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NZ vs Australia building regs

The second in a series looking at how current New Zealand building regulations for energy efficiency compare to those elsewhere measures New Zealand against Australia.

IN MANY AREAS OF LIFE, New Zealanders punch above their weight. In the Bledisloe Cup, played between New Zealand and Australia since the early 1930s, New Zealand has won the series 37 times and Australia just 12 times.

Australian and UK homes better insulated

While Kiwis do well on the pitch, it is a different story on building sites, however. On the other side of the ditch, their stronger regulations mean the roofs and walls of Australian homes are much better insulated than ours.

In the first of this series (*Build 179 Rating our building regs - part 1*), we compared insulation requirements for new houses in parts of the UK and New Zealand with similar temperatures - Ashburton, Dunedin and Invercargill here, Southampton and Manchester in the UK.

British requirements are much higher. In New Zealand, we allow more than twice as much heat loss through the walls and over two and a half times more heat to escape through windows than would be allowed in the UK.

In this *Build*, we compare the requirements for northern New Zealand coastal cities Auckland and Whangārei with southern Australian coastal cities Melbourne and Sydney. It is a reasonable comparison - considering average temperatures, the cities are just two or



Sydney roofs are better insulated than their New Zealand counterparts.

three degrees apart. A measure of climates, the Köppen-Geiger system, puts Melbourne in the same category as the New Zealand cities, with Sydney just one step away (Table 1). However, Australian cities have occasional higher mid-summer extremes than we do in New Zealand.

New Zealand minimum requirements

The main requirements covering indoor temperature in the New Zealand Building Code are in clause H1 *Energy efficiency*. Compliance can be demonstrated in various ways, including using the schedule, modelling or calculation methods in NZS 4218:2009 *Thermal*

insulation - Housing and small buildings.

The schedule method specifies minimum R-values for building envelope components depending on construction type and location. The construction R-value figures are not the R-value of the insulation in a building element but the element itself.

In other words, construction R-value includes the insulation plus the effect of thermal bridges, air gaps, cladding material and so on. The minimum R-values for timber-framed houses shown in Table 2 are for zone 1, covering the top of the country - Northland, Auckland, Franklin District and the Coromandel Peninsula.

Australian minimum requirements

The Australian system is performance-based like ours, with a number of different ways to show compliance:

- Energy assessors can use a software tool accredited under NatHERS (the federal government's Nationwide House Energy Rating Scheme) to predict the amount of heating and cooling a house requires to be comfortable year round. The result is a rating of 0-10 stars, with a minimum 6 stars required to show compliance. This is the most commonly used approach.
- Another option is complying with the relevant 'deemed to satisfy' requirements set out in the National Construction Code (NCC).
- Less frequently used is a Performance Solution (Alternative Solution), providing evidence that the heating and cooling loads of the building are less than or equal to the heating and cooling loads of a reference building prescribed in the NCC.

Deemed-to-satisfy options

The Australian deemed-to-satisfy option requires minimum total R-values for the building fabric, just like New Zealand. The minimum requirements vary depending on the climate zone. Sydney covers two zones, with coastal areas in zone 5 (warm temperate) and inland areas in zone 6 (mild temperate), while Melbourne is just zone 6. Roof colour and building elevation above sea level are also considered. There are slightly different requirements for apartments.

The Building Code sits in the National Construction Code (NCC), which is recognised by relevant laws in each state and territory. State governments also have their own exceptions to federal government requirements. In New South Wales, the Building Sustainability Index (BASIX) system replaces the NCC (although the energy efficiency requirements are the same).

Higher R-values in Australian homes

For the comparison with New Zealand (Table 2), we have used the deemed-to-satisfy requirements from the 2019 NCC, which apply in both Melbourne and Sydney. There is a very clear difference between

Table 1

Average temperatures for selected New Zealand and Australian cities

	AUCKLAND	WHANGĀREI	MELBOURNE	SYDNEY
Average annual temperature	15.2°C	15.7°C	14.8°C	17.6°C
Average temperature, coolest month	10.6°C	11.5°C	9.4°C	12°C
Average temperature, warmest month	19.8°C	20.1°C	20.3°C	22.3°C
Köppen-Geiger climate classification	Cfb	Cfb	Cfb	Cfa

Table 2

Minimum construction R-values for detached houses, non-solid construction in New Zealand's zone 1 and the equivalent in Melbourne and Sydney

BUILDING ELEMENT	NEW ZEALAND MINIMUM CONSTRUCTION R-VALUES (M ² .°C/W) FOR NON-SOLID HOUSE CONSTRUCTION IN ZONE 1 ¹	AUSTRALIAN MINIMUM TOTAL R-VALUES (M ² .°C/W) FOR NON-SOLID DETACHED HOUSE CONSTRUCTION ²	
		MELBOURNE (ZONE 6)	SYDNEY (ZONE 5)
Roofs	R2.9	R4.6–5.1 ³	R4.1–5.1 ³
Walls	R1.9	R2.8	R2.8
Floors	R1.3	R2.25 (for suspended floors only)	R1.0 (for suspended floors only)

1. From NZS 4218:2009 *Thermal insulation – Housing and small buildings*.
2. Australian figures are taken from the NCC 2019 Building Code of Australia – Volume 2 Amendment 1.
3. The lower value is for light-coloured roofs, the higher value for dark-coloured roofs to counter summer heat gain.

Australia and New Zealand, with higher R-values required in Australian houses:

- For roofs, their minimum R-value is 40-75% higher than in New Zealand.
- For walls, it is 47% higher.
- For suspended floors in colder zones including Melbourne, it is 73% higher.

Glazing requirements in Australia are calculated in a more complex way so are not included here. (Various conditions that apply to particular circumstances are also not detailed here.)

Some Australian requirements not in New Zealand

Apart from the minimum required R-values,

there are several other requirements in Australia that do not apply in New Zealand. For example, a concrete slab on ground that incorporates in-slab heating or cooling must have insulation installed around the vertical edge of the slab perimeter. The insulation must achieve a minimum R-value of 1.0 in most parts of Australia.

In New Zealand, heated slabs require a higher minimum R-value than unheated slabs, but there is no specific requirement for slab perimeter insulation and it is not commonly installed here. ◀