DATA SHEET 2 – PRE-INSTALLATION ASSESSMENT

2.0 Introduction

This data sheet outlines aspects that should be considered prior to the installation of a timber floor. It includes aspects of storage and handling, evaluating the conditions in which the floor is to be laid and measures that may need to be taken prior to installation.

2.1 Storage and Handling Procedures

Flooring should be delivered by the supplier with plastic wrapping (to top, sides and ends) in good condition in order to maintain the flooring at the appropriate moisture content. It is the floor installers' responsibility to check that the timber is at the appropriate moisture content at the time of installation and therefore flooring products must be protected from weather exposure and other sources of dampness.

Ideally, flooring should not be delivered to site until it can be immediately stored under permanent cover. If this is not achievable, other precautions that are equally effective to prevent moisture uptake and excessive sun exposure, will be needed.

Plastic wrapping is easily damaged and should not be relied upon to keep the flooring dry. If moisture penetrates the plastic or timber is stored over a moist surface, subsequent moisture uptake can result in significant swelling of some boards. Flooring should not be laid in this condition, as wide gaps at board edges may result as boards re-dry. Wrapped packs should also be protected from excessive sun exposure as this too can have a detrimental effect.

2.2 Timber Flooring Standards and Specifications

When timber flooring is received on site it should generally meet the following:-

- Grade - flooring to be supplied to the specified grade, which may be a manufacturer's grade. Note that if a manufacturer has given a specific name to a grade, the product may be similar to one of the grades contained within an Australian Standard but it is likely to differ in some respects. This may or may not be important to customers and should be resolved prior to supply.
- Moisture content - should be in the range of 9% to 14% (10 to 15 % for Cypress) with the average moisture content for all pieces approximately 11% (12% for Cypress).
- Timber moisture contents should be checked. (Resistance moisture meter readings must be corrected for species and temperature, and may be affected by other factors. Corrected readings are approximate only. If in doubt confirm results by oven-dry tests.) Water marks or a significant variation in cover width within a board may be indicative that the timber has been moisture affected.
- Cover width - not more than 1 mm difference between one board and another. Cover widths should generally be within ± 0.5 mm of the nominal cover width. (This reflects changes to board dimensions that can occur after milling and prior to installation and therefore outside the limits of Australian Standards).
- Boards should not be visibly cupped although Australian standards allows for 1 mm in 100 mm.
- Tongue and groove tolerance - not to be less than 0.3 mm nor greater than 0.6 mm. Boards should slot together to form a 'snug' fit. The fit should not be loose and sloppy or overly tight.

Grading rules for solid T&G strip flooring are contained in the following Australian Standards:-

AS 2796 – Timber – Hardwood – Sawn and milled products
AS 1810 – Timber – Seasoned Cypress pine - Milled products
AS 4785 – Timber Softwood – Sawn and milled products

If the material supplied does not meet all the above criteria, **installation should not proceed until any problem is verified and rectified.**

2.3 Evaluating Site Conditions and the Installation Environment

Evaluating Site Conditions

Every site requires assessment prior to the installation of a timber floor. It is important to know the climate in the area where a floor is being laid. Relative humidity is the major influence determining whether timber flooring will absorb moisture from the air and swell, or whether it will lose moisture to air and shrink. If the moisture content of the timber flooring is close to the average in-service moisture content then subsequent seasonal changes in humidity will only result in small changes in moisture content. The climate can be assessed from 9 am relative humidity data available from the Australian Bureau of Meteorology website at www.bom.gov.au/climate/averages. Figure 2a shows annual relative humidity charts associated with a tropical climate, temperate climate and a dry inland climate. Approximate average external equilibrium moisture contents (EMC) are also provided on the graph for each climate. Equilibrium moisture content can be thought of as the moisture content that timber will approach under set conditions of relative humidity and temperature. It is evident from these graphs that the climate may result in moisture contents that can be either higher or lower than the average moisture content of the flooring that has been supplied.

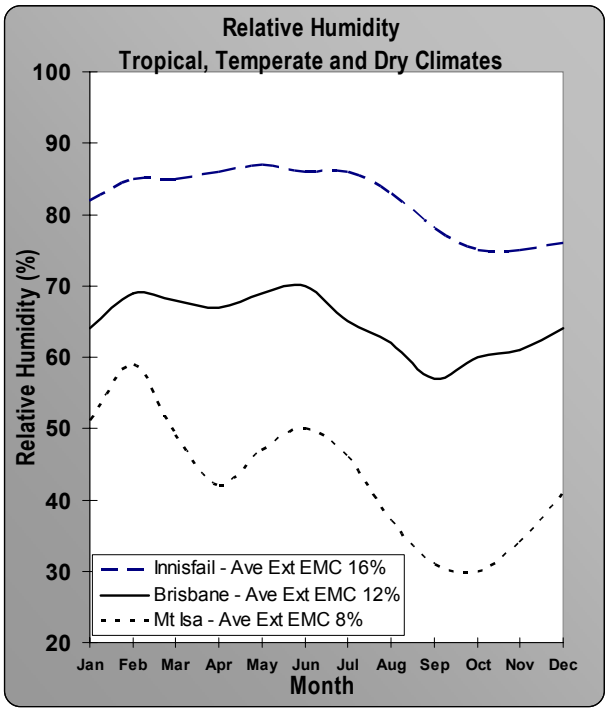


Figure 2a Climatic effects on timber floors

Relative humidity graphs for the major capitals throughout Australia are provided in Figure 2b. Seasonal variation about the average can be seen to be greater in some locations than others. For example the seasonal variation in Sydney is much lower than Melbourne. Where there is greater seasonal variations, greater seasonal movement (shrinkage and swelling) can also be expected.

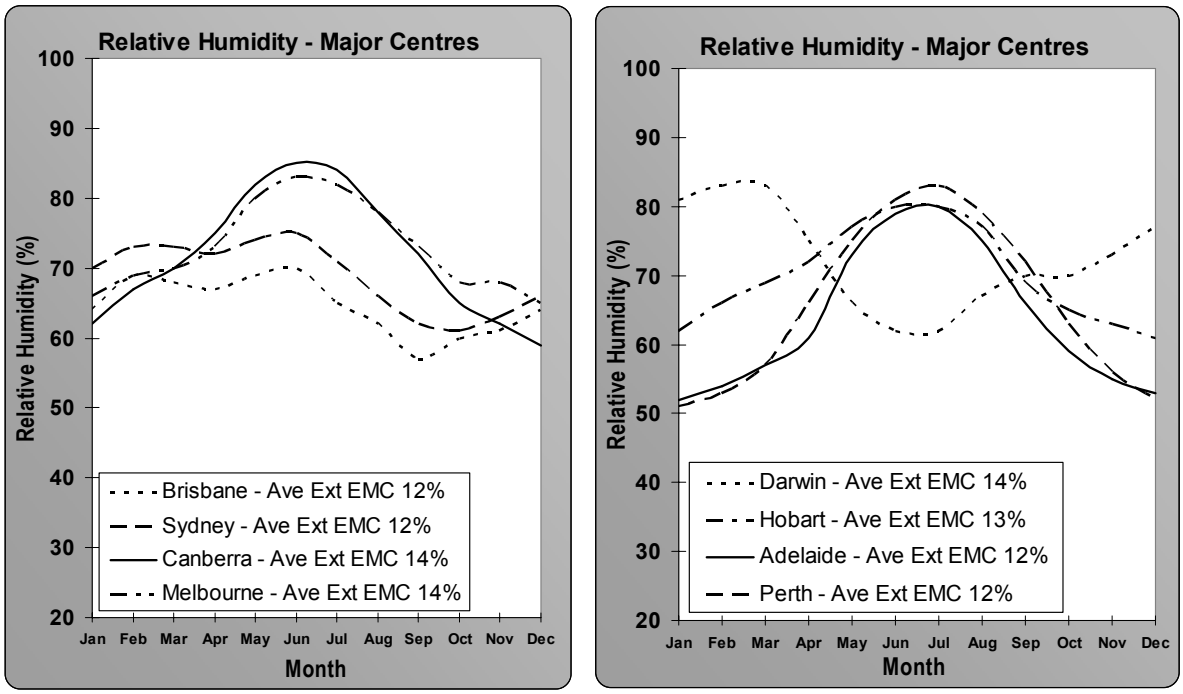


Figure 2b– Major center climates

Timber flooring is generally manufactured to suit temperate climates with average external EMCs of 12% to 14%. To provide assistance in assessing climatic influences Figure 2c outlines the general relationship between temperature, relative humidity and moisture content. Average internal EMCs are generally lower than external by 1% to 2% without heating or cooling systems operating and can be 4% to 5% lower for the periods when such systems are operating. Therefore, in climates that have cold winters, heating systems often lower the humidity within the dwelling and reduce the effect of high external humidity on the floor. Similarly in tropical locations air-conditioning operated during hot humid times can also reduce the effect of high external humidity on the floor. Installation and finishing practices need to consider accommodating both the adjustment to climatic conditions associated with a locality and the seasonal movement that will occur in that climate.

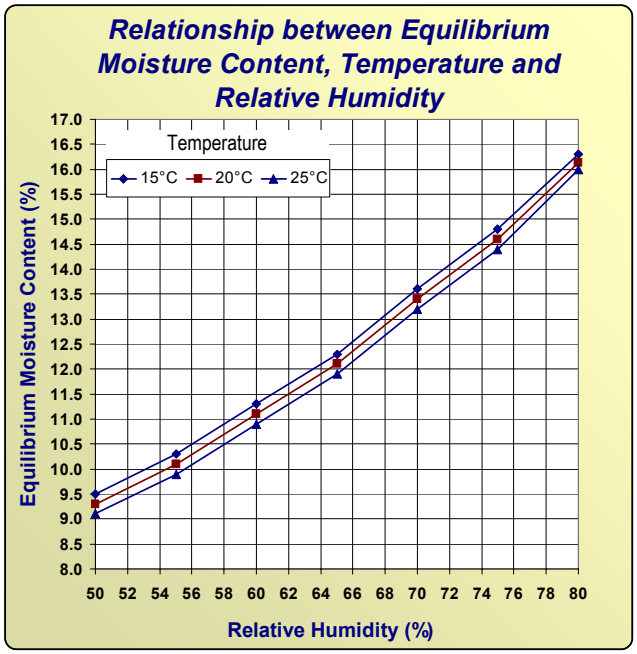


Figure 2c– Temperature, RH and EMC

In areas of higher elevation than coastal areas, average moisture contents are often higher due to the associated local weather patterns. Similarly, houses built in 'bushy' surroundings or gullies may experience higher average moisture contents. Moister conditions are also often experienced with houses on farmland or in rural type settings, particularly in coastal and hinterland areas experiencing higher or more consistent rainfall. Therefore, in these localities greater allowance for floor expansion is required at the time of installation.

Building and Installation Considerations

Closed in Sub-floor Space

Many dwellings are 'bricked' in underneath and a lack of sufficient ventilation can result in high humidities in the sub-floor space. This may result in expansion and cupping of floorboards. Quoted figures for sub-floor ventilation (Refer to DS3) are based on sub-floor spaces that are not subjected to seepage or where ventilation through the sub-floor space is inhibited. Where humidity remains constantly high beneath a floor, coatings to the underside of the boards will not reduce the moisture uptake into the flooring. 'Bushy' surroundings and dense gardens may also cause higher moisture contents and reduced airflow through the sub-floor space. Therefore this can affect the performance of the timber floor.

Houses with Open Sub-floors

Special precautions must be taken when timber floors are laid on joists in a house that is open underneath, particularly when built on steeply sloping land or escarpments. In such locations, very dry winds or wind-blown rain or fog can directly affect the moisture condition of the lower surface of the floor. This can result in either extreme shrinkage or extreme swelling. In the latter case the floor may lift off the joists and structural damage to the building may occur. Also where there is little restriction to the prevailing wind, floors can react more rapidly to dry winds. The species used in the floor and board cover width affect the rate of movement and shrinkage that occurs. Depending on the severity of the exposure, options to protect the floor include providing an oil-based sealer to the underside of the floor, which may provide short duration protection to changes in weather, and installing a vapour resistant lining to the underside of the joists or building-in the underfloor space.

Internal Environment

Within a dwelling a number of differing climates can develop, causing areas of flooring to respond differently within the same dwelling. These include large expanses of glass, fireplaces, refrigerators, air-conditioners, appliances that vent warm air, the aspect of the house and two-storey construction, all of which can have an

effect on the dimensional movement of floorboards. When floors are exposed to the 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.

Araucaria (Hoop Pine) Flooring and Araucaria Floor Framing

Where Araucaria floors and floor framing are not fully enclosed it is necessary to seal the framing members and lower surface of the floor boards to prevent attack from the Queensland Pine Beetle. Attack is specific to the Araucaria species (including Bunya) and generally restricted to the area from Bundaberg to Murwillumbah and east of the Great Dividing Range. In this region exposed framing and floors (including ventilated sub-floor spaces) require sealing to meet the requirements of the QFS Technical Pamphlet No.1 and thereby the BCA. The sealer provided needs to be a film forming finish and this may also reduce the effects from rapid weather changes.

2.4 Considering the likely movement after installation

As discussed in Data Sheet 1, timber is a natural product that responds to changes in weather conditions with seasonal temperature and humidity changes in the air causing boards to shrink and swell at different times throughout the year.

The overall movement occurring in individual boards and rate of movement will depend on the timber species and cutting pattern. Small differences in moisture content between boards at the time of manufacture (refer to Datasheet 2.2 – Timber flooring standards and specifications) and variable conditions within the house (e.g. westerly facing room compared to southerly facing) will also cause further variation in board width. Consequently, it can be expected that small gaps will occur at the edges of most boards, particularly during the drier months, and that the actual gap sizes may differ across a floor.

In cases where shrinkage occurs after installation, wider boards (e.g. 130 mm) will result in larger gap sizes at board edges than if narrower boards are used. Air-conditioning or heating systems may increase the size of shrinkage gaps at board edges.

Some movement usually occurs in timber floors after laying as the floor adjusts to the climate and although floor finishes may retard moisture content changes, they will not prevent this movement. In applications where greater movement is expected after finishing (e.g. from seasonal changes, use of wide boards, air-conditioning installed after floor installation), particular care is necessary to ensure that the finish does not act as an adhesive and bond a number of adjacent boards together (known as edge bonding). With subsequent shrinkage, wide gaps between groups of four or five boards may occur or boards may split.

The way different timber species respond in a floor depends not only on their moisture content but also on the rate at which they take up and lose moisture, the associated movement and also their density. High density species are extremely strong and those that take up or loose moisture more quickly (such as Blackbutt) will also follow seasonal moisture changes more closely than slower responding species (such as Spotted Gum). Particular care is necessary to be able to accommodate expansion of the higher density species and in moist localities this may necessitate providing small expansion gaps every 10 or so boards during installation (refer DS 3, Fig. 3c), in addition to normal expansion allowances in order to accommodate this movement. Lower density predominantly quartersawn hardwoods (e.g. Tasmanian Oak, Victorian Ash) and softwoods will to some extent compress at their edges when a floor expands. With these timbers, normal expansion allowance is more able to accommodate the expansion in moist climates.

2.5 Installation Moisture Content and Acclimatisation

The moisture content of timber is the percentage weight of water present in the timber compared to the weight of timber with all water removed. Moisture content varies with changes in the humidity and temperature in the surrounding air. To minimise the movement of a floor (swelling on moisture uptake, shrinkage on moisture loss) due to changes in moisture content it is important to lay and fix timber floors close to the average moisture content of timber in the environment where it is to be laid. Along coastal areas where higher humidities can be expected, moisture contents of flooring may vary from 9% to 14%. Timber flooring is usually supplied at an average moisture content between 10% and 12.5% and most boards can be expected to be within this range. Where conditions are drier, such as inland areas or in air-conditioned buildings, average

moisture contents of flooring may vary from 7% to 12%. In these situations flooring may need to be acclimatised on-site. Where the average supplied moisture content of the flooring is near the expected average in-service moisture content, acclimatisation is not necessary.

In areas where higher average moisture conditions persist and where floors are expected to have higher moisture contents, additional allowance should be made for subsequent expansion. Such areas include tropical North Queensland and northern New South Wales, areas of dense bushland and rainforest, particularly at higher elevations and mountain areas.

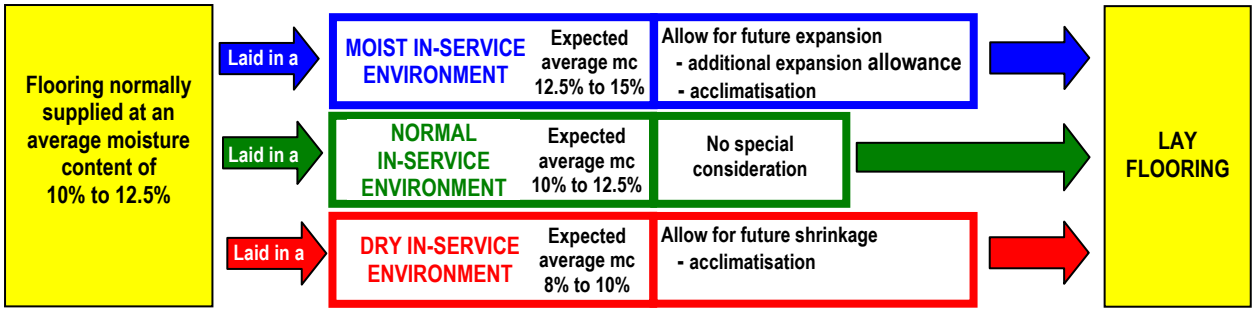
Installation methods need to be considered to accommodate the difference between the average moisture content on delivery and the average expected in-service moisture content include either providing additional intermediate expansion joints or acclimatising the flooring.

Acclimatising is the process of allowing partial equalisation of the moisture content of the timber as supplied to the moisture content of the surroundings in which the timber is to be installed. Increasing the average moisture content of the flooring supplied will only be effective if the humidity in the air is sufficient to cause moisture uptake. Care must also be exercised as the rate of moisture uptake differs from species to species. Some higher density species are very slow to take up moisture from the air (e.g. Spotted Gum) while others react more quickly (e.g. Blackbutt and Brush Box). If flooring is to be laid in a dry environment such as western Queensland or a consistently air-conditioned building, then acclimatising can be effective in reducing the average moisture content of the flooring prior to laying and thereby reducing gap sizes at board edges from board shrinkage. In such climates, future expansion of the floor must be allowed for to accommodate periods of wet weather.

Acclimatising relies on each board being exposed to the in-service atmosphere and therefore packs must at least be opened up and restacked in a way that allows airflow between each board. Acclimatising can only be effective in an air-conditioned building if the air-conditioning is operating at the time or in dry localities during drier periods. The species and period for which it is acclimatised will also influence effectiveness. For some higher density species that are slow to lose or take up moisture, acclimatising may have little effect. Acclimatising in dry climates does not negate the need to provide for floor expansion during periods of wet weather and will not overcome poor drying practices.

A simple guide to pre-installation considerations is provided in Figure 2d, which should be referred to in conjunction with the preceding text.

Figure 2d – Pre-installation considerations



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