

# Coronavirus: Ventilation and air conditioning in the workplace

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## *Introduction*

Good ventilation is one of the key controls to prevent the spread of COVID-19. Used along with social distancing, good hygiene and the use of face coverings where appropriate good ventilation can significantly reduce the risks to individuals and the business.



The law says employers must make sure there's an adequate supply of fresh air (ventilation) in enclosed areas of the workplace. This has not changed during the pandemic.

Ventilation isn't the only way of making sure you're working safely to prevent the spread of coronavirus in the workplace. You should also make sure workers are keeping the workplace clean and washing their hands frequently. You can also identify other control measures by your risk assessment.



You can do this by using:

- **natural ventilation** – fresh air comes in through open windows, doors or air vents. This is also known as 'passive airflow', or
- **mechanical ventilation** – fans and ducts bring in fresh air from outside

This guidance will help you and your workers:

- identify poorly ventilated areas
- assess the risk from breathing in small particles of the virus (aerosol transmission) in enclosed areas
- decide on the steps you can take to improve ventilation

# Coronavirus: Ventilation and air conditioning in the workplace

*Why ventilation in the workplace is important*

Adequate ventilation reduces how much virus is in the air. It helps reduce the risk from aerosol transmission.

Aerosol transmission can happen when someone breathes in small particles in the air (aerosols) after a person with the virus has been in the same enclosed area.

Aerosols can remain suspended in air for long periods of time and travel distances greater than 2 metres.

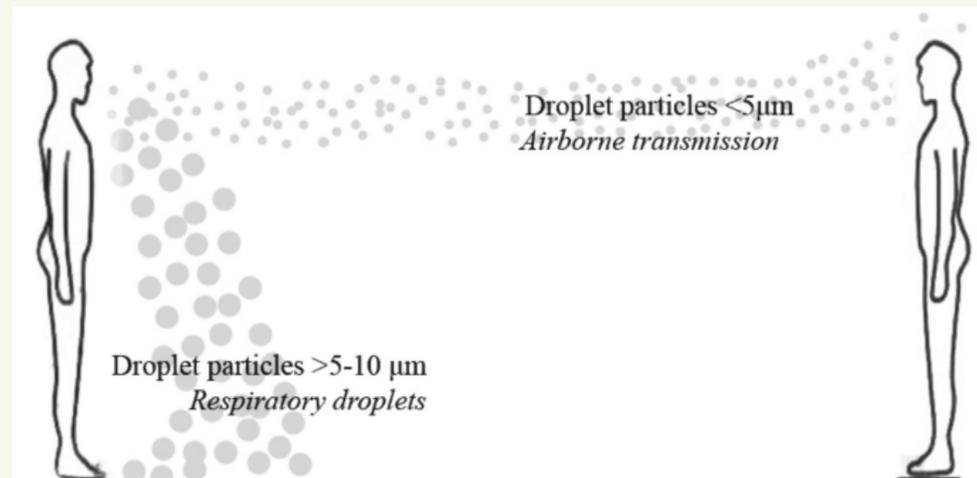
The risk from aerosols is greater in areas that are **poorly ventilated**.

Although ventilation reduces the risk from aerosols, it has minimal impact on:

- **droplet transmission** (from people being in close contact)
- **contact transmission** (touching surfaces)

Your ventilation is likely to be adequate to minimise the risk of COVID-19 aerosol transmission if the rooms or spaces in your building(s) are:

- used within the occupancy limits specified in the building design, and
- have a sufficient fresh air supply to meet the current minimum building standard. You can get advice from a competent ventilation engineer or, as a precautionary approach, operate your system on the maximum air flow rate



Assessing the risk of aerosol transmission

Adequate ventilation can look different depending on the workplace or setting.

You can reduce the risk of aerosol transmission by:

- making sure infected workers (or anyone with COVID-19 symptoms) do not come into the workplace
- providing adequate ventilation with fresh air

Deciding what adequate ventilation looks like in your workplace should be part of a risk assessment.

You should also make sure any control measures you identify by your risk assessment take account of the **latest public health regulations and guidance**

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*Identifying poorly ventilated areas and using CO2  
monitors*

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The priority for your risk assessment is to identify areas of your workplace that are usually occupied and poorly ventilated.

You should prioritise these areas for improvement to reduce the risk of aerosol transmission.

There are some simple ways to identify poorly ventilated areas:

- Look for areas where people work and where there is no mechanical ventilation or natural ventilation such as open windows, doors, or vents.
- Check that mechanical systems provide outdoor air, temperature control, or both. If a system only recirculates air and has no outdoor air supply, the area is likely to be poorly ventilated
- Identify areas that feel stuffy or smell bad

## Using carbon dioxide (CO2) monitors

People exhale carbon dioxide (CO2) when they breathe out. If there is a build-up of CO2 in an area it can indicate that ventilation needs improving.

Although CO2 levels are not a direct measure of possible exposure to COVID-19, checking levels using a monitor can help you identify poorly ventilated areas.



## Types of CO2 monitor to use

There are many different types of CO2 monitors available. The most appropriate portable devices to use in the workplace are non-dispersive infrared (NDIR) CO2 monitors.

## How to use a CO2 monitor

CO2 levels vary within an indoor space. It's best to place CO2 monitors at head height and away from windows, doors, or air supply openings.

Monitors should also be positioned at least 50cm away from people as their exhaled breath contains CO2. If your monitors are too close they may give a misleadingly high reading.

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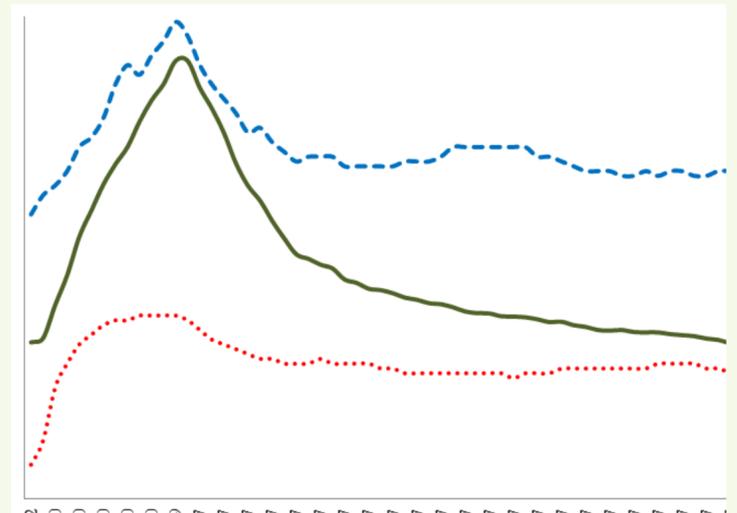
*Identifying poorly ventilated areas and using CO2  
monitors cont.*

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Measurements within a space can vary during the day due to changes in numbers of occupants, activities, or ventilation rates. Doors and windows being open or closed can also have an effect.

The amount of CO2 in the air is measured in parts per million (ppm). If your measurements in an occupied space seem very low (around 400ppm) or very high (over 1500ppm), it's possible your monitor is in the wrong location and you should move it to another location in the space to get a more accurate reading.

Instantaneous or 'snapshot' CO2 readings can be misleading, so you should take several measurements throughout the day frequently enough to represent changes in use of the room or space. Then calculate an average value for the occupied period.



You may need to repeat monitoring at different times of the year as outdoor temperatures change and this will affect worker behaviour relating to opening windows and doors when your space relies on natural ventilation.

Your readings will help you decide if a space is adequately ventilated.

How to get the most accurate readings

- Check your monitor is calibrated
- Know how to use your portable monitor correctly
- Take multiple measurements
- Take measurements at key times
- Record CO2 readings, number of occupants, the type of ventilation you're using at the time and the date. These numbers will help you use the CO2 records to decide if an area is poorly ventilated

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*Identifying poorly ventilated areas and using CO2  
monitors cont.*



## Suitability of CO2 monitoring in different types of space

Characteristics of space	Examples	Suitability of CO2 monitor
Small spaces up to 50 square metres floor area. Occupied by a consistent number of people for more than an hour.	Small offices and meeting rooms.	Can be used, but results should be treated carefully as concentrations can be affected by the differences between individual breathing rates.
Small spaces up to 50 square metres. Occupancy varies over short periods	Changing rooms and small retail premises.	Unlikely to give reliable measurements.
Mid-sized spaces of 50-320 square metres. Occupied by a number of people for more than an hour.	Larger office and meeting rooms, classrooms, restaurants/bars, and some indoor sports (low aerobic activity).	Often well suited to monitoring as the higher number of occupants provides more reliable values.
Mid-sized spaces of 50-320 square metres. Occupancy varies over short periods.	Larger office and meeting rooms, classrooms, restaurants/bars, and some indoor sports (low aerobic activity).	Often well suited to monitoring as the higher numbers of occupants provides more reliable values.
Mid-sized spaces of 50-320 square metres. Occupancy varies over short periods.	Some retail spaces.	Can be used, but results should be treated carefully as concentrations may be affected by variations in occupancy levels.
Large spaces over 320 square metres. Occupied by a consistent number of people for a longer period of time.	Indoor concert venues, large places of worship and airport concourses.	Can be appropriate for monitoring in occupied areas, but might require multiple sensors to provide meaningful measurements.
Can be appropriate for monitoring in occupied areas, but might require multiple sensors to provide meaningful measurements.	Rail concourses and shopping malls.	Unlikely to give reliable measurements.

# Coronavirus: Ventilation and air conditioning in the workplace

*Ventilation: Assessment of fresh air in the  
workplace*

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There are several factors to consider when deciding on the ventilation needed in your work areas.

You must make sure there is an adequate supply of fresh air in any workspace. You can do this by using:

- **natural ventilation** – fresh air comes in through open windows, doors or air vents. This is also known as ‘passive air flow’
- **mechanical ventilation** – fans and ducts bring in fresh air from outside

There may already be different types of ventilation around your workplace. It may help to make a list of areas in your workplace and how they are ventilated. Floor or design plans may help with this.

Alternatively, you could walk around the building and make a note of each area and how it is ventilated. Remember to include changing rooms and areas used for breaks, such as canteens. If you can't tell easily how an area is ventilated, it may be because it is poorly ventilated.



## How many people use or occupy the area?

- The more people who use or occupy an area, the greater the risk that an infected person is there, increasing possible exposure to aerosol transmission. The risk increases if an area is poorly ventilated and occupied by more than one person.
- Consider how many people use or occupy an area at any one time.

## How large is the area?

The larger the area, the lower the risk. This is because larger areas:

- have more air to help dilute the virus
- tend to be designed with ventilation rates in mind
- take longer for aerosols to build up in them

# Coronavirus: Ventilation and air conditioning in the workplace

*Ventilation: Assessment of fresh air in the  
workplace cont.*

What tasks or activities take place in the area? Activities that make you breathe deeper, for example physical exertion or shouting, will increase:

- generation of aerosols
- risk of transmission

Activities like these increase transmission risk even where there's adequate ventilation. If possible, avoid or redesign these activities to reduce the risk. This could include moving some activities outside or working alone where possible.

## **Are there any features in the workplace that affect ventilation?**

You may have large machinery, equipment or other features that could prevent air circulating in your premises. These features could include things like pillars or posts. Large machinery or physical features could make the air stagnant. Consider how to improve airflow in the area.

## **Does your workplace use local exhaust ventilation?**

You may use local exhaust ventilation (LEV) to control risks from other workplace hazards such as dust or welding fumes. If an LEV system discharges the air outside, it will improve ventilation in the area.

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## **Is there a complex ventilation system?**

Workplaces that may have complex ventilation systems include:

- some old buildings
- buildings with multiple floors and rooms using different ventilation systems
- systems designed for product manufacturing as these can include additional recirculation

## **Do you use desk or ceiling fans?**

You should not use desk or ceiling fans in poorly ventilated areas.

## **How will you tell your employees about the outcome of your assessment?**

You should tell your workers about the outcome of the risk assessment. This will help them understand how they can play their part to reduce the risk of spreading COVID-19.

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*Improving natural ventilation*

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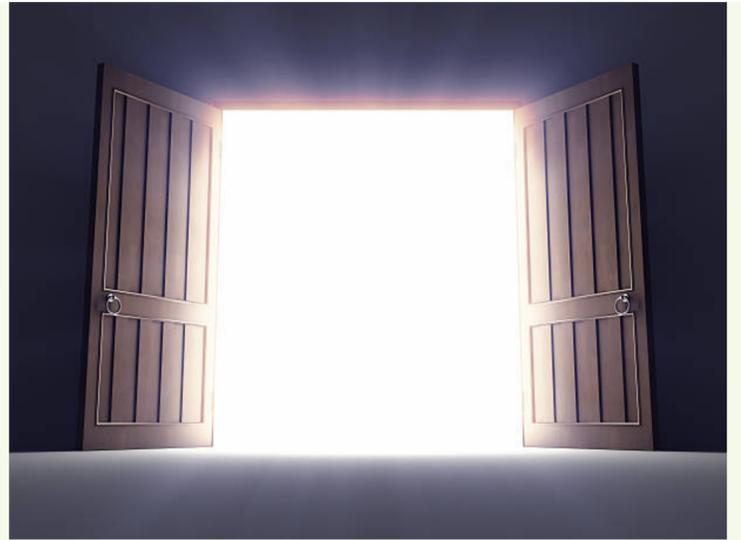
You can improve natural ventilation by fully or partly opening windows, air vents and doors. Don't prop fire doors open.

Buildings are usually designed to provide adequate ventilation. You should be able to open any windows or vents that let in fresh air. If they cannot be opened, ventilation in that area will be less effective.

If you identify an area that needs improvement, you should decide if it's safe for people to use that area before you make any changes.

Don't close doors or windows completely when people are in a naturally ventilated area. This can result in very low levels of ventilation.

Airbricks and ventilation grids need to be kept clean, so that the air supply is not obstructed, and where possible open any trickle vents in your workplace.



Cooler, windier weather increases natural ventilation through openings. This means you don't need to open windows and doors so wide.

## **Purging (airing rooms)**

Airing rooms as frequently as you can improves ventilation. Opening all the doors and windows maximises ventilation in a room. It may be better to do this when the room is unoccupied. The use of a CO2 monitor will help you judge how long it takes to purge the air in a room.



## Talking to your workers about improving ventilation

Making sure that an area has enough fresh air relies on your workers playing their part. You should explain the importance of adequate ventilation to your workers so they can play their part in reducing the risk of coronavirus (COVID-19) transmission.

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*How to improve mechanical ventilation -  
including air conditioning*

Mechanical ventilation brings fresh air into a building from outside.

You should speak to the people who manage the day-to-day operations of your workplace's mechanical ventilation systems to:

- understand how they operate
- make sure they're supplying fresh air into an area and how much
- make sure they're maintained in line with manufacturers' instructions

Don't lower mechanical ventilation rates if the number of people in an area reduces temporarily.

You should base ventilation rates on the maximum 'normal' occupancy of an area.

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## Maximising fresh air

Mechanical systems will provide adequate ventilation if they are set to maximise fresh air and minimise recirculation.

If your system draws in fresh air, it can continue to operate. You need to know how much fresh air it draws in and if this provides adequate ventilation. You may need to increase the rate or supplement it with natural ventilation (for example, by opening doors, windows or air vents) where possible.

You could also consider extending the operating times of mechanical ventilation systems to before and after people use work areas.

## Recirculating air

It's better not to recirculate air from one space to another. Recirculation units for heating and cooling that do not draw in a supply of fresh air can remain in operation as long as there is a supply of outdoor air. This could mean leaving windows and doors open.

Recirculation units (including air conditioning) can mask poor ventilation as they only make an area feel more comfortable.

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*Balancing ventilation with keeping people  
warm at work*

Providing adequate ventilation does not mean people have to work in an uncomfortably chilly or cold workplace.

There are simple steps you can take to make sure your workplace is adequately ventilated without being too cold:

- Partially opening windows and doors can still provide acceptable ventilation while keeping workplace temperatures comfortable.
- Opening higher-level windows will probably create fewer draughts.
- In occupied rooms relying on natural ventilation, air the space by opening windows and doors as fully as possible to regularly provide additional fresh air.
- This can be done while people leave the room for a break. For example, 10 minutes an hour can help reduce the risk from virus in the air, depending on the size of the room.

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- If the area is cold, relax dress codes so people can wear extra layers and warmer clothing.
- You could set the heating to maintain a comfortable temperature even when windows and doors are open.

Consider providing additional sources of heating if required. Only use fan convector heaters if the area is well ventilated.

Employers have a legal duty to ensure that working environments are a 'reasonable temperature'. Find out more about **safe working temperatures**.

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## *Air cleaning and filtration units*

You can use local air cleaning and filtration units to reduce airborne transmission of aerosols where it is not possible to maintain adequate ventilation.

These units are not a substitute for ventilation. You should prioritise any areas identified as poorly ventilated for improvement in other ways before you think about using an air cleaning device.

If you decide to use an air cleaning unit, the most suitable types to use are:

- high-efficiency filters
- ultraviolet-based devices

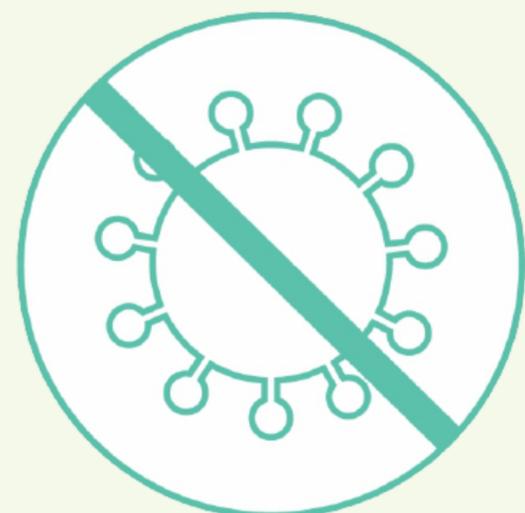
Any unit should be appropriate for the size of the area it's used in to ensure it works in the way it's intended to.

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Carbon dioxide (CO<sub>2</sub>) monitors are not suitable for use in areas that rely on air cleaning units. This is because filtration units remove contaminants (such as coronavirus) from the air but do not remove CO<sub>2</sub>.

Air cleaning devices are also used to disinfect workplaces

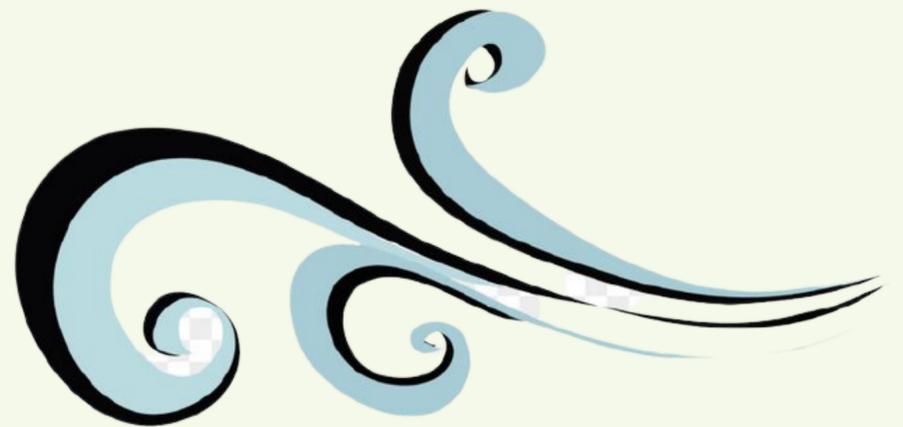


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*Ventilation in vehicles used for work purposes*

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Make sure workers switch on ventilation systems while they're using work vehicles. It is important to remember that they should be set to draw in fresh air and not to recirculate cabin air. Encourage your employees to keep vehicle windows open. If it's cold they can leave the heating on to keep the vehicle comfortable.



You should also make sure any control measures you identify by your risk assessment take account of the most up to date public health regulations and guidance.

If it's safe to do so, opening doors of vehicles at stops or between different passengers will help to change the air quickly. Keeping windows open when the vehicle is moving or opening vehicle windows fully for a few minutes when stopped can also help clear the air.

