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BVP01 Passive Ventilation Recommendations

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Computer modelling of building ventilation requirements is extremely complex and not necessarily valuable for conventional housing designs. Many interconnected factors affect ventilation performance, for example:

- Occupant behaviour
- Wind sheltering effects
- Building shape
- Permeability of various building surfaces
- Changes in occupancy levels
- Changes in building use

Our experience shows that a pragmatic approach works effectively for residential projects. Computer modelling is unnecessary in most cases.

Profiled metal roof are reasonably well ventilated without specific design. In testing for NZ Steel by BRANZ, a conventionally laid straight gable roof with no eaves flashing and underlay overlapping at the ridge had about 66% of the optimal minimum ventilation requirement, i.e. sufficient in many situations but not all.

In line with BRANZ advice, the NZMRM Code of Practice recommends an effective leakage area of 1/300 of the ceiling area when assessed using tracer gas methodology.

BRANZ's Random House Surveys show that mould issues are high in NZ houses, and are increasing. This in turn impacts on our dramatically high levels of respiratory diseases compared to other developed nations; which has been exacerbated by new HI regulations. BRANZ have also demonstrated that venting ceiling cavities results in a decrease dampness in the occupied areas of a dwelling.

Building Consent Authorities are obliged to check designs against the requirements of E3.2 a) to prevent the development of fungal growth from internal moisture. Unfortunately E3/AS1 has no guidelines for achieving such.

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The Metal Roofing Association's recommendations are as follows.

1. Typical residential buildings, excluding high risk designs:

- have the eaves purlin set 10mm back from the fascia,
- ensure free passage of air from the eaves to the apex using stepped truss or insulation baffles if necessary, and
- slit the roofing underlay at the apex.

Profiled foam inserts should not be used with residential profiled metal roofing. They should be used with restraint on wall cladding, and only where required for weatherproofing, i.e. around windows.

2. High Risk designs:

- Specifically detail pathway of free passage of air from eaves to apex by using soffit vents, over fascia vents, or fleece lined roofing at eaves, and
- slit the underlay at the apex, plus a vented soft edge, proprietary ridge vent, or bespoke ridge.

The following definition of High Risk designs should also be taken as a guide, a 1° increase in pitch or a 1m decrease in length does not take a design from one category to another.

High Risk Residential Roofs	
Category	**Description**
Skillion roofs	Sloping ceilings whether parallel to the roof or not.
Low Pitch	Less than 12°
Long Run	Over 12 m
Barrel Curved	Half round or semi round over an apex
Prickled roofs	Canterbury prickles or rib caps at the apex.
Permeable ceilings	Tiles or Tongue and groove ceilings.

Building use can also create a risk environment, for example, high density housing, educational buildings, and ski lodges.

For typical projects, following good passive ventilation principles will provide adequate venting without detailed calculations.

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The exception is when you encounter unusual occupant behaviour or defective HRV systems. In those cases, quantification may be necessary.

Sarked roofs should be designed so the sarking does not prevent airflow from the ceiling space.

Moisture ingress should also be considered.

- Internal bathrooms should have ventilation systems activated by the light switch, and porous ceilings should have a vapour control layer below the insulation.
- Ground water problems can only be resolved by preventing ingress of moisture.
- Buildings that create or expel water vapour by nature of their use such as swimming pools, bottling plants, and foam manufacturing plants should have bespoke ventilation plans developed by a suitably qualified engineer.

The ventilation requirements of passive housing and low energy designs should similarly be individually assessed.

Yours Sincerely,

Rod Newbold
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