

CONDENSATION MANAGEMENT IN ROOF CAVITIES - VENTILATION OF THE ROOF SPACE (NCC 2022)

INTRODUCTION⁽¹⁾

The National Construction Code (NCC) 2019 introduced new provisions to help minimize the impacts of condensation within houses and apartments. These new provisions were the first step through the NCC in providing guidance to assist in the mitigation of condensation within Class 1, 2 and 4 buildings.

The requirements include provisions for the installation of pliable building membrane (sarking) to control ingress of moisture through the external wall, the discharge of exhaust fans and ventilation of the roof space.

Further measures have been incorporated in NCC 2022.

WHAT IS CONDENSATION?

When a surface temperature falls below the dew point of its surrounding air, condensation in the form of water vapour from the humid air will take place on the colder surface. In order to avoid condensation, the surface temperature must be increased and/or the moisture in the surrounding air must be reduced.

Condensation within a building can form as visible surface condensation or can form within the building fabric or layers, referred to as interstitial condensation. Generally small quantities of condensation in a building are tolerable provided it can dry. However, if the environment remains wet or humid for a substantial period of time materials may degrade and mould growth may occur that can have an effect to the health of the occupants in the building.

Increasing levels of energy efficiency provisions in buildings has resulted in greater levels of insulation and buildings being built to be more air tight. Consequently this has led to potential for increased humidity in living spaces and greater risk of problematic condensation.

It is important to note that the new provisions are seeking to minimize the health impact through the management of condensation. It does not look at eradication of condensation as it acknowledges that dealing with condensation in buildings is a complex matter and is much about how the building is used as it is about how it is built.

This is reflected in the NCC Performance Requirement which states:

Vol-1 F8P1 / Vol-2 H4P7 Condensation and water vapour management

Risks associated with water vapour and condensation must be managed to minimise their impact on the health of occupants.

EFFECT OF CONDENSATION (MOISTURE) IN BUILDINGS

In extreme circumstances, it has been documented⁽²⁾ that moisture in buildings can be associated with a range of adverse health and wellness issues including upper respiratory (nasal and throat) symptoms, coughs, wheezing and asthma symptoms in sensitised persons with asthma.

More typically, moisture can cause damage to building materials and components.

For example:

- Prolonged damp conditions can lead to the colonization of building materials and HVAC systems by moulds, bacteria, wood-decaying moulds and insect pests (e.g., termites and carpenter ants).
- Chemical reactions with building materials and components can cause, for example, structural fasteners, wiring, metal roofing and conditioning coils to corrode and flooring or roofing adhesives to fail.
- Water-soluble building materials (e.g., gypsum board) can return to solution.
- Wooden materials can warp, swell or rot.
- Brick or concrete can be damaged during freeze-thaw cycles and by sub-surface salt deposition.
- Paints and varnishes can be damaged.
- The insulating value (R-value) of thermal insulation can be reduced.

MAIN CAUSES OF CONDENSATION IN ROOF SPACES⁽³⁾

The main causes of condensation in roof cavities;

1. High levels of internal water vapour passing into roof spaces through the ceiling or through exhaust fans which are not externally ducted. This is a particular problem in areas of the home where moisture is generated such as laundries, kitchens and bathrooms.
2. Insufficient ability for the roof space to dry due to lack of ventilation to remove unwanted water vapour. Once high levels of moisture exist in a roof space the consequence of poor installation, inappropriate materials and or poor construction details further increase issues associated with condensation.

KEY WAYS TO MINIMISE CONDENSATION IN ROOF SPACES

1. Extraction systems which duct moist air outside the building.
2. Installing roof cavity ventilation to allow the removal of water vapour from the roof space.
3. Maintaining the natural ventilation of the roof space by ensuring insulation and membranes do not block ventilation paths.
4. Providing roof level insulation, such as blanket and foil, particularly in cooler climates.

VENTILATION OF ROOF SPACES⁽⁴⁾

NCC 2022 NCC Housing Provisions clause 10.8.2 (2) outlines that “Exhaust from a kitchen, kitchen range hood, bathroom, sanitary compartment or laundry must discharge directly or via a shaft or duct to outdoor air.”

Clause F8D5 (Vol 1) 10.8.3(Housing Provisions) Ventilation of roof spaces further outlines that

- (1) In climate zones 6, 7 and 8, a roof must have a roof space that—
 - (a) is located—
 - (i) immediately above the primary insulation layer; or
 - (ii) immediately above sarking with a vapour permeance of not less than 1.14 µg/N.s, (Class 4) which is immediately above the primary insulation layer; or
 - (iii) immediately above ceiling insulation that meets the requirements of 13.2.3(3) and 13.2.3(4); and
 - (b) has a height of not less than 20 mm; and
 - (c) is either—
 - (i) ventilated to outdoor air through evenly distributed openings in accordance with Table F8D5 / 10.8.3; or
 - (ii) located immediately underneath the roof tiles of an unsarked tiled roof.
- (2) The requirements of (1) do not apply to a—
 - (a) Concrete roof; or
 - (b) roof that is made of structural insulated panels; or
 - (c) roof that is subject to Bushfire Attack Level FZ requirements in accordance with AS 3959.

ROOF SPACE VENTILATION REQUIREMENTS

Roof pitch	Ventilation openings
< 10°	25,000 mm ² /m provided at each of two opposing ends
≥ 10° and < 15°	25,000 mm ² /m provided at the eaves and 5,000 mm ² /m at high level
≥ 15° and < 75°	7,000 mm ² /m provided at the eaves and 5,000 mm ² /m at high level, plus an additional 18,000 mm ² /m at the eaves if the roof has a cathedral ceiling

Table Notes

- (1) Ventilation openings are specified as a minimum free open area per metre length of the longest horizontal dimension of the roof.
- (2) For the purposes of this Table, high level openings are openings provided at the ridge or not more than 900 mm below the ridge or highest point of the roof space, measured vertically.

ROOF VENTILATION SYSTEMS

Roof space ventilation is important to help keep the roof space dry by allowing water vapour that passes into the roof space to escape. Roof space ventilation provided by passive means can be effective to manage condensation risk in the majority of buildings. Passive ventilation can be achieved by natural ventilation of the roof space via unobstructed ventilation paths entering and exiting around the roofing perimeter, ridges and hips through open metal profiles and gaps. Passive ventilation can be supplemented where required to provide higher performance through additional eave, ridge and or roof vents. Powered ventilation, including solar, can be used to assist in higher risk climates or buildings.

There are a number of rooftop ventilations systems available that can be used to meet the requirements of the NCC.

These include:

- Turbine style ventilators – these are also known as “whirlybirds” and are a semi-mechanical vent comprising a cylindrical dome with fins that spin in the wind creating a vacuum, drawing out air from the roof cavity. Various brand names are readily available and also supplied by Lysaght.
- “Ridge Vent” systems – Ridge vents have been widely used throughout Europe for many years and comprise an integrated addition under the ridge vent that utilises natural upward air flow facilitated by air intake via soffit vents that draws air through the roof cavity and out the (slightly) raised ridge. VENT-A-ROOF® is a leading example of this technology providing up to 19,008mm²/m of ventilation, and is available from Lysaght.
- Roof fan systems – a wide variety of solar and mains powered ventilation fans systems are available.

References

1. HIA Information Sheet Ref: BCA 20-11 – Condensation management NCC 2019 changes explained
2. EPA 402-F-13053 : Moisture Control Guidance for Building Design, Construction and Maintenance
3. CBOS: Condensation in Buildings – Tasmanian Designers’ Guide - Version 2
4. ACBC Handbook: Condensation in build

PRODUCT DESCRIPTIONS

- All descriptions, specifications, illustrations, drawings, data, dimensions, and weights contained in this publication and websites containing information from Lysaght are approximations only. They are intended by Lysaght to be a general description for information and identification purposes and do not create a sale by description. Lysaght reserves the right at any time to:

(a) Supply goods with such minor modifications from its drawings and specifications as it sees fit, and

b) Alter specifications shown in its publications and websites to reflect changes made after the date of publication.

DISCLAIMER, WARRANTIES AND LIMITATION OF LIABILITY

- This publication is intended to be an aid for all trades and professionals involved with specifying and installing LYSAGHT® products and not be a substitute for professional judgement.
- Terms and conditions of sale are available at lysaght.com/terms
- Except to the extent to which liability may not lawfully be excluded or limited, BlueScope Steel Limited will not be under or incur any liability to you for any direct or indirect loss or damage (including, without limitation, consequential loss or damage such as loss of profit or anticipated profit, loss of use, damage to goodwill and loss due to delay) however caused (including, without limitation, breach of contract, negligence and/or breach of statute), which you may suffer or incur in connection with this publication.

FOR DETAILED PRODUCT INFORMATION,
MANUALS AND PROJECT CASE STUDIES VISIT:

[WWW.LYSAGHT.COM](https://www.lysaght.com)

VENT-A-ROOF® is a registered trademark of Vent-A-Roof Oz Pty. Ltd.

LYSAGHT® and ® product names are registered trademarks of BlueScope Steel Limited and ™ product names are trademarks of BlueScope Steel Limited. © 2023 BlueScope Steel Limited. ABN 16 000 011 058. All rights reserved.

INSPIRATION TO BUILD BETTER

LYSAGHT