

Ventilation during the coronavirus (COVID-19) pandemic



Why Is Ventilation Important?

Evidence suggests that in poorly ventilated indoor spaces, airborne transmission of COVID-19 is possible, it is therefore recommended that measures to improve ventilation are implemented to reduce the risk of transmission. Poorly ventilated areas pose a greater risk due to a higher concentration of airborne viral particles. Research by the Respiratory Evidence Panel found that airborne transmission beyond 2 metres is possible and that poorly ventilated indoor settings contribute to transmission, as well as prolonged exposure and activities that may generate more aerosols.

Ventilation however is unlikely to reduce the risk for those in close contact.

In indoor spaces COVID-19 viral particles spread between people more readily, viral particles may easily accumulate and the concentration of viral particles is often higher. Ventilation can reduce the amount of viral particles in the air and reduce airborne transmission making it less likely for viral particles to be inhaled into the lungs, contact eyes, nose or fall out of the air and accumulate onto surfaces.

What is airborne transmission?

When a person that is infectious with COVID-19 breathes, speaks, coughs or sneezes they release small particles (droplets and aerosols) containing the virus into the air which poses a risk to people who may breathe in that air. Even when an infectious person leaves the room, aerosols can remain in the air.

What Is Ventilation?

Ventilation is the process of introducing fresh air into areas whilst removing stale air. Ventilation alone cannot eliminate the risk of transmission and should be implemented alongside other control measures.

There are two main forms of ventilation:

Natural Ventilation: Fresh air that enters a space through a window, door, chimney or open vents

Mechanical Ventilation: Mechanical units such as fans and ducts that mechanically bring in fresh air from outside

What ventilation is not:

Any circulation unit that does not draw in a fresh air supply and only recirculates indoor air. This can mask poor ventilation reducing the ability to remove airborne transmission. Check the system operating manual to see if there is an option to set the system to a ventilation setting to bring in fresh air, if you are unsure refer to an air conditioning engineer or advisor.

Understanding Ventilation In Your Setting

Understanding ventilation in your workplace should be part of a risk assessment, a main focus should be identifying areas that are poorly ventilated and frequently used. It is also important to understand that ventilation does not mean you should be cold. A consideration needs to be made to the comfort of individuals and the room should be at least 18 degrees. Spending time in a room colder than that may negatively impact health, especially for those over 65 and those with long term health conditions.

Things to identify:

1. What sources of ventilation each room has?
2. How many people use or occupy the area?
3. How large is the area?
4. What tasks or activities take place in the area?
5. Are there any features in the workplace that affect ventilation?
6. Check mechanical systems are on the ventilation setting to bring in fresh air and not just recirculate indoor air
7. Identify areas that feel stuffy and smell bad

What steps can be taken?

- Review your current risk assessment to understand ventilation in your setting
- Air rooms by opening doors and windows to improve ventilation, sometimes this can be done more extensively in areas when unoccupied
- Incorporate ventilation breaks to enable airing of rooms in between different groups
- Talk to your staff about improving ventilation, improve understanding and education to ensure they play their part in reducing airborne transmission
- Leave extractor fans on for longer than usual or use more frequently
- **When its cold during the winter, opening the windows just a little bit can help bring in fresh air and make a significant difference**, you may also consider changes to dress code to increase comfort
- Opening windows for short and sharp bursts of 10 minutes every hour can help reduce the risk of transmission
- Consider the seating plan and personal preference, if applicable
- Any actions should not compromise health and safety or health and wellbeing, ventilation is not a 'one size fits all' approach as each environment is different
- In rooms and spaces where there is no option for natural or mechanical ventilation a consideration should be limiting occupancy and time spent in those areas, use of air cleaning or filtration units, considering future arrangements to improve ventilation in the long term

CO2 Monitors

Indoor CO2 monitors are low cost and can help identify risk of aerosol transmission of COVID-19 and other respiratory diseases in the workplace or school. The most appropriate portable devices to use in the workplace are non-dispersive infrared (NDIR) CO2 monitors.

How to use a CO2 monitor

- CO2 monitors are best placed at head height, away from windows, doors, or any other air supply points, at least 50cm away from any person.
- The amount of CO2 in the air is measured in parts per million (ppm).
- Measurements should be taken throughout the day to represent change in room use or space, a calculation should then be done for an average value for the occupied period, monitoring number of room occupants and the source of ventilation.
- Your readings will help you decide if a space is adequately ventilated, and if you need to take action to improve ventilation.

What do the measurements mean?

- Outdoor levels are around 400ppm and indoors a consistent CO2 value less than 800ppm is likely to indicate that a space is well ventilated.
- A average reading of 1500ppm CO2 over an occupied period in a space likely indicates the space is poorly ventilated and action should be taken to improve ventilation should this reading be consistently high.
- Where there is continuous talking, singing or high levels of physical activity it is recommended that CO2 levels are kept below 800ppm.

When they are less effective:

- CO2 monitors are not recommended in areas that use air cleaning units as CO2 is not removed but particles can be removed. They are also less effective in large spaces as you cannot be sure if the air is mixed. Monitors are also not recommended for less populated areas with only 1 or 2 occupants.

Air filtration/cleaning units

When mechanical or natural ventilation is not available

Air cleaning and filtration units should never be used as a substitute for ventilation. There is little evidence they are an effective control, but *may* be useful in some cases.

The two main types of filtration units that may be suitable for use are:

1. High–efficiency filters
2. Ultraviolet-based devices

High Efficiency Particulate Air (HEPA) filter must meet a level of efficiency. They can filter almost all particles including viruses, typically around 99.5% of particle pollution.

Any use of air cleaners should also consider noise, avoidance the use of those that produce irritants (for example ozone or other chemicals), and how much air the unit can clean compared to the size of the relevant space.

Example 1

Office with natural ventilation

Situation - A office is frequently used and occupied by staff during office hours, there are three windows and two doors for entry. There is no mechanical ventilation unit within this room.

Actions

- Windows and doors can be open partially or fully to encourage fresh air into the office
- In winter when it is cold opening windows even just a little can improve ventilation
- 'Purge' the office when it is not occupied to bring in fresh air and remove stale air
- Monitor and manage room temperature with heating to maintain a comfortable room temperature
- Provide education to employees so that they understand the importance of ventilation

Source HSE

Example 2

Meeting room with CO2 monitors

Situation - A meeting room is frequently used but feels stuffy, CO2 monitors have been introduced to monitor CO2 levels. The CO2 monitors show an increase during longer and busier meetings and remain high for an extended period of time after the meeting.

Actions

- Meeting length is reduced to a maximum of 2 hours
- Breaks have been implemented in-between meetings to 'purge' rooms, increasing natural air flow
- Messages are sent to employees using the meeting rooms reinforcing staff to leave windows open and to open fully when leaving (weather permitting)

Source HSE

Example 3

Office complex with mechanical ventilation

Situation – An office is unsure if their mechanical ventilation unit is providing adequate fresh air supply

Actions

- The business should assess the mechanical system and seek advice from a mechanical engineer or advisor
- The engineer can advise the correct setting needed to ensure fresh air is being circulated in the complex or provide alternative guidance on the correct type of mechanical unit required
- The mechanical unit should be monitored to ensure the setting is not changed and maintained as per the operational guidance

Source HSE

Ventilation during the winter months

- Typically during winter months as people try to keep warm inside, fresh air is restricted
- Consider opening a window for 10 minutes every hour, a thermometer may help monitor a safe temperature alongside heating
- Encourage warmer clothing/change of dress code rules and staff education around ventilation habits
- Identify staff who may have personal preference over being closer to a fresh air supply
- Ventilation should not compromise health and safety, security or wellbeing and room temperatures should be at least 18 degrees



Image courtesy of GOV.UK

Quick Guide to Ventilation



Ventilation helps reduce the concentration of viral particles in the air, reducing the risk of airborne transmission of COVID-19, ventilation in your setting should be a part of your risk assessment



Windows provide a natural source of ventilation, in colder temperatures opening the window just a little can encourage fresh air into a space, alternatively 10 minutes every hour



Recirculation of air is not recommended because it does not incorporate fresh air, check ventilation systems to ensure they are set to circulate fresh air or consult a mechanical unit engineer



Explore options to improve ventilation in your setting and educate employees to help them play their part



Any actions should not compromise health and safety or the health and wellbeing of staff

Further Guidance

[Ventilation and air conditioning during the coronavirus \(COVID-19\) pandemic \(hse.gov.uk\)](https://www.hse.gov.uk/covid19/ventilation/)

[Ventilation of indoor spaces to stop the spread of coronavirus \(COVID-19\) - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/ventilation-of-indoor-spaces-to-stop-the-spread-of-coronavirus-covid-19)

[CIBSE - Emerging from Lockdown](#)

[Sage environment and modelling group](#)

The British Occupational Hygiene Society (BOHS) have developed a [tool](#) to assist with assessment of ventilation in workplaces.

[Overview - Coronavirus Resource centre \(phe.gov.uk\)](#) – Campaign resources including ventilation