Passive Ventilation Solutions

INTEGRATED TRICKLE VENTILATION FOR HEALTH, EFFICIENCY & COMFORT

VENTIENT
Trickle ventilation system

INTEGRATED TRICKLE VENTILATION SYSTEMS BY AWS

Ventilation and the building envelope.

With our focus on airtightness, have we overlooked the importance of ventilation?

The AWS Ventient™ solution incorporates state-of-the-art trickle ventilation technology into Australia's leading range of residential and commercial windows and doors.

As building standards improve and our focus on airtightness increases, we can no longer rely on air leakage as a mechanism for ventilation within the building envelope.

Operable windows can provide fresh air and natural ventilation, however, studies have shown they are rarely used to maximise natural ventilation. Reliance on HVAC systems for airflow has become commonplace and poor Indoor Air Quality (IAQ) has become a growing concern for architects and building occupants.

Ventilation has been proven to achieve positive impacts on the health and productivity of building occupants. Air change rates are an important consideration in building design and mechanisms to allow sufficient ventilation are essential.

The AWS Ventient™ solution incorporates state-of-the-art trickle ventilation technology into Australia's leading range of residential and commercial windows and doors. A seamless solution to maximise health, efficiency and comfort in the building envelope.

Offices

Deteriorated indoor air quality is commonly related to sick-building syndrome in offices, causing respiratory illness, sick leave, reduced comfort and loss in productivity. Ventilation has been shown to significantly improve IAQ, increase productivity and reduce sick leave among office workers.

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Residential

In residential applications low levels of ventilation may result in high levels of humidity and excessive moisture, in turn increasing the prevalence of dust mites and mould. Natural ventilation in homes can assist in reducing odours, pollutants, moisture and CO_2 build-up making our homes healthier and more comfortable.

Schools & Institutions

Concerns about security, noise, heat or cold in classrooms often result in windows being left permanently closed reducing the availability of natural ventilation and indoor air quality. The result: higher CO_2 concentrations, shown to be directly associated with increased student absence, reduced concentration and productivity.

Health & Aged Care

Improved ventilation has been shown to have a positive impact on health and perceived air quality outcomes of aged care residents. Ventilation rates greater than 10Ls have been shown to be positively correlated to increased alertness, levels of engagement and activity of residents.

AWS Ventient™ Trickle Ventilation

With increasingly air-tight buildings, operable windows can provide much needed fresh air. However, for reasons such as security, heat or noise, some occupants are unwilling or unable to open windows at the most suitable time. The AWS sub-head integrated Ventient™ trickle ventilation solution enables the provision of fresh air regardless of occupancy, making it ideal for multi-residential apartments, aged care, education and health facilities, offices, hotels, student accommodation and Greenstar projects as part of a considered ventilation solution.

A trickle vent is a very small opening in a window or other building envelope component to allow small amounts of ventilation in spaces when major elements of the design,like windows or doors, are otherwise closed.

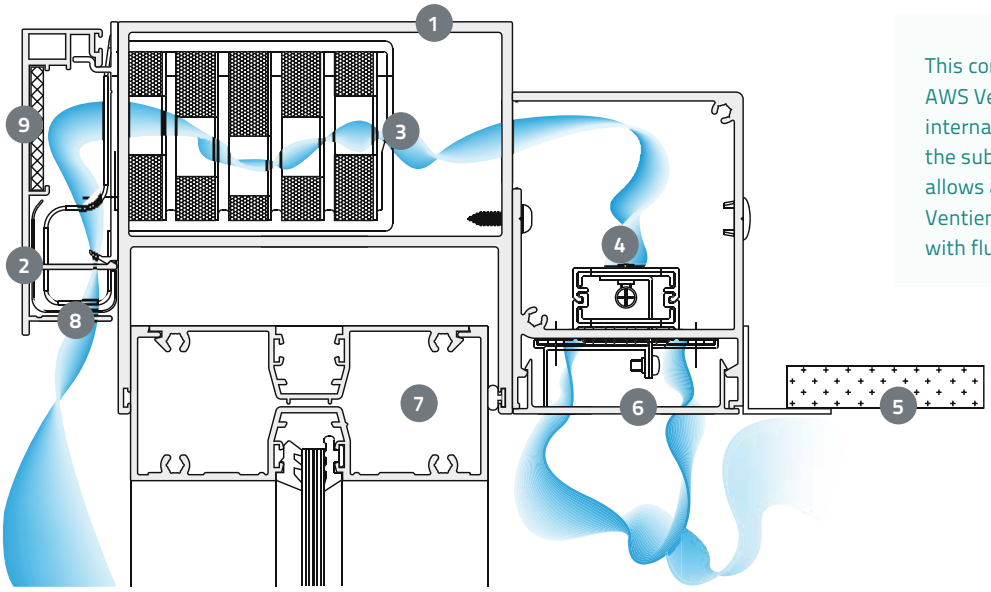
Without electric power, sensors or human intervention, AWS Ventient™ devices passively control ventilation volumes dependent on ambient temperatures, optimising ventilation without uncomfortable cold drafts.

The AWS sub-head integrated trickle ventilation solution for windows and doors is an Australian first, combining market leading window and door solutions with internationally renowned trickle ventilation technology.

It is designed to fit seamlessly into the building envelope through discreet integration into the window or door sub-head. No additional penetrations into the building envelope are required. With consideration of acoustic and water performance, protection against fire, dust and insects and the option to manually close the device, this is a highly resolved solution suited to both commercial and residential building applications.

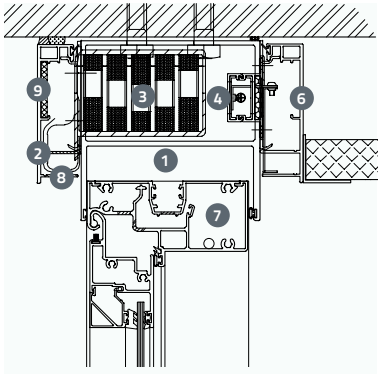
Six alternate models are available to suit window type and installation application, along with options to configure the AWS Ventient™ device for tropical or cool to temperate climates.

" A trickle vent is a very small opening in a window or other building envelope component to allow small amounts of ventilation in spaces when major elements of the design like windows or doors, are otherwise closed. "



This configuration shows the AWS Ventient™ housed within an internally mounted box fixed to the sub-head. This configuration allows access to the AWS Ventient™ device when installed with flush plasterboard ceilings.

1. Trickle ventilation integrated into AWS sub-head.
2. External cover conceals ventilation slots and can be fitted with optional intumescent seals.
3. Optional proprietary sound absorber fitted with sound wafers to trap and diffuse sound without obstructing airflow.
4. Trickle ventilation device incorporating bimetal shape-memory alloy springs to automatically open and close the vent reflecting changes in the temperature of the fresh air.
5. Internal ceiling lining installed flush with vent housing.
6. Removable snap-filler allows access to filter and vent.
7. Compatible with a full range of AWS commercial window and door systems.
8. Stainless wire is fitted inside the air intake slot on the outer cover, ensuring insects are kept out of the intake recess.
9. Optional intumescent seal fills the opening in the case of fire.



Standard configuration shows the AWS Ventient™ device mounted within sub-head. Optional angle bracket to accommodate suspended ceiling tile.

Key Features

Temperature sensing flow control

Utilising a patented shape-memory alloy spring system, the AWS Ventient™ system automatically adjusts the size of the ventilation inlet as ambient temperature changes. Two models are available suitable for use in cool to temperate or tropical climates.

Integrated system

The AWS Ventient™ system is integrated into the window or door system which means no additional penetrations in the building envelope are required to install the system.

Insect, rodent and ember screens

AWS Ventient™ systems incorporate a screen to guard against insects, rodents and embers. The non-combustible mesh has a maximum aperture of 2mm to comply with bushfire codes and can be removed for cleaning & maintenance.

Sound absorption

Recognising that outside air also carries noise AWS Ventient™ systems can be specified with an optional proprietary SoundOUT™ absorber fitted with sound wafers to trap and absorb sound without obstructing airflow. Note this is not available on our 50mm offerings.

Intumescent fire barrier

For further protection against fire, optional intumescent seals can be specified which expand to fill the opening when extreme high temperatures are reached, as experienced in a fire.

Manual override

The system can be manually closed by occupants if necessary.

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 & cleaning.

Performance Testing

Ventilation Volume

AWS Ventient™ ai rflow test results based on single vent in sub head over 2400 x 1000mm Series 466 window.

L/s – Litres per second
m^3/h – Cubic metres per Hour

With vent fully open and 6.off SoundOUT™ boxes fitted

	L/s	m^3/h
10 Pa	6.17 L/s	22.21 m^3/h
20 Pa	8.89 L/s	32.00 m^3/h
30 Pa	11.20 L/s	40.32 m^3/h
150 Pa	28.53 L/s	102.71 m^3/h

With vent fully open and SoundOUT™ boxes not fitted (6.off 75 x 23 intake holes)

	L/s	m^3/h
10 Pa	6.71 L/s	24.16 m^3/h
20 Pa	9.56 L/s	34.42 m^3/h
30 Pa	11.72 L/s	42.19 m^3/h
150 Pa	27.47 L/s	98.89 m^3/h

With vent 1/3 open and 6.off SoundOUT™ boxes fitted

	L/s	m^3/h
10 Pa	3.20 L/s	11.52 m^3/h
20 Pa	4.64 L/s	16.70 m^3/h
30 Pa	5.56 L/s	20.02 m^3/h
150 Pa	13.39 L/s	48.20 m^3/h

With vent 1/3 open and SoundOUT™ boxes not fitted (6.off 75 x 23 intake holes)

	L/s	m^3/h
10 Pa	3.13 L/s	11.27 m^3/h
20 Pa	4.51 L/s	16.24 m^3/h
30 Pa	5.68 L/s	20.45 m^3/h
150 Pa	13.26 L/s	47.74 m^3/h

Acoustic Performance

Acoustic testing on Elevate™ Series 400 series CentreGLAZE™ frame fixed window fitted with ventilated sub-head demonstrated the following performance results:

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

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.

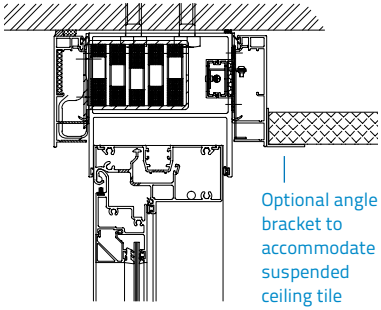
Water Performance

These tests were carried out with the vent in the 100% open position.

- 200Pa water without SoundOUT™ absorber.
- 450Pa water with SoundOUT™ absorber.

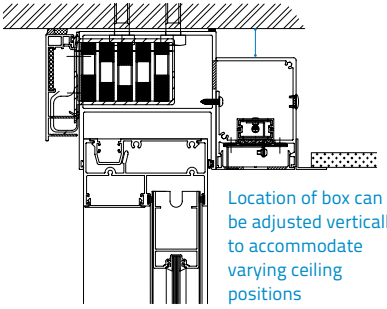
Solution Portfolio

AWS has developed a number of alternate installation configurations for Ventient™ devices allowing the AWS Ventient™ to be fully integrated with AWS high performance windows and doors. Choose from one of six configuration options to suit your application and construction method; and select from two Ventient™ devices based on your project's climate requirements.



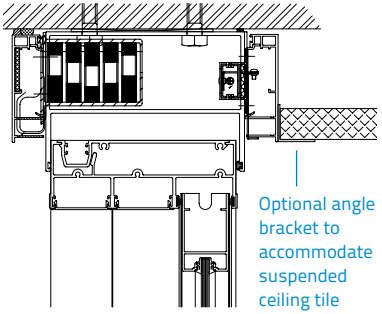
Standard Sub-head Installation 100mm

Standard sub-head configuration with optional angle bracket to accept suspended ceiling panels. This configuration is compatible with AWS 100mm platform windows. Ideal for commercial applications.



Sub-head with Vent box 100mm

Sub-head configuration with internally mounted vent housing box, allows for integration with a flush plasterboard ceiling. This configuration is compatible with AWS 100mm platform windows, ideal for commercial applications.

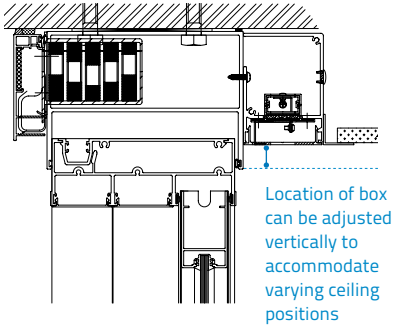


Standard Sub-head Installation 150mm

Standard sub-head configuration with optional angle bracket to accept suspended ceiling panels. This configuration is compatible with AWS 150mm platform doors. Ideal for commercial applications.

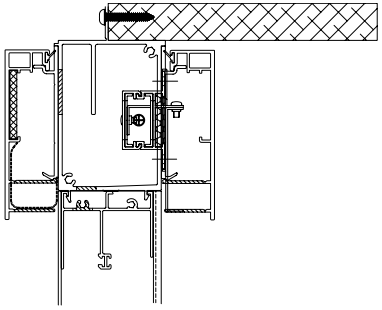
AWS Ventient™ Cool to Temperate Climate

This Ventient™ trickle ventilation device is designed for use in cool to temperate climates. A temperature sensitive shape-memory alloy spring optimises the level of airflow, adjusting to the temperature of the fresh air. The AWS Ventient™ for cool and temperate climates will close to 1/3 capacity as the fresh air passing through cools to 14°C, reducing airflow and the risk of cold drafts whilst ensuring some continued natural ventilation when the building is artificially heated.



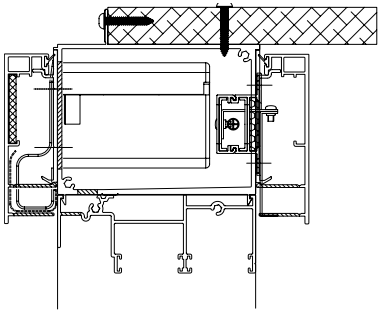
Sub-head with Vent box 150mm

Sub-head configuration with internally mounted vent housing box, allows for integration with a flush plasterboard ceiling. This configuration is compatible with AWS 150mm platform doors, ideal for commercial applications.



Head extension 50mm

Head extension designed for use in residential applications, Ventient™ device is housed directly above the window system. This configuration is compatible with Vantage Residential Series 50mm platform windows.

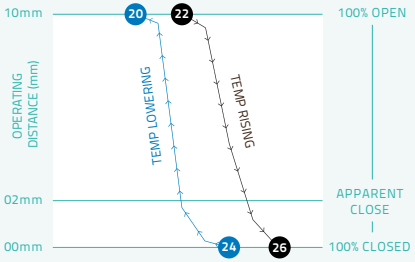


Head extension 100mm

Head extension designed for use in residential applications, Ventient™ device is housed directly above the window system. This configuration is compatible with Vantage Residential 100mm platform windows.

AWS Ventient™ Tropical Climate

The AWS Ventient™ for tropical climates will close fully as the fresh 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.



Specification Considerations & Additional Information

The minimum allowed or recommended rate of ventilation is described in Australian Building Codes and Standards. Most commonly, ventilation is expressed as volume flow of outdoor air, either per occupant or per floor area. In international standards and guidelines it is also often expressed as minimum air change rate.

Typically for residential and commercial buildings, guideline minimum requirements in Australian and international standards are close to 10L/s per person. In fact, almost all studies have found that, unless suitably treated, ventilation rates below 10L/s per person, regardless of building type, were associated with a worsening in one or more health or perceived air quality outcomes.

However, occupants are not the only pollution source and higher ventilation rates may be required to address other indoor pollution sources.

In reality, the human desire to occupy well ventilated spaces with clean, fresh air is greater than the requirements imposed by any current Australian building codes or standards. The specification of AWS Ventient™ devices in your home or building project will directly impact on occupant comfort levels, health and wellbeing.

Considerations affecting the number and location of AWS Ventient™ device:

- Occupancy (numbers)
- Occupancy (type)
- Floor area
- Other infiltration e.g vents and level of airtightness
- Number and performance of exhaust fans
- Allowance for cross ventilation
- Configuration of AWS Ventient™ e.g. type of filter specified, presence of SoundOUT™ absorber
- Floor to ceiling height (if considering air change)
- Ventilation route and the presence of suitably sized undercuts or door grilles
- Unusual floor layouts

> "...almost all studies have found that ventilation rates below 10L/s per person, regardless of building type were associated with a worsening in one or more health or perceived air quality outcomes."

AWS Ventient™ can contribute towards both IAQ and compliance strategies for the ventilation of buildings in a number of ways. (1) Providing natural ventilation - whilst an AWS Ventient™ device alone is very unlikely to meet the NCC requirements for a minimum operable area of 5% of the floor, it can be specified as part of an integrated solution, making up a shortfall where the size of openings is insufficient. (2) AWS Ventient™ can provide a make-up source for mechanical exhaust ventilation in lieu of outdoor air supply ventilation in accordance with AS1668.2. This is dependent on factors including and not limited to design building occupancy, floor area and the provision of suitable exhaust ventilation. (3) AWS Ventient™ can provide a make-up source for general mechanical exhaust ventilation in accordance with AS1668.2. (4) AWS Ventient™ can be specified as part of an alternative solution to the meet the requirements of the NCC.

Example Configuration

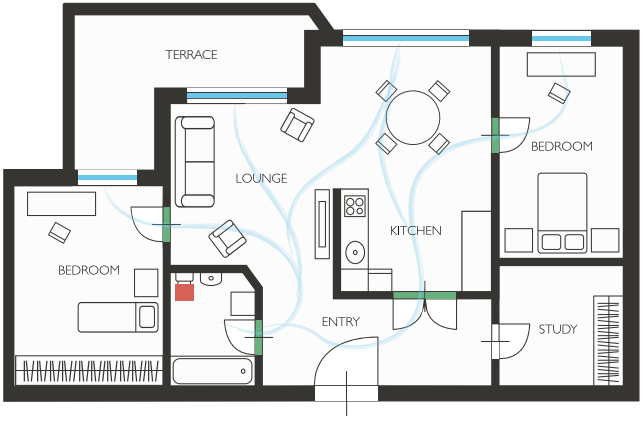
The illustration shows an example demonstrating how the combination of AWS Ventient™ trickle ventilation in conjunction with suitable low wattage, low noise, 24hr exhaust ventilation can provide a complete air change once every 2 hours.

Floor area	73.35m²
Floor to ceiling height	2.7m
Volume	198m³

To achieve one complete air change every 2 hours:

Min fresh air required:	27.5 l/s 99m³/hour
Ventilation achieved:	33.3l/s

Designers are recommended to consult with their mechanical engineer to verify the number of vents required is sufficient for the particular ventilation strategy of each project.



Integrated AWS Ventient™ above high performance windows/doors

Mechanical exhaust fan

Unobstructed ventilation pathway (e.g. door undercut)

Additional Information

For more information regarding the inclusion of AWS Ventient™ solutions in your project we recommend arranging a meeting with an AWS specification representative to discuss the specific requirements of your project.

Additional information regarding passive ventilation and building design is available in our technical white paper 'Passive ventilation & the building envelope."

Technical details, CAD files and other specification resources are available from **www.specifyaws.com.au**

References

Seppannen, O.A. et al (1999) "Association of Ventilation Rates and CO_2 Concentrations with Health and Other Responses in Commercial and Institutional Buildings" *Indoor Air 1999*; 9: 226-252

Seppannen, O.A. and Fisk W.J (2004) 'Summary of human responses to ventilation" *Indoor Air 2004*; 14 (Uppl 7): 102 -118

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