ADVANTAGES OF HIGH PITCH ROOFS

FACT SHEET

BACKGROUND

This factsheet outlines the key design principles and associated advantages of high pitch roof construction greater than or equal to 22°. High pitch roofs shall be built in conjunction with National Construction Code (NCC) requirements.

ADVANTAGES

High pitch roofs have distinct advantages over low pitch roofs (pitch < 15°) and those with slopes of 15° to less than 22°. These advantages are due to the inherent slope of the roof and the way it interacts with its external and internal environment.

1 Cost-effective additional space

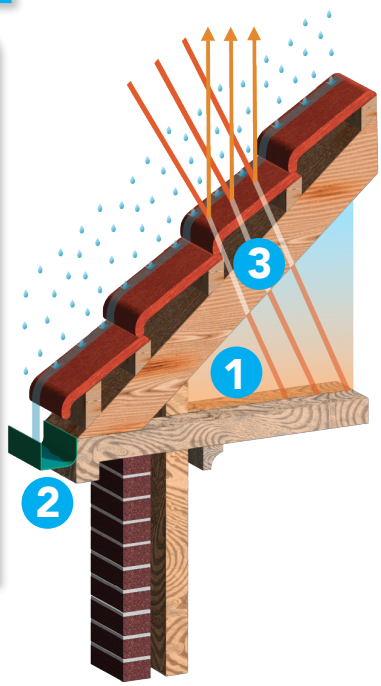
A high-pitched roof creates additional space within a building which can be easily converted and used as an attic or living space.

2 Water collection and flow

The slope of a high pitch roofs is able to control the flow of water more efficiently and drain water away more effectively. Studies have shown that a high pitch clay tile roof produces the best runoff water quality with the least level of contamination.

3 Energy efficiency

With a high-pitched roof, the amount of heat energy that enters the roof cavity and dwelling is greatly reduced.

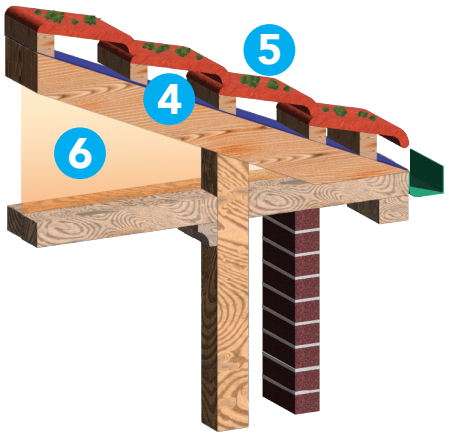


4 Sarking requirements

For roofs with pitches of less than 20°, sarking and an anti-ponding device/board is required.
However, with high pitch roofs, sarking is not required when a maximum rafter length of 6000 mm is used. This will reduce the overall cost of the roof installation process as sarking can cost an extra 2-3 thousand dollars for an average tiled home.

5 Less debris

Over time, or after a rainfall event, branches, leaves and dirt tend to accumulate onto a low pitch roof.



6 Roof ventilation

Naturally, high pitched roofs have a greater gap between the roof tiles and the flat interior ceiling. This space encourages ventilation within the rooftop which keeps the roof trusses and materials dry, preventing rot and mold. As the roof pitch increases from 15° to 35°, it has been found that the flow rate of the ventilating air increases by 53%.

ENERGY COST SAVINGS

Having an energy efficient roof is one of the best ways to save on energy costs and regulate internal temperatures. The Solar Reflective Index (SRI) of a material is used to characterise a materials solar reflectance and emissivity. It essentially measures how hot a material will become when exposed to solar radiation. A low SRI is undesirable as this means that the material does not efficiently reflect solar radiation and instead begins to heat up. The SRI is directly correlated to the pitch of the roof, where an increased pitch results in a higher SRI. This is because the pitch of the roof will affect the angle at which the light will strike it, and hence how it is reflected.

The Green Building Council of Australia (GBCA) states that to obtain credit towards a 'Green Star – Design & As Built';

- **Roofs pitched < 15° require a three-year SRI of minimum 64**
- **Roofs pitched > 15° require a three-year SRI of minimum 34**

For roofing materials in a high pitched roof, a lower SRI value is required to meet the minimum standards as the pitch of the roof itself contributes positively towards its Green Star rating. Additionally, the energy efficiency of the roofing system becomes enhanced by using a high pitch roof in conjunction with roof tiling material. Due to their strong thermal properties, roof tiles are extremely effective temperature regulators. Their relatively high thermal mass has a dampening effect as the heat transverses through the material. This reduces the reliance on internal heating and cooling devices throughout the year.

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THE DESIGN OF HIGH PITCH ROOFS

The design of pitched roofs should:

- Have dead and imposed loads calculated in accordance with AS 1170.1, AS 1170.2 (of AS 4055 for housing) and AS 1170.3.
- Be in accordance with AS 1684.2, AS 1684.3 or AS 1720.1, as appropriate.

  Be appropriate for the location, accounting for exposure and potential wind uplift.
- Ensure that the structure is coherent and that all forces are resolved.
- Ensure stability with the complete structure, including the connections and compatibility with the supporting structure and adjacent elements.

Roofs should be designed by an engineer in accordance with Section A2.2 Performance Solution of NCC 2019 or Section A2G2 of NCC 2022 where:

- The roof is not a basic pitched roof.
- The roof pitch is greater than 35° (for pitches over 35°, consult with the manufacturer).
- A proprietary system is specified (designs supplied by manufacturers will generally be acceptable).

TILES & ANCILLARIES

With high pitch roofs, one of the primary considerations to be made concern the way in which the roof tiles are to be fixed to the roofing system. For pitched roofs ≤ 35°, all roof, hip, ridge, barge and capping tiles must be fixed in accordance with AS 2050 and AS 4046.8:

TABLE 1: MINIMUM MECHANICAL INSTALLATION

Wind Classification	Tile installation		Ridge, hip and barge tiles
	Edge of roof	Field of roof	
N1 and N2	Mechanically fasten each full tile in second course and then every second tile in every course or every tile in each alternative course		Mechanically fasten each tile
N1 and N2	Mechanically fasten every full tile in second course	Mechanically fasten every second full tile in every course	Mechanically fasten each tile
N4 to N6	Mechanically fasten every full tile		Mechanically fasten each tile
C1	Mechanically fasten every full tile	Mechanically fasten every second full tile in every course	Mechanically fasten each tile
C1 to C4	Mechanically fasten each tile		Mechanically fasten each tile

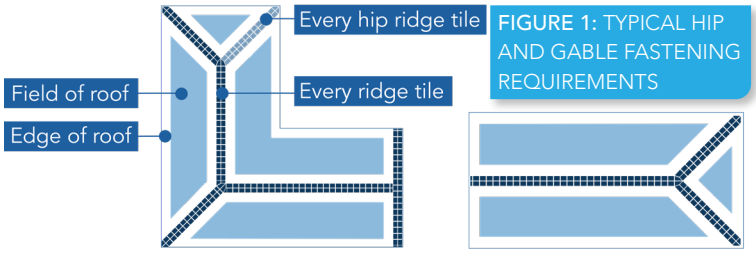

FIGURE 1: TYPICAL HIP AND GABLE FASTENING REQUIREMENTS

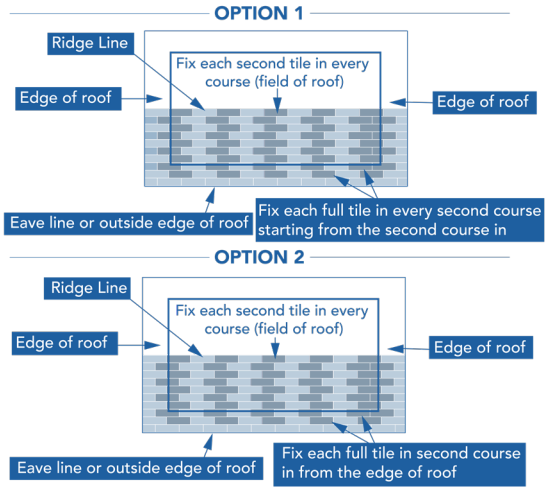

FIGURE 2: MINIMUM TILE FIXING REQUIREMENTS N1/N2

However, for pitches > 35°,

- It is recommended that every tile be mechanically fixed. Ridge cap tiles to hip tiles should be mechanically fastened.
- Where the roof pitch exceeds 40°, reinforcement is to be considered for use in the bedding cement (i.e. reinforce the bedding the gable tiles with wire mesh).
- Where the roof pitch exceeds 40°, each tile should be doubly fastened.
- The following table may be used as a guide to specify fastening requirements for roof tiles of differing pitches:

TABLE 2: MINIMUM INSTALLATION REQUIREMENTS FOR ROOFS OF VARYING PITCHES

	25°-29.9°	30°-34.9°	35°-39.9°	40°-44.9°	45°-59.9°	60°-89.9°
Mechanically fix every tile	NO	NO	YES	YES	YES	YES
Doubly fix every tile	NO	NO	NO	NO	YES	YES
Fasten every Ridge Cap	NO	NO	YES	YES	YES	YES
Wire in Bedding	NO	NO	YES	YES	YES	YES
Valley seal required	NO	NO	YES	YES	YES	YES
Valley to be Clip Wired or Screwed	NO	YES	YES	YES	YES	YES
Hip Starter fastened	N/A	N/A	YES	YES	YES	YES
Hip Cuts to be fastened	NO	NO	YES	YES	YES	YES
Battens to be doubly nailed	NO	NO	NO	NO	YES	YES

SARKING

Roof sarking is a pliable foil sheet that is layered under your roof tiles prior to their installation. Sarking requirements vary in relation to pitch/rafter length as outlined below:

TABLE 3: SARKING INSTALLATION REQUIREMENTS FOR ROOFS OF VARYING PITCHES

Roof - degrees of pitch	Maximum rafter length without sarking (mm)
≥ 15 <20	4500
≥ 20 <22	5500
≥ 22°	6000

	25°-29.9°	30°-34.9°	35°-39.9°	40°-44.9°	45°-59.9°	60°-89.9°
Sarking required	NO	NO	YES	YES	YES	YES
Fasten every tile when sarked	NO	NO	YES	YES	YES	YES
Fasten storm clip when sarked	NO	NO	YES	YES	YES	YES