SUBFLOOR VENTILATION

The 2005 BRANZ House Condition Survey found 38% of homes with suspended timber floors had less than half the subfloor ventilation required by the current building standards. This inadequate ventilation can cause some serious problems.

By Stephen Sargent, BRANZ Technical Writer

Adequate ventilation of a building's subfloor area allows drier outside air to flow through the space, removing ground moisture and keeping it fresher, healthier and drier. However, the balance must be right as too much ventilation combined with insufficient insulation can lead to unwanted heat loss through the floor.

Of our 1.5 million or so dwellings, about 1.1 million have suspended timber-framed ground floors. However, recent responses from the quarterly BRANZ Building Materials Survey show a change in this trend, with 92% of new houses being built on a concrete slab.

Check annually for problems

Lack of underfloor ventilation can lead to:

- fungal and mould growth, and timber decay
- borer attack
- corroding fasteners and metal fixings
- rising damp and general home dampness with associated health problems
- a musty smell
- persistent condensation and/or mildew on inside windows, walls, ceilings or furniture
- noticeable sagging of floor joists and sagging and swelling of particleboard floors
- bubbling under vinyl or rotting of carpet.

BRANZ recommends that a check of the subfloor space is undertaken annually as part of normal house maintenance.

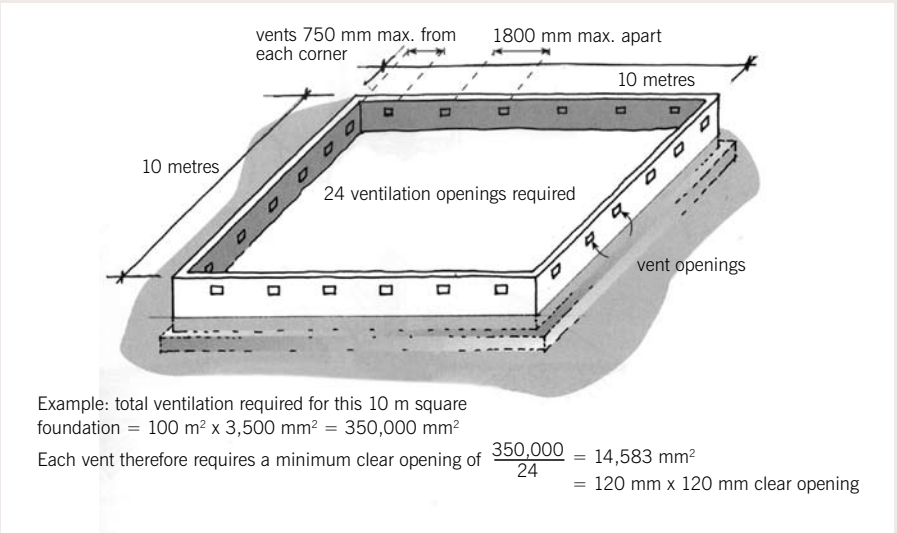


Figure 1: This example shows how to calculate the minimum clear openings necessary to meet the required ventilation rate of 3,500 mm²/m² of floor area.

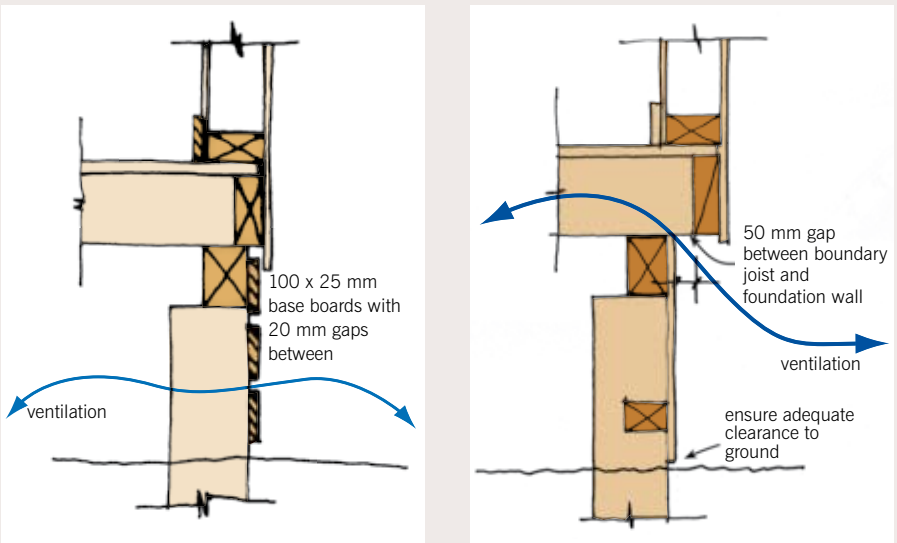


Figure 2: Examples of good timber sub-floor construction that acheive the required ventilation.

What is the open area of a vent?

The net open area of a vent is the actual free area through which air can pass. When calculating, exclude the area taken up by vermin proofing, framing and any decorative coatings. A detail of the vent should be provided at the design stage.

Vents can have different net open areas even if they are the same overall size.

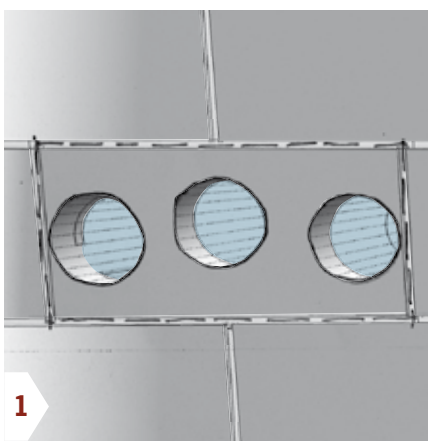
Ventilation should be located as near as possible to the underside of the timber floor structure (plates and bearers) and should be spread evenly around the entire building to allow cross ventilation (see Figure 1).

Figure 2 gives two options for providing ventilation in a timber-framed foundation. Providing additional ventilation to improve it, in this situation is typically straightforward as the integrity of the structure is not generally affected.

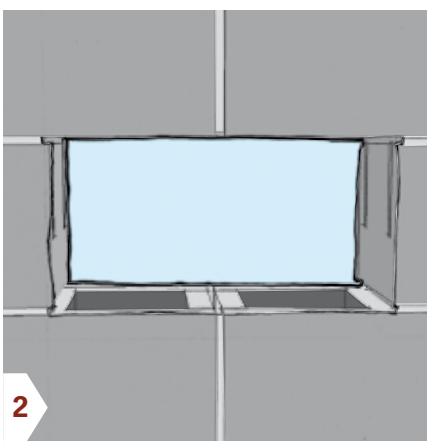
BRANZ recommends checking the subfloor space annually as part of normal house maintenance.

Concrete foundations, however, require more care. When cutting additional ventilation openings in concrete and concrete masonry foundation walls, it is important that openings are not formed in the top course of the blockwork and that reinforcing is not cut. Figure 3 gives one option for increasing the ventilation in a concrete foundation.

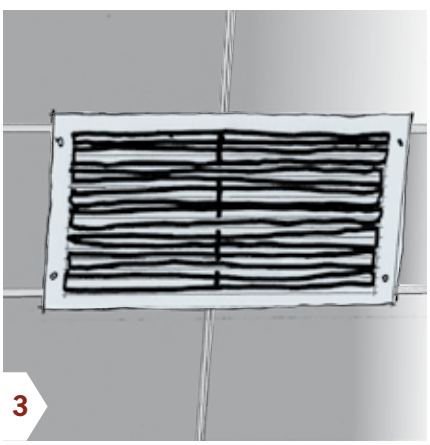
In situations where the ground is still wet even after improving ventilation, or where additional ventilation is difficult to achieve, the ground under the building should be covered in polythene sheeting (see page 36 for more on dealing with damp ground). →



Core through concrete block with masonry drill or use a concrete saw.



Chip out remaining block with cold chisel and hammer.



Install surface-mounted proprietary grill (hot-dip galvanised steel or aluminium).

Figure 3: One option for retrospective installation of ventilation into a concrete block foundation wall.

Fungi growth under the leaking wastepipe in a 1980s house. Subfloor ventilation was 34% of the required level.

Subfloor ventilation was less than 25% of the current required level in this 1970s house. Prolonged periods of high moisture levels, following by drying caused ground cracking.

How much is enough?

The New Zealand Building Code Clause E2 *External moisture* includes an Acceptable Solution (E2/AS1) for subfloor ventilation of suspended timber floors. This requires a minimum of 3,500 mm^2 of net open area for every 1 m^2 of the house plan floor area. This matches the subfloor ventilation requirements of NZS 3604: 1999 *Timber framed buildings* for uncovered ground.

E2/AS1 also provides additional detail on the design of openings, airflow and the use of vapour barriers laid over the ground in subfloor spaces.

If you experience dampness or mustiness but the subfloor ventilation appears adequate, see BRANZ Bulletins 457 *Ventilation of enclosed subfloor spaces* and 427 *Improving thermal insulation* for more detailed advice for builders, designers/architects and inspectors.

A useful reference for homeowners is the BRANZ book *Maintaining your home,* available through www.branz.co.nz.

IS THE SUBFLOOR DAMP?

To get an idea of subfloor moisture levels, get some dirt from under the house and rub it firmly on your hand. If the dirt stains, like mud, there is probably too much moisture. To rectify this BRANZ suggests that you should:

- clear the subfloor of any obstructions like stored timber or rubbish
- uncover any vents that may have been blocked by garden soil or plantings, or to keep pests out
- ensure that water after rain does not flow under the house, check guttering, downpipes, plumbing under the house and drains
- check the clearance of wall claddings above the adjacent ground (this can also contribute to a lack of ventilation and dampness).

If the subfloor is still damp install more vents or cover all the ground under the building with polythene sheeting. Polythene should be laid with sheets lapped by 100 mm, cut neatly around piles and closely butted against the perimeter wall. Rocks or bricks can be laid on top of the sheets to hold them in place.