NCC Public Comment Draft
Response Sheet

This response sheet is to be used for submitting responses to the National Construction Code (NCC) 2022 Public Comment Draft.

How to use this response sheet

1. Provide your details including name, organisation and contact details.
2. Provide your response(s) to the Public Comment Draft. For each response you should include—
   - the relevant NCC volume(s) that your response relates to by clicking in the appropriate box(es);
   - the "**Clause/Figure/Table**" that you are responding to, e.g. J6D3(1)(a), Housing Provision Figure 7.2.3 or Table C2D2;
   - your "**recommended change to draft**", e.g. it is recommended that the proposed drafting to J6D3(1)(a) be amended as follows…(*see example*);

     If you are not recommending a change, insert "N/A" in this field;
   - your "**comments/reasons for change**". This should include justification to support your recommended change, e.g. heaters that emit light do not need to be excluded because these heaters have already been exempted by J6D3(3)(d) (*see example*).

     If you are including multiple "**comments/reasons**", use dot points or a numbered list.
3. Submit your response using the online response form on the ABCB website.

Notes:

Completing all relevant fields will help to describe what change in the Public Comment Draft you are commenting on, what your alternative change is and why it should be made.

This response form is to only be used for submitting responses to proposed NCC amendments contained within the NCC 2022 Public Comment Draft. If you wish to make comments or a submission on documents that have been released with the Public Comment Draft, please follow the instructions accompanying that document.

ABCB

Example

Your details

Name: John Smith

Organisation: ABC Building and Plumbing

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Response(s)

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: J6D3(1)(a)

Recommended change to draft:

It is recommended that J6D3(1)(a) be amended as follows—

(1) In a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building—

(a) the *lamp power density* or *illumination power density* of artificial lighting~~, excluding heaters that emit light,~~ must not exceed the allowance of—

(i) 5 W/m^2 ~~-~~within ~~the building~~ a *sole-occupancy unit*; and

(ii) 4 W/m^2 on a verandah, balcony or the like attached to ~~of the building~~ a *sole-occupancy unit*; and

Comment/reason for change:

1. heaters that emit light do not need to be excluded because these heaters have already been exempted by J6D3(3)(d); and
2. replacement of “the building” with “a sole-occupancy unit” clarifies that the provisions only apply to sole-occupancy units and attached verandahs, balconies or the like, and not the entire building.

ABCB

Response Sheet

Your details

Name: Tony Gleeson

Organisation: AIRAH

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Response(s)

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8D4

Recommended change to draft:

1) Implement either of the following:
    a. Amend F6D6 to permit continuous operation options F8D4(a)(ii) and F8D4(b)(ii), or
    b. Add a NOTE below F8D4(1) reminding designers that when a mechanical exhaust system is required by F6D6, then the continuous operation options in this clause are not permitted.
2) Introduce an exemption for mandatory self-sealing devices in J5D6 where continuous operation is permitted.
3) Coordinate with Standards Australia for these prescriptive ventilation requirements to be transferred to their natural home (AS 1668.2) during the 1668 revision project, in readiness for a suitable DTS signpost reference in NCC 2025.

Comment/reason for change:

While F8D4 itself does not require an exhaust, if F6D6 does require this, then options F8D4(a)(ii) and F8D4(b)(ii) are currently prohibited by the existing DTS requirements. Many designers are likely to miss the subtle detail in this application.

Non-return dampers are typically high-resistance devices that add to the energy use of fans installed in these systems. To save energy (and capital cost), these should be omitted where there is no expectation that the systems will remain idle for extended periods.

For reference:

- When a domestic bathroom is required to be mechanically exhausted in accordance with AS 1668.2, the exhaust flow rate may not be less than 25 L/s per room (refer to Clause 3.2.1)
- AS 1668.2 also requires ventilation systems to be operable to suit the building occupancy (refer to Clause 1.7).

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8D4

Recommended change to draft:

Adopt a definition for “exhaust”, or add a NOTE before Clause F8D4 to avoid deliberate misinterpretation.

Comment/reason for change:

From AS 1668.2:

> *1.4.10 Exhaust air - Air, other than return air, removed from an enclosure by mechanical means and discharged to atmosphere.*

So, if it is not “discharged to atmosphere”, then it is not “exhaust air” in accordance with AS 1668.1 (as familiar to most mechanical services designers). A deliberate misinterpretation of this would allow recirculating rangehoods to be used.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8D4(3)

Recommended change to draft:

An exhaust systems that is operated on demand and serving…

Comment/reason for change:

Amend clause to accommodate continuous operation options in F8D4(a)(ii) and F8D4(b)(ii).

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8D4(3)(b)

Recommended change to draft:

Amend as follows:

(b) include either:

(i) a run-on timer… [as per draft text]; or

(ii) automatic humidity sensing control so that it continues to operate while the moisture level is above the design set-point.

Comment/reason for change:

Provide an option to omit an interlocked run-on timer, where active humidity control of the ventilation is provided.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8D4(3)&(4)

Recommended change to draft:

Remove “that is not naturally ventilated”

Comment/reason for change:

Suggesting that mechanical exhaust ventilation is a mandatory requirement for all kitchen and bathroom/toilets to AS1668.2 with transfer air into ventilated room and that provision of a window is not a suitable alternative.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8D4

Recommended change to draft:

Add requirement for provision of an outdoor air supply system to other than Class 1 buildings and that provision not be linked to air tightness outcomes.

Comment/reason for change:

This may have unintended consequences of builders making deliberately “leaky” buildings to avoid the mechanical ventilation installation. Operation to be continuous in balance of amenities ventilation and may be intermittent in balance of kitchen ventilation.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table F8D4

Recommended change to draft:

≤ 20

> 20 and ≤ 40

> 40 and ≤ 60

> 60 and ≤ 80

> 80 and ≤ 100

> 100

Comment/reason for change:

Airflow rates in the left-hand column are shown incorrectly.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table F8D4

Recommended change to draft:

Right-hand column heading:

Make-up air requirement for all doors ⟨700mm wide

and

Final row, left-hand column:

> 100 and for all doors < 700mm wide

Comment/reason for change:

Doors ⟨700mm wide will not exceed 12Pa pressure drop across listed undercuts (which satisfies clause 3.8 in AS 1668.2). Narrower doors require further assessment, which remains DTS.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table F8D4

Recommended change to draft:

Remove undercut provisions greater than 20mm.

Comment/reason for change:

Transfer duct required for larger airflows to maintain minimum reasonable privacy of compartment.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: J1P1

Recommended change to draft:

A building must have appropriate features that facilitate incorporation of renewable energy and electric vehicle charging equipment.

Comment/reason for change:

Including “appropriate” is consistent with other performance requirements and prevents use of “inappropriate features”.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: J1V4(2)

Recommended change to draft:

Add:

(d) the sole occupancy unit must be provided with automatic pressure relief capability to limit door opening forces during a fire.

Comment/reason for change:

Refer to *PFC Adequate protection against smoke spread via air-handling systems* (from the yet to be considered list) for relevant fire engineering advice and factors contributing to deaths in increasingly airtight construction.

Subject to fire engineering validation, consider a prescriptive pressure relief size/capability relative to the volume of an SOU (by table or equation).

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: J1V4(2)(iii)

Recommended change to draft:

Plan to transfer prescriptive ventilation requirements to AS 1668.2 as part of a revision project, in readiness for adoption in NCC 2025.

Comment/reason for change:

Prescriptive ventilation requirements should be published in one place.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: J1V5

Recommended change to draft:

Is this a candidate for a separate publication?

Comment/reason for change:

This is almost a small specification or booklet for an optional portion of a design.

ABCB's online Resource Library seems like a natural home for a range of (optional) verification methods like this example, that could be developed and published over time (potentially outside the three-year cycle).

A new "Verification Methods" page under "Resource Library" would make these very easy to find on the new website.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: J3D3

Recommended change to draft:

Add a NOTE:

The requirements of J3D3 relate to the thermal performance of the building and not the capability of heating and cooling systems that might be used to provide occupant comfort.

Comment/reason for change:

To avoid confusion, or any expectation that air conditioning systems are a suitable fix for poor envelope design.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Part J5 – Introduction to this Part

Recommended change to draft:

This part contains… ~~and improve the efficiency of its air-conditioning systems~~ and reduce the energy consumption of any installed air conditioning systems.

Comment/reason for change:

Air conditioning is not a mandatory provision, and the goal should be a reduction in energy, not an improvement in efficiency (which is a technological matter, not necessarily affected by a building's sealing).

Moisture management provisions

Increasing insulation, reduced eave depth and lighter coloured cladding all have adverse impacts on the potential for condensation behind cladding systems and sarking-type-materials. Where the energy-efficiency provisions favour these options, there needs to be considered attention to the opposite effects of increased risk of rain penetration, increased humidity behind weatherproofing layers, and potential for mould growth.

There are substantial international failures attributed to all these factors, rain ingress around windows not properly protected from weather, and humid air trapped behind vapour barrier materials due to rain or due to indoor humidity and exterior climate conditions.

This relationship between energy efficiency and moisture has been experienced in Europe, United Kingdom, North America and New Zealand to name a few:

- The Sick Building Crisis EU
- The Canadian Condo Crisis
- The “Stuccopocalypse” in USA
- The Leaky Building Crisis in New Zealand
- The Commonwealth of Australia Inquiry into Biotoxin Related Illness.

This relationship and the perverse outcomes have been well studied and solutions derived. There are too many research papers to list here.

At best the provisions are a step in the right direction, but we should not consider them complete until drainage cavities, ventilated cavities, vapour control layers and continuous mechanical ventilation are mandatory parts of the code provisions.

The condensation provisions show good signs of improvement, but there are a few issues that are outstanding that may lead to the vapour permeability requirements not having the desired effect of mitigating condensation damage related issues. The allowance of direct fixed cladding systems particularly, in the colder climates 6,7 and 8, raises big concerns for weatherproofing, condensation management and healthy building outcomes.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8D3/10.8.1 Wall Construction

Recommended change to draft:

Applicability of this clause should be extended to at least include Class 3, Class 5, Class 6, Class 8 and Class 9.

Hotels and aged care are often most susceptible to condensation issues due to 24-hour internal moisture generation and lack of occupant-controlled ventilation compared to other classes of buildings.

Perforated “sarking-type materials” must not be allowed by this clause; they may be “vapour permeable” but they will not be weatherproof. Perforated “sarking-type materials” should also be explicitly disallowed in the Weatherproofing section (in Part F1 of NCC 2019) wherein weatherproofing systems must be required to meet Water Barrier and Air Barrier Designations in AS 4200.1-2017 to be effective in their purpose under driving rain conditions.

Include rigid board systems in this clause. Additional clauses should appropriately direct when rigid board systems should be used to support pliable membranes, or the board used as the weatherproofing layer itself. Either a height limit, or a design wind speed criteria (for

example the NZBC required 6mm FC sheet or plywood above 50m/s design wind speed) must be introduced to enforce rigid board systems used for weather proofing. Identical permeability criteria should be mandated for rigid board systems.

Introduce “attachment 3” wording from condensation working group for proper consideration of direct fixed cladding systems when placed over a vapour permeable membrane (or a rigid weatherproofing layer).

Comment/reason for change:

It is not logical to only apply the vapour permeability requirements to Class 1, Class 2 and Class 4 buildings. The same issues apply across all building classes. After all, the buildings where our children learn and where sick people heal should not have mouldy walls. Therefore, it is strongly recommended that the vapour permeability requirements be extended to walls for offices, schools, hotels, health, and aged care.

Perforated "sarking-type-materials" are not fit for purpose for their primary function of weatherproofing. They are vapour permeable, so technically will meet permeability requirements. More holes and bigger holes can make them highly permeable, but they will not be weatherproof. Our experience is that when perforated foil is used as the weatherproofing layer, it does not pass a full scale AS/NZS 4284 weather test. This needs to be picked up in the weatherproofing section of the code. Weather proofing systems must meet Water Barrier and Air Barrier Designations in AS 4200.1-2017.

The permeability requirements as currently worded ignore the fact that rigid boards systems are often used for weather proofing in high wind zones and high-rise residential. These boards are commonly metal sheets, which form a vapour trap. Product solutions exist that are vapour permeable, including fibre cement Rigid Air Barrier systems (Australian made) that should be used instead of metal sheet systems in all climates (CZ 4-7) that have been identified as risky. In addition, there is no clear criteria when pliable membranes should be superseded by rigid board (aka. Rigid Air Barrier, RAB) for waterproofing reasons. The NZBC states 50m/s design wind speed when a rigid board must be used. Allowing flexible membrane to be used in high wind zones is likely to result in long term weather proofing issues and the next "Australian Leaky Building Crisis".

Flexible membranes have been singled out as the only product for which vapour permeability matters. In circumstances where direct fixed cladding systems are placed over a vapour permeable membrane (or a rigid weatherproofing layer), the permeability of the cladding and any coating systems (paints or renders) matter hugely to deliver a good outcome. This issue can be solved quite easily by including the wording discussed in the condensation working group, known as "attachment 3". This encompasses vapour permeability requirements for all materials into the discussion when they are directly fixed to the framing. It will eliminate metal sheets fixed directly over a vapour permeable membrane as an allowable solution, which is clearly poor design.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F6D5 Clause 10.8.3 Ventilation of Roof Spaces

Recommended change to draft:

For Flame Zone Roof systems compliant with BAL-FZ AS3959, require addition of airtight vapour control layer on the inside of the roof structure.

Add sub-clause with the requirement for ventilation to be provided above the vapour permeable roofing membrane (between cladding and membrane) for cathedral/skillion roofs.

Confusing wording of section 10.8.3 (ventilation of roof spaces) does not make it clear where the ventilation needs to be in all roof typologies and cladding types. This should be made clearer.

Add in clause that adds a third OR option:

10.8.3 (c) (iii) the ventilated roof space is located between the roof cladding and a sarking-type material that has a vapour permeance of not less than 1.14µg/N.s.

Comment/reason for change:

Flame Zone roofing must be included in this clause. This is where the "condensation" issues first arose due the roof space “sealing requirements for ember protection. This resulted in the first discussions almost 10 years ago. When AS 3959 became codified, the mould in roof spaces skyrocketed. Lighter coloured roofs have a higher risk of rotting or creating mould on the 15mm plywood required in this system. The only way to effectively make a BAL-FZ AS3959 roof system condensation management work is to include an airtight vapour control layer on the inside of the roof/ceiling structure.

For cathedral or skillion roofs the existing condensation requirements promote ventilation in cathedral roofing through the rafter structure. Since condensation is worst in winter in the cold climates, it makes no sense to ventilate through the insulation layer in winter, to remove moisture. This has been researched and reported by various international building science research organisations over many decades, including BBA, Building Science Corporation, and the Fraunhofer Institute for Building Physics. The clause should remove the requirement to ventilate the air void under the membrane in cathedral/skillion roofs. The ventilation should instead be located above the (AS/NZS 4200.1 class 3 or 4) vapour permeable roofing membrane. i.e., between the cladding and the membrane.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: F8V1 Condensation

Recommended change to draft:

This clause to be transferred to Volume 2, as well as a performance verification method for innovative construction systems.

Some construction systems that may be analysed with wet construction materials which have not been protected from rain will have high initial moisture content (double the equilibrium moisture content at 80%RH) in the systems as per AIRAH DA07. These construction systems which contain materials that absorb water such as timber and timber boards can easily lead to a mould growth index exceeding 3 in the first few years of simulation, then settle back down to zero or near zero. These systems have high drying potential and could be considered good systems, but fail the verification.

Comment/reason for change:

The requirement should be reworded to say for the first 10 years of operation and remove the “from the 5th year onwards.” The solution to solve early failure should be to protect the structure from wetting, in which case even with these system with high hygric capacity should not fail when they have properly designed material layers.

NCC Volume(s): ☒ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table J3D7b: Pitched roof with flat ceiling — minimum R-Value for ceiling insulation: climate zone 1

Recommended change to draft:

The use of light-coloured roof and the use of low-emittance foils need to be explicitly addressed in the condensation provisions.

Comment/reason for change:

Where less than 0.32 solar absorptance is used, the night-time and wintertime temperatures will be cooler during night-time reradiation effects. Low-emittance foil facing downward also makes the cladding and the membrane itself colder at night under night-time re-radiation effects.

Incentivising lower solar absorptive claddings is good, but the condensation management needs to be addressed. Proper drainage layers below the cladding and removal of condensate occurring from the back of the roof cladding needs to be factored into the equation.

NCC Volume(s): ☐ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table 13.2.5c: Brick veneer walls – minimum requirement for insulation R-value – climate zone 2

Recommended change to draft:

Light-coloured brickwork reduces the night-time and wintertime temperatures of the cladding. This needs to be considered for side effects in condensation management.

Comment/reason for change:

The table drives the reader to lighter-coloured claddings. Light-coloured cladding leads to an overall lower external temperature on average. It's the long-term averages that drive moisture and mould issues. This needs to be considered for the effects on condensation management.

NCC Volume(s): ☐ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table 13.2.5k: Brick veneer wall – minimum requirement for insulation R-value – climate zone 6

Recommended change to draft:

Remove options that have less than 450mm eaves and include the insulation R-value required at higher eave depths.

Comment/reason for change:

Eaves provide better rain protection and are a critical part of protecting windows from driving rain. The table is driving design to no eaves and dark-coloured cladding, leading to increased rain load and a risk of water penetration. This could have significant consequences, considering the New Zealand leaky building crisis.

Insulation can be increased above R2.7 by including 140mm studwork. This allows up to R4.0 insulation to be included. Exterior insulation layers can also be added over the studwork. There is no reason to stop at R2.7 value and restrict the use of higher R-values.

NCC Volume(s): ☐ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table 13.2.5m: Brick veneer wall – minimum requirement for insulation R-value – climate zone 7

Recommended change to draft:

Remove options that have less than 450mm eaves and include the insulation R-value required at higher eave depths.

Comment/reason for change:

Eaves provide better rain protection and are a critical part of protecting windows from driving rain. The table is driving design to no eaves and dark-coloured cladding, leading to increased rain load and a risk of water penetration. This could have significant consequences, considering the New Zealand leaky building crisis.

Insulation can be increased above R2.7 by including 140mm studwork. This allows up to R4.0 insulation to be included. Exterior insulation layers can also be added over the studwork. There is no reason to stop at R2.7 value and restrict the use of higher R values.

NCC Volume(s): ☐ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table 13.2.5o: lightweight wall – minimum requirement for insulation R-value – climate zone 8

Recommended change to draft:

Remove options that have less than 450mm eaves and include the insulation R-value required at higher eave depths.

Comment/reason for change:

Eaves provide better rain protection and are a critical part of protecting windows from driving rain. The table is driving design to no eaves and dark-coloured cladding, leading to increased rain load and a risk of water penetration. This could have significant consequences, considering the New Zealand leaky building crisis.

Insulation can be increased above R2.7 by including 140mm studwork. This allows up to R4.0 insulation to be included. Exterior insulation layers can also be added over the studwork. There is no reason to stop at R2.7 value and restrict the use of higher R-values.

NCC Volume(s): ☐ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: Table 13.2.5v Brick veneer steel-framed walls – thermal bridging mitigation climate zone 1-3

Recommended change to draft:

Remove the option for reflective pliable moisture permeable membrane on the external side. Remove options for relative wrap in combination with >R1.5 fibrous insulation in studs.

Comment/reason for change:

A reflective pliable moisture permeable membrane with an outward facing emissivity of 0.1 does not exist and cannot be manufactured to date.

The options for using more than R1.5 insulation and reflective wrap need to have thresholds placed on them for use in climate zones 2 and 3. Class 1 vapour barriers need to be assessed when used in combination with fibrous insulation, eve in climate zone 1.

NCC Volume(s): ☐ One ☐ Two ☐ Three ☐ Housing Prov. ☐ Livable Housing

Clause/Figure/Table: H6V2 Verification of building envelope sealing

Recommended change to draft:

(1) "Where an ~~air change rate of not more than 5 air changes per hour~~ air permeability of not more than 5 m3/hr.m2 at 50 Pa reference pressure is achieved

(a) The building must be provided with a mechanical ventilation system that – "

(i) Can be manually turned off; and

(ii) Has controls including text or a symbol including their function; and

(iii) Provides outdoor air, either –

…

(d) Local exhaust or supply fans are permitted to serve as such a system when they are designed and installed to run continuously and at a sound level of less than 28 dB.

Comment/reason for change:

Airtightness in the NCC should be in terms of envelope permeability, not ACH50.

The mandatory language of "must" (H6V2 (1)(a)) may seem to disincentivise testing for airtightness. If you test, you run the risk that you built tighter than expected, and you will have to install ventilation that you didn't provide for. Nevertheless, a building my relatively harmlessly be made leakier if this were a concern. In addition, if at all concerned, inexpensive and very efficient and quiet fans are available that will meet requirements for intermittent ventilation (2019: Part 3.8.5).

The term "outdoor air" may imply that direct supply is required, but makeup air for an exhaust-only system through gaps and cracks in the building envelope should be adequate for all but the tightest of buildings. The language suggested is similar to International Residential Code 2021 (M1505.4.1 System design) to allow simple continuous fans to satisfy this requirement.

https://codes.iccsafe.org/content/IRC2021P1/chapter-15-exhaust-systems#IRC2021P1_Pt05_Ch15_SecM1505.4

The 28 dB sound rating comes from a conversion of 1.0 sone which is required for continuous ventilation in ASHRAE 62.2-2019 (7.2.1).

A "double-duty" bath fan is the most common method in the U.S. for satisfying the requirement for continuous and intermittent ventilation. There are many models in Australia that are designed to run continuously at the low flow rate to meet H6V3 (1)(a)(iii) as well as higher flow rates required for intermittent exhaust (2019: Part 3.8.5). One example is a Panasonic WhisperCeiling fan which is in wide distribution in this country.

Note that the IRC 2021 *requires both* a building envelope permeability of less than 5 or 3 m3/hr.m2 AND continuous ventilation. There is no floor for airtightness (you can build as tight as you want) but you always must have continuous balanced or unbalanced ventilation.