Coronavirus risks – Air Conditioning and Ventilation April 2021

Guidance and the Role of Ventilation

Guidance issued by the department for Education in April 2021 provides guidance for higher education providers on the return of students to higher education for Spring and Summer of 2021. It draws on a package of measures including frequent hand washing, face coverings and optimising ventilation to dilute the virus in enclosed spaces. [1] The approach highlighted within the guidance mirrors the approach taken by UCL by controlling this reopening through an application and risk assessment process, ensuring that a package of control measures exists and maximising the available ventilation to enclosed spaces on campus.

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. Increasingly the vaccination program may enable the consideration of susceptibility of receptors but is currently not being relied upon within the measures being taken.

Ventilation verification has been carried out on those teaching spaces highlighted by room bookings in line with reopening following lockdown 1. All mechanical ventilation equipment will be checked to ensure that it is operating at optimum level prior to September 2021. This is being utilised as part of the controlled reopening process including full risk assessment of usage and control measures to limit the risk of transmission. In support of this works on ventilation systems are now receiving the same priority as statutory compliance items both in terms of maintenance and project priority.

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 CO₂ 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

Ventilation Validation of Critical (Teaching) Spaces:

Since emergence from the first period of lockdown in the June 2020 UCL Estates have assessed the ventilation rates (the amount of fresh or outside air provided) to critical areas across the campus, focusing on teaching spaces at a minimum of 2m social distancing, as per the list provided by timetabling. The ventilation validation assessed the spaces, assessed their ventilation strategy and took a detailed examination of the suitability of the installed ventilation against a best practice value taken from the latest building regulation. In a small number of rooms the need for remedial action against the design intent was found. In these instances either the works were completed before use or the specific room was withdrawn from service until the works could be completed

Strategic Approach to Reopening

The reopening of campus is being conducted as a strategic, prioritised and process controlled activity. The process considers the complete package of control measures required for the safest practicable reopening with respect to Covid19 control. The process can be viewed in Appendix A. Where deemed to be required as an output of this process an engineering assessment of the ventilation in the room may be performed. As this is clearly a specialist and labour intensive requirement above the normal baseline of activities Estates Operations are resourcing a team of experts to handle the anticipated increase in demand.

Ventilation Equipment Assessment

Estates services are pulling forward all planned maintenance activities on ventilation equipment, 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.
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 ventilating a space have been reclassified, gaining the highest priority. They have been awarded the funding required and are in progress for accelerated completion.

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. 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 into 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.

A Note on CO2 Monitoring

In certain rooms, CO2 monitoring can be a useful method of assessing the effectiveness of the CO2. This should be reviewed with caution. In low occupancy or large volume spaces a low level of CO2 is not a good indication of the effectiveness of ventilation.
Other Factors:
It is understood that as part of the roadmap out of lockdown UCL is working towards an assumption of no social distancing. Under these conditions this could mean that all ventilation operates under normal conditions without the need for further Covid related assessment or measures.
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 have considered all of these factors and have specific risk reduction measures in place for all of them throughout the UCL campus.

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] Guidance for higher education providers on the return of students to higher education


Appendix A – Return to Campus Process Map

Return to Campus process map
March 2021

Faculty or Department wishing to ‘Return to campus’ for teaching or research activities review their arrangements in line with current UCL guidance

Approach DOO
Discuss & agree faculty or department arrangements. Ensuring risk assessment, Return to Campus checklist have been updated

DOO
Completes & submits online ‘Return to Campus’ form providing requested details at least 5 working days prior

Heads of Service
Review provision & service provider resources to determine if can requirements can be met or need to be implemented

Estates Operations COVID Response Group
Review & confirm that falls in line with university return to campus (PPMG) plans

Estates Operations
AFM team review submitted form, to ensure sufficient information & notice has been provided, or if covered by existing arrangements

Head of Service Or USM
Confirms & advises AFM when required support service(s) will be in place by

AFM
Advises DOO date which services will be in place to support Return to Campus

DOO
Advises relevant faculty or department when support services will be in place

Abbreviations explained
DOO = Director Of Operations
AFM = Area Facilities Management team
USM = University Service Manager
PPMG = Practice & Practically Based mitigation Group