

BRANZ FACTS ROOF DESIGN #1

# Compliance

The New Zealand Building Code sets the minimum performance parameters for the design and construction of roofs. This fact sheet outlines these requirements and the paths to compliance.

**THE FIRST STEP** in roof design is determining the New Zealand Building Code clauses that are applicable to both design and construction. The Building Code in effect sets minimum levels of required performance.

A number of New Zealand and joint Australian/New Zealand standards cover roof construction, roofing materials and components.

If a designer follows a Building Code Acceptable Solution for a roof cladding covered by the Acceptable Solution, they are deemed to have met the requirements of clause E2 *External moisture*.

## **New Zealand Building Code**

Applicable Building Code clauses and their key performance parameters for roof design (structure and material selection) are given in:

- B1 Structure so the roof system (roofing and supporting structure) will accommodate the loads from wind, snow, roof-mounted equipment and dead loads
- B2 Durability so that a minimum period of durability will be achieved
- C Protection from fire rules apply to roofs that are adjacent to a building on the next door site
- El *Surface water* so that the completed roof will effectively dispose of the design rainfall
- E2 External moisture so that water is kept on the outside of the building
- E3 Internal moisture to ensure the risk of condensation within roof spaces is minimised
- G12 Water supplies for the collection of drinking water
- H1 Energy efficiency to meet prescribed minimum levels of thermal insulation.



Consideration may also need to be given to clauses:

- C Protection from fire where roofs cross tenancies, incorporate foamed plastic insulation or are adjacent to a taller building
- F2 Hazardous building materials when roof glazing is incorporated
- F4 Safety from falling to ensure that accessible roofs can be safely used.

Specific design guidance when using an Acceptable Solution as a means of compliance or to support an alternative method for roof cladding is given in the following:

- B1/AS1, which cites NZS 3604:2011 for timber-framed roofs.
- B2/AS1, which specifies a durability of not less than 15 years for roof cladding but not less than 50 years for the supporting structure.
- E1/AS1, which gives rainfall intensities across New Zealand plus prescriptive sizing and material options for gutters and downpipes.
- E2/AS1, which prescribes minimum required falls for a range of generic roofing types as well as minimum gutter sizes and slopes.
- E3/AS1, which specifies a minimum level

of roof insulation to lower the risk of fungal growth in the spaces below. To achieve this, an R-value not less than R1.5 is required (although, to meet H1 requirements, a higher R-value of roof insulation is likely to be required). Thermal breaks are required for steel framing.

• H1/VM1 and H1/AS1, which prescribe minimum insulation levels depending on location for residential buildings.

## Key roofing aspects of E2/AS1

Acceptable Solution E2/AS1 is likely to be the most common reference document. The key aspects relating to roof cladding are the sections applicable to masonry tiles (8.2), pressed metal tiles (8.3), profiled metal roof cladding (8.4) and butyl or EPDM membrane roofing (8.5).

Each roof cladding section specifies:

- a minimum acceptable roof slope for the given profile (see Table 1)
- roofing material manufacturing and other standards
- flashing and junction details including minimum flashing covers and upstands
- roof penetration details (note that roof penetrations equal to or below 10° require specific design).

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Table 1 Minimum roof slopes from E2/AS1			
Material	Profile	Minimum slope with underlay	Minimum slope without underlay
Concrete tile (maximum rafter length 4.5 m)	Type I	150 (1)(2)	200 (1)(2)
	Type II	200 (1)(2)	Not permitted
	Type III	250 (1)(2)	Not permitted
Clay tile (maximum rafter length 4.5 m)	Туре I	200 (1)(2)	Not permitted
	Type II	200 (1)(2)	Not permitted
	Type III	250 (1)(2)	Not permitted
Metal tile	Standard profiles	12º	Not permitted
	Shingle or shake profiles	15°	Not permitted
Long-run metal (maximum length 18 m with no end laps) <sup>(3)</sup>	Corrugate	8º	Not permitted
	Trapezoid symmetrical	4º (3º where crest height 27 mm or higher)	Not permitted
	Trapezoid asymmetrical	4º (3º where crest height 27 mm or higher)	Not permitted
	Trough	30	Not permitted
Membrane	Butyl or EPDM	Not applicable	2 <sup>0</sup>

Note 1. Increase pitch by 1º per additional 0.5 metres of rafter length over 4.5 m.

Note 2. Roof underlay is required for any roof receiving discharge from a spreader or for roofs in very high or extra high wind zones. Note 3. For lengths greater than 18 m, refer to the manufacturer's requirements.

It is worth keeping in mind that stated performance requirements in the Building Code and Acceptable Solutions such as E2/AS1 are just the minimum. Designers can always specify higher-performing materials and finishes (Code plus) that give, for example:

- longer durability or serviceability
- less maintenance
- better thermal performance
- lower whole-of-life costs (even though initial cost may be higher)
- recyclability
- lower emissions or environmental impact in their manufacture.

## Alternative roofing options

Where a roofing material is not covered by an Acceptable Solution, the application for building consent must be submitted as an alternative method. If accepted as Code-compliant by the building consent authority (BCA), it becomes an Alternative Solution. The onus is on the designer to demonstrate compliance with the relevant performance requirements of the applicable Building Code clause(s).

Means of supporting the building consent application include:

- CodeMark approval a voluntary product certification scheme that shows a building product or component meets one or more specific Building Code requirements
- relevant reputable supporting evidence of material durability and performance

- reference to similar details in an Acceptable Solution (provided the building is within the scope of the Acceptable Solution for wind zone and height)
- an expert opinion verifying the performance of the roofing system, such as a BRANZ Appraisal
- a verifiable history of compliant inservice use
- independent test data from a reputable testing authority.

To demonstrate Building Code compliance, a designer can use a single compliance path or a combination of two or more paths. Alternatively, one compliance path may provide part of an alternative method while another compliance path provides the balance of the solution. (For more information on compliance paths, see www. renovate.org.nz/regulation-compliance/ compliance-paths/.)

Whichever compliance path is chosen for each aspect of building performance, the designer needs to provide the BCA with evidence showing how compliance is to be achieved. The steps are as follows:

- Identify the aspects of the proposed design that fall outside the scope of Acceptable Solutions.
- 2. Identify the Building Code clauses for which performance must be demonstrated by the design and supporting documentation.

- 3. Identify the performance criteria that apply.
- 4. Select the most relevant compliance path(s).
- 5. Determine what type of information is required to demonstrate compliance.
- 6. Provide the evidence.

Other documentation relevant to the design and construction of roofs includes:

- manufacturers' product-specific technical information and installation instructions
- NZ Metal Roof and Wall Cladding Code of Practice from the New Zealand Metal Roofing Manufacturers Association Inc.
- Code of Practice for Torch-on Membrane Systems for Roofs and Decks from the Waterproofing Membrane Association Inc.
- BRANZ Appraisals of roofing systems
- CodeMark certification of roofing products, components or systems
- BRANZ Good Practice Guides Long-run Metal Roofing and Membrane Roofing (2nd edition).

### Other compliance matters

In addition to complying with the Building Code and standards, building practitioners must meet other requirements such as those in the Building Act. For example, at the completion of roofing work, the building contractor must do the following:

- Provide a copy of any current insurance policy they hold for the work completed under the contract.
- Give copies of any guarantees/ warranties for materials or services used in the roof. This should include how to make a claim, whether or not the guarantee/warranty is transferable and whether it must be signed and returned to the company that issued it.
- Explain what maintenance work must be done on the roof, especially if this is required to meet Building Code or guarantee/warranty requirements.

This information must be given to clients regardless of the price of the work.

The designer should also provide the homeowner with a current set of as-built documents and a summary of all the components incorporated into the roof.

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