

HARDWOOD CLADDING

INSTALLATION GUIDE

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DISCLAIMER

Inspect Cladding before installation. If there are any concerns regarding their quality or suitability, do not continue installation and contact your Pentarch Forestry representative.

1. Introduction

1.1 SCOPE OF THIS GUIDE

Australian hardwood cladding has a long history of use within the Australian built environment. It has contributed to the aesthetics, comfort, environmental and structural performance of many Australian buildings and has stood the test of time.

Pentarch Forestry's Australian hardwood cladding provides an attractive and economical way to finish the exterior or line the interior of both new and old buildings. It suits traditional, modern or uniquely designed residential or commercial buildings

Building applications

- Cladding for houses, villas and townhouses.
- Cladding for multi-residential apartments, hotels, commercial, industrial and public buildings.
- Cladding of outdoor structures such as studios and garages.
- Ceiling for outdoor rooms.

Building a sustainable future

All Pentarch Forestry manufacturing sites are certified to the Responsible Wood (RW) Chain of Custody (CoC) Standard. All timber products from these sites are also certified and can be traced back to the forest where the trees were harvested. This RW CoC certification supports responsible and sustainable forest management in Australia. Documentation for site and product certification is available on request.

1.2 NATIONAL CONSTRUCTION CODE (NCC) REQUIREMENTS

1.2.1 STRUCTURAL

The NCC requires that all buildings or structures (i) perform adequately under all reasonably expected design actions; and (ii) withstand extreme or frequently repeated design actions; and (iii) be designed to sustain local damage, with the structural system as a whole remaining stable and not being damaged to an extent disproportionate to the original local damage; and (iv) avoid causing damage to other properties. Fixing and installation details are provided for different wind regions around Australia.¹

1.2.2 FIRE SAFETY

Other than for cladding located in bushfire-prone areas, timber cladding used on Class 1 buildings does not have any fire resistance requirements unless it is within 900mm of a boundary or another building. In this situation timber cladding can be placed over a fire-resisting barrier that meets NCC requirements.

All Class 2 to 9 buildings must take into account fire safety requirements. This aspect is covered to some degree in this Guide, however further professional advice may be needed to determine whether Pentarch Forestry's Australian hardwood cladding can be used as cladding in specific areas in these building types.

1.2.3 WEATHERPROOFING

The NCC performance requirements stipulate that an external wall (including openings around windows and doors) must prevent the penetration of water that could cause (a) unhealthy or dangerous conditions, or loss of amenity for occupants; and (b) undue dampness or deterioration of building elements. The details in this Guide address these requirements.

¹ Refer to AS 4055 Wind Loads for Houses for explanation on wind regions.

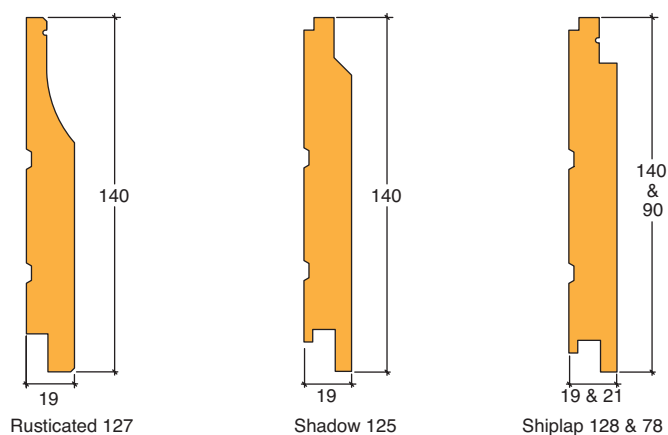
1.3 PRODUCT RANGE OF PENTARCH FORESTRY™ CLADDING

Pentarch Forestry Australian hardwood cladding is only available as seasoned, kiln dried timber. The seasoned boards are dressed, have a machined profiled face and rebated joints.

1.3.1 CLADDING

Cladding is available in the following profiles: Rusticated 127, Shadow 125 and Shiplap 128 & 78. Refer Figure 1 and 3.

Figure 1: Pentarch Forestry Australian hardwood cladding profiles

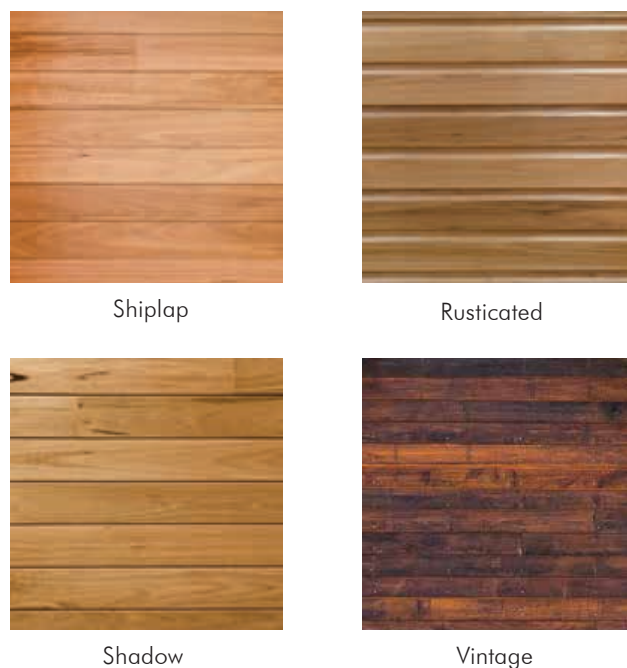


1.3.2 SPECIES AND COLOUR

Timber Cladding

Pentarch Forestry hardwood timber cladding is available in Australian Blackbutt, Ironbark, Spotted Gum and Tallowwood species. It should be noted that variation of colour within each timber species is normal. Any photograph can only be indicative of the colour range of the timber species nominated. It is recommended that timber species be viewed in a display showroom before a decision on colour is made.

Figure 3: Timber profiles used for Pentarch Forestry hardwood cladding



1.3.3 GRADES

Pentarch Forestry Australian hardwood cladding is available in two in-house grades: “Standard and Better” and “Utility”. The difference in these grades is the amount of natural feature found in hardwood timber (such as burls, hobnail and gum veins), with utility grade having more feature. See the Product Specifications section for details.

1.3.4 USE AS CLADDING IN BUSHFIRE-PRONE AREAS²

Many Australian hardwoods have a natural bushfire resistance. The Pentarch Forestry Australian hardwood cladding species that can be used as cladding in each Bushfire Attack Level (BAL)³ are found in Table 1.

For more information on building with Australian hardwood timber in bushfire-prone areas throughout Australia, refer to Pentarch Forestry’s guide ‘Construction in Bushfire Zones’.

Table 1: Pentarch Forestry cladding species that can be used in various bushfire prone zones
Source: Australian Standard AS 3959 and NSW Rural Fire Service

Bushfire Attack Level (BAL)				
	BAL-LOW	BAL-12.5	BAL-19	BAL-29
NSW	Blackbutt, Ironbark, Spotted Gum, Turpentine	Blackbutt, Ironbark (Red only), Spotted Gum, Turpentine	Blackbutt, Ironbark (Red only), Spotted Gum, Turpentine	Blackbutt, Ironbark (Red only), Spotted Gum, Turpentine
Rest of Australia	Blackbutt, Ironbark, Spotted Gum, Turpentine	Blackbutt, Ironbark, Spotted Gum, Turpentine	Blackbutt, Ironbark, Spotted Gum, Turpentine	Blackbutt, Ironbark (Red only), Spotted Gum, Turpentine

1.3.5 DURABILITY AND TERMITE RESISTANCE

All timber species used to make Pentarch Forestry Australian hardwood cladding are durable timbers species that have an above ground durability rating of Class 1, as well as being naturally termite resistant⁴. For long life in external and interior applications any lyctus susceptible sapwood present in the cladding boards is preservative treated to H3 hazard level⁵.

1.3.6 FIRE RESISTANCE PROPERTIES FOR USE IN CLASS 2 TO 9 BUILDINGS

Australian hardwoods have natural fire resistance properties which allows their use as exterior cladding in many locations in these types of building under the deemed-to-satisfy (DtS) provisions of the NCC.

Pentarch Forestry Australian timber cladding meets NCC deemed-to-satisfy requirements for use as cladding in many locations within multi-residential, commercial and public buildings

NCC Volume One has specific deemed-to-satisfy provisions for fire resistance requirements for all materials used in Class 2 – 9 buildings, such as multi-residential apartments, commercial, retail industrial and public buildings. These requirements are separate from those required for building in bushfire-prone areas. Fire properties are dealt with in two ways: specific requirements under NCC Provision C1.10 Fire Hazard Properties or a requirement to be non-combustible. In all cases, if there are no solutions using the deemed-to-satisfy provisions, an alternative solution can be used to comply with building regulations.

3 Bushfire Attacked Level (BAL) is a term used in the Australian Standard AS 3959 Construction in Bushfire Prone Areas to measure the severity of a building’s potential exposure to ember attack, radiant heat and direct flame contact from attack by a bushfire.
4 According to Australian Standard AS 5604 Timber – Natural Durability Ratings. This standard indicates a probable service life of greater than 40 years when used in exterior applications for the heartwood of timber rated as Class 1 above ground durability.
5 According to Australian Standard AS 1604.1 Specification for preservative treatment – Sawn and round timber.

Non-combustible external walls

NCC Volume One's deemed-to-satisfy provisions provide no restrictions on the use of timber for cladding for buildings that are required to be of Type C construction⁶. For Type C construction, a maximum rise of storeys⁷ of two is allowed for all building classes, except for Classes 9a and b where a rise in stories of only one is allowed.

For buildings that must be of Type A and B construction, the NCC deemed-to-satisfy provisions require the external wall to be non-combustible⁸. The exceptions are for Class 2 buildings (multi-residential units and apartment buildings) and Class 3 buildings (hotels and motels). For these Building Classes the NCC Volume 1 Specification C1.1 (Clauses 3.10 and 4.3) provides a concession for external walls; removing the restriction on combustible (i.e. timber) cladding up to a rise in storeys not more than three.

Buildings that have a greater rise in storeys than that described above may still be able to use timber cladding, but there is no NCC deemed-to-satisfy provision that covers their use. For guidance on how to incorporate timber cladding in these applications refer to Wood Solutions guide: Alternative Solution Fire Compliance.

Fire Hazard Properties

For all materials used in Class 2 to 9 buildings, NCC Provision C1.10 has separate fire performance requirements, termed Fire Hazard Properties. These Fire Hazard Properties vary depending on whether they are coverings to ceilings, walls and lift cars or used as cladding.

Cladding to commercial buildings (exterior surface to the buildings wall) that is not required to be non-combustible, fit under the NCC Specification C1.10 Clause 7 Other Materials. The clause requires cladding to have a Spread of Flame Index no greater than 9 and Smoke Development Index of 8 if the Spread of Flame Index is more than 5. Pentarch Forestry cladding meets this requirement, refer Table 2 right.

Table 2: Relevant Fire Hazard Properties of Pentarch Forestry Australian timber cladding species for Class 2 – 9 Buildings⁹

Fire Hazard Properties		
Species	Spread of Flame Index	Smoke-Developed Index
Blackbutt	9	3
Ironbark	5	3
Spotted Gum	3	3
Turpentine	5	3

⁶ NCC Provision C1.1.

⁷ Class 2, 3 and 9c require to comply with NCC Provision C1.5.

⁸ NCC Specification C1.1 clause 3.1 (b) and 4.1 (b) requires external walls to be non-combustible.

⁹ Source of information is www.woodsolutions.com.au

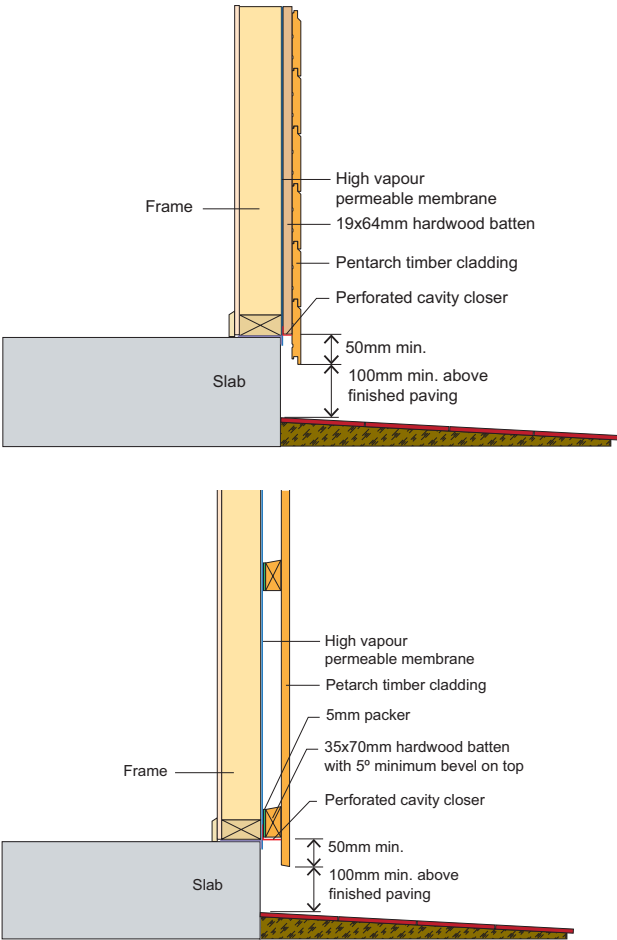
2. Cladding Design

Good design practices help to ensure best performance from Australian hardwood cladding. For example, wide eaves and verandas help to provide protection from exposure to sunlight and rain. Flashings at corners, doors, windows and wall intersections must be detailed to hold a head of water in harsh weather conditions.

Where it is exposed to the weather, cladding should end well above horizontal surfaces such as final ground level, paving, decks and roofs to avoid staining from rain splashing and prevent moisture up-take from sitting water. Adequate clearance should also be allowed above a ground floor concrete slab to allow for termite inspection. The recommended minimum clearance height is 150 above final soil level or 100mm above final paving level (as shown in Figure 5). It is also good practice to slope ground and any paving away from the house. For cladding that is above a deck or roof, a minimum clearance of 35mm is recommended. Cladding should extend at least 50mm below the wall’s bottom plate.

If installed vertically the bottom edges of Pentarch Forestry Australian hardwood cladding should be cut to slope upwards and inwards (i.e. at an angle of about 15 degrees from the horizontal) to form a drip line.

Figure 5: Minimum clearance of cladding above final ground levels and finishing below bottom plate



2.1 PROFILE DIRECTION AND FIXING METHOD

Pentarch Forestry’s Australian hardwood cladding profiles can be installed in a horizontal, vertical or diagonal direction, though Rusticated 127 is not suitable for vertical orientation. All profiles are suitable for face fixing and Shadow 125 and Shiplap 128 are suitable for secret fixing (Table 4).

When installing horizontally or diagonally ensure fixed tongue edge is upward facing. When installing diagonally and vertically ensure the tongue is installed in the direction of the prevailing weather.

Table 4: Suitable installation direction and fixing method

Profile	Installation direction			Fixing method	
	Horizontal	Vertical	Diagonal	Face fix	Secret fix
Rusticated 127	Yes	No	Yes	Yes	No
Shadow 125	Yes	Yes	Yes	Yes	Yes
Shiplap 128	Yes	Yes	Yes	Yes	Yes

3. Important Points about Timber

3.1 UNDERSTANDING MOISTURE AND MOVEMENT

Timber naturally contains a small percentage of water and is a hygroscopic material. This means it releases or absorbs water from the air to equalise with the moisture levels in the air where it is installed. The timber expands and contracts in width in response to moisture changes and some movement is considered normal. By far the most movement occurs across the width of cladding boards, not the length.

3.2 ALLOW FOR SOME MOVEMENT

Pentarch Forestry Australian hardwood cladding is kiln dried to a moisture level which suits installation in most areas of Australia and which minimises any subsequent movement during its service life. However, abnormally long periods of hot dry weather or wet weather may cause some greater shrinkage or expansion in the width of the board. Properly applied and maintained finishes will minimise the release and take-up of moisture.

Greater movement can be expected where the cladding is installed on unprotected west and north facing walls as these will be subject to greater degrees of sunlight and extreme temperature changes.

3.3 SEAL AND PROTECT THE END GRAIN

Timber's cellular structure is similar to a bunch of drinking straws. The walls of the straws (i.e. the face of the timber cladding) absorb moisture relatively slowly while the ends of timber (the "end grain") allow water to enter the timber relatively easily. Any water entering the end grain can travel a long way so it is important that the end grain is effectively protected from moisture penetration by sealing with a finish and use of appropriate detailing such as flashings.

3.4 INCORPORATE HIGH VAPOUR PERMEABLE MEMBRANE BEHIND CLADDING

Stud walls are covered with a membrane to improve thermal insulation as well as prevent drafts and wind driven rain from entering the wall cavity. In some regions of Australia wall membranes are also required for additional bushfire protection purposes. Any membrane used behind timber cladding must be highly vapour permeable (low vapour resistance) yet highly water resistant.

Vapour barriers such as polythene films and foils which are not vapour permeable or other material such as perforated foil insulation which has very low vapour permeability should never be used immediately behind timber cladding.

Additional detailing may also be necessary where condensation is a concern. This most commonly occurs where there is a large temperature difference between the indoor and outdoor environments such as in very cold and very hot/humid climates. In these conditions professional advice should be sought to ensure insulation issues are handled in such a way that moisture is not allowed to build up behind the timber cladding.

3.5 PROTECT CAVITY DURING CONSTRUCTION

Preventing rain from entering the cavity, wetting the framing or battens and getting behind the boards during construction is very important. If moisture gets in during construction and timber cladding is installed before it is dry, the cladding boards can be exposed to a lot of moisture as this cavity dries out. This moisture can cause expansion of the inner face of the board and consequently, cupping on the outer face.

If the framing or battens will be exposed to rain before roofing protection and/or eaves are in place it is recommended that temporary protection during installation is provided.

3.6 FLASHING AND WEATHERPROOFING

Before fixing Pentarch Forestry Australian hardwood cladding, all wall openings, vertical and horizontal joins, sills, heads and corners must be weatherproofed with flashing to comply with NCC.

As per NCC requirements, all openings must be adequately flashed using materials that comply with AS/NZS 2904¹⁰.

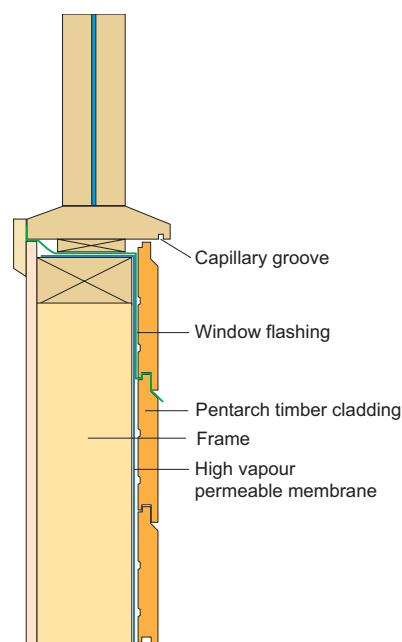
Flashings must be securely fixed 25mm under the cladding and extend over the ends and edges of the framing of the opening.

On walls projecting from the roof line in upper storey construction, keep the bottom edge of cladding boards 35mm clear of the lower storey roof claddings. Weatherproof with an approved flashing.

3.7 SPECIFICATION OF TIMBER WINDOWS AND DOORS

If using timber windows and doors it is important that the groove underneath the sills, which prevents water entering the cavity by capillary action, is clear of the external cladding. See Figure 6 below. If fixing cladding over a cavity, the additional depth of the cavity must be considered in window and door sizing.

Figure 6: Capillary groove under timber window sills kept clear of cladding



4. Installation of Timber Cladding – General

Installation must be undertaken with weather resistance in mind and to ensure any moisture that does penetrate or form behind the cladding is given a chance to drain away or evaporate.

4.1 JOINING BOARDS

If fixing boards horizontally or diagonally, start at the lowest point and install with tongue edge uppermost. Single or long lengths should be used on walls exposed to prevailing weather conditions. Short lengths can be used between windows or on sheltered parts of the wall, such as under eaves and verandas. Sealants should not be depended on for weather resistance. Joints between abutting boards should be minimised to limit opportunity for moisture ingress. If butt joints are unavoidable slightly over cut board lengths then snap the bowed board into position.

If fixing boards vertically, endeavour to use full length boards and avoid joints. For walls over one storey, install expansion joints and flashed to this horizontal joints at each floor level. If butt joints are unavoidable then butt joints in vertical boards should also be angle cut at 45 degrees across ends (scarf joints) to minimise moisture uptake in board end grain. Boards should be installed with the tongue facing towards the direction of the prevailing weather.

For good service life, the end-grain of all boards should be sealed with a water repellent prior to installation.

As work proceeds, check that the boards are level or plumb (as appropriate), loosely fitting each board to that previously fixed to allow for some movement over time. Allow an expansion gap of 1 to 2mm. Avoid over cramping cladding boards to each other.

4.2 PROVIDE A DRAINAGE CAVITY BEHIND THE CLADDING

It is recommended practice to provide a cavity behind the cladding to allow for the drainage of any moisture that penetrates the exterior cladding.

Adequate provision must be made for drainage to ensure that moisture is not left trapped between the timber cladding and the supporting wall. Care should be taken when installing supporting battens so that they allow drainage within the cavity. The bottom and top of any cavity must also be protected to ensure vermin are not able to enter and suitable perforated cavity closers are available from Pentarch Forestry.

Any cavity battens should have a stress grade and be at least above ground natural durability Class 2 hardwood or H3 treated softwood.

When fixing cladding horizontally Pentarch Forestry recommends utility grade Pentarch Forestry hardwood decking 64 x 19mm as cavity battens fixed vertically over each stud and all spacing and fixing recommendations are based on these.

When fixing cladding vertically Pentarch Forestry recommends kiln dried 70 x 35mm hardwood (above ground natural durability Class 2 minimum) as cavity battens and all spacing and fixing recommendations are based on these. Each batten must span at least three studs.

Horizontal battens (for fixing vertical cladding) should have the top planned so as to allow any water that penetrates the cladding to drain away into the cavity.

A packer of approximately 5mm thick and of sufficient durability and strength (suitable packers: plastic spacer, fibre cement, plywood) should be placed to maintain a gap between the batten and the vapour permeable membrane so that no water can drain down the cavity unimpeded. See Figure 7.

4.3 USE HIGH VAPOUR PERMEABLE WALL MEMBRANE

If fixing to studs it is recommended to use wall membranes over the studs that have a high degree of vapour permeability (i.e. low vapour resistance) as well as a high level of water resistance. This allows for controlled escape of water vapour from within the building whilst restricting the ingress of any liquid water. Such a membrane helps protect the framing, timber cladding and insulation from any water which penetrates the cladding as well as any condensation and related problems such as mould, timber rot, corrosion and loss of thermal resistance.

Where cladding is used in open joint rain screen type applications, membranes that have high UV light resistance should be considered.

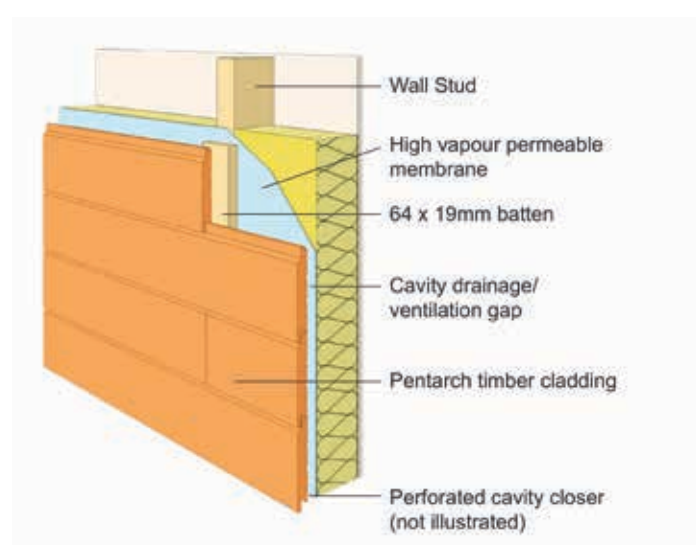
The use of impermeable foil faced sarking, foil or wall wrap with little or no vapour permeability is not recommended.

4.4 ALLOW FOR EXPANSION

Boards must be installed fitted with an expansion gap between the tongue and the corresponding rebate of 1 to 2mm to allow for some expansion and contraction over time.

4.5 CLADDING INSTALLATION – HORIZONTAL OVER CAVITY

Figure 7: Horizontal installation over a drainage cavity



1. Coat all cladding boards all round prior to installation with at least one coat of finish (refer to Finishing section of this guide).
2. Check studs for straightness and plumb. Pack or plane level as required. Studs maximum 600mm centres.
3. Install high vapour permeable membrane over studs. All overlaps (minimum 150mm) facing down.
4. Install cavity battens directly over studs and over vapour permeable membrane.
5. Stagger fixings down the batten to keep centre free to allow fixing of cladding.
6. Install flashings, corner details and perforated cavity closer where necessary. For corner details see Figures 14, 15 and 16.
7. Mark the board increments on the battens. Make sure to allow for loose fitting/expansion gaps.
8. The tongues of each board should face up to prevent water from being trapped inside the rebate.
9. Fixing is to occur at a maximum of 600mm centres and using two fixings per crossing. This requirement therefore means that any support battens also need to be at 600mm centres maximum.
10. Nailing through overlaps must be avoided but must still provide restraint to the inner board. Boards also should be nailed 25mm away from edges to avoid splitting of thinner sections, or rebated overlaps. Board ends should be pre-drilled to prevent splitting. Also angle the fixing at least 15 degree to vertical to allow settlement of the frame.
11. Install a starter cladding board at the bottom. Ensure bottom of the board is at least 100mm above finished ground level. Ground or concrete or paving should slope away from the building.
12. Install subsequent cladding boards on top of starter board. Follow the increment markings or use spacers to maintain an expansion gap. Check level of each board before fixing.
13. Place butt end joints over a stud or batten. Use double battens to support abutting boards. Stagger any butt end joints up the wall.
14. Ensure end grain of each board is sealed prior to installation.

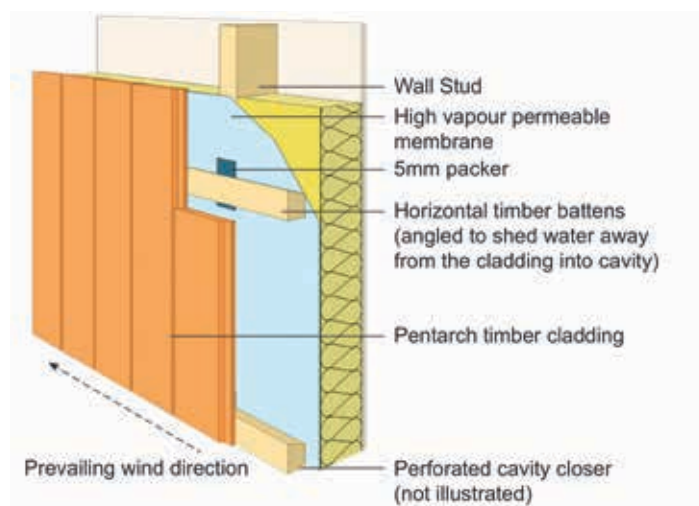
4.5.1 CAVITY BATTENS FOR HORIZONTAL FIXING

Cavity battens should be at least the width of the stud 45mm and at least 19mm thick. Kiln dried hardwood 64 x 19mm is recommended though structural (minimum stress grade F5) H3 treated softwood may be used. Battens must be sufficiently fixed onto timber studs or supporting wall material.

For fixing 64 x 19mm hardwood battens to softwood timber studs use 1/75 x 3.75mm nails (twisted or annular treaded) is recommended at 300mm spacing. Minimum diameter of machine-driven nails is 3.33mm for softwood framing (as per nominal fixings in AS 1684). Stagger nails so that the middle of the batten is free to accept cladding fixing.

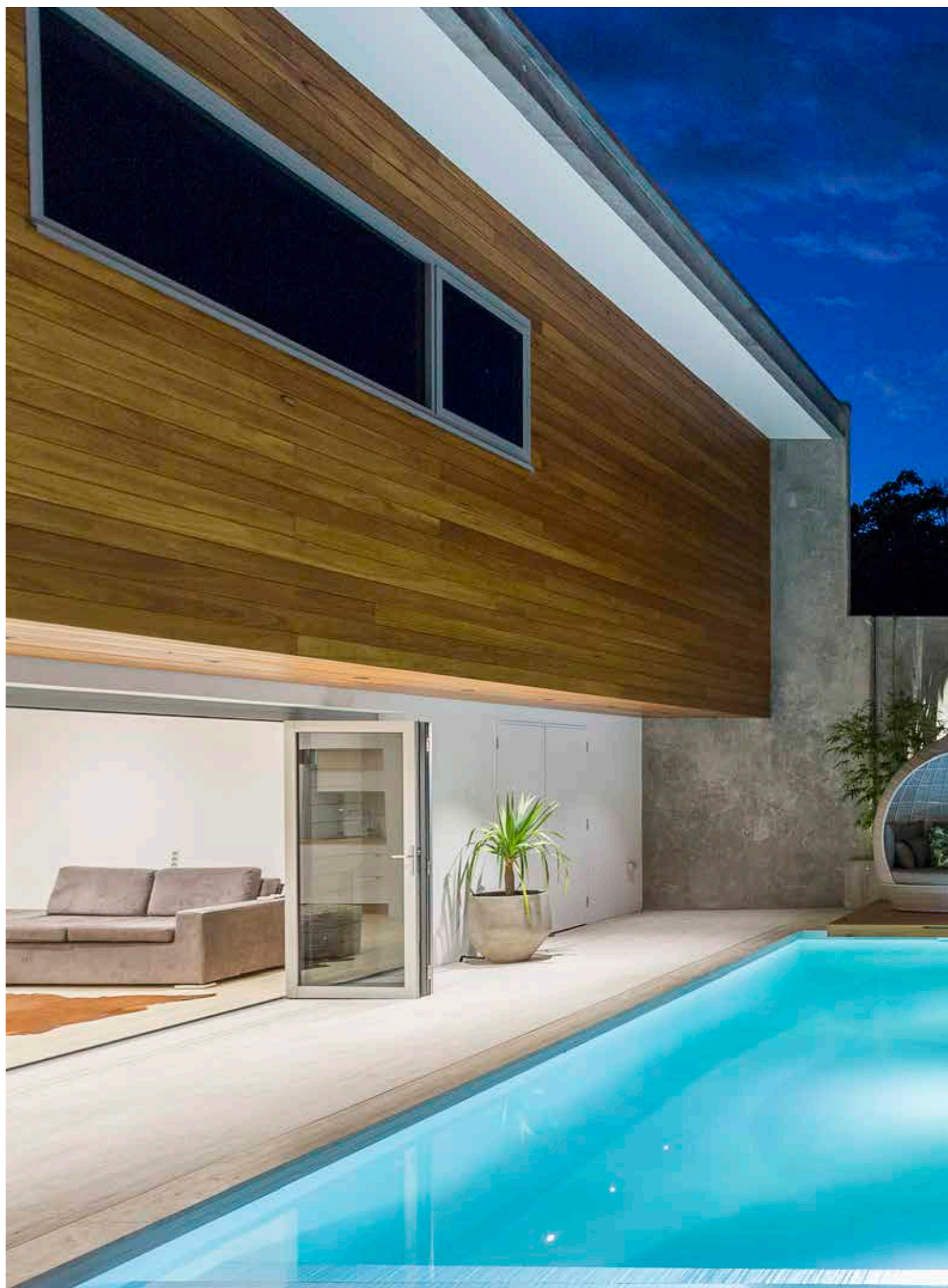
4.6 CLADDING INSTALLATION – VERTICAL OVER CAVITY

Figure 8: Vertical fixing over a drainage cavity



Coat all cladding boards all round prior to installation with at least one coat of finish (refer to finishing Section of this guide).

15. Check studs for straightness and plumb. Pack or plane level as required. Studs nominal 600mm centres.
16. Install vapour permeable membrane over studs. All overlaps (minimum 150mm) facing down.
17. Install cavity battens (see below) to studs over permeable membrane.
18. Fix horizontal battens of suitable material at maximum 600mm centres. Battens should not allow any water penetrating cladding to sit on top of the horizontal batten.
19. Alternately horizontal battens can be fixed directly to studs over vapour permeable membrane.
20. Ensure that there is proper drainage provision in the cavity between cladding and membrane.
21. Install flashings, corner details and perforated cavity closers where necessary. For corner details see Figures 14, 15 and 16.
22. Mark the board increments on the horizontal battens. Make sure to allow for expansion gaps.
23. The tongue of each board should face the prevailing weather direction.
24. Fixing is to use two fixings per crossing.
25. Nailing through overlaps must be avoided but must still provide restraint to the inner board. Boards also should be nailed 25mm away from edges to avoid splitting of thinner sections, or rebated overlaps. Board ends should be pre-drilled to prevent splitting. Also angle the fixing at least 15 degrees to vertical to allow settlement of the frame.
26. Install a starter cladding board at one end.
27. Install cladding boards next to starter cladding board. Follow the increment markings or use spacers to maintain recommended 1 – 2mm expansion gap. Check plumb of each board.
28. If joints are unavoidable, place 45 degree scarf end joints over a horizontal batten. Stagger end joints along the wall.
29. Ensure end grain is sealed prior to installation.





4.6.1 CAVITY BATTENS FOR VERTICAL FIXING

To support vertically fixed cladding boards F27 kiln dried hardwood of above ground natural durability Class 1, cavity battens 70 x 35mm are recommended. Battens should be fixed onto timber studs or supporting wall material at maximum 600mm centre spacing.

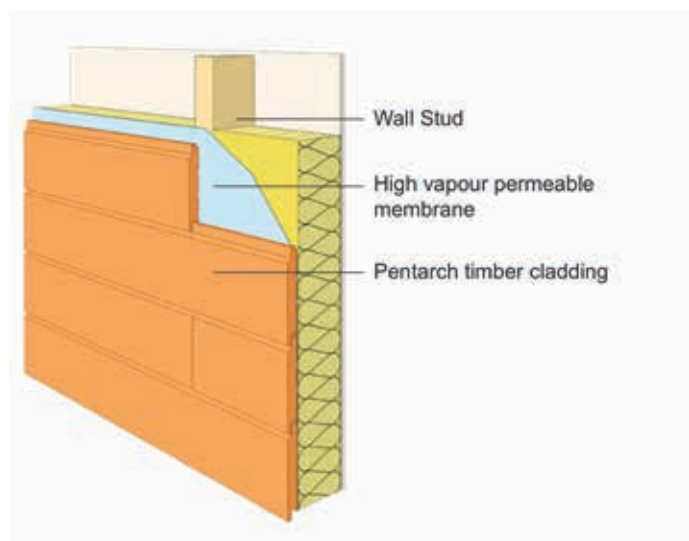
Place a timber or plastic shim spacer (minimum 5mm) between stud and batten to create a space between the batten and vapour permeable membrane

For fixing the battens to softwood timber studs 2/75 x 3.75mm skew nails (plain shank hand-driven) are recommended at each intersection with a stud. Minimum diameter of machine-driven nails is 3.33mm for softwood framing (as per nominal fixings in AS 1684).

Before fixing, the top of each batten is to be planed at an angle of 5 per cent so any water penetrating the cladding can drain away from the back of the boards and into the space between the batten and the vapour permeable membrane.

4.7 CLADDING INSTALLATION – HORIZONTAL DIRECT FIX

Figure 9: Horizontal fixing – direct fix



1. Coat all cladding boards all round prior to installation with at least one coat of finish (refer to finishing Section of this guide).
2. Check studs for straightness and plumb. Pack or plane level as required. Studs maximum 600mm maximum centres.
3. Install vapour permeable membrane over studs. All overlaps (minimum 150mm) facing down.
4. Install flashings and corner details where necessary. For corner details see Figures 14, 15 and 16 below.

5. Mark the board increments on the membrane. Make sure to allow for loose fitting/expansion gaps.
6. Fixing is to occur at a maximum of 600mm centres and using two fixings per crossing.
7. The tongues of each board should face up to prevent water from being trapped inside joints.
8. Nailing through overlaps must be avoided but must still provide restraint to the inner board. Boards also should be nailed 25mm away from edges to avoid splitting of thinner sections, or rebated overlaps. Board ends should be pre-drilled to prevent splitting. Also angle the fixing at least 15 degree to vertical to allow settlement of the frame.
9. Install a starter cladding board at the bottom. Ensure bottom of the board is well clear of horizontal surface at least 100mm above finished ground level. Ground or concrete or paving should be sloped away from the wall.
10. Install cladding boards on top of starter board. Follow the increment markings or use spacers to maintain an expansion gap. Check level of each board.
11. Place butt end joints over a stud. Stagger any butt end joints up the wall.
12. Ensure end grain of each board is sealed prior to installation.

4.8 CLADDING INSTALLATION – DIAGONAL DIRECT FIX

For fixing cladding diagonally a maximum stud spacing of 400mm is recommended (this is to provide a 600mm spacing for cladding).

1. Coat all cladding boards all round prior to installation with at least one coat of finish (refer to Finishing section of this guide).
2. Check studs for straightness and plumb. Pack or plane level as required. Studs maximum 400mm centres.
3. Install high vapour permeable membrane over studs. All overlaps (minimum 150mm) facing down.
4. Install flashings, corner details and perforated cavity closer where necessary. For corner details see Figures 14, 15 and 16 below.
5. Mark the board increments on the battens. Make sure to allow for loose fitting or expansion gaps.
6. The tongues of each board should face up and towards prevailing weather to prevent water from being trapped inside the rebate.
7. Fixing is to occur at a maximum of 600mm centres and using two fixings per crossing.
8. Nailing through overlaps must be avoided but must still provide restraint to the inner board. Boards also should be nailed 25mm away from edges to avoid splitting of thinner sections, or rebated overlaps. Board ends should be pre-drilled to prevent splitting. Also angle the fixing at least 15 degree to vertical to allow settlement of the frame.

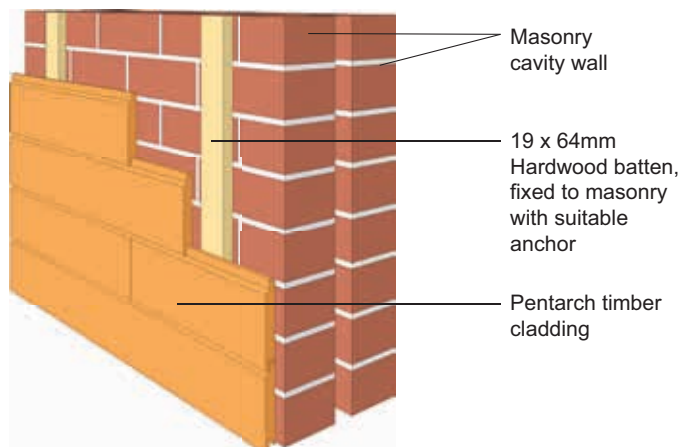
9. Ensure bottom of the boards is at least 100mm above finished ground level. Ground or concrete or paving should slope away from the building.
10. Install subsequent cladding boards on top of starter board. Follow the increment markings or use spacers to maintain an expansion gap. Check level of each board before fixing.
11. Place butt end joints over a stud or batten. Use double battens to support abutting boards. Stagger any butt end joints up the wall.
12. Ensure end grain of each board is sealed prior to installation.

4.9 CLADDING INSTALLATION – DIRECT FIXING TO EXTERIOR MASONRY/CONCRETE

In case of installing cladding battens over a masonry structure, the battens must be installed at maximum 600mm centres utilising suitable plug and screw type fasteners as specified in face fixing section, refer to Figure 7. Cavity battens should be at least 45mm and at least 19mm thick. Kiln dried hardwood 64 x 19mm is recommended though structural (minimum stress grade F5) H3 treated softwood may be used.

A vapour permeable membrane (i.e. low vapour resistance) with high level of water resistance may be used between the timber batten and the masonry wall behind to decrease the risk of moisture transfer from the masonry to timber batten. This risk depends on board profile and exposure.

Figure 10: Battens fixed to masonry and cladding fixed to battens



4.10 FACE FIXING OF CLADDING

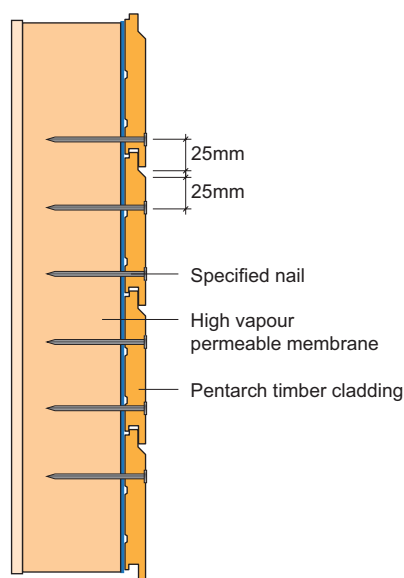
Table 5 provides further details on specific nail types and sizes for face fixing of cladding for different underlying framing. All nails are to be flat, D or bullet headed. The recommended nail diameter should not be exceeded otherwise splitting may occur. Where cladding is installed over a cavity the battens need to be fixed to studs as per minimum recommendations detailed under each installation method.

Table 5: Minimum hand driven nail sizes for face fixing cladding boards to timber framing or cavity battens

Timber framing/ batten type	Hardwood	Softwood
Nail size and type	50 x 2.8mm plain	60 x 2.8mm twisted or annular treaded
Minimum penetration	30mm	40mm

Nails as specified in Figure 11 at least 25mm from the edge and at least 25mm from edge of the rebate.

Figure 11: Face fixing showing fixing position



Note: Cavity Batten is recommended.

Where machine nails or screws are used they need to be equivalent in performance to nails defined in Table 5. As machine nails and screws vary from manufacture to manufacturer, the manufacturer should be consulted regarding the adequacy of the fixing. T-nails should never be used.

4.11 SEMI CONCEALED FIXING OF CLADDING

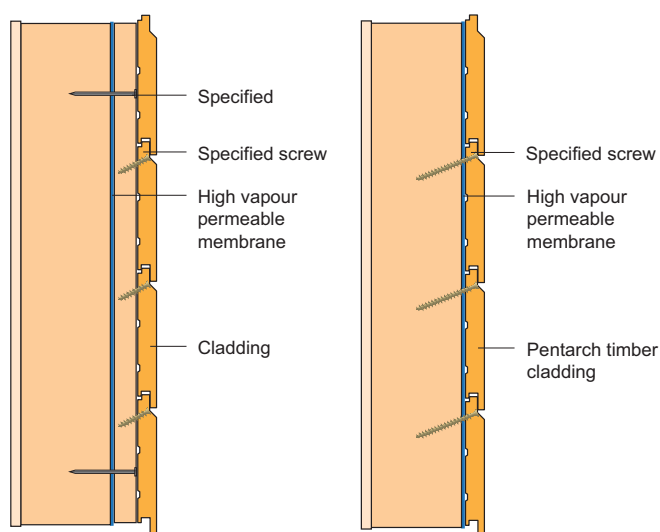
Pentarch Forestry cladding profiles Shadow 125 and Shiplap 128 may be fixed using self drilling decking screws in a semi concealed manner. These screws are to be 10g x 50mm self-drilling decking stainless steel (304/A2 or 316/A4 grade stainless steel) screws and have the following features:

1. Spear shaped screw points are required so to allowing self-drilling into timber without splitting the timber and requiring pre-drilling.
2. The Flat head designs should be used to allow embedment of the screw to provide a smooth neat flush finish for joining of the next board.

Use of screws other than with these features will require pre-drilling.

Screws should be installed minimum 9mm from the edge, on an angle and driven home such that they sit flush on the tongue allowing the over lapping board to lock into place. See Figure 12.

Figure 12: Secret fixing showing fixing position



Semi concealed fixed boards also need to be glued to the batten. A continuous bead (6mm to 10mm approximately) of adhesive rated for exterior use is to be applied to the batten before fixing.

4.12 FASTENERS DURABILITY

Fastener durability is dependent on two aspects; the surrounding environment that the fastener is placed in, as well as if the fastener is contained with preservative treated timber. To assess which fastener corrosion protection should be used, the worse condition should be used.

For surrounding environmental conditions the Australian Standard for fastener performance (AS 3566) lists four classes of corrosion resistance.

Corrosion Class Categories:

- CLASS 1 For general internal use where corrosion resistance is of minor importance.
- CLASS 2 For general internal use where significant levels of condensation occurs.
- CLASS 3 For general external use in mild industrial and marine applications. The class is for cladding fasteners in mild applications. For cladding applications it is assumed the building is protected by an eave overhang of minimum 600mm and the average rainfall does not exceed 1000mm.
- CLASS 4 For external use in marine and moderately severe corrosive environments, generally within 1 kilometre from marine surf, although topography and/or strong prevailing winds may extend this distance. For cladding applications this includes area of high rainfall areas i.e. 1000mm/year, buildings with little or no eave overhang and within a splash zone of a swimming pool.

For Class 2 and 3 environments a hot dip galvanised with a minimum 42 microns of zinc coating is recommended for use.

For Class 4 environments stainless nails with a minimum 316 grade stainless steel is recommended for use with timber cladding.

Where the fasteners are to be in contact with a preservative treated timber elements which are copper preservative based, i.e. ACQ, CCA, CuAz; a minimum of 304 grade stainless steel is to be used. Where other types of corrosion protection are provided, they shall have similar corrosion resistance as specified in the condition stated above.

4.13 EXPANSION GAPS

Care must be taken to ensure that there is a clearance within the overlap of two adjacent boards to allow for any expansion in the width of the board. The recommended gap is 1 to 2mm.

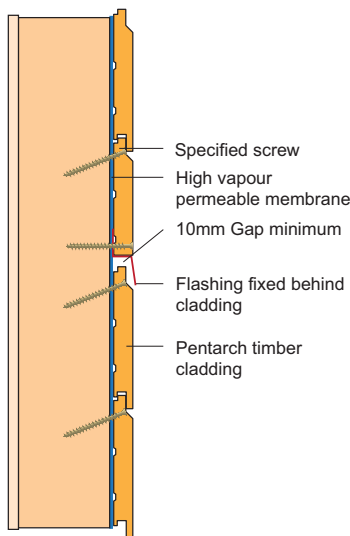
This gap can be achieved with the aid of appropriate spacers at the back or front of the boards. Any spacers must be removed after fixing. Alternatively, mark the vapour permeable membrane or a spacing rod with the spacing for each board allowing for 1 to 2mm spacing between them.

Where cladding is used over a number of storeys, an additional dedicated expansion gap of 10mm is required at every storey and under window sills. This can be achieved by leaving a gap of at least 10mm between boards. The gap formed can be weather protected by covering the gap with a metal formed flashing.

The flashing is fixed to the studs or battens and is bent to overlaps on top of the cladding board below. See Figure 11. Face nailing/screwing will be required to fix the first board above the expansion gap. Gable ends of building may also need a dedicated expansion gap.

It is also recommended that cladding is fixed to the structure once the building is fully loaded, i.e. after roof tiles are installed. This is to let settlement of the building frame work top occur.

Figure 13: Expansion gap located at every storey



All butt joints should be effectively sealed with a water repellent prior to installation. If fixing boards in a horizontal or diagonal manner, start at the lowest point and install with tongue edge uppermost. As work proceeds, check that the boards are plumb or level (as appropriate), fitting each board snugly to that previously fixed. Avoid over cramping. When product is fixed vertically, boards should be installed with the tongue facing towards the direction of the prevailing weather.

If fixing boards in a vertical or diagonal manner, endeavour to use full length boards wherever practical. If joints are unavoidable then they should be butt joints. Butts joints in vertically and diagonally installed boards should also be angle cut at 45 degrees across ends to minimise moisture uptake in board end grain and allow any water to drain down and away.

Where product is fixed diagonally, the direction of fixing shall not cause water to drain into internal corner or stops. At all times, make adequate provision to discharge such water clear of the building.

Boards forming external and internal corners shall either be neatly abutted or finished against matching timber stops of suitable sizing.

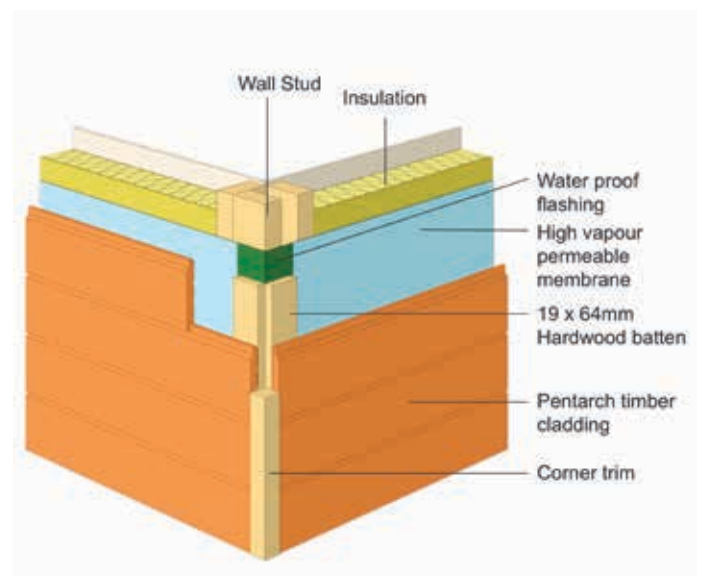
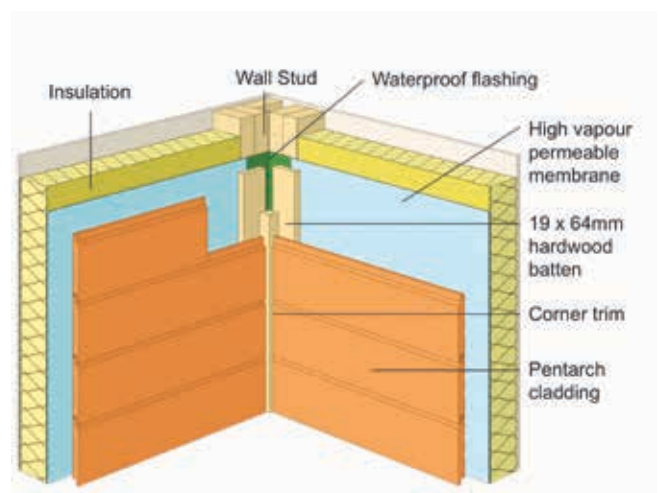
4.14 CORNER DETAILS OF CLADDING

Correct detailing at internal and external corners is very important to prevent moisture infiltrating behind the cladding. The traditional way is to use timber mouldings fixed in front of sheet flashing as illustrated in Figure 12 for an internal corner and Figure 13 for external corners. Folded sheet metal could also be used.

Boards can be butt joined to external or internal mouldings.

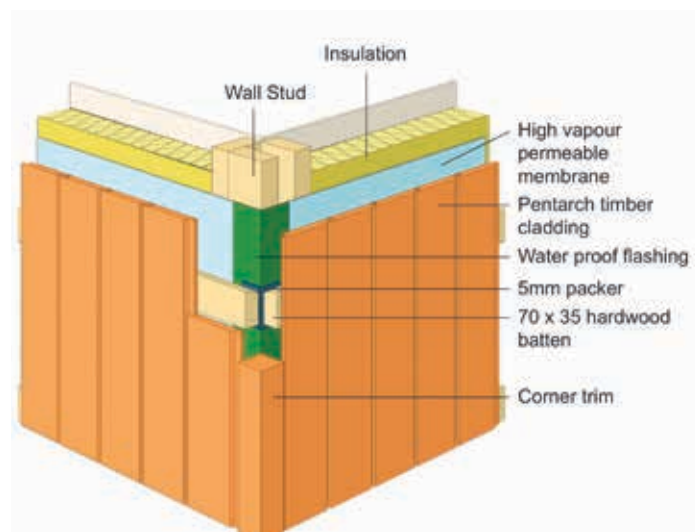
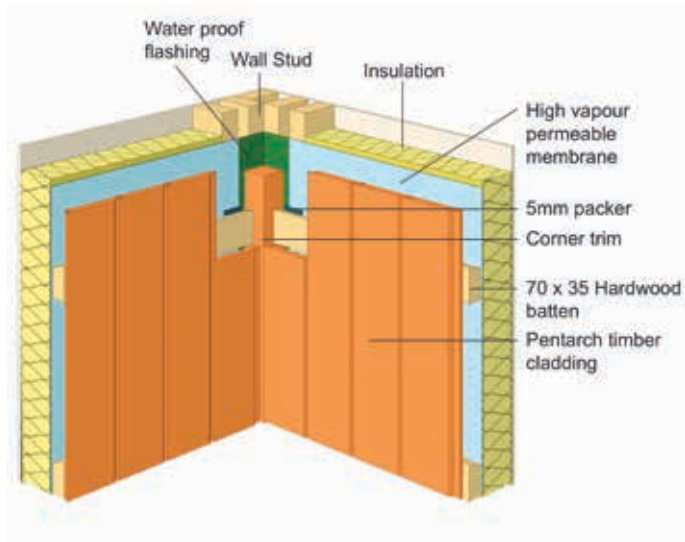
4.14.1 CORNER DETAILS – HORIZONTAL OVER CAVITY

Figure 14: Internal and External corner details – Horizontal installation over a drainage cavity



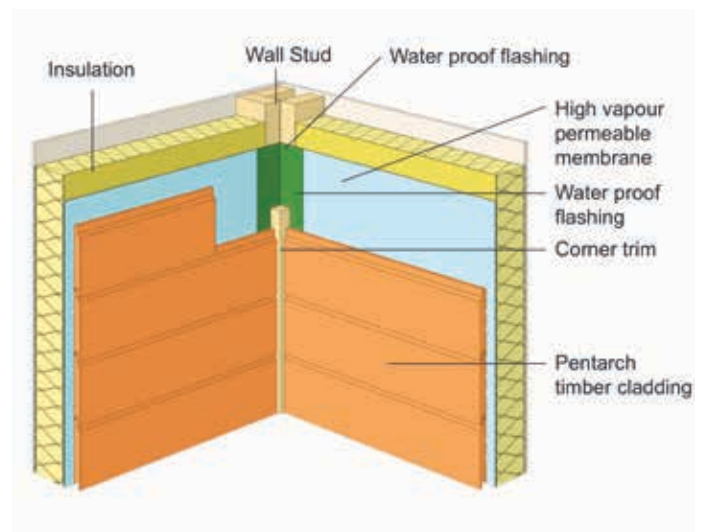
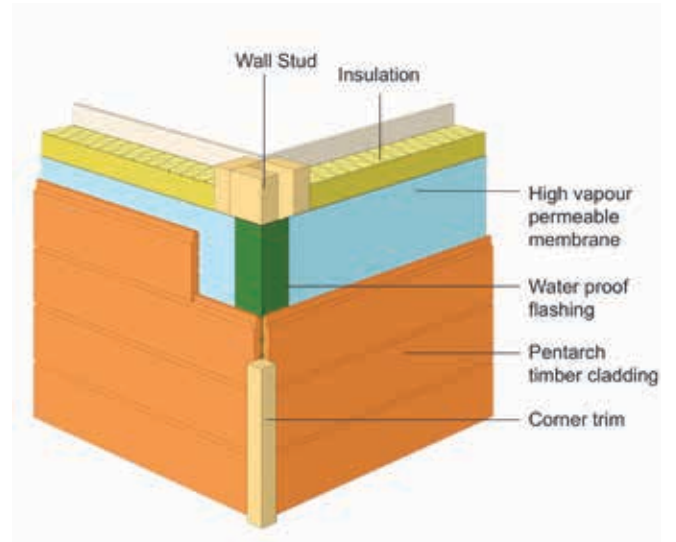
4.14.2 CORNER DETAILS – VERTICAL OVER CAVITY

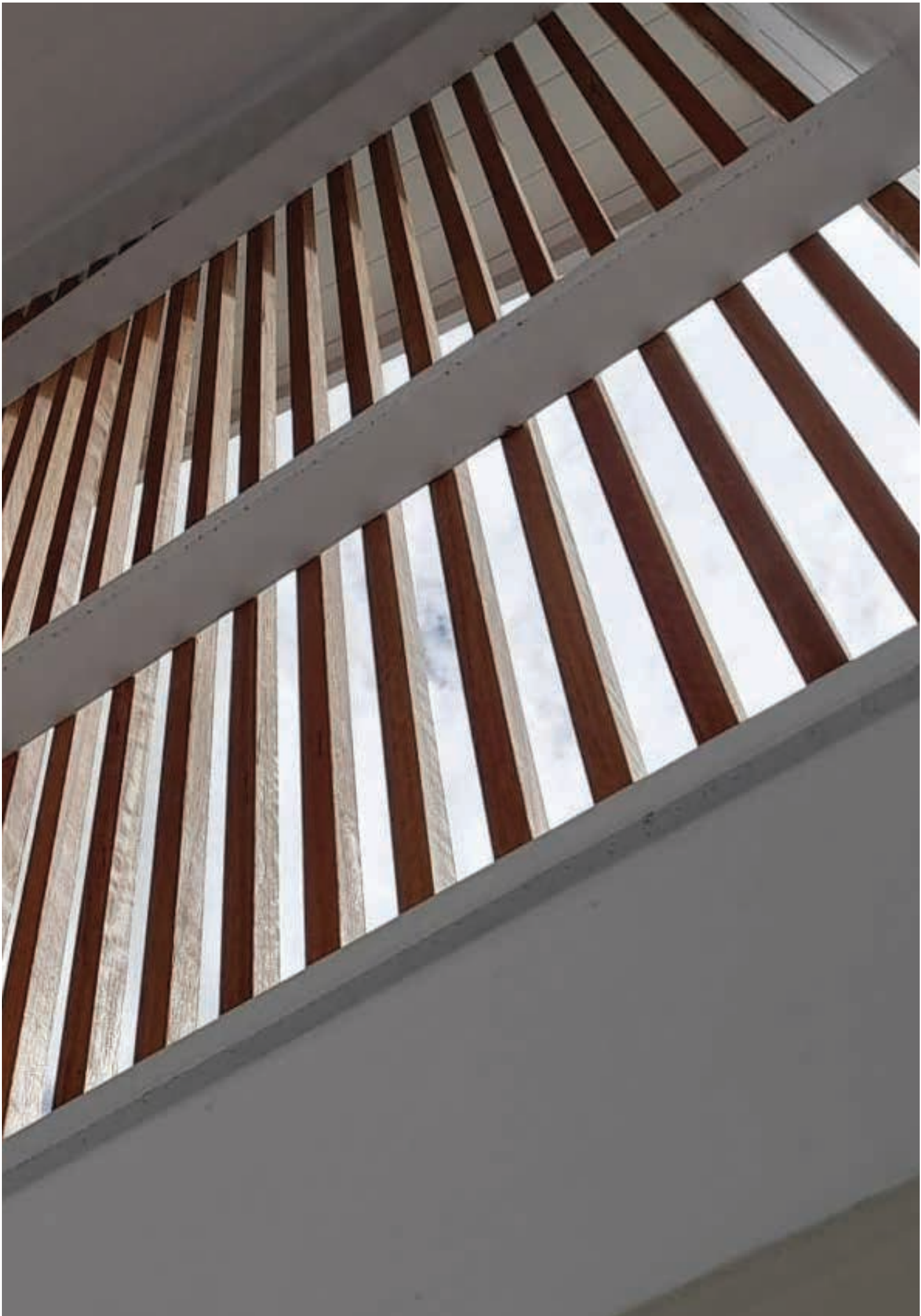
Figure 15: Internal and External corner details – Vertical installation over a drainage cavity



4.14.3 CORNER DETAILS – HORIZONTAL DIRECT FIX

Figure 16: Internal and External corner details – Horizontal installation and direct fixed





5. Finishing

Whatever finish or paint system is used, the manufacturer's recommendations for application should be followed carefully to achieve the best result. All on site cuts should be sealed with an equivalent finish.

5.1 OPTION 1

Pentarch Forestry recommends the following finishing system:

1. Factory applied initial coat

One coat of Intergrain Universal Oil is applied to all the boards all over before delivery. This provides initial protection.

2. Post installation applied second coat

Apply a second coat of desired finish onsite after installation.

3. Third and final coat

Apply a final third coat of desired finish.

5.2 OPTION 2

If the factory applied initial coat is not taken up then the following options are available:

5.2.1 PRE-INSTALLATION COAT

It is recommended that for whatever finish is selected that one coat be applied to cladding boards all round (front, back and end grain) before installation. All cut end grains to be sealed to minimise moisture uptake.

If the cladding is to be painted it is recommended that the primer is applied prior to installing the board. The primer should be coloured to match the final paint coat colour so that any shrinkage of the board does not expose tongue that may have a different colour.

5.2.2 OILS

Traditional oil finishes are suitable finished for Pentarch Forestry Australian hardwood cladding. Note that they may need to be applied more regularly than other finishes. The oil manufacturer's advice needs to be followed. Linseed oil, or a mixture of mineral turpentine and linseed oil, should never be used on timber cladding as a finish.

5.2.3 CLEAR FILM FINISHES

Clear film finishes, such as varnishes and clear polyurethanes, are generally not as durable in direct weather exposure as other finishes and are not recommended for applications where regular maintenance and easy recoating cannot be achieved. Clear film forming finishes with UV absorbing additives may provide protection as long as they are regularly maintained and reapplied as per finish supplier's recommendations.

5.2.4 STAINS

The stain manufacturer's advice should be sought prior to applying the stain and care is required to ensure that the advice is followed, particularly for primers and any final top coats.

5.2.5 PAINT

For all cladding where a painted finish is desired, lighter colour top coats are recommended as they reflect more heat from the surface of the timber cladding and minimise moisture changes. Dark colour top coats absorb more heat, particularly in north and west orientation, and are to be avoided as they may cause excessive movement of the timber due to moisture loss.

All boards should be primed all round with a solvent (oil) based primer plus one coat of undercoat. Due to shrinkage or expansion that may occur during the life of the cladding, the undercoat colour should be tinted to match to the top coat.

Any knots may be sealed with a 2 pack polyurethane or other sealer recommended by the paint manufacturer.

Apply two top coats of quality paint at the recommended thickness.

5.2.6 NO FINISH

Left uncoated, hardwood cladding will weather to a natural grey, a characteristic of all timber exposed to direct sunlight. The time it takes for the timber to grey naturally will vary depending on the exposure to direct sunlight and moisture (rain). Some areas protected from the sun and weather (for example under eaves or other roof projections) may not grey at all or take a very long time to grey off.

If a client prefers that no finish is applied, installers should discuss with the client the variability of the appearance of the timber during the period it takes to grey. The overall service life of the cladding will also not be as long as a cladding that has been protected by a well selected, well applied and maintained finish.

5.3 FINISH MAINTENANCE

Pentarch Forestry Australian hardwood cladding species are all natural durability above-ground Class 1 hardwoods and should give a long service life. However for maximum service life regular and effective maintenance is necessary. The frequency of maintenance will depend on the type of finish and the degree of exposure to the weather. Cleaning and refinishing should be carried out in accordance with the finish manufacturer's specifications.

6. Product Specification of Timber cladding

Pentarch Forestry Australian hardwood cladding is supplied to the following specification

	Pentarch Forestry Australian Hardwood Cladding Profiles		
	Rusticated 127	Shadow 125	Shiplap 128
Cover	127mm (±0.3mm)	125mm (±0.3mm)	128mm (±0.3mm)
Thickness	19mm (±0.3mm)		
Lengths	All timber is supplied in random lengths ranging from a minimum 900mm to a maximum 5,400mm. Average 3,600mm		
Cupping	< 0.8mm (edge to edge)		
Squareness	< 1.0mm (across the end of the board)		
Moisture Content (MC)	Pack average of 10.0 – 18.0% MC (oven dried basis) when produced		
Species	Blackbutt, Spotted Gum, Ironbark, Tallowwood		
Colour	Colour selection is not part of the grading process		
Grades (apply to face only)	Standard and better, natural		
Surface Finish	Moulded, uncoated, pre-oiled (by special order)		

The product is supplied within the following tolerance limits

Length (m)	Permissible Limits (mm)		
	Bow	Spring	Twist
1.2	5	1	5
1.8	11	2	8
2.4	19	3	10
3.0	30	5	13
3.6	45	7	16
4.2	60	10	18
4.8	75	13	21
5.4	95	16	23

6.1 SPECIES PROPERTIES

	SPECIES			
	Blackbutt	Ironbark	Spotted Gum	Tallowwood
Colour	Blonde to pale brown, sometimes with a slight pinkish tinge, fairly consistent	Varied – from pale brown to dark chocolate brown and dark red	Varied – pale to dark brown or chocolate	Yellowish brown with a tinge of olive green, fairly consistent
Natural features	Gum vein/fire streak, pinhole borer which may have minimal black stain	Squiggly borer swirls, occasional patches of pinhole borer, fiddle back grain	Fiddle back/interlocking grain, occasional gum vein, sapwood	Grain often interlocked, pinhole borer often
Origin	NSW – mid to far north coast and Queensland	NSW – mid to far north coast and Queensland	NSW – mid to far north coast, south coast and Queensland	NSW – mid to far north coast, coastal ranges
Sustainability certification	RW/PEFC available on request	RW/PEFC available on request	RW/PEFC available on request	RW/PEFC
Hardness (Janka Rating)	8.9 – hard	11.9 – very hard	10.1 – very hard	8.6 – hard
Unit tangential movement (%)	0.37	0.39	0.38	0.37
Above Ground Durability Class and Life Expectancy	Class 1 – Greater than 40 years	Class 1 – Greater than 40 years	Class 1 – Greater than 40 years	Class 1 – Greater than 40 years
Termite resistant heartwood	Yes	Yes	Yes	Yes
Density	850 kg/m ³	1100 kg/m ³	1100 kg/m ³	1000 kg/m ³
Maximum External Cladding Bushfire Attack Level (BAL)	BAL-29	BAL-19 (Red and Grey Ironbark)	BAL-29	BAL-29
Group number	3	3	3	3
Average Extinction Area	Less than 250m ² /kg	Less than 250m ² /kg	Less than 250m ² /kg	Less than 250m ² /kg
Spread of Flame Index	9	5	3	5
Smoke-Developed Index	3	3	3	4

Note:

1. For further information on timber species please refer to Pentarch Forestry Species Quick Reference Guide – Decorative Hardwood Timber.
2. Colour may vary.

7. Installers Information

7.1 DELIVERY, STORAGE AND HANDLING

7.1.1 ACCEPTING DELIVERY

1. Check against consignment note that you have the correct quantity of packs.
2. Check for any damage to packs. Any damage should be recorded on the delivery document, and the supplier immediately notified.
3. Check the pack label (located on one of the packs). Check that the quantity is correct.
4. Check quality according to Pentarch Forestry's Australian hardwood cladding product specification (see specification section).
5. Notify supplier immediately after delivery if any items do not meet specification.

7.1.2 ONSITE STORAGE

Pentarch Forestry's Australian hardwood cladding is all kiln dried to a moisture level that is suitable for installation to most locations around Australia. It is not necessary to acclimatise the timber before installation as it is best to install it as soon as possible to minimise the risk of any problems occurring.

After delivery the cladding should be kept in its original wrapping and protected from sun, rain and extreme heat, preferably by storing under cover.

Packs should be placed on level supports spaced no more than 600mm apart well clear of the ground; over a dry surface. This is to keep excessive moisture out or prevent timber drying out too much. This will also help maintain the timber profile accuracy and straightness.

Furthermore, keep the timber clean and dry during installation because marks and stains may not be hidden by subsequent clear or stain finishes.

7.2 HANDLING AND CUTTING

Personal Protection Equipment (PPE) should be worn to protect the eyes, nose, mouth and hands when sanding, sawing or planning timber products. Refer to tool manufacturer's recommendations for safe working with particular items of equipment. A Materials Safety Data Sheet (MSDS) for each Pentarch Forestry product is available from the website.

7.3 METAL WORK AND GRINDING

Residual metal particles from angle grinders and the like react with moisture and the natural tannins in the hardwood and are likely to cause stains on the timber. To prevent, avoid grinding metal near or above boards prior to the cladding having a finish applied. If grinding needs to be done, completely cover the boards and remove grinding dust.

7.4 TANNIN STAIN MINIMISATION

All hardwood species contain water soluble natural extractives and tannins. To minimise staining issues to surrounding structure, ensure cladding is sealed all round with the chosen finish. Where new concrete work or paving is directly beneath the cladding, additional protection during the cladding's initial exposure to rain can be provided by sealing the concrete or pavers. The type of sealer used is dependent on the substrate (i.e. concrete or natural stone) and reference to the supplier of these products is required.



Pentarch Forestry products are Responsible Wood chain of custody certified (AS 4707-2006), the only chain of custody certification process that is an Australian Standard. This provides peace of mind that Pentarch Forestry's timber is sourced from sustainably managed and legal forestry. The Responsible Wood Scheme has mutual recognition by the Programme for the Endorsement of Forest Certification Scheme (PEFC) – the world's largest forest management certifier.

This technical information is intended to provide general information on Timber products and should not be a substitute for professional building advice. We recommend you use a qualified person to install Pentarch Forestry. Illustrations in this guide are only representative of Pentarch Forestry products and the appearance and effects that may be achieved by their use. To ensure the information you are using is current, Pentarch Forestry recommends you review the latest building information available on the Pentarch Forestry website. For further information contact your nearest Pentarch Forestry Sales Office.

Note: Variations within a timber species are normal, therefore photographs, samples and displays can only be indicative of colour and should not be used for final selection. It is normal for natural timber products to react to changes in atmospheric and environmental conditions such as humidity and temperature.

pentarchforestry.com.au

National free call 1800 818 317

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