

PRELIMINARY TECHNICAL DATA

Date	October 25, 2023
From	ADWsr
For information	ADW for use with selected customers

Technical data for Hilti Panel Connector preliminary data

This document applies to the point connector for cross laminated timber (CLT) “Hilti Panel Connector”.

This document is intended for “demo calculations” only. Main idea is to assess structural performance of Hilti Panel Connector exemplified with real projects. The connector shall not be used with design and data as provided in this document.

The product is currently in development. The data provided in this document are based on test results of prototypes.

This document expires with the release of a later version of this document, but latest on 31.05.2024.

Revisions:

V.0 12.10.2023 Initial version

Intended Use

The Hilti Panel Connector is intended to be used to join panel elements of timber structures. It is installed into pre-machined cutouts of timber members such as floor panel elements. It can be used as non-structural or structural element to cover in-plane shear and/or tension loads. The point connector is not intended to transfer bending moments or out-of-plane shear loads.

The point connector can be subjected to static, quasi static and seismic shear and/or tensile loads in the plane of the CLT panel. Design of the Hilti Panel Connector can be performed according to EN 1995-1-1 and EN 1998-1.

The point connector may be used with panels made of cross laminated timber according to European Technical Assessments or national standards and regulations, considering following specifications:

- Minimum thickness of 120 mm
- Minimum 3 crosswise arranged layers
- Minimum total thickness of longitudinal layers being in contact with fully embedded connector is 37 mm
- Minimum total thickness of transverse layers being in contact with fully embedded connector is 13 mm
- Minimum strength class of lamellas is C16, average strength class of lamellas is C24 according to EN 338

The point connector can be used with various butt joint configurations, including flat or profiled butt joint, over-lapping joint, flat butt joints including slot-key elements as shown in Figure 1.

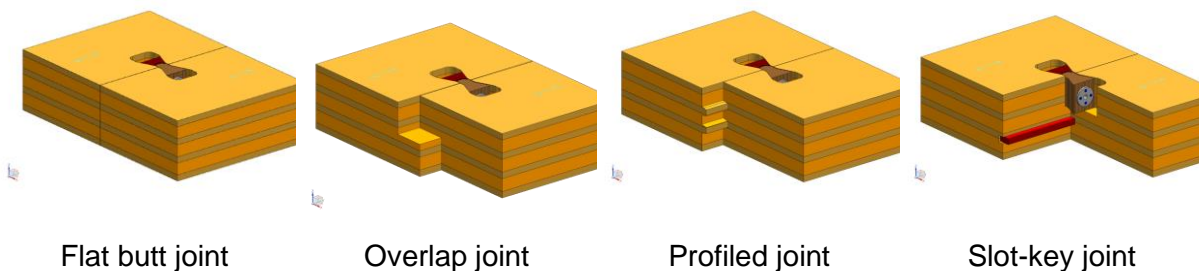


Figure 1: Joint configurations suitable for Hilti Panel Connector

The point connector is for use in timber structures subject to dry, internal conditions defined by service classes 1 and 2 according to EN 1995-1-1. The provisions made in this technical data (draft) are based on an assumed intended working life of the Hilti Panel Connector of 50 years.

- Behavior of assembled connection under fire: not assessed
- Air permeability of assembled connection: not assessed
- Smoke tightness of assembled connection: not assessed

Product details and installation

The Hilti Panel Connector is composed of two dovetail-shaped wedges made of LVL plywood with steel components according to DIN 1052 (washer M12), DIN-EN-ISO 4017 (hexagon head screw M12x100) and AISI 1008 (sleeve M12).

The plywood wedges are made of cross-laminated veneer lumber made of beech for use as structural component according to EN 13986 and EN 636. The basic design and dimensions of the Hilti Panel Connector is shown in Figure 1 and Figure 2.



Figure 1: Design of Hilti Panel Connector

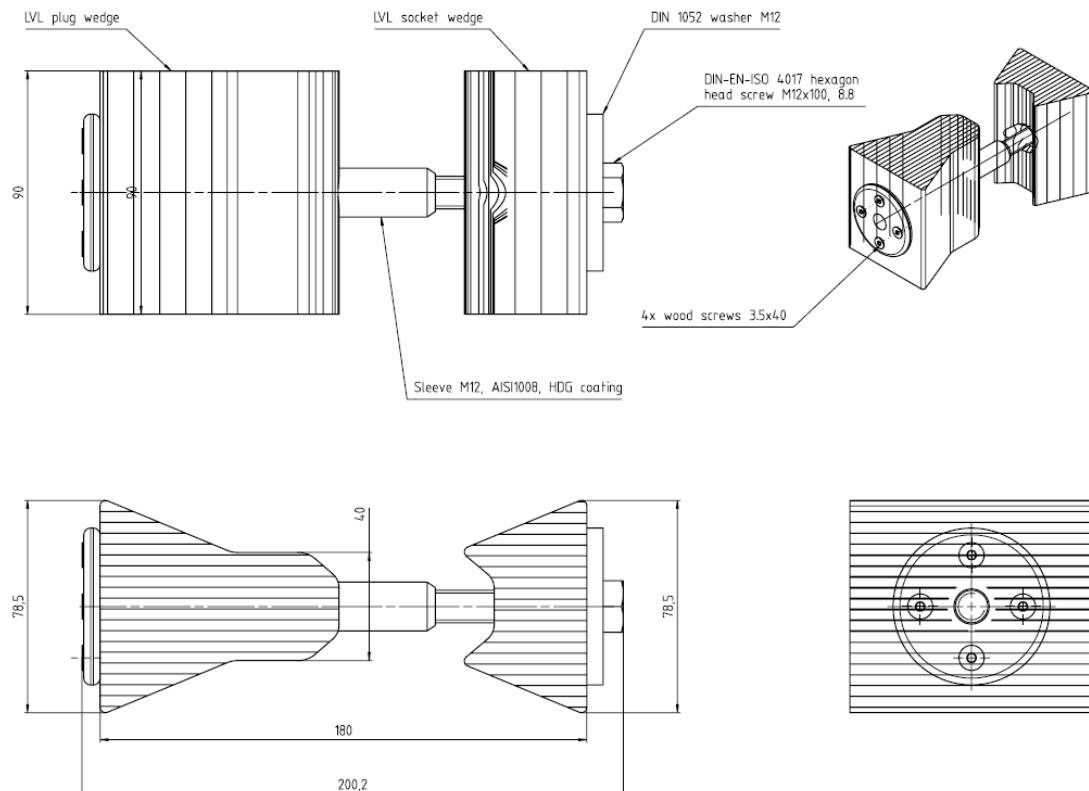


Figure 2: Basic geometry and components of the Hilti Panel Connector; all dimensions are given in mm

To install the Hilti Panel Connector a cut-out of defined shape must be done inside the timber member, preferentially by CNC machining. The geometry of cutouts that accommodates the Hilti Panel Connector is shown in Figure 3 (Detail A). The recommended cutout depth is 93mm, as exemplified in Detail B with a CLT panel of 150-5s (L30-T30-L30-T30-L30 lamella structure) type. Recommended range of CLT specifications covers panels with 120-340mm (preferred 160-220mm).

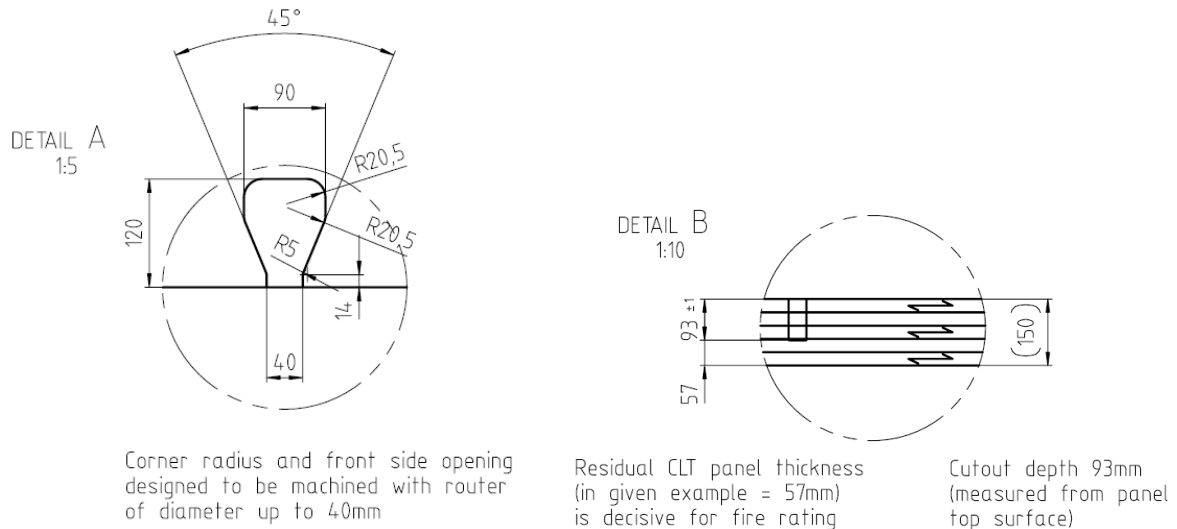


Figure 3: Cutout geometry to accommodate the Hilti Panel Connector inside CLT; Detail B exemplified with CLT 150-5s

An illustrative example of the assembled connection is given in Figure 4. Cutout depth of 93mm (recommended) and connector height of 90mm are designed that the connector is installed either sunk-in or flush with the surface of the timber element. The cutout depth can be deeper than 93mm, thus allowing deeper sunk-in installation, but should not exceed 105mm.

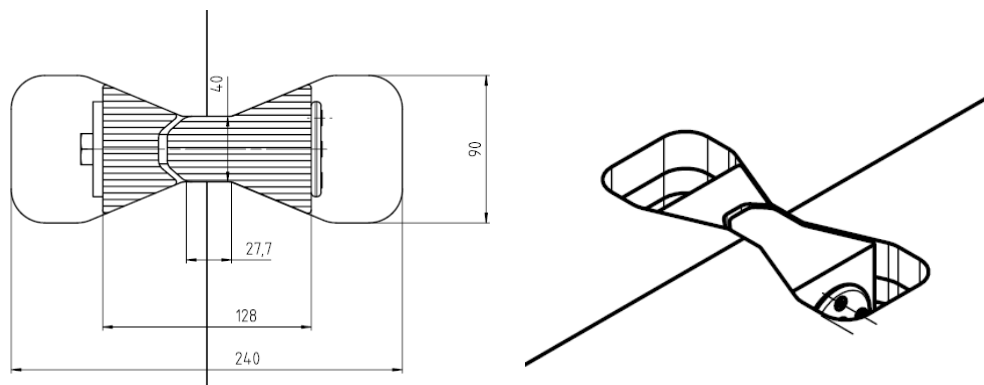


Figure 4: Hilti Panel Connector in assembled connection

P2 Connector		Variant 1	Variant 2
Minimum distance between 2 connectors	$a_{\text{connector,min}}$	300 mm	
Maximum distance between 2 connectors (recommendation)	$a_{\text{connector,max}}$	3000 mm	
Minimum distance edge	$a_{\text{edge,min}}$	300 mm	

Table 1: Distances

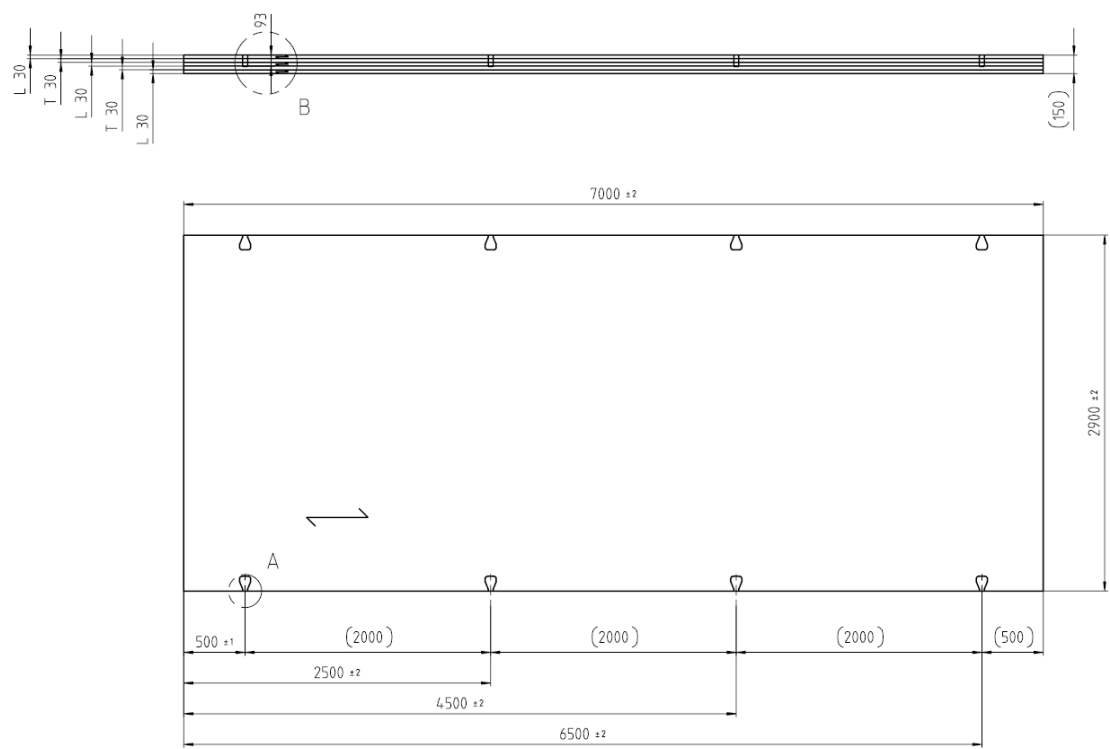


Figure 5: Example for layout of fastening points; panel size, CLT layer structure and distances are only illustrative and need to be selected based on structural needs considering provisions as given in Table 1; all dimensions are given in mm

Performance

Mechanical resistance and stability		Level / Class
Tensile – strength	$R_{t,k}$	35 kN
Tensile – slip modulus	$K_{ser,t}$	10 kN/mm
Shear – strength	$R_{v,k}$	40 kN
Shear – slip modulus	$K_{ser,v}$	10 kN/mm
Seismic tension	Ductility class	DCL
Seismic Shear	Ductility class	DCM
Reaction to fire		
Plywood, min. density 400 kg/m ³	EN 13501-1	D-s2-d0

Table 2: Mechanical resistance, slip modulus, and reaction to fire of Hilti Panel Connector (preliminary data)

In case of further questions please consult

Roland Schneider, roland.schneider@hilti.com, +423 234 3882