

Improving Ventilation on Campus

Airborne transmissions are a major contributor to the spread of respiratory diseases including COVID-19. To help manage the infection risk when working indoors staff should be mindful of the three main transmission routes; close contact with an infected person or contaminated surfaces, droplet transmission from an infected person and aerosols - smaller droplets and particles that are suspended in the air over longer distances and time.

The University Estate comprises a variety of buildings ventilated in three ways; naturally ventilated with outside air, mechanically ventilated or a combination of the two approaches.

The majority of teaching and office space is naturally ventilated. Natural ventilation uses the driving forces of outside air and temperature differences within the building to drive airflow through the building. The outside environment will influence natural ventilation performance. Natural ventilation is an acceptable method of ventilation in offices and general teaching spaces.

Mechanical ventilation uses fans, ducts and control systems to drive the ventilation process. A number of buildings have interlinked HVAC systems which combine the Heating, Ventilation and Air Conditioning controls via a centralised Building Management System (BMS).

The law requires employers to ensure an adequate supply of fresh air in the workplace. The pandemic has not altered this requirement. Ventilation is a key mitigation to reduce the concentration of contaminants in the air to reduce the risk of airborne transmission. This control should be used in conjunction with hygiene measures to help keep the workplace safe.

The Health and Safety Executive has provided guidance to help employers decide whether their ventilation is suitable. Ventilation is likely to be adequate in reducing aerosol transmission if rooms and spaces;

- are used within the occupancy limits specified in the building design;
- have sufficient fresh air supply to meet the current minimum building standard.

Ventilation requirements will differ depending on the room size and use. The University has reviewed the air supply across a number of spaces to inform whether our risk controls are robust ahead of a larger return to campus for the 2021-2022 academic year.

The University's Estates Department has appointed competent ventilation engineers and where possible the inflow of air into buildings has been increased. In addition:

- Poorly ventilated spaces (those that have no openable windows) have been reviewed
- Building ventilation system controls have been adjusted following a building specific review
- Purge ventilation is in operation with a two-hour extended run for ventilation systems beyond normal occupancy hours, at the start and end of each day
- Mechanical systems have been serviced and maintained
- Building Management Systems (BMS) are monitored for any faults
- Ventilation systems being run on full fresh air where possible to reduced and avoid air recirculation
- CO2 monitors installed in naturally ventilated teaching spaces to assess air quality.

There are multiple engineering controls that are used to help increase the effectiveness of the mechanical ventilation systems in place.

However, for naturally ventilated spaces, staff play a key part in helping to maximise airflow. There are a range of measures to do this, these include but are not limited to;

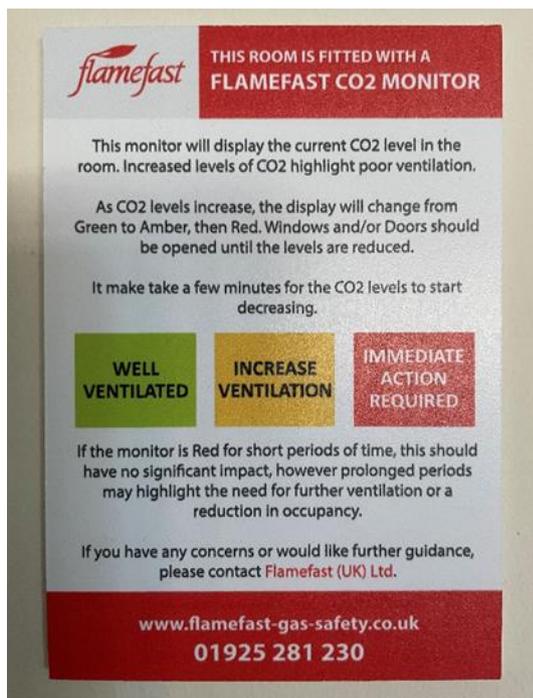
- Increased use of natural ventilation; partial or complete window opening, opening external doors.
- Consideration of how to balance increasing outside airflow with thermal comfort.
- Temporary purge ventilation or airing through intermittent window/door opening.
- Breaks periods between occupants using a space.
- Limiting duration of indoor activities where practicable.
- Carefully planning activities that involve increased aerosol generation including shouting, singing and aerobic activity in suitably sized and ventilated spaces. This should be a priority control measure within the accompanying risk assessment.

Staff are central to how well this will work in practice and need to put the relevant measures into action daily. Staff also need to highlight when things don't seem right. Where rooms are stuffy or stale smelling or where there are issues with window openings, grilles or doors these should be reported to the Estates Helpdesk promptly.

i. Indoor Air Quality

Carbon Dioxide monitors have been installed in naturally ventilated teaching spaces to give an indication of general air quality within the space. Whilst CO² is not a direct measure of possible exposure to COVID 19 it is used as a proxy value to indicate the potential for airborne spread. CO² monitors will indicate to room users in real time whether any further action is needed to improve the ventilation with the room.

Each monitor uses a traffic light display to signpost staff to follow the instructions via the in-room posters, an example is shown below. The set point limit – to trigger a red warning – is 1,500ppm. The HSE and CIBSE indicate indoor air quality should be at a maximum CO² concentration of 1,500 ppm against average external air levels.



ii. Ventilation Rates

There is no known assessment of safe ventilation rates to reduce or protect against COVID-19. An assessment and comparison of mechanical ventilation rates and confirmation that these ventilation rates are acceptable is not a requirement but the University has undertaken an assessment exercise across 54 teaching spaces to help provide additional reassurance.

The data from this exercise shows in larger teaching spaces i.e. lecture theatres are operating at a ventilation rate of 10l/s/p and classrooms rates are recorded between 10l/s/p and 8l/s/p.

All areas sampled showed an 'air change per hour' that exceeds the 5-15 threshold advised by CIBSE. 'Air changes per hour' or the rate of ventilation is the number of times per hour that the entire air volume of the area is changed. Whilst this doesn't indicate the efficacy of air spread, where a room has 5 air changes per hour – then over a 60-minute period the volume of air in the space will be changed every 12 minutes. For a lecture theatre within LTC used for 50 minutes, the air change rate is such that the volume of air is changed approximately every 3 minutes.

iii. Thermal Comfort

Keeping workspaces warm enough is also important. To help staff manage thermal comfort;

- Only partially open windows.

Lower outdoor temperatures and windier conditions will mean that windows do not need to be opened fully during winter months to achieve the same inward level of airflow. Even partially open windows can still provide adequate ventilation and maintain a comfortable temperature

- Open higher-level windows where available to help minimise draughts
- Reposition furniture, where possible to avoid incoming draughts.
- Wear warmer layers of clothing to help maintain body temperature.

iv. Local Airflow Controls

Desk Fans

Desk fans should not be used in poorly ventilated areas to help minimise the spread of aerosols. Please consult your local risk assessment, line manager and / or Safety Coordinator for more information if you wish to use a fan type device.

HEPA Filters

Local filtration or air cleaning units should only be considered where it is difficult to maintain adequate ventilation however the effectiveness of air purifiers depends on the room dimensions, flow rate and location. Secondary issues such as noise and any unintended effects on air quality also have to be considered. In most cases, it is not possible to retrofit HEPA filters to existing plant.

UV Air Cleaning devices

The use of UV light to sterilize clinical environments is well known however there is limited data at present to support this approach in other workplace settings, given the exposure risk to staff and students from high levels of UV light. A pilot study on the use of related technology in Schools is currently underway in the UK, results are expected in 2022.

Ventilation in Vehicles

When using University vehicles, hired vehicles or personal vehicles on University business, staff should ensure that ventilation systems are switched on and set to drawing fresh air in, not recirculating air. Heating can be used where needed, and windows opened as much as possible. If the vehicle is for shared use, opening doors during stops or between journeys will help to clear the air within the vehicle.

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