

This technical article provides additional guidance to the fixing of:

- particle boards
- Orientated Strand Boards (OSB)
- plywood boards
- tongue and grooved softwood boards

fixed to domestic engineered or solid timber domestic floor joists.

It is important that all workmanship carried out during construction is completed in accordance with the relevant tolerances.

## Problems arising from poor fixing

Noisy (squeaky) floors – the subject of several conciliation claims, which in turn have a cost due to the investigation visit. Claim under Defects Insurance Period due to noncompliance with the Technical Manual.

## What creates the problems?

- Loose deck – not fixed securely to joists or not fixed together at joints.
- Deck flexing onto fixings.
- Deck flexing due to missing supports.
- Straining of deck due to no edge gap for expansion.

## What to look for on-site:

- Exposed nails below the deck (ends poking through the deck):



- Gaps between joists and deck:



- Lack of edge gap between floor deck and solid walls:



- Unsupported edges (missing noggins).
- Lack of fixings (unless using a BBA certificated system).

## Fixing requirements - particle boards - grades P5 or P7 (see note)

Floor joist spacing – (maximum centres)	Particle board thickness – domestic loading
450mm	18mm
600mm	22mm

**Square-edged boards:** Require continuous support along all edges of the board. Best achieved by positioning their longer edges butt jointed along the centreline of the joist and supporting the short edges by a suitable noggin.

Square edged boards require a 3mm gap and should be provided between each board. Joints should remain free of plaster or other building debris.

**Tongue and grooved boards:** Are usually laid with their longer edges perpendicular to the span of the joists. Joints between the shorter edges are to be supported with a noggin along its centreline.

Tongue and grooved joints between boards should be glued using a PVA adhesive. Adhesive to be applied to the supporting timber to further reduce creaking.

Square-edged and tongue and groove boards require that joints along the short edges should be staggered. Board lengths are not to be less than two joist spacing. Perimeter edges are to be fully supported with a joist or noggin.

**Expansion:** Where the board abuts a vertical surface, i.e. perimeter wall or column, an allowance of 2mm for every metre of room span must be provided with a minimum gap width of 10mm.

**Fixings:** All boards are to be fastened to the supporting timber with flat headed annular-ringed shank nails. Nails to be corrosion resistant – galvanised or sherardized steel.

Board thickness	Nail diameter (mm)	Nail length (mm)	Spacing supported edge (mm)	Spacing intermediate edge (mm)	Edge distance (mm)
18	3	50	150	300	8
22	4	65	150	300	8

All nail heads to be punched 2-3mm below the surface of the particle board.

**Note:** Classification used P5 and P7 relates to the 'moisture resistance' of the adhesive used in the manufacturing process. It does not mean that the board is waterproof. Exposure to the elements must be minimal and for a limited time.

## Fixing requirements – Orientated Strand Board (OSB)

Floor joist spacing – (maximum centres)	Particle board thickness – domestic loading
450mm	15mm
600mm	18mm

**OSB flooring:** For domestic flooring requirements only OSB/3 or OSB/4 should be used. OSB flooring boards have a predominately stronger and stiffer axis in either length or width and must be laid with the strongest edge spanning the joists. Boards are generally marked with the preferred laying direction.

**Square edged boards:** require that all the edges are continuously supported by either joists or noggins and that a 3mm gap should be provided between each board. Joints should always remain free of plaster or other building debris.

**Tongue and grooved boards:** Are usually laid with their longer edges perpendicular to the span of the joists. Joints between the shorter edges are to be supported with a noggin along its centreline.

Tongue and grooved joints between boards should be glued using a PVA adhesive. Adhesive to be applied to the supporting timber to further reduce creaking.

Square-edged and tongue and groove boards require that joints along the short edges should be staggered. Board lengths are not to be less than two joist spacing. Perimeter edges are to be fully supported with a joist or noggin.

**Expansion:** Where the board abuts a vertical surface, i.e. perimeter wall or column, an allowance of 2mm for every metre of room span must be provided with a minimum gap width of 10mm

## Fixings:

All boards are to be fastened to the supporting timber with flat headed annular-ringed shank nails. Nails to be corrosion resistant – galvanised or sherardized steel.

Board thickness	Nail diameter (mm)	Nail length (mm)	Spacing supported edge (mm)	Spacing intermediate edge (mm)	Edge distance (mm)
15	2.5	50	150	300	8
18	3	50	150	300	8

All nail heads to be punched 2-3mm below the surface of the particle board.

## Fixing requirements – plywood

Plywood type – UK domestic	Recommended nominal thickness (mm)	
	Joist span – 450	Joist span – 600
American construction and industrial plywood: C-D grade exterior - unsanded	15.0	18.0
American construction and industrial plywood: C-C grade exterior - sanded	15.0	18.0
Canadian Douglas fir plywood: select tight face, select and sheathing grades - un-sanded	15.5	15.5
Canadian softwood plywood: select tight face, select and sheathing grades - un-sanded	15.5	18.5
Finnish birch faced plywood: 1/1, 1/11 - sanded	15.0	18.0
Finnish conifer plywood: 1/1, 1/11 - sanded	15.0	18.0
Swedish softwood plywood: P30 grade unsanded	15.0	16.0
Thicknesses shown apply to boards spanning 3 or more joists where the face grain of the boards is perpendicular to the support members		

Plywood should always be laid with the face grain perpendicular to the supports. Edge support should be provided by noggins or the edges tongue and grooved.

**Square edged boards:** Butting of boards is acceptable due to its dimensional stability.

**Tongue and grooved boards:** Tongue and grooved joints between boards should be glued using a PVA adhesive as good practice. Adhesive to be applied to the supporting timber to further reduce creaking.

Attention to be given to tongue and grooved joints as these might be designed with integral allowances for movement and should not be forced tightly together.

Square-edged and tongue and groove boards require that joints along the short edges should be staggered. Board lengths are not to be less than two joist spacing. Perimeter edges are to be fully supported with a joist or noggin.

**Expansion:** Where the board abuts a vertical surface, i.e. perimeter wall or column, an allowance of 2mm for every metre of room span must be provided with a minimum gap width of 10mm.

## Fixings:

All boards are to be fastened to the supporting timber with flat headed annular-ringed shank nails. Nails to be corrosion resistant – galvanised or sherardized steel.

Board thickness	Nail diameter (mm)	Nail length (mm)	Spacing supported edge (mm)	Spacing intermediate edge (mm)	Edge distance (mm)
15	3	50	150	300	8
15.5	3	50	150	300	8
18.0	3	50	150	300	8
18.5	3	50	150	300	8

All nail heads to be punched 2-3mm below the surface of the particle board.

## Fixing requirements – softwood boards

Floor joist spacing – (maximum centres)	Board thickness – domestic loading
505 mm	16 mm
600 mm	19 mm

Boards should be pulled tightly together with care.

All end joints to bear directly on a joist or infill joist to give maximum bearing and should be staggered so that end joints are at least two board widths apart.

## Fixings:

All boards are to be face nailed to every joist or batten. For plank widths up to 175mm the board is to be twice nailed to the support joist. For larger boards 3 nails are to be used

Board thickness	Nail diameter (mm)	Nail length (mm)	Edge distance end joint (mm)	Edge distance (mm)
16	3	50	10	15-20
19	4	65	10	15-20

All nail heads to be punched 2-3mm below the surface of the particle board.

## Summary

Decking boards must be suitably supported and fixed at centres appropriate to the board material and thickness. Tongue and grooved boards to be glued together at all joints.

Allowance must be made for expansion between the floor deck and vertical walls or columns. Butted square edge boards must have a 3mm gap between which must be maintained clean

## References

BS 8103-33 *Structural Design of low-rise buildings – Code of practice for timber floors and roofs for housing* requires mechanical fixings and glued joints between tongue and grooved boards.

BS EN 312 Particleboards-Specifications-Part 5: Requirements for load-bearing boards for use in humid conditions.

BS EN 312 Particleboards-Specifications-Part 7: Requirements for heavy duty load-bearing boards for use in humid conditions

BS EN 12369-1:2001 Wood-based panels - Characteristic values for structural design

*Every care was taken to ensure the information in this article was correct at the time of publication. Guidance provided does not replace the reader's professional judgement and any construction project should comply with the relevant Building Regulations or applicable technical standards. For the most up to date Premier Guarantee technical guidance please refer to your Risk Management Surveyor and the latest version of the [Premier Guarantee Technical Manual](#).*