VERTICAL TILING

Design and construction guide

Vertical tiling is a type of exterior or interior wall covering where roof tiles or boards are installed vertically as walling. This is often chosen due to its aesthetic appeal and ability to shed water effectively. This factsheet outlines the basic design principles and key considerations for vertically installing roof tiles on various walling systems.

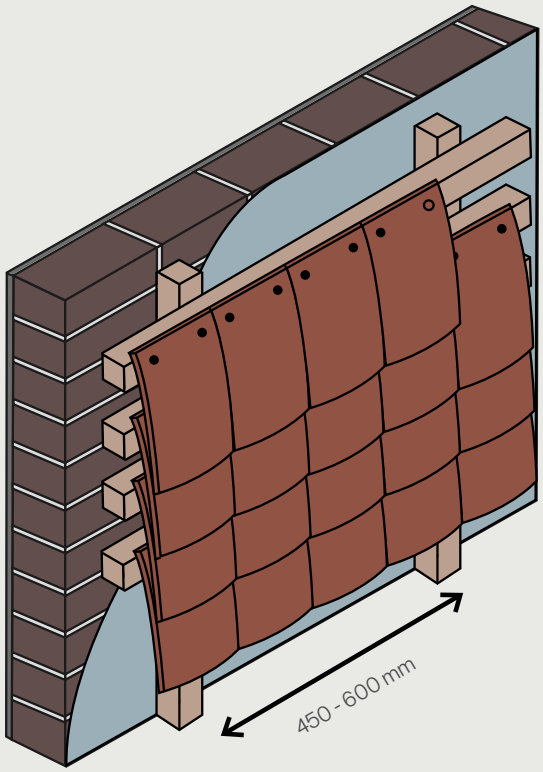


Figure 1: Typical Vertical Tiling Assembly

STRUCTURAL SPECIFICATIONS

The structural design specifications are based on assessment of the ultimate loading cases in the weatherproofing test regimes and engineering calculations in accordance with:

- the National Construction Code (NCC),
- AS 2049 *Roof tiles*,
- AS 2050 *Installation of roof tiles*,
- AS 1720.1 *Timber structures, Part 1: Design methods*,
- National Association of Steel Framed Housing (NASH) Standards, and
- AS 4055 *Wind loads for housing*.

The design specifications are based on the capacity of:

- the roof tile to resist wind actions and point live loads based on the breaking load determined in accordance with AS 4046.3.
- the connection of tile to batten using #10 screws with minimum 30 mm embedment in the timber batten.
- the connection of batten to counter batten and counter batten to stud with:
  - 1x #14 (10 x 75 mm) bugle head type 17 screw per joint for timber; or
  - 2x #12 (14 x 25 mm) hex head tek screws for cold-formed steel.

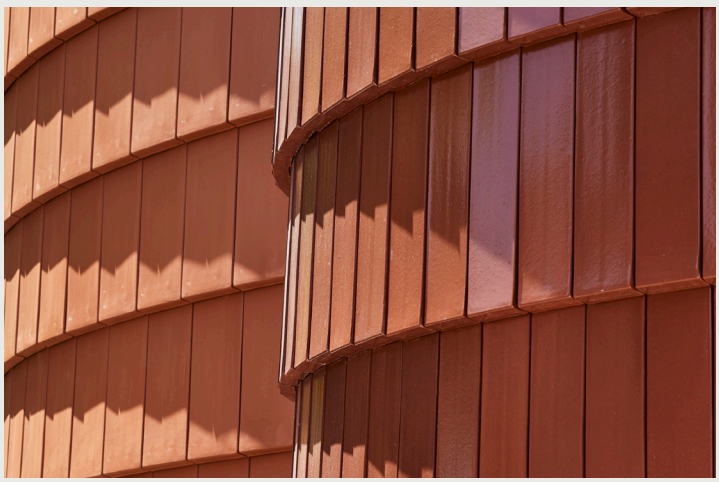
For information regarding the design for the structural frame please consult with ARTA for the full vertical tiling report.

GENERAL REQUIREMENTS

Tiles that comply with AS 2049 are considered acceptable for use in this wall cladding application provided the following minimum properties are achieved:

- Tile Mass - Maximum 44 kg/m^2
- Characteristic Breaking Load - Minimum 5.9 Newtons per millimetre of exposed width
- Batten Spacing - 330 mm or 400 mm

Demonstrated water penetration resistance in roof applications with sarking to the specified wind class (as per AS 4055) or design wind pressure (as per AS/NZS 1170.2).



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BATTEN SPECIFICATIONS

The following are the minimum batten structural and connection specifications. This assumes timber battens used with timber framing and cold-formed steel battens will be used with cold-formed steel framing are used within the design. For other designs refer to a project engineer.

Vertical (Counter) Batten:

- 25 mm x 38 mm F8 unseasoned hardwood batten; or,
- Rondo 25 mm deep 0.75 mm BMT G2 top hat, oriented with the top of the profile to the stud and the feet outwards.

Counter battens spaced at 450–600 mm centres may be fixed to specific masonry walling systems using correct fasteners.

Horizontal Batten, at 330 mm or 400 mm centres:

- 38 x 38 mm F8 unseasoned hardwood batten; or,
- Rondo 35 mm deep 0.75 mm BMT G2 top hat.

Wall Stud Specification:

- MGP10 timber, max. 600 mm centres. and as per the design tables; or,
- 0.75 mm BMT G550 cold-formed steel, max. 600 mm centres. and as per the design tables. For cold-formed steel framing of different thickness and grade, the tables and specifications in this report apply provided the following relationship is observed:

  $t_2 \cdot f_u \geq 412.5$ N/mm

  Where t_2 is the thickness of the steel (in mm) and f_u is the ultimate stress of the member (in MPa).

For more information on connections of vertical (counter) batten to studs and connections of horizontal batten to vertical counter battens please consult with ARTA for the full vertical tiling report.

WEATHERPROOFING

Although vertical tiling provides excellent protection against wind driven rain, roof tiles are constructed from porous materials and require specific design considerations to prevent water ingress. Please refer to the Product Technical Statement of the tile manufacturers for further specifications and test in accordance with AS 4284: *Testing of Building Facades.*

Recommendations:

- Utilisation of a cavity air space between the wrapped outside face of the structural wall frame and the cladding.
- Minimum 38 mm depth horizontal timber battens or top hat battens to provide cavity between the wrapped structural frame.
- Internal lining such as plasterboard that has an effective air seal at the periphery, and to window frames, door frames and other penetrations.
- Flashing shall be lapped at joints by a minimum of 150 mm and extend 150 mm over the vertical tile where flashing is required
- An underlay installed between the battens/counter battens and walling system to prevent condensation issues.
- Flashing installed above lintels and below sills where openings are required.

DURABILITY

The minimum required design life for wall claddings to detached residential buildings is 15 years. The structural frame supporting the cladding is required to have a design life of 50 years. The roof tiles used in the wall application will have similar design life as for roofing applications. When the tiles specified for the application are of 'exposure' category in accordance with AS 4046.7, a 50 year design life in all exposure categories is achieved.

The timber battens, which are the same specification as for roofing applications, will likewise have a design life of the order of 50 years. For further information on Cold-formed steel top hats please consult with ARTA for the full vertical tiling report.

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SPAN AND FIXING TABLES

The following tables show the span and fixing specifications by wind class (N1 to N5 and C1 to C3) and by ultimate wind pressure determined in accordance with AS/NZS 1170.2, for timber battens.

Table 1. Wind Class Span and Fixing Table – Timber Battens at 330 mm Spacing

Wind Class	Maximum Stud Spacing (mm)		Maximum Spacing of Fixings to Stud for 28 mm Vertical Batten (mm)	
	General Areas	Corner Zones	General Areas	Corner Zones
N1	600	600	600	600
N2	600	600	600	600
N3	600	600	600	600
N4	600	450	600	450
N5	450	300	450	300
C1	600	450	600	450
C2	450	450	450	450
C3	450	300	450	300

Table 2. Wind Class Span and Fixing Table – Steel Top Hats with Steel Studs at 330 mm Spacing

Wind Class	Maximum Stud Spacing (mm)		Maximum Spacing of Fixings to Stud for 25 mm Vertical Top Hat (mm)	
	General Areas	Corner Zones	General Areas	Corner Zones
N1	600	600	600	600
N2	600	600	600	600
N3	600	450	600	600
N4	600	300	600	600
N5	300	200	600	450
C1	600	300	600	600
C2	450	300	600	450
C3	300	200	450	300

The tables above apply to tiles with battens at maximum 330 mm horizontal spacing fixed with at least 2 screws per tile per horizontal batten (for a maximum 280 mm tile). For information regarding battens at maximum 400 mm centres, please consult with ARTA for the full vertical tiling report.

DETAILS

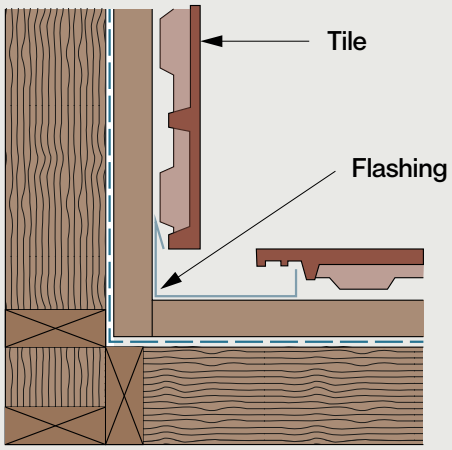

Figure 2: Internal Corner Detail

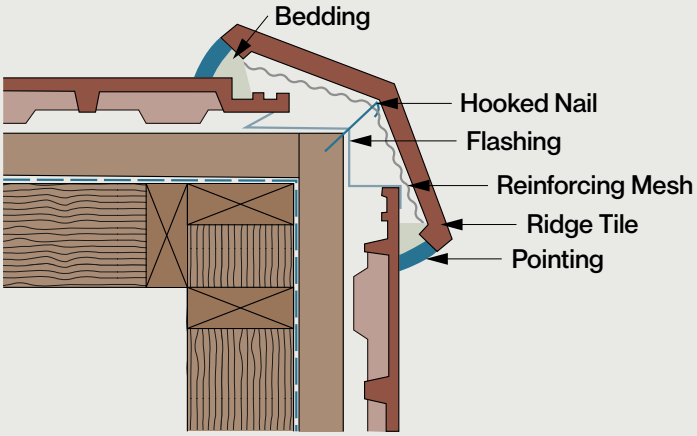

Figure 3: External Corner Detail

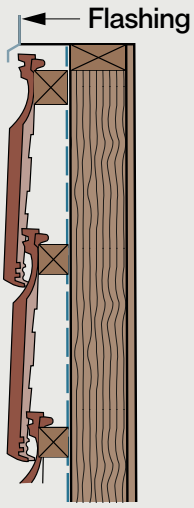

Figure 4: Vertical Tiling Sill Detail

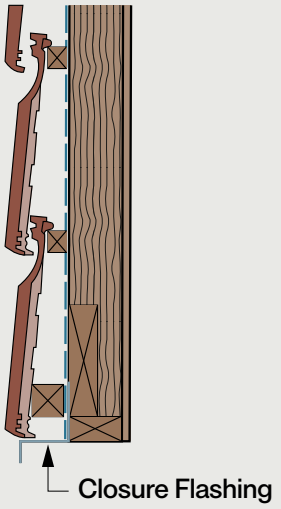

Figure 5: Vertical Tiling Above a Lintel Detail