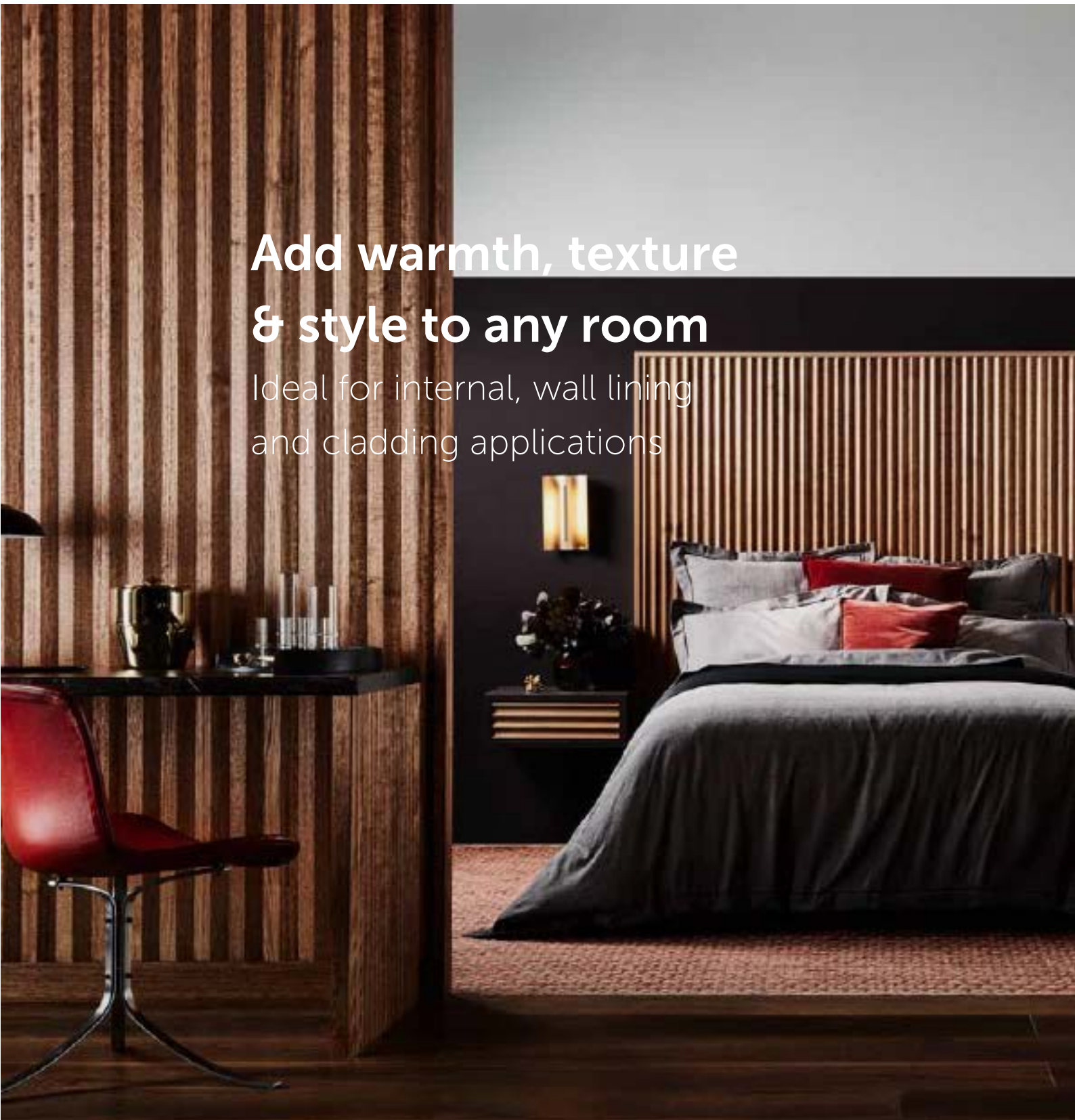
porta

know & love timber

PORTA CONTOURS Lining Board Range

Design, installation & maintenance guide



We are Porta....the people who know and love timber!

We pride ourselves on being Australia's leading supplier of timber products, mouldings and custom moulding services to the home improvement, building, trade and commercial sectors.

An Australian-owned and operated company, Porta has a rich history spanning over 65 years proudly manufacturing and distributing a broad range of timber products using various local and imported certified timber specie.

Porta's milling and importing operations provide quality timber, moulding and design solutions to the construction, commercial and industrial sectors, for home improvement, and also to specifiers and designers. Porta leverages our expertise in timber to source and provide aesthetic and decorative products for the architectural, designer and specifier industries. Porta's timber product range offer innovation and unique designs for interior and external applications.

Porta's brand is built on the 4 pillars that govern how we operate internally and guide our interactions with you. Porta strives every day to be:

- Passionate & Dedicated
- Engaging
- Reliable & Trustworthy
- Experts

We are focused on helping to meet your timber needs and like us....know and love timber!

You can rest assured knowing Porta holds Chain of Custody under the three national and internationally recognised and accredited organisations:

- Forest Stewardship Council® (FSC®)
- Australia Forest Certification Scheme (AFS)
- Programme for Endorsement of Forest Certification (PEFC™)

These are the key bodies that promote stewardship of the world's forests so that you can be confident Porta's timber products in your home can be traced to certified sources.

Porta is committed to sustainable and renewable operations giving priority to sourcing timbers from certified sources. Backed by a team that is passionate about timber and with the expertise to meet your specific needs.

DISCLAIMER

The information, opinions, advice and recommendations contained in this guide have been prepared with due care. They are offered only for the purpose of providing useful information to assist in technical matters associated with the specification and use of timber and timber products. While every effort has been made to ensure that this guide is in accordance with current technology and standard, it is not intended as an exhaustive statement of all relevant data, and as successful design and construction depends upon numerous aspects outside the scope of the guide. Porta Mouldings Pty. Limited accepts no responsibility for errors or omissions from this guide, nor for specification or work done or omitted to be done in reliance on this guide.

Contents

1. SCOPE

This guide outlines key selection, design, installation and maintenance issues for timber lining boards featuring the use of Porta Contours lining board range.

With the correct timber selection, construction and maintenance, lining boards in internal and protected external areas can provide a feature to enhance the décor of walls and ceilings.

1.1. BENEFITS OF USING TIMBER

The benefits of using timber include:

- Tackles climate change and reduce new carbon emissions
- Stores carbon – reduces atmospheric carbon as trees grow
- Good for health and wellbeing – timber is great to be around
- Production and processing uses less energy
- Certified timber is renewable – trees will regrow
- Select the right timber and it will last – it's durable
- Structurally strong – excellent strength to weight ratio
- A natural insulator – better to walk on
- Fast and efficient to build with
- Naturally beautiful

Source: www.makeitwood.org

1.2. BENEFITS OF USING TIMBER FROM PORTA

Porta's timber offers many benefits including;

- Graded to Australian Standards
- Certified: FSC & PEFC certified as being responsibly harvested and processed using responsible forest management and practices and accredited by a third-party organisation.
- Range of species: Tasmanian Oak, Radiata Pine, Meranti & American Oak and other species, sourced locally and globally.

1.3. APPLICATION OF THIS GUIDE

This guide covers selection, design, installation and maintenance guide for Porta Contours timber lining boards, (including soffit lining) for use on walls and ceilings in areas where they are not subjected to water splashing or emersion.

Use this guide for residential and commercial applications. Residential applications are defined in National Construction Code (NCC) Volume 2 as a Class 1 structure (such as detached houses, villas and townhouses) and Class 10 structure (such as garages, sheds and swimming pools) and commercial applications defined by the NCC Volume 1 as Class 2 to 9 structures within deem to satisfy requirements.

2. DESIGN CONSIDERATIONS

Timber lining provides a decorative or aesthetic feature to wall and ceilings and also serves to thermally and acoustically insulate a room.

Lining is known as a soffit when used externally as an underside eave lining and protected against direct weathering. Timber soffit lining can provide a softening yet contrasting texture when combined with co-ordinated wall linings.

When selecting a timber lining consider the final colour, texture, wear-ability and overall look, fixing method and choice of coating for protection of the timber.

2.1. ASTHETICS

Timber lining is chosen for its colour, surface texture, presence of timber features and grain pattern.

While the raw timber lining can be painted with a solid coating, the effect of a clear coating or penetrating finish will enhance the natural timber lining.

The application of a suitable surface finish coating will affect the colour and highlight the grain while maintaining the quality of the timber surface and provide the long-term integrity of the timber by protecting against moisture transfer.

Porta's range of naturally good-looking timber lining will be enhanced by a water, oil or wax based, clear or a tinted coating.

2.2. SPECIES AND CUTTING STYLE

Both softwood (from cone bearing conifer trees) and hardwood (from flowering angiosperms trees) timbers have varying colour, hardness, density, grain feature and dimensional stability.

The way the timber is cut from the tree log will change way the timber looks and its stability as a lining. Two main cutting styles capture different grain features and create a varying stability in the lining. These styles are known as quarter-sawn or back-sawn.

Quarter-sawn timber features a straight grain while back-sawn timber will highlight the growth rings in an arched or cathedral look.

Lining board profiles moulded from quarter-sawn timber is recommended as it is more stable due to reduced shrinkage across the width when compared to equivalent back-sawn lining.

Figure 1: Quarter and back sawn timber' shows the grain through the profile.

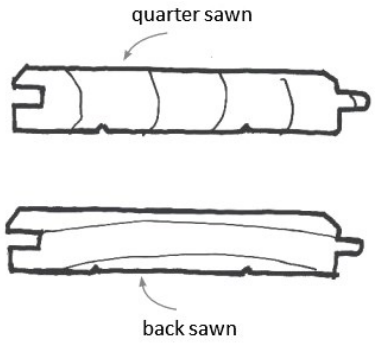


Figure 1 Quarter and back sawn timber

Porta Tasmanian Oak is offered as quarter-sawn lining for added stability.

2.3. GRADES

The type of timber, hardwood or softwood, that the lining is made from determines the method used to grade the timber.

Hardwood timber lining is graded to AS 2796.2 'Timber Hardwood Sawn and milled products Part 2: Grade descriptions'. While softwood timber lining is graded to AS 4785.2 'Timber Softwood Sawn and milled products Part 2: Grade description'. Porta can grade timber to other standards as required.

Grades levels can range from Select (Hardwood) and Clear (Softwood) with minimal defects, through to High Feature (Hardwood) or Utility (Softwood) which will include a significant range and number of features.

For availability and suitability of the specific grade and requirements contact Porta prior to specifying.

Porta Tasmanian Oak is available in a range of grades from Select grade with minimal feature to grades which include a higher level of feature such as Utility and High Feature, to accent the lining. The grade of Porta Pine ranges from Clear to knotting feature lining.

2.4. PROFILES

Timber lining is available in the Porta Contours range profiles and a range of traditional profiles. In addition, unique specific custom designs can be produced to suit the requirements of a project.

Typically, lining uses a tongue-and-groove joint with a secret brad nail fix. Alternatively, over-lapping concealed-fixed joints are available which enables robust fixing.

Porta Contours lining board range offers a unique range of shaped lining which is ideal for residential and commercial projects. The various models are designed to be modular, which enables each of the models to be interchanged across a wall or ceiling, allowing multiple effects to be created. Most of the range has a 78mm cover (overall 91mm width) plus there is a half width in-fill flat model (Porta Contours Plateau-39). The range includes the ability to conceal the fixing (while allowing for board movement) and rear grooves (which improves adhesion and relieves stress across the profile to prevent cupping). Additionally, a brad nail alignment line is included on the board to speed installation. The Contours range of models are shown below.

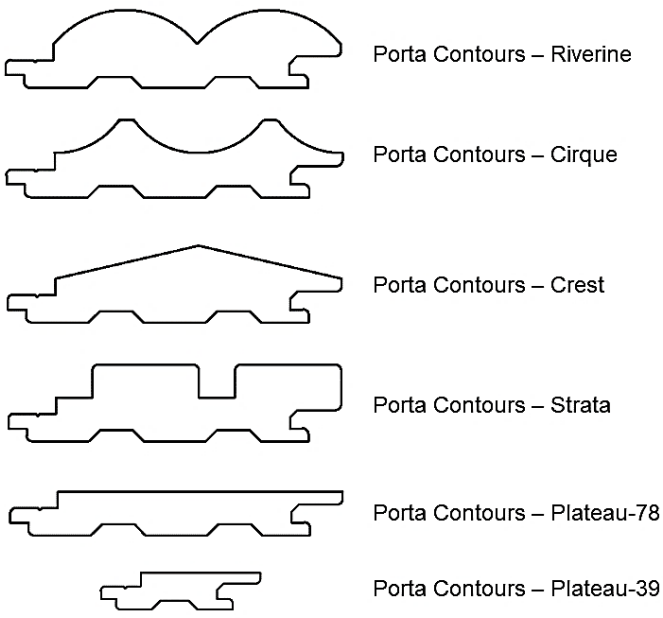


Figure 2 Porta Contours range profiles

Traditional profiles include Shiplap, V-Jointed (Shadow line) and Regency styles.

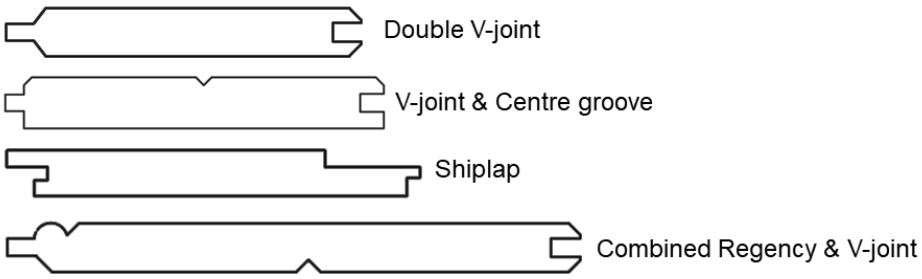


Figure 3 Traditional Lining profiles

The edges of the V-joint on the exposed face are chamfered to create a 'V' when the boards are installed. This V-joint can mask an installation gap and a small amount of movement due to expansion and contraction of the board.

Wider boards (150mm or wider) will have a greater susceptibility to cupping of the timber. Also for a given width of wall there will be less boards, therefore less joints to take up any expansion of the timber, which if laid tight may lead to 'peaking' of the lining.

Conversely, for a given width of a room there will be a higher number of narrow lining boards. Along with being more dimensionally stable, narrow lining boards (less than 100mm) can distribute any expansion or movement across the additional number of joints.

2.5. SIZES & LENGTHS

When considering the species, grade and profile of lining also consider the suitably of the length.

For vertical lining, 2.4m, 2.7m or longer lengths can provide a continuous length to ease and speed up installation.

Random lengths can be a more cost-effective alternative in vertical or horizontal applications yet will require additional joins which will increase the cost of installation.

Porta Lining is available in a range of lengths and random length packs. Consider set length sizes to speed installation.

2.6. ACCLIMATISATION

To minimise the amount of movement of the timber once installed, the lining should be installed at or slightly below, the prevailing relative humidity (equilibrium moisture content) of the room in which it is to be installed.

Store the lining in the space or room condition where it will be installed for as long as practical. This will stabilise the moisture content of the timber to the ambient conditions.

The length of time required to stabilise the timber is dependent on difference between conditions This will take between 48hrs and to at least two weeks. Keep the timber supported and protected from drying effect of direct sunlight and high drafts during acclimatisation.

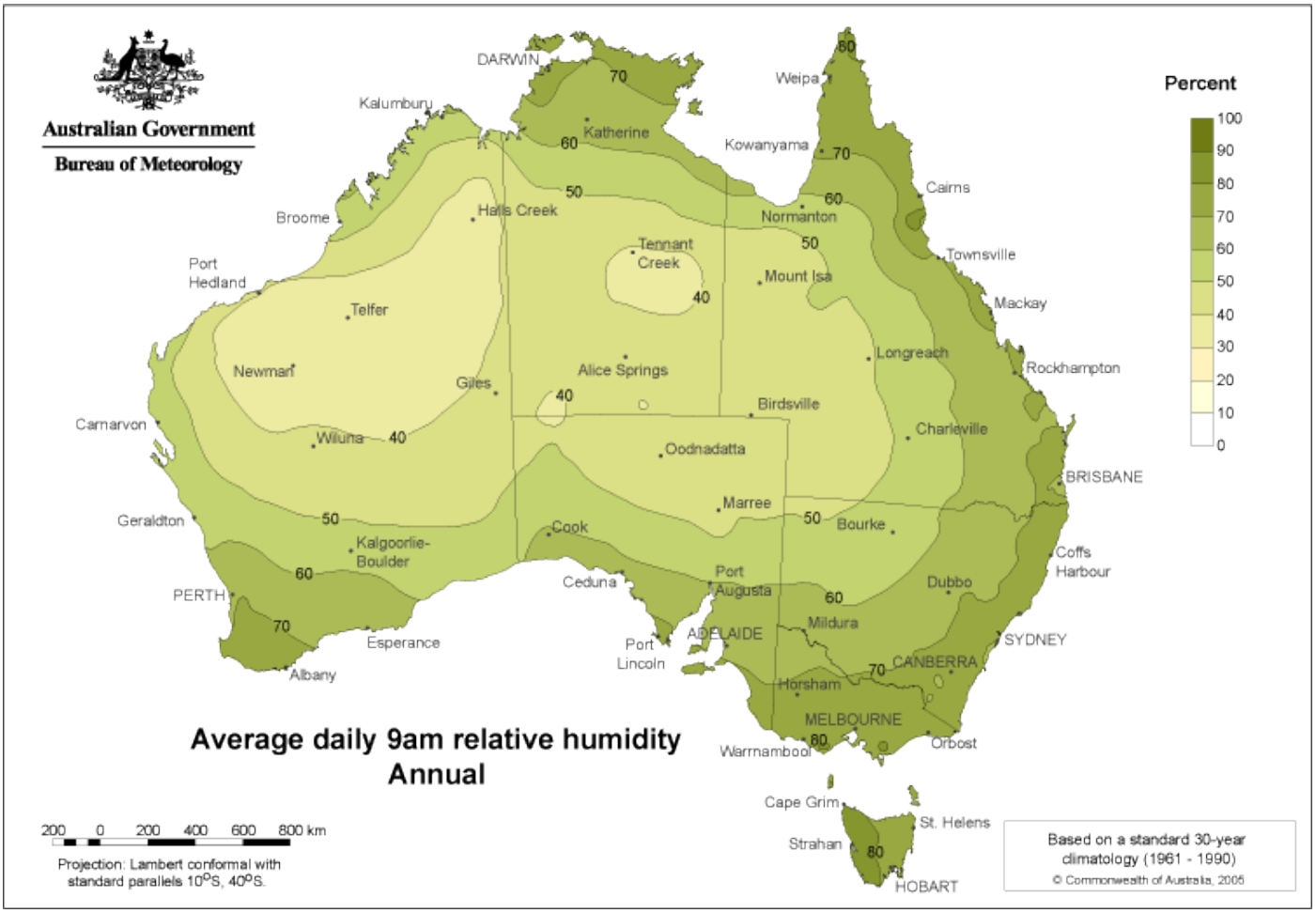


Figure 4 Average relative humidity across Australia

2.7. RESISTANCE TO TERMITE ATTACK

Internal applications are less susceptible to termite attack. Yet it is prudent, where there is a concern of termite attack at the site, to use a termite resistant timber species.

Councils have the responsibility to designate areas, within their municipal district, in which buildings are likely to be subject to attack by termites. Check with local council to assess the risk.

Porta offers a range of timber species for linings including Porta Cumaru which is certified as a termite-resistant timber and can be confidently used in all locations across Australia.

2.8. TANNIN AND RESIN BLEED

Most hardwood timber species contain varying amounts of water-soluble extractives that provide colour and some natural decay resistance to the timber.

Water-soluble extractives, which includes tannin and resins, may leach to the surface of the timber whenever moisture leaves the timber, even in internal environments. High feature grades are particularly susceptible.

These extractants can pass to and mark surrounding surfaces. Tropical areas and other high humidity environments are particularly susceptible.

Coating timber will reduce bleed from the timber. Yet resin pockets in high feature timber can bleed through surface coatings and may discolour the surrounding area.

Common hardwoods such as spotted gum, tallowwood and ironbark have been known to show surface marking.

Clear grade timber such as Porta Tasmanian Oak Select Grade are less susceptible to bleed. Porta Cumaru has been shown, through previous field experience and controlled trials, to have minimal leeching and can be confidentially used in critical applications.

2.9. INSTALLATION VENTILATION

The most common cause of cupping movement in timber is moisture held behind the lining. Ensure the space behind the lining is well ventilated to ensure excessive moisture does not occur in this cavity.

2.10. FINISHING SYSTEMS

Clear polyurethane finishes are the most serviceable for interior applications. However, care is necessary when choosing the finish as some finishes have the potential to bond board edges together at the tongue and groove joint. This may result in wide irregular gaps between some boards or may cause some boards to split. It is recommended that finishes and finish systems do not adhere boards together and have the boards coated before installation.

Oil and wax based finish systems containing a bond breaking sealer are recommended. Pre-finishing is recommended to ensure complete curing of the finish and prevent board adhesion.

Oil stains may be used to achieve special colour effects, however first trial with a number of offcuts. Where a clear finish is used over a stain, it is necessary to check with the manufacturer to ensure the clear finish is compatible with the stain.

Lining boards can 'darken or yellow' if exposed to direct sunlight. Darkening may also occur over a period of years through indirect sunlight which may cause colour variations between various areas.

Finishes should be applied in accordance with the manufacturer's specifications. Check with coating supplier for specific product information.

2.11. CHANGES DUE TO MOISTURE AFTER INSTALLATION

Timber is a natural product that responds to changes in weather conditions. In persistent moist conditions timber will absorb moisture from the air which will swell the timber. Conversely, during drier times when there is low humidity, timber will shrink.

If the moisture content of the board when installed is close to the ambient condition at site, the design of the lining should be able to accommodate this movement.

On larger applications, adequate expansion joints should be included to take-up movement. With excessive expansion, 'peaking' may occur.

Exposure to the sun through windows, heat from fireplaces or air-conditioning may cause additional shrinkage and increases in gaps, and if extreme it may dis-lodge the lining from the wall. Continual cycling from dry to wet conditions will stress the timber and finishes, which may result in the surface cracking or the coating failing.

Coatings will not stop timber movement due to changes in ambient moisture conditions. Yet a quality coating and application, and appropriate maintenance, will reduce the rate of response and movement of the timber. An initial coating should be applied (before installation) to all surfaces; front, back, edges and especially the end-grain and any opening (protrusions) in the surface. Factory pre-finishing is recommended.

Regular inspection to identify any emerging issues and early treatment such as recoating can minimise significant costs.

2.12. PRECAUTIONS WHEN INSTALLING IN MOISTURE EFFECTED AREAS

Moisture laden air, which can occur in bathrooms and laundries, can adversely affect untreated and inadequately finished timber lining.

When lining is installed in moisture effected areas good ventilation behind the lining is mandatory. Recommended practices for installing lining in these applications are:

- a vapour barrier should be fitted behind the lining to protect adjacent walls from humid air
- cut the lining to size and dip or completely flood brush with a water repellent preservative coating
- apply one coat of finish to all surfaces of the lining (including ends) prior to installation and two to four additional coats of the finish onto the exposed surfaces after installation
- fix the lining using non-corrosive nails such as hot dipped galvanised, silicon bronze or stainless steel

Lining is not recommended for wall areas where it would receive frequent wetting or emersion such as shower cubicles and bath surrounds, basins and splashbacks or unprotected direct exterior exposure.

2.13. STRAIGHTNESS AND DIMENSIONAL TOLERANCES

Porta Contours hardwood lining is supplied within the requirements of AS 2796.1 'Timber Hardwood – Sawn and milled products Part 1: Product specification', with the maximum spring, bow, twist and dimensional tolerances shown in the tables below.

The grade of timber is supplied to AS 2796.2 'Timber Hardwood – Sawn and milled products Part 2: Grade description'

Summary:

- Moisture content less than 14% and greater than 9%
- Tolerances (width or thickness) $\pm$0.5mm

Width (mm) Length	90mm	120mm
2.4	13	10
3.0	20	15
3.6	30	22
4.2	40	30
4.8	48	40
5.4	65	50

Table 1 Maximum Allowable Spring AS 2796.1

Thickness (mm) Length	12mm	15mm
2.4	25	22
3.0	40	35
3.6	55	50
4.2	75	70
4.8	100	90
5.4	120	110

Table 2 Maximum Allowable Bow AS 2082

Note 1: data extrapolated from table data

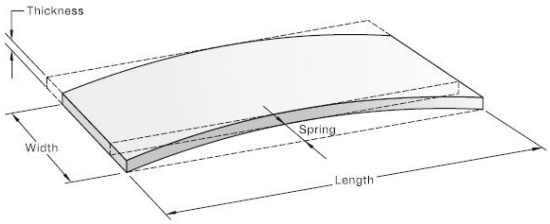


Figure 5 Measurement of Spring

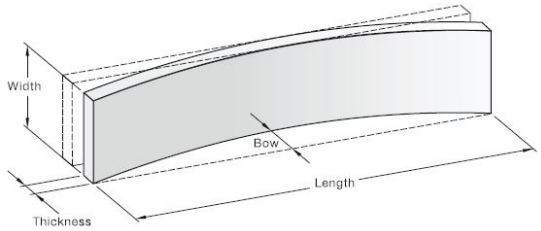


Figure 6 Measurement of Bow

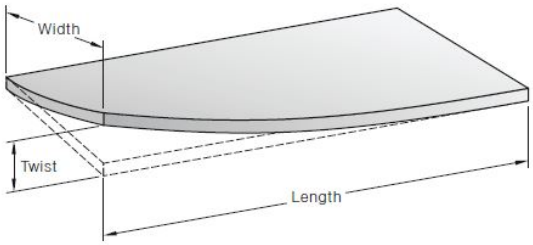


Figure 7 Measurement of Twist

Note: Spring, Bow, Twist and dimensions can vary dependent on exposure, environment and site conditions, during transit and in storage. Ensure timber when stored is protected correctly to minimize movement.

3 SETTING OUT

3.1. PRE-COATING & ONSITE SEALING

If timber is left uncoated it will be subject to surface checking, warping and loss of dimensional stability to varying degrees. The coating is designed to slow down the rate at which moisture can move in or out of the timber and protect against attack from sunshine which when combined, will result in a breakdown of the timber and loss of stability.

Pre-coating or factory applied finish protects the timber before it arrives at site. An onsite coating will be required for long term protection.

The pre-coating generally is a higher quality finish than can be applied onsite. Also, pre-coating will be applied consistently to each face and end which can be difficult to achieve onsite.

In particular, cut-end or protrusion must be adequately coated onsite. Timber surfaces affected by sea salt contamination should be washed off with clear water and allowed to dry before commencing site coatings.

End grain of timber lining boards should be coated with a specialised end grain sealer, available from Porta.

3.2. COATING PRIOR TO INSTALLATION

Porta recommends lining is pre-coated on all faces prior to installation.

All protrusions (cut holes, cut-outs and trimmed ends) should be coated onsite before or during installation of the boards.

End grains are particularly susceptible to drying, cracking and leeching of extractants. Where the installation may be affected by high humidity the end grains should be pre-coated with a specialised end-grain sealer.

3.3. STORAGE OF TIMBER

Lining should be delivered to site and be protected from weather exposure and other sources of dampness on site.

The timber lining should be supplied fully protected wrapped in plastic. This protects against contamination and reduces the change in moisture content during transit and storage. Ensure the lining is fully wrapped on receipt of goods.

The builder is responsible to ensure that the lining remains wrapped and is at the appropriate moisture content when installed.

Lining may be stored on site, provided packs are kept fully wrapped in plastic and protected from weathering. Check to ensure the wrapping has not been damaged which may allow water into the pack.

Boards should be kept dry, covered from direct sunlight, well ventilated and adequately supported with a maximum 450mm spacing, at least 150mm off the ground. To prevent moisture uptake boards must not be stored in wet area.

Seasoned lining (particularly if not coated) readily absorbs moisture. If excessive moisture is taken up the boards and they are not dried prior to installation, they may subsequently shrink and create wide gaps between boards. This may result in a total failure of the boards with the tongue pulling out of the groove. If lining becomes wet, problems such as staining, distortion, opening-up of joints may occur. Continued wetting may also promote mould growth or staining.

If the lining board pack becomes wet, separate the boards by inserting ventilation strips between layers and store undercover in a dry well-ventilated area until dry and moisture content has stabilised.

3.4. MOISTURE CONTENT PRIOR TO INSTALLATION

Timber lining is generally supplied at an average moisture content between 9% and 14% (within AS 2796.1 Clause 6.2).

A high moisture content suits a ventilated coastal area where the average moisture content of internal timbers is expected to be approximately 12% (when in-service). Where conditions are drier, such as inland areas or an air-conditioned building, a lower average moisture content can be expected, within the range from 8% to 12% (when in-service).

Where the average moisture content of the supplied lining differs from the in-service condition, the lining should be acclimatised prior to installation.

To acclimatise boards, they should be removed from the pack and all surfaces exposed to the installation environment by re-stacking with separating sticks between layers, for a period which is dependent on the difference in conditions between lining and the ambient conditions. Check the timber moisture content until it has stabilised to the in-service condition. A period of two weeks of acclimatisation should be used as a guide.

Movement after installation due to changes in moisture content (swelling on moisture content increase and shrinkage on moisture loss) can be minimised if lining is installed at a moisture content close to the average in-service moisture content.

Note: Installation should be avoided during very wet or very dry periods of weather.

3.5. PREPARATION AND SORTING TIMBER

Lining should be inspected before installation and the following issues considered.

- Pre-seal all surfaces before installation, seal all end-grains
- Dock out natural defects which are not required
- Sort the colour and grain of timber lining to the desired style or pattern
- Optimize lengths by sorting to suit the application
- Ensure joins are located at batten supports
- Install expansion gaps on wide expanses (greater than 3m wall widths)
- Do not install lining excessively tight, especially in dry conditions

3.6. SPACING OF SUPPORTS

Adequate backing support is an essential requirement for smooth, flat, wall and ceiling lining.

This can be achieved by fixing lining to wall framing, rafters, joists, trusses or battens spaced at no greater distance than shown in Table 3 'Maximum Spacing of Supports'.

Application	Linings Thickness (mm) (minimum thickness)	Spacing (mm) of supports at 90deg to lining
Wall & Ceiling	12mm	450mm

Table 3 Maximum Spacing of Supports

Note: For lining used as a non-trafficable roof, refer to AS 1684 which may require a reduced spacing of supports

4. INSTALLATION

4.1. PREPARING

Ensure that surface the lining is being fixed to is even, with a maximum tolerance of 3-4mm from flat. Use packers to 'even' the surface if the difference is more than this tolerance.

Cut the boards neat, leaving only enough gaps for expansion. This provides a square edge look and there is no need for an edging trim.

Alternatively cut the boards with a gap smaller than the edge bead width at the edges. Affix a timber bead around the perimeter of the lining to cover any cuts, chips and edge nails. A broad range of trims are available from Porta for this purpose.

Prior to fixing, check that the boards are of a suitable grade. Set aside any lining that are not within the required grade and do not install them. If choosing high feature (rustic or knotty) grades, confirm soundness of knots. Cut or dock-out any lining which is below grade. When the product is installed it is deemed to be of an acceptable grade.

Chipped or star checked knots can be remedied with a small touch of colour tinted putty prior to finishing.

Note: All timber will vary in colour and features between individual lining boards. Select and pre-arrange lining boards in a fixing sequence so as to achieve the desired result.

Ensure lining boards are acclimatised to the local humidity condition with a stable timber moisture content.

If battening is required to present a suitable surface for installation, these should be installed at suitable centres. If the battens are timber, they should be kiln dried and accurately sawn or dressed. Where required fixing battens should be packed out to provide a true and even surface prior to securing lining boards. Introduce expansion gaps in the lining layout at each 3metre width.

4.2. FIXINGS

The brad nail type used to fix the lining should be selected to resist the environment and timber where it is used. Corrosion resistant nails should be used in applications when there is a possibility of high ambient humidity.

The brad nail must be selected to suit the specific profile and substrate batten or support board. AS 3566 'Self-drilling screws for the building and construction industries; General requirements and mechanical properties' lists four levels of corrosion resistance. AS 2334 'Steel Nails – Metric Series' provides guidance on the requirements for nails and fixing.

The effect of the natural timber resin should be considered when selecting the corrosion resistance level.

If corrosion resistance is required, stainless steel brad nails are available which meet the highest performance standard (AS 3566 Class 4).

Application	AS 3566 Corrosion Resistance	Protection Type
General environments	Class 1	Bright Steel
Significant humidity	Class 2	Electro Galvanised
Treated timber or premium corrosion resistance	Class 4	Stainless Steel

Table 4 Brad nail selection

4.3. CEILING LINING FIXED ON TOP OF RAFTERS

Ceiling lining fixed to the top of rafters (used with exposed rafters) may be exposed to condensation in the roof cavity.

Directly after installation, the lining should be covered with a vapour permeable sarking and the roof installed to protect the lining. If counter battens are used, sarking may be fixed over the counter battens.

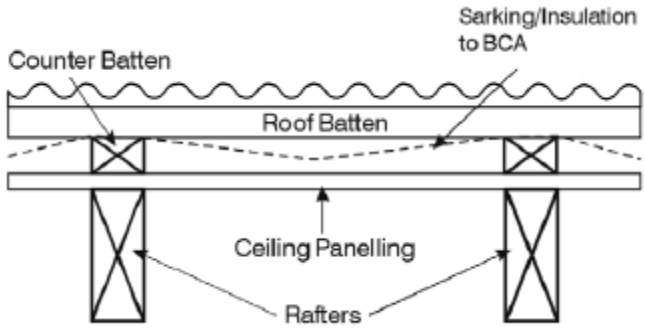


Figure 7 Ceiling Lining fixed on top of rafters

4.4. WALL LINING AND CEILING LINING FIXED TO THE UNDER SIDE OF RAFTERS

Where the wall or ceiling surface is uneven, use suitable batten size

Lining Thickness	Minimum Size of Dressed Batten	Finish Nails size
12mm	42 mm x 19 mm	40mm x 1.6mm (16 gauge)
19 -21mm	42 mm x 35 mm	50mm x 1.8 (15 gauge)

Table 5 Minimum fixing batten size and finish nail sizes

Note: Timber wedges or other rigid materials may be used at the fixing points.

When affixing lining through the face, use two bullet head brad nails, into each support. The heads may be either left flush with the surface or punched and filled with a colour matching wood filler.

Lining with cover widths up to 90 mm may be secret nailed with one nail at each support. For cover widths up to 135 mm, secret fixing may be achieved if both secret nailing and gluing are used in combination.

4.5. INSTALLATION

For wall or ceiling installation, either vertical or horizontal layouts, the interior lining should be securely fixed at centres not exceeding 450mm. A diagonal layout should allow for an appropriate fixing spacing support.

Installation can be either Secret Fix (though tongue) or Face Fix (through the face of the board) – see Figure 8, Fixing Styles.

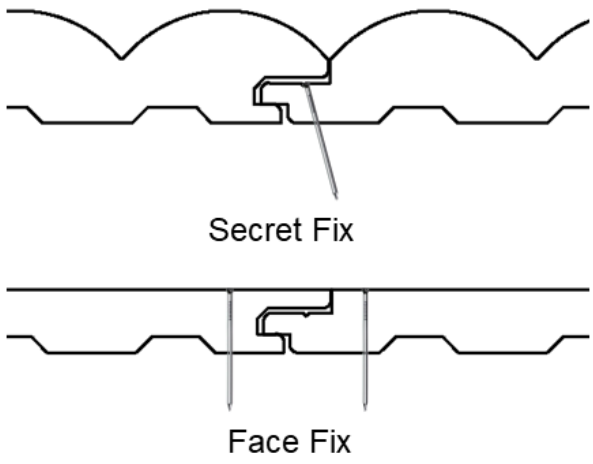


Figure 8 Fixing styles

A combined nail and adhesive technique with secure deep drive wire brad can be used. Use a length of brad / nail to suit the product thickness. Some harder timber species may require pre-drilling with a finishing nail. Trial the application before installation.

Alternatively, lining may be fixed directly to wall surfaces by adhesive alone: Ensure the backing surface is structurally sound, dry, free of dust or soiling, grease and oil. If the backing is painted, remove any loose or flaking paint film. Ensure the glued boards are physically supported in place for at least 24 hours to allow the adhesive to cure.

By placing the nail at an angle, it will reduce splitting the timber. Wider boards may require face-fixing to securely fix them. In all case, it is preferred to fix with adhesive and use nails to secure the lining in place while the adhesive cures.

Installation Process:

1. Firstly, ensure battens are even, secure and clean. Apply beads of adhesive to framing (or battens) sufficient for the installation of 5 boards at any one time. Locate the first board and support in place until the adhesive has cured. Face fixing of the edge boards may be necessary.

2. If secret nailing, nail the boards by installing the nail at an oblique angle, in a position to conceal the fixing under the overlapping edge. Some profiles, such as Vee-join, can be fixed by installing the brad nail at an oblique angle in the face within the contour of the profile.

3. When fixing lining boards horizontally or diagonally, start at the lowest point and install with tongue edge to the top.

4. Secure the first board by nailing through the face of the tongue side of the board. If an edge bead is planned, the nails on the groove side may be able to be covered by the bead. Alternatively, recess the nail and fill.

5. Each following board will only need to be nailed through the tongue side. Put the tongue nails in accurately and flush with the surface so the next board covers the head of the nail.

6. Progressively check boards are plumb or level (as appropriate). Fit each board snugly and avoid over cramping.

7. If lining over a wide wall, introduce an expansion joint at 3m spacing, butt together with a suitable spacing and fix on stud or batten.

8. Secure the final board by nailing through the face. This board should be carefully punched and filled with colour tinted putty prior to finishing.

9. Once all lining is installed, fill any exposed punched nails with matching colour tinted putty and sand with a fine paper, when dry. Cut and fit any trim mouldings to the lining board prior to sealing the boards. Alternatively, if using an ‘adhesive only’ method, support the lining until the adhesive is fully cured.

10. Follow the recommendation of the fastener and adhesive supplier.

4.6. CORNER DETAIL

Two methods are recommended to detail external and internal corners of the lining board. These involve using corner blocks or mitring corners. These two methods are shown below as external corners below. Use the reverse treatment for internal corners.

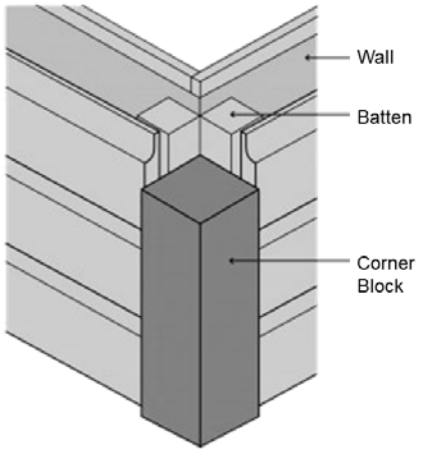


Figure 9 Corner Block detail

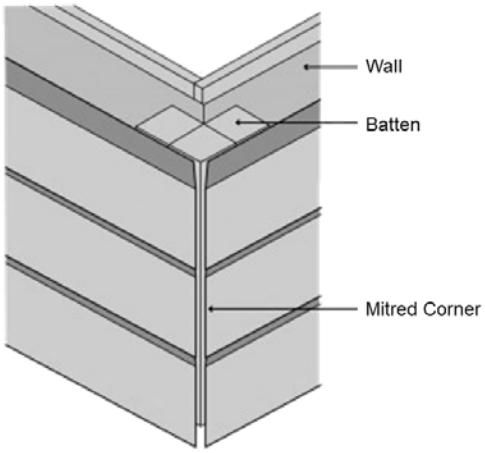


Figure 10 Mitre Corner detail

Block corners can be designed either to sit 'proud' of the lining board profile to create an over-hang or finish under the surface to create a small recess. It is not recommended to finish the block at exactly the same face height as the board because a small amount of movement will be noticeable.

Mitred corner detail can look impressive if executed well. A mitred corner detail should only be attempted with seasoned and acclimatised boards. A neat finish requires very accurate fixing of the boards and subsequent movement of the wood may be obvious.

Flat boards or vertically orientated lining may use corner detail which is created with simple square boards overlapping the corner.

Porta can supply moulded timber in a suitable species and grade to suit a range of corner blocks details and match the timber linings.

4.7. FINISHING COATINGS

In addition to improving the aesthetic appeal of the lining, the main function of the finish or coating is to improve the durability of the timber and slow down the rate at which the timber will take up or lose moisture. This will maintain an attractive appearance and dimensional stability of the lining boards. There are several finishing coatings which can be used.

Film-forming finishes, such as clear polyurethane and acrylic surface coatings and heavy-bodied stains form a layer on the surface of timber, visually creating a smooth surface and forming a barrier to moisture and can protect against UV attack.

Due to the high risk of adhesion between boards and the resultant splitting of boards, coating boards with film forming finishes after installation requires special care. If it is necessary to apply a finish coating after installation, take care to remove excessive coating from tongues and in grooves.

Penetrating finishes such as water repellents, oils and stains penetrate into the surface of the timber and do not form a significant surface film. With proper maintenance these can produce a durable timber finish and allow the board to readily move after installation.

Below is typical information for a range of finish types provided for guidance. Check supplier's specific product information for preparation, pre-coating and applications.

In high humidity environments such as North Queensland or where there is a concern about infection, consider using a finish which contains a fungicide to prevent mould or bacterial growth. Seek further advice from your coatings supplier.

	Film Forming Finish			Penetrating Finish		
	Modified Urethane	Water based Urethane	100% Acrylic lacquer	Tung Oil	Poly-merised linseed oil	Linseed oil & isoparaffin wax
Use on:						
Flooring	✓	✓	✓	✓	✓	×
Stairs	✓	✓	×	×	×	×
Furniture	✓	✓	×	✓	×	✓
Doors & Windows Frames	✓	✓	✓	✓	✓	✓
Wall Lining & Trim	✓	✓	✓	✓	✓	✓
Bench Tops	✓	✓	×	×	×	×
Clean-up	Mineral Turpentine	Water	Water	Mineral Turpentine	Mineral Turpentine	Mineral Turpentine
Number of Coats	3	3	2	3	2	1
Finish	Satin or High Gloss	Satin or Gloss	Satin or Gloss	Satin Luster	Natural Matt	Matt
Re-Coat	16hrs	3hrs	3hrs	16hrs	16hrs	12hrs
Odour	Medium	Minimal	Minimal	Medium	Medium	Minimal
Durability	Best	Better	Better	Good	Good	Good
Wear Resistance	Best	Better	Good	Good	Good	Good
Maintenance	Minimal	Minimal	Minimal	Regular	Regular	Minimal
Coating Thickness	Highest	High	Medium	Medium	Low	Low

Table 6 Typical finish coatings and performance

Source: Industry information including Cabots (Dulux Group), Feast Watson (Dulux Group), Wattyl (Valspar), Hayes, Resene and OSMO

5. MAINTENANCE

Timber is a natural product and as the timbers ages, small cracks (or checks) are likely to appear on the surface of the boards.

Excessive timber movement as a result in changes in ambient conditions and exposure to heat and sunlight, may crack a solid coating or appear as surface cracks. The timber will then be exposed to increased effects of the environment, accelerating these effects.

This ageing process can be slowed by effective maintenance of the finish coating.

Additionally, the colour of the lining may change to a different shade after exposure to the environment. The colour variation will be different between boards and will vary dependant on the variation in exposure to sunlight and heat.

5.1. RESIN BLEED

Some hardwood and softwood timber species such as spotted gum, radiata, slash pine and some hardwoods can be prone to resin bleed.

Resin bleed may only become apparent after installation. Cleaning and re-coating may be required.

5.2. CARE AND LIFESPAN

Lining should be cleaned to prevent build-up of contaminates on the surface.

Any coating or oil applied will require subsequent recoating.

Refer to the coating manufactures maintenance schedule. The period between recoating will be dependent on on-site conditions; humidity, sunlight exposure and local heat sources.

With regular inspection, cleaning and coating maintenance, the lining should meet the life of the building.

6. WARRANTY

Porta warrants that timber supplied by Porta will perform in accordance with claims stated in the written literature.

Each piece of timber is unique. Colour and wood grain variation will occur across supplied material. Sample material will provide guidance. Timber can crack due to humidity levels and sudden changes in temperature. Timber undergoes a natural process of oxidation when exposed, which will affect the colour. Porta does not warrant the consistency of colour or wood grain, or stability of supplied timber.

Except where Porta has agreed in writing to the contrary, this warranty does not apply unless the timber product is supplied in its final shape and form. Timber must be stored, protected and maintained in accordance with written advice.

This warranty does not apply if the timber supplied by Porta has been used for a purpose other than that intended use and installed other than in accordance with Porta recommendations and relevant building codes.

This warranty does not exclude any provisions that cannot be excluded under the Australian Consumer Law.

7. SPECIFYING

7.1. TIMBER

Timber Lining Boards shall be Porta Contours supplied with PEFC [or FSC, as applicable] certification and written product information. Hardwood lining boards shall comply with AS 2796 Section 6: Lining Boards. Softwood lining boards AS 4785.1 Section 5: Lining Boards.

7.2. FIXING

Pre-drilled pilot holes shall be provided on species harder than Janka 10kN.

Include a stable and flat backing. Level batten and spaces shall be used when out-of-flat is greater than 4mm.

7.3. COATINGS

Pre-coat all timber components to the manufacturer recommendations.

Coat all end-grains with an appropriate end grain sealer.

Any onsite protrusions are to be coated with Teknos Teknoseal 4000 an end-grain sealer, or equivalent.

Follow coating suppliers' recommendations.

7.4. INSTALLATION

All materials shall be installed in strict compliance with all local codes, ordinances and manufacturers recommendations including specific additional requirements as may be called for in the specifications or shown on the drawings.

8. PRODUCT INFORMATION

For further product information the following documents are available from Porta.

a. Porta Contours website information available from www.porta.com.au
b. Porta Contours – Timber Lining Boards & Cladding flyer, 4pp, 2018

9. REFERENCES

a. Timber Queensland, Timber Panelling, Technical data Sheet 1, February 2004
b. AS 1684.2 Residential timber framed construction Part 2: Non-Cyclonic Areas
c. AS 4785.2 'Timber Softwood Sawn and milled products
d. AS 2796 Timber Hardwood Sawn and milled products
e. AS 3566 Self-drilling screws for the building and construction industries; General requirements and mechanical properties
f. AS 2334 Steel Nails – Metric Series

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Revision: 21-Mar-18

10. APPENDIX ONE: COMMERCIALLY AVAILABLE PRODUCTS

The following commercially available products are available for the installation and maintenance of lining boards. These are provided as guidance only. Refer the suppliers' specific product performance, preparation, pre-coating and application information.

10.1. FINISH COATINGS

	Film Forming Finish			Penetrating Finish		
Brand	Modified Urethane	Water based Urethane	100% Acrylic lacquer	Tung Oil	Poly-merised linseed oil	Linseed oil & isoparaffin wax
Cabot / Feast Watson	Cabots Cabothane Clear	Cabots Cabothane Clear Water Based	Feast Watson Wet Look Deck	Feast Watson Tung Oil	Cabots Danish Oil	-
Wattyl	Estapol Interior Poly-urethane	Estapol Interior Water-Based Xtra Clear	Colourwood Interior	Estapol Tung Oil	Estapol Danish Oil	-
Haymes	Easy Floor	Aquatic Floor	Aqua GP Clear	Tung Oil	Danish Oil	-
Resene	Qristal Clear	Aquaclear	-	-	Danska Teak Oil	-
Osmo	-	-	-	-	-	Wood Wax Finish
Use on:						
Flooring	✓	✓	✓	✓	✓	×
Stairs	✓	✓	×	×	×	×
Furniture	✓	✓	×	✓	×	✓
Doors & Windows Frames	✓	✓	✓	✓	✓	✓
Wall Lining & Trim	✓	✓	✓	✓	✓	✓
Bench Tops	✓	✓	×	×	×	×
Clean-up	Mineral Turpentine	Water	Water	Mineral Turpentine	Mineral Turpentine	Mineral Turpentine
Number of Coats	3	3	2	3	2	1
Finish	Satin or High Gloss	Satin or Gloss	Satin or Gloss	Satin Luster	Natural Matt	Matt
Re-Coat	16hrs	3hrs	3hrs	16hrs	16hrs	12hrs
Odour	Medium	Minimal	Minimal	Medium	Medium	Minimal
Durability	Best	Better	Better	Good	Good	Good
Wear Resistance	Best	Better	Good	Good	Good	Good
Maintenance	Minimal	Minimal	Minimal	Regular	Regular	Minimal

Coating Thickness	Highest	High	Medium	Medium	Low	Low

Table 7 Suppliers' finish coatings and typical performance

Note: Inspect, sand and recoat when there is visible deterioration in the coating

Brand / Supplier	Customer Service	Website
Cabots (Dulux Group)	1800 011 006	http://cabots.com.au/
Feast Watson (Dulux Group)	1800 252 502	http://www.feastwatson.com.au/
Wattyl (valspar)	132 101	http://www.wattyl.com.au/en/
Hayes	1800 033 431	http://specifiers.haymespaint.com.au/
Resene	1800 738 383	http://www.resene.com.au/
OSMO	03-9464 4252	http://www.osmoaustralia.com.au/

Table 8 Timber coating supplier contact information

Source: Industry information including Cabots (Dulux Group), Feast Watson (Dulux Group), Wattyl (valspar), Hayes, Resene and OSMO

10.2. END GRAIN SEALER

Porta recommends the use of Teknos Teknoseal 4000 specialised end-grain sealer, available from Porta.

10.3. FIXING NAILS

All fixing brad / nails should be selected to resist the environment where it is used and selected timber species and grade. The effect of the timber resin should be considered when selecting.

The brad nail must be selected to suit the specific profile and substrate batten or support board. Stainless brad nails are available which meet the highest performance standard (AS 3566 Class 4) if corrosion resistance is critical.

Typical brands include: Paslode, Powerfit, Craftright.

If the head of the nail is exposed, it should be punched below the surface and a colour matched putty applied.

10.4. ADHESIVE

To install lining boards to battens or backing sheets use a general purpose construction adhesive, applied with the use of a caulking gun. Typical brands include:

- Selleys Liquid Nail Original
- Sikabond Construction Adhesive
- Max Bond Original
- Fuller Trade Construction Adhesive

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