VENTILATION IN SCHOOLS DURING COVID

Overview

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 (pupils, staff and visitors) in schools.

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

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

Ventilation is not the only way of making sure staff in schools are working safely. You should also make sure that staff are keeping the workplace clean and washing their hands frequently.

You can also identify other control measures by your risk assessment. The EA provides generic Covid risk assessments for different types of school and for ventilation on the C2k site Here under the Resources Tab – Covid 19 - EA Risk Assessment Guidance and Templates.

This guidance will help you and your staff:

- 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.

Why ventilation 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 2m.

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 pupils and staff (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 school should be part of a risk assessment. A generic ventilation risk assessment can be found on the C2k site Here under the Resources Tab – Covid 19 - EA Risk Assessment Guidance and Templates.

The following video gives basic advice on how you can use ventilation to help reduce the risk of COVID-19 transmission in your workplace.

https://www.youtube.com/watch?v=hkK_LZeUGXM

Identifying poorly ventilated areas and using CO_2 monitors

The priority for your risk assessment is to identify areas of your school 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 staff 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 (CO_2) monitors

People exhale carbon dioxide (CO_2) when they breathe out. If there is a build-up of CO_2 in an area it can indicate that ventilation needs improving.

Although CO_2 levels are not a direct measure of possible exposure to COVID-19, checking levels using a monitor can help you identify poorly ventilated areas.

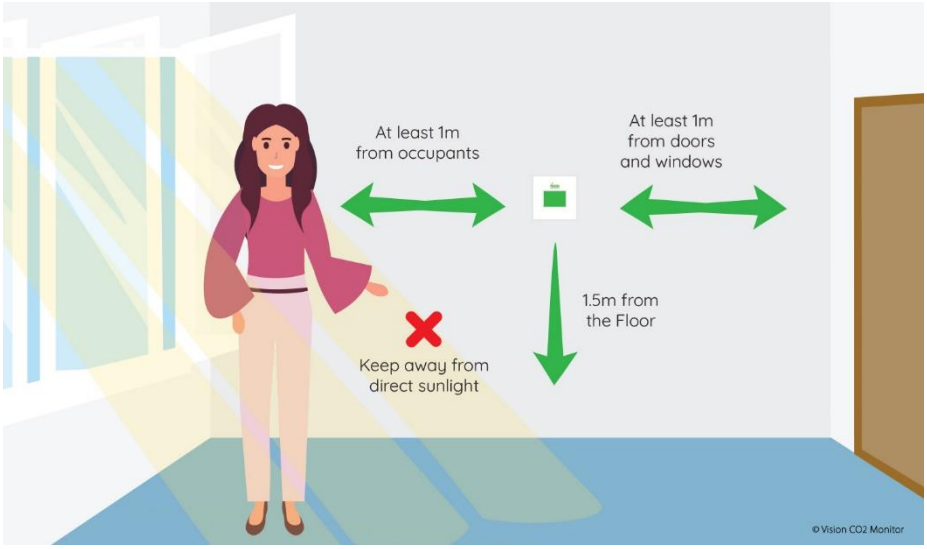
Types of CO_2 monitor to use

There are many different types of CO_2 monitors available. The most appropriate portable devices to use in the workplace are non-dispersive infrared (NDIR) CO_2 monitors. They type currently supplied to schools by EA is the Vision Monitor:

How to use a CO_2 monitor

CO_2 levels vary within an indoor space. It's best to place CO_2 monitors at head height and away from windows, doors, or air supply openings.

Monitors should also be positioned at least 1m away from people as their exhaled breath contains CO_2. If your monitors are too close they may give a misleadingly high reading.



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 CO_2 in the air is measured in parts per million (ppm). If your measurements in an occupied space seem very low (far below 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' CO_2 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 before making CO_2 measurements. Follow the manufacturer's instructions, including the appropriate warm-up time for the device to stabilise
- Know how to use your portable monitor correctly, including the time needed to provide a reading
- Take multiple measurements in occupied areas to identify a suitable sampling location to give a representative measurement for the space. In larger spaces it is likely that more than one sampling location will be required
- Take measurements at key times throughout the working day and for a minimum of one full working day to ensure your readings represent normal use and occupancy
- Record CO_2 readings, number of occupants, the type of ventilation you're using at the time and the date. These numbers will help you use the CO_2 records to decide if an area is poorly ventilated.

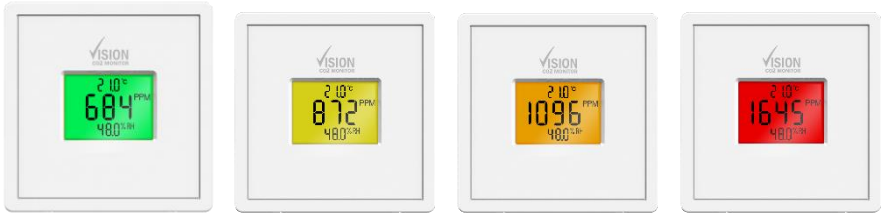
How the measurements can help you take action

CO_2 measurements should be used as a broad guide to ventilation within a space rather than treating them as 'safe thresholds'.

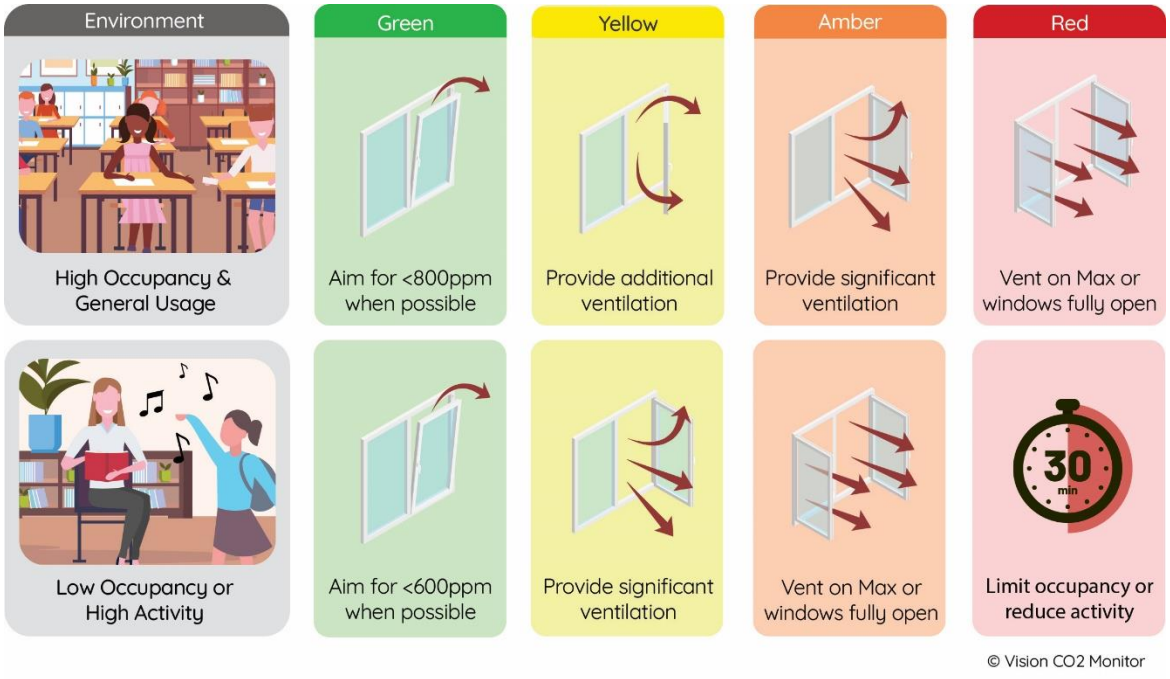
Outdoor levels are around 400ppm and indoors a consistent CO_2 value less than 800ppm is likely to indicate that a space is well ventilated.

An average of 1500ppm CO_2 concentration over the occupied period in a space is an indicator of poor ventilation. You should take action to improve ventilation where CO_2 readings are consistently higher than 1500ppm.

However, where there is continuous talking or singing, or high levels of physical activity (such as dancing, playing sport or exercising), providing ventilation sufficient to keep CO_2 levels below 800ppm is recommended.



Treating the risk with natural ventilation



Where CO_2 monitors will be less effective

CO_2 monitors are not suitable for use in areas that rely on air cleaning units because these remove contaminants (such as coronavirus) from the air but do not remove CO_2.

In large, open spaces and spaces with higher ceilings, such as assembly halls or gymnasiums, you can't be sure the air is fully mixed and CO_2 monitors may be less representative.

Monitors are of limited use in less populated areas. These include large foyers or large offices with one or two occupants.

The Scientific Advisory Group for Emergencies (SAGE) has published a paper on the use of CO_2 monitoring. The table below gives examples of spaces in a school where monitors may be useful.

Although this table gives some examples, every space is different, and you need to consider whether a CO_2 monitor will be appropriate for you.

Suitability of CO_2 monitoring in different types of space

Characteristics of space	**Examples**	**Suitability of CO_2 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/stores/staff rooms	Unlikely to give reliable measurements
Mid-sized spaces of 50-320 square metres. Occupied by a consistent number of people for more than an hour	Larger office and meeting rooms, classrooms, dining areas, 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, dining areas, and some indoor sports (low aerobic activity), Multi-Purpose Halls and Assembly Halls,.	Often well suited to monitoring as the higher numbers of occupants provides more reliable values
Large spaces over 320 square metres. Occupied by a consistent number of people for a longer period of time	Large Assembly Halls	Can be appropriate for monitoring in occupied areas, but might require multiple sensors to provide meaningful measurements
Large spaces over 320 square metres. Occupancy varies over short periods	Large Sports Halls	Unlikely to give reliable measurements

Assessment of fresh air (ventilation) in the school environment

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 throughout the school building. 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 school. It may help to make a list of areas in your school and how they are 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. Is there a set number of people each day or do numbers fluctuate?

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

What tasks or activities take place in the area?

Activities that make you breathe deeper, for example physical exertion, singing 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.

Do you use desk or ceiling fans?

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

Does your workplace use local exhaust ventilation?

You may use local exhaust ventilation (LEV) e.g. in Technology or Science, 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.

How will you tell your staff about the outcome of your assessment?

You should tell your staff 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.

Improving natural ventilation

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 CO_2 monitor will help you judge how long it takes to purge the air in a room

Talking to your staff about improving ventilation

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

How to improve mechanical ventilation (including air conditioning)

Mechanical ventilation brings fresh air into a building from outside.

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.

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 is 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.

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 pupils 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
- If the area is cold, relax uniform codes so pupils 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.