Timber Flooring
Acoustic Treatments

Introduction
Timber floors offer a natural warmth, beauty, longevity and performance unsurpassed by other materials. They are widely used in both new residential projects as well as renovations of existing residences/apartments. In many of these applications, the acoustic performance of the floor covering in relation to the transfer of sound into other dwellings/apartments is of great importance. In renovations, noise levels from the renovated floor in many cases are required to be no greater than the floor in its original state—typically carpet and underlay. In new projects, building regulations have some control over the floors performance in terms of sound where they are separating sole occupancy units. Timber floors, much like other hard surfaces, tend to transfer the impact noises unless suitably detailed. This brochure is designed to give some generic approaches to this detailing which will improve the acoustic performance of these timber floor systems.

Understanding Noise Transmission Between Units
The source and transfer of noise from one unit to another will vary in accordance with the building design and layout, construction materials and acoustic detailing. The transfer of noise from one unit to another, or from one area in a building to another, is via a combination of direct and flanking sound paths. The reduction of noise or the "sound transmission loss" is the difference in noise between the sound energy within the unit generating the noise through the wall and/or floor to the neighbouring unit. This sound transmission loss is measured in decibels. The higher the transmission loss the lower the noise energy and hence less noise is heard. Transmission loss also depends upon the frequency of the noise with lower frequencies passing through the structure more easily than higher frequencies.

Methods of improving sound performance or increasing sound transmission loss includes:

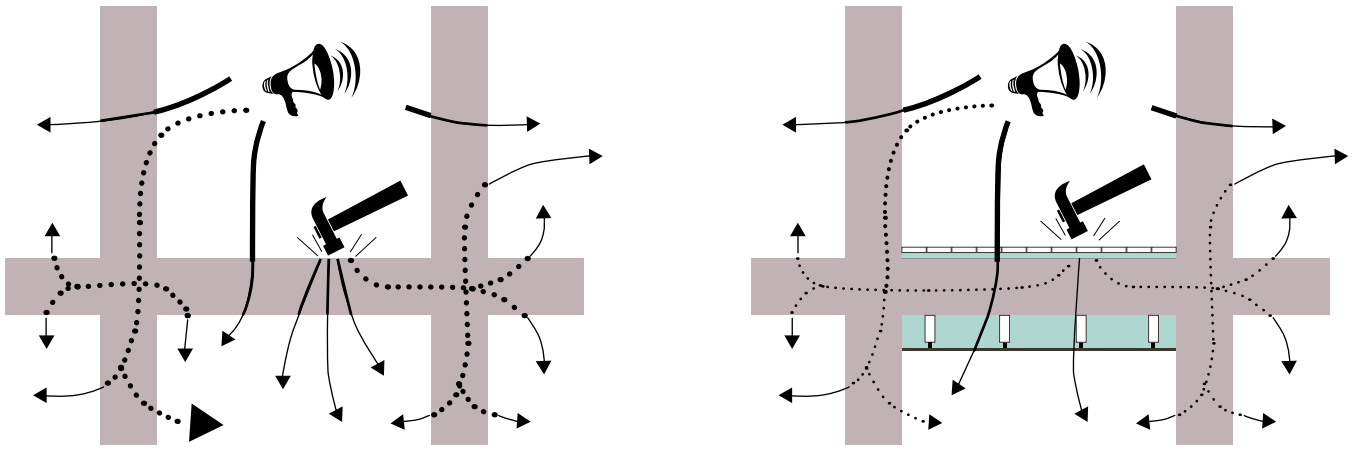
- Increasing Mass
- Isolation
- Absorptive materials

Floors are particularly affected by impact noise. Footfall noise is the main issue generating direct vibration through to the floor below. Hard surfaces such as timber, ceramic and terracotta tiles etc offer minimal isolation or absorption of the sound energy generated by the footfall. Timber floor systems can be specifically designed to reduce these effects and are detailed below.

The best solution for a particular application will vary depending upon the implications of floor level increase, nailing requirements ie secret or top nailed boards, strip or parquet.

Figure 1 — Sound Transmission paths

Direct Transmission
Flanking Transmission



(a) Bare floor and no acoustic ceiling

(b) timber floor with acoustic underlay and isolated ceiling

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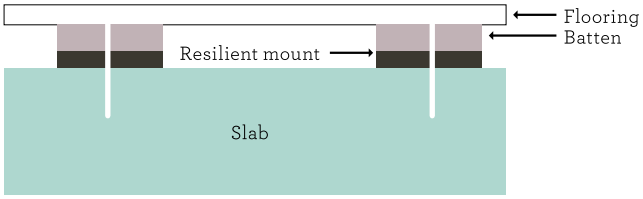
Timber Floors Over Battens
This approach utilises conventional tongue and grooved floor boards fixed to timber battens which are in turn supported off mounts of isolating material. The battens still require fixing through to the substrate (concrete slab) and hence some physical connection still affects the transmission of noise, however this is reduced somewhat with minimising these fixing points. The fixing of these battens to the substrate will vary depending upon the batten thickness with thinner battens typically requiring fixings at closer centres.

Depending upon the batten thickness, the boards may be either top or secret nailed. Boards must be of a suitable thickness to span between the battens — typically, for residential loadings, these will be at 450 centres and utilise conventional 19 mm strip flooring. It should be noted that top nailing will require battens of a minimum 30 mm in depth.

The isolating pads need to be of a suitable density and thickness for this application. Many products are on the market and advice should be sought from these suppliers as to the suitability of their product for this specific application.

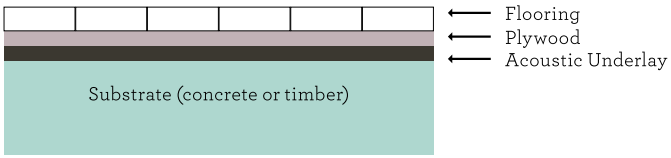
Figure 2 — Section of timber floor on battens



Timber Floors over Sheet Flooring
This system works by placing a complete layer of resilient material (acoustic underlay) over the substrate (timber or concrete) then installing a layer of sheet flooring typically of 12—19 mm thickness over the acoustic underlay. The strip flooring can then be secret nail fixed and/or glued to the sheet flooring. The specific fixing requirements will vary on the type of sheet flooring ie plywood, particleboard etc (refer to relevant standards for information). The board thickness, as it is fully supported, can be reduced if desired. This approach also works well with timber parquet and other timber products designed to be fixed to a continuous substrate.

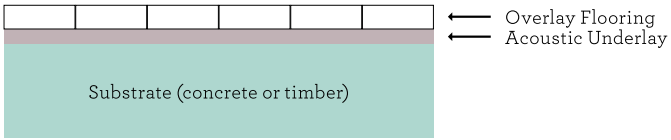
The plywood sheeting generally requires some fixing or pinning to the slab—it should be noted that each solid connection through the foam reduces the acoustic effectiveness by "bridging" through the acoustic isolation.

Figure 3 – Timber floors over plywood and underlay



Proprietary Floating Floor Systems
There are a wide range of "floating" floors available on the market. Typically these floor systems comprise of the flooring itself either in strip or parquet pattern supported on an underlay. They are non-structural and hence require full support from the substrate ie concrete or timber floor. The producers/suppliers of these products have specific installation instructions along with the appropriate underlay system for their products. Care should be taken to follow their instructions as any variance may potentially reduce the acoustic efficacy.

Figure 4 — Typical section of overlay flooring



Underlay Selection
The purpose of the underlay or isolating pads, as is the case with floors supported on battens, is to isolate or reduce the impact energy from the hard floor surface through to the structure of the building. A wide range of products are available on the market each claiming varying performance achievements. The key elements are that the product be:

- Of sufficient thickness to offer positive separation
- Rigid enough to not over compress when loaded
- Able to offer long term performance without collapse or 'flattening' of the layer—specifically under point loads ie fridges, lounge feet etc as well as normal foot traffic
- Supported with acoustic testing reports and specific application data.

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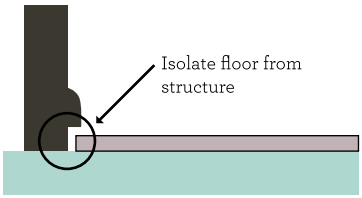
Isolation at Junctions
In order to minimise the potential for acoustic bridging, flooring should be stopped short of junctions with walls, steps, columns and any other structure which is non-isolated.

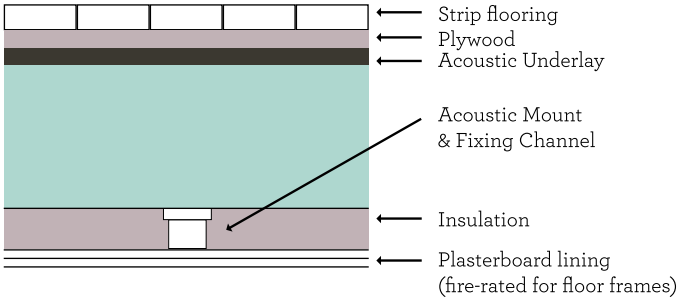
Figure 5 — Isolation at Junctions



Ceiling Systems
The separation of sound between units can also be improved with the addition of a ceiling system that is designed to isolate (acoustically) the noise source from the unit below. Typically these ceilings comprise a grid of isolating mounts fixed to the soffit of the slab or timber floor frame, to which a furring channel is fixed followed by insulation and plasterboard lining. In many cases the ceiling lining will comprise of double layers of plasterboard. (Timber floor frames require the use of fire rated plasterboard).

These systems are particularly affective in lowering the noise transmission between floor levels and offer a relatively economical option particularly with new construction. A typical detail is shown below with variations in performance based upon the thickness of the ceiling lining and the insulation material selected.

Figure 6 — Section of resilient suspended ceiling system



House Keeping
In order to offer additional performance and to also care for your timber floors, rugs and hall runners are extremely affective. They offer further isolation from footfall noise, reduce acoustic reverberation within the unit due to having some absorptive qualities and also protect your floor coating system in heavy traffic areas.

Checklist

Proposed Floor System

Battens	❍
Plywood	❍
Floating	❍

Underlay Selection (if required)

	Yes	No
Sufficient Thickness	❍	❍
Adequately Rigid	❍	❍
Long term stability	❍	❍
Acoustic Report/Opinion	❍	❍

Junctions

Floor isolation	❍	❍

Ceilings

Acoustic detailed	❍	❍

Notes

Please consult with suppliers of proprietary products for specific acoustic testing reports.

Source

References: MRTFC Technical Bulletins

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Technical Advice
Further technical information and assistance is available from the following Timber Advisory Services.

New South Wales
Timber Development Association NSW Ltd
13–29 Nichols Street
Surry Hills NSW 2011
Tel: (02) 9360 3088 Fax: (02) 9360 3464

Queensland
Timber Research and Development
Advisory Council of Queensland
500 Brunswick Street, Fortitude Valley Qld 4006
Tel (07) 3358 1400 Fax: (07) 3358 1411

Victoria
Timber Advisory Centre
180 Whitehorse Road
Blackburn Vic 3130
Tel: (03) 9877 2011

Pine Australia
830 High Street,
Kew East, Vic 3102
Tel: (03) 9859 2455 Fax: (03) 9859 2466

South Australia
Timber Development Association os SA
113 Anzac Highway, Ashford, SA 5035
Tel: (08) 8297 0044 Fax: (08) 8297 2772

Western Australia
Timber Advisory Centre
Cnr Salvado Road & Harborne Street,
Wembly WA 6014
Tel: (08) 9380 4411 Fax: (08) 9380 4477

Tasmania
Tasmanian Timber Promotion Board
c/o University of Tasmania
PO Box 1214, Launceston, TAS 7250
Tel/Fax: (03) 6324 3688

Plywood Association of Australia
3 Dunlop Street,
Newstead, Old 4006
Tel: (07) 3854 1228 Fax: (07) 3252 4769
Fax: (03) 9877 6663

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VAFI—Victoria Association of Forest Industries
TPC (Vic)—Timber Promotion Council of Victoria
PAA - Plywood Association of Australia
FIAT—Forest Industries Association of Tasmania
TTPB—Tasmanian Timber Promotion Board
NAFI - National Association of Forest Industries
TRADAC—Timber Research and Development Advisory Council
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TDA (SA)—Timber Development Association (SA)
Pine Australia
FIFWA—Forest Industries Federation (WA)
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Source

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For further information refer to:

timber.net.au

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