Combating internal moisture

Newer homes may be less draughty but concern is growing that they are accumulating too much internal moisture. Ventilation is key, and BRANZ is researching how to keep homes aired, warm and healthy.

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Mould growth in poorly ventilated home.

THE MOST PRESSING contaminant in New Zealand homes is internal moisture. It is produced constantly from many different sources and can be a challenge to manage effectively.

Moisture damages health and home

Moisture absorbs readily into a wide range of materials and can take considerable time to remove from a home. The most effective technique for managing moisture is ventilation at its source, supplemented with a whole-of-house ventilation strategy.

Moisture in the home can cause a variety of problems including:

- health issues
- building material decay
- mould and fungi growth on surfaces.

Internal moisture can also influence interstitial condensation, and BRANZ's vapour control in walls project is providing guidance on this.

Steps to managing indoor moisture

BRANZ Building Basics *Internal moisture* outlines several practical steps to help manage indoor moisture problems:

- Limit sources of moisture - where this can't be done, ensure moisture is extracted where it is produced.
- Effective heating - warmer air has a higher moisture-carrying capacity. Heating the indoor air lowers the relative humidity and encourages evaporation of moisture from surfaces. This means ventilation will remove more moisture from the building.
- Regular opening of windows.
- Installing an appropriate ventilation system.

Take care venting dryers

Clothes dryers can emit 5 kg of water per load into the indoor air, so their proper venting outdoors is a good example of extraction of moisture at the source.

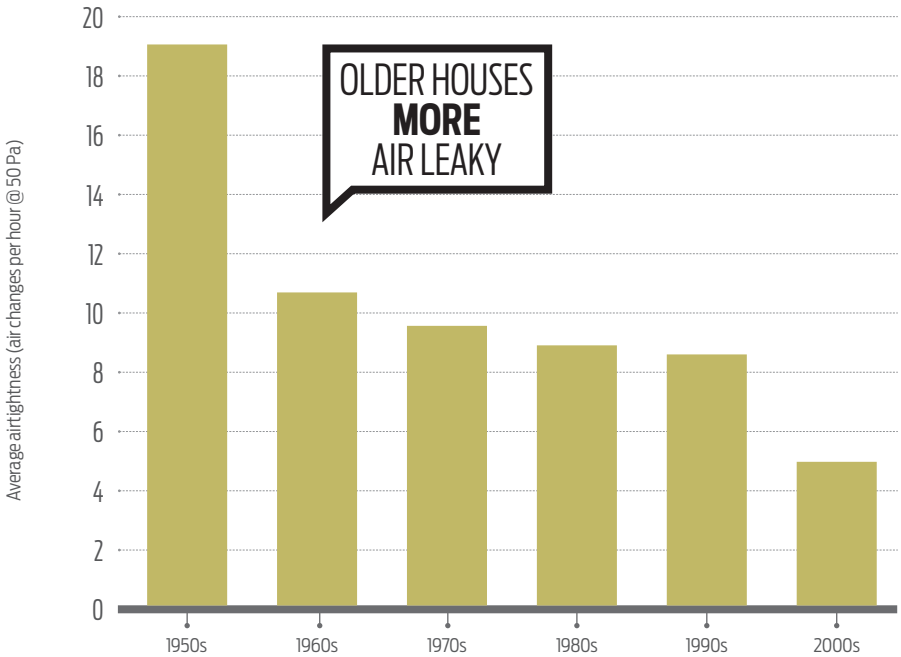

Figure 1: Increasing airtightness of newer New Zealand homes.

In BRANZ case studies, staff have seen the consequences of high indoor moisture levels from venting a dryer into a living space. One case assumed that a small extractor fan would remove the moisture, but once the moist dryer air mixed with the air in the house, it was difficult to extract.

The recommended solution is to vent the dryer directly outdoors. This requires thought at the design stage as it is sometimes difficult to do after the build is completed.

What is ventilation?

Ventilation consists of:

- background infiltration
- purpose-designed ventilation achieved by mechanical or passive means.

Background infiltration

Infiltration is the uncontrolled air movement through gaps and openings in the building envelope. It is typically driven by wind and stack pressure differences between indoors and outdoors.

There is much debate as to the quality of infiltration air, which is dependent on where it is coming from. Air from subfloors can be a concern, with typically high moisture levels. Roof-space air can have potential moisture and airborne particle issues.

Infiltration air can also have energy impacts - the magnitude of this varies with airtightness and the nature of the flow paths in the building envelope.

Mechanical and passive ventilation

Ventilation can be provided by:

- opening windows
- passive vents
- mechanical extraction, such as a range-hood and bathroom fans
- mechanical supply
- balanced mechanical
- passive stack ventilators.

To be compliant with Building Code clause G4 *Ventilation*, ventilation air must come from outside the building.

Increasing airtightness having an impact

Work in the BRANZ WAVE (Weathertightness, Air quality and Ventilation Engineering) programme highlighted a trend to more airtight construction (see Figure 1).

Earlier trends in increasing airtightness resulted from a shift away from strip flooring and timber windows to sheet materials and aluminium joinery with seals.

The current trend is because of the drive for more energy-efficient buildings, improved levels of indoor finish, such as square stopping and an increase in slab-on-ground construction.

Building Code relies on open windows

This trend to more airtight homes has affected infiltration rates. The question now is whether or not clause G4 needs to be updated to reflect this.

Currently, the most common route to demonstrate compliance with clause G4 is the provision of 5% of the building floor area as openable windows. This assumes that occupants open the windows regularly.

Older houses probably OK

In older housing, the guidance in clause G4 is likely to be sufficient, but the ventilation survey undertaken during WAVE indicated that the level of window opening by occupants varies.

Newer houses short on ventilation

If occupants in newer housing do not open windows, this can cause problems.

Actual ventilation rates measured in conjunction with the survey found that about a third of the sample occupants were getting insufficient ventilation.

The measured ventilation rates in these cases was very close to the estimated infiltration rates from blower door tests, which indicated windows were not being opened that often (see pages 55-56).

Study checking window use

This has resulted in the BRANZ occupant behaviour project, where new sensor technology will enable measurements of how often and how far occupants are opening their windows and doors.

This project will give important information on how people are using their homes.

May need to update Building Code G4

Depending on the results of the occupant behaviour project and given the results from WAVE, we may not be able to rely on the regular opening of windows.

As infiltration is no longer at the level it was previously when it provided a useful amount of dilution ventilation, we are near a point where an update of clause G4 may be needed. Various case studies by BRANZ are beginning to show this (see pages 55–56).

Double glazing misconception

A common misconception is that double-glazed windows fix moisture issues since there is a reduction in condensation. However, all double glazing does is raise the temperature of the glass in contact with the indoor air.

This, in effect, just masks indoor moisture issues and does nothing to help its removal.

What's next?

A current BRANZ project is looking at establishing a national airtightness database to more effectively track changes in housing stock. Meanwhile, the energy-efficient ventilation project will establish a framework for evaluating ventilation system performance in tandem with whole-building energy efficiency.

The outputs from WAVE, along with these two projects, will help provide the evidence necessary to make informed choices around the future of Building Code clause G4. This, in turn, will assist the industry to design and deliver homes that are ventilated efficiently and are warm and dry.

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BRANZ Building Basics *Internal moisture* is available from www.branz.co.nz/shop.