

# Laying Guidelines for Solid Wood Floors

The following is a general indication of how to lay particular types of hardwood flooring.

Ultimately it is up to the floor layer to check site conditions, decide on the basis of experience and the site conditions which methods to apply, whether to acclimatise the floor and if so for how long and the amount of expansion allowance etc.

Fitting instructions are supplied to all new customers and packed with the delivered flooring. For more information please refer to the section on "**Site Conditions**" and also to the section on "**Site Survey & Predicting the performance of Wood Floors.**"

## Acclimatisation

The acclimatisation of a new wood floor prior to laying has been accepted practice for many years. Some recent experiences have led us to doubt some of the accepted wisdom and initial research has indicated that acclimatisation can, in some circumstances, lead to problems. This is the subject of ongoing research by ourselves, but the fitter should consider the following:-

The site conditions at the time of laying the floor should always be the same as those expected in service. The building fabric must be thoroughly dried out and the ambient temperature and relative humidity be as specified in the "**Site Conditions**" section.

If the site conditions differ significantly from those specified then the equilibrium moisture content will be different from the actual average moisture content of the new flooring and considerable movement may take place. A competent site survey will determine the actual site conditions.

New timber flooring should only be delivered to site when the site conditions are correct. If not, it is likely that some of the flooring will absorb moisture from the surrounding air or structure of the building and expand and distort.

If the contractor chooses to acclimatise the flooring, the process may take significantly longer than the accepted 7 to 14 days. It must be stacked in the room where it is to be laid so that each separate piece of flooring is exposed to circulating air on all four sides and the air circulation improved using a fan for the best results. It is not acceptable to simply leave the bundles, unopened in the room where it is to be laid. Only the outer boards of each bundle will acclimatise and only on the outer face.

The acclimatisation period required to significantly change the moisture content may be much longer than 14 days and in some tests the period was as much as 10 weeks to change the moisture content by about 1.5%. The delay and inconvenience caused by this would obviously be unacceptable to the client.

Where the site conditions are significantly different from those specified, the acclimatisation process may cause the flooring to expand or contract unevenly and the dimensions to go out of tolerance. This may result in unsightly gaps between adjacent boards when the floor is laid and make for a difficult installation.

In situations where the flooring is likely to expand a small, acceptable amount and, provided that the site conditions are more or less acceptable, it may be better to allow the flooring to acclimatise after laying. This means that some estimate of the amount of expansion must be made and this can be done by comparing the estimated equilibrium moisture content at the ambient site conditions with the actual moisture content of the new flooring.

**If the floor is likely to expand, leave an adequate gap around the perimeter and fix the floor using a recommended pneumatic nailer. This will fix the floor more loosely than a Powernailer and although there may be a few gaps here and there, they will close up as the floor adjusts.**

This method is suitable only if the site conditions are reasonably close to those specified. It cannot be used where site conditions are significantly different because the movement may be too great. Correct site conditions must be achieved.

This method may offer the optimum solution because the floor dimensions and machining tolerance are correct at the time of laying and this makes for an easy installation. Any differences in the expansion rates of different boards are taken up and equalised within the floor and boards which could expand more than others are restrained by the adjacent boards.

The timber should not be taken to site or unwrapped until the site conditions are correct and this method provides the fitter with more control over the whole process. For this method to work effectively it is important to fit the floor with some slack.

If the flooring is acclimatised at incorrect conditions for a long enough period of time - say for example during or just after building work when the relative humidity is high - the moisture content will adjust to these conditions. Once the floor is laid and exposed to heated conditions, the floor will then shrink and could distort.

If new hardwood flooring is to be fitted over underfloor heating, the flooring may be acclimatised before laying while the heating is on and some adjustment may occur. However, it is essential that sufficient allowance is made for expansion during summer when the heating is turned off. The previous comments about changes in dimension still apply and our certificate of moisture content will help in deciding whether to acclimatise or not. Also see the **Underfloor Heating** section in Site Conditions and **Expansion** below

## Fitting the Floors

Our floors are tongued, grooved and ends matched.

The boards are dimensionally stable provided that the site conditions are correct and stable.

If this is the case they only require fixing by secret nailing at 45 degrees through the base of the tongue using a 50mm long, serrated T nail.

If conditions are likely to vary a little, then the 140mm wide is recommended as a maximum for secret nailing. The wider boards may be used, but facing fixing may also be required.

If this is not carried out, the wider strips may bow slightly across the face as conditions vary from summer to winter. Face fixings may be nails driven vertically through the face and any holes filled or screws and cross grained wood pellets.

Boards are nailed at about 200mm to 300mm intervals or less depending on the length of the board and the nature of the sub floor.

The floor must be nailed frequently to provide sufficient fixings to hold the floor in place and prevent unnecessary movement.

Nailing at more than 300mm centres may not provide enough fixings.

Within reason, the more nails used, the better the floor. The best subfloor is an existing boarded floor or a new ply floor which allows the floor to be nailed at any point.

### 1. Floors fixed to existing boarded floors

Lay new flooring at 45 or 90 degrees to the direction of the existing boards and nail at intervals of 300mm or less.

The existing sub floor should be in sound structural condition and level. It is usual to punch in any nails and check for high points with a straight edge before levelling the existing floor with a floor sander.

Where the hardwood floor is required to run in the same direction as the existing boards, it should preferably be overlaid with dry, exterior grade 9mm plywood (minimum thickness 6mm) which is securely fixed to the original floor. The new floor is fixed through the ply into the existing floor.

If the floor is a ground floor over a cavity or unheated room, a vapour barrier, such as Sisalkraft 728, should be placed between the new hardwood floor and the old to prevent an increase in moisture content of the new. The joints should have an overlap of at least 100mm and may be taped for extra security. Polythene sheet is not recommended in this case because it may sweat. It is advisable, but not essential, to insulate under the existing floor.

**Useful, but not essential advice, is to use a damp proof membrane under all new floors and not just ground floors. This has the advantage of isolating the new floor from the sub floor and this prevents any migration of moisture from the underside during the summer months when the humidity is high.**

### 2. Floors fixed to existing chipboard or plywood floors

The principle is the same as in 1. with the following exceptions:-

- A. Flooring should be laid at 45 or 90 degrees to the joists and nailed at 300mm centres or less. In reality it is normal to nail at about 50mm in from each end and every 200mm to 300mm centres. A few extra nails costs little and improves the rigidity and stability of the floor.
- B. The chipboard or plywood must be securely fixed to the joists. Make sure you use a building paper on ground floors. Plywood is a better subfloor than chipboard because it holds nails better and there is less chance of the nail breaking out the underside of the floor especially with face nailing.

Under normal circumstances, our hardwood floors should not be fixed to a floating chipboard floor because it is not sufficiently rigid. Any excessive seasonal movement may cause the floor to expand and perhaps lift the floor. Contraction is not a problem with a floating floor.

In thoroughly dry, modern buildings with a high level of insulation, the seasonal variations in floor moisture content are small. A solid floor could be fixed to a floating floor in these conditions provided that the chipboard or ply is sufficiently thick, very dry and adequately bonded together. The floor slab must be dry and overlaid with visqueen and a building paper laid over the chipboard. Site conditions must be correct and stable.

### 3. Floors fixed directly to timber joists

This is only acceptable if the joist centres are less than 300mm and should only be considered if the space below the floor is fully heated. In any event, it is good practice to first fix 18mm T & G plywood or chipboard for the reasons listed below.

**Hardwood flooring should not be fixed directly to ground floor joists over a ventilated cavity.** The timber will absorb moisture from the air in the cavity and expand. It is recommended that an exterior grade plywood or flooring grade T & G chipboard at least 18mm thick is first fixed to the joists followed by a vapour barrier such as Sisalkraft 728. Hardwood flooring is then fixed as in Section 2.

Fixing Chipboard or plywood offers other advantages:-

1. The plywood or chipboard provides a useful platform for all the second fixings, plaster work etc. and living, bearing in mind that the hardwood floor can only be fitted when the house is fully dried out.
2. It makes for easier, safer and faster floor laying.
3. Floor joists are normally set at 400 to 500mm centres and the 18mm thick board should be used so that the flooring can be nailed at the correct spacing ie:- 300mm or less.

#### **4. Hardwood floors fixed to softwood battens on concrete**

Flooring may be laid over concrete floors by fixing dry, pre-treated softwood battens to the concrete at the correct centres (see B. below) and nailing the board at every intersection to a batten taking note of the following:-

1. The battens may be fixed by gluing with a recommended adhesive or by screwing and plugging. All fixings should be sunk below the surface of the batten.
2. The distance between the centres of battens should be less than or equal to the shortest length of the flooring but no greater than 300mm & preferably less.
3. The minimum thickness for a batten is 25mm (20mm if the nail is driven at 30°) and the normal width is 44mm. If insulation is to be laid between the battens, they may need to be 50mm deep or to suit the depth of insulation. Battens should be laid in short lengths (1.8 to 2.1 metres) with a 200\250mm overlap (side to side).
4. The concrete should be level and very dry. As it is difficult to fully dry out a concrete slab to the necessary relative humidity, it is necessary to lay an additional vapour barrier above the concrete. This may be a non breathable building paper, an applied epoxy resin membrane or a polythene membrane provided that it is laid in such a way to prevent condensation. The type of vapour barrier is really dependant on the humidity of the slab. As a guide line:-  
If the RH is dry (say under 60%) Sisalkraft 728 building paper with taped joints can be used.  
If 60% to 75% use a heavy gauge polythene with taped joints.  
If over 75% use 2 coats of Creom DPM. Bond battens to epoxy with Rewmar MS-Polymer adhesive. Discuss details with the manufacturers.
5. If no DPM is to be used over slab and under the floor, the concrete slab must be fully dried out with a maximum relative humidity of 40%. This equates to a moisture content of 2%.  
The concrete slab must contain an effective integral damp proof membrane.  
In reality it is difficult to achieve 40% RH in the slab and a DPM must therefore be used over the slab.
6. Any under floor pipe work should be fully pressure tested prior to laying the floor. All pipes should be effectively insulated to prevent hot spots under the floor. If not, this may cause localised shrinkage.  
NB. When nailing hardwood flooring to an existing timber floor, care should be taken to avoid any under floor services - pipes, wires etc.

#### **Use of Adhesives Directly to Concrete**

During recent years, new adhesives have been developed along with compatible epoxy DPMs, self levelling compounds etc. Several contractors are now successfully gluing our floors to concrete sub floors with these compounds.

Because of the accuracy of our machining the floors push together to give a reasonably tight fit. Although we cannot recommend the methods used, they seem to be reasonably successful to date.

Below is a summary of the methods which have been used, some of the adhesives used and general comments by the contractors. In our opinion it is too early to assess the long term success of the methods, but they are worth considering.

#### **Adhesives successfully used were**

1. Rewmar MS Polymer Adhesive in conjunction with Creom DPM.

The Rewmar MS Polymer is applied over the whole area with knotted trowel and, we feel, is more likely to provide a better fixing. These adhesives will bond directly to the Creom DPM. Some adhesives do not.

The method has the advantage of sticking directly to concrete and reducing the height of the floor. The disadvantage is that it has not been proven over a long period of time in the UK, but it has been used in Europe for many years.

For this to be even considered, the concrete slab must be very dry and have an epoxy mortar surface DPM (Creom) and the adhesive must be compatible with the epoxy. The property must have dry stable conditions.

Please remember that this is an account of what has been done and we cannot recommend it as a foolproof or proven method.

## Expansion Allowance and Setting Out

Our floors are machined to very accurate tolerances and the timber is generally dried to ensure stability in modern heated buildings. In order to prevent excessive expansion it is essential to make allowances.

### Always leave an expansion gap:-

1. Around the perimeter of the room, 10mm to 12mm for a small room and 15mm to 20mm for a larger room.
2. As a series of intermediate expansion gaps across the width of the floor if the flooring is to be fitted with a pownailer. If not fit with a pneumatic nailer and do not include intermediate expansion allowance. This may be necessary when the floor is likely to expand after laying and especially with a large floor where the peripheral allowance may be too little. Flooring laid during winter with full central heating will mostly expand in summer. Flooring laid in summer will tend to expand immediately after fitting and may take several months to reach equilibrium.

Floor laying may be started adjacent to the longest wall, in which case the first 2 or 3 rows are set to a line & fixed through the face with the tongues pointing away from the wall.

If the shape is complicated or includes several rooms, laying may be started part way across the room.

A line running through the rooms is set out and adjusted so that the flooring is either parallel to one or more walls or, if the walls are out of parallel, the best line is followed.

For this method, two lines of boards are placed groove sides together, with a loose tongue of plywood inserted into the grooves. Each piece is face nailed or screwed (and pelleted) to the sub-floor.

Ensure that these rows are laid in a perfectly straight line with the joint aligned to the string line.

Once the first 2 or 4 rows are face fixed, the rest of the floor is fitted by working outwards to each side of the centre line leaving expansion gaps where and when necessary.

With the exception of these first few rows, the boards are fixed using a Pownailer floor nailer or pneumatic nailer.

Where use is obstructed by the wall, the boards are either drilled and nailed by hand, face nailed with the appropriate Pownailer face nailer or pneumatic nailer or screwed and pelleted. All flooring is sanded and sealed in situ. Full fitting instructions are supplied with all strip & plank floors.