Condensation mitigation

What are the proposed changes?

We are proposing further changes to NCC Volume One and the Housing Provisions Standard[1] (Housing Provisions) to better manage the risk of condensation in residential and residential-type buildings.

These include changes to 4 main areas:

- External walls in climate zones 1 to 5
- External walls in climate zones 6 to 8
- Roof ventilation openings
- Application of the requirements to hotels, hostels etc. (Class 3 buildings) and aged-care buildings (Class 9c buildings).

External walls in climate zones 1-5

In these climate zones, if an external wall has a drained and vented cavity, we're proposing the Deemed-to-Satisfy (DTS) Provisions require any control layer, sheathing or water barrier incorporated into the external wall achieve a certain vapour permeance. (Table F8D3 in Volume One and Table 10.8.1 of the Housing Provisions).

Note that vapour permeance is the degree that water vapour can diffuse through a material.[2]

[1] The Housing Provisions are referenced in NCC Volume Two and apply to houses (Class 1 buildings).

[2] Vapour permeance is measured in µg/N.s and tested in accordance with the ASTM-E96 Procedure B – Water Method at 23°C 50% relative humidity.

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Some types of external wall constructions will be exempt from this change. (F8D3(5) and 10.8.1(5) of the Housing Provisions).

External walls in climate zones 6 to 8

For external walls in these climate zones, we're proposing the DTS Provisions require:

1. an external wall to have a drained and vented cavity (F8D3 and 10.8.1 of the Housing Provisions).
2. any control layer or barrier installed between the exterior side of the primary insulation layer and the cladding to have the equivalent of Class 4 vapour permeance (as defined in AS 4200.1) (F8D3(2) and 10.8.1(2) of the Housing Provisions).

Roof ventilation openings

For ventilation of roof space, we're proposing to extend the current roof ventilation requirements to climate zones 4 and 5.

In addition, there are separate roof space ventilation requirements depending on whether a roof has a ceiling parallel or not parallel to the roof plane (F8D5 and F8D6 in Volume One) and (10.8.3 and 10.8.4 of the Housing Provisions)

Note, the proposed changes to 10.8.3 of the Housing Provisions also include an example in an 'Explanatory Information' box to show how to calculate high- and low-level ventilation openings.

Application

For condensation management in Part F8 of Volume One, we're proposing to extend the application to hotels, hostels and the like (Class 3 buildings) and aged care-buildings (Class 9c buildings) (F8P1).

Why are these changes proposed?

Condensation and subsequent mould growth in the residential parts of buildings presents health risks to occupants and can degrade building elements prematurely. These proposed changes aim to minimise these issues by aligning the NCC with approaches, as practicable as possible, with other international codes and standards in jurisdictions with similar climatic conditions.

External walls

Lessons learned from local and international building failures, and feedback from stakeholders indicates underlying condensation risks for external walls in some climate zones. The proposed

changes to F8D3 of Volume One and 10.8.1 of the Housing Provisions, for external wall construction, aim to reduce these risks.

Roof ventilation openings

The proposed changes to F8D5 of Volume One and 10.8.3 of the Housing Provisions, to ventilate roof spaces, is in response to concerns raised by NCC users. These concerns include the need for clarification to prevent misinterpretation and practical limitations when complying with the current requirements in NCC 2022. (e.g., cavity height, roofs without eaves, etc.).

Emerging evidence and modelling also indicates roof systems in climate zones 4 and 5 are particularly susceptible to condensation and mould.

The proposed changes aim to clarify the intent of the current provisions which require evenly distributed openings. This will ensure better alignment with practical design and construction approaches used in Australia.

Application

The current requirements for external wall construction, roof space ventilation and exhaust systems are proposed to be extended to hotels, hostels and the like (Class 3) and aged-care buildings (Class 9c buildings) in response to concerns raised by stakeholders. A growing number of these buildings are experiencing condensation issues due to higher occupant densities, smaller room sizes and infrequent use of windows to ventilate spaces.

How were the changes developed?

The proposed changes stem from a 2016 scoping study. To ease the burden on industry, the study suggested a gradual implementation of new DTS Provisions. The first set of condensation measures was introduced in NCC 2019, followed by a second set in NCC 2022.

Lessons learned from local and international building failures, feedback from stakeholders, and hygrothermal modelling have revealed hidden risks that could still lead to damage caused by condensation and mould in some buildings. In addition, most condensation-related issues are hidden and might not be noticed for a long time. To gather evidence and identify common trends in buildings experiencing condensation issues, we engaged with a number of experts and key stakeholders.

In particular, given the complexity and the number of variables impacting water vapour movement in buildings, we engaged with building physics experts. They helped us to undertake hygrothermal simulations, a climate sensitivity study and a literature review.

Who has been involved?

The proposed changes were developed in consultation with a Technical Reference Group (TRG) that included industry members, academic institutions and state and territory governments. We also consulted with our peak technical committee and the Building Codes Committee (BCC).

We also worked with experts from other relevant fields (e.g., energy efficiency, fire safety, etc.) to mitigate unintended consequences to other parts of the code resulting from the proposed changes.

What are the impacts?

We engaged consultants to undertake impact (cost-benefit) analysis of the proposed changes to mitigate condensation.

The findings of the impact analysis show there's a net benefit of $400 million nationally, but it varies across the country by climate zone and depends on whether a wall has a cavity or not.

The tropical (climate zone 1) and cooler climates (climate zones 5-8) show a significant overall benefit. In these climate zones, walls with a drained and vented cavity show a total net benefit of $217 million and walls without a cavity shows a net benefit of $500 million.

In warmer climates (non- tropical, climate zones 2-4), it shows a net cost due to the modelling predicting a lower baseline risk. In these climate zones, walls with a drained and vented cavity show a net cost of $259 million.

Indirect benefits of the proposed changes have positive significant health benefits due to less bronchitis, asthma and upper respiratory tract symptoms. In addition to economic benefits, the proposed changes to the external wall provisions find a balance between community expectations, technical merit and practicality. They are relatively easy to implement and allow practitioners some flexibility when designing and building external walls.

The proposed changes to better ventilate roof spaces provides alignment with design and construction approaches for roof spaces in Australia. This will make it easier for practitioners to comply with the DTS Provisions and ensure consistency in interpretation.

More information and relevant links

- Final report - Stage 3 Condensation Mitigation Measures – Phase 2 Impact Analysis
- Condensation Mitigation Modelling: Final report
- Condensation mitigation Impact Analysis placemat

To read the full details of the changes, please review the NCC 2025 Volume One and Two, and the Housing Provisions Standard PCD.

Want to provide feedback?

Responses to the Public Comment Draft are invited until **11:59 PM AEST Monday 1 July 2024**.

In line with the ABCB's process for undertaking public consultation, comment will only be accepted through the ABCB's online Consultation Hub.

To access the Public Comment Draft and response form:

1. Download the NCC volume(s) you wish to view and provide comment. You can also download the *supporting information* PDF for detailed information on the more significant/complex changes.
2. Download the response form.

Once you've reviewed the draft, complete the response form, and include your feedback on the suggested changes to the NCC.

To submit your comments:

1. Enter our Public Comment Draft consultation hub.
2. Start by agreeing to the privacy statement.
3. Let us know if you'd like your submission published publicly.
4. Enter your contact details.
5. Upload your completed form in .doc format (please make sure each file is under 25MB) and submit.