



BRANZ Appraised

Appraisal No.664 [2009]

BRANZ Appraisals

Technical Assessments of products
for building and construction

**BRANZ
APPRAISAL
No. 664 (2009)**

**STRANDBOARD™
FLOORING**

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Product

1.1 Strandboard™ Flooring is an engineered woodpanel flooring material for the interior flooring of residential and commercial buildings.

1.2 Strandboard™ Flooring is available as Strandboard™ and Strandboard™ T&G, a tongue and groove system.



Scope

2.1 Strandboard™ Flooring has been appraised for use as sheet flooring material on suspended timber-framed floors that have been designed and constructed in accordance with NZS 3604 Section 7.

2.2 Strandboard™ Flooring has also been appraised for use as an overlay on concrete slab-on-ground floors, suspended concrete floors and suspended timber floors.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Strandboard™ Flooring, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Strandboard™ Flooring meets the requirements for loads arising from self-weight, imposed gravity loads arising from use, earthquake, wind and impact [i.e. B1.3.3 (a), (b), (f), (h), and (j)]. See Paragraphs 8.1 - 8.8.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, and B2.3.1 (b) 15 years. Strandboard™ Flooring meets these requirements. See Paragraphs 9.1 - 9.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Strandboard™ Flooring meets this requirement. See Paragraphs 13.1 and 13.2.

3.2 This is an Appraisal of an **Acceptable Solution** in terms of New Zealand Building Code compliance.

Technical Specification

Strandboard™ Sheets

4.1 Strandboard™ sheet flooring is manufactured from strands of radiata pine. The wood strands are bonded with a pMDI resin and contain a mineral wax-based water repellent throughout the thickness of the sheet. At manufacture, the sheets have an average density of 680 kg/m³ and average moisture content of 10%. The sheets are identified by the product name printed on one face.

4.2 Strandboard™ sheet flooring material is a wood based high density board which has a plain wood colour. Strandboard™ is square edged and has a nominal thickness of 20 mm or 12 mm. Superstrand™ T&G is 20 mm nominal thick, with the long edges factory grooved with a 4.5 mm wide and 9.5 mm deep slot, and fitted on one side with a rigid opaque white polypropylene tongue. This forms a tongue and groove (shear key) joint between adjacent sheets.

4.3 Strandboard™ Flooring is manufactured to the following tolerances:

- Thickness ±0.2 mm.
- Length and width ±1.5 mm.
- Squareness 0.5 mm/m.
- Sheet edges 1.0 mm/m maximum deviation from the line.

4.4 The product is available as set out in Table 1.

Table 1: Product Range

Strandboard™ Product Range	
Sheet Sizes (mm)	Approximate Weight per Sheet (kg)
3600 x 2400 x 20	118
3600 x 1200 x 20	59
2700 x 1200 x 20	44
2400 x 1200 x 20	39
3600 x 1200 x 12	35
2400 x 1200 x 12	24
3600 x 80 x 20*	39

*T&G Only.

Accessories

4.5 Accessories used with Strandboard™ Flooring which are supplied by the contractor are:

- Fixings - hot dip galvanised or stainless steel 60 mm x 2.8 mm annular grooved flooring nails or 50 mm x 8g screws that comply with AS 3566.1, for fixing Strandboard™ to timber framing.
- Adhesive - BRANZ Appraised adhesive suitable for adhering timber sheet material to timber framing or concrete as required.

Handling and Storage

5.1 Strandboard™ Flooring must not be stored on wet concrete floors. Sheets must always be block-stacked on bearers at maximum 1200 mm centres. For short-term storage, sheets must be protected from the weather with a breather-type cover which is supported clear of the sheet surface on battens, so that air can circulate freely around the stack.

5.2 For long-term storage, Strandboard™ Flooring must be stored inside in well-ventilated, dry conditions.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Strandboard™ Flooring. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 Strandboard™ Flooring may be used as pre-laid or post-laid flooring for suspended timber floors designed to Section 7 of NZS 3604, and as a flooring overlay to concrete slab-on-ground floors and suspended concrete or timber floors.

7.2 For timber framed floors the 20 mm Strandboard™ Flooring must be used. When used as an overlay on concrete slab-on-ground floors or suspended concrete or timber floors, Strandboard™ Flooring may be either 12 mm or 20 mm thick.

7.3 When flooring is pre-laid, care must be taken in the planning and construction stages to ensure the building is closed in within the maximum exposure period of 8 weeks. If this is unlikely, then the flooring must be post-laid.

7.4 An expansion gap of 10 mm is required between sheets at 20 m intervals. A minimum 10 mm clearance must be provided between sheet edges and fixed objects such as bottom plates, columns, abutting concrete etc.

7.5 For timber framed systems, the use of a construction adhesive is recommended by BRANZ, in conjunction with mechanical fasteners to help eliminate floor system movement, which could result in the undesirable generation of noise (squeaking). The use of adhesives for fixing Strandboard™ Flooring in this application is outside the scope of this Appraisal.

Strandboard™ T&G Diaphragm Floors

7.6 Where Strandboard™ T&G is used for diaphragm floors, the joist spacing supporting the Strandboard™ Flooring must be no greater than 450 mm centres. Strandboard™ T&G sheets must be laid with the long edges perpendicular to the joists and the short edges coincident with the joists. The nailing pattern to be used in fixing these sheets down must be in accordance with the Technical Literature.

Sub Floor Ventilation

7.7 Where Strandboard™ Flooring is laid over a subfloor framing system, all timber and flooring must be protected against damage from ground water moisture in accordance with all the requirements of NZBC Acceptable Solution E2/AS1, Section 10.0. Cross-flow ventilation around the full perimeter of the building must be provided in accordance with the relevant requirements of NZBC Acceptable Solution E2/AS1 Paragraph 10.2.4. In calculating the required number of vents, only the open unobstructed area of each vent unit shall be taken into account. Hot-air, steam systems, and relief or overflow pipes must not vent or drain into subfloor areas. To allow for adequate ventilation and access, a minimum clearance of 550 mm between the surface of the ground and the underside of the Strandboard™ floor is required.

Concrete Floors

7.8 Concrete slab-on-ground floors, where Strandboard™ Flooring is to be used as a flooring overlay, must be constructed using protective damp-proof membranes in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 10.3.1. The concrete surface must not deviate by more than 5 mm over

3 m. In addition, the substrate must be sound, dust free and dry. The relative humidity of air at the concrete surface must not exceed 75% prior to installation. Relative humidity must be determined using a hygrometer in accordance with BRANZ Bulletin No. 330. It is important that where a construction joint exists in a concrete slab, a joint must also be formed in the flooring directly above.

Finishing

7.9 Strandboard™ Flooring must be finished by sealing of the surface or finishing with a three-coat polyurethane coating system or other floor covering, as detailed in the Technical Literature, before occupancy.

Wet Areas

7.10 The design of Strandboard™ Flooring in wet areas must be undertaken in conjunction with the Technical Literature.

7.11 Wet areas are spaces where sanitary fixtures and sanitary appliances are located such as bathrooms, toilets, laundries and kitchens. There are two general categories of wet areas as follows:

- Water Splash – these are areas subject to intermittent splashing of water such as around baths, vanities, tubs and sinks.
- Shower Areas (Spaces) – these are areas subject to frequent and heavy water splash such as enclosed showers, unenclosed shower zones and showers over baths.

7.12 Where Strandboard™ Flooring is used in shower areas, a waterproof membrane system specified for use with timber panel flooring must be used to protect the Strandboard™. The waterproof membrane must comply with AS/NZS 4858 or be covered by a valid BRANZ Appraisal. Other water splash areas must be protected by impervious floor coverings in accordance with NZBC Acceptable Solution E3/AS1 Paragraph 3.1.1.

7.13 A floor waste is recommended where accidental flooding is possible. Floor wastes must be installed in accordance with the requirements of Acceptable Solution E3/AS1 Paragraph 2.2 or Acceptable Solution G13/AS1 Paragraph 3.4.

Exposure

7.14 Due to rain wetting before closing in, it may be possible for the moisture content of the pre-laid sheets to temporarily exceed the 18% level given in NZBC Acceptable Solution E2/AS1 Paragraph 11.2.(c). Under normal circumstances, when used and installed as required by this Appraisal and the Technical Literature, this level of temporary wetting of Strandboard™ is acceptable.

Structure

Density

8.1 Strandboard™ and Strandboard™ T&G sheets have a density of approximately 660 kg/m³.

Loads

8.2 Strandboard™ Flooring 20 mm thick will support loads of up to 1.5 kPa in buildings built within the scope of NZS 3604 with maximum floor joist spacing of 600 mm centres. Strandboard™ Flooring 20 mm thick will support loads up to 3 kPa for all other non-domestic flooring applications built within the scope of NZS 3604 with maximum floor joist spacing of 450 mm centres. The maximum point load allowed is 2.5 kN for both Strandboard and Strandboard T&G.

8.3 Timber floors built outside the scope of NZS 3604 have not been assessed and are outside the scope of this Appraisal. These floors must be subject to specific design and Juken New Zealand Limited must be consulted for relevant design information, strength and stiffness.

8.4 The installation of Strandboard™ Flooring over steel floor joists has not been assessed and is outside the scope of this Appraisal. Juken New Zealand Limited must be consulted for relevant design information using these floor systems.

8.5 For typical NZS 3604 applications pre-laid over supports at the above spacings, the stiffness of the sheets will still be acceptable after exposure to the weather for 8 weeks for Strandboard™ Flooring. Post-laying of sheets avoids any loss in stiffness which may occur as a result of weathering.

Structural Diaphragms

8.6 Strandboard™ Flooring has been appraised for use as a sheet material for diaphragms to resist lateral loads in NZS 3604 buildings. Such diaphragms must be detailed as required by Clause 7.3 of NZS 3604 and the Technical Literature. Screw fixing must **not** be used for diaphragm floors.

Heat

8.7 Over-floor heating systems may be used with Strandboard™ Flooring provided it is not subjected to a temperature exceeding 35°C.

8.8 Strandboard™ Flooring must not be subjected to temperatures exceeding 50°C for prolonged periods.

Durability

9.1 Strandboard™ Flooring meets the performance requirements of NZBC Clause B2.3.1 (a), not less than 50 years where the floor is a structural diaphragm or it is installed under structural walls, and the performance requirements of NZBC Clause B2.3.1 (b), at least 15 years in other situations.

Serviceable Life

9.2 Flooring systems based on Strandboard™ Flooring can be maintained in a serviceable condition for at least 50 years, provided that:

- a) When pre-laid, the flooring has not been exposed to the weather for a period greater than 8 weeks.
- b) Appropriate measures have been taken to ensure the moisture content of the flooring is controlled in accordance with the provisions of NZBC Acceptable Solutions E2/AS1 and E3/AS1, the Technical Literature and this Appraisal.
- c) The flooring has not been exposed to further weathering, or subjected to water immersion, e.g. flooding, or to sub-zero temperatures while in a wet condition.

9.3 When sheets are used as a floor overlay fixed directly over concrete floors and the sheets do not perform any structural function (i.e. support loads), the NZBC does not require a minimum serviceable life for the covering. However, where slab-on-ground floors are permanently protected from ground moisture in accordance with NZBC Acceptable Solution E2/AS1 Sections 10 and 12, a serviceable life of over 50 years is still possible.

Maintenance

10.1 Adequate subfloor ventilation must be maintained by ensuring vegetation or other obstructions are kept away from vents in perimeter foundation walls. Where ground vapour barriers exist they must be maintained in a serviceable and effective condition.

10.2 In wet areas, impervious floor coverings (or waterproof membranes) must be maintained to ensure water cannot penetrate through to the Strandboard™ Flooring. Any floor wastes must be installed and maintained so as to remain unobstructed, drain to the outside of the building, and prevent Strandboard™ Flooring from becoming wet.

Outbreak of Fire

11.1 To meet the performance requirement of NZBC Clause C1.3.2, Strandboard™ Flooring must be separated from fireplaces, flues, chimneys and fuel burning appliances in accordance with NZBC Acceptable Solution C/AS1, Part 9.

11.2 The serviceable life of the product may be affected if the surface temperature exceeds 50°C for long periods. Fuel-burning appliance manufacturers must therefore be consulted to ascertain the clearances or protection required to ensure that a 50°C surface temperature is not exceeded. Clearances specified in NZBC Acceptable Solution C/AS1 Part 9 may not be sufficient for some appliances.

Spread of Fire

12.1 Strandboard™ Flooring can be used as flooring in detached dwellings (purpose group SH), which have no specific fire requirements under the NZBC.

12.2 For other classes of occupancy, reference must be made to NZBC Acceptable Solution C/AS1 Paragraphs 6.14.1 and 6.15.1 for required fire resistance ratings for floors and NZBC Acceptable Solution C/AS1 6.20.8 and 6.20.14 for flooring material performance properties. Surface finish requirements for floors are given in NZBC Acceptable Solution C/AS1 Section 6.20 and Table 6.2.

Hazardous Building Materials

13.1 The adhesive used to manufacture Strandboard™ Flooring contains no formaldehyde. The amount of formaldehyde emitted by the Strandboard™ Flooring is significantly less than similar flooring materials manufactured using melamine urea formaldehyde type adhesives. Formaldehyde emissions from Strandboard™ meet the E zero classification when tested in accordance with AS/NZS 4266.16.

13.2 The level of formaldehyde emission will decrease with time. After installation, emission levels will be controlled by ventilation together with the sealing of the surface or finishing with a three-coat polyurethane system, or the use of coverings such as tiles, vinyl or carpets with foam or rubber underlays. Covering or sealing of the sheets must be carried out before the building is occupied.

Energy Efficiency

14.1 For the purposes of calculating the building performance index of the building envelope (refer NZBC H1.3.2) the R-value of Strandboard™ 20 mm sheets should be taken as 0.17 m²K/W.

Installation Information

Installation Skill Level Requirements

15.1 Strandboard™ Flooring installation must be completed by competent persons with an understanding of flooring installation, in accordance with the instructions given within the Technical Literature and this Appraisal.

General

16.1 General installation of Strandboard™ Flooring must be in accordance with the Technical Literature and the provisions of this Appraisal.

16.2 It does not generally matter which way up the Strandboard™ sheets are laid. If the floor is to be finished with a clear finish, then all of the Strandboard™ sheets should be laid with the printed face down.

16.3 Sheets must be supported at all edges and ends, which may require additional blocking to be installed. Superstrand T&G Flooring does not need blocking under the tongue and groove joint.

16.4 Each sheet must span at least two floor joist spans (i.e. be continuous over three joists), except at floor edges where infill sheets may be required.

16.5 The moisture content of the floor framing timber must not exceed 18% when Strandboard™ Flooring is installed.

16.6 Strandboard™ Flooring must be fixed with 60 x 2.8 mm hot-dipped galvanised or stainless steel, annular grooved flooring nails, or 50 x 8g screws (non-diaphragm applications only) at 150 mm centres around the perimeter of the sheets, and at 300 mm centres at intermediate supports. Nails may be power or hand driven but must be parallel with, and no closer than 10 mm to the edge of the sheet.

16.7 Where Strandboard™ T&G Flooring is to be used as a diaphragm floor then fixing must be in accordance with the Technical Literature. This type of flooring system requires the supporting joists to be at no more than 450 mm centres.

16.8 Where used as an overlay to timber substrates, the moisture content of the substrate must not exceed 15%.

16.9 Existing timber floor substrates must be re-punched and then coarse sanded flat prior to fixing the sheets in place.

16.10 When used as an overlay on timber substrates or as a second layer over a pre-laid single layer, sheets must be fixed with mechanical fasteners or adhesive with fasteners, ensuring that sheet joints do not coincide with joints in the substrate.

16.11 Where used as an overlay to T & G timber flooring, the joints in the Strandboard™ Flooring must not coincide with the joints in the T & G flooring.

16.12 Where used as an overlay to concrete, the concrete surface must not deviate by more than 5 mm over 3 m. In addition, the substrate must be sound, dust free and dry. The relative humidity of air at the concrete surface must not exceed 75% prior to installation. Relative humidity must be determined using a hygrometer in accordance with BRANZ Bulletin No.330. As a general guide for new concrete slabs, one month of drying time must be allowed for each 25 mm thickness of concrete.

16.13 When used as an overlay on concrete, sheets must be bonded using a full spread of approved adhesive (see the Technical Literature).

16.14 Continuously-laid bottom plates to walls in pre-laid situations must be cut away at openings as soon as possible, in order to allow ponded water to drain or be removed.

16.15 Protection required to prevent damage to the floorings during other construction processes must be provided in a manner which allows sheets exposed to the weather to dry quickly. For this reason temporary weather protection such as plastic sheeting or liquid sealers must not be used directly on sheet surfaces.

Finishing

17.1 Covering or sealing of the Strandboard™ Flooring must be carried out after the building is fully closed-in but before it is occupied. Details for finishing are provided in the Technical Literature.

17.2 Covering or sealing must not be carried out until the moisture content of the flooring is less than 15%.

17.3 Some coating and adhesive manufacturers may require lower moisture contents for optimum performance when their products are used on Strandboard™ Flooring. The instructions of these manufacturers must be followed when their products are used on Strandboard™ Flooring.

Health and Safety

18.1 Exposure to wood dust may cause irritation to the respiratory system and skin and may cause sensitisation resulting in asthma, and by skin contact resulting in dermatitis. A dust mask and eye protection must be worn when working with Strandboard™ Flooring. Work areas must be ventilated and kept clean. Machinery used must be fitted with dust extractors. Off cuts, shavings and dust must be disposed of in accordance with the requirements of local authorities.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

19.1 The change in the physical properties of the Strandboard™ Flooring, such as modulus of rupture, modulus of elasticity, internal bond strength, thickness swell and surface water absorption after natural weathering have been determined by BRANZ.

19.2 The density, modulus of rupture, modulus of elasticity, internal bond, and deflection under concentrated load (stiffness) of Strandboard™ Flooring have been determined by BRANZ.

19.3 Strength capacity and deflection under concentrated load (stiffness) of Strandboard™ Flooring exposed to the weather for 8 weeks, have been determined by BRANZ.

19.4 The thermal resistance of Strandboard™ Flooring has been determined by BRANZ.

19.5 Formaldehyde emission levels have been determined by testing by Juken New Zealand Limited to AS/NZS 4266.16. The results of these tests have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

20.1 The Technical Literature for Strandboard™ Flooring has been reviewed by BRANZ and found to be satisfactory.

Quality

21.1 The manufacture of Strandboard™ Flooring has been examined by BRANZ, including methods adopted for quality control. Details of the manufacturing processes, and quality and composition of the raw materials used were obtained and found to be satisfactory.

21.2 The quality management systems of Juken New Zealand Ltd - Triboard Mill, Kaitia have been assessed and registered by SGS as meeting the requirements of ISO 9001: 2000.

21.3 Juken New Zealand Limited is responsible for the quality of the product supplied.

21.4 Quality of installation of the product on site is the responsibility of the installer.

21.5 Maintenance of the flooring system is the responsibility of the building owner.

Sources of Information

- AS 3566.1: 2002 Self-drilling screws for the building and construction industries.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 4266.16:2004 Reconstituted wood based panels - Methods of test. Method 16: Formaldehyde emission - Dessicator method.
- AS/NZS 4858: 2004 Wet area membranes.
- BRANZ Bulletin No. 330 Thin flooring materials - 2, preparation and laying.
- NZS 3602:2003 Timber and wood-based products for use in building.
- NZS 3604: 1999 Timber framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook Department of Building and Housing, Third Edition May 2007.
- The Building Regulations 1992, up to, and including August 2008 Amendment.



BRANZ

In the opinion of BRANZ, Strandboard™ Flooring is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Juken New Zealand Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the technical literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. Juken New Zealand Limited:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
4. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by Juken New Zealand Limited.
5. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
6. BRANZ provides no certification, guarantee, indemnity or warranty, to Juken New Zealand Limited or any third party.

For BRANZ

P Burghout
Chief Executive

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