Airtightness of apartments

Recent BRANZ research into the airtightness of apartment buildings has prompted a shift in thinking around airtightness and ventilation. BRANZ now recommends that residential buildings are mechanically ventilated and are built to an airtightness target.

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THE AIRTIGHTNESS OF A BUILDING is a measure of how much air flows between indoors and outdoors through the structure itself - in other words, how big the holes are in the structure.

Airtightness is a key aspect of a building's performance, affecting the energy efficiency, thermal comfort and indoor air quality. However, airtightness is only mentioned indirectly in the New Zealand Building Code, and there is no requirement to meet a particular target level of airtightness.

BRANZ tested a range of apartments

Given the growing number of apartments in New Zealand, BRANZ measured different apartment buildings to get an indicative sense of the level of airtightness in the wider stock of apartments (see *Build* 165, *Flat-out testing* for more). While a limited amount of data exists for stand-alone low-rise residential buildings, very little was known about the airtightness level provided by apartments.

The BRANZ testing looked at the airtightness of individual units using ISO 9972. The magnitude of inter-apartment leakage was also investigated with additional guarded testing, where multiple blower door fans were used to pressurise more than one unit at a time.

In total, nine apartment buildings were investigated (Figure 1), comprising 148 individual non-guarded airtightness tests. There were no pass-fail criteria for the measurements, given there was no target for any of the buildings.

Airtightness similar to new standalone houses

In general, the apartments were of a similar level of airtightness to what could be expected from a typical new-build stand-alone dwelling - approximately 5 air changes an hour (ach) @ 50 Pa. However, the results suggest a strong dependence on construction style.

For example, for apartment buildings where individual units were separated by concrete fire partitions, the average result was 3.5 ach @ 50 Pa. Inter-apartment leakage appeared to be insignificant in this style of apartment, but inter-apartment leakage did occur in some instances - most clearly when timber partition walls were used to separate dual-key apartments.

Airtightness ranged from 1.9–12.6 ach

In terms of variation across the whole sample, the most airtight unit measured 1.9 ach @ 50 Pa, and the least airtight unit measured 12.6 ach @ 50 Pa. This range of airtightness is understandable, given that airtightness is often not a key consideration when constructing buildings in New Zealand.

Many homes underventilated

The airtightness results in this study are just a snapshot of a limited number of apartments in the stock. In general, the tighter apartments happened to have mechanical ventilation systems and so ventilation should be satisfactory.

However, the measurements sit alongside other data at BRANZ that suggests living spaces in a significant proportion of our housing stock are underventilated unless