BRANZ

ISSUE611 BULLETIN

TIMBER SLAT DECKS

June 2017

- Timber slat decks are supported by joists, bearers and piles and have gaps between the decking timbers so rainwater can drain away.
- A deck less than 1.5 m above the ground does not need a building consent but must comply with the New Zealand Building Code and may require a resource consent. A barrier is required if it is possible to fall more than 1 m from the deck.
- This bulletin replaces Bulletin 489 *Timber slat decks/balconies*.

1.0 INTRODUCTION

1.0.1 This bulletin details the requirements for timber-framed decks with a slatted timber walk-on surface within the scope of NZS 3604:2011 *Timber-framed buildings*. To fit within that scope, a deck must:

- be designed using a floor loading of 2 kPa
- not require specific engineering design
- not be enclosed by roofs or walls but may have a separately supported veranda over it
- have a maximum height of 3 m from cleared ground to deck surface.

1.0.2 Specific engineering design is required for decks:

- supported on piles where the deck surface is more than 3 m above cleared ground
- where joist and bearer spans are outside the limits of NZS 3604:2011 Table 7.1
- supported on joists cantilevered past a bearer more than is allowed in Table 7.2 of NZS 3604:2011
- supporting a spa pool or similar water-retaining structure
- having a floor load exceeding 2 kPa (such as vehicle decks)
- not founded on good ground.

1.0.3 Timber slat decks supported on floor or other joists cantilevered past the external wall of the building are outside the scope of this bulletin.

2.0 GENERAL DESIGN

2.1 NEW ZEALAND BUILDING CODE REQUIREMENTS

2.1.1 New Zealand Building Code (NZBC) clauses and supporting documents that apply to open, slatted timber deck construction:

- B1 *Structure* – Acceptable Solution B1/AS1 cites NZS 3604:2011 for timber deck construction not requiring specific design. It gives the sizing of deck joists and bearers. Amendment 15 (January 2017) amended the requirements for connections between deck framing members where posts (balusters) are attached. For specific engineering design, B1/VM1 references AS/NZS 1170.1:2002 *Structural design actions – Part 1: Permanent, imposed and other actions* and NZS 3603:1993 *Timber structures standard*. Clause 3.6 of AS/NZS 1170.1:2002 as modified by B1/VM1 2.2.7 applies to barrier loads. The MBIE publication *Guidance on Barrier Design* provides guidance on a range of barrier types. It gives an approved alternative method for timber deck barriers complying with paragraph 6.7.1 below.
- B2 *Durability* – NZS 3604:2011 section 4 provides a means of compliance for the selection of metal fixings and fastenings. NZS 3602:2003 *Timber and wood-based products for use in building* provides a means of compliance for timber selection.
- D1 *Access routes* – Acceptable Solution D1/AS1 provides a solution for stair design and defines the level of slip resistance where required.
- E2 *External moisture* – covers waterproofing to the building envelope, particularly where any deck structure is attached to the building.
- F2 *Hazardous building materials* – requires that people be protected from illness or injury caused by exposure to hazardous building materials (such as glass barriers).
- F4 *Safety from falling* – Acceptable Solution F4/AS1 sets out the minimum requirements for heights, maximum opening sizes and other critical dimensions for barrier construction, including decks incorporating fixed seating.

2.2 NZS 3604:2011

2.2.1 Under NZS 3604:2011, the sizing of bearers, joists and decking is to accommodate a maximum floor load of 2 kPa.

2.2.2 Decks extending more than 2 m from the face of the building must have subfloor framing braced at half the earthquake bracing demand given in NZS 3604:2011 Table 5.8. There is no requirement for bracing to resist wind loads.

2.2.3 Decks attached to a building and projecting 2 m or less from it do not require subfloor bracing.

2.2.4 NZS 3604:2011 clause 7.4.1.3 and Figures 7.10 (a), (b) and (c) describe joist configuration and fixings required for cantilever barrier supports. MBIE modified these figures in Amendment 15 of B1/AS1 (January 2017). Designers must ensure that the modified version is used.

2.3 TIMBER GRADING

2.3.1 The spans and spacings for joists and bearers must be read from the 'wet in service' tables in NZS 3604:2011. SG8 is the default timber grade used.

3.0 CONSENTS

3.0.1 A building consent is required for a deck where a person could fall 1.5 m or more. A safety barrier is necessary if there is a fall of 1 m or more.

3.0.2 Decks not requiring a consent must still comply with NZBC requirements.

3.0.3 The consent application must identify the NZBC clauses relevant to the proposed deck and should also include:

- drawings and specifications
- calculations for any specific design
- construction aspects such as structure, durability and weathertightness at the intersection of deck and building
- access (stairs)
- slip resistance
- safety from falling (barrier design).

3.0.4 Where appropriate, manufacturers' data, engineering and design calculations, product appraisals and technical statements and warranties specific to the project should also be included.

3.0.5 The drawings should include:

- a site plan showing site and boundary locations, location and size of the deck and other buildings, and location of services
- deck elevations, including height above the ground, barrier height and steps
- a section through the deck
- construction details including:
  - subfloor bracing (if required)
  - pile foundations
  - sizes, spans and fixing of bearers, joists and decking
  - barrier details and calculations
  - stair details if required.

3.0.6 A resource consent may be required from the territorial authority. Check before starting the project.

4.0 SAFETY

4.1 SAFETY FROM FALLING

4.1.1 Protection must be provided where people could fall 1 m or more. This may be a timber barrier constructed in accordance with *Guidance on Barrier Design* paragraph 4.2.7 (to be submitted for consent as an alternative method) or by specific design to B1/VM1.

4.1.2 Where fixed seating no more than 500 mm high is incorporated at the deck edge and the deck is less than 1 m above ground, a barrier is not required to the seat. This applies even if the potential fall height from the seat is more than 1 m (Figure 1a).

4.1.3 If the deck is more than 1 m above ground level, a seat back at least 760 mm high is required. The seat back must be of solid construction or vertical members with gaps of no more than 100 mm. An alternative option could be horizontal slats with a maximum gap of 15 mm. There must be no openings beneath the seat that a 100 mm sphere can pass through (Figure 1b). Where ground slopes away from the deck, MBIE recommends that the fall height is measured 1200 mm out from the edge of the deck (Codewords 32).

4.1.4 Barrier loads are set out in AS/NZS 1170.1:2002 clause 3.6. In order to be used in the design of a barrier system, these loads must be multiplied by the appropriate combination factors for both the ultimate and serviceability states. These are given in section 4 of AS/NZS 1170.0:2002 *Structural design actions – Part 0: General principles* in conjunction with B1/VM1, which modifies some of the loadings of AS/NZS 1170.

4.1.5 Barriers should:

- be continuous and extend the full length of the hazard
- be at least 1 m high
- have adequate rigidity, both in the barrier itself and its connection to the supporting structure
- have strength to withstand wind loads, human impact and, where required, the static force from people pressing against them (refer to AS/NZS 1170 for specific design criteria)
- prevent children falling through or climbing over them by having:
  - no openings that will permit the passage of a 100 mm diameter sphere

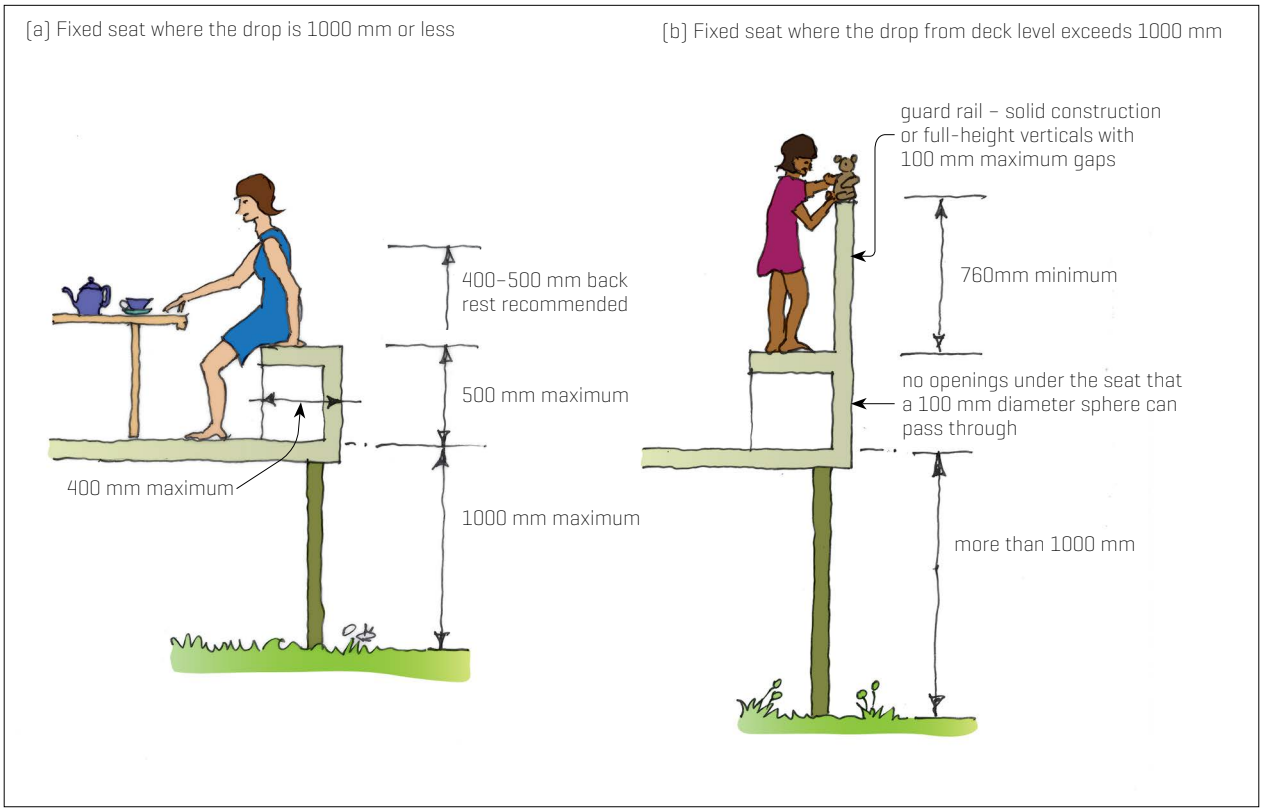

Figure 1. Fixed seat on a deck to housing.

- no components between 150 mm and 760 mm above the deck (or stair nosing) that can provide a toehold – continuous mesh, perforated sheet or trellis can only be used if openings are no larger than 35 mm
- no gaps greater than 15 mm between horizontal slats.

4.1.6 Proprietary barrier systems must either comply with B1/VM1 or be submitted for consent as an alternative method. Evidence must be provided to demonstrate compliance with the requirements of the NZBC for both the barrier and its connections to the deck framing. Usually, the supplier of the proprietary balustrade system will provide a producer statement (PS1), which must be site and job specific. The deck designer must be satisfied that:

- the proprietary balustrade system meets durability requirements
- the supporting structure is capable of accommodating the loads applied to the balustrade system without collapse or excessive deflection.

4.2 SLIP RESISTANCE OF DECKING

4.2.1 Where a deck is part of the main access route into a building, D1/AS1 requires the surface to have adequate slip resistance under all conditions of normal use. From January 2017, D1/AS1 uses the term slip resistance value (SRV) instead of the previous term coefficient of friction. Compliance may be demonstrated:

- by test, using the wet pendulum test method of AS 4586-2013 *Slip resistance classification of new pedestrian surface materials* Appendix A with the Slider 96 rubber, or
- by using materials listed in D1/AS1 Table 2 as having 'acceptable wet slip' (D1/AS1 Table 2 simply says yes or no when identifying slip resistance and does not give an SRV.)

4.2.2 A coefficient of friction of 0.4 equates to an SRV of 39 measured using the test method above. All external stairs and ramps are required to have both wet and dry slip resistance.

4.2.3 Timber decking is typically profiled on one face and smooth on the other. To provide sufficient slip resistance where the deck is part of the main access to the building, decking should be laid perpendicular to the direction of travel with the grooved face uppermost. Smooth timber and profiled timber that runs in the direction of travel does not comply with 4.2.1 above. However, anti-slip tapes and sand or grit added to a coating meet the requirement.

4.2.4 There is no specific requirement to provide slip-resistant surfaces elsewhere, but BRANZ recommends that profiled timber decking should run at right angles to the direction of travel where practicable. If a deck is not part of an access route, the smooth side, which is easier to keep clean, may be laid face up. Consideration should also be given to the slip resistance of the surface when worn or wet.

5.0 DURABILITY

5.0.1 The minimum durability provisions of the NZBC are (Figure 2):

- not less than 50 years for structural components – handrails, handrail supports (posts or balusters)

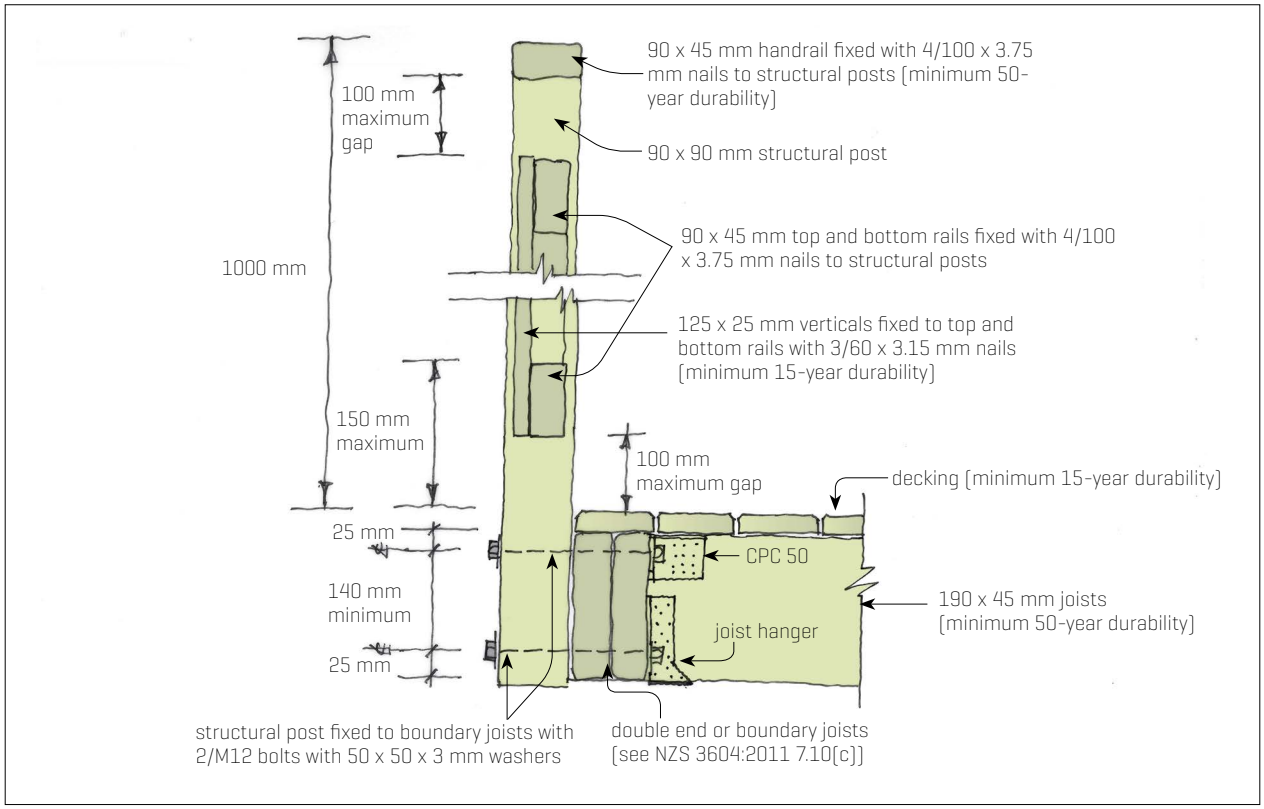

Figure 2. Minimum durability and fixing requirements for deck elements.

and all framing and structural fixings below the decking
- 15 years for other elements – decking and balustrade infill between the handrail supports
- 5 years for slip-resistant coatings where required – coatings will have to be regularly recoated to ensure the performance requirement continues to be met.

5.1 TIMBER DURABILITY

5.1.1 NZS 3602:2003 identifies timber species, grades, levels of treatment and in-service moisture ranges to meet durability requirements.

5.1.2 Recommended minimum levels of timber treatment for decks (to Table 3.1 of NZS 3640:2003 *Chemical preservation of round and sawn timber*) are:
- timber in ground contact (piles or poles) – H5
- joists/bearers – H3.2 (designers can always specify higher levels of treatment)
- strip decking – H3.2 (or a naturally durable timber in accordance with NZS 3602:2003).

5.1.3 Where bearers are installed within 150 mm of the ground using an alternative foundation support detail such as concrete pads and brackets, BRANZ recommends specifying:
- H4 treatment where the bearers are clear of but close to the ground
- H5 treatment if there is a risk of ground contact.

5.1.4 In the situations described in 5.1.3, fixings and brackets attached to the bearers and piles are regarded as exposed and must be stainless steel, type 304 minimum.

5.2 METAL FASTENER DURABILITY

5.2.1 Metal fasteners require protection from corrosion that can result from the presence of moisture and:
- copper contained in preservative timber treatments
- chloride (salt) in the atmosphere
- geothermal environments.

5.2.2 Care is required to ensure there are no incompatibilities between metal fixings (including coating systems) and the preservatives used in the timber treatment – for example, copper azole (CuAz) or alkaline copper quaternary.

5.2.3 NZS 3604:2011 section 4 identifies exposure zones according to the severity of the corrosion risk and also defines the exposure levels of building elements (Figure 3). Slatted timber decks are classified as exposed environments, and all structural fixings must be type 304 stainless steel minimum, regardless of the exposure zone. Use type 316 stainless steel where fixings are visually important, as type 304 may develop tea staining. Galvanised fixings to joists and decking are permitted in all exposure zones where CCA-treated H3.2 timber is used. However, when decking or framing material is treated with alkaline copper quaternary or CuAz, stainless steel (type 304 minimum) or silicone bronze fixings are required.

6.0 DECK DESIGN

6.1 STRINGERS/RIBBON BOARDS

6.1.1 Decks attached to a building can be supported by either:
- stringers fixed to a concrete or concrete block

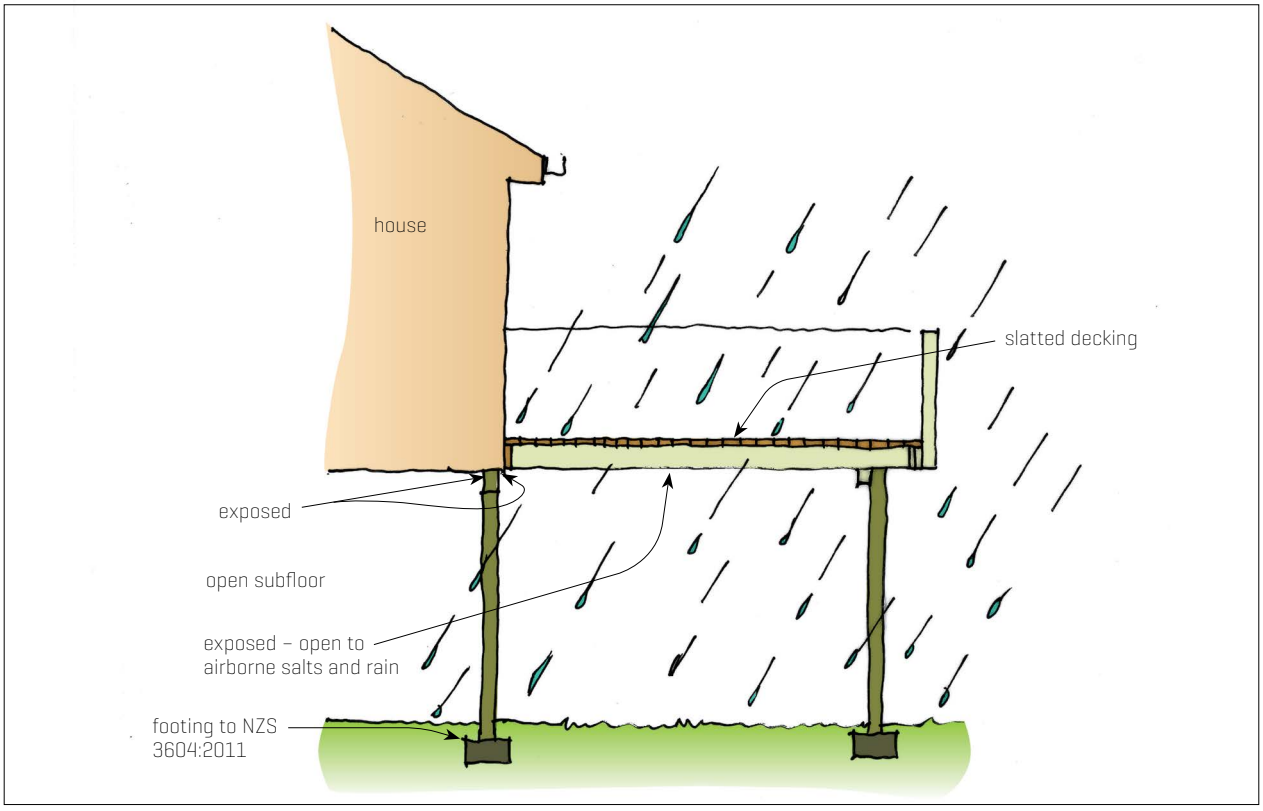

Figure 3. Exposure definitions.

foundation wall, or
- ribbon boards (also commonly referred to as stringers – see Figure 4) fixed to timber piles, timber wall or subfloor framing
- a row of piles adjacent to the building – note that decks that are separate from the building structure must have a fully braced subfloor using braced piles or anchor piles.

6.1.2 Ribbon boards should be packed out from the wall cladding by a minimum of 12 mm to provide drainage between the wall and deck. Packing must be fixed into either:
- a stud, or
- solid framing for direct-fixed cladding, or
- a batten for a cavity system.

6.1.3 Packers must be sealed to the wall cladding at the bolt fixings. For best practice, it is recommended that EPDM washers be used:
- between the packer and the cladding
- between the packer and the ribbon board
- between the washer and the ribbon board.

6.1.4 Stringer sizes and fixing spacings must be in accordance with NZS 3604:2011 Table 6.5 and are dependent on the span of the deck joists. Stringers and ribbon boards must be fixed with M12 bolts in accordance with Table 6.5.

6.1.5 BRANZ has designed and tested alternative stringer fixings, using pairs of 200 mm long coach screws at spacings given by NZS 3604:2011 Table 6.5, fixed into the jack stud framing or main stud framing of the building.

6.1.6 Under E2/AS1, a ribbon board cannot be attached to the face of EIFS, stucco or profiled metal claddings.

6.2 PILES

6.2.1 The vertical load from a deck is generally supported on piles, which may be one or a combination of:
- ordinary piles
- driven timber piles (cantilever piles)
- braced piles (two piles with 450 mm deep footings and a diagonal brace between them)
- anchor piles.

6.2.2 Timber piles must be treated to hazard class H5 and may be either:
- 140 mm minimum diameter round timber, or
- 125 x 125 mm square sawn timber (note that 100 x 100 mm posts are not included in NZS 3604:2011 for deck support and, if used, must be specifically designed and H5 treated if in ground contact).

6.2.3 Piles (other than driven timber piles) must have a minimum 17.5 MPa concrete footing in which they are embedded, with a minimum of 100 mm of concrete beneath the pile. Minimum concrete footing depths are:
- 200 mm for an ordinary pile
- 450 mm for a braced pile
- 900 mm for an anchor pile.

6.2.4 The minimum plan dimensions of the pile footing are given in NZS 3604:2011 Table 6.1. For braced and anchor piles, the minimum footing dimensions are:
- 350 x 350 mm for square piles.
- 400 mm diameter for round piles.

6.2.5 Under NZS 3604:2011 clause 6.4, the maximum permitted height of piles above cleared ground level to the top fixing is:
- ordinary and braced piles – 3.0 m
- cantilever piles – 1.2 m
- anchor piles – 600 mm.

6.2.6 NZS 3604:2011 limits the minimum pile height above ground to 150 mm. No piles may be cut or drilled (such as for fixings) within 150 mm of the finished ground level.

6.3 BEARERS

6.3.1 Bearer size depends on pile spacing and joist span. Use NZS 3604:2011 Table 6.4 (b) to size bearers for SG 8 timber and Table A6.4 (b) for SG 10. For fixing and other requirements, refer to clause 6.12 of NZS 3604:2011.

6.4 JOISTS

6.4.1 Use NZS 3604:2011 Table 7.1 (b) to size joists in SG 8 timber (Table A7.1 (b) for SG 10). Boundary joists that will be supporting a cantilevered barrier must be no less than 190 x 50 mm and have the same width and depth as the deck joists.

6.4.2 Joist set-out must allow for adequate vertical separation between the finished deck level and the floor level. For non-cantilevered slatted decks, the decking surface may be at the same level as the floor.

6.4.3 The maximum practical joist spacing is influenced by decking thickness:
- 32 mm thick (finished) timber decking – 600 mm maximum joist centres.
- 19 mm thick (finished) timber decking – 450 mm maximum joist centres.

6.4.4 Deck joists may be cantilevered beyond the outer bearer. Joist size is given by the right-hand column of NZS 3604:2011 Table 7.2. Note that, if a cantilevered barrier is attached to the ends of these joists, the minimum joist depth must be 190 mm. While the back span of cantilevered joists is not defined by NZS 3604:2011, BRANZ recommends a minimum back span of 1.5 times the cantilever length (Figure 5). This is to provide sufficient resistance to overturning – for example, if people congregate at the overhanging deck edge.

6.5 BRACING

6.5.1 Decks projecting no more than 2 m from the building with stringers (or ribbon boards) and joists

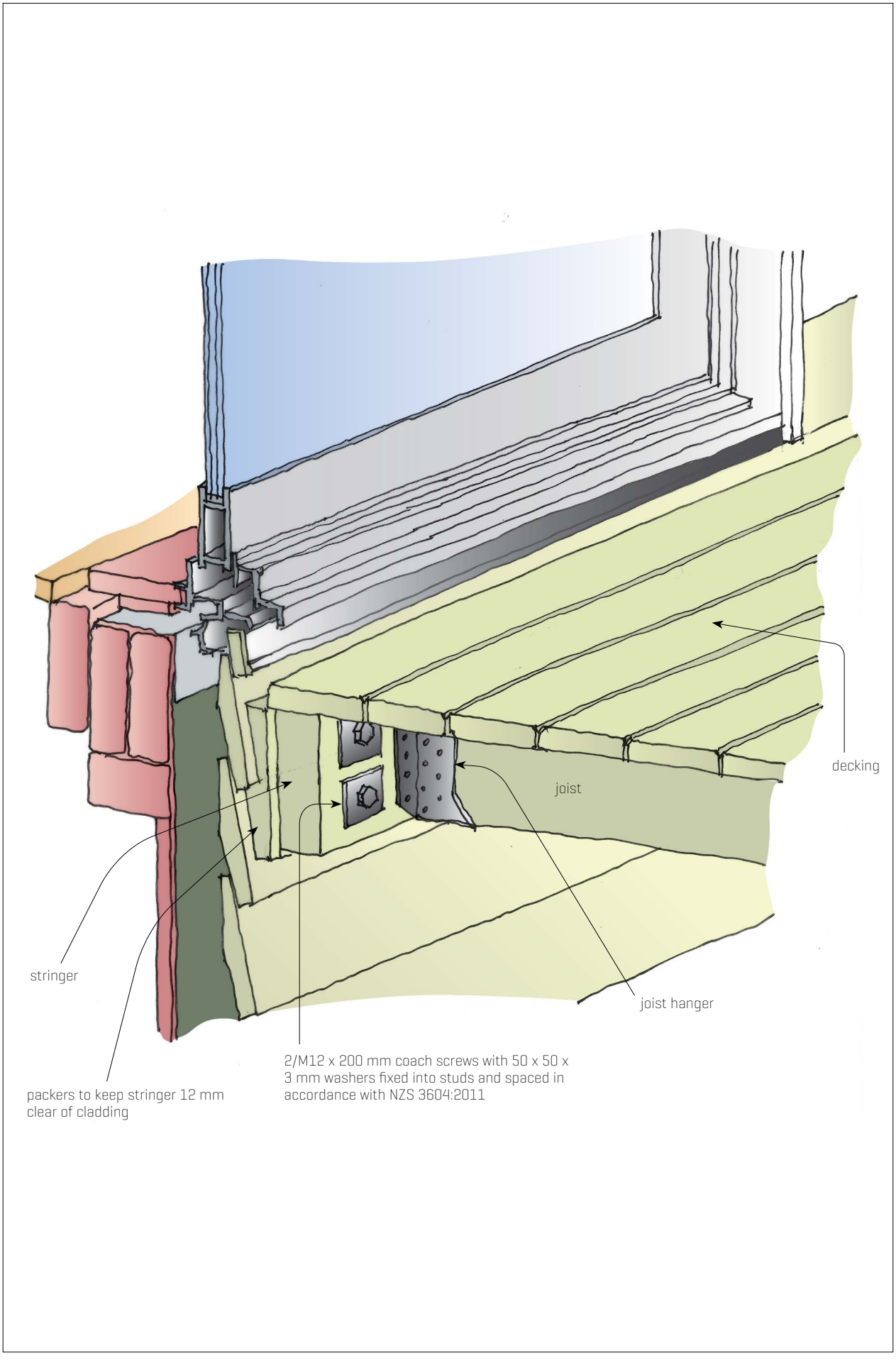

Figure 4. Deck supported on a packed ribbon board (stringer) – cavity construction shown, direct-fixed construction is similar.

bolted to the building do not require subfloor bracing.

6.5.2 Decks that project more than 2 m from a building and freestanding decks (not supported by the building) must have a braced subfloor. This must provide 50% of the earthquake bracing demand required by NZS 3604:2011 Table 5.8 for 'light/light/light' cladding, 0° roof slope and for 'subfloor structures', modified by the factors for soil class and earthquake zone.

6.5.3 Where the deck must be braced to resist earthquake loads, this may be provided by:
- a braced pile system (Figure 6)
- anchor piles, if the highest connection is less than 600 mm above cleared ground level
- driven timber (cantilever) piles, if the deck is less than 1.2 m above cleared ground level.

6.6 DECKING

6.6.1 Timber species suitable for decking are given in NZS 3602:2003. The most commonly used timbers in New Zealand are shown in Table 1. They are:
- radiata pine (must be treated H3.2)
- kwila
- vitex (also known as vasa)
- cypress species such as heart macrocarpa
- jarrah.

Note that only radiata pine is provided for in NZS 3604:2011.

6.6.2 Traditional decking boards are 19 or 32 mm thick and 90 mm wide. Wider boards:
- require larger gaps between the boards to allow for increased movement (6 mm is recommended)
- have increased risk of cupping
- if smooth, are likely to be more slippery when wet.

6.6.3 Installing timber decking:
- Leave a minimum 12 mm gap between decking and the building.
- Leave a gap between boards (for example, for 90 mm boards, use a 100 x 4.0 mm nail as a spacer) to allow:
  - movement in the boards from moisture changes (allowance must also be made for the initial shrinkage of unseasoned timber)
  - water to drain from the deck.
- Fix with annular-grooved hot-dip galvanised nails – use stainless steel annular-grooved nails with alkaline copper quaternary and CuAz-treated timber. Stainless steel fixings are also recommended in exposure zone D.
- To minimise the risk of splitting, pre-drill fixing holes before hand nailing and where screws are not self-drilling.
- Nail boards at each joist with two nails:
  - 60 mm long for 19 mm thick decking
  - 75 mm long for 32 mm thick decking.

6.6.4 Gun nailing is not recommended by BRANZ because:
- using gun nails in dry decking may cause the decking to split and splinter around the nails

TABLE 1. QUALITIES AND SUSTAINABILITY OF COMMON DECKING TIMBER.

Timber	Colour	Hardness	Durability	Stability	Splintering tendency	Sustainability	Other characteristics
Radiata pine (H3.2 treated)	Medium brown	Softwood	Medium	Medium	Some splintering	Yes – New Zealand sources – Forest Stewardship Council (FSC) certification must be requested in advance from the specific supplier or merchant	No leaching, takes finishes well
Kwila (dressing heart)	Dark red/ brown	Hardwood	High	High	medium	Limited supplies – check source and obtain FSC chain of custody certification	Machines and finishes well, bleeds brown stain when first installed
Vitex (dressing heart)	Dark yellow brown, weathers to grey	Hardwood	High	High	Low	Yes – check source and obtain FSC chain of custody certification	Durable – suitable for coastal situations
Macrocarpa (dressing heart)	Light golden brown, weathers to grey	Softwood	Medium	Medium	Low	New Zealand sources available from shelter belts and plantations	No leaching
Pacific jarrah	Dark red/ brown	Hardwood	High	High	Low	From Western Australia – check source and obtain FSC chain of custody certification, some recycled available	No leaching or bleeding

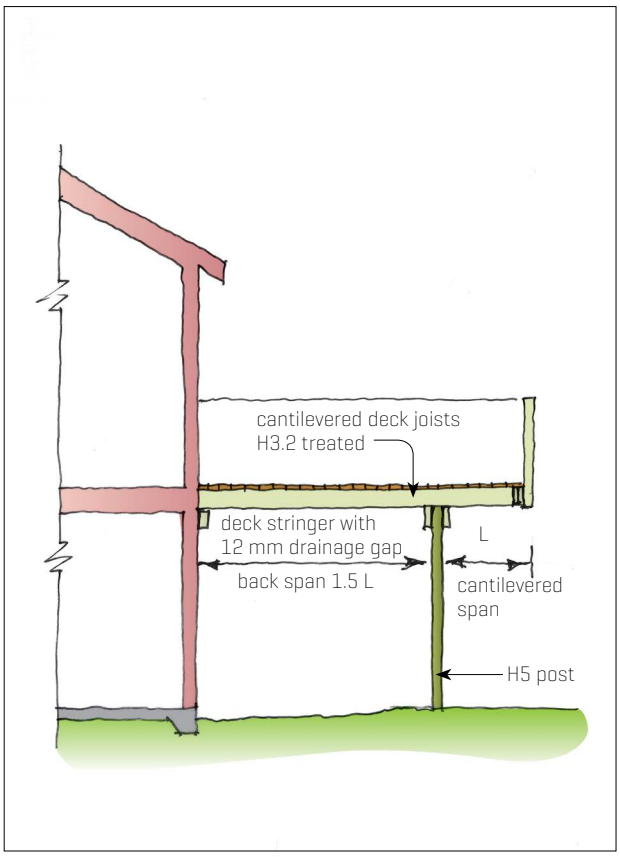

Figure 5. Cantilevered deck joists.

- gun nails may not be sufficiently durable when used externally and with treated timbers.

6.6.5 Proprietary clip fixing systems provide concealed fixing of the decking but are outside the scope of NZS 3604:2011 and must be treated as alternative methods.

6.6.6 Tropical hardwood decking:
- should be sourced from sustainable forests
- may splinter
- may vary considerably in durability between boards
- can be difficult to sort, since the colour difference between lower-durability sapwood and durable heartwood can be indistinct.

6.6.7 Deck timbers may be left unfinished or may be given some protection from weathering and UV light. This involves the application of decking oil, timber stain, non-slip paint or non-pigmented sealer (which does not protect against UV light). To enhance the performance of the decking:
- avoid dark stains
- ensure the space under the deck is well ventilated.

6.6.8 Composite decking boards are manufactured from recycled plastic (HDPE) and waste timber fibre, which is heated, compressed and then extruded into a decking timber shape. Composite decking:is outside the scope of NZS 3604:2011 – check for verified performance information such as a BRANZ Appraisal. It is prefinished and is marketed as:
- UV resistant and resistant to insects, mildew and moisture

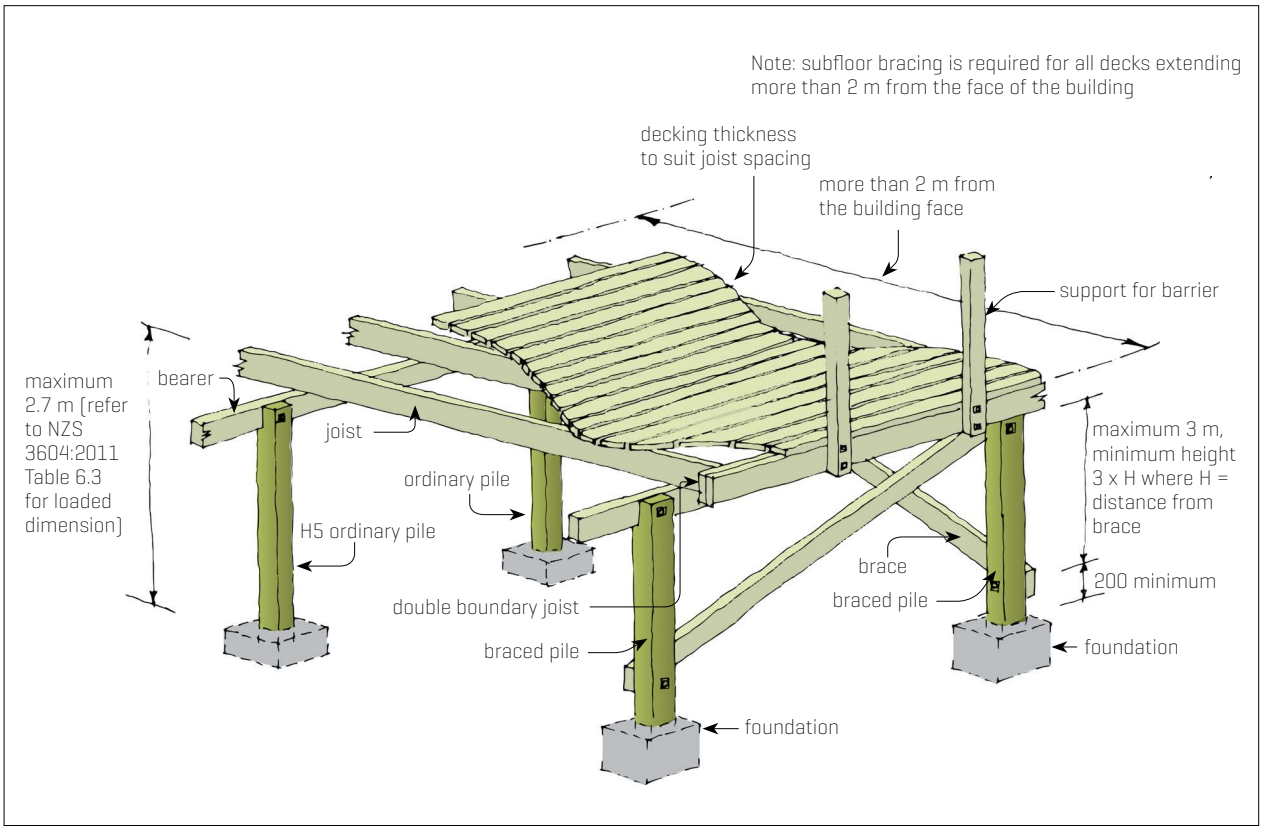

Figure 6. Deck with braced piles.

- low maintenance (no rotting, splintering, warping or loss of colour).

6.6.9 Install composite decking:
- with joist spacing to the manufacturer's recommendations
- with a 12 mm minimum gap between decking and cladding for drainage and maintenance
- to the manufacturer's instructions.

6.7 BARRIER DESIGN

6.7.1 Typically, a barrier rail is supported by posts fixed to the deck structure (a 'cantilever balustrade', NZS 3604:2011). When following B1/VM1, the barrier must be designed to resist the horizontal and vertical loads and wind loads given by AS/NZS 1170, without undue deflection, so its connection to the deck structure is critical.

6.7.2 No Acceptable Solution is currently available for cantilevered post fixings. Published MBIE guidance states that timber barriers complying with *Guidance on Barrier Design* paragraph 4.2.7 meet the performance requirements of NZBC clauses B1, B2 and F4. NZS 3604:2011 clause 7.4.1.3 and Figure 7.10 (a), (b) and (c) describe the support details for cantilevered barriers. Some of the fixing details have been modified by B1/AS1 Amendment 15. Other barrier types require specific engineering design.

6.7.3 BRANZ has designed and tested a selection of cantilevered deck barrier support details (posts) (see one example in Figure 7) and one detail where the H5 deck foundation post is extended to form support for the handrail. These details satisfy the loading and deflection criteria of AS/NZS 1170.

6.7.4 A range of other barrier materials are included in *Guidance on Barrier Design* but are outside the scope of this bulletin. Such materials include glass, aluminium, steel and wire infill.

6.8 STAIRS TO DECKS

6.8.1 Stairs that are on the access route to the first entry point of a house or used by the general public must comply with D1/AS1 requirements for common stairways. Other exterior stairs are classified as main private stairways.

6.8.2 The parameters given in D1/AS1 Table 6 for both common and main private stairways are:
- 37° maximum pitch
- 190 mm maximum riser
- 280 mm minimum tread
- a D1/AS1 compliant handrail (on both sides where stairs are wider than 2 m) – handrails may be omitted on stairways of two or three risers within or giving access to a household unit.

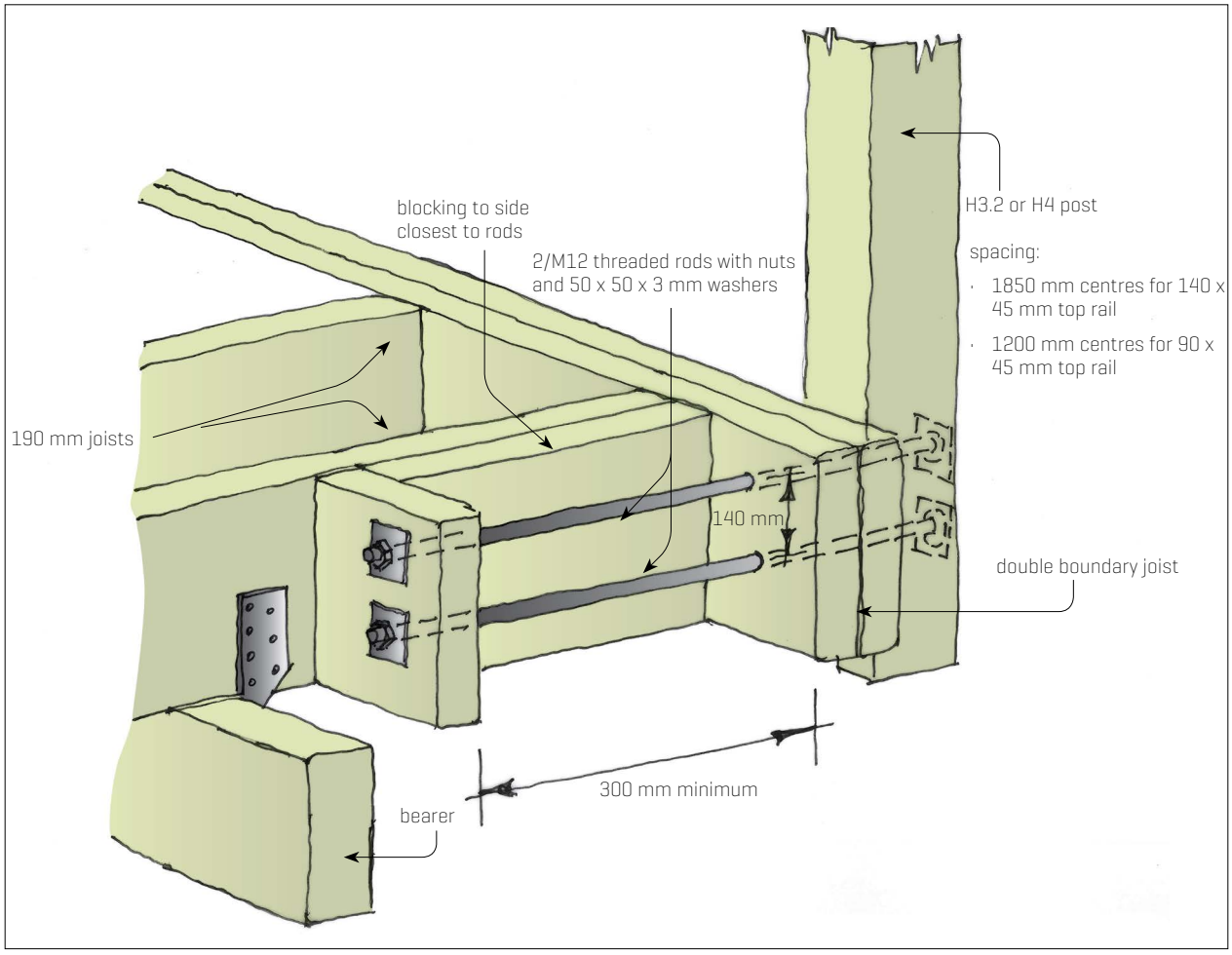

Figure 7. Cantilevered post fixing.

6.8.3 All steps in a flight must be uniform. Treads must have a level surface and a slip resistance in accordance with D1/AS1 Table 2. Where open risers are used, the open space between treads must be small enough to prevent a 100 mm diameter sphere from passing through. Safety is enhanced where a non-slip nosing is installed and treads are a contrasting colour.

6.8.4 Stair barriers have the same requirements as decks. In addition, barriers to stairs should:

- be a minimum 900 mm high, measured vertically from the pitch line (the front edge of the treads, steps or stair nosing)
- not allow a 150 mm diameter sphere to pass through the triangular opening formed by the stair riser, tread and bottom of the barrier
- have handrails with a profile complying with D1/AS1 Figure 26 (a), where required.

6.8.5 A stair handrail may transition up to a height of 1000 mm on intermediate landings for housing.

7.0 GUIDANCE, CODES AND STANDARDS

Ministry of Business, Innovation and Employment (MBIE)
Guidance on Barrier Design, March 2012

Standards
AS 4586-2013 *Slip resistance classification of new pedestrian surface materials*

AS/NZS 1170.0:2002 *Structural design actions – Part 0: General principles*
AS/NZS 1170.1:2002 *Structural design actions – Part 1: Permanent, imposed and other actions*
AS/NZS 1170.2:2011 *Structural design actions – Part 2: Wind actions*
AS/NZS 1170.3:2003 *Structural design actions – Part 3: Snow and ice actions*

NZS 1170.5:2004 *Structural design actions – Part 5: Earthquake actions – New Zealand*
NZS 3602:2003 *Timber and wood-based products for use in building*
NZS 3603:1993 *Timber structures standard*
NZS 3604:2011 *Timber-framed buildings*
NZS 3605:2001 *Timber piles and poles for use in building*
NZS 3631:1988 *New Zealand timber grading rules*
NZS 3640:2003 *Chemical preservation of round and sawn timber* (incorporating Amendment 3)

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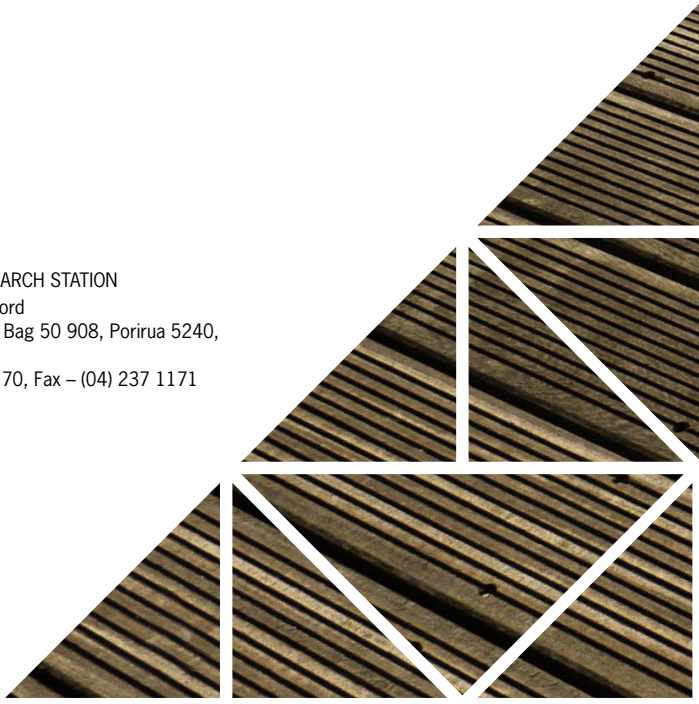

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