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Understanding Continuous Insulation and H1 Requirements

H1 and I, A, V, H explanation

NZBC Code Clause H1 – Energy Efficiency

Using energy efficiently.

That means not letting go of energy easily, so use insulation.

More insulation is the easy bit.

Tightly bound up with other demands like E3

Insulation. Airtightness. Ventilation. Heating

Methods

Schedule AS1

S: make sure each element complies

S: wall, roof, floor, windows as separate (energy use?)

Calculation AS1

C: Calculate and compare with reference building

C: trade-off strong area with weak (energy use?)

Model VM1

M: Software model - Find out how it will perform

M: Known energy required, overheating %

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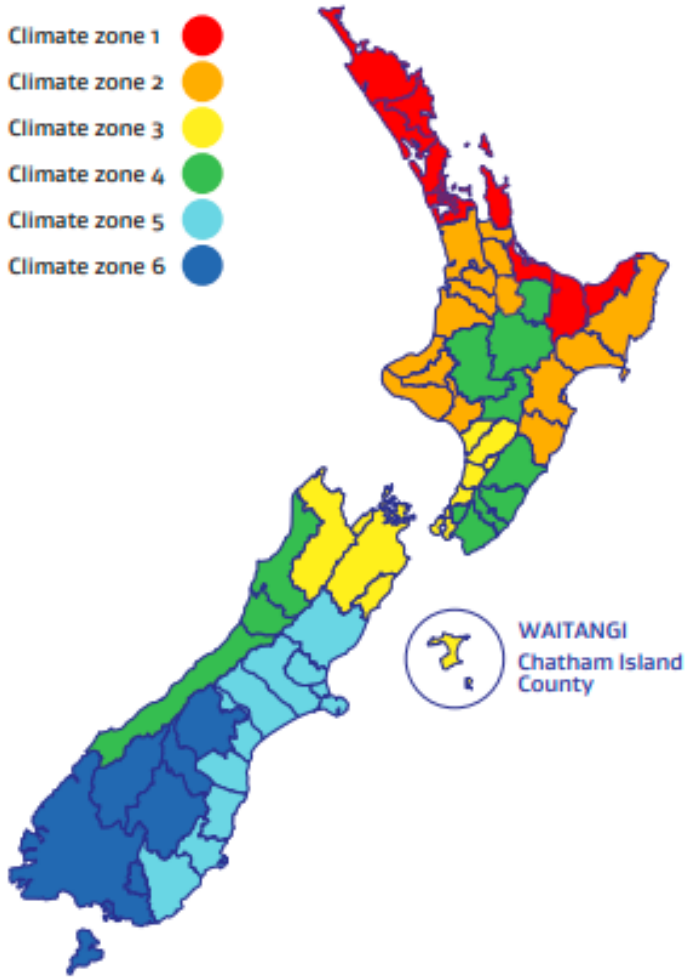
New Zealand Climate Zones



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H1 – Residential and Small Buildings

INCREASE IN MINIMUM ROOF R-VALUES FOR ALL RESIDENTIAL (INCL. APARTMENTS) AND SMALL BUILDINGS (UNDER 300sqm)

CLIMATE ZONE	1	2	3	4	5	6
Was	R2.9		R2.9 / R3.3		R3.3	
Now	R6.6					

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H1 – Large Buildings

INCREASE IN MINIMUM ROOF R-VALUES FOR LARGE BUILDINGS (OVER 300sqm)

CLIMATE ZONE	1	2	3	4	5	6
Was	R1.9					
Now	R3.5	R4	R5	R5.4	R6	R7

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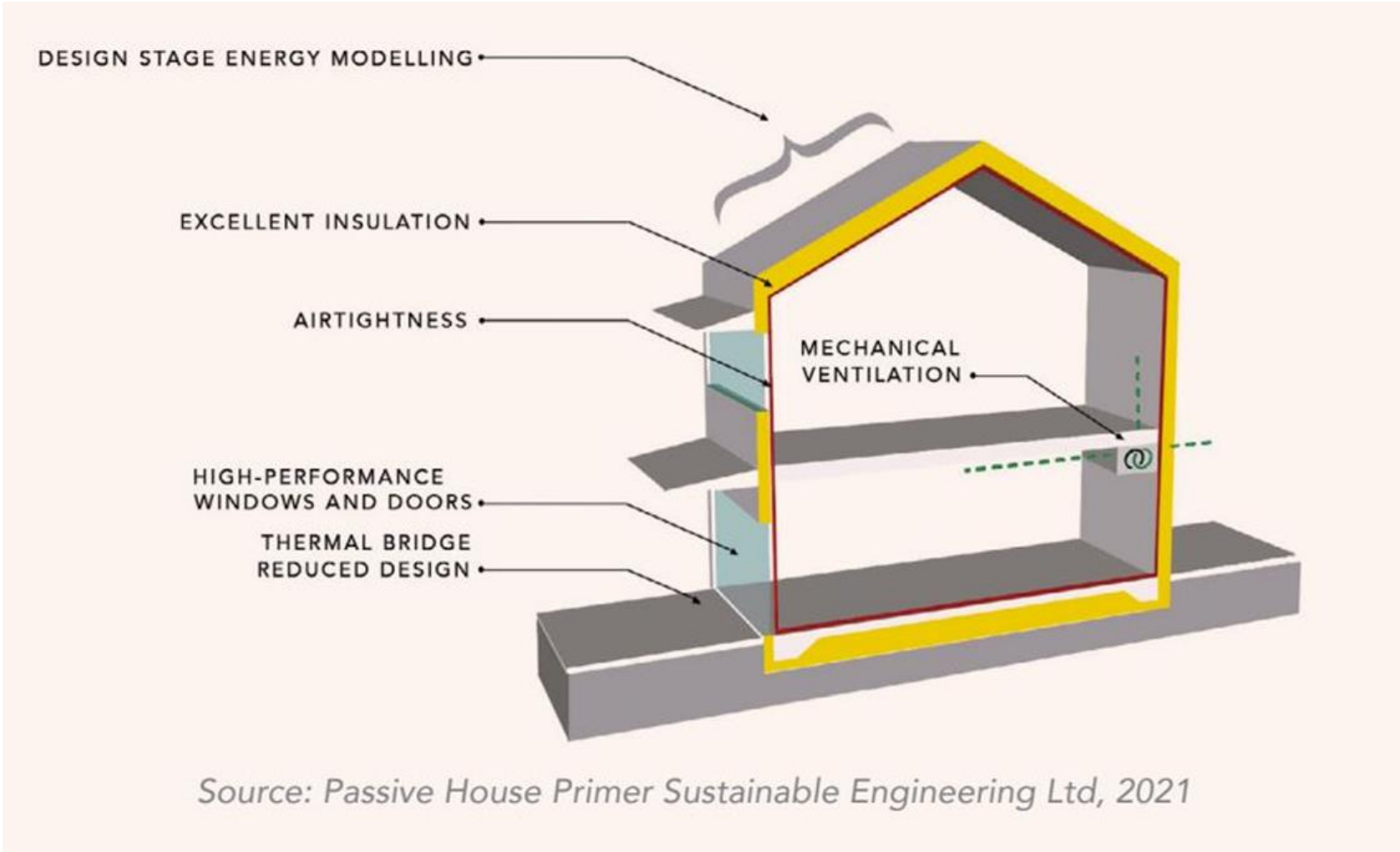
Control Layers



Source: Passive House Primer Sustainable Engineering Ltd, 2021

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Summary

- Installing a vapour control layer improves roof performance and reduces risk.
- Airflow above the insulation layer assists with moisture dissipation.
- Consider thermal bridging – the construction R-value is the critical number.
- PIR insulation is a useful way to achieve high insulation values with minimum roof buildup.

A Designer's Guide: Outsulation for H1 Compliant Roofs

1

H1 changes

What Is H1?

Any building design must consider all parts of the Building Code. Clause H Energy Efficiency is part of the Building Code. The objective of Clause H is "to facilitate efficient use of energy" within buildings – a critical component as we strive for Net Carbon Zero in our building stock.

One way to demonstrate compliance with a part of the Building Code is through compliance with a relevant acceptable solution. Of particular interest for this guide is the revised acceptance solutions (H1/AS1, 5th edition and H1/AS2, 1st edition). These solutions demonstrate performance criteria to meet Building Code clause H1.3.1, which states:

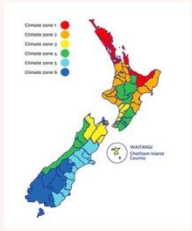
> "The *building* envelope enclosing spaces where the temperature or humidity (or both) are modified must be constructed to –
>
> (a) provide *adequate thermal resistance*; and
>
> (b) limit uncontrollable airflow." [their emphasis]

In essence, the expectation of adequate thermal resistance has changed. For roofs, that expectation has in most cases doubled.

The revised solutions are effective now – but are a requirement for building consent applications submitted from 3 November 2022.

What Changes Have Been Made To Minimum Roof Standards?

The first notable change was that New Zealand has been divided into 6 climate zones that more accurately reflect the climatic differences experienced across the country.



Source: Outcome of consultation, Building Code update 2021, pg 13

Having made the change to climate zones, the schedule method in H1/AS1 applies the same R-value for roofs, regardless of location. The increase is significant with some areas more than doubling in the minimum insulation levels.

INCREASE IN MINIMUM ROOF R-VALUES FOR ALL RESIDENTIAL (INCL. APARTMENTS) AND SMALL BUILDINGS

CLIMATE ZONE	1	2	3	4	5	6
Was	R2.9		R2.9 / R3.3		R3.3	
Now	R6.6					

For larger buildings (over 300sqm) H1/AS2 is applicable and a different standard is used depending on the climate zone.

INCREASE IN MINIMUM ROOF R-VALUES FOR LARGE BUILDINGS (OVER 300sqm)

CLIMATE ZONE	1	2	3	4	5	6
Was	R1.9					
Now	R3.5	R4	R5	R5.4	R6	R7

Is Complying With These Minimum R-Values The Only Option?

The values listed in the schedule method are not necessarily the only option. Under the acceptable solutions, the minimum required construction R-values can be determined by either:

a. **The Schedule Method** – where each element meets the minimum threshold, or

b. **The Calculation Method** – where the elements are accumulated to meet a threshold. Some elements may be under but offset by other higher elements. For example, the roof could be designed to a lower R-value but the walls designed to a higher than standard R-value to offset it, or

c. **The Modelling Method** in H1/VM1 or VM2. The entire building is modelled to calculate the energy requirements. This is a useful process, especially for high-performance design, and would allow the designer to optimise insulation needs.

Beyond that, compliance with the Building Code could be demonstrated using an alternative solution. This path, however, is outside the scope of this guide.

Roof Insulation Design – Revised H1 Schedule Method

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