TECHNICAL BULLETIN # *014*

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Formance *H1 Code Changes Explained*

In accordance with the Paris Treaty of 2016, New Zealand is committed to being carbon-neutral by 2050.

The Construction Industry plays an important part in achieving this goal, and consequently, the NZ Government has tasked MBIE (Ministry of Business, Innovation & Employment) with finding ways to align the industry with this goal.

MBIE states that 'The Building and Construction Sector needs to play its part in meeting this goal as the Sector currently accounts for around 20% of New Zealand's carbon emissions through the energy and materials used in buildings.'

MBIE are already taking action, with pending changes to the NZ Building Code clause H1 Energy Efficiency, meaning new homes will require higher levels of insulation. They are planning to introduce changes to H1 Energy Efficiency in a series of steps in upcoming years – to set the Building & Construction sector on a path to becoming carbon neutral.

H1, is the code clause that deals with energy efficiency and ensures that your building's thermal performance is going to be sufficient. All elements of the building envelope are included in H1, however this bulletin just covers the thermal performance of the roof and walls.

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Mostly about "R Values"

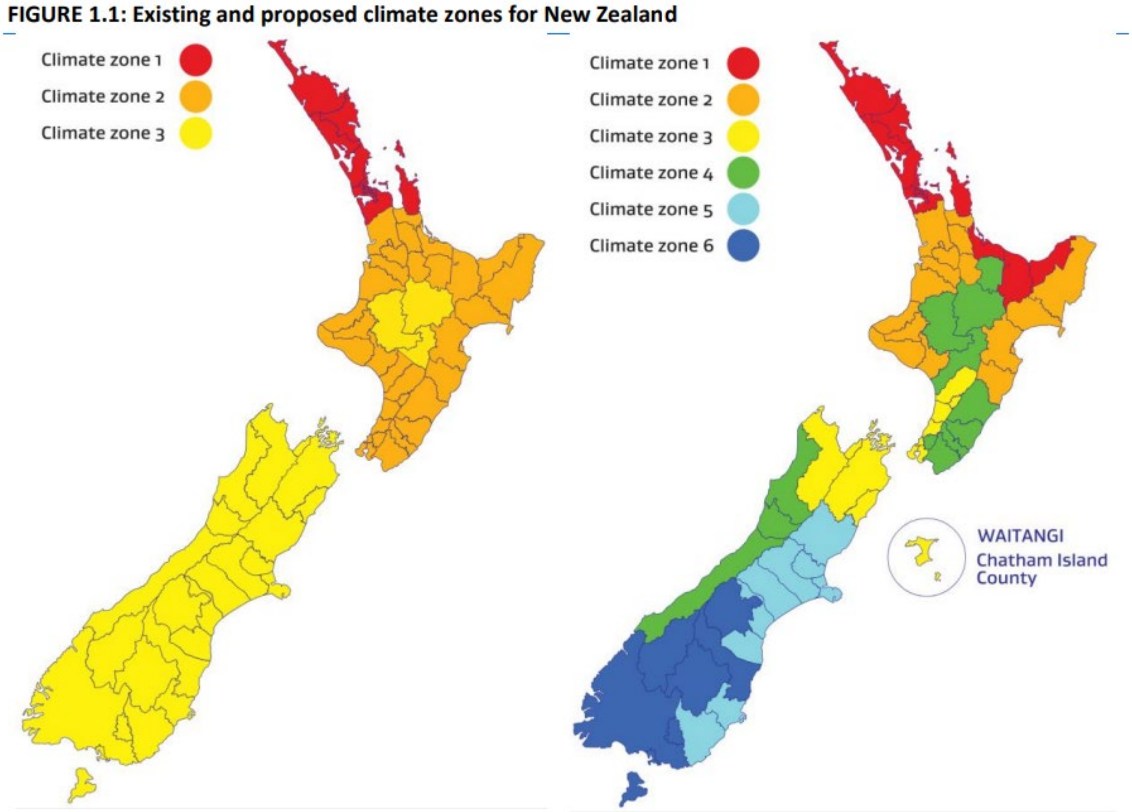
While energy efficiency comes from a variety of factors such as local climate, shading, envelope airtightness and the thermal performance of the materials of the building envelope, the current changes are only focused on the thermal performance. Thermal performance of building materials is measured using "R values" – which measure the resistance of the material to changes of temperature. A more insulated material has a higher "R value".

Building envelopes with higher "R values" are more insulated and generally improve thermal performance. Being an easy number to measure on individual building material components MBIE have determined it's a great first step to require increased "R values" as part of the 2022 building code updates.

The New Climate Zones

New Zealand is currently split into 3 climate zones. However, with the new changes, this will double to 6 climate zones, allowing code legislations to be adjusted to better reflect building requirements specific to weather and removing the 'one size fits all approach' that we have been used to. These zones are based on the average climate of the areas in the zones and therefore each associate different R-value requirements.

FIGURE 1.1: Existing and proposed climate zones for New Zealand



(a) Existing three climate zones in New Zealand

(b) Proposed six climate zones for New Zealand

The New R-Values

Currently, all the walls in New Zealand houses must meet an R-value of R1.9 or R2 (region dependent).

New Zealand roofs must meet a minimum R-Value of R2.9 or R3.3 (region dependent). This is achievable by using 180mm of fibreglass insulation, and again, while compliant doesn't consider settling of insulation and thermal bridging.

The graph below shows the new minimum R-values. You will notice a minimal increase for walls, but a massive jump for roof, doubling it for all regions. This increase is to bring NZ closer to international standards and ensures New Zealand houses will not be cold and expensive to run.

Options	Climate zone					
	1	2	3	4	5	6
Roofs						
Current minimum requirements	R2.9		R2.9/3.3		R3.3	
1 May 2023	R6.6↑					
Walls						
Current minimum requirements	R1.9		R1.9/2.0		R2.0	
1 May 2023	R2.0↑					

These changes certainly are changing the way we specify and build houses. When the new requirements have been fully implemented, all zones will have to meet R2 for walls, and R6.6 for ceiling. For a timber frame house, this means 140mm walls, and 300-400mm of ceiling insulation. You can say goodbye to your ceiling space and skillion ceilings!

A note on R Values with Traditional Framing.

It's important to note the difference between theoretical and actual thermal performance. While R values required for compliance are achievable using fiberglass insulation within a timber framing or between trusses, there are a number of considerations for the discerning homeowner. As many renovators discover, fiberglass insulation is very "installer dependent" and can slump over time. So, while it complies with the building code when the home is new (and when fitted correctly), it may be performing at much less than expected R values over time. Traditional compliance methods typically haven't accounted for this reduced performance, nor have they allowed for the significant losses from thermal bridges caused by the timber framing in a traditional framed house.

When are these changes being implemented?

MBIE have recently announced a delay to their initial timeline, which slows down the change and provides the industry with more time to adapt to the new requirements. The new date for the update is the 1st of May 2023. This means that any building consents submitted after that time must comply with the new H1 requirements.

The change is the start of many changes to come in the years between now and 2035 when the final cap for energy demand is expected to take effect.

How do I prove compliance?

There are three methods to prove your building complies with H1 of the NZBC .

Schedule Method (low detail – based off pre-determined tables)
Calculation Method (medium detail – based off your unique plans)
Modelling method (high detail – based off special software)

Schedule Method:
The schedule method is an overly simplified approach that uses specific R values for various building elements. Taking a very generic approach, the Schedule Method simply accepts compliance if each individual element has an R value that is greater than or equal to the levels stated. These levels vary depending on which climate zone the building is situated within. For example R6.6 is required on the ceiling as a minimum under the new H1 code. This method does not consider true "whole-of-building" energy efficiency, therefore has the tendency to well over-specify the insulation. More advanced methods provide a more accurate level of information that allows designers to minimize costs while still demonstrating compliance.

Calculation Method:
The calculation method provides much more flexibility than the schedule method, and could be expected to provide a more optimum from a cost perspective. The New Zealand Green Building Council (NZGBC) has released a very helpful calculator, which can be found **here**. If, for example, you have high ceiling insulation (R6.6+), you can reduce the level of insulation in other parts of the building, saving money, while still demonstrating compliance. The calculation method compares the inputs chosen (proposed model) versus a reference model of the same size and code minimum spec. A building will be deemed to comply if the proposed model has better thermal performance than the reference model.

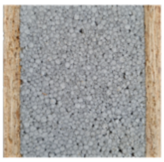
Modelling Method:
The modelling method is the most advanced and provides the designer with the most accurate overall estimate of a buildings energy-efficiency. The modelling method considers the orientation and location of the building, the thermal performance of each component of the envelope, how all the components work together, and often, how airtight the building is. Negative effects of over-insulating are also identified, such as issues with over-heating. Designers who invest in the modelling method can find a significant reduction in build costs by smarter choices for H1 compliance. The cost to develop a thermal model is likely to be easily recovered by smarter choices of building materials. Contact Formance for references to companies who can help with thermal modelling.

Where does Formance sit with all this?

Formance provides a range of panel solutions that easily achieve the latest H1 code requirements. By choosing the Calculation Method for code compliance, or for more granular decision, the Modelling Method, the optimum panel thicknesses can be specified to get the right balance between thermal performance and cost, while also demonstrating code compliance.

With Formance there is no need to wait until energy-efficiency is enforced through the building code. By choosing materials that provide far superior levels of energy efficiency you're future proofing your new home and ensuring it remains compliant for the foreseeable future. But it's not just about compliance, occupants will enjoy reduced energy bills and increased comfort year-round.

A list of our panel thicknesses and the respective R-Values are below.


PANEL THICKNESS	STANDARD EPS	NEOPOR®	PIR*
90mm	R2.1	R2.4	R3.3
115mm	R2.8	R3.3	R4.5
165mm	R4.3	R4.9	R6.9
215mm	R5.7	R6.6	-
265mm	R7.2	R8.3	-
315mm	R8.6	R9.9	-

*Available as Formance SIP Roof Panels.

Sources:

https://www.building.govt.nz/building-code-compliance/annual-building-code-updates/2022-building-code-update/