OVERVIEW

Woodhouse Timber Company has supplied timber lining boards manufactured from finger-jointed Radiata pine to the Australian market since the 1990s, when H3 LOSP treated and pink primed Weatherproof® lining boards were made available to the public as part of an inaugural run of claddings and linings.

Today, the Woodhouse lining board offer has grown to include several popular lining products within the pre-primed interior Edgeline® range, four pre-oiled and vertically glue-laminated lining boards referred to collectively as Clear Grain®, and a small, curated range of knotty pine lining boards from Northern Europe that we call Antara®.

WOODHOUSE ANTARA

- 140x12 321 Lining Board

WOODHOUSE EDGELINE

- 140x12 302 Lining Board
- 140x12 321 Lining Board

WOODHOUSE CLEAR GRAIN

- 90x12 302 Interior Lining Board
- 138x12 302 Interior Lining Board
- 90x15 302 Exterior Lining Board
- 138x15 302 Exterior Lining Board

WOODHOUSE WEATHERPROOF

- 138x11 302 Lining Board
- 138x11 321 Lining Board
- 138x18 Reversible VJ Shiplap Lining/Cladding Board

This manual contains critical recommendations and information on best practices to help you get the best from your wall and ceiling linings.

Because each application is subject to a wide variety of variables, including different local and state legislative requirements, it is the responsibility of the end user to ensure that the design and installation of the wall or ceiling system satisfies all relevant building regulations, codes, and Australian Standards.

References to some of the guidelines and regulations that apply to timber lining systems can be found in this manual.

1.0 - NATIONAL CONSTRUCTION CODE & AUSTRALIAN STANDARDS

Timber lining systems in Class 1 and Class 10 buildings are required to satisfy several performance requirements under Volume Two of the National Construction Code, most notably *Performance Requirement H1P1* which states that the system must:

- *Perform adequately under all reasonably expected design actions; and*
- *Withstand extreme or frequently repeated design actions; and*
- *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*
- *Avoid causing damage to other properties.*

Performance Requirement H2P2 further describes the importance of designing structures for weathertightness as follows:

A roof and external wall (including openings around windows and doors) must prevent the penetration of water that could cause:

- *Unhealthy or dangerous conditions, or less of amenity for occupants; and*
- *Undue dampness or deterioration of building elements.*

Similar provisions exist for Class 2 to Class 9 buildings under the National Construction Code: Volume One – refer to *Part B1: Structural Provisions*; and *Part F1: Damp and Weatherproofing* – and reinforce the importance of carefully designing and installing lining systems to ensure satisfactory long-term performance as a key element of the building envelope.

1.1 - FIRE SAFETY - CLASS 1 & CLASS 10 BUILDINGS

Consideration should also be given to the role of timber linings in Class 1 and Class 10 applications that require fire resistance under *Part H3: Fire Safety* of Volume Two of the National Construction Code.

This Section requires that Class 1 buildings be protected from the spread of fire from other structures within 1.8m on the same allotment (except when the other structure is a Class 10 building), or from structures on adjoining allotments where the Class 1 building is within 900mm of an allotment boundary.

The typical method for meeting these provisions is to construct a *fire-resisting* external wall with an FRL of at least 60/60/60 where such protections are needed, ensuring that these walls commence at the footings or slab and extend to the underside of a *non-combustible eaves lining* [Section 9.2.3(1)]. Woodhouse lining boards are not deemed a non-combustible material under the NCC, therefore, an alternative fire-resistant eaves lining such as fibre cement should be selected for these locations.

1.2 - FIRE SAFETY - CLASS 2 TO CLASS 9 BUILDINGS

Class 2 to Class 9 buildings usually have specific requirements for fire-resistance that correspond with the building's classification, and the location of the building element within the structure. For example, wall and ceilings fitted to fire-isolated exits and control rooms in an unsprinklered, Class 6 retail supermarket should be Group 1 compliant. Wall and ceiling linings in the same unsprinklered, Class 6 structure but located in a public corridor can be manufactured from Group 1 and Group 2 materials [Section S7C4].

Because performance solutions are tailored to the building type and design under this section of the NCC, they fall outside the scope of this manual. For more information, contact your architect, building designer or building certifier.

1.3 - BUSHFIRE ATTACK LEVEL

Woodhouse lining boards are manufactured from sustainably-sourced Radiata or Baltic pine that has a seasoned density of between 500kg/m3 and 550kg/m3. These species are not considered a bushfire-resisting timber (BRT) under *AS3959 – Construction of buildings in bushfire-prone areas.*

This classification prohibits designers and installers from selecting pine lining boards as an eaves lining on BAL-29, BAL-40 and BAL-FZ allotments. Eaves linings on these lots must be manufactured from non-combustible materials or bushfire-resisting timbers.

Non-bushfire-resisting timber eaves linings are permitted on BAL-LOW, BAL-12.5 and BAL-19 allotments, and can be installed as usual in indoor areas on allotments up to and including BAL-FZ.

For more information, consult *AS3959 – Construction of buildings in bushfire-prone areas; Wood Solutions Design Guide 04 – Building with Timber in Bushfire-prone Areas*; or a professional building designer or certifier.

2.0 - STORAGE & HANDLING

Upon delivery, lining boards should be stored in a covered area out of direct sunlight and away from inclement weather. Unload boards by hand, crane or forklift, and stack them on timber gluts at 450mm increments, at least 150mm above slab or soil.

Lining boards should be covered loosely in plastic to protect them from rain and condensation, while ensuring there is sufficient air movement around the pack. This will help individual lining boards to attain equilibrium moisture content with the surrounding atmosphere. For more information on this topic, refer to Section 4 – Moisture and Movement.

When handling lining boards on site, carry individual boards on their edge and do not drag or transport them in a way that will damage the primer or substrate. If the board becomes damaged, sand affected areas to a clean finish and, for primed or pre-oiled lining boards, apply a wood sealer / primer to bare timber to protect it from moisture ingress.

3.0 - MOISTURE & MOVEMENT

All Woodhouse lining boards are kiln-dried during production to a moisture content of between 12 and 15 per cent, which is designed to minimise the potential for expansion and contraction following installation.

Nevertheless, timber is *hygroscopic* and will react to seasonal changes in weather conditions during the service life of the installation despite pre-seasoning efforts by the manufacturer. Consideration should therefore be given to the way that boards will interact with their environment by absorbing moisture from or releasing moisture into the local atmosphere over time.

3.1 - ACCLIMATISATION

The journey from storage in a controlled environment – for example, a merchant warehouse or distribution centre – to installation in an uncontrolled environment – often, a building under construction – is challenging for dry lining boards. The preparation of Woodhouse lining boards for expansion and contraction should therefore begin as soon as products are delivered to the job site.

The 12 to 15 per cent moisture content level that Woodhouse linings boards are seasoned to suits the mild conditions typical of large parts of coastal Australia. Where boards are to be installed in more humid environments, for example, in tropical North Queensland, they will absorb moisture from the atmosphere and expand to a larger width. The opposite effect is known to occur in dry, inland environments. Boards release moisture into the atmosphere and shrink to a narrower overall width.

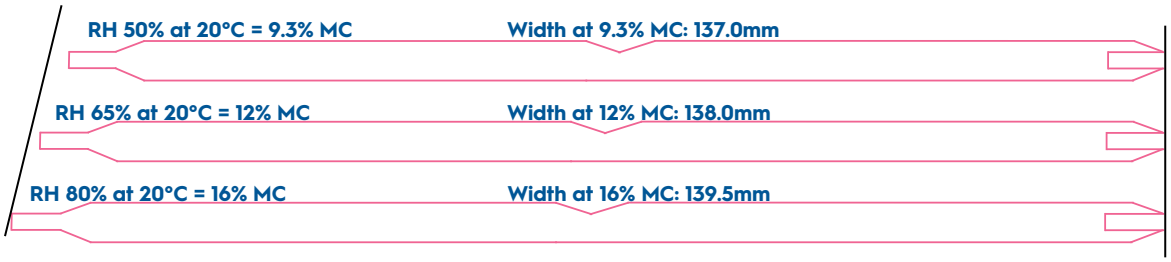
These changes will usually take place within weeks of installation as the timber seeks equilibrium with the relative humidity of the surrounding atmosphere. This condition is referred to as equilibrium moisture content (EMC). During periods of EMC, timber will neither expand nor contract. It exists in harmony with its environment.

Issues relating to the expansion or contraction of lining boards can therefore be mitigated by allowing the boards to reach EMC before they are fitted to the structure. Best practice is to allow lining boards to acclimatise on site, close to the installation area, for one to two weeks before they are fixed in position, however, longer periods may be required if prevailing weather conditions are either very dry, hot or wet. Products installed in exterior applications may also require longer acclimatisation periods than products installed in controlled interior applications.

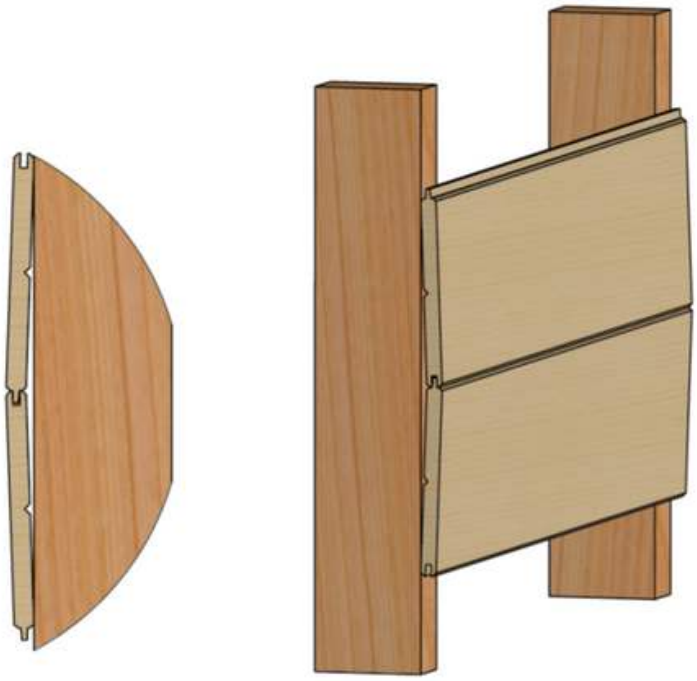
To check whether lining boards are ready for installation, use a moisture meter to obtain moisture content readings for several boards within the pack. If these readings indicate that the timber has reached an equilibrium with the expected in-service moisture content levels shown in the following chart, boards can be installed.

TEMP °C	RELATIVE HUMIDITY								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
	EQUILIBRIUM MOISTURE CONTENT								
0°C	2.6	4.6	6.3	7.9	9.5	11.3	13.5	16.5	21.0
10°C	2.6	4.6	6.3	7.9	9.5	11.2	13.4	16.4	20.9
20°C	2.5	4.5	6.2	7.7	9.3	11.0	13.1	16.0	20.5
30°C	2.4	4.3	6.0	7.5	9.0	10.6	12.7	15.5	20.0
40°C	2.2	4.1	5.7	7.1	8.6	10.2	12.2	15.0	19.3

Table of equilibrium moisture content at various temperatures and humidities



Depiction of varying lining board widths at different relative humidities



Depiction of 'tenting'

Failure to observe these recommendations may result in the equalisation of lining boards in situ, leading to undesirable phenomena such as 'tenting' whereby boards pitch forward from framing supports at the intersection of tongue and groove.

4.0 - INSTALLATION

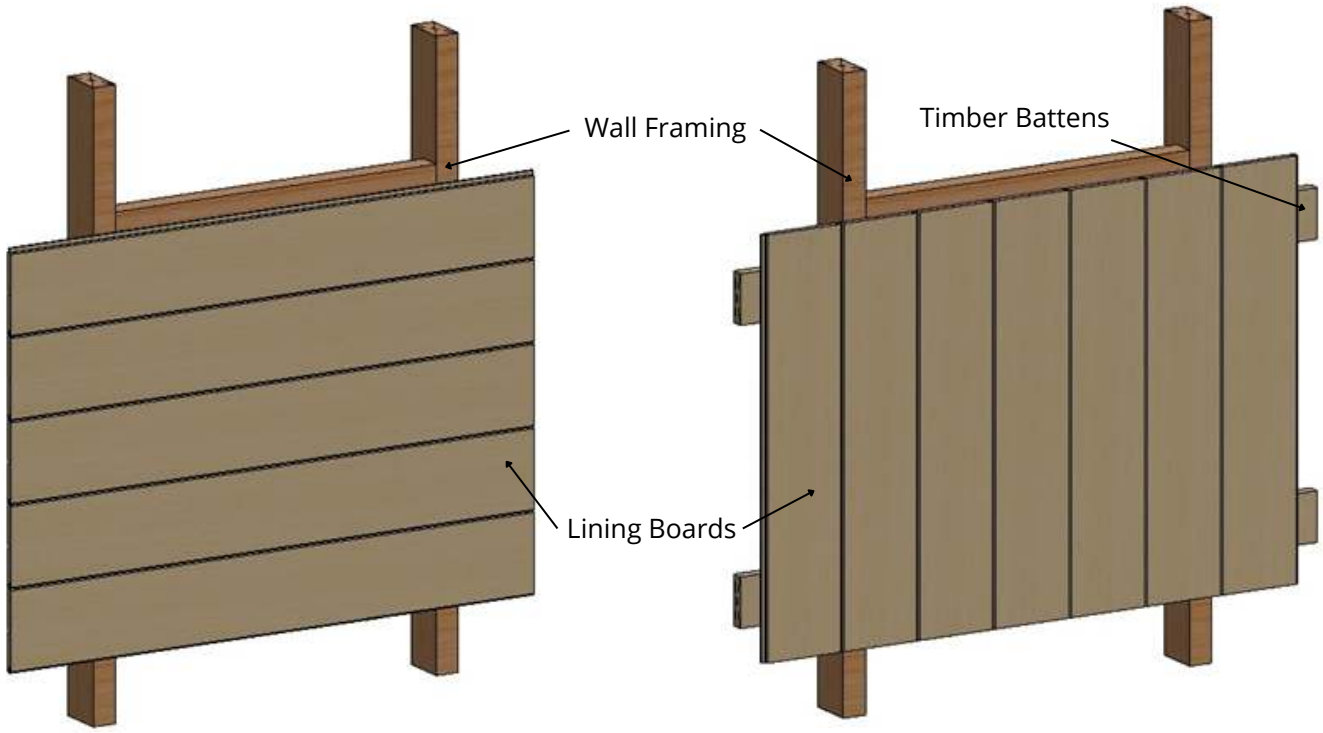
4.1 - GENERAL GUIDELINES

Woodhouse Antara®, Clear Grain®, Edgeline®, and Weatherproof® lining boards should be checked with a moisture meter to ensure their moisture content is consistent and within range before they are fitted to the building.

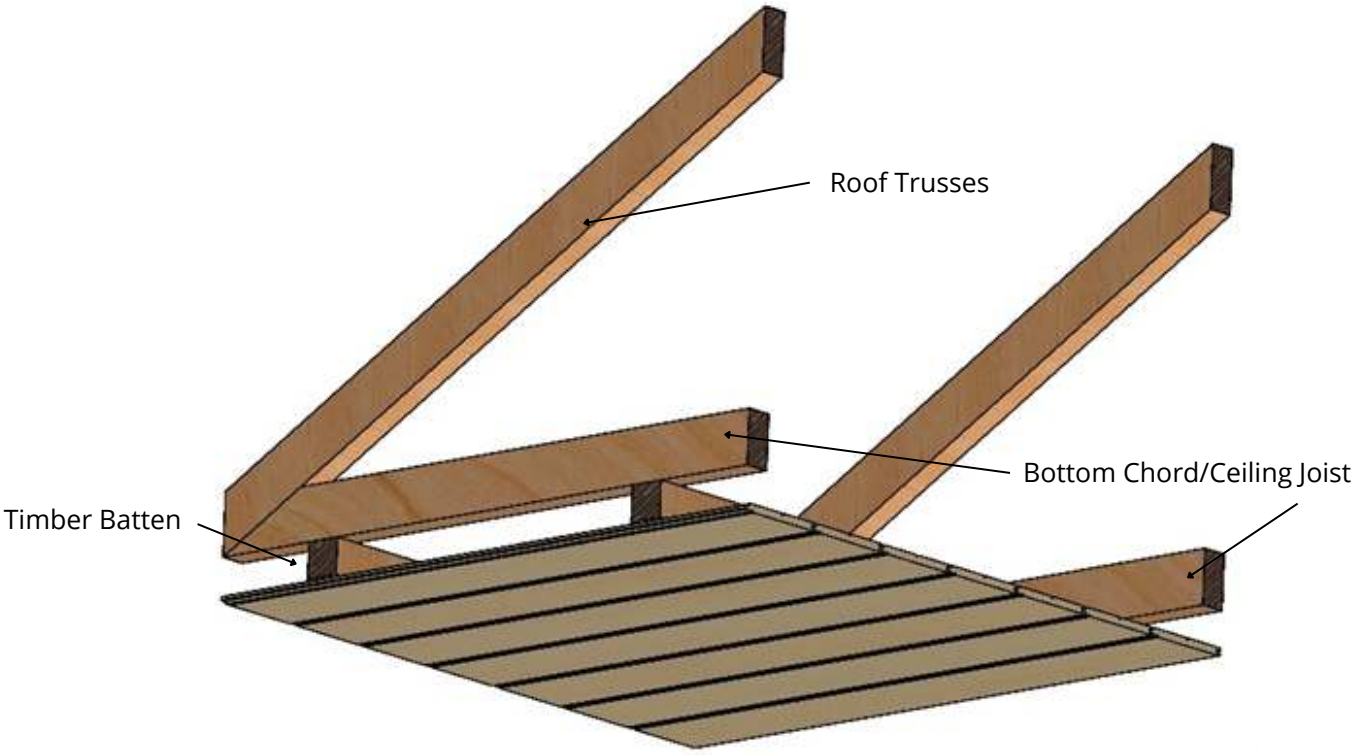
Wall and ceiling framing should meet the requirements of *AS1684.2 – Residential timber-framed construction or AS4100 – Steel structures* and, in areas directly adjacent to the building envelope, be protected from mould, rot and corrosion through installation of a vapour-permeable membrane. These membranes allow for the controlled escape of water vapour from within the building cavity, while restricting moisture ingress into areas behind the lining board.

Lining boards can be installed in a horizontal, vertical or diagonal orientation, and should be securely fastened to framing at the centres shown in the table below. Greater spans can be achieved in some cases, however larger stud and batten spacings may compromise the appearance of the wall or ceiling lining by causing boards to distort where there is inadequate support.

APPLICATION	LINING THICKNESS	SPACING OF SUPPORTS
WALL	11-12mm	600mm maximum
	15-18mm	900mm maximum
CEILING	11-12mm	250mm maximum
	15-18mm	600mm maximum



Lining boards installed vertically and horizontally as a wall



Lining boards installed as a ceiling

Where possible, and before lining boards are fitted, apply a preliminary finishing coat of paint, oil or varnish to every surface – including the back – of each board. Wood coatings slow down the transfer of moisture into the substrate, and an initial application of topcoat will ensure that any moisture-related movement that does occur is consistent across all of the board's surfaces.

Preliminary coatings also minimise the potential for primer 'show through' at joints if shrinkage occurs after installation.

When installing Woodhouse Weatherproof® lining boards in an exterior location such as under a patio or eave, ensure that all areas of bare timber exposed during installation are resealed with an in-can preservative like Tanalised® Enseal Clear or Ecoseal, *and* reprimed with primer or topcoat. These supplementary products give additional protection to areas at risk of fungal decay, particularly end grain.

Please note that Woodhouse does not recommend and will not warrant the installation of untreated Antara®, Clear Grain Interior® and Edgeline® lining boards in any exterior application, including under verandahs, eaves, patios, pergolas, and porticos.

4.2 - INSTALLATION METHOD - DIRECT FIX

1. Check lining boards for dimensional consistency and ensure that moisture content is within optimal range.
2. Where possible, apply a pre-installation topcoat to all surfaces of the lining boards. Any cuts, holes and notches installed into Weatherproof® and Clear Grain® exterior lining boards should also be resealed and reprimed before boards are fixed to the frame.
3. Check framing for straightness and plumb. Pack, cripple or level studs as required to ensure the lining surface will be even.
4. Apply a bead of construction adhesive to each batten or stud. Position the first board with tongue facing towards the installation and secure to framing supports with brad or nails.
5. Install subsequent boards, checking periodically for straightness and plumb. Avoid over-cramping. Boards should have a snug fit, without being connected so tightly as to inhibit expansion at the joint.
6. Place butt end joints over battens or studs, staggering these joints over the surface of the installation.
7. If required, the final lining board can be ripped or trimmed with a power saw to fit the remaining space. Face fix trimmed boards into position with brads or nails, ensuring that bare timber exposed by rip-sawing of Weatherproof® and Clear Grain® exterior products is resealed and reprimed prior to installation.

4.3 - INSTALLATION METHOD - FACE VS. SECRET FIXING

Lining boards can be secured to framing by either face fix or secret fix methods according to the preferences of the installer.

When using the face fix method, boards should be fixed with at least two brads or nails at each stud, taking care to position fasteners at least 15mm from the edges and ends of products, where splitting can occur.

If the secret fix method is selected, one brad or nail should be driven through the tongue of the board at each stud, ensuring that the head of the fastener is punched sufficiently below the surface of the timber to allow the next board to be fitted over the top.

Secret Fixing, nail hidden when next board is fitted over the top

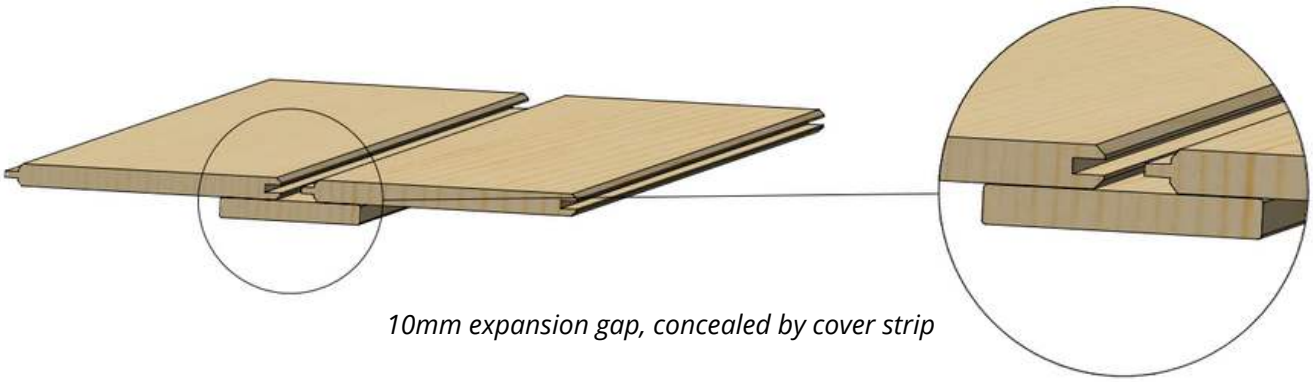
Face fixing.

4.4 - EXPANSION GAPS

In moisture-laden interior and exterior applications, allowances should be made for changes in the equilibrium moisture content and width of lining boards through the provision of expansion gaps and control joints.

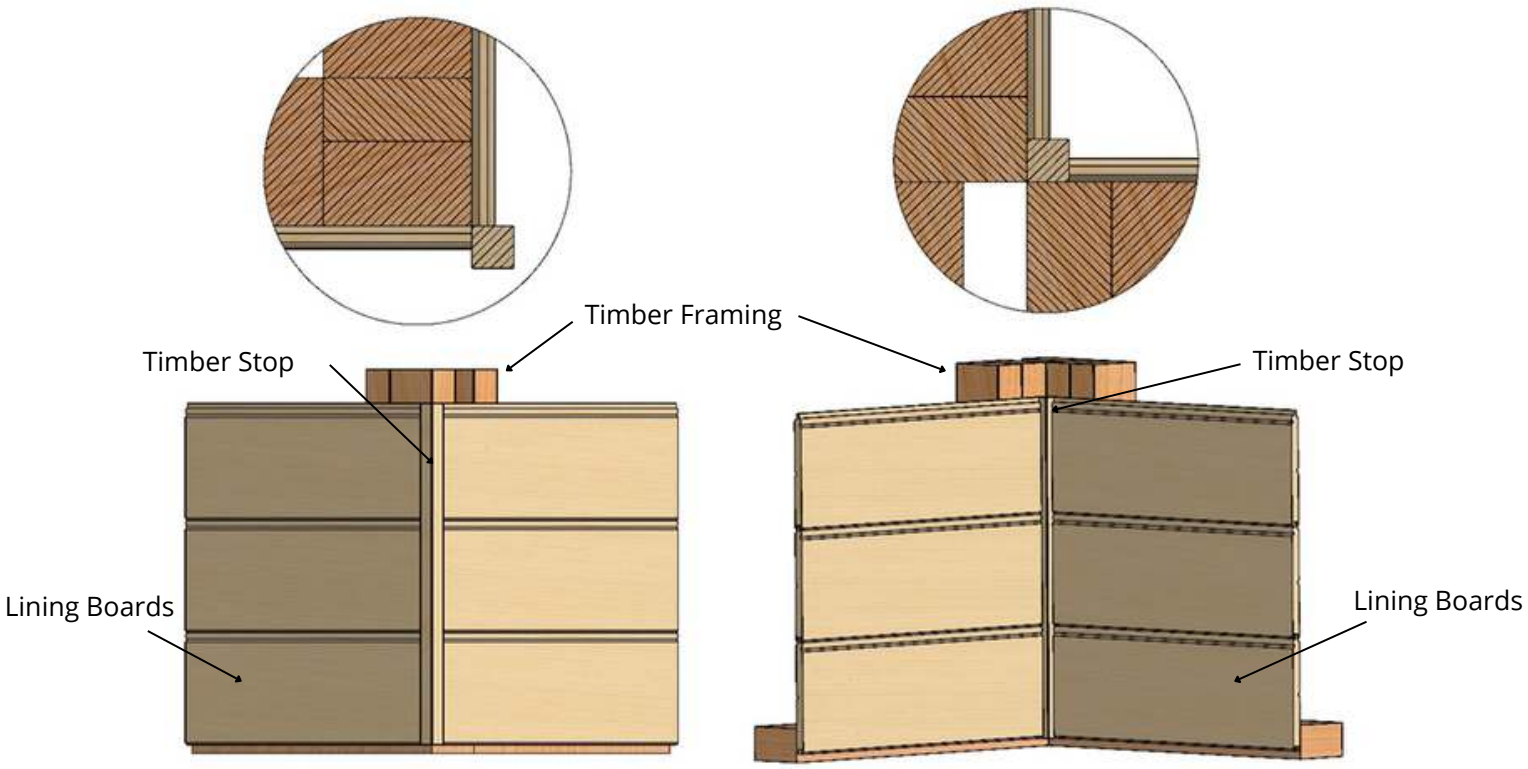
As a general rule, a 10mm expansion gap should be left at the top and bottom of horizontal applications, or at the left- and right-hand sides of vertical installations. This will prevent surfaces from distorting after products are fitted.

Larger lining board systems may require the installation of control joints at intervals of approximately three metres. These controls can be concealed under a cover strip if preferred by the installer or homeowner.



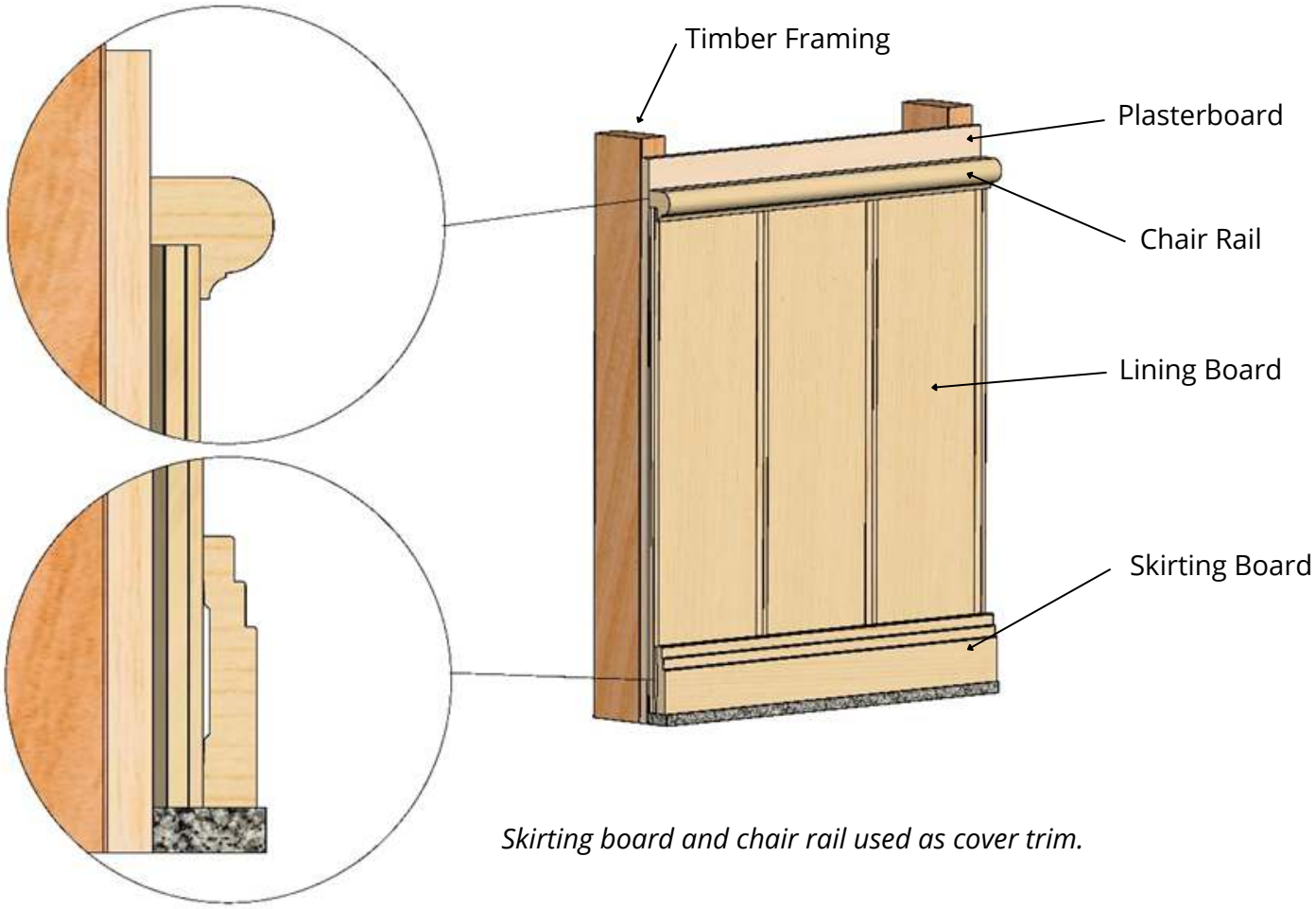
10mm expansion gap, concealed by cover strip

4.5 - CORNER & TRIM DETAIL



External corner, showing stop placement

Internal corner, showing stop placement



Skirting board and chair rail used as cover trim.

5.0 - FASTENER SPECIFICATION

Woodhouse lining boards should be fixed to framework with quality timber fasteners in accordance with the table below.

BOARD SIZE & PROFILE	HAND NAILING	GUN NAILING
90x12 Lining Board	40x 1.6mm Bullet Head Nail	40x 16ga Brad
140x12 Lining Board		
90x15 Lining Board	50x 1.8mm Bullet Head Nail	50x 18ga Brad
138x15 Lining Board		
138x18 Lining Board	50x 2.8mm Bullet Head Nail	50x 2.5mm Coil Nail

Where pneumatic nailing guns are used, care should be taken to ensure that fasteners are not over-driven as this may cause boards to split or distort. For a typical finishing gun, a pressure of 120psi is usually sufficient to drive the head of the nail flush with the surface of the lining board.

5.1 - FASTENER DURABILITY

Fasteners should have an appropriate level of durability for the intended application.

In inland exterior environments, choose a nail or brad that has been hot dip galvanised for protection against corrosion caused by exposure to moisture or high levels of humidity.

In coastal environments, airborne salt can cause pitting corrosion in fasteners protected by galvanic coatings. Stainless steel nails or brads should be selected for these applications.

In interior applications, bright steel fasteners are acceptable except where boards are to be installed in moisture laden areas such as bathrooms and laundries. Select a hot dip- or electro-galvanised fastener for long-term durability in these locations.

6.0 - FINISHING

Woodhouse Clear Grain®, Edgeline® and Weatherproof® lining boards are factory primed and will accept topcoats with minimal preparation.

For best performance, apply at least one preliminary coat of quality topcoat to the front, back, edges and ends of boards before they are fitted to framework. Wood coatings slow down the transfer of moisture into the substrate, and an initial application of topcoat will ensure any that moisture-related movement that does occur is consistent across all of the board's surfaces.

Preliminary coatings also minimise the potential for primer 'show through' at joints if shrinkage occurs after installation.

The preparation and finishing of boards should be undertaken in a tradesman-like manner to the requirements laid out in *AS/NZS2311 – Guide to the Painting of Buildings*, and according to the following guidelines:

1. Fill any nail holes with a quality wood filler and lightly sand to an even finish.
2. Sand and spot prime any areas that require additional attention with a quality primer/sealer.
3. Ensure that the surface of the lining board is free of dirt and contaminants. If necessary, clean gently with a light dilution of detergent or sugar soap and water.
4. Apply chosen topcoats in accordance with the manufacturer's recommendations.

Take care when applying finishes to the tongue and groove joint between boards. Some finishes – especially film forming polyurethane coatings – can cause boards to be bonded together at the joint, inhibiting movement and causing cracking and splitting within the lining board system.

6.1 - RESIN BLEED & LIGHT REFLECTIVE VALUE

Dark paint colours have the potential to cause several issues when applied to Radiata pine in exterior applications because of the way these colours absorb solar radiation instead of reflecting it away from the timber substrate.

The most common of the issues is referred to as resin bleed, which occurs when pockets of resin within the timber mobilise on the surface of the painted board as a sticky, honey-coloured material. If it has occurred, resin bleed is typically found on timbers that have been coated with dark coloured paints, as these finishes tend to increase temperatures on the surface of the installation (beyond the melting point of resin).

It is for this reason that Woodhouse recommends the application of light coloured paints to products in exterior applications. Referring to the light reflective value (LRV) scale where 0 is pure black and 100 is pure white, installations finished in paints with an LRV of 45 and greater are cooler to the touch and will be less prone to issues such as resin bleed.

Light reflective values are published by all major paint manufacturers and can usually be found online

7.0 - MAINTENANCE

Exterior products should be cleaned every six to twelve months with a mild detergent and soft bristle brush to remove dirt, pollen and other contaminants. While cleaning, inspect sealants, flashings and fixings and maintain them as needed.

Note that pressure washing has the potential to damage protective coatings and can cause surface checking or aggravate moisture-related movement by forcing water deep into the substrate. It should generally be avoided.

Finishes should be reapplied in accordance with the manufacturer's recommendations, or when existing coatings have started to deteriorate.

8.0 - DISPOSAL OF OFFCUTS & WASTE

Do not burn offcuts or residues collected from preservative treated timber. This waste should be disposed of by approved local authority methods.

9.0 - ADDITIONAL RESOURCES

AS1684.2-2021 (2021), *Residential timber-framed construction, Part 2: Non-cyclonic areas*

AS/NZS2311 – 2017 (2017) – *Guide to the Painting of Buildings*

National Construction Code (2022), *Volume One – Building Code of Australia*

National Construction Code (2022), *Volume Two – Building Code of Australia*

Timber Queensland (2014), Technical Data Sheet 1 – T*imber Panelling, available at: http://www.timberqueensland.com.au/*

Wood Solutions (2020) – Design Guide 04 – *Building with Timber in Bushfire-prone Areas, available at: https://www.woodsolutions.com.au/*

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