

# Coronavirus risks – Air Conditioning and Ventilation September 2021

## Guidance and the Role of Ventilation

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. [1] |

Ventilation is an important factor in mitigating against the risk of far-field (>2m) aerosol transmission, but has no impact on other transmission routes. [2] Hence the need to consider it as part of a package of control instead of seeing it as a sole solution to transmission. The remainder of this note focuses purely on ventilation as a control measure.

## Types of Ventilation

### Mechanical Ventilation

Mechanical ventilation is used to describe the means of bringing air into a building by mechanical means, for example fans. Often air is moved through ductwork to deliver outside air into a building and there are several ways in which this can be achieved.

### Natural Ventilation

The term natural ventilation is used to describe ways that outside air can enter the building without using fans or other mechanical means. For example, airflow through openings in the building envelope such as windows, doors, wind catchers and other vents.

Some ventilation strategies use both natural and mechanical ventilation within the same space; this is often termed mixed-mode ventilation. Typically mechanical ventilation may be the primary means of delivering outside air into the room year round, with the additional benefit of openable windows to provide more outside air to help cooling during the summer or to purge the room, for example from a smell caused by a spillage.

## Ventilation rates:

### What is a good ventilation rate?

The HSE states that every enclosed workplace should be ventilated by a sufficient quantity of fresh or purified air [3]. This statement has not changed since the pandemic. General guidance with respect to minimising the transmission of Covid19 is to maximise the amount of Fresh Air make up to a room, turning off any recirculation and maximising the dilution effect of fresh air to a space. An approach the University has undertaken.

Increasingly there has been a need to quantify this in terms of numbers. There are various references within a number of documents there are different values for a good or poor rate of ventilation. Other research suggests that 'to date, far-field aerosol transmission has been associated with outbreaks in poorly ventilated spaces' [2] (quantified as <2 l/s/p). There are also factors in

terms of spacing and the nature of the activity taking place in that room (e.g. singing/exercising will increase the risk as aerosol droplets are projected further and faster) that impact the effectiveness of a solution. For these reasons a blanket check/assurance is not being delivered by calculating the air change rate in each room and applied across the university. This all follows the risk assessment process highlighted in the 'works in progress' section.

In line with the Chartered Institution of Building Services Engineers London (CIBSE) guidance extended operation times are being implemented. UCL Estates are changing the clock times of system timers to start ventilation at nominal speed at least 3 hours before the building usage time and switch to lower speed 3 hours after the building usage time. In demand-controlled ventilation systems we have changed CO<sub>2</sub> set point to lower, 400 ppm value, in order to maintain the operation at nominal speed.

It should be noted that the DFE guidance dated April 2021 does not provide any level of numeric values for ventilation and simply states achieve good ventilation.

## **Works in Progress - Ventilation**

### **Plant Maintenance**

All mechanical plant has recirculation turned off and is supplying on full fresh air. Estates services have pulled forward all planned maintenance activities on equipment that introduce fresh air, ensuring that these are complete prior to the start of autumn term. These works will ensure that provision of mechanical ventilation to the campus is maximised. Among other activities, during the Planned maintenance the performance main plant is assessed, the unit cleaned, and filters monitored and changed as appropriate. All mechanical plant has recirculation turned off and is supplying on full fresh air.

### **Strategic Maintenance Projects**

To ensure facilities are maintained in line with highest standards UCL Estates undertake a rolling program of projects to replace plant that is beyond economic repair. Due to planning and budget these projects are prioritised with those impacting Health and Safety and Statutory Compliance. All items of plant impacting the amount of fresh air ventilating a space have been reclassified, gaining highest priority for action as soon as they can be executed.

### **Baseline of Approach**

Using a combination of consultants and internal team members UCL baseline approaches of industry and similar institutions to ensure that our approach remains at a leading standard, and we respond to all changes in guidance and legislation. We meet monthly to review legislation and guidance changes; actions being taken by other institutions and any emerging trends and technologies.

### **Assurance of Natural Vent Arrangements**

Where spaces are naturally ventilated, Estates Teams are undertaking a full survey of these spaces to ensure these arrangements operate. Checks have been progressing quickly with only two buildings outstanding. Few defects have been found and those that have are being repaired concurrently with the survey.

## **Risk Assessment**

Safety Services have updated the institutional risk assessment accordingly.

Due to the nature of the estate, and the fact that we have previously checked most areas, we have agreed with Safety Services and the EO team that the approach to issues / concerns with ventilation will be as follows:

Departments will update their existing risk assessment. Any concerns relating to ventilation will be flagged with the AFM team who will either confirm the ventilation is OK (based on previous work) or issue help desk ticket for the appropriate EO staff to attend, during the period from reporting to rectification the department will be advised to update their risk assessment to mitigate any identified risks.

## **Installed Equipment to Aid Ventilation**

### **Recirculating centralised ventilation systems:**

For buildings with centralised ventilation systems that remove and circulate air to different rooms recirculation has been turned off and as much fresh air supply introduced as possible.

The HSE state that other types of air conditioning systems do not need to be adjusted<sup>1</sup>.

UCL Estates estimate that 90% of UCL ventilation systems do not have any recirculation.

Recirculating plant within ventilation systems have been turned off or bypassed, including heat recovery systems.

### **Recirculating local ventilation systems (split A/Cs or Fan Coil Units [FCUs]):**

Within a room/zone these systems provide thermal comfort by warming or cooling the indoor air and the air movement they provide can help prevent stagnant areas. However, they do not provide any outside air into the room/zone and without a dedicated source of outside air they could be responsible for recirculating and spreading contaminants into the path of socially distanced building users.

It is important that in room/zones with more than one occupant that there is a source of outside air provision (either natural or mechanical ventilation) when these units are in operation. If a room/zone has no or very little outside air ventilation provision then the action of a FCU or split unit could create air movement that could spread any airborne contamination throughout the room and the advice is to turn off the fan coil unit fan if there is more than one occupant. However, if there is a good outdoor air ventilation supply (either mechanical or natural) to the room/zone then the action of the fan coil unit fan will help de-stratify the air and reduce the chance of pockets of stagnant air, helping to dilute any airborne contaminants. UCL Estates will be identifying and marking the FCU/Split units in spaces with limited fresh air supply.

## **Fans**

The HSE recommends consideration to improving the circulation of outside air and prevent pockets of stagnant air in occupied spaces. This can be achieved by using ceiling fans or desk fans for example, provided good ventilation and supply of outside air is maintained. Guidance does recommend that desk fans are not aimed directly in to the face but in to the mid-point of the body or local area as a precaution. That said, the risk of transmission through the use of ceiling and desk fans is extremely low providing there is good ventilation in the area it is being used, preferably provided by fresh air through a window or from a centralised

system. They are recommended to assist natural ventilation in rooms where fresh air can only enter from one side of the room.

## **CO2 Monitoring**

In certain rooms, CO2 monitoring can be a useful method of assessing the effectiveness of the Ventilation. To review the use of this at UCL we are in the progress of rolling out a trial at the Institute of Education to assess the usefulness of CO2 monitoring. We have reviewed all spaces in the building against the parameters set out by the HSE [3] to target the appropriate spaces and surveyed these spaces to verify and fix the location with an installation contractor. We imminently anticipate the program for installation. In parallel we have analysed room data from across the entire estate such that we have the locations surveyed prior to the success of the trial at IoE.

## **Other Factors:**

Ventilation is only part of a very large range of risk reduction measures that have been put in place. Safe transmission mitigation measures depend on multiple factors related to the individuals, their activity and the environment, including viral load, duration of exposure, number of individuals, and distance between them and whether face coverings are worn. We are following the latest Government and UK Health and Safety Executive (HSE) guidelines, and drawing on the latest research, to ensure safety on campus.

## **References**

Related references to COVID spread can be found here:

[1] [USHA Ventilation as a Control Measure in Managing the Spread of COVID-19](#) 2021

[2] Role of Ventilation in Controlling SARS-CoV-2 Transmission SAGE-EMG  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/928720/S0789\\_EMG\\_Role\\_of\\_Ventilation\\_in\\_Controlling\\_SARS-CoV-2\\_Transmission.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928720/S0789_EMG_Role_of_Ventilation_in_Controlling_SARS-CoV-2_Transmission.pdf)

[3] Ventilation and air conditioning during the coronavirus (COVID-19) pandemic  
<https://www.hse.gov.uk/coronavirus/equipment-and-machinery/air-conditioning-and-ventilation/index.htm>