

woodspan

# PLT PANELS

DESIGN AND INSTALL GUIDE



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## General

### Purpose

This guide will help to correctly specify and install Woodspan® PLT panels.

### Important documents

This guide must be read in conjunction with these documents:

- › Woodspan® PLT Panels pass™ [www.thebuildingbusiness.co.nz/pass/woodspan](http://www.thebuildingbusiness.co.nz/pass/woodspan)
- › Woodspan® PLT Panels standard connection details [www.woodspan.co.nz/cad-resources/](http://www.woodspan.co.nz/cad-resources/), and
- › Wood Solutions Floor Diaphragms in Timber Buildings Guide [www.woodsolutions.com.au/publications](http://www.woodsolutions.com.au/publications).

## The Woodspan® PLT Panel

### Description

Woodspan® PLT (parallel laminated timber) panels are an engineered mass timber product suitable for use as prefabricated floor and roof panels. Manufactured from New Zealand grown

### Skills required

This guide is suitable for use by licensed building practitioners (or deemed practitioners) licensed to the applicable class.

### For more help

Technical assistance is available at [info@woodspan.co.nz](mailto:info@woodspan.co.nz).

While all reasonable efforts have been made to ensure the accuracy of information provided, this document is a guide only. It may be subject to change.

### For our warranty

Refer to [www.woodspan.co.nz](http://www.woodspan.co.nz).

Radiata pine, the lamina are finger jointed or solid, treated and then laminated to create large panels where the grain runs parallel to the panel span direction.

### Certifications & approvals held by Taranakipine™:

- › Grade Right NZ Ltd Member Certificate Producer Grade Verified Structural Timber, valid until 31/03/2023.
- › Grade Right NZ Ltd Member of Treat Right Programme, valid until 31/03/2023.
- › Grade Right Ltd Member of Grade Right Verified Engineered Wood Products QA Programme, valid until 31/03/2022.
- › FSC Single Chain of Custody and Controlled Wood NC-COC-005483, NC-CW-005483, 22/12/2020.



[www.graderight.co.nz](http://www.graderight.co.nz)



[www.nz.fsc.org/en-nz](http://www.nz.fsc.org/en-nz)

### Scope & limitations

For scope and limitations refer to: Woodspan® Parallel Laminated pass™ [www.thebuildingbusiness.co.nz/pass/woodspan](http://www.thebuildingbusiness.co.nz/pass/woodspan)



## Woodspan® PLT panel physical characteristics

- › Timber species: NZ grown Pinus Radiata
- › Maximum panel size (finger jointed) 7200 mm × 890 mm
- › Maximum panel size (whole timber) 5900 mm x 890 mm
- › Panel depths: 90 mm, 117 mm, and 140 mm
- › Panel type: Finger jointed (FJ) or Whole Timber (WT)
- › Adhesive: Purbond clear polyurethane adhesive, Type 1 for all service classes
- › Treatment levels: Untreated, or preservative treated to hazard class H3.1 or H3.2
- › Surface protection: Factory-applied water-based surface sealer
- › Moisture content: 8-14% (ex-factory)
- › Joint strength group: J5
- › Panel Mass (Average Density = 450 kg/m<sup>3</sup>):
  - WS8 - 90 mm PLT = 40.5 kg/m<sup>2</sup>
  - WS8 - 117 mm PLT = 54 kg/m<sup>2</sup>
  - WS8 - 140 mm PLT = 63 kg/m<sup>2</sup>
- › Panel Tolerances (ex-factory):
  - Width = +/-3.0 mm
  - Depth WS8-90 mm; +/-1.0 mm
  - Depth WS8-117 mm; +/-1.0 mm
  - Depth WS8-140 mm; +/-1.0 mm
  - Length; -0, +/-2.0 mm
- › Appearance grades; visual and non-visual

Property		WS8 (MPa)	WS10 (MPa) <sup>1</sup>
Modulus of Elasticity (average)	MoE	8000	10000
Bending Strength <sup>2,3</sup>	F'b	14.0	20.0
Compression Parallel <sup>2,3</sup>	F'c	18.0	20.0
Compression Strength (perp to grain) <sup>1,3</sup>	F'p	8.9	8.9
Tension Strength <sup>1,3</sup>	F't	6.0	8.0
Shear Strength <sup>1,3</sup>	F's	3.8	3.8

### PLT Panel Weight Guide

PLT length (all panels 890 mm wide)	WS8 – 90 mm	WS8 – 117 mm	WS8 – 140 mm
3500 mm	127 kg	169 kg	197 kg
5000 mm	181 kg	241 kg	281 kg
7200 mm	260 kg	346 kg	404 kg

1 WS10 Available on special request from Woodspan®

2 Use  $\phi = 0.8$  Material Strength Reduction Factor

3 Bending, tension, compression and shear strength parallel to grain is to be multiplied by  $K6 = 1.33$  ( as per NZS3603)

# DESIGN

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

The following describes the steps necessary to successfully design and specify a Woodspan PLT panel. Also supplied are tools that will assist in these design steps; span tables, penetration details, passive fire penetration details and fixing options.

## Design steps



### Select floor or roof

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



### Determine loads

Determine the loads that apply to the building for:

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



### Establish fire requirements

Fire resistance ratings (FRR) on Woodspan® PLT floor panels have been established through independent, full scale loadbearing fire testing to test method AS 1530.4:2014. Woodspan® PLT floor assemblies achieve FRR 30/30/30 and FRR 60/60/60 without any additional protective linings. Test results are available on request.

Further information about mass timber fire performance and fire design is covered by WPMA/NZ Wood Design Guides. [www.wpma.org.nz/timber-design-guides.html](http://www.wpma.org.nz/timber-design-guides.html).



### Select panel span

Use the span tables provided by Woodspan® 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.

[Floor span tables](#) Page 10

[Roof span tables](#) Page 11

[Fire span tables](#) Page 12



## 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.
- Elastomeric adhesives will improve the performance of the connection.

Panel to panel joint (Top Spline) Page 13

Panel to panel joint (Lap Joint) Page 13

Panel to beams or supporting members Page 14

Fire Rated Panel to panel joint (Top Spline) Page 14



## 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:

- Refer to [page 16](#) for guidance around un-reinforced penetrations through a Woodspan® PLT Panel
- For penetrations outside of the scope as shown on page 16 please contact Woodspan® for further information.

### Ensure passive fire protection

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 [www.woodspan.co.nz/passive-fire-details/](http://www.woodspan.co.nz/passive-fire-details/)

The details cover penetration seals to

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



## Identify & select relevant details

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-panel joint connections

These can be found at [www.woodspan.co.nz/cad-resources](http://www.woodspan.co.nz/cad-resources).



## Consider other structural design elements

### 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<sup>1</sup>.

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

### 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 <sup>2</sup>.

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





## Consider other building code 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.

### Thermal performance

Check thermal performance.

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

- 90mm PLT:  $R_{PLT\ 90} = 0.75$
- 117mm PLT:  $R_{PLT\ 117} = 0.98$
- 140mm PLT:  $R_{PLT\ 140} = 1.17$ .

Refer Appendix C for formula for calculating thermal resistance properties.

### Acoustic performance

Check acoustic performance.

Contact Woodspan® for indicative STC & IIC configurations for inter-tenancy floors.

Where a higher level of acoustic performance is required, an Acoustic Engineer should be engaged.



## Select visual grade required

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

Visual appearance grade panels are for use where appearance is a primary design consideration. All surface voids are filled, small knots and knot holes are permitted.

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



## Sustainability

### Assess sustainability & environmental impact

Choosing Woodspan® in design and construction can help tackle climate change. 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 environmental impact of the production of Woodspan® has been assessed independently and is available in the form of a New Zealand industry average Environmental Product Declaration (EPD), this can be found at [www.woodspan.co.nz/technical](http://www.woodspan.co.nz/technical)

The production of Woodspan® has a negative GWP (global warming potential) of **-596kg CO<sub>2</sub> eq/m<sup>3</sup>**. The incredible advantage of timbers ability to sequester CO<sub>2</sub> and store it as carbon offsets other impacts of production. This compares favourably to average concrete production which is **+350kg CO<sub>2</sub> eq/m<sup>3</sup>**; an almost 1 tonne/m<sup>3</sup> difference in CO<sub>2</sub> released in the atmosphere.



## Confirm all design requirements are met

Confirm the chosen panel configuration meets all relevant design requirements.



## Check documentation

Ensure the building consent plans and specifications clearly define:

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

The installer will be relying on these, and the Woodspan® shop drawings, to correctly install the Woodspan® PLT panels.

## Design tools

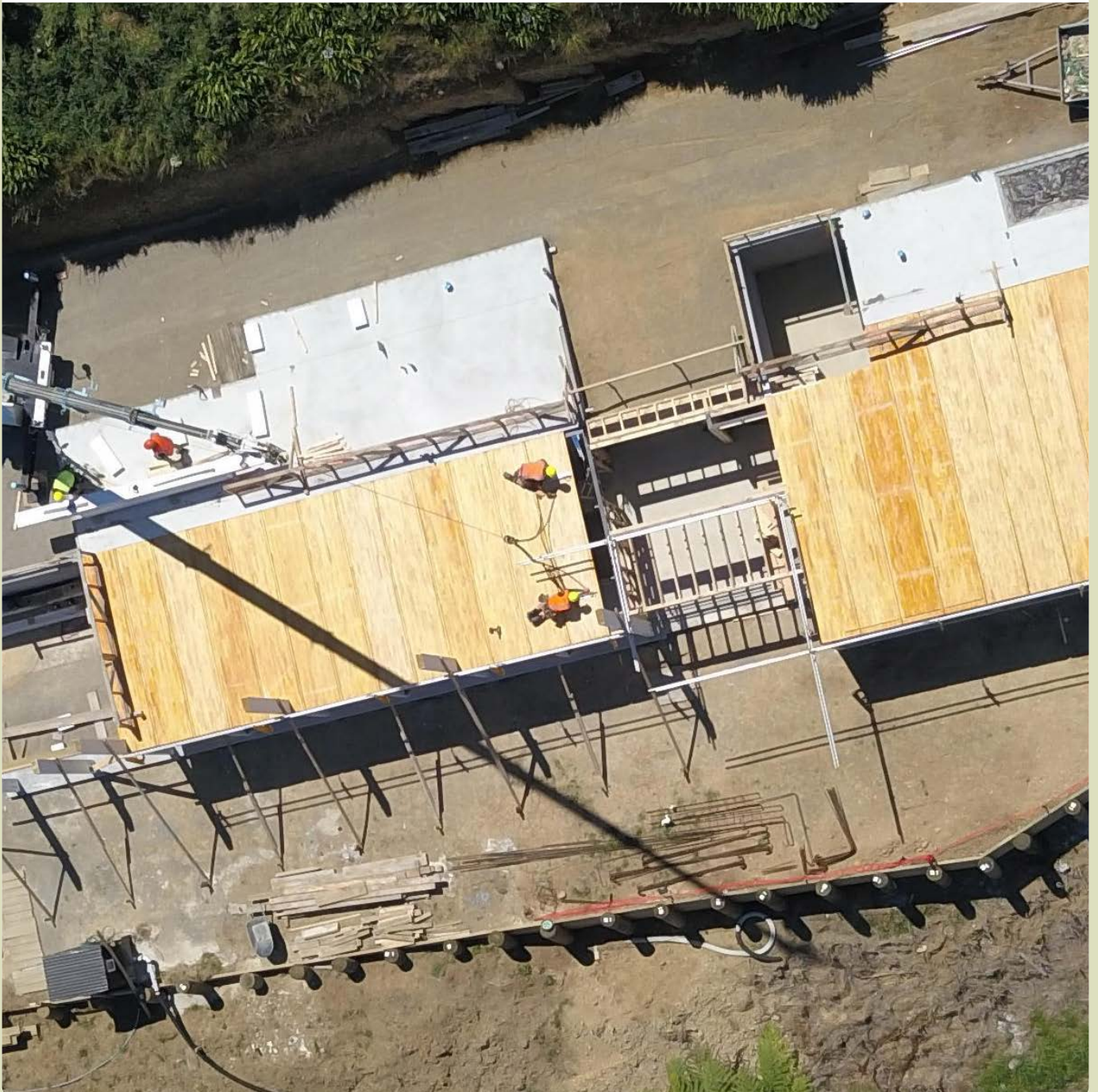


### Span tables

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

#### Notes:

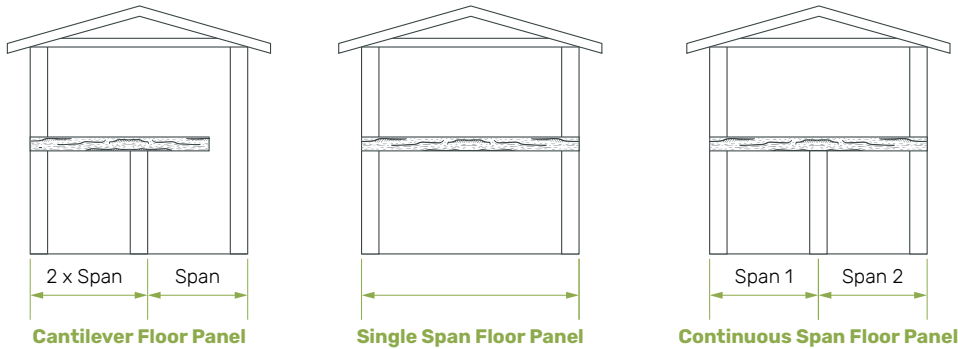
- All dimensions shown in mm.
- Continuous spans over two unequal spans must have the lesser span greater than 0.6 of the longer span.
- The back span for all cantilevers should be at least 2 times the cantilever length.



## Floor panels

Design Deflection limits:

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



### Single span

<b>Dead load (kPa) plus self-weight</b>	0.23		0.53		Cantilever
<b>Live load (kPa)</b>	1.5	3.0	1.5	3.0	3.0
<b>Panel</b>	<b>Depth (mm)</b>	<b>Single Max Span (mm)</b>			
WS8 -90	90	3110	2910	3090	1090
WS8 - 117	117	3790	3700	3790	1380
WS8 - 140	140	4340	4340	4340	1610

### Continuous span

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

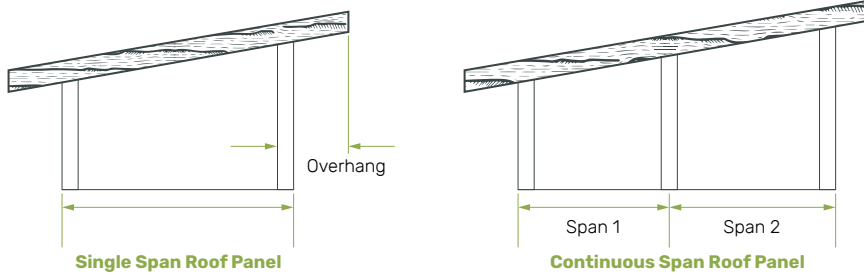
### Notes:

- Maximum length of finger jointed panel is 7200 mm, maximum length of whole timber panel is 5900 mm.
- 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.

## 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	120	*	*	*	*	1260	1160
WS8 - 140	140	*	*	*	*	1470	1360

### Notes:

- Maximum length of finger jointed panel is 7200 mm, maximum length of whole timber panel is 5900 mm.
- 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.



## 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, [See page 14 for details.](#)



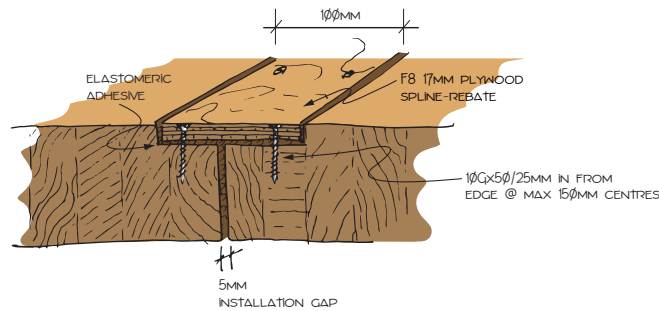
## Fixings

Recommended fixings for ductile construction. Suitability of fixings must be confirmed by a qualified structural engineer.

### Panel to panel joint (top spline)

Screw Type Options

Panel	Panel to Panel Plywood (Diaphragm only)	Simpson Strong-Tie QD	Rothoblaas HBS	SPAX Delta seal	FH Nail	Spacing (mm)	Min Edge Distance (mm)
WS8 – 90	17 x 100 mm F8	10 x 50	5 x 50	6 x 60	60 x 2.8	150	25
WS8 – 117	17 x 100 mm F8	10 x 50	5 x 50	6 x 60	60 x 2.8	150	25
WS8 – 140	17 x 100 mm F8	10 x 50	5 x 50	6 x 60	60 x 2.8	150	25

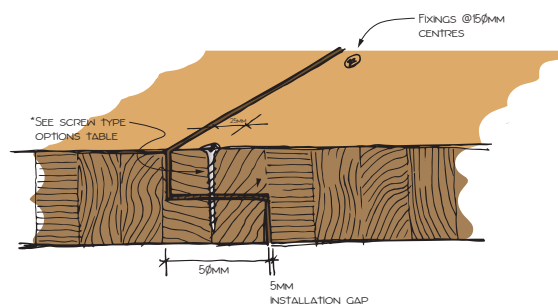


TOP SPLINE CONNECTION

### Panel to panel joint (lap joint)

Screw Type Options

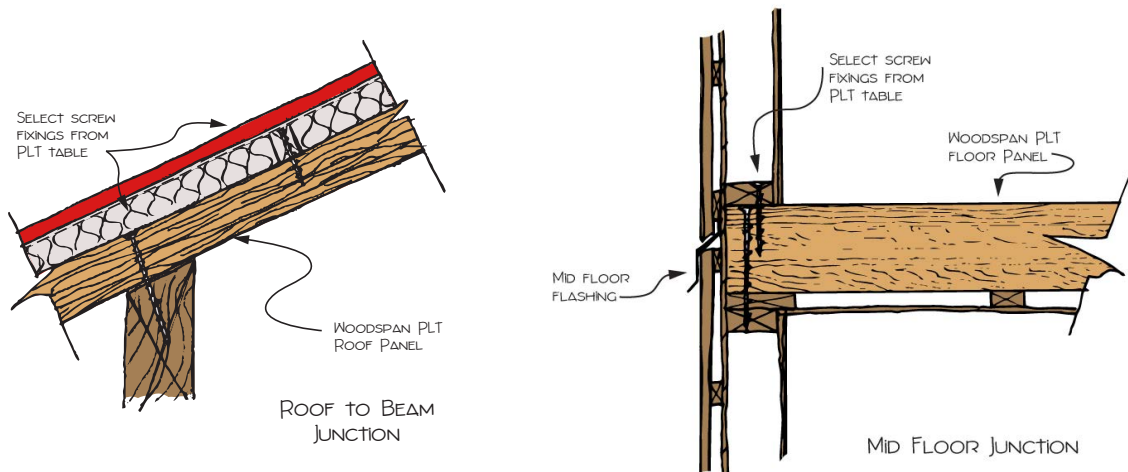
Panel	Simpson Strong-Tie ESCRC	Rothoblaas HBS	SPAX Delta seal	Spacing (mm)	Min Edge Distance (mm)
WS8 – 90	8 x 80	5 x 80	6 x 80	150	25
WS8 – 117	8 x 100	5 x 100	6 x 100	150	25
WS8 – 140	8 x 120	5 x 120	6 x 120	150	25



LAP JOINT CONNECTION

## Panel to beams or supporting members

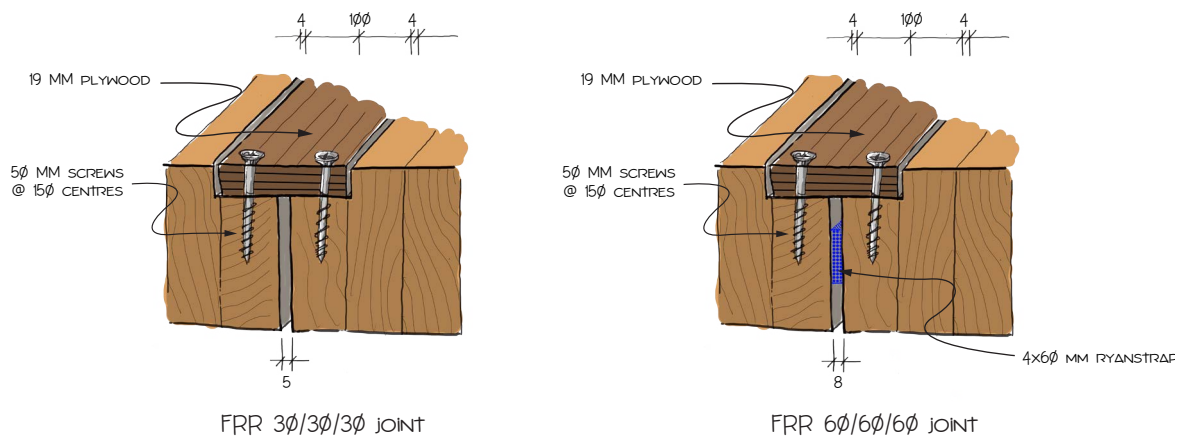
Screw Type Options					
Panel	Simpson Strong-Tie ESCRC	Rothoblaas VGZ	SPAX Delta seal	Spacing (mm)	Min Edge Distance (mm)
WS8 – 90	8 x 180	8 x 180	8 x 180	150	25
WS8 – 117	8 x 220	8 x 220	8 x 220	150	25
WS8 – 140	8 x 240	8 x 240	8 x 240	150	25



## 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	Simpson Strong-Tie QD	Rothoblaas HBS	SPAX Delta seal	Spacing (mm)	Min Edge Distance (mm)
WS8 – 90	19 x 100 mm F8	10 x 50	5 x 50	6 x 60	150	25
WS8 – 117	19 x 100 mm F8	10 x 50	5 x 50	6 x 60	150	25
WS8 – 140	19 x 100 mm F8	10 x 50	5 x 50	6 x 60	150	25





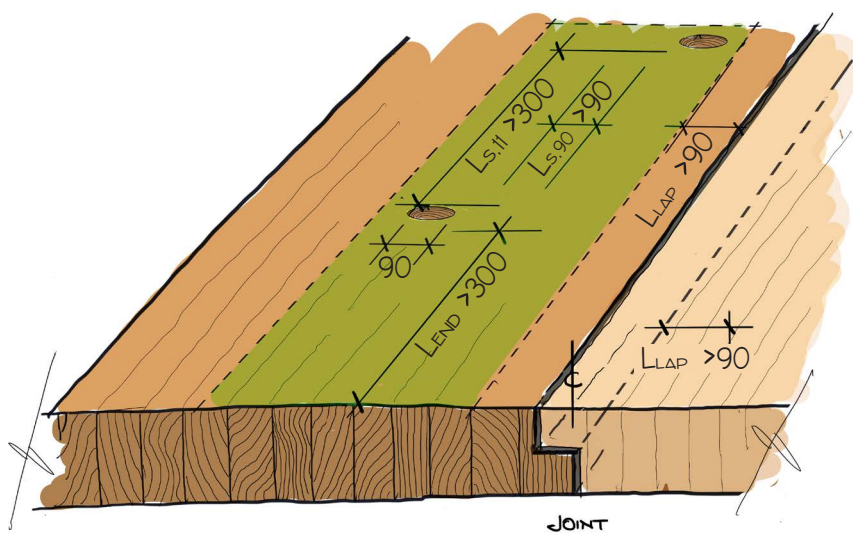


## Penetrations

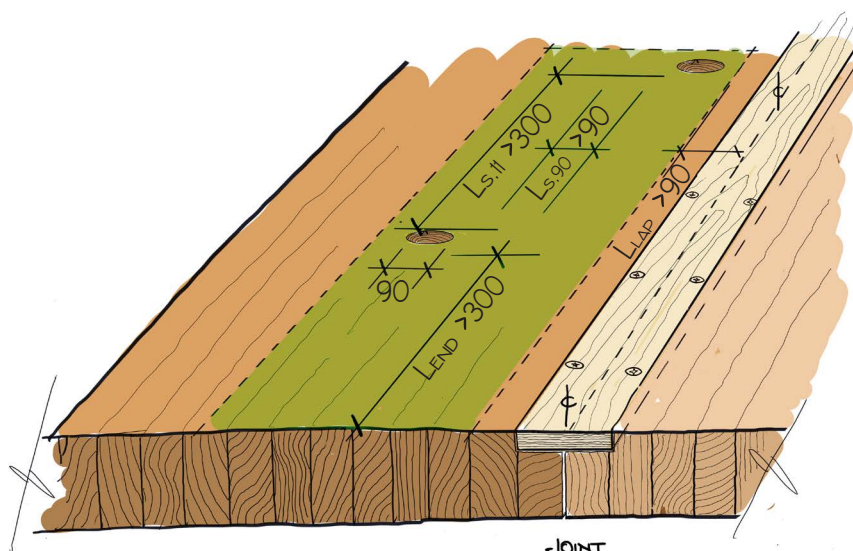
Simplified un-reinforced penetration.

- No penetration allowed in vicinity or below load bearing walls nor directly through panel joint.
- When using more than 2 openings across the panel and more than 2 penetrations within the whole panel – confirm increased stresses within the panel with the designer.
- Allow spacing between the penetrations of  $L_{s,||} > 300\text{mm}$  and  $L_{s,90} > 90\text{mm}$
- Allow 90mm distance to panel joints  $L_{lap} > 90\text{mm}$
- Minimum distance to load bearing walls/ ends / and intermediate supports  $L_{end} > 300\text{mm}$ .
- For penetrations outside this scope, please contact Woodspan® for further information.

### General penetration details

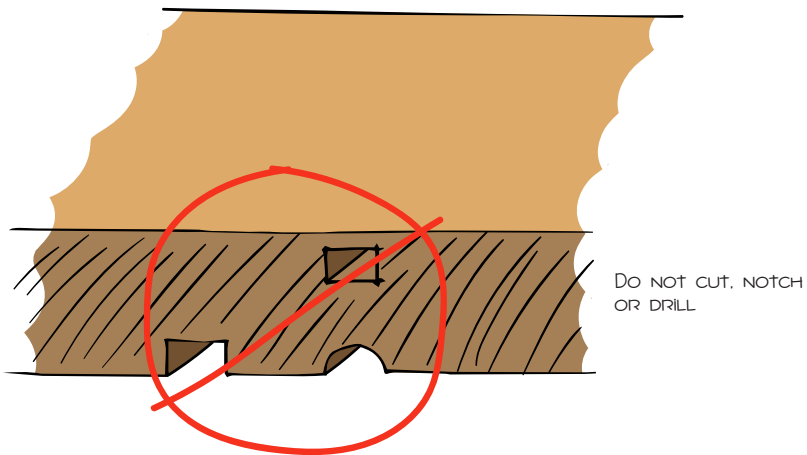


LAP JOINT



SPLINE JOINT

## Holes and notches



## Tested passive fire assemblies

For passive fire assemblies refer to [www.woodspan.co.nz/passive-fire-details](http://www.woodspan.co.nz/passive-fire-details)

# INSTALLATION

## Pre-installation



### Health & safety

Take all necessary steps to ensure your safety and the safety of others:

- check weight of Woodspan® panel and lifting capacity of Hiab/crane
- ensure adequate ventilation or mechanical dust extraction when cutting or drilling
- ensure the timber is well supported when cutting and nailing
- wear appropriate safety equipment, clothing and footwear
- use all tools in accordance with relevant instruction manuals
- plan and monitor a safe approach for working at height; select and use the right equipment
- clear the work area of any obstructions before work starts.

For further information refer to:

- WorkSafe July 2018. Small Construction Sites, The Absolutely Essential Health and Safety Toolkit.
- WorkSafe December 2016. Health and Safety at Work, Quick Reference Guide.

These documents are available at [www.worksafe.govt.nz](http://www.worksafe.govt.nz).



### Delivery & storage

#### Delivery

Woodspan® plans the panel delivery sequence to suit the on-site lifting program.

Panels are dispatched pre-coated with a temporary moisture resistant coating, wrapped in moisture-proof packaging and have an equilibrium moisture content (EMC) of 8-14%. They are delivered flat-packed with; assembly plans, lifting brackets and plywood spline (if required) to suit the specified jointing system.

#### Storage

The panels should be stored in a dry environment; placed horizontally on bearers (no more than 2000 mm apart) which extend across the full width of the pack. Panels stored on or near the ground will absorb moisture. To prevent this a layer of plastic should be laid underneath the bearers.

Where storage inside is not possible remove the weatherproof wrap, place timber spacers on top of the panels then re-wrap and cover with a waterproof cover for additional protection. Storing the panels this way allows airflow to circulate and prevents condensation accumulation.

# Installation



## Key documents

### Building consent plans & specifications

Building consent documentation shows spacing, set out and connection, and fastener type for:

- panel to panel joints
- panel to building structure connections
- passive fire details
- system layout where the panel is part of a system, e.g. acoustic system.

### Shop drawings

Shop drawings identify panel set out and assembly sequence.



## Moisture control

To maintain the look and functionality of Woodspan® PLT panels, exposure to moisture must be controlled.

During all stages of supply, storage and installation, climatic conditions shall be as close as possible to in-service conditions. Where changes to EMC cannot be avoided, the coefficients for shrinkage and expansion of wood must be taken into consideration.

### Managing moisture before a building is weathertight

- Ensure water does not pond on the surface. Sweep ponded water from the surface.
- Cover the construction area where possible.

#### Note:

- Woodspan® PLT should only be enclosed or lined once EMC is 18% or lower<sup>1</sup>.
- 5mm expansion gaps perpendicular to panel edge must be allowed for.
- Ceiling linings susceptible to cracking (e.g. stopped plasterboard) should not be fixed directly to Woodspan® PLT. Instead a layer of battens/strapping should be installed (refer Woodspan® PLT standard details) [www.woodspan.co.nz](http://www.woodspan.co.nz).

1 NZBC E2/AS1 Clause 10.2



## Lifting the panels into place

Woodspan® PLT panels should be lifted by crane or hiab.

Panels come with guide holes pre-drilled onto the face of the panel to assist with fast bracket fixing onsite.

Woodspan® recommend the use of screw-on lifting brackets. These are available on-loan from Woodspan®.

The Woodspan® screw-on lifting brackets are supplied with d-shackles for crane to bracket connection, and M-12 coach screws for fixing the bracket to the panel (8 x M12 coach screws per bracket).

The length of the coach screws will depend on the depth of the Woodspan® PLT panel. Woodspan® recommends a minimum thread embedment to be no less than 50% of the panel depth. Screw holes can be filled or plugged after installation.



Figure 1 Tag lines attached to panel.



Figure 2 Tag lines attached to panel.



Figure 3 Bolt on lifting brackets

Tag lines should be used for guiding panels mid-air.



## Fixing the panels

Ensure fixing and finishing is in accordance with the plans and specifications and all requirements of this guide.

Woodspan® PLT Panels should be screwed down immediately after placement. This includes panel to panel jointing and fixing of PLT panels to support structure.

- Information on creating penetrations [see page 15 for details](#).
- Information on passive fire protection of penetrations [www.woodspan.co.nz/passive-fire-details](http://www.woodspan.co.nz/passive-fire-details).
- Information on screw fixing requirements [see page 14 for details](#).



## Finishing the panels

Primarily Woodspan® PLT is used as a structural member and is concealed by floor and ceiling linings. In these situations, no additional finishing or coating system is required.

Woodspan® can supply visual grade PLT for use as an exposed ceiling. If considering the use of PLT in a visual application the effect of weather and moisture needs to be considered. Despite all measures being taken to protect panels, some minor remediation of panels due to watermarking, transport and construction damage is to be expected.

Once any repair and sanding has been completed, Woodspan® recommends that the panels are finished with a protective coating system such as stain, sealer, polyurethane, or oil.

For more technical information please visit [www.woodspan.co.nz/technical](http://www.woodspan.co.nz/technical).

# APPENDIX



# Appendix A

## Basis of engineered span tables



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T: +649 952 0001 F: +649 528 4906 M: 6421 259 1903  
[www.lignumstructural.co.nz](http://www.lignumstructural.co.nz)

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15 August 2018

Our ref 2409

Woodspan PLT Panels  
PO Box 7145  
Fitzroy  
New Plymouth 4341

**Re: Woodspan Parallel Laminated Timber Panels Selection Tables**

Woodspan PLT is a glue laminated timber product manufactured in sheets 890mm wide, in depths ranging from 70mm to 140mm, from Radiata Pine grade MSG8.

The Woodspan PLT span tables in the Woodspan PLT Design Guide have been developed by Lignum Structural Ltd in accordance with Compliance Documents and Verification Method B1/VM1 of the NZ Building Code; and in accordance with sound and widely accepted engineering principles. The tables reference the following standards and documents:

AS/NZS1170:2002

NZS3603:1993

FP Innovations CLT Handbook

The tables are a guide to selecting the product and should be used by suitably qualified design professionals.

A handwritten signature in blue ink, appearing to read "D Reid", enclosed in a rectangular box.

David Reid

STRUCTURAL ENGINEER, Engineering NZ Member ID 121639.

**Structural Timber Engineering**

---

David V Reid, Structural Engineer, BE, Dip Bus, CMEngNZ, CPEng

## Appendix B

### Thermal performance (insulation)

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<sup>1</sup>:

- › 90mm PLT:  $R^{PLT90} = 0.75$
- › 117mm PLT:  $R^{PLT117} = 0.98$
- › 140mm PLT:  $R^{PLT140} = 1.17$ .

---

1 Raw panel values only:  $R_{se}$ ,  $R_{si}$ ; and R-values of other floor assembly layers need be added as required to get a construction R-value.

## Appendix C

### Sustainability & 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 environmental impact of the production of Woodspan® has been assessed independently and is available in the form of a New Zealand industry average Environmental Product Declaration (EPD). [www.woodspan.co.nz/environmental-product-declaration-epd-released/](http://www.woodspan.co.nz/environmental-product-declaration-epd-released/)

An EPD is an independently verified and registered document that communicates transparent and comparable data and other relevant environmental information about the life cycle environmental impact of a product. Building materials are measured using a range of indicators, one of which is Global Warming Potential; this is measured in units of carbon dioxide equivalent (CO<sup>2</sup> e).

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

# PLT PANELS ONSITE PRODUCT GUIDE

**There are a number of factors to consider when working with Woodspan PLT Panels onsite.**

## **PROTECTION OF WOODSPAN PLT PANELS PRIOR TO INSTALLATION:**

Woodspan PLT Panels will arrive onsite packed as per the pre-determined assembly sequence agreed with the contractor prior to dispatch.

Panels are dispatched pre-coated with a temporary moisture resistance coating, wrapped in moisture proof packing on evenly spaced timber bearers. Panel packs must remain fully wrapped and protected from the weather until contractor is ready for installation.

## **WOODSPAN PLT PANEL TOLERANCES:**

It is important that both the building designer and the installing contractor are aware of the following panel tolerances (ex-factory as specified in the Woodspan Design & Install Guide) and have factored this into their design and installation methodology.

**PLT Panel width: +/- 3.0mm**

**PLT Panel depth: +/-1.0mm**

**PLT Panel length: -0/+2.0mm**

## **LIFTING SYSTEM:**

Packed with the PLT Panels will be a plywood box containing: 2 x sets of steel brackets (4 in total), coach screws for fixing of brackets to panel (screw size will suit the relevant panel depth) and d-shackles. PLT Panels are pre-drilled with screw guide holes to enable fast bracket to panel connection onsite. Bracket screw holes should be filled post installation to prevent moisture ingress.

Lifting brackets are provided on a loan basis only. If they are not returned, Woodspan reserves the right to invoice the client/contractor for full replacement cost.



# PLT PANELS ONSITE PRODUCT GUIDE

## PANEL FIXING:

PLT Panels must be screwed down immediately after placement. This includes panel to panel jointing and fixing to support structure.

## SERVICES PENETRATIONS, HOLES & NOTCHES:

Refer to your project engineer or the Woodspan Design & Install Guide for guidance around penetrations for services through PLT panels. DO NOT cut, notch or drill out Woodspan PLT Panels without approval from your project engineer.

## EFFECT OF WEATHER ON WOODSPAN PLT PANELS:

When exposed to rain and ponding water PLT Panels will absorb moisture. Generally, over the course of the construction phase the moisture will dry out with no adverse effect on durability, structural integrity or overall panel dimensions. Weather, environmental and moisture exposure to panels may result in panel discolouration and water staining.

Cupping of panels across the grain can occur, particularly where the depth to breath ratio is in excess of 10:1 or if panel is exposed to differential climatic conditions (heat or moisture) on opposite sides. Temporary moisture resistance is provided by way of a factory applied coating which will provide a level of protection from moisture ingress for up to

five weeks. Best practice is to protect panels from the weather and close the building in as quickly as possible.

## EFFECT OF CONSTRUCTION ON WOODSPAN PLT PANELS:

Construction work and foot traffic across the floor will leave marks and dirt on the PLT panel if unprotected. In addition any prolonged contact with metal and grinding dust may cause dark surface staining to the panel.

## VISUAL WOODSPAN PLT FLOOR PANELS:

In general Woodspan recommends the application of an overlaid flooring product post installation of the Woodspan PLT system. If considering Woodspan PLT Panels for use as a finished floor the effect of weather and construction on the panels as noted above needs to be acknowledged. Ideally panels will be protected during construction with a moisture resistant wrap.

An alternative type of lifting system may also be needed – this can be discussed with Woodspan prior to site installation. Please be aware that despite all measures being taken to protect panels – some remediation of panels and sanding will be required. Once sanded, Woodspan recommends the finishing of the panels with a coating system, this will offer an increased level of protection and hardness to the floor.

## VISUAL WOODSPAN PLT FLOOR PANELS IN USE:

Like any finished timber floor, a Woodspan visual floor will wear over time with use – regardless of the type of protective finishing applied. There may also be minor movement of the floor as humidity/moisture levels change within the home. Timber is hygroscopic, which means its moisture content will fluctuate based on the relative humidity (RH) of the surrounding air.

As humidity increases the moisture content increases and the wood expands. As the humidity decreases moisture content decreases and the wood shrinks.

## WOODSPAN CONTACT DETAILS:

P 027 211 6490  
E [info@woodspan.co.nz](mailto:info@woodspan.co.nz)  
[www.woodspan.co.nz](http://www.woodspan.co.nz)

CAD Resources/Design & Install Guide:  
[www.woodspan.co.nz/technical](http://www.woodspan.co.nz/technical)





# WOODSPAN PARALLEL LAMINATED TIMBER (PLT) PANELS

## PURPOSE

Woodspan supplies PLT panels to be used in buildings for use as floor and roof structures including diaphragm applications.

## PLT PANELS EXPLAINED

Woodspan PLT Panels are glue laminated, structural panels. Manufactured by Taranakipine from NZ grown Radiata Pine, lamina may be finger-jointed or solid. Lamina are glued so that the grain runs parallel to the panel span direction. Adhesive is Purbond, a Type 1, one component polyurethane adhesive in accordance with AS/NZS 4364 and suitable for all service classes. The maximum panel size is 7200 mm x 890 mm and available in 90 mm, 117 mm, and 140 mm thicknesses. Panels are available in visual grade and non-visual grade. Panels are available untreated or treated to hazard class H3.1 or H3.2. All panels are supplied with a factory applied temporary waterproof coating.



For further assistance please contact:

-  06 755 9000
-  [info@woodspan.co.nz](mailto:info@woodspan.co.nz)
-  [www.woodspan.co.nz](http://www.woodspan.co.nz)

## SCOPE AND LIMITATIONS OF USE

Scope	Limitations
<b>Location</b> In any wind zone or calculated wind pressure (ULS). In all exposure zones, excluding microclimates as defined in NZS 3604:2011. In all seismic zones.	> Specific design required for fixing capacity where the wind zone is greater than extra high or the ULS is greater than 2.1 kPa. > Fastening materials to be in accordance with NZS 3604:2011.
<b>Building</b> In conjunction with a primary structure that complies with the NZ Building Code or where the designer has established that the existing structure is suitable for the intended building work. In all hazard classes up to and including H3.2.	> The treatment level must be appropriate to the relevant hazard class. > Woodspan PLT Panels must not be used in exposed applications and must not be in contact with the ground.
As a diaphragm where specifically designed.	> The design of connections to bracing elements is subject to specific design.
In applications where NZ Building Code Clause C6 (structural stability) obligations apply.	> The use of Woodspan PLT Panels is subject to specific design by a fire engineer.
Woodspan PLT Panels may be used with floor loadings up to 3.0kPa.	> Specified fixings to meet floor loadings and floor panel thickness.

## USEFUL INFORMATION

For design, installation and maintenance information, refer to [www.woodspan.co.nz](http://www.woodspan.co.nz).

## THE FOLLOWING CERTIFICATIONS AND APPROVALS ARE HELD BY TARANAKIPINE:

- > Grade Verified QA Programme Membership, valid until 31/03/2023 [Grade Right NZ Ltd, 31/03/2019].
- > Single Chain of Custody and Controlled Wood FSC-C006125 [FSC, 22/12/2020].
- > Treat Right QA Programme Membership, valid until 31/03/2023 [Grade Right NZ Ltd, 30/03/2019].

## PERFORMANCE CLAIMS

If designed, installed and maintained in accordance with all Woodspan requirements, Woodspan PLT Panels will comply with or contribute to compliance with the following performance claims:

NZ Building Code clauses	BASIS OF COMPLIANCE	
	Compliance statement	Demonstrated by
<b>B1 Structure</b> B1.3.1, B1.3.2 B1.3.3 (a, b, c, f, i, j, m, q) B1.3.4 (a, b, c, d, e)	VERIFICATION METHOD B1/VM1	> Timber manufactured in accordance with NZS 3622 and AS/NZS 4490 [Grade Right NZ Ltd, 30/03/2019].
<b>B2 Durability</b> B2.3.1 (a), B2.3.2 (a)	ACCEPTABLE SOLUTION B2/AS1	> Lamina treated to NZS3640:2003 prior to lamination [Grade Right NZ Ltd, 30/03/2019]. > NZS 3602:2003 (para 107.3) requires compliance with AS/NZS 1328:1998.
<b>C6 Structural Stability</b> C6.2, C6.3	ALTERNATIVE SOLUTION	> Specification to section 9 of NZS 3603:1993.
<b>F2 Hazardous Building Materials</b> F2.3.1	ALTERNATIVE SOLUTION.	> Taranakipine is part of Grade Right Timber Treatment programme [30/03/2019]. > NZTPC Best Practice Guideline for the Safe Use of Timber Preservatives & Anti-sapstain Chemicals. Establishes drying & flash off requirements.

## SOURCES OF INFORMATION

The following information was relied upon to prepare this pass:

- > Grade Right NZ Ltd. [31/03/2019]. *Member Certificate Grade Verified QA Programme.*
- > Grade Right NZ Ltd. [30/03/2019]. *Member of Treat Right QA Programme.*
- > FSC. [23/12/2020]. Certificate C006125. Retrieved from <https://app.powerbi.com/view?r=eyJrjoiN2U3NGMyNWEtZTAxNS00MzVhLWExNmMtOThhZjdiYjQ4MWNkIiwidCI6IjEyNGU2OWRiLWVmNjUtNDk2Yi05NmE5LTVknNTZiZWxZDI5MSlsmMiOjI9.> Accessed on 29/08/2022].

1. Where a standard is referenced it is to be read as amended by the acceptable solution or verification method as applicable. 2. Sources of information also include the Building Act 2004 and its regulations, including the Building Code (Schedule 1 of the Building Regulations 1992), Acceptable Solutions and Verification Methods, and relevant cited standards. 3. The product is not subject to a warning or ban under section 26 of the Building Act. 4. For overseas manufacturer details, where applicable, refer to the company that is the holder of this pass™. 5. The quality and assurance that the supplied products meet the performance claims stated in this pass™ are the responsibility of the company that is the holder of this pass™. 6. The availability of the information about the supplied products required to be disclosed under s14G(3) is the responsibility of the company that is the holder of this pass™.



SCAN OR CLICK THIS QR CODE TO ACCESS OR REQUEST THE RELEVANT SUPPORTING DOCUMENTATION FOR THIS PASS™.

[www.woodspan.co.nz](http://www.woodspan.co.nz)



Woodspan Ltd confirms that if Woodspan Parallel Laminated Timber (PLT) Panels are used in accordance with the requirements of this pass™ the product will comply with the NZ Building Code and other performance claims set out in this pass™ and the company has met all of its obligations under s14G(2) of the Building Act.

**Date of first issue:** 29/04/2019

**Date of current issue:** 04/09/2023

**NZBN:** 9429047333758

Kevin Brunton

Kevin Brunton, Technical Director, TBB confirms that the process used to prepare this pass™ on behalf of Woodspan Ltd has been undertaken in accordance with MBIE PTS guidelines and in accordance with the TBB pass™ process which is within the scope of TBB's ISO 9001 certification.

9606D66ADE51EA6CCC25850D00239F99

Hudson Road, Bell Block, New Plymouth > [info@woodspan.co.nz](mailto:info@woodspan.co.nz) > 06 755 9000 > [www.woodspan.co.nz](http://www.woodspan.co.nz)

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# STANDARD GLULAM DIMENSIONS

Finished Size (mm)	Lengths (m)
140x90	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
210x90	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
250x90	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
295x90	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
340x90	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
380x90	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
425x90	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)

Finished Size (mm)	Lengths (m)
210x140	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
250x140	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
295x140	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
340x140	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
380x140	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)
425x140	(4.8/2.4) - (5.4/2.7) - (6.0/3.0) - (7.2/3.6)

## Structural grade

GL8  
GL10 (on request)

## Treatment

Untreated  
H3.1 LOSP  
H3.2 MCA *maximum length 6.0m*

## Visual Grade

FJ5 - planer finish  
FJ1 - planer finish  
Pre primed

Packs or pieces  
CNC machined connections



## WOODSPAN CONTACT DETAILS:

P 027 445 5313

E jaredw@woodspan.co.nz

www.woodspan.co.nz



## Woodspan PLT Glulam Physical Properties:

- Timber species: NZ grown Radiata pine
- Maximum size (finger jointed) 7200 x 890mm
- Depths: 90mm and 140mm
- Grade: GL8, GL10 (on request)
- Moisture: 8-14% (ex-factory)
- Adhesive: Purbond clear polyurethane
- Appearance: Visual & Non-visual
- Treatment: Untreated, or preservative treated to hazard class H3.1 or H3.2
- Surface protection: Painted or un-painted finish. Factory-applied water-based surface sealer is available on request.
- Joint strength group: J5
- Mass (Average Density = 450 kg/m<sup>3</sup>)
- Tolerances (ex-factory):
  - Width = +/-3.0mm
  - Depth = +/-1.0mm
  - Length = -0, +2.0mm
- Appearance grades: visual and non-visual

Property		WS8 (MPa)	WS10 (MPa) <sup>1</sup>
Modulus of Elasticity (average)	MoE	8000	10000
Bending Strength <sup>2,3</sup>	F'b	14.0	20.0
Compression Parallel <sup>2,3</sup>	F'c	18.0	20.0
Compression Strength (perp to grain) <sup>1,3</sup>	F'p	8.9	8.9
Tension Strength <sup>1,3</sup>	F't	6.0	8.0
Shear Strength <sup>1,3</sup>	F's	3.8	3.8

<sup>1</sup> WS10 Available on special request from Woodspan.

<sup>2</sup> Use  $\phi = 0.8$  Material Strength Reduction Factor

<sup>3</sup> Bending, tension, compression and shear parallel to grain is to be multiplied by K6 = 1.33 (as per NZS3603).

## Long Span Decking - Span Table

Product	Width x Depth (mm)	1kN vibrational governed <sup>1</sup> (mm)	Vibrational limits with Continuous Beam (mm)	Higher Vibrational limitations <sup>2</sup> (mm)	Cantilever 1kN vibrational governed <sup>1,3</sup> (mm)
WS8-90 GL8	310 x 90	2223	2446	1867	600
WS8-65 GL8	310 x 65	1556	1712	1307	400
WS8-90 GL8	210 x 90	1953	2148	1640	500
WS8-65 GL8	210 x 65	1367	1504	1148	350

<sup>1</sup> 1kN with 1.52mm deflection – based on equivalent response of floor panel as per Woodspan design guide. We note this is likely to feel lively and bouncy but meets the criteria of NZS1170 and is deemed to be OK for decking and pathways.

<sup>2</sup> We recommend using the higher vibrational span to limit the response to below 1mm for a more rigid feel.

<sup>3</sup> Based on a minimum back-span of 2 x cantilever span.

