woodspan by techlam

PLT PANELS

DESIGN GUIDE



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INTRODUCTION

Woodspan PLT panels can be used as interior floor and roof panels. It can also form part of a fire rated system and act as a diaphragm.

This guide is intended for use by designers to specify Woodspan PLT panels. Included in this guide are:

- span tables,
- penetration details,
- passive fire penetration details, and
- fixing options.

All documents are uncontrolled in printed format and so should always be downloaded from www.woodspan.co.nz at the time of use.

SUSTAINABILITY AND ENVIRONMENTAL IMPACT

The combination of carbon sequestration in growing trees and the long-term carbon storage in wood products represents a significant net sink and store of carbon and can significantly reduce the environmental impact of construction.

The production of Woodspan PLT panels has a negative GWP (global warming potential) of -596kg CO^2 eq/m^3. This compares favourably to average concrete production which is +350kg CO^2 eq/m^3, an almost 1 tonne per m^3 difference in CO^2 released in the atmosphere.



SPECIFY WOODSPAN PLT PANELS

1 CONSIDER THE CONTEXTUAL BUILDING

Woodspan PLT panels can be used as floor and roof structures in buildings, including diaphragms. Contextual building work means the building work that the functionality of the Woodspan PLT panels relies on – the primary structure, including foundations.

The Woodspan PLT Panel design advice contained in this document applies to the panels only. Verification of supporting beams, posts, foundations, connections and overall building stability remains the responsibility of the project designer or engineer as applicable.

The structure must be specified to comply with the NZ Building Code.

For existing buildings, the engineer will need to ensure that the existing building is suitable for the intended work. This will include ensuring that the existing primary structure has the equivalent framing stiffness to the applicable standard that would apply if it was being designed as new.

2 SELECT FLOOR OR ROOF

Woodspan PLT panels can be used as floor and roof structures in buildings, including diaphragms.

The in-service exposure of the panel as well as other contextual building work will determine the hazard class treatment requirements.

Where the panels are to be used as floor panels in a wet area or an area subject to water splash H3.2 or H3.1 covered with a waterproof membrane is required.

Where used as a floor or roof diaphragm transferring loads to bracing elements and creating a cohesive structure continuous support must be provided around the perimeter of the panels. All elements, including fixings must be specifically engineered to AS/NZS1170:2002[1].

3 DETERMINE LOADS

Determine the loads that apply to the functional use of the Woodspan PLT panel for:

- Roof loads: wind, snow, weight of roof, seismic, dead and live loads,
- Floor loads; dead & live loads, diaphragm loads (if relevant).

4 ESTABLISH FIRE REQUIREMENTS

Woodspan PLT panels can achieve FRR 30/30/30 and FRR 60/60/60 depending on assembly. Test results are available on request.

Further information about mass timber fire performance and fire design is covered by Timber Unlimited Wood Design Guides: www.timberunlimited.co.nz/resources

5 SELECT PANEL SPAN

Use the following span tables to determine panel thickness and maximum span where the PLT panels are to be used as floors, roofs or in fire resistance rated floor assemblies.

Note:

- All dimensions shown in mm.
- Continuous spans over two unequal spans must have the lesser span greater than 0.6 of the longer span.
- The back span for all cantilevers should be at least 2 times the cantilever length.

1. For the definition of supervision refer to LBP Practice Note Supervision, August 2017.

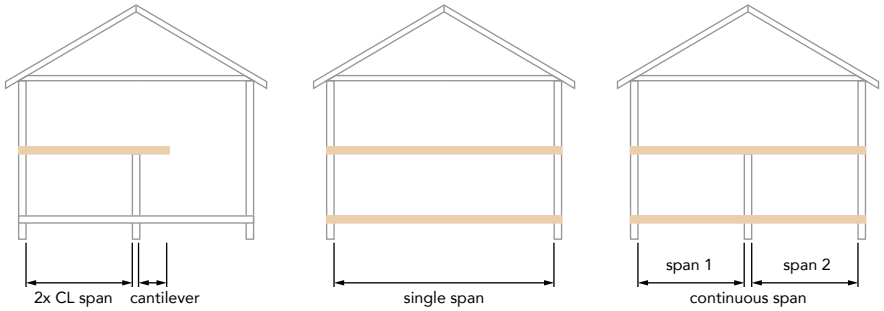
FLOOR PANELS

Design Deflection limits:

- Long term loads – Span/400,
- Cantilever – Span/1000,
- Dynamic Criteria – FP Innovations methodology.

Dynamics

8hz is the recommended natural frequency for a Woodspan PLT floor panel for dynamics performance calculation. The Woodspan PLT design is based on FP Innovations design methodology for CLT[2].



Single Span

Dead load (kPa) plus self-weight		0.23		0.53		Cantilever
Live load (kPa)		1.5	3.0	1.5	3.0	3.0
Panel	**Depth** (mm)	**Single Max Span** (mm)				
WS8 – 90	90	3110	2910	3090	2770	1090
WS8 – 117	117	3790	3700	3790	3530	1380
WS8 – 140	140	4340	4340	4340	4160	1610

Continuous Span

Dead load (kPa) plus self-weight		0.23		0.53		Cantilever
Live load (kPa)		1.5	3.0	1.5	3.0	3.0
Panel	**Depth** (mm)	**Continuous Max Span** (mm)				
WS8 – 90	90	3380	3380	3380	3380	1090
WS8 – 117	117	4130	4130	4130	4130	1380
WS8 – 140	140	4730	4730	4730	4730	1610

Notes

- Maximum length of finger jointed panel is 7200mm, maximum length of whole timber panel is 4500mm,
- A long-term creep factor K2=2.0 has been used,
- Table is designed for 1.5kPa (residential) and 3.0kPa (commercial) live load,
- Floor Tile loads are an additional 0.3kPa long term dead load,
- Table allows for the dead load from the panel, as well as 0.23kPa super-imposed dead load (allowance for ceiling and light partition non-loadbearing walls),
- No allowance has been made for load bearing walls on the cantilever.

[2] *Lignum Engineering compared the performance of CLT and PLT and concluded that reliance on the FP Innovations design methodology was applicable in respect of Woodspan PLT.*

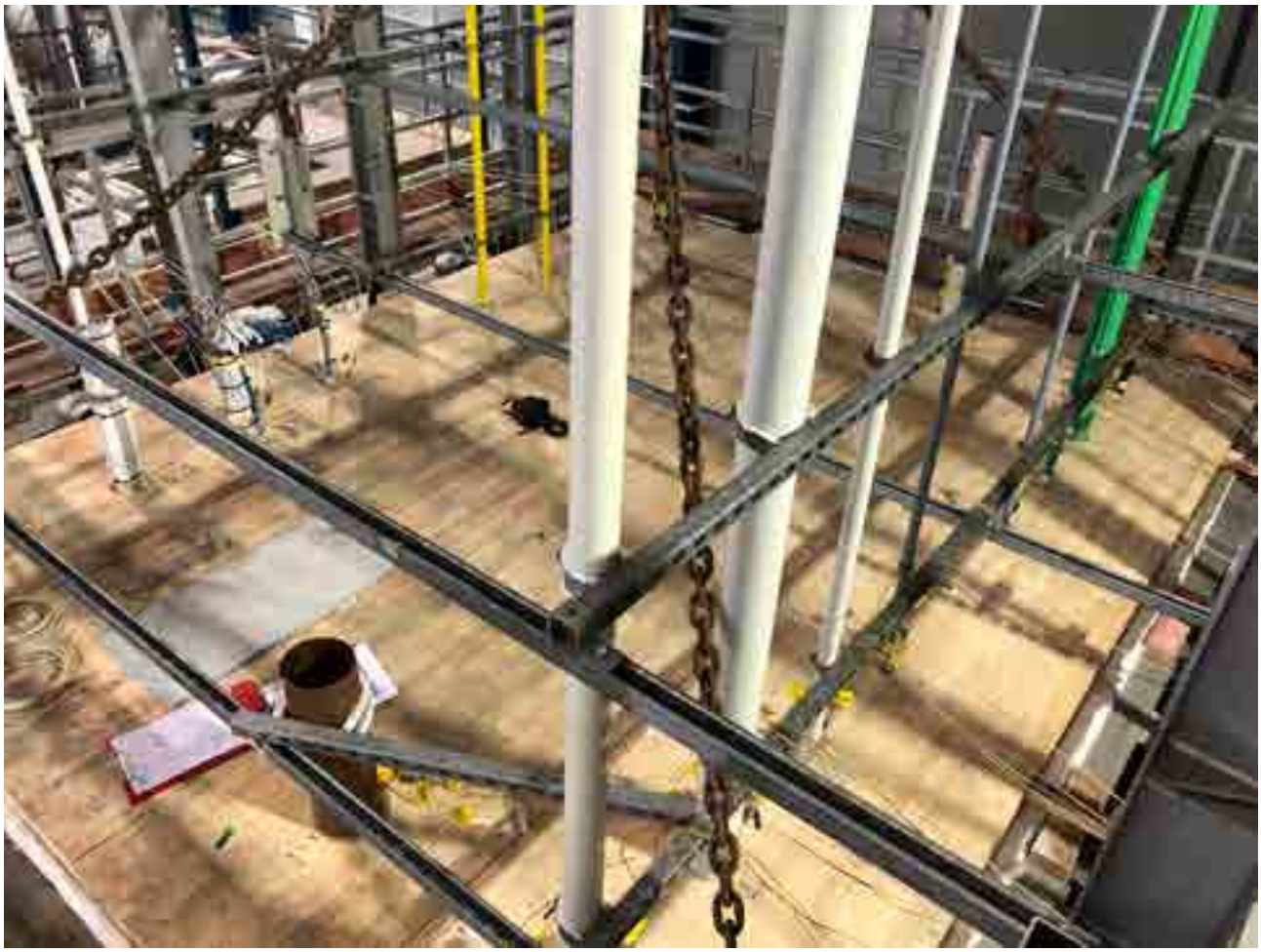
Floor Fire Span Tables

FRR 30/30/30 & FRR 60/60/60

Dead load (kPa) plus self-weight		0.23		0.53	
Live load (kPa)		1.5	3.0	1.5	3.0
Panel	**Depth** (mm)	**Maximum Span** (mm)			
WS8 – 90	90	3110	2910	3090	2770
WS8 – 117	117	3790	3700	3790	3530
WS8 – 140	140	4340	4340	4340	4160

Notes

- Fire resistance ratings on Woodspan PLT Floor panels have been established through independent, full scale, loadbearing fire testing to AS1530.4:2014,
- To achieve tested FRR rating, fire rated panel joints (top-spline) must be used.

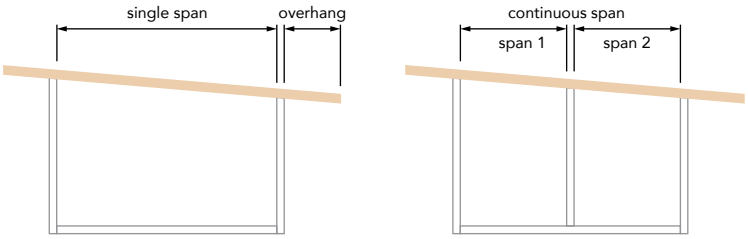


Penetration Fire Test

ROOF PANELS

Design Deflection limits:

- Dead Load – Span/400,
- Overhang – Span/1600,
- Snow Load – Span/300.



Single Span		Light Roof Load (0.25kPa)		Heavy Roof (0.73kPa)		Overhang Eave	
Snow load (kPa)		0	1.0	0	1.0	0	1.0
Panel	**Depth** (mm)	**Single Max Span** (mm)					
WS8 – 90	90	4040	3380	3400	3400	1000	920
WS8 – 117	117	4960	4850	4260	4260	1260	1160
WS8 – 140	140	5680	5630	4960	4960	1470	1360

Continuous Span		Light Roof Load (0.25kPa)		Heavy Roof (0.73kPa)		Overhang Eave	
Snow load (kPa)		0	1.0	0	1.0	0	1.0
Panel	**Depth** (mm)	**Continuous Max Span** (mm)					
WS8 – 90	90	5420	5200	4560	4560	1000	920
WS8 – 117	117	*	*	*	*	1260	1160
WS8 – 140	140	*	*	*	*	1470	1360

* *Not applicable due to max panel length.*

Notes

- Maximum length of finger jointed panel is 7200mm, maximum length of whole timber panel is 4500mm,
- Table allows for the dead load from the panel, as well as 0.25kPa light roof and ceiling, or 0.73kPa heavy roof and ceiling,
- Table is based on 1kPa design snow load on the roof,
- All roof panels allow for Very High wind zone (to NZS3604:2011),
- Roof span is plan span. Roof pitch to be between 5 and 30 degrees.

DIAPHRAGMS

Woodspan PLT Panels may be used as a floor or roof diaphragm, transferring loads to bracing elements and creating a cohesive structure. Continuous support must be provided around the perimeter of the panels. All elements, including fixings must be specifically engineered to AS/NZS1170:2002[3].

For diaphragm design within the scope of NZS 3604:2011, a minimum ply spline depth of 17mm is required. Where the project falls outside the scope of NZS 3604:2011 the spline depth must be specifically engineered.

3. Where a standard is referenced it is to be read as amended by the applicable acceptable solution or verification method.

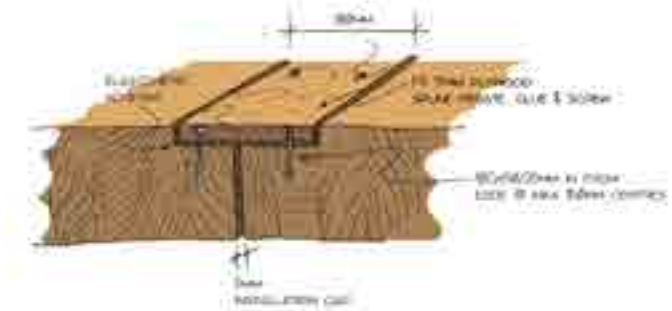
6 SPECIFY FIXINGS

Woodspan provides recommended fixings for ductile connections.

- Use self-tapping screws for lap-joint panel-panel fixing and for panels-support element fixing.
- Use self-tapping screws or nails for top-spline panel-panel fixing.
- Where connection requires shear capacity, the connection and fixings must be specifically engineered.

PANEL TO PANEL JOINT (TOP SPLINE)

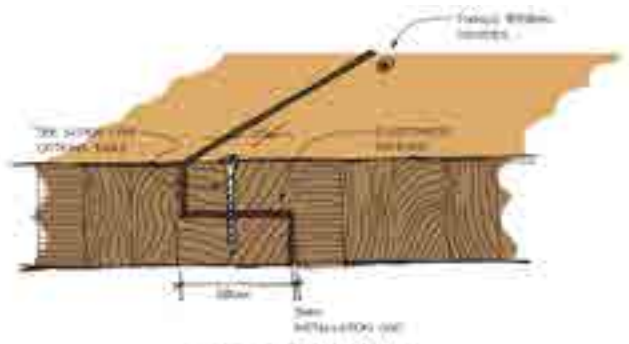
		Screw Type Options					
Panel	**Panel to Panel Plywood** (Diaphragm only) (mm)	**Simpson Strong-Tie QD** (mm)	**Rothoblaas HBS** (mm)	**Eurotec Paneltwistec AG** (mm)	**FH Nail**	**Spacing** (mm)	**Min Edge Distance** (mm)
WS8 – 90	21 x 100 F8	4.8 x 50	5 x 50	5 x 50	60 x 2.8	150	25
WS8 – 117	21 x 100 F8	4.8 x 50	5 x 50	5 x 50	60 x 2.8	150	25
WS8 – 140	21 x 100 F8	4.8 x 50	5 x 50	5 x 50	60 x 2.8	150	25



Top Spline Connection

PANEL TO PANEL JOINT (LAP JOINT)

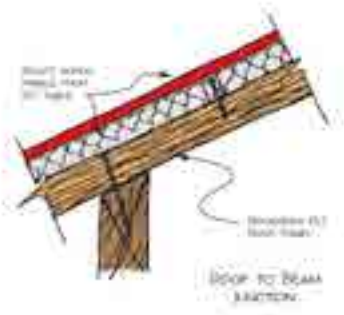
	Screw Type Options				
Panel	**Simpson Strong-Tie SDWS** (mm)	**Rothoblaas HBS** (mm)	**Eurotec Paneltwistec AG** (mm)	**Spacing** (mm)	**Min Edge Distance** (mm)
WS8 – 90	5.6 x 76	5 x 80	5 x 80	150	25
WS8 – 117	5.6 x 102	5 x 100	5 x 100	150	25
WS8 – 140	5.6 x 127	5 x 120	5 x 120	150	25

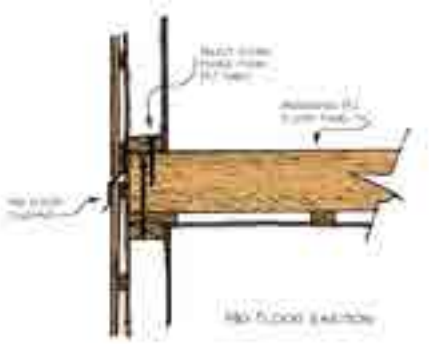


Lap Joint Connection

PANEL TO BEAMS OR SUPPORTING MEMBERS

	Screw Type Options					
Panel	**Simpson Strong-Tie ESCRC** (mm)	**Rothoblaas VGS EVO** (mm)	**Spax Delta Seal** (mm)	**Eurotec KonstruX ST** (mm)	**Spacing** (mm)	**Min Edge Distance** (mm)
WS8 – 90	8 x 180	8 x 180	8 x 180	8 x 195	150	25
WS8 – 117	8 x 220	8 x 220	8 x 220	8 x 220	150	25
WS8 – 140	8 x 240	8 x 240	8 x 240	8 x 245	150	25

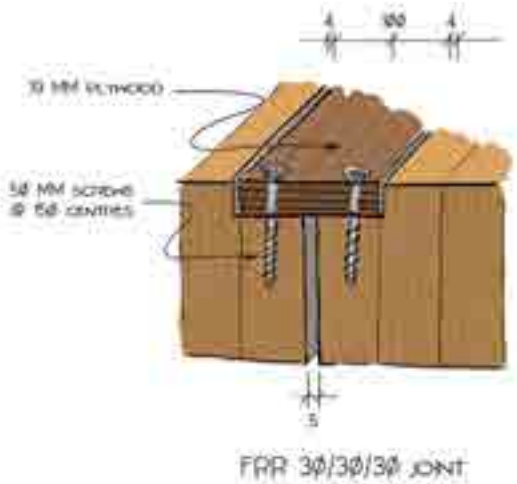




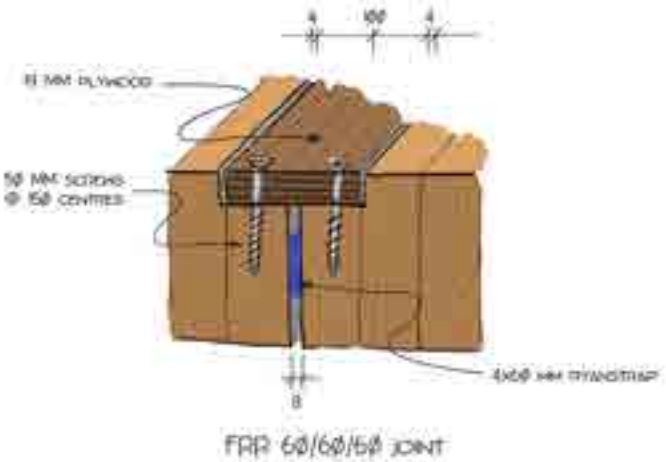
FIRE RATED PANEL TO PANEL JOINT (TOP SPLINE)

Note these fixings apply to both FRR 30/30/30 and FRR 60/60/60.

		Screw Type Options				
Panel	**Panel to Panel Plywood** (mm)	**Simpson Strong-Tie QD** (mm)	**Rothoblaas HBS** (mm)	**SPAX Delta Seal** (mm)	**Spacing** (mm)	**Min Edge Distance** (mm)
WS8 – 90	19 x 100 F8	10 x 50	5 x 50	5 x 60	150	25
WS8 – 117	19 x 100 F8	10 x 50	5 x 50	5 x 60	150	25
WS8 – 140	19 x 100 F8	10 x 50	5 x 50	5 x 60	150	25



FRR 30/30/30 JOINT



FRR 60/60/60 JOINT

7 PENETRATIONS

When penetrations through a Woodspan PLT panel are required it is necessary to consider the impact on structure and fire protection.

MAINTAIN STRUCTURAL INTEGRITY

The following must be applied to ensure the continuing structural performance of the panel

Simplified un-reinforced penetrations

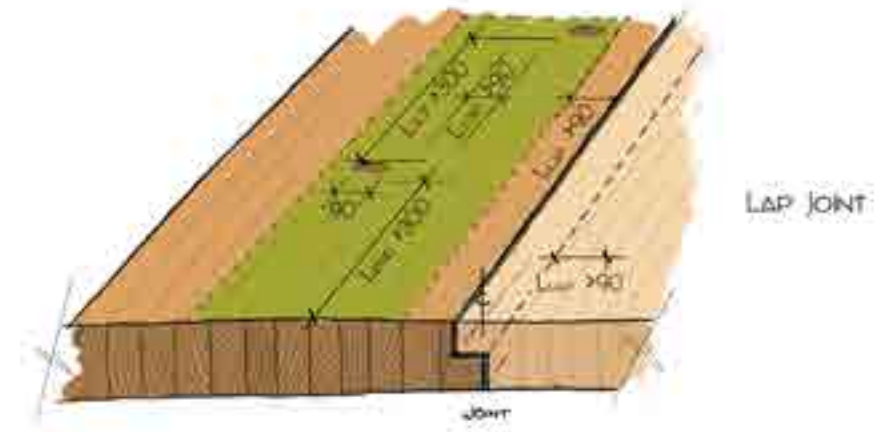
- Penetrations to be less than 90 mm in diameter.
- Penetrations are not permitted within 300 mm, or directly below a load bearing wall.
- Penetrations must not be created to go directly through a panel joint.

When using more than 2 openings across the panel or more than 2 penetrations within the whole panel or the penetration is greater than 90 mm, confirm increased stresses within the panel with the designer/engineer.

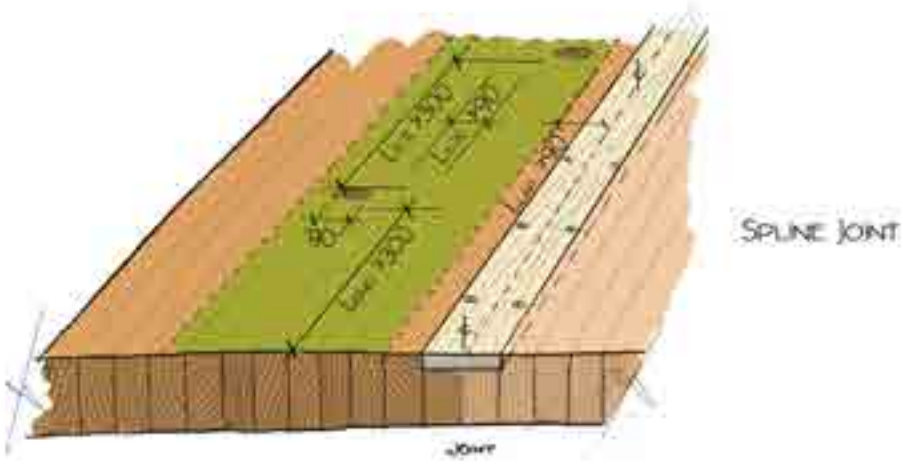
Allow spacing between the penetrations as follows:

- a minimum 300 mm (midpoint to midpoint) parallel to the lamina.
- a minimum 90 mm (midpoint to midpoint) at 90° to the lamina,
- a minimum of 90 mm (lower edge of penetration) from joint.

Lap Joint



Spline Joint



FIRE RATED PENETRATIONS

Where a penetration requires passive fire protection Woodspan provides details that have been independently tested to test method AS 1530.4:2014 and should therefore be used. The details rely on a range of RyanFire fire stopping solutions that meet FRR -/30/30 and FRR -/60/60 requirements. Refer to Woodspan passive fire details: www.woodspan.co.nz/resources/passive-fire-details

Note the un-reinforced penetrations requirements also apply.

The details cover penetration seals to:

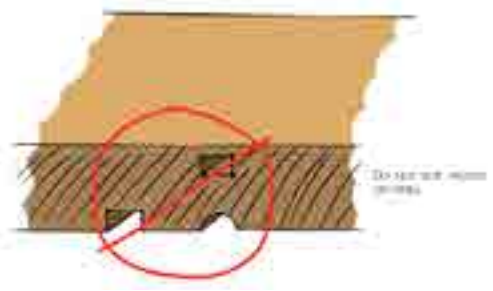
- metal pipes,
- mixed combustible services,
- combustible and non-combustible pipes,
- combustible PEX and Kelox pipes.

OTHER PENETRATIONS

For all other penetrations consult the engineer if the penetration is not included in the consenting documentations.

NOTCHES AND HOLES

Notches and holes are not permitted.



8 IDENTIFY & SELECT RELEVANT DETAILS

Fire resistance ratings To assist with specification of Woodspan PLT Panels, the following typical details are supplied:

- roof
- floor to wall
- mid-floor
- mid-span floor supported
- panel to panel connections
- fire rated panel-to panel connections.

Refer to Woodspan CAD details: www.woodspan.co.nz/resources/cad-drawings

9 CONSIDER OTHER BUILDING REQUIREMENTS

INTERNAL LININGS FIRE PERFORMANCE

Woodspan PLT Panels meet material group number 3. To achieve a lower material group number additional protection such as a plasterboard lining or coating with an intumescent paint system is required.

ACOUSTIC PERFORMANCE

Woodspan PLT panels will contribute to the acoustic performance and noise reduction of a floor or ceiling. For indicative STC & IIC values contact Woodspan.

THERMAL PERFORMANCE (INSULATION)

Calculate thermal performance. Timber has a low thermal conductivity, which can aid in designing a building envelope with high resistance to heat flow. At 12% moisture content (which is the expected equilibrium moisture content in service of Woodspan PLT Panels), the conductivity of Radiata pine is 0.120 W/mK.

The thermal resistance (R-value) is calculated by dividing panel thickness [m] by their thermal conductivity [W/mK].

The total thermal resistance (R_{total}) for an assembly is calculated by adding the R-values of other roof or floor assembly layers, including the internal and external surface values.

$R_{total} = R_{se} + R_{PLT} + R_{si}$ [m^2K/W].

R_{se} = Thermal Insulation attached on the outside (external) of the Woodspan PLT Panel.

R_{si} = Thermal Insulation attached on the inside (internal) of the Woodspan PLT Panel.

R values [m^2K/W] for typical panel thicknesses (raw panel values) are:

90 mm PLT	$R_{PLT}90 = 0.75$
117 mm PLTS	$R_{PLT}117 = 0.98$
140 mm PLT	$R_{PLT}140 = 1.17$

10 SELECT APPEARANCE GRADE

Panels are available in visual and non-visual appearance grades.

Non-visual appearance grade panels are intended for use where appearance is of no consideration; blemishes, knots and knot holes are permitted.

Woodspan PLT panels are made from NZ radiata pine which is a soft wood and will wear faster than hardwood floors. The visibility of the expansion gap between panels will vary depending on climatic conditions. If the intention is to leave the panels exposed, then the designer must make the customer aware of the long-term aesthetic look and feel, and maintenance.

11 CONFIRM ALL DESIGN REQUIREMENTS ARE MET

Confirm the chosen panel configuration meets all relevant design requirements.

12 PREPARE BUILDING CONSENT DOCUMENTATION

Efficient consenting requires that all necessary information is provided to the building control authority (BCA).

1. COMPLETE THE SPECIFICATION

The specification describes the panels, materials, and associated work. It forms part of the Construction Contract as it relates to the installation of the Techlam floor system.

2. CHECK THE PLAN SHEETS

Ensure that the applicable plan sheets clearly show the:

- thickness of the panel,
- fixings, type and placement
- relevant details.

3. COLLATE THE DOCUMENTATION

Ensure that the consent application includes:

- Plan sheets showing Woodspan PLT panels with all applicable fixing details,
- Woodspan PLT Panel BPIR
- Woodspan PLT Panel specification
- Woodspan PLT Panel installation guide
- Woodspan PLT Panel care & maintenance
- Woodspan PLT Panel warranty general terms



INSTALLED IN HOURS. NOT DAYS.

Our PLT panels are quick and easy to install, without the need for an entire construction crew. We'll ensure you can keep your overheads as low as possible.

CHAT WITH US

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