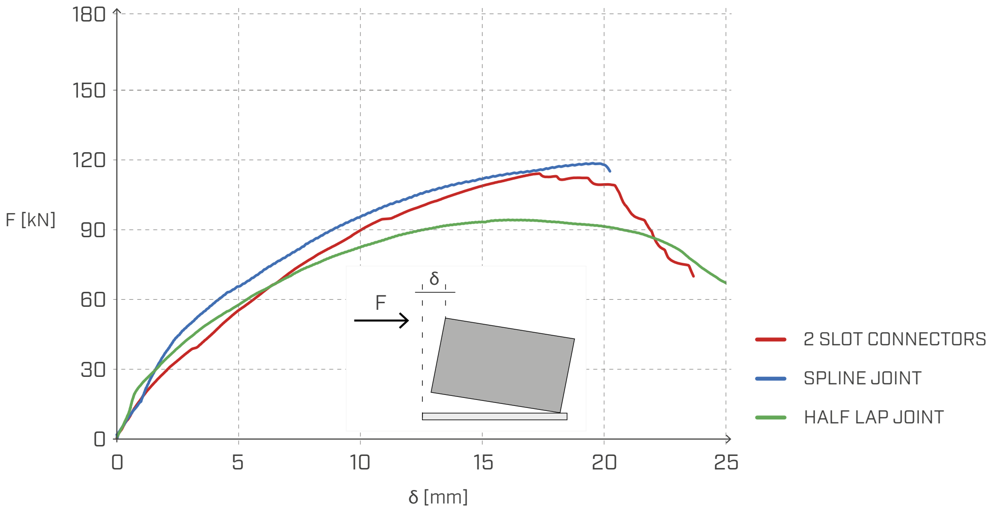
EXPERIMENTAL COMPARISON BETWEEN CONNECTION SYSTEMS

SLOT - SINGLE PANEL COMPARISON



The graph shows the comparison between single panel and panels connected with the SLOT connector. Both tests with SLOT connectors have a **marked single-wall behaviour**, with a single pivot point located in the compressed edge of the wall. The SLOT connectors remained in the elastic field in both tests, while the hold-down failure occured. The walls connected with the SLOT connector show a 20-30% loss of stiffness compared to the single panel. By increasing the number of connectors, **it is possible to bring the stiffness of the multi-panel wall even closer to the corresponding stiffness of the single panel.** For example, on a 2,40 m high wall it is possible to install up to a maximum of 6 SLOTs for each connection, tripling the stiffness of the vertical joints for the 2A configuration.

SLOT - SPLINE JOINT - HALF LAP JOINT COMPARISON



The graph shows a comparison between test 2A (2 SLOT connectors) and the other connection systems (tests 3 and 4). The tests have been designed to represent two borderline cases:

- for **TEST 2A**, using the minimum number of SLOT connectors (2 connectors);
- for **TEST 3 and 4**, using a very large number of screws (22 screws for the half-lap joint and 88 screws for the spline joint). The wall connected with 2 SLOT connectors, can show a behaviour comparable to that of walls connected with a very large number of screws.

This means that, in case the designer decides to further approximate the behaviour of the multi-panel wall to that of the single panel, **the SLOT system has wide margins in terms of increased stiffness, while the other connection systems tested already reach their maximum stiffness limit** due to the difficulty in further increasing the number of screws.

ANALYTICAL COMPARISON BETWEEN CONNECTION SYSTEMS

INCREASED SPACING

connection system	number of connectors	spacing [mm]	$R_{v,k}$ [kN]
SLOT	2	967	81.1
HALF-LAP	14	200	42.6
SPLINE JOINT	56	100	60.9

REDUCED SPACING

connection system	number of connectors	spacing [mm]	$R_{v,k}$ [kN]
SLOT	4	580	162.3
HALF-LAP	28	100	73.1
SPLINE JOINT	114	50	70.1

The strength values are calculated according to ETA-19/0167, ETA-11/0030 and EN 1995-1-1.

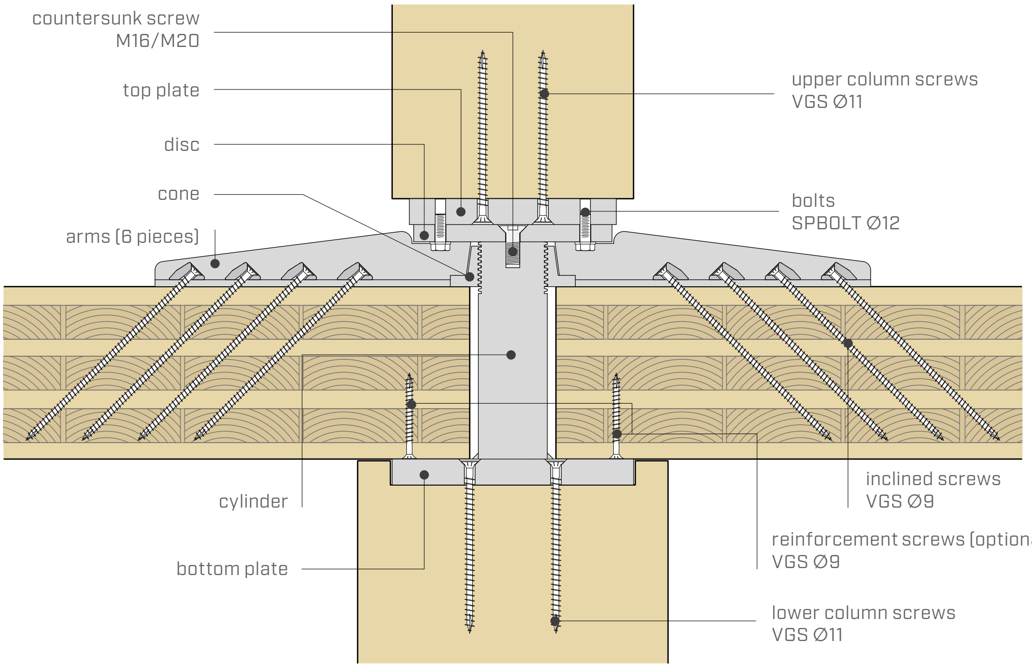
The tables show a comparison in terms of strength between the three types of connection. A 2,9 m high wall panel was used for the calculation. In the INCREASED SPACING table, 200 mm and 100 mm spacings have been used for half-lap joint and spline joint respectively. For the SLOT connector a spacing of about 1 m has been used; in this case the screw connections offer much lower strengths than the SLOT connector. As shown in the REDUCED SPACING table, halving the distance between the screws (and therefore doubling the number of screws) it is not possible to reach the strength offered by only the two SLOT connectors alone of the previous case, due to the reduction of strength given by the effective number. Using 4 SLOT connectors, it is also possible to achieve very difficult strength values with screws. This means that high connection strength values cannot be achieved with traditional connections.

SPIDER AND PILLAR CONNECTORS

The SPIDER connector is the result of an idea born within the Arbeitsbereich für Holzbau of the University of Innsbruck and realised through close collaboration with Rothoblaas. The ambitious research project, co-financed by the Österreichische Forschungsförderungsgesellschaft (FFG), led to the development, for the first time in the world, of a metal connector for the construction of flat CLT floors that are placed precisely. The experimental campaign allowed the development of 10 models, suitable for different applications.
The PILLAR connector is a simplified version of the SPIDER connector, suitable for columns with smaller spacing; it can adapt with versatility to different types of applications.

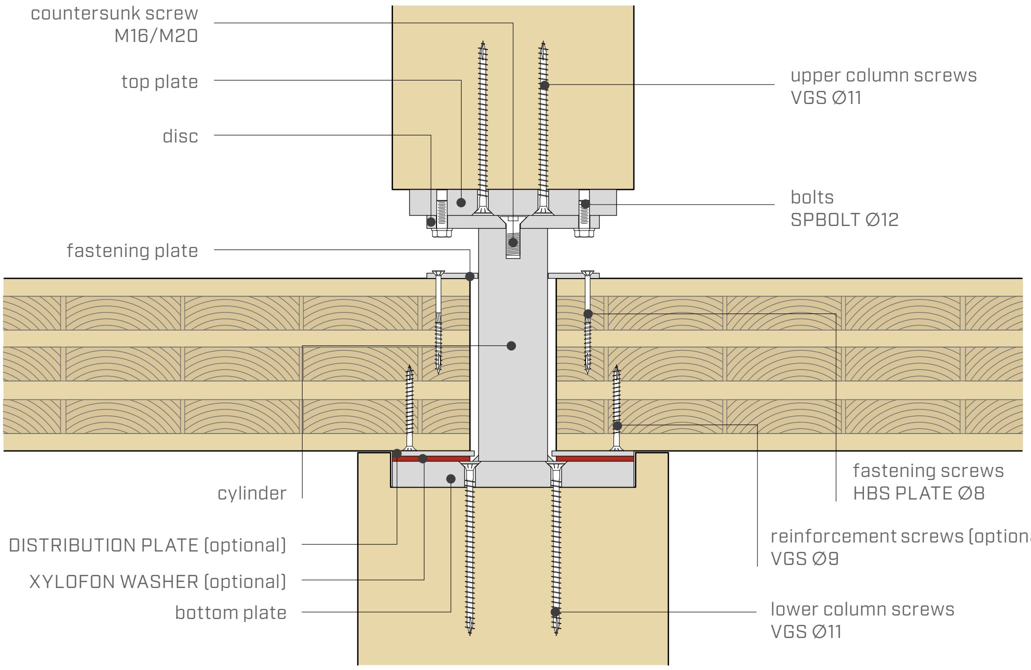
SPIDER

COMPONENTS	FASTENERS



PILLAR

COMPONENTS	FASTENERS



PREDIMENSIONING TABLES

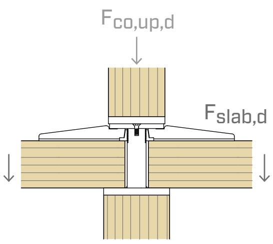
SPIDER CONNECTOR DESIGN STRENGTHS

MODEL	CLT floor thickness [mm] 160	180	200	220	240	280	160 + 160	COLUMNS
	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	
SPI60S	345 + 296	290 + 349	240 + 401	185 + 454	135 + 506	135 + 506	245 + 394	GL32h
SPI80S	630 + 296	575 + 349	525 + 401	470 + 454	420 + 506	420 + 506	530 + 394	GL32h
SPI80M	920 + 296	865 + 349	815 + 401	760 + 454	710 + 506	710 + 506	820 + 394	GL32h
SPI80L	1215 + 296	1185 + 349	1135 + 401	1080 + 454	1030 + 506	1030 + 506	1140 + 394	GL32h
SPI100S	1515 + 296	1515 + 349	1515 + 401	1515 + 454	1475 + 506	1475 + 506	1515 + 394	LVL BEECH
SPI100M	1965 + 296	1930 + 349	1895 + 401	1855 + 454	1820 + 506	1820 + 506	2030 + 394	LVL BEECH
SPI120S	2490 + 296	2440 + 349	2385 + 401	2335 + 454	2280 + 506	2280 + 506	2395 + 394	LVL BEECH
SPI120M	2855 + 296	2855 + 349	2855 + 401	2855 + 454	2855 + 506	2855 + 506	2855 + 394	LVL BEECH
SPI100L	3805 + 296	3805 + 349	3805 + 401	3805 + 454	3805 + 506	3805 + 506	3805 + 394	STEEL
SPI120L	4840 + 296	4840 + 349	4840 + 401	4840 + 454	4840 + 506	4840 + 506	4840 + 394	STEEL

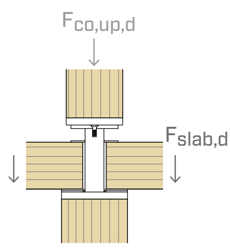
PILLAR CONNECTOR DESIGN STRENGTHS

MODEL	CLT floor thickness [mm] 160	180	200	220	240	COLUMNS
	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	$F_{co,up,d}$ + $F_{slab,d}$ [kN]	
PIL60S	470 + 132	470 + 145	470 + 157	470 + 157	470 + 184	GL32h
PIL80S	815 + 167	815 + 181	815 + 195	815 + 195	815 + 225	GL32h
PIL80M	1005 + 208	990 + 223	975 + 239	975 + 239	940 + 272	GL32h
PIL80L	1325 + 208	1310 + 223	1295 + 239	1295 + 239	1265 + 272	GL32h
PIL100S	1515 + 162	1515 + 175	1515 + 190	1515 + 190	1515 + 220	LVL BEECH
PIL100M	2205 + 202	2205 + 218	2205 + 234	2205 + 234	2205 + 266	LVL BEECH
PIL120S	2675 + 196	2660 + 211	2645 + 227	2645 + 227	2610 + 260	LVL BEECH
PIL120M	3200 + 196	3185 + 211	3170 + 227	3170 + 227	3140 + 260	LVL BEECH
PIL100L	4435 + 202	4435 + 218	4435 + 234	4435 + 234	4435 + 266	STEEL
PIL120L	5480 + 196	5480 + 211	5480 + 227	5480 + 227	5480 + 260	STEEL

SPIDER



PILLAR



NOTES:

The strengths shown in the table refer to the design values, calculated in accordance with EN 1993-1-1, EN 1993-1-12 and EN 1995-1-1 considering an average life class load (k_{mod}=0.8).

For safety reasons, an CLT floor height of 320 mm has been considered.

All strength refers to the situation "with reinforcement". For the PILLAR connector, the configuration shown is the one with central support (see the specific chapter).

The values shown in the table are to be considered as connector pre-dimensioning values. The structural verification must be carried out in accordance with the tables on the following pages. Dimensioning and verification of the timber elements must be carried out separately.

PREDIMENSIONING ABACUS

The abacus can be used for an initial selection of the connector to be used in each position and for each floor.
In the abacus, each column refers to a different area of influence A_i of the column in question, while each row refers to a different level, the levels are numbered starting from the roof floor and going downwards.
By crossing influence area and level, it is possible to determine the most suitable connector for each level. The calculation is performed with reference to a design load on the floor at the Ultimate Limit State of 8,0 kN/m^2 with average load duration class (k_{mod}=0,8). The final selection and structural verification must be carried out in accordance with the tables shown on the following pages. Dimensioning and verification of the timber elements must be carried out separately.

The colours of the various cells make it possible to determine the most suitable material for the construction of the column on which the SPIDER or PILLAR connector will be placed. In any case, a more refined calculation, as well as the choice of a different column type, can be performed in accordance with the tables on the following pages.

Glulam column

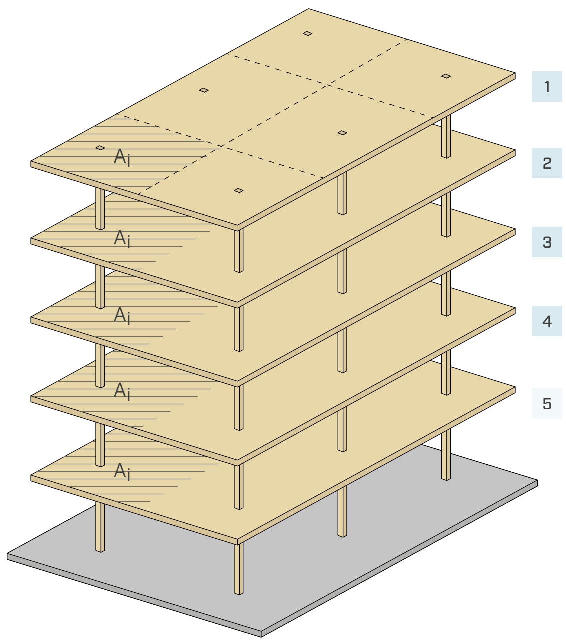
LVL hardwood column

Steel column

EXAMPLE

With reference to the 5-storey building shown in the drawing and to the column highlighted, an area of influence of about 40 m^2 is assumed. First of all, the connectors and columns to be used are the following:

Floor	1	SPI60S **connector** on glulam column
Floor	2	SPI80S **connector** on glulam column
Floor	3	SPI80M **connector** on glulam column
Floor	4	SPI80L **connector** on glulam column
Floor	5	SPI100S **connector** on LVL hardwood column



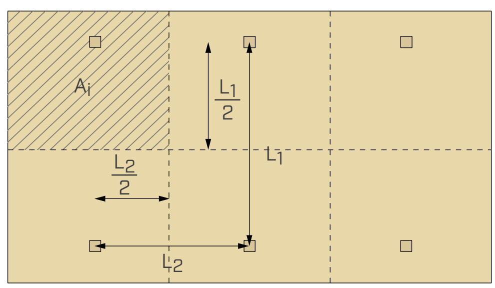


Diagram of floor areas of influence.

PREDIMENSIONING ABACUS

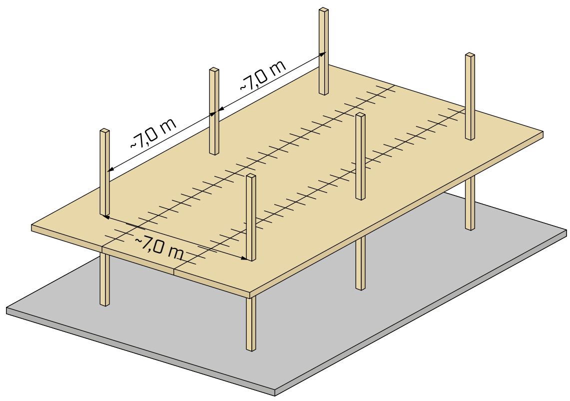
floor number	A_i [m²]								
	10	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
1	PIL60S	PIL60S	PIL80S	PIL80M	SPI60S	SPI60S	SPI60S	SPI60S	SPI60S
2	PIL60S	PIL60S	PIL80S	PIL80M	SPI80S	SPI80S	SPI80S	SPI80S	SPI80S
3	PIL60S	PIL60S	PIL80S	PIL80M	SPI80S	SPI80M	SPI80M	SPI80L	SPI80L
4	PIL60S	PIL60S	PIL80S	PIL80M	SPI80M	SPI80L	SPI80L	SPI100S	SPI100S
5	PIL60S	PIL80S	PIL80S	PIL80M	SPI80L	SPI80L	SPI100S	SPI100S	SPI100M
6	PIL60S	PIL80S	PIL80S	PIL80L	SPI100S	SPI100S	SPI100M	SPI100M	SPI120S
7	PIL80S	PIL80S	PIL80M	PIL80L	SPI100S	SPI100M	SPI120S	SPI120S	SPI120M
8	PIL80S	PIL80M	PIL80L	PIL100M	SPI100M	SPI120S	SPI120S	SPI120M	SPI120M
9	PIL80S	PIL80M	PIL80L	PIL100M	SPI120S	SPI120S	SPI120M	SPI100L	SPI100L
10	PIL80S	PIL80L	PIL100S	PIL100M	SPI120S	SPI120M	SPI100L	SPI100L	SPI100L
11	PIL80S	PIL80L	PIL100M	PIL100M	SPI120M	SPI120M	SPI100L	SPI100L	SPI120L
12	PIL80M	PIL100S	PIL100M	PIL100M	SPI120M	SPI100L	SPI100L	SPI120L	SPI120L
13	PIL80M	PIL100S	PIL100M	PIL120S	SPI100L	SPI100L	SPI120L	SPI120L	SPI120L
14	PIL80L	PIL100M	PIL100M	PIL120S	SPI100L	SPI100L	SPI120L	SPI120L	-
15	PIL80L	PIL100M	PIL120S	PIL120M	SPI100L	SPI120L	SPI120L	-	-
16	PIL80L	PIL100M	PIL120S	PIL120M	SPI100L	SPI120L	SPI120L	-	-
17	PIL80L	PIL100M	PIL120S	PIL100L	SPI120L	SPI120L	-	-	-
18	PIL100S	PIL100M	PIL120M	PIL100L	SPI120L	SPI120L	-	-	-
19	PIL100S	PIL100M	PIL120M	PIL100L	SPI120L	-	-	-	-
20	PIL100M	PIL120S	PIL120M	PIL100L	SPI120L	-	-	-	-
21	PIL100M	PIL120S	PIL100L	PIL100L	SPI120L	-	-	-	-
22	PIL100M	PIL120S	PIL100L	PIL100L	-	-	-	-	-
23	PIL100M	PIL120S	PIL100L	PIL100L	-	-	-	-	-
24	PIL100M	PIL120M	PIL100L	PIL120L	-	-	-	-	-
25	PIL100M	PIL120M	PIL100L	PIL120L	-	-	-	-	-
26	PIL100M	PIL120M	PIL100L	PIL120L	-	-	-	-	-
27	PIL100M	PIL120M	PIL100L	PIL120L	-	-	-	-	-
28	PIL100M	PIL100L	PIL100L	PIL120L	-	-	-	-	-
29	PIL120S	PIL100L	PIL120L	-	-	-	-	-	-
30	PIL120S	PIL100L	PIL120L	-	-	-	-	-	-

FLOOR CONSTRUCTION MODES

There are two different installation modes for the SPIDER connector and two for the PILLAR connector.
It is possible to adopt mixed solutions in which both connectors are used on the same floor, in order to optimize performance and costs.

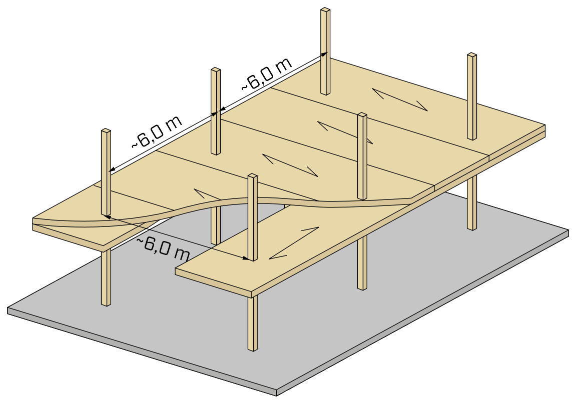
SPIDER

PLATE FLOOR



- maximum spacing between the columns
- it exploits the two-dimensional behaviour of the panel

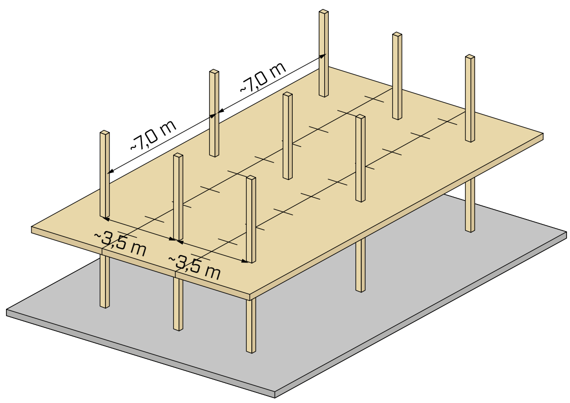
CROSSED PANELS



- services duct at the bottom of beam
- no moment connections

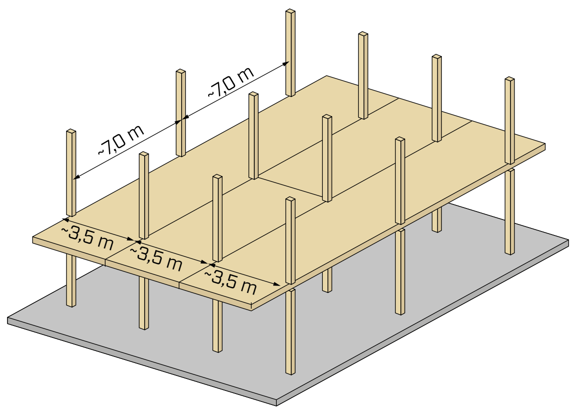
PILLAR

CENTRAL SUPPORTS



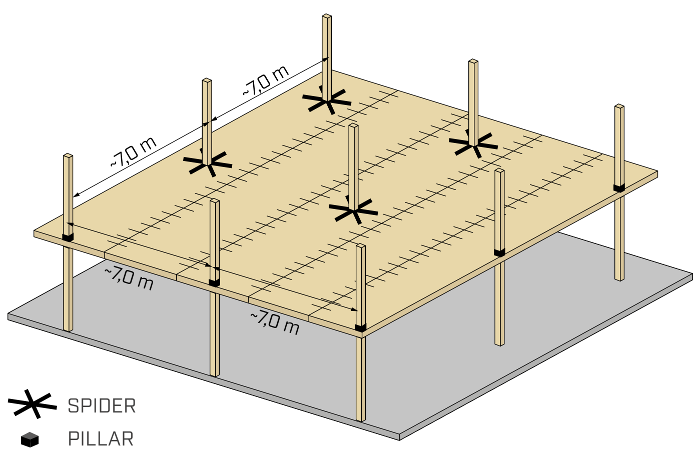
- fewer columns than the edge/angle supports
- external walls free of columns

EDGE/ANGLE SUPPORTS



- no props
- no moment connections

SPIDER + PILLAR



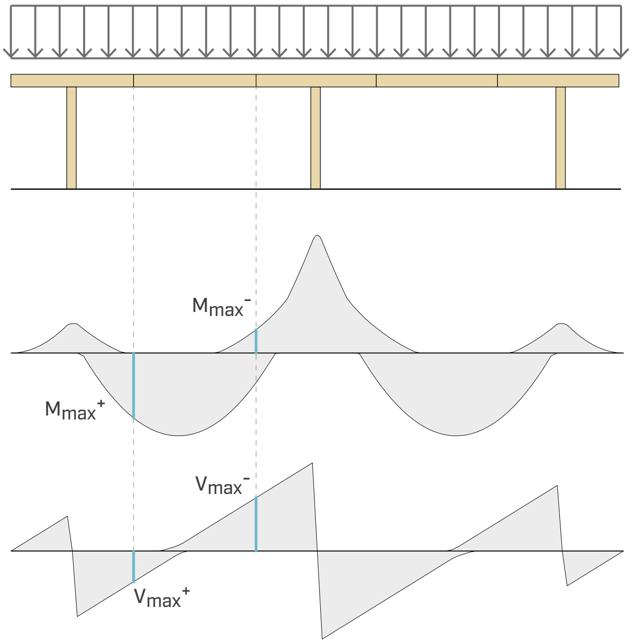
The PILLAR connector can be used together with the SPIDER connector in the less stressed supports or in the edge and angle areas, in order to optimize performance and costs.
This solution allows greater architectural freedom in the positioning of the columns in the base area.

- maximum architectural freedom in the columns positioning
- optimization of performance and costs

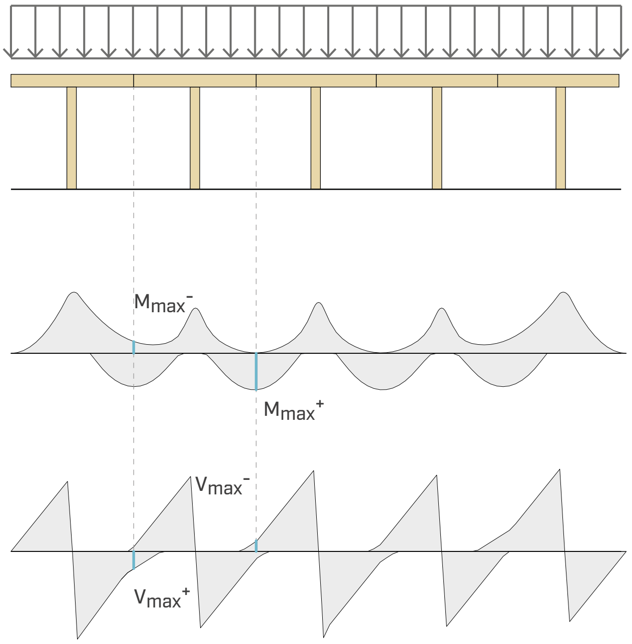
STRESSES ON CONNECTIONS BETWEEN CLT PANELS

The plate behaviour of the CLT floor can be achieved by means of special moment resisting connections. The connections, normally positioned at 1/4 of the span for the SPIDER WITH PLATE FLOOR system, are never subject to the maximum stress moment. In the case of the PILLAR WITH CENTRAL SUPPORTS system, the connections are positioned approximately in the middle, where the moment is however reduced due to the reduced spacing between the columns.
Vertical sections are represented in correspondence to a column in the following patterns.

SPIDER WITH PLATE FLOOR



PILLAR WITH CENTRAL SUPPORTS



SPECIAL CONNECTION BETWEEN CLT PANELS

Moment connection made with steel plates glued in vertical grooving into the panel. The connection geometry ensures positive and negative moment strength, adapting to typical envelope stresses. The use of a high-performance material such as steel in combination with epoxy resin guarantees excellent performance in terms of strength and flexural stiffness.