

GOOD PRACTICE GUIDE FOR THE INSTALLATION OF TIMBER DECKS FOR FLAT ROOFS

Applicable sections of the Technical Manual

- Roofs – Flat roofs
- Roofs – Green Roofs
- Roofs – Metal Deck Roofing
- Roofs – Blue Roofs
- Roof Terraces and Balconies – Roof Terraces

Introduction

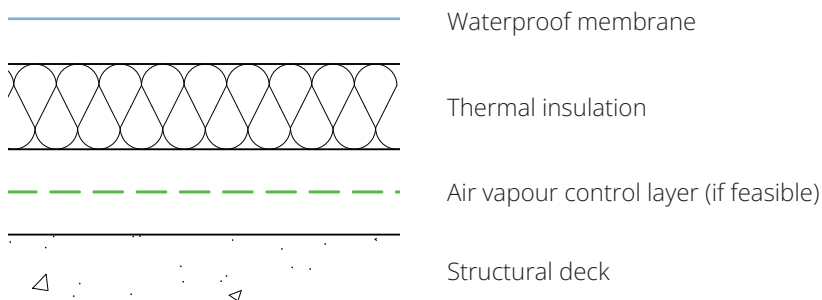
The structural deck for a flat roof provides the primary support for the waterproofing system whilst also resisting any loads imposed on it. Where structural decks are installed incorrectly or poorly, it can cause serious problems with falls, ponding of flat roofs and various failures with the waterproofing system.

This article aims to provide some useful tips on the best practices for installing a timber deck and how to avoid common issues.

Flat roof build-ups – where should the structural deck be positioned?

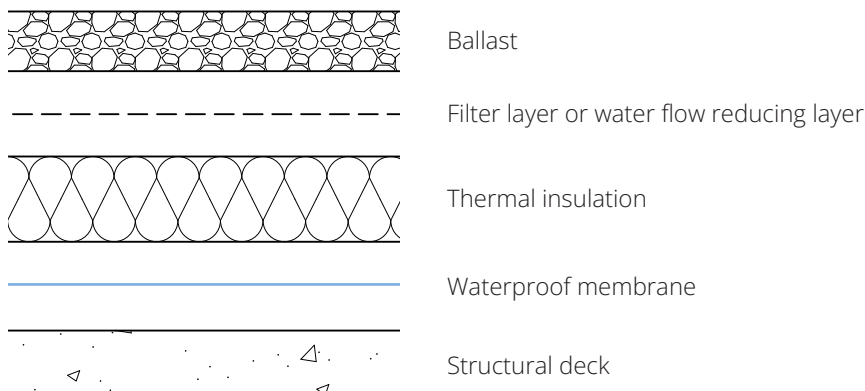
Warm deck roof

For a warm deck roof, the principal thermal insulation is placed immediately below the roof covering, resulting in the structural deck and support being at a temperature close to that of the interior of the building.



Inverted warm deck roof

A variant of the warm deck roof in which the principal thermal insulation is placed above the waterproof membrane, resulting in the waterproof membrane, structural deck and structural support being at a temperature close to that of the interior of the building. Generally, the principal insulation is secured by separate ballast (paving, gravel, or blue/green roof - minimum 80 kg/m²).

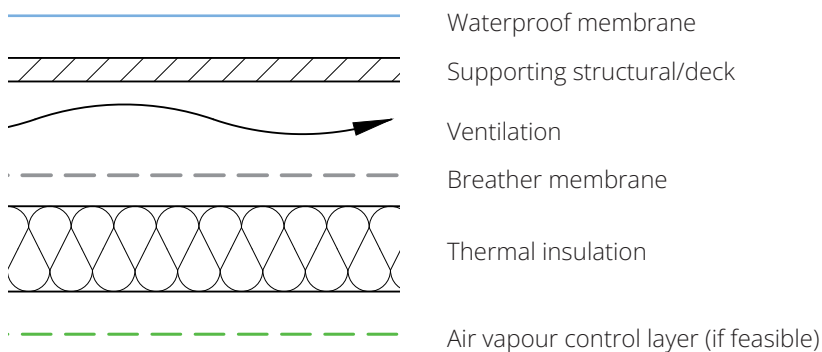


GOOD PRACTICE GUIDE FOR THE INSTALLATION OF TIMBER DECKS FOR FLAT ROOFS

Cold deck roof

For Warranty purposes, cold deck roofs are not recommended and an alternative form of flat roof should be adopted. Where cold deck roofs are adopted, they must be limited to 3m².

The principal thermal insulation is placed at or immediately above the ceiling i.e. below the structural deck, resulting in the waterproof membrane and structural deck being substantially colder in winter than the interior of the building.



Timber deck materials and minimum thicknesses

Timber decks must be as one of following materials as listed in the below table:

Materials used for deck to flexible membrane roof coverings	Minimum thickness (mm)	
	450mm joist centres	600mm joist centres
Plywood board to BS EN 636, Use Class 3	15	18
Oriented strand board, to BS EN 300 type OSB3	15	18
Pre-treated tongue and grooved softwood boarding. Moisture content between 16-20% at time of fixing	19	19

Notes

- The thickness of the board may need to be increased to resist pull out forces on fixings.
- The timber deck must be protected against wetting until the final roof covering has been laid.
- There should be provision for the flat roof area to be easily covered over in the event of unexpected rainfall.
- Any damaged or saturated timber decks must be replaced. There should be provision for the flat roof deck to be protected against damage from follow on trades.
- Cut edges should be treated to prevent moisture ingress.
- For full supported single skin metal roof coverings, the timber deck must be a minimum of 18mm. Please refer to the 'Roofs – Metal Deck Roofing' section for further guidance.
- Wood particle board (or chipboard) is not suitable for use as a structural timber deck for a flat roof due to its long term structural instability, especially where it's contaminated by moisture.
- We do not accept the use of cross-laminated timber (CLT) or structurally insulated panels (SIP's) to be used as timber structural deck for a flat roof.
- Materials are often substituted during a construction project. Substitute materials can be an issue as they're often of an inferior quality, performance and/or durability. Where materials are substituted, it is important they still meet our Warranty requirements.
- Where a design alteration results in additional loads being applied to the flat roof (PV panels being specified for example), this must be communicated back to the Structural Engineer to account for this in the design of the flat roof. This should be communicated to all interested parties, including your appointed Warranty Surveyor.

GOOD PRACTICE GUIDE FOR THE INSTALLATION OF TIMBER DECKS FOR FLAT ROOFS

Fixings requirements

Fixing nails should be at centres not exceeding 150 mm along any end or edge, and not exceeding 300 mm along any intermediate support.

Fastenings should be at least 8 mm from the edge of the board. Nail heads should be punched 2 mm to 3 mm below the surface of the board and screws should be pre-drilled and countersunk. In service class 2 fixings should be corrosion resistant. Corrosion resistant materials include galvanized or sherardized steel, austenitic stainless steel, phosphor bronze and silicon bronze.

Plywood

Fixing Plywood should be laid with the face grain perpendicular to the supports.

All end joints should occur over joists of at least 38 mm basic thickness or be supported by noggings. Fixing nails should be either:

- Plain wire nails at least 3.35 mm in diameter and at least 65 mm long, which penetrate at least 40 mm into the support; or,
- Annular-ringed shank nails at least 3.35 mm in diameter and at least 50 mm long, which penetrate at least 32 mm into the support.

OSB

All boards should be fastened firmly to the supporting timber. Flat headed annular-ringed shank nails and screws have superior holding power and should be used in preference to plain shank nails.

All fixings should be a minimum of 50 mm or 2 times the thickness of the board, whichever is greater; and the diameter of the fixing should be a minimum of 0.16 times the thickness of the board.

Pre-treated tongue and grooved softwood boarding

For boards of no more than 175 mm basic width, two nails should be used at each intersection. For wider boards, a minimum of three nails should be used at each intersection.

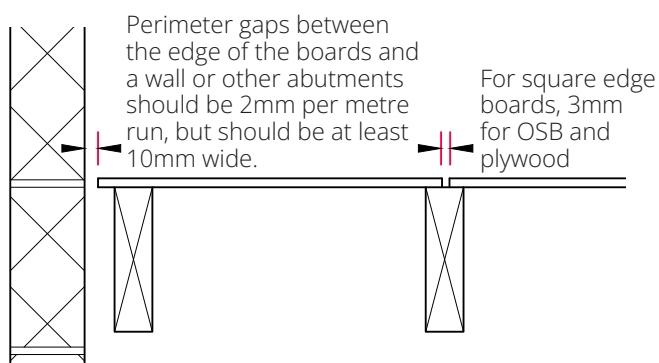
Laying of OSB and plywood decks

The following should be observed when installing timber decks for a flat roof:

- Boards should be laid in a staggered pattern.
- Plywood should be laid with the face grain perpendicular to the supports.
- OSB should be installed at the direction indicated on the boards with the strongest direction perpendicular to the joists.
- OSB and Plywood tongue and grooved boards should be installed with the longest edge at right angles to the joists and short edges supported on a joist or noggings.
- Boards should be supported by noggings at the perimeter where they run at right angles to roof joists.
- All square edged boards must be continuously supported on all edges.
- The minimum decking board bearing onto a supporting timber is 18mm at board joints, with a full bearing for the width of the supporting timber achieved at perimeter or abutment detailing.

Expansion gaps

Perimeter gaps between the edge of the boards and a wall or other abutments should be 2mm per metre run, but should be at least 10 mm wide. A maximum movement gap of 3mm should be provided for square edge boards. Larger roofs may also need intermediate expansion gaps.



GOOD PRACTICE GUIDE FOR THE INSTALLATION OF TIMBER DECKS FOR FLAT ROOFS



The importance of an AVCL

A common issue we often come across with flat roofs is interstitial condensation. This is where condensation occurs within elements of the building fabric. The most effective way to prevent interstitial condensation is to use an air and vapour control layer (AVCL).

An AVCL is a membrane used within a flat roof build up and it is designed to protect building elements from degradation by restricting the movement of water vapour from inside a building to within the building structure (or in the case of a flat roof, the cold side of the insulation).

In a warm deck flat roof, the AVCL should be installed above the timber deck and before the insulation is laid. The AVCL should be selected with regard to the following minimum criteria:

- Ease with which it can be sealed at laps and at abutments to other elements.
- The method of attachment.
- Condensation risk, expressed as calculated vapour pressure based on notional conditions pertaining to the project building.
- Compatibility with the waterproof membrane and thermal insulation.

For further guidance on AVCL's in flat roofs, please see the 'Roofs – Flat Roofs' section of our Technical Manual.

Deck Survey

A common issue we often come across with flat roofs is interstitial condensation. This is where condensation occurs within elements of the building fabric. The most effective way to prevent interstitial condensation is to use an air and vapour control layer (AVCL).

An AVCL is a membrane used within a flat roof build up and it is designed to protect building elements from degradation by restricting the movement of water vapour from inside a building to within the building structure (or in the case of a flat roof, the cold side of the insulation).

In a warm deck flat roof, the AVCL should be installed above the timber deck and before the insulation is laid. The AVCL should be selected with regard to the following minimum criteria:

- Ease with which it can be sealed at laps and at abutments to other elements.
- The method of attachment.
- Condensation risk, expressed as calculated vapour pressure based on notional conditions pertaining to the project building.
- Compatibility with the waterproof membrane and thermal insulation.

For further guidance on AVCL's in flat roofs, please see the 'Roofs – Flat Roofs' section of our Technical Manual.

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 technical guidance please refer to your Risk Management Surveyor and the latest version of the Technical Manual.