

## Introduction

For as long as there have been timber floors there have been squeaks and it is generally accepted that many floors will make some noise when walked on. This includes traditional solid timber floors that may be laid direct to joists, to the more recent floated engineered floors. However as with most things there comes a point where too much is too much and it becomes a concern to the owner. In solid strip floors laid on joists or battens squeaks can come about from board on board rubbing or board on 'nail' rubbing. However, there are also instances where the squeaks are not associated with the flooring itself. This includes noise associated with the subfloor framing of either timber or steel and also the likes of noise from boards rubbing on fixed building elements. Excessive squeaking should not be taken lightly as the annoyance created can be a legitimate concern that needs to be investigated and corrected as best as possible. This information sheet considers squeaks associated with solid T&G floors laid on joists or battens which may also have an intermediate sheet subfloor of particleboard or plywood.

## Squeaks in traditional solid timber floors

### Floors laid direct to joists and battens

With these types of installations the squeaking is often associated with rubbing of board edges or rubbing of the board on the floor fixings.

With board on board rubbing, a small amount of movement can cause noise. Even correctly milled boards can rub slightly and result in squeaking from the floor. However, often when squeaks occur the T&G joint is relatively loose and movement at board edges can be felt as the floor squeaks. Generally, a T&G tolerance at board edges of about 0.4 mm makes a good floor where boards will slot together easily and firmly enough so as to minimise movement at board joints and thereby minimise the possibility of squeaking from this source. [A tolerance of 0.4mm is about the thickness of a business card. Note however that the



*A hole saw through the board joint in a cupboard reveals out of tolerance joints contributing to the squeaking in this floor*

manufacturing standard for hardwood flooring does allow a tolerance of between 0.3mm and 0.6mm.] In addition to the tolerance at board edges, the tolerance on the end-match (tongue and groove on the end of the board) is also very important. It should be the same as board edges and again at the lower end of this tolerance. If the end match tolerance is too loose this can increase movement at board edges along from it and contribute to some squeaking.

If shrinkage or movement has caused the floor to lose firm contact with the joists then board on 'nail' (or staple or cleat) movement can result in squeaking. Obviously, with secretly fixed floors this is more of an issue as the fixing is no longer accessible preventing reseating of the fixing. For these reasons do not secret fix into unseasoned joists.

Firm fixing and anything that reduces movement of boards or fixings after installation will reduce the risks of squeaking developing in the installed floor. It is partly for this reason that with some methods of installation, adhesive is applied to the tops of joists or battens to fill any small gaps under the board, (in addition to adding to the fixing strength). Some floor fixing methods do not require adhesive to hold the floor down and therefore adhesive may not be present in such instances. However, with these floors severe swelling can also result in loosening of the fixings of board to joist, batten or sheet subfloor which adds to the risk of squeaks developing and makes repair difficult in a secretly fixed floor. Secret fixing to plywood laid over hard surfaces; e.g. ceramic tiles, can result in staples rubbing and leading to squeaks in the floor.

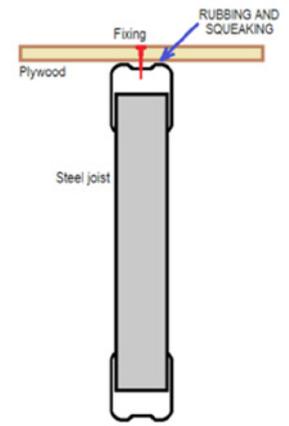
### **Floors laid to particleboard and plywood**

With some installations squeaks have also been associated with floors fixed to particleboard and plywood subfloors. If the adhesive beneath the board is not providing sufficient support to the edge of the board then movement at board edges can still result in rubbing and squeaking boards. Overlay flooring boards (generally 14mm or less in thickness) are also more flexible than structural T&G floors and the manufacturing standard does not specify tolerances for overlay flooring. Therefore, concerning squeaks, a full bed of adhesive and correct spacing and pattern of beads of adhesive, where used, is necessary to reduce the risk of squeaks occurring. That is, the beads of adhesive support board edges and are at least between the fixing points.

### **Squeaks from subfloors**

Although the floor installer is often the first cab off the rank when there is a squeaking floor the problem may well lie with the subfloor. Squeaks from subfloors can be from a number of different mechanisms. Firstly, it may be from the fixing of the particleboard or plywood to the joists and for this reason these subfloors should be walked over thoroughly to determine if squeaks are present. They need to be corrected at this stage as once the timber floor is installed they are generally still present.

In some instances fixing of plywood to steel joists has resulted in noisy squeaking with every step made on the T&G timber floor above. In such cases the plywood has been fixed through the recessed section of the top flange of the steel joist and with each step the outer edges of the joist rub on the plywood (as indicated in the diagram and second photo). Once the timber floor is laid this can become very difficult to rectify. Other causes of squeaks from subfloors include nails which just miss the joist but rub on the edges of the joist. Such instances can result in loud squeaks whenever that area of the floor is walked on, but the simple fix if the nail is accessible is to bend it so that it no longer rubs. In another case steel joist hangers had been used to support joists laid between the bearers and particularly when the floor was walked on centre span, the deflection resulted in movement at the end joints and squeaking would occur.



The first photo illustrates a nail rubbing on a steel joist. The second photo and diagram indicates that rubbing can occur between the plywood subfloor and top surface of the joist.

### That 'crackling' noise

On some occasions the noise from the floor could not be referred to as a traditional squeak but more as a 'crackle'. The characteristics of this is that when you walk on the floor first up, it goes 'crackle', 'crackle', 'crackle' under foot. Walk on it again and there is no noise. However, come back some hours later or the next day and it 'crackles' again when first walked over. This does not occur very often and is thought to relate to the coating in board joints. However, as it is infrequent a remedy has not been found. Others have observed that this can also occur when board joints are stressed prior to the dwelling being lived in and once occupied the noise has diminished.

### Assessing squeaks

Above we have described many ways in which squeaks can develop in floors over joists or battens and also with intermediate subfloors of particleboard and plywood. But when faced with a squeaking floor, the question of how to assess it arises. The following steps may help.

- Firstly it is necessary to consider both the floor construction and installation method of the floor as this will guide you as to whether the squeaks are likely to be relating to the boards or the subfloor.
- Next it is necessary to understand the nature of the squeaks and what they sound like. Is it a 'crackle' or a 'creaking' sound? Does it make this sound whenever I walk on the floor or just certain time of the day? Is the floor noisier when the weather is dry or is it the same when it is wet? Noises that disappear in wet weather are often associated with board on board squeaks. Wet weather often swells the floor and tightens it so that board edges do not rub with foot pressure.
- It is then necessary to consider how extensive the squeaking is. Is the squeaking in just a few locations or is it present throughout the floor and is it always occurring in the same places. Where there are only a few squeaks they are usually easier to attend to.

After gaining this information, if the floor is direct to joists or battens and it is decided likely that the squeaks are from board on board rubbing or board on nail rubbing then the next process is to walk up and down the floor, first walking above the joists or battens for three or four rows and then similarly between the joists or battens. Often with board on board squeaks there will be little or no noise when walking up and down above of the joists or battens. This is easy with a top nailed floor and less easy if secret fixed. Then down on hands and knees and considered the movement at board edges where the floor is squeaking and particularly cantilevered end-matched joints between joists or battens. At times if the subfloor is open it is necessary to go below the floor and get another person to create the squeak by standing on the floor above and by doing this, the interface between board and joist can be observed. Although the above does not cover all

aspects and many floors that do not provide access beneath, it does illustrate how a systematic approach and working with what you have, is necessary when assessing a squeaking floor. To check the tolerance in the tongue and groove and end match joint there may be times when a hole saw needs to be used to take a sample from the floor so that measurements can be taken.

## Correcting a squeaking floor

It is far more prudent to correct a subfloor or attend to the flooring prior to laying the timber floor. As indicated above particleboard and plywood subfloors need to be walked over thoroughly as simply re-screwing some places may be all that is needed to stop the squeaks. If the floor is direct to joists or battens then consider the flooring more carefully in terms of the tolerance at board edges and at the end match and if considered a possible concern, contact the supplier at this time. When laying the floor consider that adhesive between board and joist or batten, can reduce the risk of squeaking and particularly if secretly fixed, as once the floor is laid the fixings are hidden. Prevention is a better course than repair.

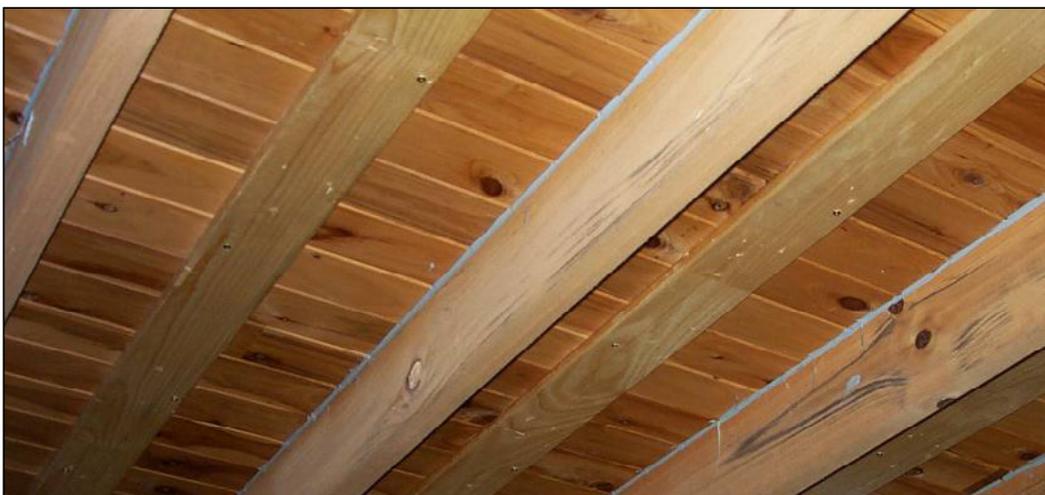
Before discussing aspects of repairing squeaks in a floor it is first necessary to consider what an acceptable level of squeaking in a floor is. Guidance regarding this is provided in ATFA publication Timber Flooring which states:–

*A small amount of noise can be expected from most timber floors, when walked on. Noises can occur from movement of one board edge against another or from boards moving on nails. A floor is often more noisy during drier weather due to loosening at the joints.*

Although this may be considered a broad statement it does indicate that floors are not always squeak free. However, in saying this we would also consider that in general the main walking areas should, by in large be squeak free. Squeaks in entrances and down hallways and into kitchens would be viewed differently to a squeak in the corner of say a bedroom or in the pantry. This is because squeaks in areas more frequently walked on are also more annoying.

There have been many suggestions on how to repair squeaking floors over the years and the truth is that some are more successful and long lasting than other. Also depending on the cause of the squeak or the floor construction then what can be trialled is limited on some floors. Repairs may also have a degree of visibility to them however when done well there is often little affect on the aesthetics.

If the subfloor is accessible then this is the place where repairs should start. This is for both the squeaks that are board on board rubbing squeaks as well as board on fixing squeaks. From the subfloor with board on board squeaks it is possible to add a batten mid way beneath and parallel to the joists. Flooring adhesive applied to the batten and then it screwed to the underside of the floor every 4 boards or so. If the

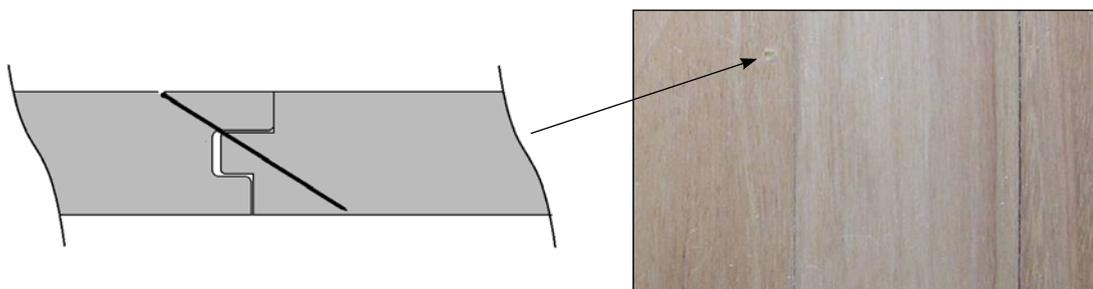


*Battening between joists and beads of adhesive can quieten floors*

squeaking is considered to be associated with boards rubbing on their fixings then adhesive can be applied at the interface between joists and board so as to reduce the movement of the board relative to the joist that is fixed to. The adjacent photo illustrates where both these options have been applied to a floor.

However in many instances the underside of the floor is not accessible and when this is the case repairs are often necessary from the face of the board.

Methods used in Australia and overseas to prevent board on board movement and the associated squeaking has been to skew nail the boards or board ends with finishing or fine nails (say 40mm x 2mm) through the tongue and groove joint. Particularly with harder species drilling a pilot hole will assist to prevent splintering and enable the nailing. The nail is then countersunk and colour matched filler applied. A method used in USA is to drive small metal triangular 'glazing points' (for with window glass installation) into the gaps between the boards,( using a 'point gun' – its like a staple gun). The glazier point is then wedged below the board surface with a putty knife or similar.



*Fine nailing through the tongue and groove joint quietened this floor*

In more severe instances where loosening of the fixing occurs with secret nailed floors and has resulted in squeaking between the boards on the staples, it may require consideration of top nailing the floor.

At times various types of lubricants have been applied to board joints in order to prevent squeaking. Note that many 'click together' engineered floors have wax applied to the locking joints, in part to minimise squeaks. Lubricants include talcum powder and powdered graphite. Boards may be tapped to enable the powder to penetrate the joints or it is rubbed in with a towel. Note that this requires more than one application. In other instances liquid wax has been used but with this option it may cause future recoating issues and this should be determined and considered first.

Success with any of the above methods is not guaranteed and for this reason it is often prudent to trial one room and look for a significant improvement before continuing the process in other rooms of the house. It is also often difficult to remove all squeaks from a floor and some floor areas can squeak at different times to others. However the methods outlined above have been successful in reducing floor noise to much more acceptable levels. These are not the only approaches to this problem but they are the common approaches. At times re-sanding and coating during dry times has made a floor much quieter. It is important to work with your floor installer and it may take some time to resolve.

## **Squeaks in engineered timber floors**

When it comes to engineered floating floors it is necessary to understand that the construction of engineered flooring differs from product to product and that each will react a little differently to environmental conditions. However, as timber is involved with each there will be minor expansion and shrinkage which can result in some overall expansion or shrinkage in the floor or changes to board shape. Also with engineered flooring systems they include both glueless and glued joints.

A lack of correct expansion allowance can cause the floor to buckle in areas resulting in the floor feeling spongy to walk on and with glued floors also noise emanating when walked on. This type of noise is the glue bond failing and requires expansion allowance to be reinstated. If not attended to quickly, joints may open due to bond failure.

Vertical movement can also be induced in a floating floor when walked on and result in noise when the subfloor is uneven. Although some vertical movement is to be expected as the floor is laid on a foam underlay, too much movement can again result in glued joints weakening, breaking and consequently boards rubbing.

With glueless systems the joints are often waxed which provides added moisture protection to joints and reduces rubbing and squeaking of the boards. However, a subfloor with the correct flatness is still important to avoid noise with these floors. But not all products have waxed joints or wax may not be present at the end joints and this can lead to squeaking as the boards rub when walked on. Care is also necessary that sufficient expansion allowance has been provided to the floor as expansion over a larger expanse of floor can skew sections of the floor, induce some unevenness and result in squeaking.

When it comes to correcting squeaks it must first be recognised as with other timber floors that a small amount of squeaking can be acceptable. However, as with other flooring systems, floor preparation is important and methods used with other flooring types such as the use of talcum powder or creating slight gaps at end joints have been effective.