

# Strandfloor®

Design Guide



strandfloor®

Laminex™  
NEW ZEALAND

# Design Guide

## 1.1 Non-specific design

The use of engineered timber flooring joists such as LVL, I-Beam or Pozi -STRUTS with a moisture content less than 15% is strongly recommended, and will provide the following benefits;

### 1.1.1 Joist selection

Ranges of joists are now available, in solid timber, engineered timber (“I” joists) and steel. Each has its particular advantages and preferences.

The use of solid timber or “I” joists, with a moisture content of less than 15%, is strongly recommended and will provide the following benefits:

- o Post construction shrinkage and distortion will be minimised, limiting fastener noise and nail popping.
- o Deflection will be limited as dry timber is stronger and stiffer.
- o In all cases joists are lighter and easier to handle – particularly with “I” joists.

In some cases it is hard to avoid the use of “wet” timber due to the treatment requirements of NZS 3602. If this is the case care should be taken to select straight and undistorted material or consideration given to post laying of panels.

### 1.1.2 Domestic buildings

In domestic housing applications, joist support centres up to 600mm are acceptable for all Strandfloor® products, in line with Table 1.2 of NZS 3604.

- o If a more rigid floor is required reduce support centres to 450mm or less.
- o For large floors, over 25m long, consider post laying or allow for expansion.
- o Ensure that adequate ventilation is provided in sub-floor areas (see 1.3.1).
- o When clear finish/coating is the required finish surface use only Square Edge panels. \* (Refer C1.1.2b)
- o Additional panel support will be required for high point loads such as pianos, billiard tables etc.

**C1.1.2a** Refer to full Technical Manual Section 7 – 7.4. Large floors.

**C1.1.2b** This is to ensure that timber nogs are used to support edges – if Tongue & Groove product is used, cracking of surface coatings may eventuate due to slight differential movement.

### 1.1.3 All other buildings

In all non-domestic building applications (i.e. residential, institutional, educational and other buildings)

- o Joist spacings shall not exceed 600mm centres.
- o The kPa loadings, from Table 1.2 of NZS 3604, shall not be exceeded without specific design.
- o Special attention shall be given at the design stage to the effects of concentrated loadings, such as high density foot traffic, storage racks, hand trolley point loads etc.
- o Where a double layer floor system is used, joists can be spaced up to 600mm support centres for all products.
- o Adequate cross flow ventilation shall be provided in all subfloor areas.
- o Where large areas of Strandfloor® are laid e.g. gymnasiums, community halls, institutional type dwellings, farm buildings etc., it is important to ensure that careful consideration is given to the cross flow effect of sub-floor ventilation and allowance is made for panel expansion.
- o Post laying is always the better option for large floors, particularly where clear finishing.

### 1.1.4 Structural diaphragms

All Strandfloor® products can be used for structural diaphragms. Design requirements for diaphragms to resist wind or seismic loads are given in NZS 3604.

- o Strandfloor® Square Edge complies if fixed in accordance with this manual.
- o Strandfloor® Tongue & Groove complies if fixed in accordance with this manual and joist centres do not exceed 450mm.
- o Refer to 1.2.3 Specific Engineer Design for structural diaphragms outside scope of NZS 3604

For floor diaphragms complying with NZS 4229 – Concrete Masonry Buildings Not Requiring Specific Engineering Design – Strandfloor® Square Edge shall be used. Details shall be in accordance with NZS 4229.

**C1.1.3** Residential, institutional, educational and other buildings as described in NZS 3604: clause 1.1.2 (e), (ii) - (v)

**C1.1.4** Refer to full Technical Manual Section 7 – Installation, for special fixing details.

## 1.2 Specific design, commercial and industrial use

The following information has been specifically designed for Strandfloor® products. All calculation is based on the requirements and methods detailed in AS/NZS 1170.

Reference to Table 3.1 in the full Technical Manual of this standard will give the requirements for particular activities, which can then be aligned with these tables.

This information is by no means exhaustive but covers the common commercial and industrial situations that may occur outside the scope of NZS 3604 and the majority of those within AS/NZS 1170.

All other situations require individual specific design.

### 1.2.1 Uniformly distributed actions (UDL)

Table 1.1 gives safe uniformly distributed actions for Strandfloor®.

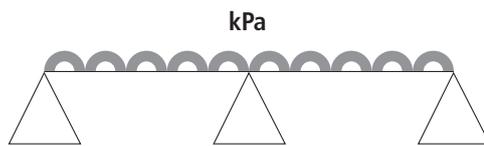


Table 1.1

Strandfloor®	
Span up to 600mm	
Single layer	5kPa
Double layer	10kPa

### 1.2.2 Concentrated actions

Table 1.2 gives safe concentrated actions for Strandfloor®.

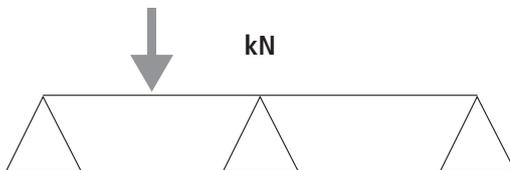


Table 1.2

Strandfloor®					
Support centres	400mm	450mm	500mm	550mm	600mm
Single layer	4kN	3.2kN	3kN	2.1kN	1.8kN
Double layer	8kN	6.4kN	5kN	4.2kN	3.6kN

### 1.2.3 Specific design SED structural diaphragms

In New Zealand, the specification of ceiling or floor diaphragms does not always require specific structural engineering input. NZS 3604 sets out the construction requirements for light timber framed buildings that do not require specific design by structural engineers.

When the diaphragm geometry does not fall within the scope of NZS3604 the designer will have to size the diaphragm and its fixings in accordance with NZS3603:1993 Timber structures standards. The tables below provide the Strandfloor® structural shear modulus of rigidity and other strength properties for use in SED diaphragm design.

**C1.2.1** Refer to the full Technical Manual Section 7 – Installation, for double layer fixing details.

Table 1.2a

Strandfloor® Average Shear Modulus Characteristic Properties				
Product		Shear Modulus (GPa)	Shear Modulus (MPa)	Shear Strength (MPa)
Strandfloor Statistics	Across Average	1.50	1500	8.73
	Along Average	1.47	1470	8.43
	All Specimens Average	1.49	1490	8.58
	All Specimens Coefficient of variation	10.2%	10.20%	

Testing was undertaken at an independent facility. Testing was in accordance with ISO 46572:2008, for determining shear modulus in panel products using method B.

Table 1.2b

Strandfloor® Characteristic Properties		
Property	Parallel	Perpendicular
Modulus of Elasticity	4336 MPa	4367 MPa
Bending Strength	19.67 MPa	19.5MPa
Tension Strength	13.76 MPa	14.45 MPa
Compression Strength	13.47 MPa	10.39 MPa

Results are based on testing of 30 panels in accordance with AS/NZS 2269.1 and analysis using the log normal method of AS/NZS 4063.2 - (Testing undertaken by Juken NZ at EWPAA)

Laminex New Zealand™ engaged Blueprint Consulting Engineers (BCE) to carry out structural investigations and analysis on the use of Strandfloor® and Strandsarking® as structural diaphragms outside the scope of NZS3604:2011 Timber-framed buildings and provide input on the technical data required to undertake specific engineering design (SED) calculations in accordance with NZS3603:1993 Timber structures standards.

Shear modulus tests on both the Strandfloor® and Strandsarking® undertaken by Laminex New Zealand™, succeed to qualify both Strandfloor® and Strandsarking® as flooring that can be used for structural applications.

Testing was undertaken at an independent testing laboratory and in accordance with ISO 46572:2008 for determining shear modulus in panel products using method B.

Please refer to laminex.co.nz for the Blueprint Consulting Engineers Report P18-099 RPT.

## 5.3 Sub-floor ventilation

Sub-floor ventilation must be provided to all platform floors suspended above the ground to ensure the ongoing moisture content of the Strandfloor® remains at or below 16%.

The following information shall be regarded as the minimum ventilation levels required. Failure to control moisture in the Strandfloor® could result in a non-performance which Laminex New Zealand™ will not be responsible for.

**C1.3.1** All requirements in accordance with NZBC – E2/AS1 and NZS 3604.

### 1.3.1 Opening requirement

This requirement shall be met by the provision of evenly distributed openings in the foundation wall, at a rate of no less than 3500mm<sup>2</sup> for every m<sup>2</sup> of floor area. The openings shall be as near as possible to the underside of the plates and bearers and be positioned to allow effective cross flow.

Either one, or a combination of the following methods, may be used to construct ventilation openings:

- o Continuous gaps, at least 20mm wide between baseboards, around the building perimeter.
- o Perimeter wall ventilators with sufficient net open area spaced regularly, commencing 750mm from the wall corner and at intervals of no greater than 1.8m.
- o A 50mm gap between the wall plates and a boundary joist at the ends of cantilevered floor joists and the wall plate and joist, where the bearer is cantilevered.
- o Other regularly spaced openings that will provide adequate ventilation.

It is important to ensure that party walls, internal foundations, attached terraces, or any other impediment, do not obstruct the subfloor ventilation airflow, and that:

- o No point of the ground is more than 7.5m from a ventilation opening, or
- o The subfloor ventilation rate is greater than 10 air changes per hour for wet sites, or five air changes per hour for dry sites.

### 1.3.2 Vapour barriers

Where a sub-floor space cannot be adequately ventilated, the ground under a suspended floor shall be covered with a vapour barrier having a vapour flow resistance of no less than 50MN s/g, and a thickness of no less than 0.25mm. Refer figure 1.3.

Even with a vapour barrier, ventilation openings shall still be provided, but the net open area may be reduced to no less than 700mm<sup>2</sup> for every m<sup>2</sup> of floor area and be located to provide air cross flow in the subfloor space.

The vapour barrier shall be installed in a way that ensures:

- o It covers the total ground area.
- o Adjacent sheets are lapped no less than 75mm and laps are intermittently taped.
- o The ground is shaped to prevent water accumulation on the vapour barrier.
- o Water drains to the exterior.
- o It is securely held in place by bricks, large stones or a similar method.

Where floor area designs still do not meet the above criteria, consideration should be given to the use of mechanical draft ventilation systems that create a subfloor ventilation rate greater than 10 air changes per hour for wet sites, or five air changes per hour for dry sites.

It is essential that all ventilation openings remain unrestricted and that vegetation is not allowed to cause obstructions over the life of the building.

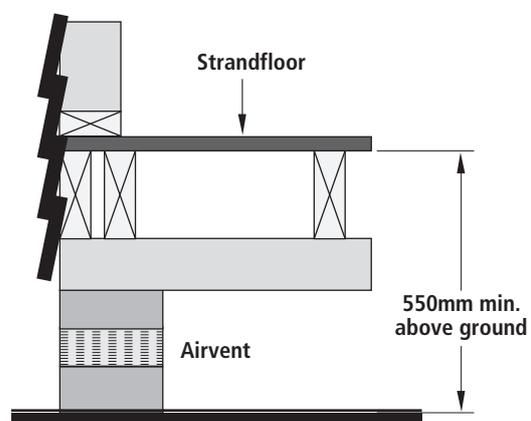
## 1.4 Ground clearance

A minimum clearance of 550mm between the surface of the ground beneath the building and the underside of the flooring panels shall be provided in order to give adequate sub-floor air capacity and to provide access for inspection of the sub-floor structure.

The clearance of 550mm may not be reduced, even when vapour barriers are installed. Vapour barriers only allow the reduction in the ventilation requirement not the clearance dimension.

For ground clearance detail, see Figure 1.3.

Figure 1.3



**C1.3.2** It is strongly recommended that vapour barriers be installed regardless of the situation. Great advantages can be gained in the reduction of sub-floor moisture content for very little cost.

## 1.5 Fire ratings

Strandfloor® can be used as flooring in detached dwellings that have no specific fire resistance rating requirements under the NZBC (purpose group SH).

For other types of occupancy, product use depends on the number of stories, the number of full and intermediate floors involved and whether the building is sprinkled etc.

For the purpose of compliance with clause C3.4(b) of the NZBC, Strandfloor® products have been assigned a critical radiant flux value of 2.2 kW/m<sup>2</sup>.

## 1.6 Insulation

While Strandfloor® panels used to form an on-ground platform floor will contribute toward the building performance index of the building envelope, additional insulation material will be needed to achieve the thermal insulation requirements as detailed in NZBC H1.3.2. For the purposes of calculation the R-value of 20mm Strandfloor® panels shall be taken as 0.17 m<sup>2</sup>K/W

When fitting any insulation it is important to ensure the material that is chosen is installed in accordance with the insulation manufacturers' instructions. It is also critical to ensure that control of moisture in the sub-floor space is maintained as the efficiency of some insulation materials may be affected by elevated moisture levels.

## 1.7 Supporting timber

The moisture content of the support system at the time of laying and fixing the flooring panels can affect the performance of the total floor system. As wet framing dries it will shrink. This can reduce the effectiveness of the fixing, allowing movement of panels resulting in floor squeaking and nail-head rise under vinyl flooring.

The use of kiln dried timber or "I" joists is therefore recommended.

Herringbone strutting in lieu of solid blocking will reduce the likelihood of a noisy floor. End nailing of solid blocks often result in squeaking and is hard to rectify once the structure is closed in.

## 1.8 Technical support

Refer to the full technical manual for further details and technical support or visit [laminex.co.nz](http://laminex.co.nz).

**C1.6a** Refer full Technical Manual NZBC C/VMZ appendix B - Table B1

**C1.6b** Refer 1.3 Sub-floor ventilation

VISIT US

**[laminex.co.nz](https://laminex.co.nz)**

CALL US

**0800 303 606**