

S183106-MDL-02-1 Response to IPC on Trickle Ventilation System

24 July 2019

Kim Gray  
St George Community Housing  
Level 5, 38 Humphreys Lane  
Hurstville NSW 2220

Dear Kim,

**Re: 11 Gibbons Street, Redfern**  
Response to IPC on Trickle Ventilation System

This letter is in response to a query from the Independent Planning Commission (IPC) on the ventilation and acoustic performance for the trickle ventilation system serving all apartments.

Northrop Engineers has specified the performance requirements for a trickle ventilation system *to be of make AWS or approved equivalent. Trickle ventilation system shall be complete with sound box with no filter having a ventilation openable area of 0.067m<sup>2</sup> and 12Pa pressure differential across the ventilator.* This detail is typical for all apartments to provide make-up air or relief air depending on the mechanical use of each apartment.

The trickle ventilation system is designed to serve the Living/Dining room. It provides make-up air for the mechanical exhaust serving toilet/laundry and kitchen rangehood. This make-up air path to be treated as providing mechanical outside air to the Living room. The system also provides relief air from the Central Outside Air System when all mechanical exhaust systems are inactive. This trickle ventilation system provides compliant outside air to the Living room in accordance with BCA 2019, whilst complying with the minimum acoustic requirements within the space.

Appendix A outlines the mechanical design of three typical apartments with the trickle ventilation system shown in the Living room.

Two trickle ventilation manufacturers have been recommended, *Renson Invisivent Evo HF* and *AWS Ventient*, and their relative manufacturers specifications are located in Appendix B and Appendix C. The final trickle ventilation system is to be of listed make or approved equivalent.

Yours faithfully,

**George Harris**  
Mechanical Engineer  
BE (Mechanical) BBus

On behalf of Northrop Consulting Engineers Pty Ltd



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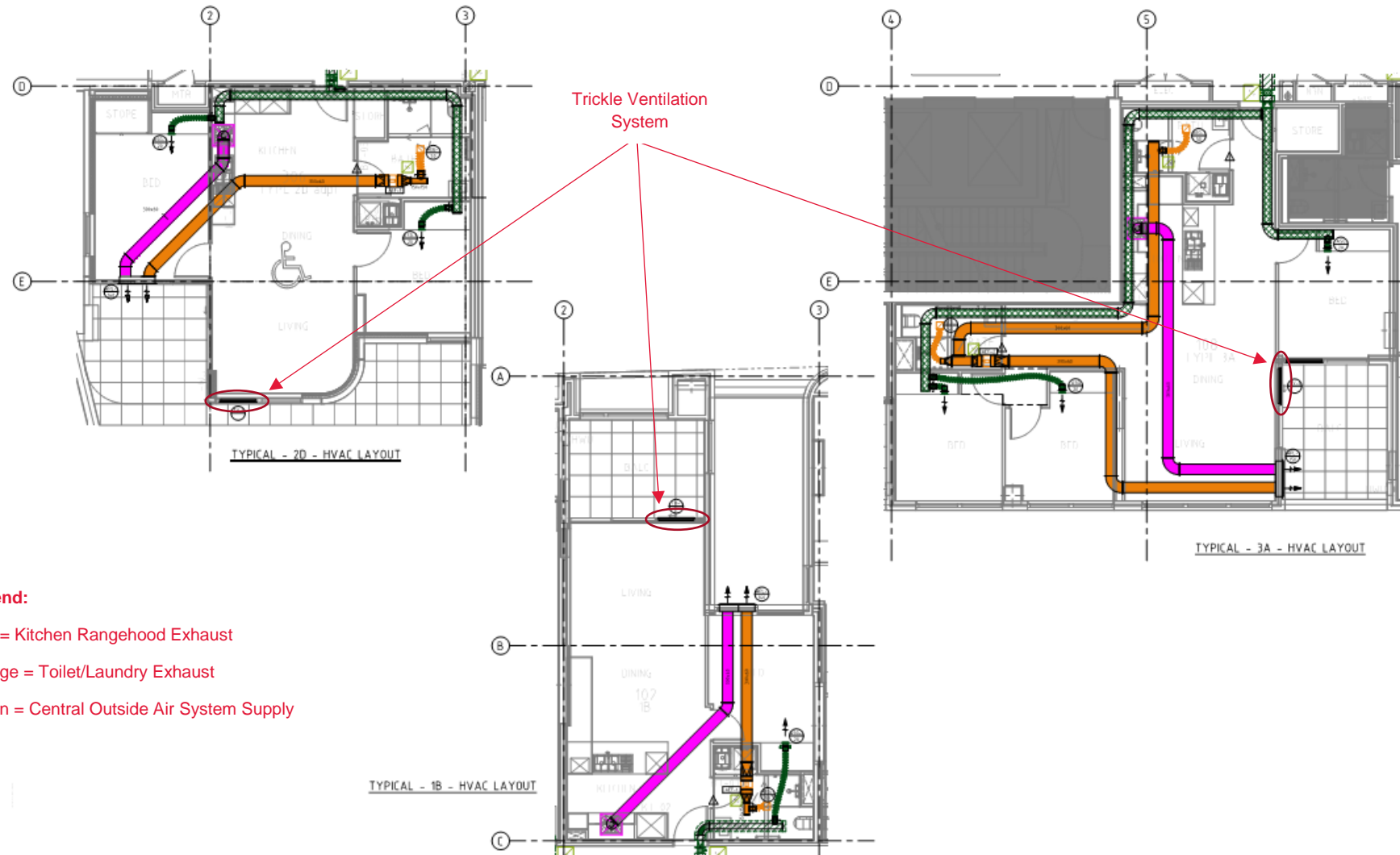
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# Appendix A

## Typical apartment layout for the mechanical design



**Legend:**

Pink = Kitchen Rangehood Exhaust

Orange = Toilet/Laundry Exhaust

Green = Central Outside Air System Supply



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# Appendix B

## Renson Invisivent Evo HF equipment specification



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# INVISIVENT<sup>®</sup>EVO HF

The most discrete, self-regulating overframe flap ventilator with higher airflow

OVERFRAME

SELF-REGULATING I-FLUX

THERMALLY BROKEN

30% MORE AIRFLOW



## INTRODUCTION

The Invisivent<sup>EVO</sup> HF delivers 30% more airflow than the regular Invisivent<sup>EVO</sup>. This version of the Invisivent<sup>EVO</sup> has been specifically developed for use in spaces with small windows where sufficient airflow must be achieved, and is ideal for ensuring sufficient fresh air in rooms with high occupancy such as classrooms. In closed position there is no visual difference between the Invisivent<sup>EVO</sup> HF and Invisivent<sup>EVO</sup>, so both models can be used in the same building.

## INSTALLATION ON TOP OF THE WINDOW FRAME

The Invisivent<sup>EVO</sup> HF is a thermally broken window ventilator that is installed on top of the aluminium, timber or PVC window frame. This almost invisible installation guarantees maximum light penetration as the glass size is not reduced.

## 30% MORE AIRFLOW THAN THE REGULAR INVISIVENT<sup>®</sup> EVO

Invisivent<sup>EVO</sup> HF delivers 30% more airflow than the regular Invisivent<sup>EVO</sup>, which makes this the ideal solution for spaces with small windows where sufficient airflow must be achieved.

## THERMALLY BROKEN

No cold air transfer from outside to inside.

## I-FLUX<sup>®</sup>

Thanks to its self-regulating flap, the Invisivent<sup>EVO</sup> HF ensures the supply of fresh and healthy air without draughts. Moreover, the interior profile deflects the incoming air upwards, causing an optimal spread of fresh air in the room.

## INSECT MESH

The perforated inside profile acts as an insect mesh.

## BURGLAR PROOF

The Invisivent<sup>EVO</sup> range meets the requirements of burglary resistance class 2 according to standard prEN 1627 to 1630, and therefore suits to be used on a window class WK2.

## INTEGRATION IN SYSTEM C<sup>+</sup>

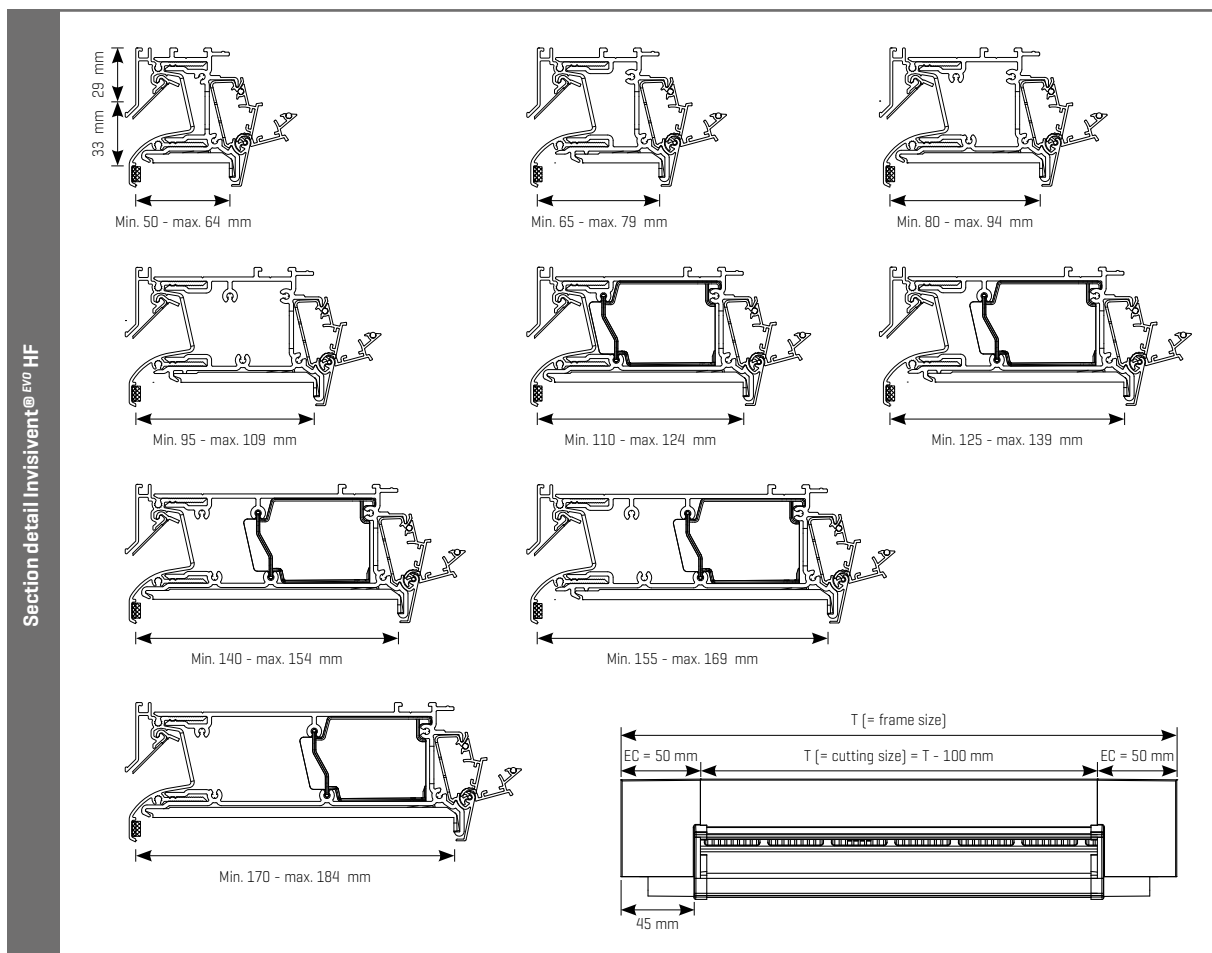
This window vent guarantees an optimal indoor air quality in combination with Healthbox 3.0.

## TECHNICAL CHARACTERISTICS

| Airflow  |  |
|--|--|
| Equivalent area                                  | 17942 mm <sup>2</sup> /m               |
| Q at 1 Pa  | 14,1 l/s/m                             |
| Q at 1 Pa  | 50,8 m <sup>3</sup> /h/m               |
| Q at 2 Pa  | 18,5 l/s/m                             |
| Q at 10 Pa                                       | 16,5 l/s/m                             |
| Q at 20 Pa                                       | 18,0 l/s/m                             |
| Comfort  |  |
| Sound reduction $D_{n,e,w}$ [C;C <sub>tr</sub> ] |  |
| In open position                                 | 28 [-1;-2] dB                          |
| In closed position                               | 49 [-2;-4] dB                          |
| Technical characteristics                        |  |
| Controllable internal flap                       | 5 stepped positions                    |
| Control options internal flap                    | Manual, cord, rod, motor               |
| U value  | 2,8 W/m <sup>2</sup> K                 |
| Air leakage at 50 Pa                             | <15% [in closed position]              |
| Watertightness in closed position, up to         | 900 Pa                                 |
| Watertightness in open position, up to           | 150 Pa                                 |
| Dimensions                                       |  |
| Glass reduction                                  | 0 mm                                   |
| Height   | 62 mm                                  |
| Depths window frame                              | 50 up to 184 mm [or more upon request] |
| Max. length                                      | 6000 mm                                |



## TECHNICAL DRAWINGS



# Appendix C

**AWS Ventient – Sound Box & No Filter**

# Breathe fresh air into your next building project with AWS Ventient™.



AWS Ventient™ is an integrated trickle ventilation system that contributes to natural ventilation of the building enclosure without requiring any windows or doors to be opened.

Using the passive temperature perception technology of the unique physical characteristics of a unique Shape Memory Alloy (SMA), the AWS Ventient™ responds to changes in ambient temperature, optimising the benefits of ventilation without the use of electric power, sensors or human intervention.

The AWS Ventient™ Trickle Ventilation technology can passively manage ventilation flow dependent on ambient temperatures, optimising the benefits of ventilation without introducing excessive air at an uncomfortable temperature.

## Applications

Unlike conventional systems such as operable windows or louvres, the AWS Ventient™ allows continual background ventilation whether a room is occupied or not, making it ideal for education projects, commercial and healthcare applications, accommodation, multi-storey houses, or anywhere that has the need for ventilation without compromising the safety of building occupants.

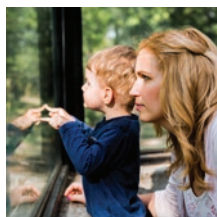
### Commercial & Office

As part of a total ventilation system AWS Ventient™ can allow controlled infiltration during favorable ambient conditions, to offset heating and cooling demand in buildings.



### Residential & Accommodation

Homes are often locked up for extended periods during the day. AWS Ventient™ is an ideal solution for residential buildings such as modern airtight medium and high-rise developments, providing ventilation when occupants are away.



### Schools & Institutions

Unlike conventional systems such as operable windows or louvres, the AWS Ventient™ provides outdoor air without human intervention. It is safe and quiet making it ideal for education.



### Health & Aged Care

Improved ventilation has a positive impact on the health of aged care residents. AWS Ventient provides good ventilation while maintaining the safety of the building's occupants.



## Natural Ventilation

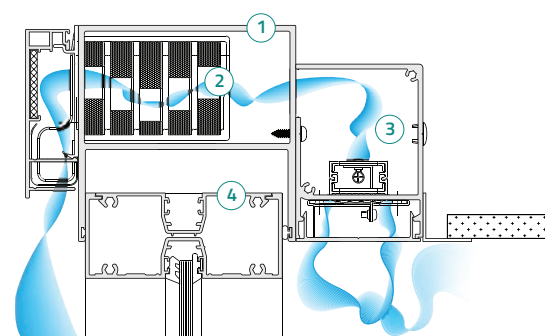
AWS Ventient devices can enable a more integrated approach to a natural ventilation solution, with the window frame itself forming part of the required openable area<sup>b</sup>.

## Alternative supply air solutions

AWS Ventient™ used in conjunction with low energy, mechanical extract ventilation can enable or contribute to alternative outdoor air ventilation strategies permitted by Australian Standards<sup>c</sup>.

## General Exhaust Make-Up Air

Make-up air for bathroom and other general exhaust applications in the past has generally relied on leakage through poorly sealed façade construction. Improved construction techniques and the energy drivers for better sealing is impacting on mechanical ventilation systems' ability to operate below the limiting pressure losses in Australia's ventilation Standards<sup>d</sup>. Make-up air drawn through alternate paths such as gaps and service penetrations will affect the cleanliness of this air and may impact on compliance with Australian Standards<sup>e</sup>. The use of AWS Ventient as permanent natural ventilation openings<sup>f</sup> can reduce the amount of make-up air and unhealthy contaminants being drawn into the enclosure through poorly sealed construction joints, brick cavity vents and even power outlets.



- ① Trickle ventilation integrated into AWS proprietary sub-head design.
- ② Proprietary sound diffuser fitted with sound wafers to trap and diffuse sound without obstructing airflow.
- ③ Trickle ventilation device incorporating bimetal shape memory alloy springs to automatically open or close the vent based on external air temperature.
- ④ Compatible with a full range of AWS commercial window and door systems.

## Ventilation Volume

|                                 | Ventilation Openable Area (mm <sup>2</sup> ) | AWS Ventient™                            |                            |           |           |
|---------------------------------|--|--|----------------------------|-----------|-----------|
|                                 |  | Effective Open Area (αA) mm <sup>2</sup> | Ventilation Volume (Q) l/s |           |           |
|                                 |  |  | ΔP = 6Pa                   | ΔP = 12Pa | ΔP = 20Pa |
| Sound Box & Filter 1200         | 4100   | 1500                                     | 4.4                        | 6.5       | 8.6       |
| Sound Box & No Filter           | 4100   | 1900                                     | 5.7                        | 8.6       | 11.5      |
| Filter & No Sound Box           | 4100   | 1600                                     | 4.5                        | 6.9       | 9.4       |
| No Filter or Sound Box          | 4100   | 2000                                     | 5.8                        | 8.7       | 11.6      |
| 4.off Sound Box & Filter 900    | 4100   | 1400                                     | 4.3                        | 6.4       | 8.6       |
| No filter & 4.off Sound Box 900 | 4100   | 1700                                     | 5.3                        | 7.8       | 10.5      |

## Acoustic Performance

Acoustic testing has been conducted on the Elevate™ Series 400 series CentreGLAZE™ frame fixed window fitted with ventilated sub-head. From our testing we can conclude that the ventilation opening drops the sound performance of the product by up to 7 Rw. The addition of the SoundOUT™ absorber improves this result by 3 Rw.

Series 400 fixed window 6.38mm Laminated Glass

|  |       |
|--|-------|
| Window only no ventilated sub-head               | Rw 32 |
| Window + ventilated sub-head                     | Rw 26 |
| Window + ventilated sub-head + SoundOUT™ difuser | Rw 29 |

Series 400 fixed window 10.38mm Laminated Glass

|  |       |
|--|-------|
| Window only - no ventilated sub-head             | Rw 34 |
| Window + ventilated sub-head                     | Rw 27 |
| Window + ventilated sub-head + SoundOUT™ difuser | Rw 30 |

## Standard Features

|   |   |
|---|---|
| Shape Memory Alloy (SMA) Thermal Actuator | Utilising a patented shape memory alloy spring system, the AWS Ventient™ system automatically adjusts the size of the ventilation inlet as ambient temperature changes.       |
| Insect, rodent and ember screens          | Non-combustible, removable mesh with a maximum aperture of 2mm to comply with bushfire codes.   |
| Manual override                           | The system can be manually closed by occupants.   |
| Air filter                                | Dust and pollen filters are fitted to the interior side of the vent to reduce up to 68% of typical airborne dust. The air filter can be removed for maintenance and cleaning. |

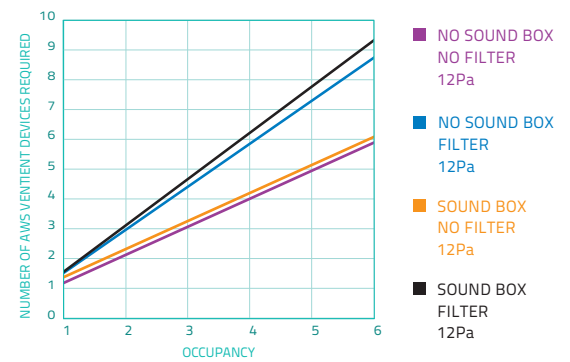
## Optional Features

|                          |   |
|--------------------------|---|
| Intumescent fire barrier | Optional intumescent seals expand to fill the opening when extreme high temperatures are reached <sup>a</sup> . |
| Acoustic Attenuation     | Optional proprietary SoundOUT™ absorber traps and absorb sound without obstructing airflow.                     |

## Design Coordination

The AWS Ventient™ is an integrated ventilation solution, simplifying the specification, supply and installation process. Traditional building in/installation methods are used to incorporate windows with integrated ventilation.

Supply air at 10l/s per person design using AWS Ventient (12Pa pressure differential)



### AWS Ventient™ Cool to Temperate Climate

Closes by 2/3 as the outdoor air passing through cools to 14°C, reducing airflow and the risk of cold drafts whilst ensuring continued background ventilation when the building is artificially heated

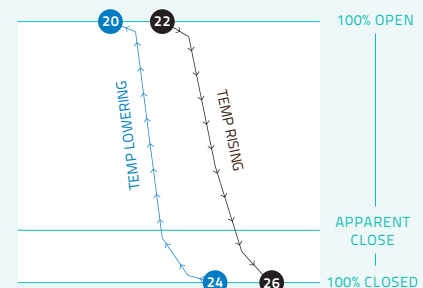
| Temperature | Vent open |
|-------------|-----------|
| 12°C        | 33%       |
| 20°C        | 100%      |



### AWS Ventient™ Tropical Climate

Closes fully as the outdoor air temperature passing through the device rises to 26°C, thus reducing the risk of warm humid air entering the building and causing condensation when the interior is likely to be artificially conditioned.

| Temperature | Vent open |
|-------------|-----------|
| 26°C        | 0%        |
| 20°C        | 100%      |



a. This information has been prepared by AWS as a guide for designers in a range of applications that would benefit from AWS Ventient. Details are provided based on information available at the time and it remains the designer's responsibility to ensure all aspects of a design incorporating AWS Ventient are completed in accordance with the relevant legislative requirements. Please contact AWS to discuss details or where further support is required. b. Designers should refer to details in Part F4 of NCC 2016 for details of limitations associated with natural ventilation applications. In many circumstances, AWS Ventient will form part of a holistic natural ventilation solution. c. When applied in accordance with Clause 1.22 of AS 1668.2-2012, mechanical exhaust air ventilation together with appropriate make-up air may be provided in lieu of supply ventilation. d. Clause 3.8.4 in AS 1668.2-2012 specifies a limiting pressure loss of 12Pa between enclosures. e. Clause 2.3.1 in AS 1668.2-2012 requires outdoor air to enter a building through paths that do not reduce the quality of the air. f. Clause 3.8.1 in AS 1668.2-2012 identifies permanent natural ventilation openings as an acceptable source of exhaust replenishment. g. Fire testing data to AS 1530 is not currently available for a Deemed-to-Satisfy application in accordance with AS 1682. Designers should consider prototyping as per Clause 3.3.2 in AS/NZS 1668.1:2015 or a Performance Solution in accordance with NCC 2016 for the use of AWS Ventient's intumescent fire barrier in building elements required to have a fire resistance level.