PENTARCH FORESTRY®

# PREMIER SOLID OVERLAY FLOORING™

**INSTALLATION GUIDE** FOR END MATCHED PROFILE

**Pentarch Premier solid overlay flooring™ is a 14mm thick non-structural solid hardwood tongue and groove strip flooring profile designed to be installed over a solid structural subfloor. It is precision-milled to 85mm and 130mm. Tongue and groove joints ensure a continuous and stable surface.**

The following should only be used as a guide and the installer should apply all Australian Standards, National Construction Code (NCC) requirements, and best practices when installing. The sub floor moisture and under floor humidity must comply with NCC and AS 1684 requirements. This must include the relevant safety protocols required. This guide should not be used as the sole means of direction.

Pentarch Forestry recommends that a qualified professional timber flooring contractor installs, sands and finishes a Pentarch hardwood timber floor. Read all instructions before starting and take the time to plan the job properly. Please check all material for faults or defects prior to installation. If there are any problems before or during the laying of a Pentarch Forestry product, stop and do not continue laying, contact your Pentarch representative immediately.





## 1. Properties of Timber

Timber is hygroscopic – meaning it is capable of easily absorbing and expelling moisture in response to local conditions. As timber absorbs moisture it expands and as it expels moisture it contracts.

As such, factors such as relative humidity (atmospheric moisture), moisture ingress (sub-floor or other), direct sunlight, air conditioning and lack of adequate ventilation can cause timber to expand or contract.

Therefore, care must be taken to correctly assess the suitability of the site prior to the installation of timber flooring, as well as to maintain a suitable environment where the timber floor has been installed.

## 2. Acclimatisation

It is important to allow the timber to adapt to the environmental conditions of the site and a period of two weeks between installation and sanding and finishing should be considered to allow the overlay timber floor to acclimatise to the expected in-service conditions.

Timber is a natural product that expands and contracts with seasonal changes and is affected by the moisture content of the air. The moisture content of timber is the percentage weight of water present in the timber compared to the weight of the timber with all water removed. Moisture content varies with changes in humidity and temperature in the surrounding air.

Small seasonal changes in timber flooring are a normal occurrence and fine gaps that open up between boards during dry periods are not considered a defect.

To minimise the movement of a hardwood floor caused by swelling on moisture uptake and shrinking on moisture loss, it is important to lay and fix a timber floor that is close to the average moisture content of the environment in which it is to be laid.

This guide outlines the procedures required to assess the site and acclimatise solid hardwood timber flooring for the best results.

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## 2(a). Site Climate Assessment

Every site requires climate assessment prior to the installation of a timber floor. It is important to know the long term relative humidity (RH) for the area where the floor is to be installed. Relative humidity is the major influence determining whether solid timber flooring will absorb moisture from the air and swell, or whether it will lose moisture and shrink.

If the moisture content of the timber floor is close to the average long term relative humidity for the area then subsequent seasonal changes will be minimal. However, if the long term relative humidity for the area is significantly different to that of the timber flooring, increased seasonal changes in the moisture content of the floor should be expected.

Solid hardwood timber flooring is kiln dried to approximately 9 to 14% moisture content as per AS 2796.

On-site relative humidity is measured with a Hygrometer. It is recommended that Relative Humidity (RH) and temperature levels are recorded prior to and during installation.

The local site climate can be assessed using data from the Australian Bureau of Meteorology website at www.bom.gov.au/climate. Approximate average equilibrium moisture content (EMC) is provided for each climate in Australia. EMC is the moisture content that timber will reach under set conditions of relative humidity and temperature.

Where seasonal variations are greater, seasonal movement (shrinkage and swelling) can be expected to be greater. Areas that experience high levels of seasonal variation require greater allowance for floor expansion at the time of installation.

Adequate subfloor ventilation is an important factor in reducing expansion and cupping of hardwood timber flooring. The sub floor moisture and under floor humidity must comply with NCC and AS 1684 requirements. Where humidity remains high beneath a floor, the boards will absorb the moisture and expand.

It is recommended that the ground below the subfloor be sealed with an impervious membrane, such as 200 micron plastic or vapour barrier. The plastic should be taped continuously with a 200mm overlap.

As subfloor conditions can change, this alone can greatly improve the performance of a timber floor in the future.

The internal environment should also be assessed before installation. Within a dwelling, a number of climates may develop, causing areas of flooring to respond differently within the same dwelling. These include large expanses of glass, fireplaces, fridges, air conditioners, any appliances that vent warm air, the aspect of the house and two-storey construction. All of these can have an effect on the dimensional movement of the boards. When floors are exposed to direct sun through large

glassed areas, protection should be considered before, during and after construction. Evaporative coolers add moisture to the air and raise the relative humidity, resulting in moisture contents in the flooring that are higher than under ambient conditions.

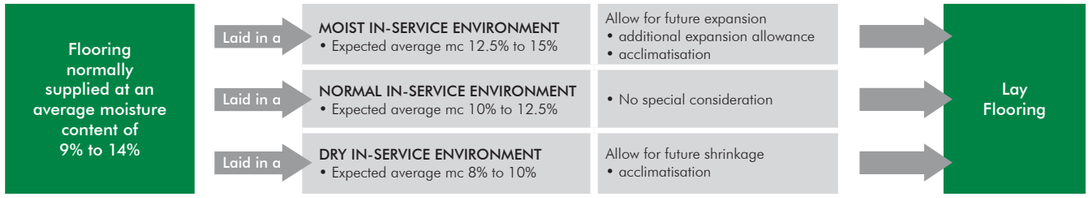
The likely movement of a floor after installation should also be a consideration when assessing the site. Small differences in moisture content between boards at the time of manufacture (5% is allowed by Australian Standards) together with variable conditions within the house (such as a west-facing room compared to a south-facing) will cause further variation in board width.

For this reason, it can be expected that small gaps will occur at the edges of most boards, particularly during drier months. These gap sizes may differ across the floor.

In cases where shrinkage may occur after installation, wider solid strip flooring boards such as 130mm will result in larger gaps at board edges when compared with narrower board widths (e.g. 85mm). Air conditioning that does not have a humidity control system, which is installed after a floor has been laid, may increase the size of shrinkage gaps, as it changes the relative humidity in the area.

Some movement occurs after laying timber floors as the timber adjusts to the climate. Although some floor finishes may reduce moisture content changes, they will not prevent this kind of movement. In cases where greater movement is expected after installation, such as from seasonal changes, the use of wider boards or from air conditioning installed after installation, particular care should be taken to ensure that the flooring finish does not act as an adhesive by bonding a number of boards together. With subsequent shrinkage, wide gaps between groups of four or five boards may occur, or boards may split.

**1.0 – A simple guide to whether acclimatisation is necessary is provided in the flow chart below**




## 2(b). Moisture Content and Acclimatisation

Solid hardwood timber flooring is kiln dried to 9 to 14% moisture content as per AS 2796.

Where the average supplied moisture content of the flooring is near the expected average in-service moisture content, acclimatisation of the hardwood boards is not necessary. Where conditions are drier, such as inland areas or air conditioned buildings, or where conditions are humid, such as in coastal areas or elevated regions, flooring may need to be acclimatised on site.

Acclimatisation can only be effective in dry locations during dry periods or in an air conditioned building if the air conditioning is operating at the time.

Acclimatisation is only complete when the moisture content of the timber flooring is equal to the Relative Humidity (RH) in the environment. This usually takes about 14 days, but the time may vary depending on the species used and the weather conditions. To check that the timber flooring has reached this point it should be moisture tested with an appropriate timber moisture meter.

This reading can then be compared to the Relative Humidity (RH) using Table 1.1.

It is important to acclimatise the timber in or as near to the area of installation as is possible to achieve the desired outcome.

**Table 1.1 Moisture content of wood at various temperature and relative humidity readings.**

| Temperature (°C) | Relative Humidity (percent) | | | |
|---|---|---|---|---|
| | 40 | 50 | 60 | 70 |
| 10 | 7.9 | 9.5 | 11.3 | 13.5 |
| 16 | 7.8 | 9.4 | 11.1 | 13.3 |
| 21 | 7.7 | 9.2 | 11.0 | 13.1 |
| 27 | 7.6 | 9.1 | 10.8 | 12.9 |
| 32 | 7.4 | 8.9 | 10.5 | 12.6 |
| 38 | 7.2 | 8.7 | 10.3 | 12.3 |

## 3. Product Handling on Site

The packaging around Pentarch Forestry products is designed to protect it during transport only. Upon delivery timber flooring should be stored indoors where it can be protected from the elements. Do not store outside using a protective covering such as a tarpaulin as condensation can occur underneath.

Within a pack of 85mm or 130mm wide Pentarch Overlay solid strip flooring, boards are supplied between 900mm to 4200mm long, in a single, random length configuration. It is recommended that the boards are kept wrapped during pre-installation and are only cut open just before laying.

## 4. Suitable Subfloors

Pentarch Overlay is designed for a subfloor that is structurally sound, level, flat, clean and dry such as:

- Sheet flooring such as plywood or particleboard (all profiles)
- Existing strip timber floors (all profiles)
- Concrete slab – **85mm profile only.**

The ground level moisture and under floor humidity must comply to NCC and AS 1684 requirements.

- Air vents should always remain unobstructed.
- Number of air vents and size should meet or exceed NCC requirements.
- Ground level below flooring should be well drained and should be flat, level and clear of any debris.

**If there are any problems before or during the laying of a Pentarch Forestry product, stop and do not continue laying.** Contact your Pentarch Forestry representative immediately. If the above preparation is not practical then plywood sheeting should be laid over the existing floor boards to act as a sub-floor. If plywood is used it must comply with AS/NZS 2269 – Part 0 Plywood Structural Specifications.

## 4(a). Inspection of the Site

Before installing a timber floor, ensure the site conditions are suitable. A timber floor should only be installed in a weatherproof building. The project should reach near completion before installation begins to avoid damaging the newly fitted timber floor from heavy trade traffic. The roof, external doors and windows, exterior cladding and wet trades should all be complete before a timber floor is installed. The storm water system must be complete or effectively directed away from the sub-floor.

1. Conduct a visual inspection for signs of moisture possibly resulting from pipe leaks, window seal leaks, bathroom/laundry overflow problems, ceilings leaks or rising damp. Any signs of moisture ingress must be remedied prior to installation.
2. If the ground level underneath the timber flooring is consistently damp (high humidity) this can adversely affect the timber flooring and lead to increased expansion and/or cupping.
3. Sub-floor ventilation should at a minimum conform to the NCC, although in areas of high humidity or where increased exposure to moisture is apparent it is good practice to increase the surface area of the vents and/or install fans to increase air circulation under the floor. Sub-floor vents should always allow for cross ventilation of the sub-floor and must not be placed on only one side of a dwelling.

## 5. Suitable Subfloors
## 5(a) Expansion Gaps (Control Joints)

Plan expansion gaps and perimeter fixings before commencing the job. Due to the hygroscopic nature of timber, the flooring will expand and contract with changes in moisture content making expansion gaps essential.

The allowance of expansion gaps at the perimeter walls and around obstructions will allow the floor to move as required. Insufficient expansion gaps can result in buckling and deformation of the flooring.

Pentarch Forestry recommends a minimum expansion gap at all perimeter walls and obstructions of 12mm. For domestic applications floor widths over 6m will require an intermediate expansion joint.

Alternatively, a series of smaller expansion gaps every 800mm to 1000mm can be used to provide equivalent spacing. If cork expansion joints are used, the cork should be approximately 2mm above the floor surface when installed. This will be removed during the sanding process. However, cork to the perimeter should be installed level with the timber surface.

Expansion gaps can be readily increased by under cutting plasterboard walls or through the use of thicker skirtings or beading. Expansion joints are best placed at doorways or in line with internal walls. Expansion joints help to break large floors into smaller sections thereby maximising total expansion gaps.

## 5(b). Plywood/Particleboard

Make sure the concrete slab is flat with no more than +/-3mm deviation in a 3 metre radius as per AS 3600 – 2001: Concrete structures. Deviations to the surface greater than 3mm over 3m are to be filled with a self-levelling compound following manufacturers recommendations, or ground down to conform to the aforementioned specification for flatness.

Plywood or particleboard is a good sub-floor for Pentarch Premier solid overlay flooring when free from wax and dirt. The sub-floor must be level sanded prior to installation removing any surface irregularities, such as edge swelling at joints. Plywood sheeting should be a minimum of five ply 12mm thick. The plywood must comply with AS/NZS 2269 – Part 0 Plywood Structural Specifications.

**The plywood or particleboard should have a moisture content that is within 2% of the flooring being installed.**

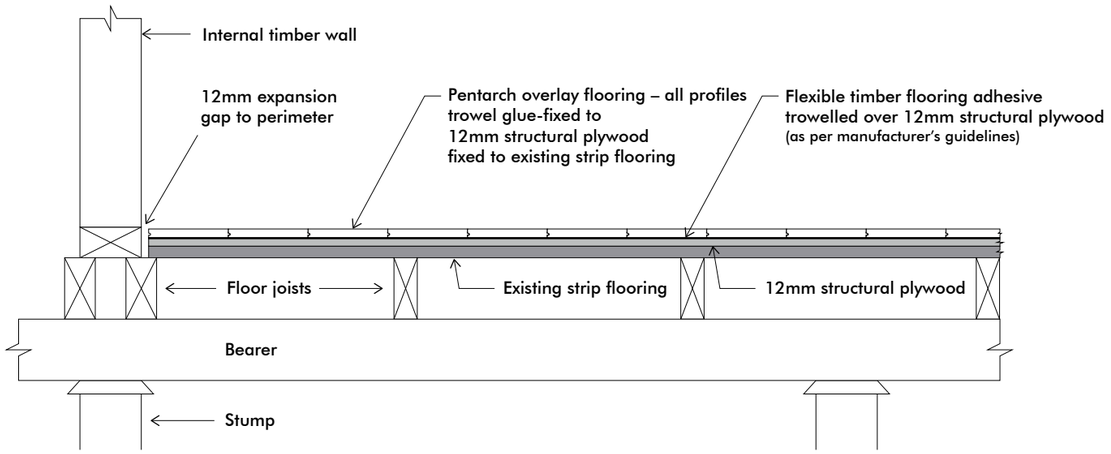
Pentarch recommends Plywood and Particleboard substrates over battens or joists and should be screwed down as per manufacturer's recommendations. If installing plywood/sheet flooring over a concrete slab, a plastic moisture barrier (minimum thickness of 200 micron) needs to be installed under the plywood as per manufacturer's instructions.

Any joins should be overlapped by 200mm and taped to ensure that no moisture ingress (entry) is possible through the barrier. The plastic barrier should continue 75mm up the walls and all joins should overlap by 200mm. Joins should then be sealed with duct tape.

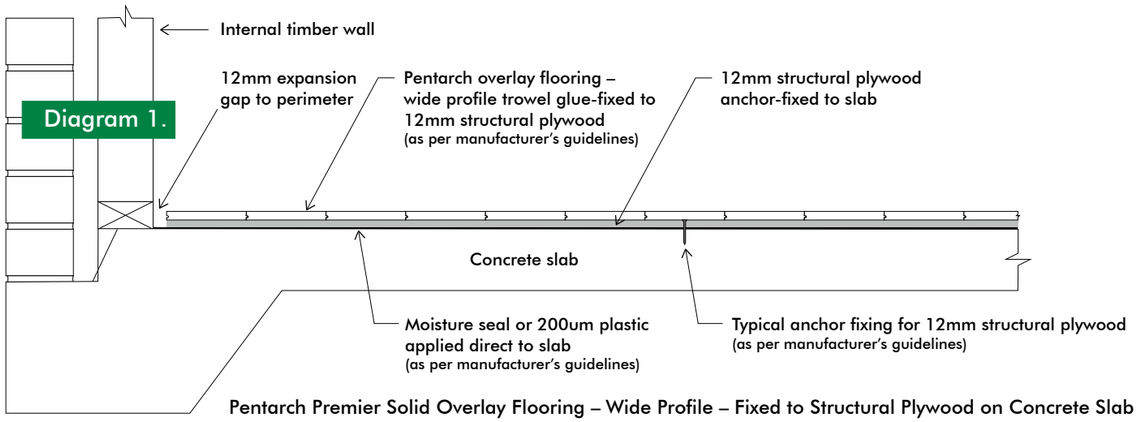
An alternative, is to apply a moisture/vapour barrier as per manufacturer's instructions.

## 5(c). Existing Timber Floor

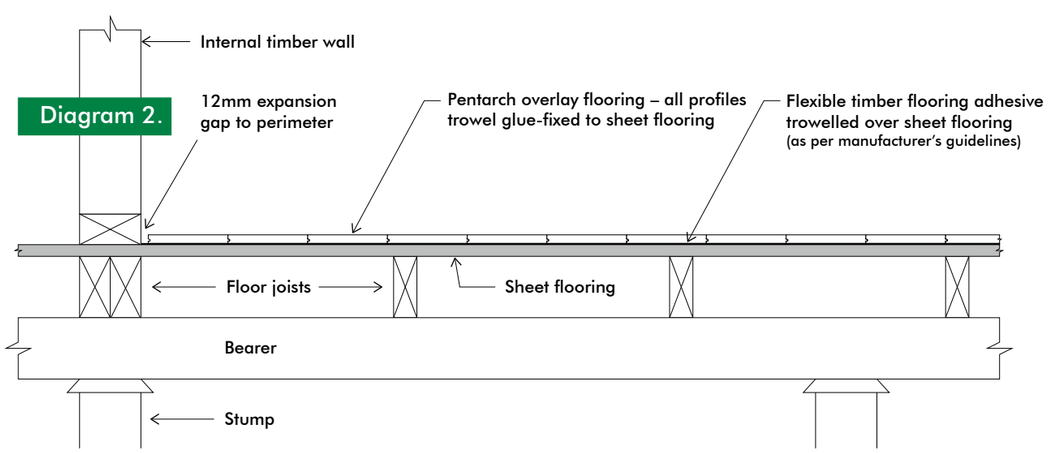
Existing timber flooring must be structurally sound and rough-sanded to remove any unevenness, cupping or rough material and to remove wax or other surface finishes. It is recommended that the Pentarch Premier solid overlay flooring™ floor boards be laid at a 90 degree angle to the line of the existing sub-floor boards to avoid possible sub-floor movement that could affect the finished floor.




## 5(d). 13mm Profiles




Pentarch Premier Solid Overlay Flooring – Wide Profile – Fixed to Structural Plywood on Concrete Slab








130mm profile is suitable to be installed onto plywood, particle board or existing timber floors. 130mm profile **CANNOT** be laid directly over a concrete slab.

- Select a number of floorboards from all the packs to ensure colour and grain variations are evenly spread.
- In the room. Leave a 12mm expansion gap alongside and end walls. Place 12mm blocks/wedges along sides and on one end to maintain these gaps while boards are being placed and nailed or stapled.
- Pentarch Overlay 130mm must be installed using a full trowel glue and mechanical fix method. Pentarch recommends using a 16 gauge secret nailer with 25mm cleats.
- Pentarch Overlay must be fixed with a Flexible timber flooring adhesive as per manufacturer's instructions. The sub-floor area must be fully trowelled with adhesive. Spread only enough for 3 or 4 boards at a time. Starting from the wall and working from left to right, lay the boards and nail with the groove to the wall.
- Continue working towards the right then start the next row, remembering to allow for a 12mm expansion joint. To minimise cutting waste try to make the off-cut from this board long enough to use elsewhere.

## 5(e). 85mm Profile

**This can be installed directly to an appropriate concrete slab as well as plywood, particle board and timber flooring.**

**If installing direct to a concrete slab:**

For concrete tolerances, please refer to 5(b).

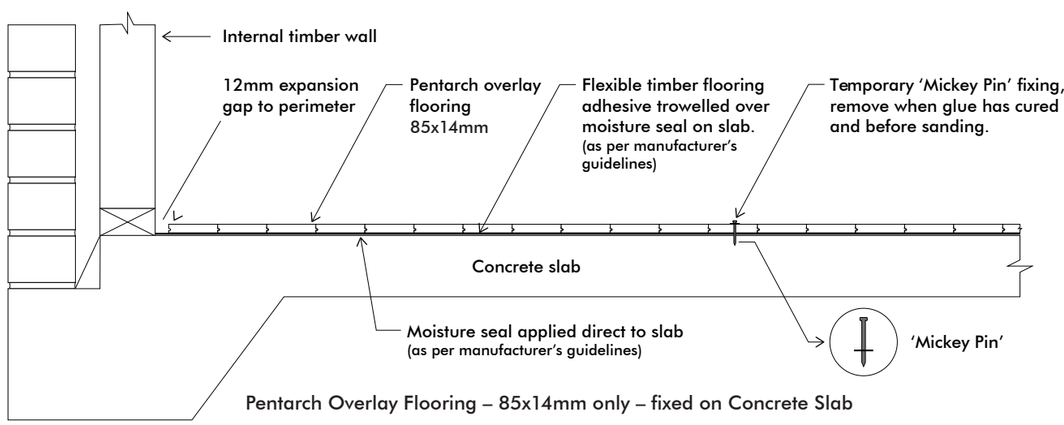
A concrete sub-floor should be moisture tested in accordance with AS 1884 – 1985. Excerpt from ATFA guidelines – Concrete moisture assessment – A 'dry' slab is signified by impedance moisture meter readings of up to 2.0% and in-slab relative humidity (RH) up to 75%. Where floors have been covered by previous floor coverings values are often up to 3.5% and 80% in-slab RH. Higher readings require investigation as to possible moisture sources and may require more than the slab moisture protection outlined in this specification.

Moisture assessment does not preclude the need for moisture vapour barrier assessment. It is also recommended to provide a 200 micron plastic membrane (builder's plastic) as a moisture/vapour barrier prior to installation of the plywood substrate. This minimises the risk of moisture uptake into the timber flooring from the concrete slab after installation.

The plastic barrier should continue 75mm up the walls and all joins should overlap by 200mm. Joins should then be sealed with duct tape.

If using a paint on moisture/vapour barrier apply as per manufacturer's instructions. Ensure a compatible adhesive is used with the moisture/vapour barrier.

- The concrete slab must be dry and free of contaminants including but not limited to oil, paint, grease, dust, metal shavings, saw dust.
- Fully scrape the concrete slab with a wide blade scraper to remove all cement render spoil, plasterboard setting residues and mortar excess at the base of walls. Grinding the surface clean is a trade accepted and more thorough method.
- Select a number of floorboards from various bundles to ensure colour and grain variations are evenly spread.
- Set up a work area and a main floor area. Flick a chalk line that is 10 board widths plus 12mm from the starting wall to establish a straight line. The area between the chalk line and the starting wall is the work area.
- Using concrete nails or "mickey pins" nail a row of boards on this line as a holding block, with the tongue facing the starting wall.
- The nails may be removed after the glue has set. Pneumatically fixed 'T' nails are acceptable as alternative to 'Mickey Pins'.
- Leave a 12mm expansion gap along end walls. Place 12mm blocks/wedges along one end to maintain the gap while boards are being placed and glued down.




Pentarch Overlay Flooring – 85x14mm only – fixed on Concrete Slab

## 6. Sanding and Finishing

- Pentarch Forestry recommends a professional sander and finisher to complete the job successfully. Refer to AS 4786 for sanding and finishing of timber floors.
- Once installation is complete the new floor should be left to allow the glue to cure before sanding machines are used. Refer to adhesive manufacturers recommendations for the appropriate timing.
- There are many different types of finishes available from the increasingly popular water-borne polyurethanes to oil based and solvent based coatings. All of these coatings will affect the look of the timber floor in a different way so it is important for the installer/customer to be informed when deciding on the coating. Sheen levels choices can be influenced by the colour of the timber e.g. dark timbers and gloss finishes will highlight dust and matt finishes will minimise reflection.
- Pentarch Forestry recommends water-borne or oil based finishes because they are less prone to "edge-bonding". Edge-bonding can occur when the coating bonds the flooring together so tightly that the flooring splits mid – board instead of on the joins during contraction. Always follow the manufacturer's recommendations when choosing and using floor coatings.

## 7. Care and Maintenance

For information on care and maintenance of a timber floor download a Pentarch Forestry Care and Maintenance brochure at **http://www.pentarch.com.au/flooring.html**

Responsible Wood RW/1-31-217

PEFC PEFC/21-31-217

Sustainably Grown. Australian Made.

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.

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