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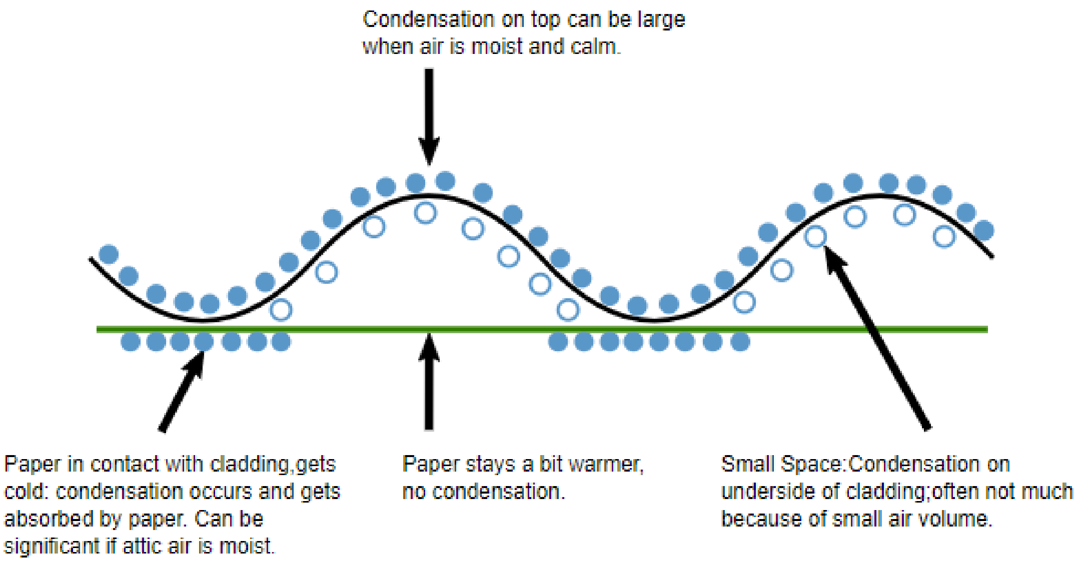
How to Minimize Roof Cavity Condensation

General

Condensation occurs readily when the humidity and temperature changes are high especially in winter with the use of metal cladding and synthetic underlays. Bathing, showering, cooking, heating, clothes drying, respiration and perspiration all produce moisture. During construction, timber can become wet and take some time to dry out. Concrete floors are a particularly prolific source of moisture. During curing, a 100mm thick concrete slab releases approximately 10L of water vapour per m^2 of surface area. Water vapour readily migrates upwards into the ceiling cavities. The air movement needs to be sufficient to keep the humidity to a level that the synthetic underlay under the metal roof cladding can work within its intended capacity.

Synthetic and bituminous kraft roof underlays are two different materials and therefore perform differently. Synthetic underlays overall offer more benefits than that of the bituminous kraft underlays. To minimise roof cavity condensation, recommendations from MRM Code of Practice v3.0 must be followed. Supposed and perceived problems with synthetic underlays have not been found to be with the product but with the overload of attic moisture due to lack of ventilation of moisture from below. Most condensation forms on the underside of the underlay, because while roofing underlays are permeable they still form a substantial vapour check, and as they are in contact with the roof they are at a similar temperature.

MRM Code of Practice v3.0 9.5A Roof Cavity Condensation



RECOMMENDATIONS

- Use sufficient ventilation to minimize condensation.
- Kitchen, bathroom and clothes dryer fans should be vented outside, not into the attic spaces.
- Do not push insulation up hard against the underside of the roofing material. Minimum air gap of 25mm is required.
- Have air gap between the metal cladding and synthetic underlays where condensation risks are high.
- Underlay should terminate at the ridge purlin or upper purlins.
- Do not use non-perforated profiled filler strips at the eaves and apex.
- Skillion and flat roofs and any other high-risk designs (curved roofs) **must be ventilated** to comply with the NZMRM Code of Practice.
- **Educate occupants** – avoid unvented gas heating and kerosene heaters. Try to minimize sources of moisture and open a window when possible.

VENTILATION

Refer to MRM Code of Practice v3.0 9.4 Ventilation for more details.

Additional ventilation mechanisms include:

- Louvre vents in gable ends.
- Soffit vents.
- Fascia vents.
- Proprietary ridge vents.
- Ventilated soft edge strips on transverse flashings.
- Solar powered or wind-powered vents positioned close to the apex.

Where eave vent intake and ridge vent exits are both employed, the area of the ridge vents should be less than that of the eave vents. This arrangement prevents air escaping through the ridge vent from lowering the pressure of the attic cavity, which will encourage more ingress of moist air from the dwelling area.

For venting to be effective, an intake at the lower edge and outlet at the upper edge of the roof end is optimal.
In pitches of 30° or less, cross venting alone is generally sufficient, combined with trickle ventilation at the ridge or apex.

When ventilated ridges are used, the underlay must be terminated at the ridge purlin to allow free passage of air. The COP recommends that the underlay is terminated to allow passive ventilation of the ceiling cavity.

While a rule of thumb of 1/300 of ventilation aperture to ceiling area exists overseas, far smaller ratios have proven sufficient in NZ conditions. The main rule is to let air in at the bottom, out at the top, and provide a free passage in between.

The function of bulk insulation is to trap air, so the effect of moderate air movement is insignificant. Wet insulation, however, is ineffective. Ventilation of spaces above insulation to remove excess moisture will allow the insulation to perform to its design capacity.

When insulation fills a ceiling cavity or takes up a significant portion of the ceiling cavity space, it inhibits ventilation. The installation of a vapour barrier to limit entry of moist air into the ceiling space has been used in some older New Zealand homes, but removing damp air by ventilation is a more practical approach unless a properly engineered vapour control system is adopted. A minimum air gap of 20 mm must be provided between bulk insulation and the roof.

Even with good ventilation, condensation may form at times on the underside of the roof and, more commonly, on the underside of the underlay. This is acceptable, providing the quantity of condensation, and the duration of it being present is not excessive.