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Laminate Flooring

Industry Standard

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Laminate Flooring Industry Guidelines

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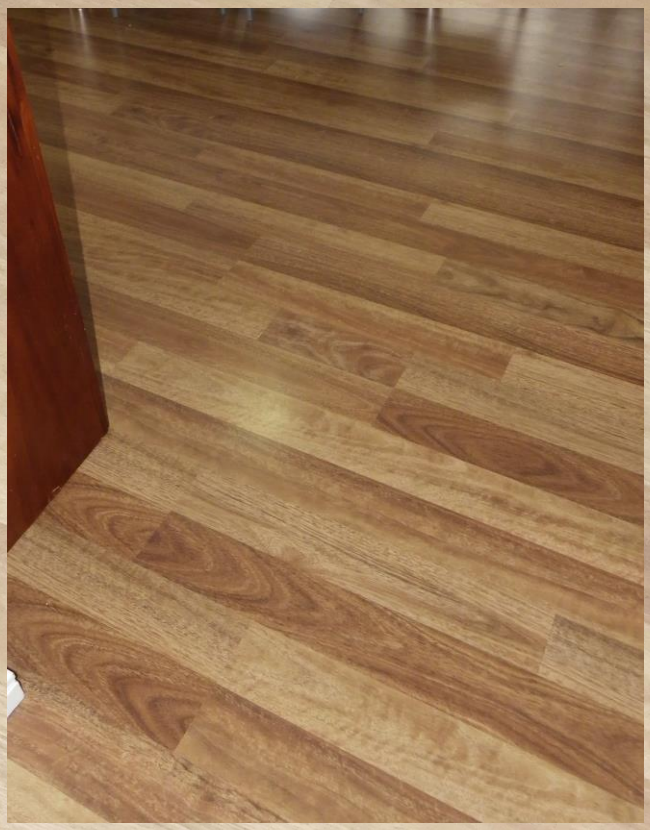

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with the assistance of atfa member companies and organisations who provided information and photographs.

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Introduction

Scope

This publication provides a reference guide for the installation of laminate flooring laid as floating floors over structural subfloors. Floors of this type comprise a wood fibre-based core with an exposed decorative paper replicating natural flooring. The decorative or décor paper is protected by a melamine-impregnated wear paper and a stabilisation paper is used on the base of the board. The standard covers this type of flooring with a glueless locking system. When installing a laminate floor many aspects must be considered and this includes assessing the product used, the dwelling environment in which the floor is to be laid and the desired appearance of the floor. These aspects are covered by these guidelines as well as aspects relating to product selection, board widths and the available finish textures.

The flooring production process

Laminate flooring is not manufactured in Australia with much of the flooring being imported from China, South East Asia and Europe, where it is manufactured in large factories. Laminate flooring, originally developed in Sweden, first entered the market in 1980 with many developments occurring over the 35 or so years since. Over this time, there have been significant improvements to both the quality and appearance with some products now much more closely resembling wood flooring. Even though product components and processes have undergone many changes and enhancements, board construction basically remains the same as when it was first developed. As will be discussed in more detail in Section 1, laminate flooring comprises: an exposed clear protective layer for durability; beneath this is the decorative or décor paper providing the timber appearance (or tile and stone); beneath this the thicker structural fibreboard layer; and the final layer is a backing paper for stabilizing the board. These four layers are then pressed under high temperature and pressure to form a single multilayered panel from which the boards are cut and machined to the required dimensions and edge and end profiles.

Flooring types can be difficult to distinguish visually, laminate on the left and engineered on the right.

Quality control

Leading factories place a strong emphasis on product quality and underpinning this are rigorous quality control procedures and checking. Quality starts with material selection and a well-controlled production environment. Manufacture should be to recognised standards that require the testing of product quality aspects to acceptable tolerances. Standards are discussed in more detail in Section 1.5.

The owner's choice

Ultimately, the owner often decides what product is to be laid and this is influenced by such factors as product availability, appearance of the product and cost. Due to the wide variety of products available, care is needed in the choice of product and this standard provides assistance with aspects that should be considered. It is also recognised that as well as professionally installed floors there is also a high level of DIY installations.

When purchasing flooring, quality is important and with laminate flooring, lower-priced product can often reflect a reduction in the quality. Aspects such as the density of the core layer or paper quality cannot be discerned visually at time of sale but such aspects affect product performance and appearance. Similarly, the joining system, where tight machining tolerances are necessary, needs to provide a joint of adequate strength. A further aspect that cannot be assessed visually is the product's resistance to moisture and this is also of importance.

As such, it is important to research the products available and have some knowledge of the quality rating for the products being considered. Later in this publication, aspects relating to the standards, testing, quality and symbols used with laminate flooring are discussed. Similarly, product reviews and how long the product has been used in Australia can be of assistance. Products generally come with long warranties, however, it is important to understand what is and what is not included in the warranty. Warranty considerations are discussed later in this standard.

For those supplying or installing laminate flooring, aspects relating to what customers desire is of great importance and should not be taken lightly. Although some products are aimed at the DIY market, many look to a high-quality installation provided by a floor installer. Owners are reliant on the installer's expertise. It is important when installing a laminate floor that the owners are given correct information regarding the ongoing performance and care necessary for their floors. In addition to this, aspects relating to warranties need to be carefully explained. Each of these aspects can influence the owners' satisfaction with their floors. Owners are much more aware and have much more access to information than ever before, however, they are unlikely to have the same depth of knowledge as those specifically experienced in the flooring industry.

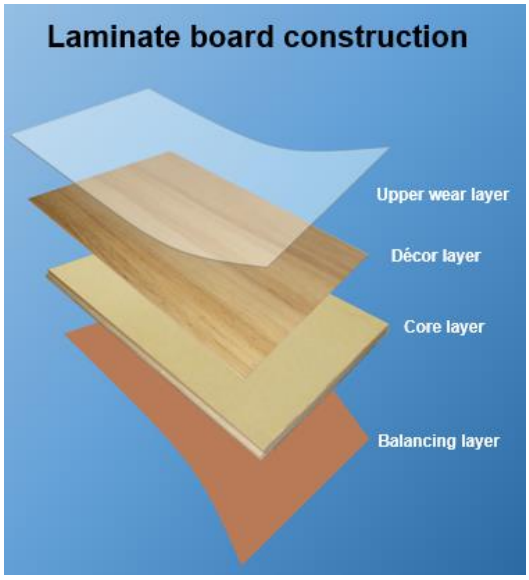
1. Product characteristics

Many of the aspects important to the design and performance of the flooring product will be discussed in this section. These include: providing a more in-depth understanding about the purpose of each layer in the construction of the board; board thickness considerations; and profile designs. Additionally, aspects relating to product durability, the purpose of underlays and consideration of in-service movement (expansion and shrinkage) will also be covered.

1.1 Laminate flooring constructions

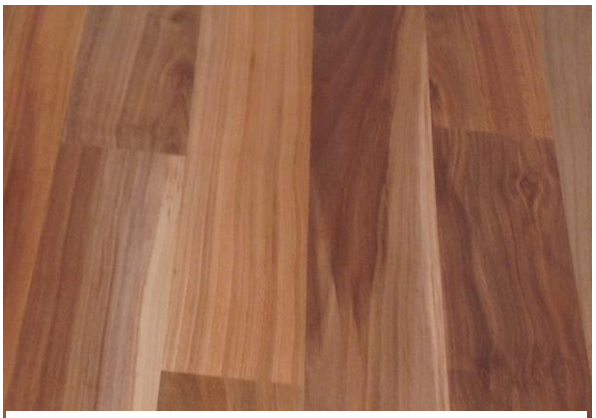
Laminate flooring is a composite product made up of at least four distinct layers and shown in the diagram below. Each of the layers are fused together to provide a sheet from which boards are cut and edge profiled. The construction is generally as follows:

- Surface or upper wear layer – This melamine layer is transparent and has the function of making the board surface resistant to the likes of stains, wear, scratches and scuff marks. As such, it creates a durable board surface capable of not being damaged from everyday use with shoes, furniture legs, vacuum cleaners etc. and will not be penetrated by moisture or cleaning compounds. It also adds some protection to the effects of UV light that can fade the colour of the board. The durability of the floor is largely governed by this layer and greater wear resistance is generally obtained with greater proportions of aluminium oxide in this layer.
- Décor, design or decorative layer – This paper layer is what defines much of the appearance of the board and typically comprises a high-resolution photographic image of a timber floorboard. To provide variety in the floor a number of different board images will be used to create a realistic reproduction of a timber floor, as shown in the photo. Board installation can also enhance this effect by ensuring board end joints are not closely spaced as is considered good practice with solid timber flooring. The appearance of any timber floorboard can be created, included flooring that is more highly featured or has had coating effects applied. In particular with the more rusticated-looking floors, their appearance and realism is also contributed to by embossing the board surface which occurs during the pressing process. Surface texture is covered in Section 1.4.



- Substrate or core layer – In contrast to the other layers, this layer is thick and provides structure to the board. It is now made from high-density fibreboard (HDF) but in the past has been made from medium-density fibreboard. The higher the density, the stronger the core layer will be. There is a range of densities that characterise HDF and flooring made to the upper end of the density range will often be considered as having better core layer properties and consequently can contribute to higher product costs. It should also be noted that HDF also provides for

greater stability and more precise machining of the edge profiles. HDF is essentially composed of wood fibres that are randomly aligned, and like with solid timber, wood fibres will swell under higher humidity conditions. It is for this reason that environmental conditions need some consideration when installing laminate flooring. This is discussed in Section 1.10 Boards of various thicknesses ranging from 7 to 12mm are available and it is the core layer that largely governs board thickness.



A realistic appearance can be created with the use of a range of high-quality images in the décor paper, textured surfaces and care with board placement on installation.

- Backing or balancing layer – With many building materials stability is enhanced with balanced construction. That is, if a product is made from a composite of materials, then the upper and lower layers are essentially the same material or have similar properties, and in this case, with laminate flooring moisture-resistant melamine paper. With changes in humidity, this layer greatly assists in maintaining the shape of the board and preventing it from warping (for example, bowing or cupping) when installed.

Also requiring consideration are the two types of manufacturing processes used to make laminate flooring. These are the Direct Pressure Laminate (DPL) flooring process and the High Pressure Laminate (HPL) flooring process. The more common and more applicable to domestic flooring is DPL with HPL currently aimed at heavy commercial applications. The two processes are quite similar, however, with HPL higher pressing pressures are used and there are added layers of phenolic-treated craft paper, making the flooring more resistant to impact and resulting in this flooring usually being of the highest wear rating. However, with this increased strength and durability comes not only additional cost but also reduced flexibility necessary for the more highly embossed flooring that attracts many domestic consumers. Normal domestic situations also do not require such high wear resistance properties as can be achieved with HPL. Therefore, with DPL there will be more styles and representations in terms of species and colour available and at a more moderate cost.

1.2 Board dimensions

Earlier in the history of laminate flooring board length was more restrictive, however, it has now been recognised that in order to more closely replicate a solid timber floor, longer board lengths are beneficial. Most flooring is still supplied in lengths of about 1.2m which are easy to handle, although longer floor lengths of about 1.8m to 2.0m are also now available in some product ranges. There is no specific length specification, with one manufacturer producing boards at, say, 1,213mm and another at 1,292mm. Similarly, when considering board width, there is also no specific specification and could be in the range of 126mm, 188mm, 192mm or 205mm.

A range of board thicknesses are available with most manufacturers producing more than one thickness. Standard board thicknesses produced are often 7mm, 8mm, 10mm or 12mm, although other thickness may also be manufactured. Some flooring is produced with a sound-absorbent underlay already adhered to the lower surface of the board and when overall board thickness is quoted, it includes the thickness of the underlay. That is, a board normally 8mm thick with a 1mm-thick underlay attached would be quoted as a 9mm-thick board. Therefore, thickness relates to the measurement across all layers.

The thickness of the board influences board strength and a thicker board will also provide a more solid and natural feel underfoot when walking on a floor. A thicker board will not make the floor more wear resistant as this relates to the properties of wear layer. Impact resistance is the ability of the board to withstand objects falling on the board where thinner boards would be more prone to fracture than thicker boards. As such, it is also important to realise that board thickness does not correlate to product quality. The quality of a product relates to the properties of each layer used and to the production processes and, therefore, a thicker board manufactured from, for example, lower-density MDF, as was used in the past, is no longer be considered a high-quality product.

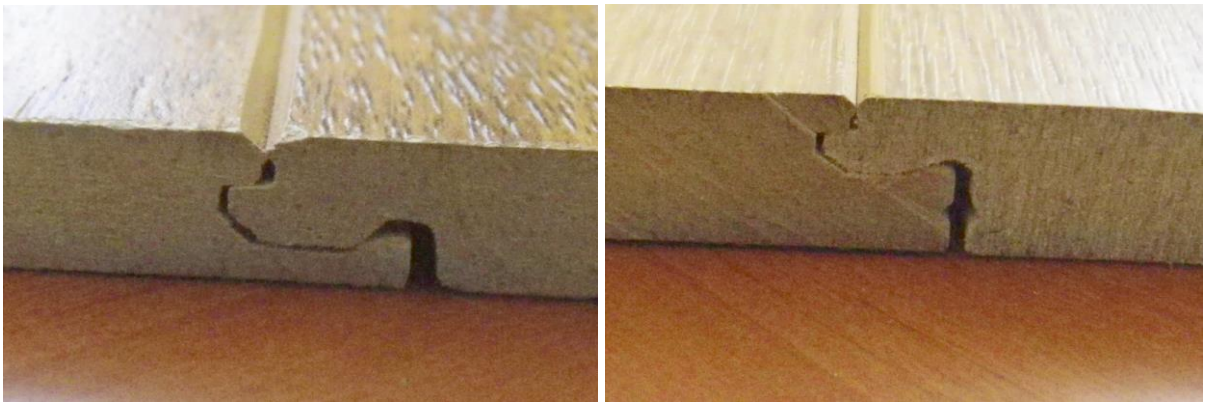
However, it is recognised that a thicker board can have benefits: the 'feel' underfoot when walking on a floor; it is quieter when walking on the floor; it is more forgiving in bridge minor undulations in the subfloor; and some consider it easier to lay. Therefore, board thickness, with associated higher production costs, is one of a number of aspects to be considered.

1.3 Glueless profiles

There are two profile types that have been used along board edges with laminate flooring. The first was a more traditional 'tongue and groove' profile similar to that found in solid timber flooring, which may be found in old floors (greater than 10 years), and then there are the interlocking or glueless joint systems which are now used. These two systems are shown in the image below. The T&G profile type required adhesive (cross-linked PVA) to be applied to the board joint at the time of installation. This not only ensured that boards did not separate with foot traffic after installation but also provided added moisture resistance to the board joints. As indicated, all laminate flooring in Australia is now of the interlocking or glueless type, which has many advantages including no need for adhesive with associated drying times and thereby providing a floor immediately suitable for foot traffic after installation. The reduction in installation time also provides time savings.

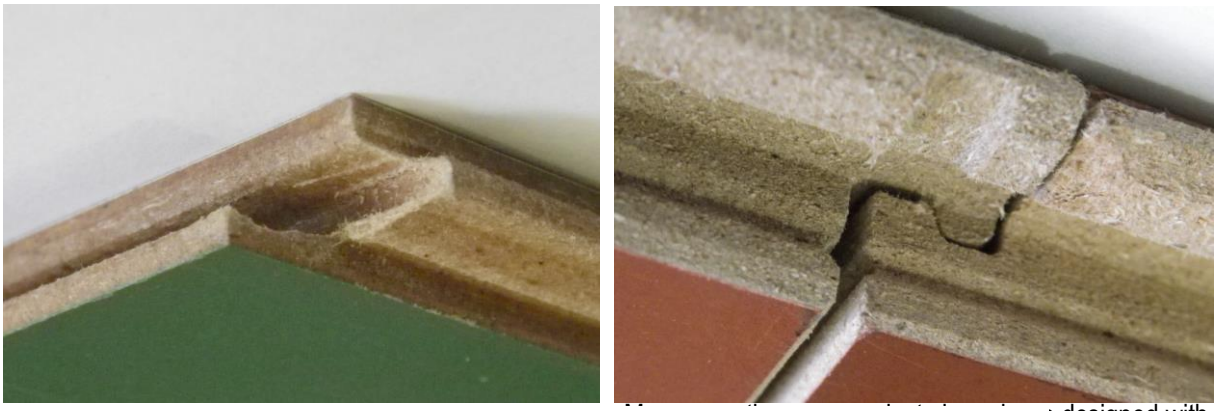
The upper T&G board requires adhesive on installation and the lower board is of the interlocking type.

The edge jointing systems vary and are often patented designs with names including: Unilin, Uniclic, Forma-Lock, Kwik-Fit, Lock&Fold and JustClic with each having its own individual profile. Although many of the products imported into Australia will use one of these edge profile designs, other designs will also be used. It is important that the jointing system has sufficient strength and provides sufficient locking force to prevent separation. It should be noted that strength, fit, ease and speed of installation varies substantially between locking systems. The images below show two interlocking joint profile designs to board edges.



Typical interlocking edge profiles in 8 and 12mm thick flooring.

At board ends there are two distinct profile types often used which affect the method of installation. The first is where the profile requires the end of the board being installed to be angled on installation into the end joint of an installed board before marrying the edge joint, known as 'angle-angle' installation. With this method tapping blocks are often required to ensure tight board edge joints. The second profile is often referred to as 'drop lock' where on installation the long side of the panel is angled into position and as the board is lowered into place the end joints lock. This style relies on the next row of boards completing the locking of the board end joint. The images below illustrate from beneath the boards both the 'angle-angle' and 'drop lock' end joint profiles.



An example of an 'angle-angle' and a 'drop lock' end joint profile viewed from beneath the boards.

a plastic tongue at end joints, which is another form of the 'drop lock' profile. As the installation board end is lowered, the plastic tongue retracts and then springs back into a groove in the board that is being lowered. This

has the advantage of locking the board end in place on installation. The retractable plastic tongue and end joint are shown in the following image.

End joint profile including the plastic tongue.

1.4 Surface texture and edge bevels

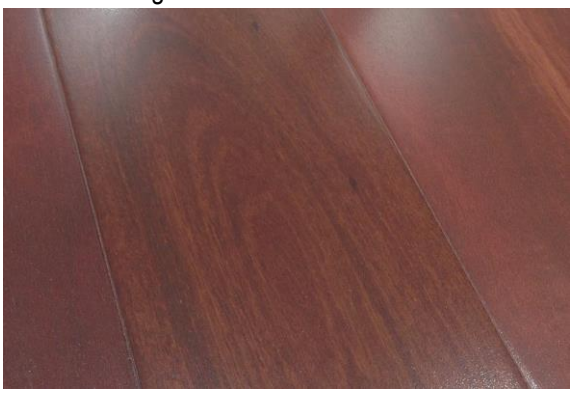
Laminate flooring is available with many different surface textures. Similarly, appearance ranging from matt to very high gloss is achievable. With textured surfaces, a lower sheen or matt finish is generally adopted. With high-sheen levels, as shown in the image to the right, reflections become much more apparent and are not detectable on the low-sheen finished surface.

Effect of sheen level on reflected light.

A wide variety of embossing patterns are available which provide fine to heavy embossing and include embossing that follows the wood grain pattern of the décor paper. In addition, more highly textured surfaces are available to replicate a sawn board surface, brushed surface or hand-scraped surface. Embossed in register laminate flooring provides a heavy indented texture that near exactly matches the grain patterns in the décor paper. Pictured below are four images that demonstrate a range of the embossing patterns used.

Board textures.

Boards are available that are either square-edged or contain a bevel to board edges and ends. A bevelled edge makes the boards more defined in the floor whereas a square edge provides a look more akin to a sanded and coated solid timber floor. The bevel has the benefit of disguising any mismatch or misalignment at board edges due to machining variations. With square edge boards, mismatch at board edges will result in rough edges (a small tolerance is permitted). On bevel-edged boards, a variety of designs are available with some suppliers offering more than one option. The bevel can be 'micro' in size or a more distinct 'v' or 'u' shape. Where the bevel is more distinctive it is usually painted to a tone that complements the décor paper. With some suppliers, a pressed bevel is also available. Examples of these are shown in the images below.

Painted 'v' bevel and pressed bevel.

Timber engineered flooring is often manufactured as a two or three strip product. That is each board has two or three strips of timber adhesive fixed to the plywood or similar base beneath. This type of product is also simulated with laminate flooring. With this type of product the boards are usually square edges. An example of a three strip board is provided in the photo.

This board simulates three strip construction in engineered flooring.

It should also be noted that décor development can vary substantially in terms of type, size and quality. Some flooring will provide long panel designs with repeats of over ten boards, while with other products there will be shorter panel designs with repeats of less than six boards. Such aspects influence the overall appearance of the floor. Larger European producers generally do their own in-house development of décors whereas more generic deigns often occur with Chinese product.

1.5 Standards

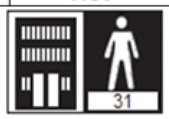
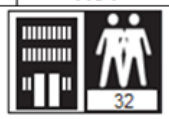
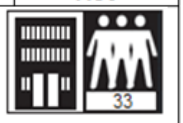
The European standard EN 13329 – Laminate Floor Coverings – Specifications, Requirements and Test Methods (EN 13329) is used by many manufacturers throughout the world. The standard specifies characteristics, states requirements and provides test methods to be used in the manufacture of laminate flooring. It also includes a classification system indicating practical requirements based on where the flooring is to be used and the expected level of foot traffic. As such, it provides an avenue for purchasers to make informed choices about the product they select by providing criteria to be met and supplies standard symbols and marking that are required on packaging.

The standard provides manufacturing tolerances for board dimensions, squareness, flatness, impact resistance, abrasion resistance, moisture content and effects of humidity. For each of these, test methods to this standard or other European standards are specified with criteria to be met in order for the product being tested to meet its required load class. The load class is designated by the numbers 21, 22, 23, 31, 32 and 33. The classes starting with the number 2 apply to residential applications and the classes starting with 3 apply to commercial

applications. To meet a particular load class, in addition to meeting the criteria above, criteria relating to resistance to staining, cigarette burns and effects of furniture legs and castors must also be met.

Where the first digit of the load class relates to domestic (2) and commercial (3) applications, the second digit relates to whether the flooring suitable for moderate (1), general (2) or heavy use (3). Hence, flooring with a load class of 23 would imply the product was suitable for heavy-use domestic applications.

As such, with a two-digit number guidance is provided on what application or level of use the product is suitable for. It also highlights differences in expected performance based on product class. The standard also indicates which pictograms are to be used with the class and the figure below summarises this and shows the level of use, the load class and the AC rating which is considered in Section 1.6.

Residential buildings			Commercial and public buildings		
Moderate loads and traffic e.g. bedrooms, guest rooms, etc.	**Normal loads and traffic** e.g. living rooms, dining rooms, etc.	**Heavy loads and traffic** e.g. kitchens, corridors, home offices, etc.	**Moderate loads and traffic** e.g. hotel rooms, small offices, meeting rooms, etc.	**Normal loads and traffic** e.g. offices, waiting rooms, boutiques, etc.	**Heavy loads and traffic** e.g. large offices, shops, public buildings, etc.
21	**22**	**23**	**31**	**32**	**33**
AC1	**AC2**	**AC3**	**AC3**	**AC4**	**AC5**
					

Although this system provides guidance for purchasers, it needs to be noted that testing of product is undertaken by the flooring manufacturers and not an independent body. Also, the standard sets a very low benchmark for swell resistance and as such, there is significant variation in the quality of products, even though they may fall under the same 'load class'.

1.6 Wear resistance - AC rating

The wear resistance of laminate flooring is classified by the abrasion class (AC) that the flooring meets and is closely linked to the load class as indicated in the diagram above. The abrasion class is commonly referred to as the AC rating of the flooring and is particularly important to laminate flooring in that it relates to wear resistance. Although the rating system was first developed in Europe, it is now accepted throughout the world and it is common to see the symbols on product packaging.

Wear resistance is measured using the Taber Test which is used worldwide to test abrasion resistance not only for laminate but also extensively for solid timber floor coatings. With this equipment various methods are used depending on the product and with laminate flooring it is important that the testing is undertaken to the procedures set out in EN 13329 if results are to be comparable. The test undertaken within a particular environment in terms of humidity and temperature, involves spinning laminate flooring sample under a specified grit of abrasive paper and causing the surface to be abraded or worn away. The abrasive paper is changed every 200 revolutions. The number of rotations to the point where the décor paper begins to wear through, as clearly defined by the standard, is recorded and determines the abrasion class for the sample (AC1 to AC5). As evident from the diagram above, AC1 is the lowest rating and AC5 is the highest. For domestic flooring, products with an AC2 and AC3 rating are common and for commercial floors, AC3 and AC4. Again, this balances utility and cost considerations.

Any slip resistance information needs to include Australian test methods.

1.7 Special types and treatments

Some laminate flooring products are provided with specific treatments or additives to the materials in order to enhance the properties or provide additional properties. This includes the likes of carborundum to enhance wear

resistance, wax or similar treatments at edge and end joints to enhance moisture resistance or treatments that are anti-static. For added sound reduction, some products are also provided with sound insulation material adhered to the underside of the board. Use of laminate flooring in high-rise apartments is covered in more detail in Section 2.6.

1.8 NCC requirements - fire properties and slip resistance

For commercial class 2 to 9 buildings (shops, offices, hotels, age facilities, apartments, hostels and public buildings etc.) the National Construction Code (NCC) (formerly the BCA) requires certain fire hazard properties for timber flooring (including floating floors) to be met. Note that this does not apply to single dwelling domestic houses. The properties that need to be assessed for exposed timber floors under NCC Specification C1.10a relate to the critical radiant flux (CRF) and the Smoke Development Rate (where appropriate).

The NCC specification sets out the deemed-to-satisfy requirements for floor materials and floor coverings. A floor material or covering is required to have a Critical Radiant Flux (CRF) equal to or greater than specific values that are dependent on the building class, location in the building and whether a complying sprinkler system is installed or not. Where the building does not have a sprinkler system the Smoke Development Rate must also not exceed a certain value.

For laminate flooring used in these applications, it is important to use a product where the fire hazard properties have been tested, noting that different fire properties are used in different countries. As such, it is important to check that the fire properties relate to Australian use. Companies will often have test data or reports on their website.

When we refer to slip resistance with timber flooring products we are generally referring to the slip resistance of the exposed surface of the product which, in laminate flooring, is the wear layer. In Australia there are a significant number of accidents from slips, trips and falls and therefore occupational health and safety requirements outline duties for safe designs which include the specification and supply of floor surfaces. Under the Building Code of Australia and with reference to the Australian Standards, it states that paths of travel for most new commercial buildings shall have a slip resistant surface. To assess the slip resistance of new surfaces, we are guided to AS/NZS 4586 – Slip Resistance Classification of New Pedestrian Surface Materials and the associated handbook *HB 198*: *2014 – Guide to the specification of slip resistance of pedestrian surfaces*. This handbook is seen as best practice for satisfying slip resistance requirements for new floor surfaces. With recent changes to the National Construction Code (NCC), slip resistance requirements for domestic stairs are currently being introduced. In some states, the changes have taken effect and in other states they are yet to finalised and introduced. In effect, these changes state that either the treads or a nosing to the treads must have the appropriate slip resistance.

Wet pendulum slip resistance test apparatus.

Where laminate flooring is used in commercial applications and on stairs it is important that the appropriate slip resistance provisions are provided for. Companies will often have test data or reports on their website or in terms of domestic stairs may have nosing options (including slip resistant tapes) that comply. Again it is important that any test data or report relates to Australia and also noting that test method criteria has recently changed in Australia.

1.9 Environmental attributes and health

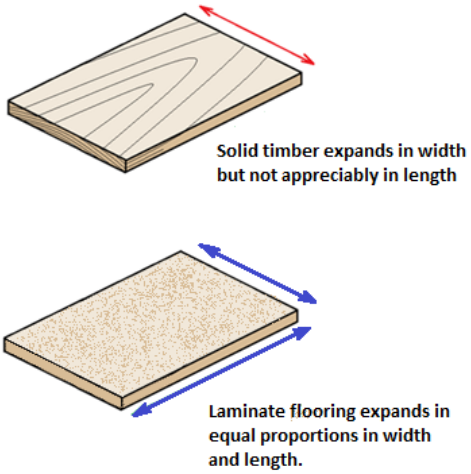
The core layer or substrate is substantially wood fibre and most major products source their board material from sustainably managed forests. A logo with the letters PEFC or FSC indicates certification that the HDF core layer is sourced from sustainably managed forests. Other environmental certifications may also be indicated such as the life cycle-related Environmental Product Declaration (EPD).

With some products, Green Star credits may also be available for categories such as: volatile organic compounds; formaldehyde emission; and flooring materials. In addition, due to the nature of the flooring product, it is easy to care for without the use of harsh chemicals.

With regard to health considerations, it is recognised that the main component of resins is formaldehyde that is contained in many products including laminate flooring. As it is a health risk in higher concentrations, it needs to be managed including the emissions from products after manufacture. For timber-based products with formaldehyde emissions, an emission class system has been developed where products, on testing, can fall within one of four classes, E0, E1, E2 and E3. A product classified as E1 is in the class with very low levels. Testing involves the sample at a particular temperature being subjected to moving air and the formaldehyde emissions measured in parts per million are determined. Laminate flooring with class E1 can be expected.

1.10 In-service movement and moisture

Laminate flooring is manufactured at a moisture content of about 8 to 9%. Moisture content is the amount of water in a product compared to the weight of the dry product. This moisture is absorbed into the wood fibres and cannot be seen or felt. Wood and wood-based products are known to be hygroscopic which means that with changes to the air's relative humidity, there will be changes to the moisture content of the wood fibre. High humidity causes the moisture content to increase and low humidity causes the moisture content to decrease. Laminate flooring at 8–9% is manufactured to be more suited to what would be considered as drier or lower humidity environments of about 50% relative humidity. In many places throughout Australia, the internal humidity will be higher at certain times of the year, and in more tropical locations often 70% to 80%. Due to this, even with the moisture-resistant wear and backing layers, there is often a slow increase over time in the moisture content of the core layer.



When wood fibres increase in moisture content they will swell a little and it is for this reason that all laminate flooring manufacturers insist that expansion allowance is provided around all edges and fixed objects such as kitchen island benches with laminate floors. Laminate floors are floating floors and therefore this movement cannot be constrained in any direction. It is also important to understand that with solid timber flooring, expansion allowance is predominantly only necessary across the width of a floor. This is because the wood fibres run down the length of the boards and observable expansion is generally in board width. With laminate flooring the wood fibres in the HDF core layer are not aligned in any particular direction and for this reason, a small and equal amount of expansion movement occurs to both the width and length of a floor.


Insufficient expansion allowance can result in a peaked appearance, or the floor buckling.

If this natural expansion movement is not adequately allowed for and the flooring is restrained anywhere, then this can lead to problems with the floor such as peaking (raised board edges) and squeaking. Peaking, where insufficient expansion allowance was provided, in demonstrated in the image opposite. It is for this reason that expansion trims must be installed to recommendations by the flooring manufacturer. This will be covered further in Sections 4.2 and 5.

The swelling or moisture resistance of a board refers to the board's ability to not absorb moisture and swell under high humidity conditions or from water ingress. It is important to understand that moisture resistance varies significantly between HDF materials and, by and large, is not related to density. It is the content and the type of resins used that provide moisture resistance to HDF. Due to this, the cost of HDF varies substantially, depending

on its moisture resistance. High-quality laminates use core material with a swell in the 6 to 8% range, while lower-quality products can use HDF with a swell of up to 18% or higher when testing using the EN 13329 standard.

2. Subfloors

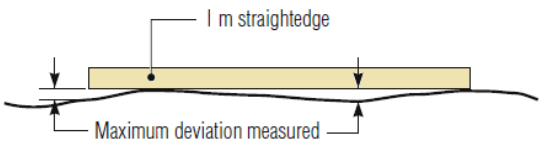
2.1 Appropriate subfloors over which laminate floors can be laid

With floating floors, a wide range of subfloors can be laid over them provided the subfloor is in a suitable condition to accept the flooring as outlined below.

This includes subfloors of concrete slabs, timber or sheet floors of plywood or particleboard as well as other smooth well-bonded flooring surfaces, such as cork, ceramic tiles (or similar) and vinyl floor coverings. Possible moisture from beneath is guarded against by polyethylene plastic sheeting or underlay with a similar plastic layer bonded to it. Product manufacturers generally list out the subfloors over which their products can be laid. Most products are not suitable for laying in wet areas such as bathrooms, however, and more moisture-resistant products are now being used in that application. Note that kitchens and food preparation areas are not considered to be wet areas.

2.2 Subfloor flatness

All subfloors should be sound and structurally comply with relevant Australian construction standards (i.e. the supporting timber or concrete which may also have been overlaid with tiles or resilient flooring etc.). Any determined problems with an existing subfloor or overlaid product (for example, squeaks in an existing timber or sheet subfloor or tile fixing integrity) may affect the performance or appearance of the installed laminate floor and should be corrected prior to floor installation.



All subfloors need to be sufficiently flat to accept floating flooring systems, even though tolerances are not always specified in manufacturer's instructions and often differ between manufacturers. This is even more critical with floating floors than adhesive fixed floors. If the subfloor is not sufficiently level then this can lead to board squeaking or separating. A tolerance where deviations do not exceed 2mm beneath a 1m-long straight edge (or 3mm beneath a 1.5m-straight edge) is considered applicable. Some manufacturers specify tighter tolerances and others not as tight. It is important to comply with the specified manufacturer's tolerances. Where concrete subfloors are not sufficiently flat, levelling compounds and grinding to level the subfloor needs to be undertaken. With timber and timber-based subfloors, packing of joists and sanding of sheet subfloors may be necessary.

2.3 Concrete slab subfloors – protection from moisture

Steps need to be taken to prevent possible moisture uptake into the flooring from the concrete subfloor. Moisture absorption from beneath the floor can cause greater levels of expansion resulting in board distortion and buckling. New slabs need to be given adequately drying time (four to six months) and it should not be assumed that old slabs are 'dry' slabs. Some slabs have greater ongoing permeability to moisture vapour than others and slab moisture can vary with water table height and weather conditions.

Particular care is required with slabs that are below ground level and which can be more prone to pressure effects from ground moisture and also with construction joints between slabs through which there can be the a continual transfer of moisture vapour and, at times, moisture by capillary action. Such joints should be sealed as necessary.

Protection from slab moisture is either provided through polyethylene plastic sheeting over the slab or underlay with a similar plastic layer as an integral part of it. When polyethylene sheeting is used it is often 0.2mm (200 microns) thick, taped at overlaps of 200mm and is often brought up to at least floor level at walls and other vertical elements (for example, island benches). Note that some underlays with integral moisture-retarding layer that are significantly less than 0.2mm will not provide the same level of protection, and in some situations an additional polyethylene sheet barrier should be considered.

2.4 Timber and sheet subfloors – protection from moisture

Laminate flooring can be laid over sheet subfloors or solid timber flooring on joists. It is necessary to ensure possible moisture in either the sheet or timber subfloor and the subfloor space beneath does not affect the flooring being laid. The conditions beneath a dwelling where the subfloor space is enclosed needs to have dry soil even during periods of rain. Ventilation to the subfloor space is a requirement of the National Construction Code (NCC) and that the required cross-floor ventilation is achieved. Polyethylene sheeting can be laid over timber and sheet subfloors for added protection, however, if this is to compensate for high humidity in the subfloor space or poor subfloor ventilation, it needs to be considered that this could increase further the likelihood of higher humidity conditions in the subfloor space.

2.5 Other floor covering surfaces

When laying over an existing floor covering, as permitted by the laminate flooring manufacturer, it is necessary to ensure that the floor covering is securely bonded to the subfloor and that it provides a smooth flat surface which is able to accept the laminate floor. Any observed problems that may affect the performance of the laminate floor including the integrity of the floor covering or aspects relating to the subfloor beneath it, need to be corrected prior to laying the laminate floor.

2.6 Acoustic requirements for apartments

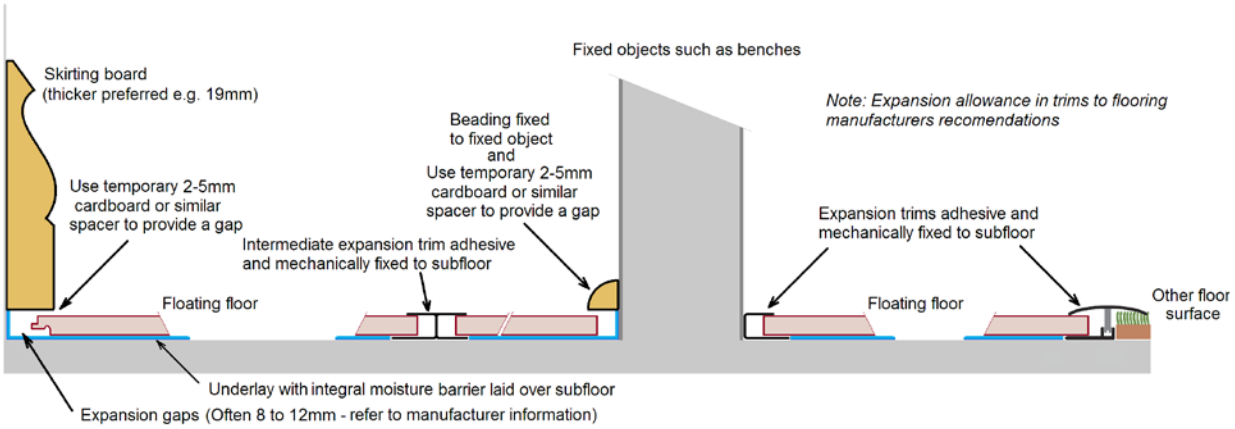
A degree of acoustic isolation is achieved with floating installation on underlay. In apartment development there is a requirement in new buildings to meet NCC requirements of an L_{nTw} (plus a modification factor CI) to be not more than 62dB for floors separating dwellings and in existing buildings the provisions under the Strata Schemes Management Act where the Body Corporate can set its own requirements. In addition to this some Councils also have specific requirements. Note that the lower the L_{nTw} the less sound is transmitted and the better the result.

For comparative purposes it should be noted that carpet will generally achieve an L_{nTw} of about 40dB and for bare concrete with a 175 mm slab an L_{nTw} may be about 70dB. Note that sound pressure is measured in decibels (dB) and an increase or decrease is perceived by a person as a change in loudness. Most of us would notice a change of 3dB and a reduction of 10dB would sound about half as loud.

Due to these requirements, specific underlays and installation practices need to be employed to achieve the required sound isolation. Aspects relating to the thickness of concrete subfloors play a significant role. Underlay performance relates more to the design of the underlay rather than the thickness. Laminate floors including acoustic underlays often provide about 10 to 20dB attenuation (reduction in noise). Some flooring is also provided with a specific sound-absorbing underlay fixed to the underside of the board.

Sound absorbing underlay pre-applied to the underside of the board.

Hence, with such applications, advice from the flooring product manufacturer and others will likely be necessary. The diagram below shows typical details for floating floor installations where greater acoustic performance is required.



2.7 Underfloor Heating Systems

If considering laying a laminate floor over an underfloor heating system, then it is first necessary to consider that not all products are recommended for this use. Where permitted by the laminate flooring manufacturer, installation aspects of the flooring do not change, however, with new heated slabs there is process required to adequately dry the slab prior to laying the flooring and also a provision on the maximum temperature the slab can attain when the heating system is in use. Therefore, if installing a floor over a heated subfloor it is necessary not only to choose the correct product but also to follow the installation requirements.

Provided below is an outline of principles that need to be considered with heated slabs, although installation practice must follow the flooring manufacturer's guidelines.

The suitability of the slab for floor installation must first be assessed in terms of slab integrity, flatness and initially at a moisture level suited to floor installation over unheated slabs. Following this, further drying is necessary. If this is not done, heating of the slab will drive remaining moisture out after the flooring is installed, which can affect its performance. Hence, the heating system must be operational prior to floor installation and further drying of the slab achieved by applying heat for about 72 hours and then letting it rest for 24 hours.

Forty-eight hours after installation, the heating system is operated and the temperature increased equally over a five-day period up to a maximum floor surface temperature of 27°C and then maintained at this temperature for at least a further two weeks.

The system may then be used, but be aware that the floor should not be subjected to sudden changes and therefore temperatures should be either increased or decreased over a period of days (maximum of 5°C per day) up to the desired operating temperature with a maximum of 27°C. Some seasonal movement in the floor is to be expected and it should also be borne in mind that the floor is now accustomed to dry conditions which should be maintained even when external humidity is high. Ideally, an internal humidity between 35% and 55% will generally provide conditions for best performance.

3. Pre-installation

3.1 Locality and dwelling environment

As outlined previously, it is mainly the relative humidity that influences the moisture content of the flooring. Within a dwelling there are many things that influence the relative humidity and a comfortable living environment's conditions are not as extreme as the conditions outside the dwelling. In cold climates, the internal environment is moderated by heating when cold wet conditions cause high humidity outside and in summer months, when conditions can be hot and humid, refrigerative air-conditioning is often used which moderates the high external humidity. In places experiencing hot dry summers, evaporative coolers add moisture to the air thereby also moderating the conditions. Furnishing such as curtains and rugs also tend to moderate the internal environment. Generally, in the conditions that we feel most comfortable, the laminate floor will also perform the best. Care is necessary not to create conditions within the dwelling in which we would feel particularly uncomfortable. More extreme use of heating and cooling systems, unfurnished dwellings and permitting hot humid conditions for extended periods inside the dwelling, can all have a detrimental effect on laminate floors.

Many manufacturers indicate conditions in terms of temperature and humidity that they consider their laminate flooring products will perform best in. Conditions of about 18 to 25ºC and 50 to 60% relative humidity are regarded as comfortable conditions. However, when the humidity falls outside the range of 30% (dry conditions) to 70% (moderately humid), then performance effects need further consideration. Low humidity results in greater shrinkage and high humidity in greater expansion. Under higher humidity conditions, greater expansion allowance is required and this is reflected in some installation instructions. It is also important to note that some manufacturers indicate that their products are not suitable outside a particular humidity range, making it a warranty condition. As such, in some locations care is needed when considering products. Although short periods exceeding certain humidity ranges will not affect the floor, it needs to be considered that even in localities such as Brisbane, and more so in the northern tropical locations, relative humidity in a naturally ventilated dwelling can frequently and consistently exceed 70%.

Product choice is therefore very important in certain locations. It is important to check both the manufacturer's installation recommendations and warranty conditions that the product being considered is designed for the intended dwelling environment.

3.2 Building condition and storage prior to laying

With regard to the building, it should be substantially complete at the time of floor installation. Floor coverings including laminate flooring should only be installed at the end of the project similar to the time when carpets are laid.

Prior to installation, the boxes of flooring should be stored flat and unopened in the rooms where they will be installed. The boxes should not be placed directly on a concrete subfloor but have plastic or similar between them. The boxes should also be stored away from external walls and preferably toward the centre of the room and in a location not subject to intense direct sunlight. See acclimatisation in Section 3.3.

3.4 Acclimatisation

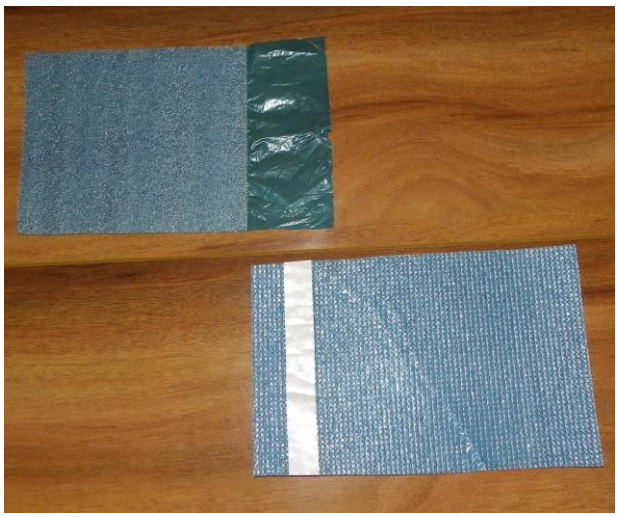
Prior to laying the floor, a period of 48 hours acclimatisation is recommended. Note that with laminate flooring, acclimatisation has a different meaning to when it used for solid timber flooring (where boards are restacked in layers in the installation environment). When acclimatising laminate flooring, the boxes remain in their plastic wrap, unopened, for 48 hours so that the flooring can become accustomed to the temperature within the dwelling. Boxes are placed side by side near the centre of the rooms that they will be installed in, and away from direct sunlight. Allowing 48 hours means that the flooring is not subjected to sudden temperature changes on installation which could result in possible distortion on opening, at the time of laying.

4. Accessories

4.1 Underlays

The underlay provides a cushioning effect between the laminate floor and the subfloor or floor covering over which it is laid. It allows the floor to accommodate the minor acceptable tolerances in the flatness of the subfloor or floor covering beneath and also adds acoustic performance. Many underlays also provide the role of a moisture vapour retarder and have this built into them with a plastic layer to prevent subfloor moisture vapour from affecting the flooring. However, this is not provided with all underlays and therefore moisture vapour transmission may need to be considered separately, such as by placing a 0.2mm (200 micron) polyethylene plastic sheet over the subfloor first. In such instances, the plastic sheeting is usually overlapped by about 200mm and the joints taped.

The underlay can also influence the noise emitted from the floor when walked on. Consequently, underlays come in a variety of materials depending on the properties that the manufacturer desires to achieve. Some flooring is also provided with a specific sound-absorbing underlay fixed to the underside of the board.



Two underlays – one showing the moisture vapour barrier overlay and the other the 'peel and stick' adhesive tape. The foam does not overlap on installation.

Many types of underlay are available and it is important that the underlay used complies with the flooring manufacturer's requirements. Often suppliers of the flooring will also have their own underlay or recommended products. Underlays are often 2 or 3mm thick and supplied in rolls of about 1.0 to 1.6m in width and made from foams such as polyethylene or polyolefin providing the necessary compression properties. If containing an integral moisture vapour-retarding barrier, often known as a combination underlay, it has a clear or coloured plastic backing with an adhesive tape overlap. On laying this provides a moisture vapour resistance joint. Some underlays are also manufactured that can absorb hollow-sounding foot noise when walking on the floor.

4.2 Trims

Laminate flooring is generally provided with a wide range of accessories and trims which are not only necessary for the floor installation but also complement the flooring installed. As such, the trims can match the décor wood finish. This is illustrated in the adjacent image.

Trim complementing the laminate colour and grain.

Trims are available for a number of different purposes including transitions to vertical surfaces, transitions to other floor coverings, control joints within a floor and stair nosing. Concerning transitions to other floor surfaces, the variety of trims cater for different heights as well as being adjustable in height. Trims are made to suit different laminate thicknesses.

The diagram shows three trims that are most widely used.

End trim used to adjoining floor surfaces at the same height or along sliding patio door tracks.

'H' trim used to provide a low profile joint within a floor. It provides a for expansion as well as locating the flooring.

'T' trim used to provide a smooth transition to two different floor surfaces that are at different heights.

In addition to trims, there are also Scotia, quads and skirtings that are offered. Scotia and quads are used mainly around vertical surfaces other than walls with skirtings such as island benches. If flooring is laid up to skirtings, however, they are also used along walls as shown in the adjacent image.

Scotia fixed to the skirting.

5. Installation

It is necessary to determine whether the chosen product is suitable for a specific locality and that the subfloor is suited to the specific product. The installation must follow the product manufacturer's recommendations.

Provided below is a general overview of the installation of floating laminate floors. It is a description of the general process only. Note that the individual manufacturer's recommendations should be followed with the actual floor installation.

5.1 Measuring the flooring and products required

Prior to installation it is necessary to determine the amount of product needed. The area of each room is calculated (length (m) x width (m) = area (m^2)) and added to obtain the net total area. To this a minimum of 5 to 7% should be added to account for boards being cut, irregular shapes and some wastage. If some spare boards for possible future repairs are desired, then this is additional to this allowance. If the total calculated area where the flooring is to be laid was $80m^2$, then 5% more means that $84m^2$ should be ordered. At this time it is also necessary to have determined the necessary expansion trims and transitions (refer Section 4.2) that will be used. These, along with the underlay and moisture vapour barrier with 50mm-wide clear polyethylene tape for joints, if not integral to the underlay (refer Section 4), should also be ordered. Finally, consideration needs to be given to the skirtings or other trims that will be used around walls and fixed objects, such as island benches.

5.2 Equipment required to install the floor

The specific tools required to install the floor may differ depending on the exact product, however, most installations will require:

- general tools including a tape measure, carpenters square, pencil
- a tapping block and pull bar to provide tight joints without damaging the flooring
- spacers or wedges to provide the required expansion allowance at walls
- a hand saw to undercut door architraves but may also be used to cut boards. For faster cutting of boards a power circular saw (drop saw, bench saw or jigsaw) is often used. Professional layers may also use a guillotine which provides for fast, clean cutting.
- a broom and vacuum cleaner.

5.3 Safety

Safety is a priority and therefore correct use of power tools and use of products associated with the floor installation need to be in accordance with the manufacturer's guidelines, safety instructions and application instructions as applicable for the equipment and products used. The work area also needs to be kept clean.

If laying a laminate floor where existing vinyl flooring is present, then be aware that vinyl flooring manufactured in Australia before 1 January 1984 contains asbestos. Advice must be sought and appropriate measures taken to avoid potential harm in such circumstances.

Also be aware that wood and wood dust can be an irritant and that wood dust has been classified as a nasal carcinogen in humans by the International Agency for Research.

5.4 Preparing the subfloor and rooms

With existing dwellings, it needs to be decided whether the floor covering is to be removed or the flooring will be laid over the existing surface, as permitted by the flooring manufacturer. Irrespectively, it must be checked that the subfloor or surface is sufficiently flat and sound to accept the product (refer Section 2). Any issues with the subfloor or surface need to be corrected at this time.

In existing dwellings, any trims or skirtings can be removed to permit the flooring to be laid with adequate expansion allowance to walls or other vertical surfaces. Some manufacturers do have trims to enable floors to be laid up to skirtings without them being removed. At doorways, the architraves need to be undercut at the new floor height to enable the flooring to pass beneath and provide a neat and tidy installation. This is achieved by placing a hand saw flat on an offcut of flooring with underlay beneath as guide to ensure the architrave is cut to the correct height. Door heights should also be checked to ensure the flooring will pass beneath them. If not, the doors will need to be removed and bottom planed to the point where adequate clearance can be achieved (about 10mm).

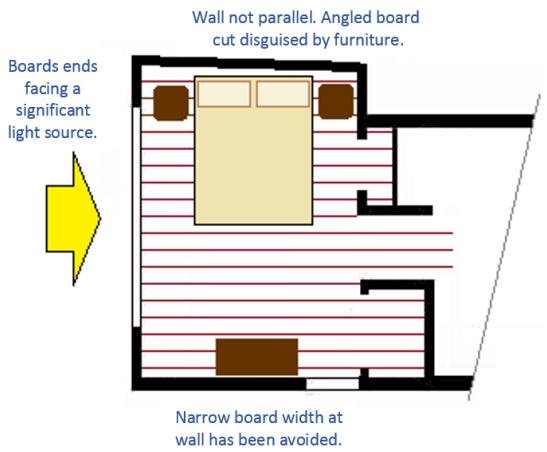
On completion of this preparation work, the area needs to be cleared of debris and vacuumed cleaned. At this time it is also important look for signs of building leaks which may include visual water stains. Although stains may be dry, it should be investigated because moisture ingress will affect the flooring.

Prior to laying the subfloor, the surface should be clean, dry and flat and other areas around doorways and walls prepared.

5.5 Laying direction

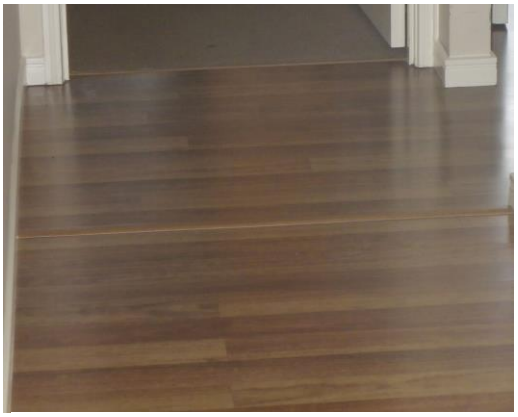
It is generally preferable to lay the boards with their ends facing significant incoming light sources as minor unevenness in the floor surface is less apparent. However, if laying directly over solid T&G flooring, some manufacturers require the laminate flooring to be laid perpendicular to the existing floorboards.

It is important to consider that in rooms, walls are not always parallel or perpendicular to each other. Keeping this in mind, also be aware that having narrow or very short pieces of flooring adjacent to walls should be avoided. Therefore, with reference to the adjacent diagram, some planning is necessary to obtain the best solution.



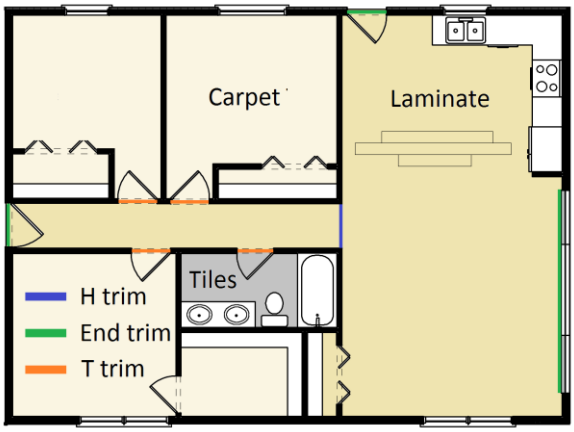
5.6 Allowance for expansion

As previously explained in Section 1.10, laminate flooring is subject to expansion during conditions of higher humidity and shrinkage under conditions of low humidity. As all boards are joined together, the floor acts as a 'raft' floating on the underlay and as such must be able to move freely in all directions to perform properly. It is for this reason that the floor needs to be cut around island benches and some items of heavy furniture may not be suitable (for example, pool tables). However, this does not concern beds and lounge furniture or the like. It was also outlined in Section 1.10 that with increased humidity the expansion in a square metre of floor will essentially be the same across the width of the boards as it is along the length of the boards. Note that this is not the case with engineered or bamboo floating floors where width movement is greater than length movement.



Control joint within the floor.

When considering this further, it also becomes apparent that adjoining floor areas are generally different sizes. That is, a 15m-long by 1m-wide hallway may adjoin through a doorway to a bedroom that is 3m long by 3m wide. As such, the hallway floor under high humidity conditions would expand more in its length than the bedroom floor. Consequently, there will be a difference in the movement of the two floor areas where they adjoin. To prevent one floor area from having an adverse effect on the other, it is necessary to separate the two floor areas. Therefore, control joints need to be added and this is referred to as compartmentalisation. An example with applicable trims is shown in the diagram opposite. With these joints, one floor area can no longer impair the movement of the other. The diagram shows a hallway with a control joint to separate the movement of the hallway floor from that leading into the room off it. As such, controls joints may be needed within the main body of a floor as well as with doorways to rooms off hallways.



Compartmentalisation and use of trims.

The next aspect to consider is the overall size of the room or floor area that may extend from one room to another. Manufacturers' installation instructions require intermediate control joints if the floor area is over a certain size. This may be, say, 10m in length and 8m in the width of the floor, which in some instances may influence decisions regarding the laying direction. It is important, however, that the specific manufacturer's instructions are followed with regard to this as a different manufacturer may, for example, specify 10m in both floor width and length of the floor.

5.7 Installation

Aspects relating to the product chosen, onsite storage and acclimatisation, the in-service environment, subfloor condition, underlay to be used, safety aspects and equipment needed to complete the installation should all have been considered and be in accordance with the manufacturer's recommendations prior to the point of floor installation.

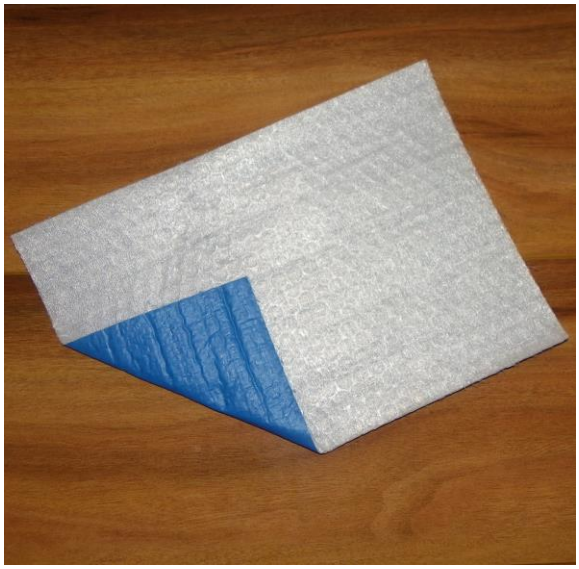
Some general points with floating floor installation are as follows:

- All floors are laid on underlay which generally has a pre-attached moisture-retarding barrier and manufacturers generally require the inclusion of a moisture-retarding barrier.
- Floating floors are not to be fixed to the subfloor at any point. It needs to be ensured that the floor is free to move in all directions. That is, the floor is not to abut any vertical surfaces which include doorways, other adjoining floor surfaces, pipe work, benches or staircases. Similarly the likes of kitchen benches are not to be placed on the floor, but the floor is to be cut around them.

- Manufacturers recommend expansion allowance to all vertical surfaces to be provided, noting that in more humid environments greater expansion can be expected and therefore expansion allowance toward the upper end of the manufacturer's range is prudent. Similarly, wider or longer floors should be provided with more than the minimum.
- It should be ensured that intermediate control joints are provided where recommended and that appropriate expansion joints at doorways are also provided. Subfloor expansion joints and construction joints running parallel to the direction of laying should be mimicked in the laminate floor above. Construction joints in slabs need to be sealed from vapour transmission.
- At the time of installation the boards are to be checked for visible defects and such boards should not be laid. Some manufacturers also suggest that flooring should be laid with boards taken from three or more boxes and that boards are mixed in terms of colour variation and pattern. Similarly, board ends should be staggered.
- Right-handed people usually install flooring from left to right.

The installation process differs a little between manufacturers and this is in part due to the many different jointing systems in the market. Most manufacturers have detailed instructions, diagrams and references to internet videos. Generally the installation process is as follows:

- If the underlay does not have an integral moisture vapour-retarding layer, or one that is equivalent to 0.15mm (150 micron) polyethylene, or it is desired to provide added protection against subfloor moisture, then polyethylene 0.2mm (200 microns) is to be laid over the subfloor or surface. The polyethylene sheet should be overlapped 100 to 200mm and joints taped with 50mm wide moisture-resistant PVC or polyethylene tape. At walls and vertical surfaces, the polyethylene sheeting is brought up the walls and vertical surfaces, where it can later be cut off at the height of the floor once it is laid.



Underlay with integral moisture retarding layer.

- The underlay is rolled out onto the subfloor (with an integral moisture vapour-retarding layer if present) facing the subfloor as applicable. The underlay is fitted within the walls and joints in the underlay and are butted together and taped if a self-adhesive overlap is not integral to the underlay. This provides a continuous layer where the underlay is not overlapped.
- If the wall undulates then the first row of boards will need to be scribed and cut so that the expansion allowance is even down the length of the wall. Also at this time, consideration may need to be given to the opposite wall so that the floor will not finish with a very narrow board. This can be another reason for cutting back the first row of boards. To scribe the boards with an undulating wall or where opposite walls are not parallel, the row of boards can be temporarily laid in a straight row a short distance from the wall and a small board offcut with marker pen over the boards, run down the wall. This will mark the position of the wall on the boards. Each board can then be cut down the marked line and placed in position against the blocks or wedges to provide the necessary expansion allowance.
- In laying the first row of boards, manufacturers differ as to whether the tongue side or groove side faces the wall. Installation usually starts in the left-hand corner and working from the left-hand wall to the right-hand wall. Manufacturer's instructions are to be followed. If the tongue side faces the starting wall the tongue is removed from the board edges of the entire row and removed off the end of the first board. It is necessary to ensure that the recommended expansion allowance is provided which can be from about 6 to 15mm depending on the product and floor size. Blocks or wedges are generally used to create an expansion gap that maintains the correct allowance.

- Installation to manufacturer's instructions will also differ depending on the jointing system. As stated above, boards are to be inspected for visible defects. Some installation instructions indicate that the selection of boards should be mixed from different boxes (three or so), and when laying, end joints

should show a random staggered pattern with end joints separated a minimum of 150mm. In the process of laying, a pull bar and tapping block may be necessary. Where boards are cut to length ensure perimeter expansion allowance is maintained. When cutting boards with a power saw (circular and jigsaw), ensure the decorative side is facing down to minimise chipping of the decorative face. With hand sawing, the decorative side faces up.

- Each row should not start or end with a short board, although offcuts can often be used to start the next row if they are sufficiently long. The minimum length of a starting or finishing board should be about 200mm. It may require cutting a full-length board to obtain a board of sufficient length and to maintain staggered joints.
- In doorways, which should have been undercut, it is necessary to maintain the required expansion allowance. At times, pipes may also protrude though a floorboard. A hole saw is used to create a hole where the pipe will be. The hole needs to be larger than the pipe diameter to provide the necessary expansion allowance. After the hole is cut, the board is cut across its width so that it can be laid around the pipe. Pipe trim covers fitting around the pipe are available to cover the expansion allowance. Similarly, ensure the necessary control joints are installed. Control joint trims allow one edge of the floor to be slotted into it (maintaining expansion allowance) with the trim then fixed to the subfloor before continuing.
- The last row of boards will generally need to be scribed and cut as described with the first row. However, in this instance the final row of boards is placed directly over the last row laid. This time the small board offcut can have a piece added to its edge equal to the width of the expansion allowance. Therefore, after cutting the boards down the scribed lines, they will fit and include the necessary expansion allowance.
- Following this, the blocks or wedges can be removed and the floor should look complete except for finishing around vertical surfaces etc.

5.8 On completion

After the flooring has been laid, and in order to complete the installation, it is first necessary to trim excess polyethylene moisture vapour barrier or underlay away. Transitions to other floor surfaces can be installed, again insuring that the fixing is to the subfloor.

Skirtings of sufficient size to cover expansion allowance provided at walls etc. need to be fitted and fixed to the walls. If floors are laid with the skirting in place or around the likes of island benches a moulding is used to cover the expansion allowance. When laminate floors are completed they should be thoroughly cleaned using the appropriate cleaning products (see Section 7) and any scuffing or minor scratches attended to.

Transition trim to tiled floor.

6. Caring for your floor

Laminate timber floors are considered to be easy to maintain but like all floor surfaces they do require regular cleaning and a few precautionary practices in order to maintain their appearance and preserve their service life.

6.1 Preventative care

Preventative care consists of things that can be done to reduce potentially harmful effects on the laminate floor. These can include the following:

- Dirt, grit and sand can result in scratching and excessive wear. Providing mats at all external doorways to trap dirt and grit before the floor is walked on can be of significant benefit. During wet weather they will also help to dry footwear.
- In high traffic and high wear areas the use of rugs and runners can reduce wear in these areas and often add to the décor. Similarly, use non-slip rugs at pivot points, such stair landings.
- With furniture that will be moved either frequently or from time to time, felt or similar protectors can be fixed beneath the legs. Again, this reduces the risk of localised wear and scratches.

- Similarly, in home offices castor wheels on chairs may be run on clear vinyl floor mats. Castors should be the barrel type or exiting castors replaced with rubberised castors.
- Avoid dragging or sliding furniture, or rolling appliances into place. Furniture should be lifted into place or may be slid on a carpet offcut.
- The UV rays from direct sunlight can cause a change in colour of the laminate. Rearranging rugs and furniture periodically makes any colour changes less apparent. Sun-filtering curtains or blinds on windows and doors can be used to prevent direct sunlight on the floor.

6.2 Regular Care

In addition to preventative care measures, owners need to carry out regular maintenance which includes the following:

- Floors should be swept, dry mopped or vacuum cleaned (with a brush head) to keep the floor clean. Door mats and rugs should also be vacuumed.
- Any spills should be mopped up quickly. Note that some laminate flooring is more resistant to spills than others. Check with your supplier and warranty terms.
- For substances that are more difficult to remove, most suppliers have specific cleaning agents that can be sprayed on prior to wiping up.
- Do not use cleaning methods or products not designed for laminate floors such as scouring pads or cleaners that may contain abrasives, soaps, waxes, ammonia or silicone.
- Do not use steam mops (irrespective of what the product sales people may say) or any form of scrubbing machine.
- Floor wax and polish are not necessary and can cause unwanted residues on boards consequently affecting their appearance.
- Wet mopping is not to be undertaken as over time the water ingress can change the moisture balance in the boards resulting in expansion and distortion of the boards' surfaces. Such damage is not covered by warranties. Damp mopping can be used but care is also needed and moisture on a floor makes it more slippery.
- Do not use floor mats or rugs over heated subfloors.
- Footwear with high point loads such as stiletto heels will also damage timber floor surfaces and therefore management of this is necessary.

Clean with brush head vacuum cleaner.

- If pets are to be inside, it is necessary to ensure that nails are trimmed and paws are clean, thereby not introducing excessive grit.
- Small chips and scratches can be repaired with colour-matched filling compounds made for laminate flooring.

6.3 Replacing damaged boards

If a board is to be replaced due to damage then there are number of approaches, but this relates only to glueless installation profiles. At times it may be easier to take up the laminate and replace the board. However, in other instances this may be quite difficult. Some manufacturers outline repair methods whereby through using a router or saw, the central area of the damaged board (25mm in from the edges) is removed followed by further cuts into the remaining 'rim' to facilitate board removal. Then, often by removing sections of the tongue on the replacement board and with use of PVA adhesive, the replacement board can be glued in place. The board is then checked to ensure it is fitting correctly and weighted for 24 hours while the adhesive cures. Actual methods are going to be product specific.

7 Warranties

Products are generally provided with warranties relating to manufacturing defects and wear. Warranty periods not only differ for manufacturing defects and wear, but the warranty period is also often dependent on the product (in part, the AC rating for wear warranties) and whether the flooring is installed for residential or commercial use. Commercial warranties for a particular product can be significantly less the residential warranty (for example, 20

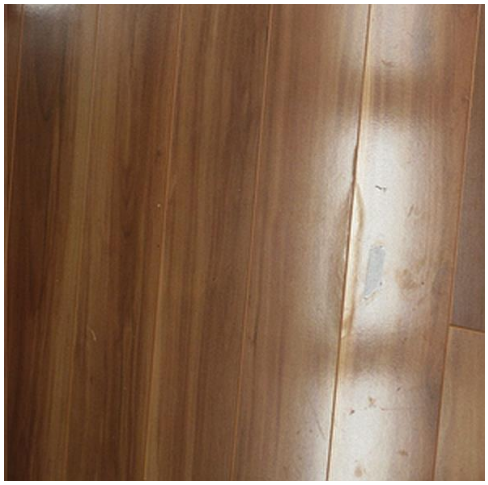
years versus three years). With some warranties, thinner boards also have a shorter warranty period (10 years for 7mm thick and 20 years for 12mm thick). Product warranties require the flooring to be installed and maintained in accordance with the manufacturer's guidelines.

It is important to understand that these product-related warranties do not cover installation factors that can affect a floor's performance. Therefore, warranties relating to the installation also need to be considered and purchasers need to determine what is covered with respect to this as it will relate to individual installers. It should not be assumed that because product manufacturer warranties are being provided that installation warranties necessarily apply.

The warranty also needs to establish what would be provided under a product warranty claim. In many instances, it relates to replacement product only and no labour or other associated costs to facilitate the repair. In other instances, the value of the claim is also based on the purchase price and is depreciated depending on the number of years that the floor has been in service.

Warranties relating to board manufacture are generally very specific in nature and only cover defects that relate to manufacture but which could develop over the warranty period. A condition of warranties is often that boards are to be inspected for possible faults at the time of installation and therefore only defects that develop and are not visible at that time of installation may be covered. With regard to wear warranties, some are non-specific with regard to how they apply, however, in other instances warranties only apply when wear (of a certain size) is through to the HDF core layer or relate to a percentage of the floor area being affected. Again, if factors other than manufacturing-related ones, have contributed to damage (for example, moisture or no floor mats to trap grit), then such factors may void warranties.

Most warranties have specific exclusions and although these vary between warranty statements they often include indentations from shoes or other causes, scratches and gloss variation, water ingress which may include spills and cleaning processes, installation in wet areas (for example, bathrooms not kitchens) and exposure to excessive heat or improper humidity conditions. As you will note from this, some aspects are not well defined and are open to interpretation. Therefore, due care and consideration is needed when assessing warranties and what they actually provide.



Water damage at board edges from spills is often not covered by product warranties.

8 Glossary of commonly used terms

Acclimatisation – Some product suppliers indicate that flooring should not be installed immediately after it is delivered to a site. However, with engineered flooring, acclimatisation can have different meanings. In many instances, it refers to storing the flooring in the installation environment in its boxes for a period so that it can become accustomed to the temperature within the dwelling. In a few instances, acclimatisation may be referring to unpacking and equilibrating the flooring to the internal relative humidity. Also see relative humidity.

AC rating – This stands for the abrasion class and as such, provides guidance on how wear resistant the laminate flooring is. AC1 is the lowest rating and AC5 is the highest rating and it is determined from a Taber Test. The AC rating is closely aligned to the load class in that each class has an AC rating requirement. Domestic flooring products with an AC2 and AC3 rating are common and for commercial floors, AC3 and AC4. Also see load class.

Backing or balancing layer – This melamine layer is on the underside of the board and is therefore at times called the backing layer. However, it also creates a balanced construction to the board. That is, layers with similar properties including moisture resistance to the top and bottom of the board. As such, this provides board stability.

Buckling – This refers to a group of boards arching off the subfloor generally due to the expansion allowance provided being exceeded. Also see expansion allowance.

Cupping – This refers to boards that have a dished appearance across the width of the board resulting in board edges being higher than the centre of the board.

dB – Noise transmission through a floor is measured in decibels with the abbreviation dB. Most of us would notice a change of 3dB and a reduction of 10dB would sound about half as loud. Choice of underlay can affect the noise transmission through a floor but there are also many other factors that contribute, including the thickness of the slab subfloor. See also underlay and subfloor.

Décor, design or decorative layer – This paper provides visually attractive timber-like appearance to the board.

Direct Pressure Laminate (DPL) – All laminate flooring is manufactured from various layers adhered together under pressure. With DPL the upper wear layer is more flexible, which enables the more highly textured surfaces aimed at the domestic market to be produced. See also High Pressure Laminate (HPL).

Emission class – As formaldehyde used in resins is a health risk in higher concentrations, this is managed in timber-based products with an emission class system. There are four classes: E0, E1, E2 and E3. A product classified as having E1 is in the class with very low emissions and this is considered as being quite acceptable.

Expansion allowance – Due to the hygroscopic nature of timber flooring products, all floors require expansion allowance. With small floors, this may only be required at the outer edges of the floor and be covered by skirtings or beading. However, many floors will also require intermediate expansion allowance provided at doorways and, at times, within the floor due to the greater width of length in those floors. See also hygroscopic.

Flatness – It is important that the surfaces on which floors are laid are flat. Flatness differs from how level a floor is. A floor can be flat not undulate up and down but may not be level in that it slopes from one side of a room to the other.

Formaldehyde – This is a main component of resins and adhesives and is contained in many products including laminate flooring. As it is a health risk in higher concentrations, it needs to be managed and this includes emissions from products after manufacture. See also emission class.

Glueless joint system – This refers to the jointing system where the profile machined along the edges and ends of boards enable installation without the need to glue the board joints. At the factory, wax is at times applied to the joint to reduce possible squeaking from rubbing in the joints. Also see tongue and groove.

High Density Fibreboard (HDF) – The substrate or core layer is now invariably manufactured from HDF. There is a density range which categorises HDF and board toward the higher end of this range would generally be considered to have better properties in terms of stability and machining quality.

High Pressure Laminate (HPL) – All laminate flooring is manufactured from various layers adhered together under pressure. With HPL the upper wear layer is thicker and less flexible than DPL rendering the product more highly wear resistant and more suitable to heavy commercial applications. The thicker layer and higher pressures used also make this a higher-priced product. See also Direct Pressure Laminate (DPL).

Hygroscopic – A material that is hygroscopic will absorb water vapour from the air or release water vapour to the air depending on its moisture content and the relative humidity of the air. Both timber and concrete are hygroscopic materials. Also see relative humidity and moisture content.

Load class –-The European standard EN 13329 for laminate floor coverings provides a two-digit number to laminate products that provides guidance on what application or level of use the product is suitable for. The load class is designated by the numbers 21, 22, 23, 31, 32 and 33. The classes starting with the number 2 apply to

residential applications and the numbers starting with 3 apply to commercial applications. A class 33 is the highest class and suited to heavy-use commercial applications. Also see AC rating.

Moisture content – This is a measure of how much water a material such as timber or concrete contains. At a particular relative humidity the moisture content of two hygroscopic materials will differ. At 60% relative humidity timber attains a moisture content of about 11% whereas concrete attains a moisture content of about 2%. Also see hygroscopic and moisture content.

Moisture meter – Due to flooring and subfloor materials being hygroscopic, meters have been developed to assess the moisture content of these materials. Meters have their limitations and the interpretation of readings should be conducted by someone with experience. Also see hygroscopic and moisture content.

Relative Humidity – This is a measure of the capacity of the air to hold invisible water vapour at a particular temperature. Under high relative humidity conditions some of this water vapour can be absorbed by the flooring causing board expansion, and under low relative humidity conditions water vapour can be released from the flooring back to the air causing board shrinkage. Relative humidity is expressed as a percentage (%) where 30% and below would represent very dry conditions and 80% and above, very moist and humid conditions. Also see hygroscopic, stability and moisture content.

Stability – In terms of timber flooring, a more stable flooring product is one which undergoes only small changes in its dimensions (width and length) as a result of moisture vapour uptake or loss from the air. Consequently, expansion and shrinkage of the product in response to changing environmental conditions is small. Also see hygroscopic, relative humidity and moisture content.

Subfloor – The term subfloor refers to the structural surface over which a laminate floor is laid. This often comprises concrete, sheet flooring (particleboard or plywood) or existing timber flooring. It is also often satisfactory to lay over some floor coverings coherent with the subfloor and in good condition such as ceramic tiles, cork or linoleum.

Surface or upper wear layer – In order to protect the décor layer, a transparent resin-impregnated paper layer (usually melamine) is used and is referred to as the surface or upper wear layer.

Substrate or core layer – The substrate or core layer is the thickest layer made from a wood-based composite and today this is invariably High Density Fibreboard (HDF). It makes up much of the common board thicknesses of 7, 8, 10 and 12mm. The upper wear layer and décor layer are pressed onto the upper surface of the core layer and the backing or balancing layer to the lower surface. Also see HDF.

Tongue and groove – This is often abbreviated as T&G and refers to a board profile that slides together at edges and ends. When used with floating floors, adhesive is applied to the joints. But note that laminate flooring now utilises glueless jointing systems. Also see glueless joint system.

Underlay – With floating floors it is necessary to provide a cushion between the flooring and subfloor. This is the underlay which is generally thin foam but which often contains a moisture-retarding barrier. Also see subfloor.

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