Timber Advice and Display Centre
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SELECTING THE RIGHT FLOOR

FLOOR TYPES

Conventional tongue and groove boards, sometimes called strip flooring.
Stick-down overlay boards.
Floating floors.

Note: This note is a guide to floor characteristics. It is not an instruction manual. In all cases consult the manufacturer for advice on installation and maintenance.

CONVENTIONAL T AND G BOARDS

T and G floors suit large rooms and long hallways because boards are long (up to 5.4 metres). The longitudinal edge-to-edge joins are neat and tight because the boards are cramped, nailed, sanded and coated on site. Boards can be face-nailed (nails punched and holes filled) in the traditional way, or secret-nailed (nailed through tongue and invisible).

Available in 25 species or more – wide choice
Available in up to three grades – Select, Standard, Natural Feature
Resilient under foot; comfortable to walk and work on
Random board lengths up to 5.4 metres in pack lots.
Long lengths means fewer end-to-end joins and a less busy look to the floor
Solid timber 19mm thick; strong, to support bridging loads between joists
Three widths – typically 60mm, 80mm and 130mm
Also available in 89mm (31/2 inch) and 108mm (41/4 inch) widths
Baltic Pine boards typically very wide – 152mm (6 inches)
Wider boards are available to order but not held as stock lines.
Kiln dried to 9% to 14% moisture content (Zone 3 mean is 12%); plastic wrapped by mill
Need acclimatization in house, on-site, before installation
Coated on-site with your choice of finish

PROFILES AND FIXING

Two profiles – standard face-nail profile, and secret-nail profile
Secret-nail profile has a chin of wood extending under the tongue to support it and prevent the tongue breaking off when nailing
Boards up to 85mm width may be face-nailed or secret nailed
Boards over 85mm width must be face nailed to prevent cupping and tenting
Face nailing is a more secure method of fixing than secret nailing.
Install boards over joists, particle board, existing T and G strip floor, or concrete slab.

Over joists:

Secret-nail to joists using pneumatic nailer (staple), running a wavy 5mm bead of polyurethane adhesive (Bostik Ultraset) down each joist before placing board down. Adhesive prevents squeaking. Pneumatic nailer cramps board as it drives nail.
Face-nail to joists without glue, using manual or pneumatic nailing and cramping dogs mounted on joists to ensure a tight floor.
Check flatness of joists using aluminium straight edge before nailing; maximum deviation over three metres is 3mm.

Over particle board:

Fix to particle board using polyurethane flooring adhesive and secret nailing; both are needed to ensure floor will not move.
Difficult to face-nail as no quick way to cramp boards, as joists are hidden.
First, use three metre aluminium straightedge to check particle board for flatness – maximum deviation over three metres is 3mm. Sand high spots.
Spread polyurethane flooring adhesive out on particle board using a 4mm "V" notched trowel.
Push each board into adhesive bed so that 100% of underside of board is coated with adhesive.
Secret nail using pneumatic nailer, which cramps board and drives nail or coated staple simultaneously.

Over existing T and G strip floor:

Run new boards at right angles to old, or fix 7mm plywood underlay first and then run new boards in parallel with old. Plywood should meet Structural Plywood AS2269 and have type A waterproof bond, or Exterior Plywood AS2271 and have a type B bond.
Installing new boards over old in parallel, without underlay, will increase risk of movement in old boards, which are exposed to the vagaries of the outside atmosphere in the sub-floor space, causing movement in the new boards.
If running new boards at right angle to old boards, cannot face-nail as new boards now run parallel with joists; it is not sufficient to face-nail into old boards alone as nails need 30mm embedding to grip properly. Must therefore secret –nail new boards into old boards.
If running new boards over plywood underlay and parallel with old boards, can either face-nail through plywood into joists (use 70mm nail instead of 50mm), or secret-nail through plywood into old floor (use longer staple or nail).

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Over concrete slab: three methods.

Face-nail into 70 x 35mm hardwood battens fixed to slab, with battens at 450 centres and bolted to slab, wide face on slab.
Secret-nail into 35 x 19 hardwood battens fixed to slab, with battens at 450 centres and bolted to slab, wide face down.
Secret nail into 19mm thick plywood with plywood bolted to slab and laid in a diagonal pattern across room. Use only Australian Standard AS 2269 structural plywood with water -proof phenol formaldehyde bond (type A) and stress grade F14.
Slab to have moisture content less than 5.5%, or use moisture vapour barrier or 0.2mm thick black polythene under battens or plywood.

COSTS

Lowest total (material, labour and coating) cost per square metre – less expensive than stick down overlay and good quality floating floors, in general.

GRADES

Refer Australian standard AS2796 for grading rules.
Select Grade has a limited number of natural features or marks.
Standard Grade has more natural features or marks.
Natural Feature Grade has many natural marks. Natural marks are gum veins, Ambrosia beetle flight holes (dark stained), scribbly worm tracks, and Bardi grub (Witchety Grub) holes.
All three grades can be used over normal 450mm joist centres spacing. Refer span tables in AS 1684.

ACCLIMATIZATION

Acclimatization attempts to ensure that the boards are installed with a moisture content that is appropriate for the relative humidity typical for the specific location and house characteristics. In this way, expansion and contraction during the seasons of the year should not be noticeable. To ensure proper acclimatization, have boards delivered to site when building is lock up and not before. Storm water system must be complete. Take boards inside on the same day and remove plastic. Allow boards to adjust moisture content to surroundings – takes two to four weeks. Before installing, test some boards to make sure that moisture level is reasonable and not excessive. Then install boards, adjusting the degree of cramping force to allow for the time of year. In summer, allow for winter expansion by cramping lightly. In winter, allow for summer shrinkage by cramping tightly ("Summer lights, Winter tights"). In all cases follow the manufacturer's installation instructions.

STICK DOWN OVERLAY FLOORING:

Stick-down overlay flooring is the ideal solution where a timber floor is desired but floor thickness needs to be minimal (as in replacing carpet), and an existing substrate (particle board, concrete slab) is in place. Being glued down they provide a solid feel underfoot and are quieter than conventional T and G boards set on joists. Stick down overlay floors attempt to replicate the look of a conventional T and G strip floor. They are not quite the same however because the shorter board lengths create a busier looking floor with more end-to-end joins.

Available in smaller range of species (typically 8 per supplier)
Available in fewer grades – usually one or two at most per supplier
Firm under foot; underlay will soften feel and deaden sound however
Straight, short boards - lengths up to 2.4 metres maximum, typically
More end-to-end joins means more variation the floor
Solid timber 11 to 13mm thick; ideal for replacing carpet
One width – typically 80mm, to ensure stability
Kiln dried to 9% to 14% moisture content (Zone 3 mean is 12%); plastic wrapped by mill
Need acclimatization in house, on-site, before installation
Available pre-coated and un-coated

PROFILES AND FIXING

All stick down floor boards have an interlocking system, usually a miniature tongue and groove.
Can install boards over particle board, over existing T and G strip floor or over a concrete slab.
Cannot be installed over bare joists because they are not strong enough to carry bridging loads between joists.

Over particle board:

Check existing floor for flatness – use three metre straight edge.
Gaps over three millimetres per three metres must be reduced by sanding high spots.
Spread polyurethane adhesive out using a 4mm "V" notched trowel.
Press individual boards into the adhesive bed and tap home with block
Overlay boards are short and straight, so cramping as such is not usually required

Over existing T and G strip floor:

Check existing floor for flatness – use three metre straight edge.
Gaps over three millimetres per three metres must be reduced by sanding high spots.
Run new boards at right angles to old, or staple 7mm plywood underlay first and then run new boards in parallel with old. Plywood shoud-meet Structural Plywood AS2269 and have type A waterproof bond, or Exterior Plywood AS2271 and have a type B bond.
Installing new boards over old in parallel, without underlay, will increase risk of movement in old boards, which are exposed to the vagaries of the outside atmosphere in the sub-floor space, causing movement in the new boards.
Spread polyurethane adhesive out using a 4mm "V" notched trowel.
Press individual boards into the adhesive bed and tap home with block
Overlay boards are short and straight, so cramping as such is not usually required

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Over concrete slab:

Check slab for flatness - use a three metre aluminium straight edge.
Gaps over three millimeters must be reduced by grinding high spots or filling low spots with a leveling compound.
Check slab for moisture content; must be 5.5% or less. Use moisture meter.
If moisture content exceeds 5.5%, use moisture vapour barrier.
Epoxy barriers are trowelled out and left to set (Bostik Moisture Seal)
Self-adhesive sheet barriers are glued to concrete (Tilling Maxlon).
Spread polyurethane adhesive out using a 4mm "V" notched trowel.
Press individual boards into the adhesive bed and tap home with block
Overlay boards are short and straight, so cramping as such is not usually required

GRADES

Grade choice is more restricted than for T and G strip flooring; manufacturers usually offer one or two grades instead of three.

ACCLIMATIZATION

Acclimatization attempts to ensure that the boards are installed with a moisture content that is appropriate for the relative humidity typical for the specific location and house characteristics. In this way, expansion and contraction during the seasons of the year should not be noticeable. To ensure proper acclimatization, have boards delivered to site when building is lock up and not before. Storm water system must be complete. Take boards inside on the same day and remove plastic. Allow boards to adjust moisture content to surroundings – takes two to four weeks. Before installing, test some boards to make sure that moisture level is reasonable and not excessive. Then install boards, adjusting the degree of cramping force to allow for the time of year. In summer, allow for winter expansion by cramping lightly. In winter, allow for summer shrinkage by cramping tightly ("Summer lights, Winter tights"). In all cases follow the manufacturer's installation instructions.

FLOATING FLOORS

Best choice for houses with:

heated slabs
evaporative air coolers
large floor to ceiling windows exposing the floor to strong localized heating
large changes in atmospheric moisture content during the year

They are also a very good choice when it is a requirement that the floor be installed in a day (schools, offices, shops) to minimize disruption to operations, and where it is anticipated that changes in interior use or décor will occur every few years (restaurants, apartments).

High quality floating floors will not gap in dry conditions, nor will they cup or tent in moist conditions. They are therefore distortion-free and the best type of floor, technically.
Typically, an individual floating floor board consists of three layers: a surface veneer (0.6mm to 4.0 mm thick) of choice timber, a core of low expansion material, and a thin backing sheet. The thicker and harder the surface veneer, the better the floor will resist indentation. The thicker the surface veneer, the safer it is to resand it. However, sanding down to bare timber is not necessary because floating boards do not distort over time, and because it is much simpler to lightly sand the existing coating and apply a refresher coat.
Essentially, floating floors are floors built up into a single sheet in each room. Individual boards are attached to each other by their edges, so that as the boards expand, they push each other across the room from the centre. As they contract, they pull each other back, like a train. This is diametrically opposed to conventional T and G and stick down overlay floors, the boards of which are never attached edge to edge and must be able to shrink away from each other during dry times. Floating floors are not secured to the substrate by glue or nails, but are held down by gravity. An expansion gap of 10mm is left right around the room to allow the floor to expand and contract at will. This gap is hidden by the skirting board. If this gap is blocked by nails, or if the skirting boards are fixed hard down on the floor boards, the floor cannot move freely and crowning and rippling can result..
Good quality floating floor boards are made as a multi-layered laminate. This is not to save money. The core of each board – the controlling influence – is made of a low expansion material. High quality floating floors use plywood, pine with grain run crosswise, or HDF cores. Pine cores, with the grain run crosswise instead of longitudinally, are extremely insensitive to changes in atmospheric humidity because timber expands and contracts along the grain (lengthwise) only about 2% of the amount across the grain, using a quarter sawn board as the comparison.
So, floating floors share two principles – edge to edge joining of boards, and a man-made low expansion core. In summary:

Available in large choice of species
Available in one or two grades
Firm under foot; underlay will soften feel and deaden sound however
Straight, short boards - usually 2.4 metres long in one length
Wide boards – usually 130mm but 180mm available
Range in thickness from 14mm to 16mm
Laminated construction – low expansion core, solid veneer on top
Always attached edge-to-edge so cannot come apart and show gaps
Kiln dried to between 6% and 12% in most cases
Do not usually need acclimatization in house before installation
Pre-coated with 4 to 6 coats of water-based urethane acrylic – very abrasion resistant. Higher standard of finish than on-site coating can provide.

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PROFILES AND FIXING

There are differences between manufacturers in terms of the method of joining the boards edge to edge. For example:
Wunderlay: glues boards onto plywood sheets on site, using latex glue
Big River: joins boards using a plastic extrusion or tongue; no glue
Interloc: joins boards using a "jigsaw" join; no glue
Ekofloor: joins boards using a "jigsay" join; no glue

Floating floors can be laid over particle board floors, plywood floors, existing T and G strip floors, and concrete slabs.
Substrate must be flat – not more than 3mm deviation per three metres
Substrate must be dry (slabs not more than 5.5% moisture content).
Substrates not sufficiently flat will allow board deflection
Substrates not sufficiently dry will cause unnecessary floor expansion and, if really damp, could promote fungal attack.

An underlay is always used: the best are plastic sheets comprising a moisture vapour barrier on the underside and a sound deadener on the top.

COSTS

High quality floating floors generally cost more per square metre than conventional T and G floors and stick down overlay floors. Floating floors require a great deal more machine and labour time in their manufacture (they are essentially man-made), although they may require less labour time to install.
Paradoxically, the cheapest floors per square metre are floating floors as well. Cheap versions do not have low expansion cores (thus deleting a critical engineering characteristic), use poor quality adhesives for the laminations, have thin surface veneers of lower quality timber (some just use simulated timber), and low durability coatings.

GRADES

Grades of veneer on topfaces vary by manufacturer.

ACCLIMATIZATION

Because floating floors cope so well with moisture variation, they do not usually need to be acclimatized. This is an advantage in speeding the completion of the house or extension.

TIMBER SELECTION

The main issues to address in making the selection on timber are:

Species: Colour and grain vary. The main colour groups are Red, Brown, Grey, Pale and Variable.

Sawn style: Quarter sawn boards are cut out of the log as a radius; these boards have very straight grain and are very stable. Back sawn boards are cut out of the log as a tangent; these boards have highly contoured grain, rather like a topographical map. They add interest to a floor but are not as stable as quarter sawn boards. Most flooring is a mixture of both. ITC makes all of its Victorian Ash boards quarter sawn.

Hardness: On the Janka scale, most flooring timbers range in hardness from 2.1 to 14. The higher the number, the harder the timber and the better it will resist indentation. The threshold of acceptability is 4.9; such timbers are adequately hard for all normal domestic usage (see **Hardness and Density Chart**

Grade: The Australian Standard AS2796 sets out the rules for grading flooring into Select, Standard and Natural Feature grades. Boral Timber uses its own grading rules, but they are similar.

Board width: Choose from 60, 80, 85, 89, 108, 130 in conventional T and G. Narrow boards do not show gaps as readily as wide boards. Wide boards (over 80mm) must be face nailed to prevent movement. Good stick-down boards are no wider than 80mm. Floating floor boards can be had in 120, 130 and 180mm widths, depending on maker.

Pedigree: Timber comes from overseas and from local sources. Australian-grown timber with an environmentally sound pedigree is readily available. All states now have Regional Forest Agreements in place. In Victoria, "**ecoSelect**" branded timber products are made only from timber harvested under the Regional Forest Agreement applicable. "Interloc" floating floors and "ITC" Victorian Ash flooring are both "ecoSelect" approved

Board Thicknesses

	Underlay	Board	Total
Conventional Tongue & Groove	Nil	19mm	19mm
Baltic Pine Tongue & Groove	Nil	22mm	22mm
Boral Slimwood	Nil	13mm	13mm