

# Domestic Decks

## Introduction

This application guide provides information on the specification, design, and construction of timber decks used for domestic purposes. This includes decks associated with Class 1 and 10 buildings as defined in the Building Code of Australia. Decks in this category are designed to withstand distributed loads of 3.0 kPa and point loads of 1.8 kN (refer to AS1170.1 - note 1).

A typical domestic deck system is shown in Figure 1 (under Construction Systems).



## Acknowledgments

- Timber Manual, National Association of Forest Industries Ltd., Canberra.
- Residential Timber Decks, Timber Research and Development Advisory Council, Brisbane.

**Note**

1. AS1170 Structural design actions - Permanent, imposed and other actions, Standards Australia, Homebush.

**Construction Systems****Footings**

Unreinforced concrete pad footings are commonly used to support decks. Design requirements are contained in AS2870 (see note 2) and AS1684 (see note 3). The initial step is to determine the classification of the site. This and footing sizes should be sought from the above documents or via a structural engineer.

**Posts**

Hardwood posts are usually unseasoned and commonly come in cross sectional sizes of 100 x 100mm or 125 x 125mm. For posts, the common stress grades fall in the range of F11 to F22, all providing adequate load carrying capacity.

**Bearers & Joists**

Bearers and joists are available in a wide range of species, grades and sizes. Unseasoned bearers usually come with a fine sawn finish, while seasoned timbers are accurately thickened and dressed. Tables 1 and 2 provide guidance on the common sizes and spans.

**Structural Joints**

Joints between posts and bearers must efficiently transfer load. Notching posts as shown in Figure 1 is one method of achieving suitable loadbearing capacity. Care must be taken to ensure the notch depth does not compromise the strength of the post (refer AS1684 (see note 3) span tables).

**Notes**

2. AS2870 Residential Slabs and Footings, Standards Australia, Homebush.
3. AS1684 Residential Timber Framed Construction, Standards Australia, Homebush.

**Figure 1: Typical domestic deck construction**

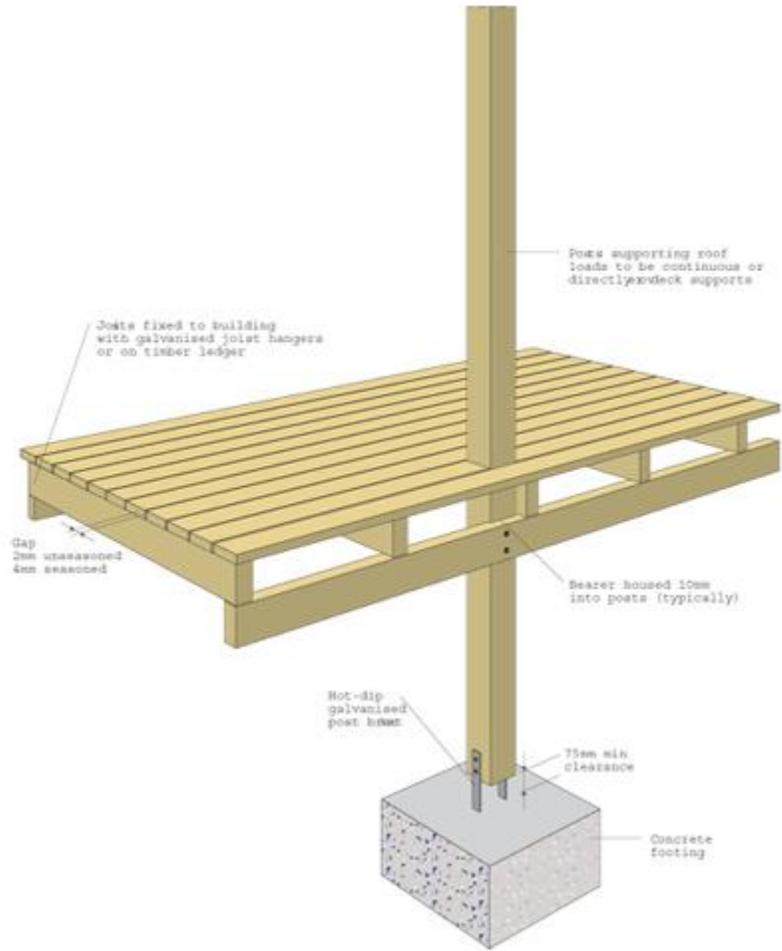


Table 1: Bearer spans and sizes

Bearer Size Depth x Breadth (mm)	Floor Load Width (mm)					
	1200	2400	4800	1200	2400	4800
	Maximum Bearer Span (mm)					
	Single Span (mm)			Continuous Span (mm)		
CYPRESS UNSEASONED F5						
100x75	1200	NS	NS	1200	NS	NS
2/100x50	1600	1100	NS	1600	1100	NS
125x75	1600	1100	NS	1600	1100	NS
2/125x50	2000	1400	NS	2000	1400	NS
150x75	1900	1300	NS	1900	1300	NS
2/150x50	2400	1700	1200	2400	1700	1200
175x75	2200	1600	1100	2200	1600	1100
2/175x50	2800	2000	1400	2800	2000	1400
200x75	2600	1800	1200	2600	1800	1200
2/200x50	3200	2300	1600	3200	2300	1600
225x75	2900	2000	1400	2900	2000	1400
2/225x50	3600	2500	1800	3600	2500	1800
250x75	3200	2300	1600	3200	2300	1600
2/250x50	4000	2800	2000	4000	2800	2000
HARDWOOD UNSEASONED F11						
100x75	1900	1400	1000	1900	1400	1000
125x75	2400	1700	1200	2400	1700	1200
150x75	2900	2100	1500	2900	2100	1500
175x75	3300	2400	1700	3400	2400	1700
200x75	3700	2800	2000	3900	2800	2000
225x75	4000	3100	2200	4400	3100	2200
250x75	4400	3500	2500	4900	3500	2500
275x75	4700	3800	2700	5400	3800	2700
300x75	5000	4200	2900	5900	4200	2900
HARDWOOD UNSEASONED F14						
100x75	2000	1500	1000	2100	1500	1000
125x75	2500	1800	1300	2600	1800	1300
150x75	3000	2200	1600	3100	2200	1600
175x75	3400	2600	1800	3600	2600	1800
200x75	3800	3000	2100	4200	3000	2100
225x75	4200	3400	2400	4700	3400	2400
250x75	4500	3700	2600	5200	3700	2600
275x75	4900	4100	2900	5700	4100	2900
300x75	5200	4400	3200	6300	4500	3200
HARDWOOD UNSEASONED F17						
100x75	2100	1600	1200	2300	1600	1200
125x75	2600	2100	1400	2900	2100	1400
150x75	3200	2500	1700	3500	2500	1700
175x75	3600	2900	2000	4100	2900	2000
200x75	4000	3300	2300	4700	3300	2300
225x75	4300	3700	2600	5300	3700	2600
250x75	4700	4000	2900	5800	4200	2900
275x75	5100	4300	3200	6400	4600	3200
300x75	5400	4500	3500	6800	5000	3500
HARDWOOD SEASONED F17						
2/90x35	1900	1500	1100	2200	1600	1100
2/90x45	2100	1700	1200	2500	1800	1200
2/120x35	2600	2000	1500	2900	2100	1500
2/120x45	2800	2200	1700	3300	2400	1700
2/140x35	3000	2400	1700	3400	2400	1700
2/140x45	3200	2600	1900	3800	2700	1900
2/170x35	3500	2900	2100	4100	2900	2100
2/170x45	3700	3100	2300	4700	3300	2300
2/190x35	3800	3200	2300	4600	3300	2300
2/190x45	4100	3400	2600	5100	3700	2600
2/240x35	4600	3800	2900	5700	4100	2900
2/240x45	4900	4100	3300	6100	4700	3300
2/290x35	5300	4400	3500	6600	5000	3500
2/290x45	5600	4700	4000	7100	5700	4000
HARDWOOD SEASONED F27						
2/90x35	2100	1700	1300	2800	2000	1400
2/90x45	2300	1800	1400	3100	2200	1600
2/120x35	2800	2200	1800	3700	2600	1800
2/120x45	3100	2400	1900	3900	3000	2100
2/140x35	3300	2600	2100	4100	3100	2100
2/140x45	3500	2800	2200	4400	3500	2400
2/170x35	3800	3200	2500	4800	3700	2500
2/170x45	4000	3400	2700	5100	4200	3000
2/190x35	4100	3500	2800	5200	4100	2800
2/190x45	4400	3700	3000	5500	4600	3300
2/240x35	4900	4100	3500	6200	5200	3500
2/240x45	5200	4400	3700	6600	5500	4200
2/290x35	5600	4800	4000	7100	6000	4300
2/290x45	6000	5100	4300	7200	6400	5000



Table 2: Joist spans and sizes

Bearer Size Depth x Breadth (mm)	Floor Load Width (mm)					
	1200	2400	4800	1200	2400	4800
	Maximum Bearer Span (mm)					
	Single Span (mm)			Continuous Span (mm)		
CYPRESS UNSEASONED F5						
100x38	1000	1000	1000	1400	1400	1300
100x50	1400	1400	1400	1800	1700	1600
125x38	1800	1700	1700	2000	1900	1800
125x50	2300	2100	2000	2300	2100	2000
150x38	2400	2300	2200	2400	2300	2200
150x50	2700	2600	2500	2700	2600	2500
175x38	2700	2600	2500	2700	2600	2500
175x50	3200	3000	2900	3200	3000	2900
200x38	3200	3000	2900	3200	3000	2900
200x50	3700	3500	3300	3700	3500	3300
225x38	3600	3400	3300	3600	3400	3300
225x50	4100	3900	3700	4100	3900	3700
250x38	4000	3800	3600	4000	3800	3600
250x50	4600	4300	4100	4600	4300	4100
HARDWOOD UNSEASONED F11						
100x38	1800	1800	1700	2200	2100	2100
100x50	2100	2100	2000	2400	2400	2400
125x38	2500	2400	2400	2800	2700	2700
125x50	2700	2700	2600	3100	3000	3000
150x38	3000	2900	2900	3400	3300	3300
150x50	3300	3200	3200	3700	3700	3600
175x38	3500	3400	3400	3900	3900	3800
175x50	3800	3800	3700	4300	4300	4200
200x38	4000	3900	3800	4500	4500	4400
200x50	4300	4200	4100	5000	4900	4900
225x38	4400	4300	4200	5100	5000	4900
225x50	4800	4600	4500	5600	5500	5500
250x38	4800	4600	4500	5700	5600	5400
250x50	5200	5000	4900	6200	6200	6100
HARDWOOD UNSEASONED F14						
100x38	1900	1900	1900	2300	2300	2200
100x50	2200	2200	2200	2500	2500	2500
125x38	2600	2500	2500	2900	2900	2800
125x50	2800	2800	2800	3200	3200	3100
150x38	3100	3100	3000	3500	3500	3400
150x50	3400	3400	3300	3900	3800	3800
175x38	3600	3600	3600	4100	4100	4000
175x50	4000	3900	3800	4500	4500	4400
200x38	4200	4000	3900	4700	4700	4600
200x50	4500	4400	4200	5200	5100	5100
225x38	4600	4400	4300	5300	5300	5200
225x50	4900	4800	4700	5900	5800	5700
250x38	5000	4800	4700	5900	5800	5800
250x50	5300	5200	5000	6500	6400	6300
HARDWOOD UNSEASONED F17						
100x38	2100	2100	2000	2400	2400	2400
100x50	2400	2300	2300	2700	2600	2600
125x38	2700	2700	2600	3100	3000	3000
125x50	3000	2900	2900	3400	3300	3300
150x38	3300	3200	3200	3700	3600	3600
150x50	3600	3600	3500	4100	4000	4000
175x38	3800	3800	3700	4300	4300	4200
175x50	4200	4100	4000	4800	4700	4700
200x38	4300	4200	4100	5000	4900	4900
200x50	4700	4500	4400	5500	5400	5400
225x38	4700	4600	4500	5600	5500	5500
225x50	5100	5000	4800	6200	6100	6000
250x38	5100	5000	4900	6200	6200	6100
250x50	5500	5400	5200	6900	6800	6600
F17 SEASONED HARDWOOD						
90x35	1900	1800	1800	2200	2200	2200
90x45	2100	2100	2100	2400	2400	2400
120x35	2700	2600	2600	3000	3000	2900
120x45	2900	2900	2800	3300	3200	3200
140x35	3100	3100	3000	3500	3500	3400
140x45	3400	3300	3300	3800	3800	3700
170x35	3800	3700	3700	4300	4200	4200
170x45	4100	4000	3900	4700	4600	4500
190x35	4200	4100	4000	4800	4700	4700
190x45	4500	4400	4200	5200	5100	5100
240x35	5000	4900	4800	6100	6000	5900
240x45	5400	5200	5100	6600	6500	6400
290x45	6300	6000	5900	7900	7900	7900

## Bearer & Joist Selection

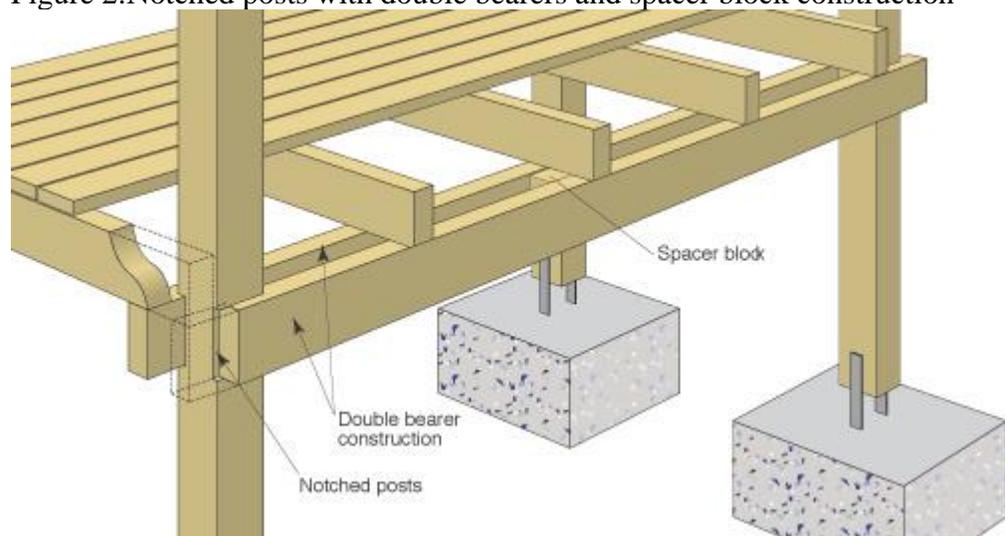
Issues to consider when selecting bearers and joists from Tables 1 and 2 are:

- Bearer and joist sizes are based on a maximum deck mass of 20 kg/m<sup>2</sup>. For higher loads refer to the Application Guide for Non-domestic Decks, Board Walks and Light Traffic Structures (as referenced at the end of this document).
- Bearer and joists sizes assume a minimum end bearing of 50mm, and intermediate bearing of 100mm.
- Availability of timber species and sizes varies from one region to the next - check with suppliers for detailed information regarding availability and refer to AS1684 (see note 3) parts 2 and 3 for other grades and sizes.
- 45 or 50mm wide joists are recommended in order to avoid splitting when receiving nails. Joists of 35 or 38mm width are only suitable where proprietary deck fixings are used on the side of joists.
- Joists may overhang bearers a maximum of 25% of the allowable single span of the selected joist. Further details, such as back-span requirements are available in AS1684 (see note 3).
- Double bearers should be spaced apart as shown in Figure 2. Blocks should be placed at the mid-span for spans under 2.0m, at one-third points for spans 2.0 to 3.6m, at one-quarter points for spans over 3.6m. Details on block fixing requirements are provided in AS1684 (see note 3).
- Unseasoned material is well suited to these external applications. In many cases a wider range of both length and section size is available.

## Notes

3. AS1684 Residential Timber Framed Construction, Standards Australia, Homebush.

Figure 2: Notched posts with double bearers and spacer block construction



## Decking Board Selection

Decking is available in Cypress and a range of hardwood species.

Deck profiles include: square edged (plain), pencil round edges (arrised) and reeded faced (ribbed). Pencil round provides a soft appearance compared to square edged, and there is less likelihood of splintering at edges. Reeded facing is employed where increased slip resistance is desired, however if this feature is unwanted, the reeded face can be laid downward to prevent dirt potentially catching in the ribs.

Boards are sized to minimise the likelihood of cupping and twisting while still allowing easy water run-off. Popular sizes along with species and nailing requirements are provided in Table 3.

Figure 3: Common decking profiles

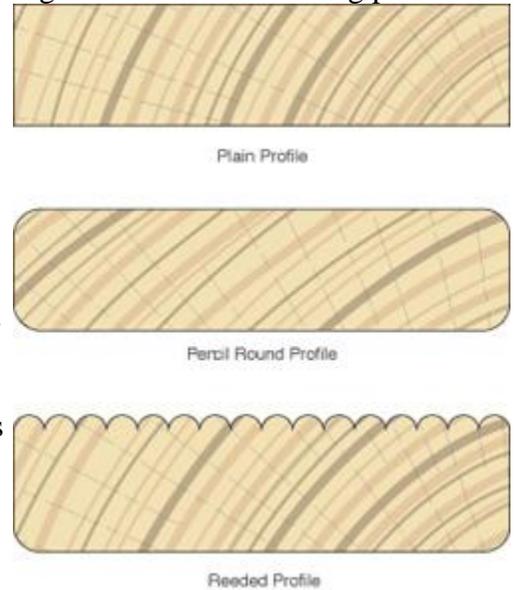


Table 3 – Popular species and nailing specifications for domestick decking

Species	Durability class	Appearance (i.e. colour)	Deck width, thickness, joist span (mm)	Nailing requirements
Cypress	1	yellow	68 x 19 x 400 span 68 x 21 x 450 span	Machine driven - 50 x 2.5 flat heads
Blackbutt	2	brown	87 or 68 x 19 x 500 span	Hand driven – 50 x 2.8mm bullet head
Ironbark red or grey	1	red/grey		Note : Nails into treated pine framing - 50mm deformed shanked or 65mm long plain shanked
Mahogany ( White)	1	blond		
Spotted Gum	2	brown		
Tallow wood	1	yellow		

Note: All fixings shall be suitable for external application – ie hot-dip galvanised, stainless steel or otherwise suitably coated.

## Durability

Because of their exposure to the weather, durability is an important consideration in deck construction:

- All timbers should be of class 1 or 2 durability. Suitable decking species are provided in Table 5.

- Cypress decking should be supplied with sapwood limited to 10% of the cross sectional area and 50% of faces or edges.
- Hardwoods with sapwood exceeding 10% of cross-sectional area should be factory treated with preservative.
- Sapwood should be avoided where possible in exposed applications.
- Posts should be kept clear of the ground via the use of galvanised metal post shoes or similar fitments.
- Connectors must be a minimum of hot-dip galvanised, however environments such as splash zones around pools, coastal regions or industrial corrosive environments, require stainless steel or silicon bronze connectors.
- Joints should be designed to minimise moisture entrapment using drained joints and flashings. Protective coatings can also be used to minimise moisture up-take inside the joint.
- A coat of water repellent preservative or oil based primer, plus a coat of surface finish, should be applied to the tops of joists and all surfaces of the decking. An alternative is to utilise proprietary capping, bituminous felt or coated capping systems. Where necessary this should be done prior to fixing and particular attention should be paid to ends of decking boards and the supporting timber framework.

Figure 4: Staggered deck board ends

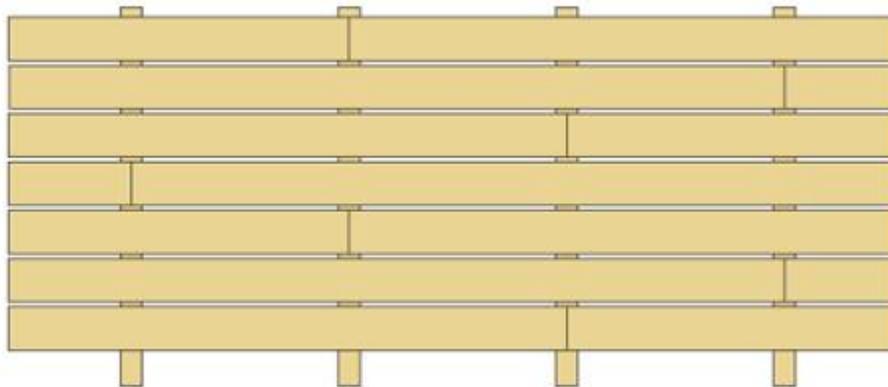
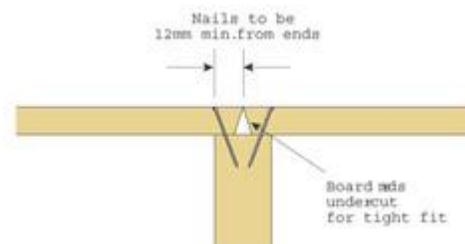
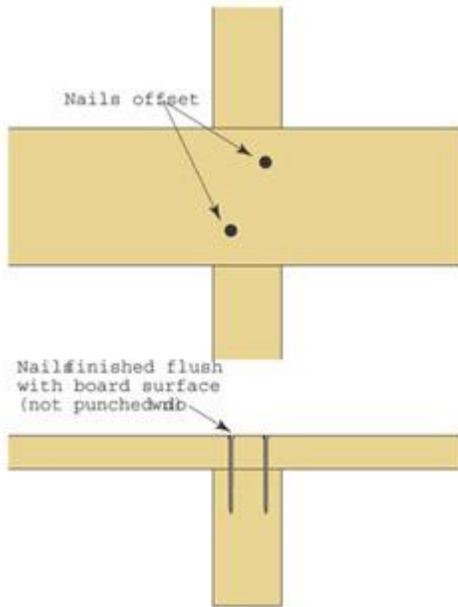


Figure 5: Nailing at intermediate locations

Figure 6: Nailing at board ends





## Laying Decking

- Seasoned decking boards should be spaced with a 4mm gap; unseasoned with a 2mm gap to allow for shrinkage (this may vary for larger board widths).
- Butt joints in boards should be staggered. (Refer to Figure 4 under Durability).
- Where fixing occurs other than at the ends of the board, nails should be staggered across the joist to avoid shrinkage cracks. (Refer to Figure 5 under Durability).
- Each board should be fixed at each joist with two nails which should be finished flush with the top of the boards (rather than punched) to prevent moisture being trapped. (Refer to Figure 5 under Durability).
- To obtain a tight fit at joints, a slight under-cut is recommended. (Refer to Figure 6 under Durability).
- To prevent splitting, nails should be kept a minimum of 12mm from edges and ends, and drilled nail holes should be 80% of the nail diameter. (Refer to Figure 6 under Durability).

