



Ventilation as a Control Measure in Managing the Spread of COVID-19

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INTRODUCTION

There are currently three recognised routes of transmission for COVID-19 transmission via surfaces; droplet transmission directly person-to-person via inhaled particles; and aerosol transmission through the air in a shared room.

The primary protection against COVID-19 are the steps that are taken to minimise the number of cases on campus and the arrangements to minimise potential spread.

Effective ventilation is part of the armoury of protection and is a vital control measure in preventing and limiting the spread of COVID-19 through the third of these routes.

The Health and Safety Executive (HSE) advises that the priority for an organisation should be to identify areas of the workplace that are usually occupied, and poorly ventilated. The HSE website has specific and really helpful pages on ventilation and COVID-19.

The HSE guidance states:

“Ventilation is likely to be adequate to minimise COVID-19 aerosol transmission risk 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.”

In most settings, for ordinary activities, the risk of aerosol transmission is likely to be low if the ventilation rate achieves current ordinary building design standards.

The HSE advises there are simple ways to identify poorly ventilated areas:

- Areas where people work but there is no mechanical forced ventilation and no natural ventilation such as openable windows, or doors or vents which connect directly to the outside.

- Areas that feel stuffy or smell.
- Unexplained high humidity.

Higher rates of ventilation are likely to be appropriate for higher risk activities such as choir singing and aerobic exercise. Guidance on the levels of ventilation that are recommended can be found in the more specialist links at the end of this document.

Teaching, studying, research work and office work are not high risk activities and conventional levels of ventilation are likely to result in a low risk of indirect transmission if room occupancy is not excessive.

In many areas without mechanical ventilation air movement can be improved relatively easily by ensuring that windows can be opened. (It is not unusual to find windows painted closed or over glazed.) Tackling these issues can lead to an improvement in ventilation levels relatively quickly.

Much of the estate of Higher Education Institutions are served by mechanical ventilation.

systems which are often very complex systems and need to be adjusted by suitably qualified heating and ventilation engineers.

Following on from advice issued in September 2020 by the HSE and [CIBSE](#) most, if not all HEIs have already modified there systems such that:

- All plant operating schedules extended starting 2 hours before occupation and continue 2 hours post occupation to purge the buildings.
- All systems incorporation the facility to recirculate a proportion of system return air have had this facility isolated/disabled with systems operating using 100% fresh air.

- In ventilation systems where ventilation rates are determined by CO2 levels, the set points have been altered to provide a higher air change rate.

Where there is concern about the levels of ventilation, for example in a room with no mechanical ventilation and little obvious natural ventilation it may be possible to assess the effectiveness of the ventilation by using Carbon Dioxide levels as a surrogate for ventilation effectiveness. Simply put if ventilation is ineffective Carbon Dioxide levels rise as people breath and the change in this level can indicate if the ventilation is sufficient.

*Whilst Carbon Dioxide is present in exhaled breath, and therefore its concentration represents the fraction of air that has been exhaled by individuals in the space. It is a proxy for occupancy and/or a ventilation rate, **but it is not a direct proxy for infection risk.***

Nor are CO2 monitors a universal solution. *Measurements of elevated Carbon Dioxide levels in indoor air are an effective method of identifying poor ventilation in multi-occupant spaces. However, in low occupancy or large volume spaces, a low level of Carbon Dioxide cannot necessarily be used as an indicator that ventilation is sufficient to mitigate transmission risks.*

However, in most situations measuring Carbon Dioxide levels using calibrated carbon dioxide monitors provides a high level of confidence that spaces are adequately ventilated for the occupancy limits set.

Carbon Dioxide monitors can be helpful in assessing air quality and in providing reassurance to staff and students.

Carbon Dioxide levels can be taken as spot samples or with data recorders to give real time, or near real time information. These

measurements are normally taken and interpreted by a competent person. The most appropriate portable devices to use in the workplace are non-dispersive infrared (NDIR) CO2 monitors.

Alternatively fixed or portable traffic light Carbon Dioxide monitors can be placed in rooms of concern.

These monitors are often installed in rooms of concern and normally have a traffic light system which can help to prompt users to open doors or windows if the Carbon Dioxide levels are rising.

Having a visible traffic light system can be reassuring to staff and students, if the meaning of traffic lights is properly explained, along with the action to be taken if higher levels of Carbon Dioxide are recorded. However in many cases a simpler solution would just be to ensure that windows remain open so that CO2 levels do not rise excessively.

Further more detailed information on regarding ventilation and Covid can be found through these links:

REHVA - The Federation of European Heating, Ventilation and Air Conditioning associations.
<https://www.rehva.eu/activities/covid-19-guidance>

The Chartered Institution of Building Services Engineers.
<https://www.cibse.org/coronavirus-covid-19>

The Health and Safety Executive.
<https://www.hse.gov.uk/coronavirus/equipment-and-machinery/index.htm>

Guidance from the Scottish Government.
<https://www.gov.scot/publications/coronavirus-covid-19-ventilation-guidance/pages/non-domestic-or-commercial-settings>



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