Wood Flooring and Moisture

The environment for wood flooring is important especially prior to; and during installation. Once a wood floor is installed to the recommended method with a good subfloor it will become balanced within its normal environment. If there is underfloor heating and the flooring was installed during summer months then there may be some shrinkage in the depths of winter when the heating is turned on. Humidity should be around 65% and the moisture content of the subfloor 2% or less.

Underfloor Heating Conditions
If you have underfloor heating we always advise that this is commissioned and turned on so that engineered flooring can be acclimatised before installation. This means that any additional moisture the boards may have picked up to high humidity in summer months that the boards will find their natural balance.

Moisture Content (MC) of the top and Bottom layer
We kiln dry our engineered floors to around 8% which is standard for engineered floors and they will stay at this level in normal conditions. We balance the top layer with the base layer whatever its construction. The information below has been sourced from many articles to help you understand wood and its properties.

Water and Wood
The durability of wood is often a function of water, but that doesn't mean wood can never get wet. Quite the contrary, wood and water usually live happily together. Wood is a hygroscopic material, which means it naturally takes on and give off water to balance out with its surrounding environment. Wood can safely absorb large quantities of water before reaching moisture content levels that will be inviting for decay fungi.

Moisture content (MC) is a measure of how much water is in a piece of wood relative to the wood itself. MC is expressed as a percentage and is calculated by dividing the weight of the water in the wood by the weight of that wood if it were oven dry. For example, 200% MC means a piece of wood has twice as much of its weight due to water than to wood. Two important MC numbers to remember are 19% and 28%. We tend to call a piece of wood dry if it is at 19% or less moisture content. Fibre saturation averages around 28%.

Fibre saturation is an important benchmark for both shrinkage and for decay. The fibres of wood (the cells that run the length of the tree) are shaped like tapered drinking straws. When fibres absorb water, it first is held in the cell walls themselves. When the cell walls are full, any additional water absorbed by the wood will now go to fill up the cavities of these tubular cells. Fibre saturation is the level of moisture content where the cell walls are holding as much water as they can. Water held in the cell walls is called bound water, while water in the cell cavities is called free water.

As the name implies, the free water is relatively accessible, and an accessible source of water is one necessity for decay fungi to start growing. Therefore, decay can generally only get started if the moisture content of the wood is above fibre saturation. The fibre saturation point is also the limit for wood shrinkage. Wood shrinks or swells as its moisture content changes, but only when water is

taken up or given off from the cell walls. Any change in water content in the cell cavity will have no effect on the dimension of the wood. Therefore, wood only shrinks and swells when it changes moisture content below the point of fibre saturation.
Like other hygroscopic materials, wood placed in an environment with a stable temperature and relative humidity will eventually reach a moisture content that yields no vapour pressure difference between the wood and the surrounding air. In other words, its moisture content will stabilize at a point called the equilibrium moisture content (EMC).

Installing Wood Flooring
Wood used indoors will eventually stabilize between 8-10% moisture content depending on the local environment, time of year etc; outdoors at 12-18%. Hygroscopicity isn't necessarily a bad thing - this allows wood to function as a natural humidity controller in our homes. When the indoor air is very dry, wood will release moisture. When the indoor air is too humid, wood will absorb moisture. You should always fit any wood floor with a relative humidity of 55% to 65% so that you have a stable environment when fitting which will reduce the risk of contraction and expansion during installation with a MC in the floor of 2% or less.

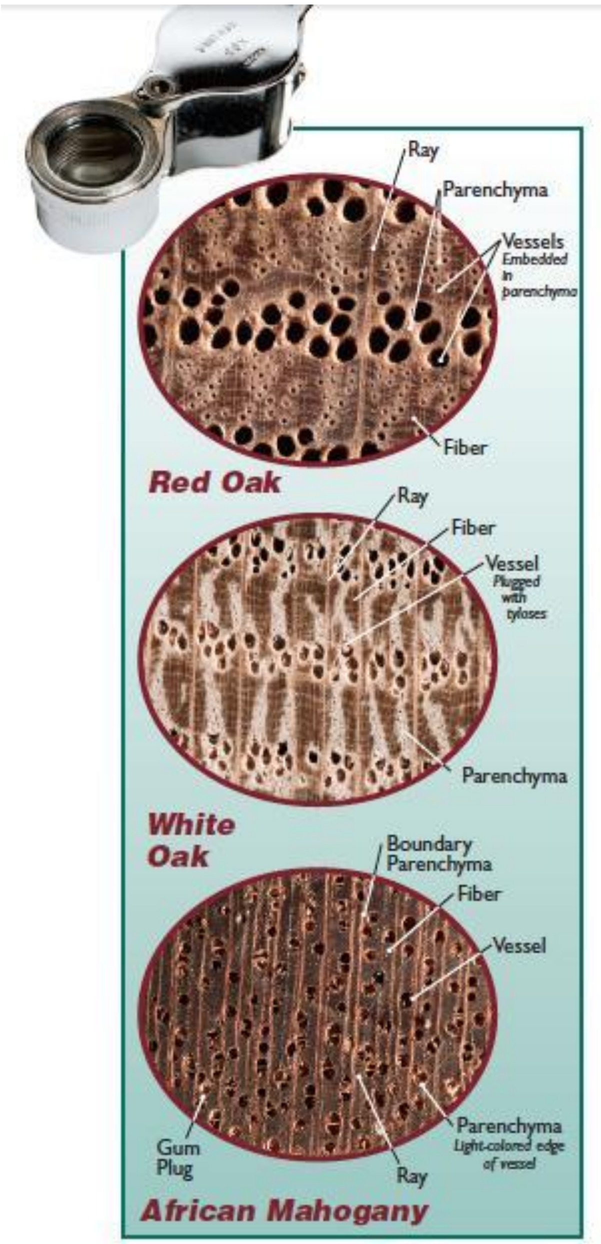
Shrinkage and expansion of Wood
Wood shrinks/swells when it loses/gains moisture below its fibre saturation point. This natural behaviour of wood is responsible for some of the problems sometimes encountered when wood dries. For example, special cracks called checks can result from stresses induced in a piece of wood that is drying. As the piece dries, it develops a moisture gradient across its section (dry on the outside, wet on the inside). The dry outer shell wants to shrink as it dries below fibre saturation, however, the wetter core constrains the shell.

This can cause checks to form on the surface. The shell is now set in its dimension, although the core is still drying and will in turn want to shrink. But the fixed shell constrains the core and checks can thus form in the core. Another problem associated with drying is warp. A piece of wood can deviate from its expected shape as it dries due to the fact that wood shrinks different amounts in different directions.

It shrinks the most in the direction tangential to the rings, about half as much in the direction perpendicular to the rings, and hardly at all along the length of the tree. Where in the log a piece was cut will be a factor in how it changes shape as it shrinks. One advantage of using dry lumber is that most of the shrinkage has been achieved prior to purchase.

Dry lumber is lumber with a moisture content no greater than 19%; wood does most of its shrinking as it drops from 28-19%. Dry lumber will have already shown its drying defects, if any. It will also lead to less surprises in a finished building, as the product will stay more or less at the dimension it was upon installation. Dry lumber will be stamped with the letters S-DRY (for surfaced dry) or KD (for kiln dry).

Another way to avoid shrinkage and warp is to use composite wood products, also called engineered wood products. These are the products that are assembled from smaller pieces of wood glued together - for example, plywood, OSB, finger-jointed studs and I-joists. Composite products have a mix of log orientations within a single piece, so one part constrains the movement of another. For example, plywood achieves this cross-banding form of self-constraint. In other products, movements are limited to very small areas and tend to average out in the whole piece, as with finger-jointed studs.



Elements in Hardwood

In hardwood, the fusiform initial makes three different elements called vessels, fibre and parenchyma. The ray initial is responsible for only one element, rays.

Each element plays a specific role in the tree, and each is sufficiently well-defined that it can be identified with the aid of a 10x hand lens when viewed on a transverse section. Vessels conduct water and nutrients from roots to leaves. They are long tube-like elements with thin walls and large cavities. Although each vessel is short, they are connected in vertical series and can extend for quite some distance up the tree.

Fibre is the mechanical or support element of the wood. It's laid down in the later part of the growing season. You can describe this element as the reverse structure of a vessel. It's short and has a pointy end, a thick wall and a small cavity that isn't visible with a 10x lens.

Parenchyma is essentially storage tissue. It's deposited vertically in different species in a variety of ways throughout the tree's growing season.

Rays are the most complex of the four elements. In some cases, they continue to function as the growing season progresses to provide or store food. Their size, shape and number varies enormously according to species. In a few species, such as poplar and willow, the rays are only one cell wide and therefore not visible. In the majority of species, rays are easily visible. Rays in oak are relatively huge structures, hundreds of cells high and tens wide. Seen on the transverse section, rays radiate outward like spokes on a wheel. When you split a log, it generally splits along a series of rays. You can then see them on the split side of the log in their front elevation or as a plate.

We hope you found this article of interest and help in understanding ones of nature beautiful products that will enhance any home.