

## VENTILATION STRATEGY

The [Building and Estates COVID-19 Ventilation Strategy and Risk Assessment](#) sets out ventilation considerations which forms part of the University's COVID-19 Infection Control measures.

## TRANSMISSION ROUTES & VENTILATION AS A PROTECTIVE MEASURE

### What are the main transmission routes of COVID19 (SARS-CoV-2)?

There are four transmission routes can be distinguished, also illustrated in Fig 16 below:

1. **Close Contact Transmission**, < 1.5 m of Infected Person, via large droplets and aerosols (when sneezing, coughing or talking);
2. **'Long Range' (aerosol based) Transmission** (> 1.5 m, with droplet nuclei < 10 µm, which can stay airborne for a long time); (released when breathing, talking, sneezing or coughing);
3. **Surface (fomite) Contact Transmission** (hand-hand, hand-surface etc.) A person may be infected with COVID-19 by touching a surface or object that has the virus on it and then touching their mouth, nose, or possibly their eyes;
4. **Faecal-oral Transmission Route**. (infected droplets and aerosols can be released when flushing toilets, or from dried out water seals in Floor Drains, Sink and Shower Drains etc., particularly if negative pressure in the space due to operation of an Extract Fan or Fumecupboard etc.)

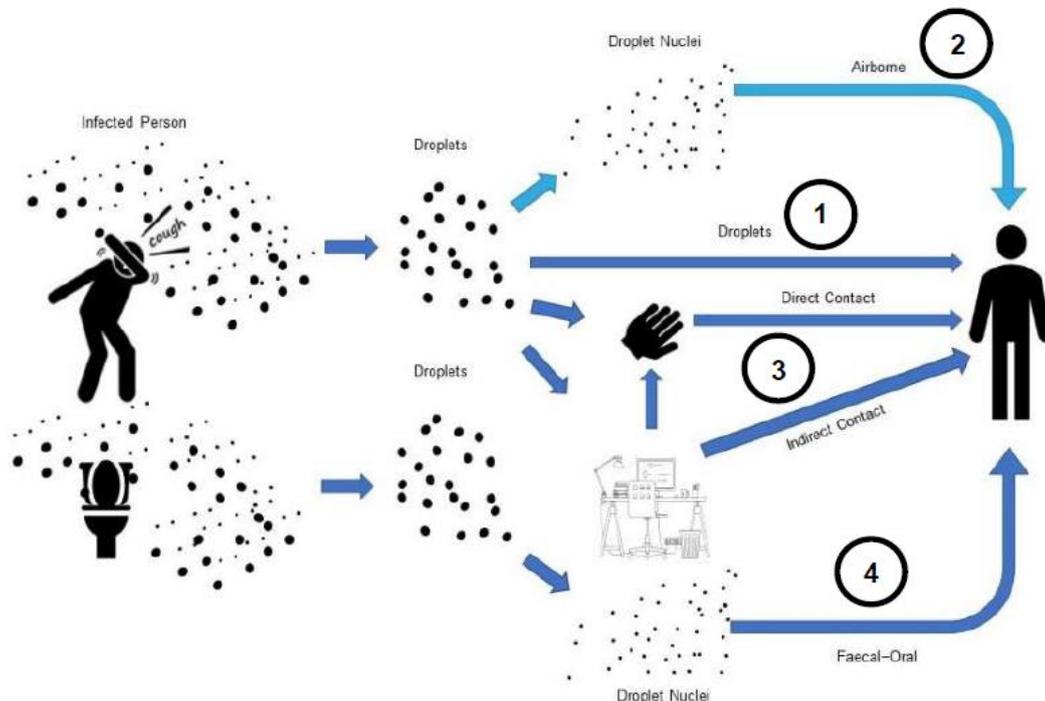


Figure 16. Exposure mechanisms of COVID-19 SARS-CoV-2 droplets. (Figure: courtesy Francesco Franchimon). Source: [REHVA COVID Guidance Ver 4.1, April 2021](#), page 33

Transmission Route	Protective Measures
1/ <b>Close Contact Transmission</b> , < 1.5 m of Infected Person, via large droplets and aerosols (when sneezing or coughing or talking)	Face Coverings, Confinement, Social Distancing
2/ <b>'Long Range' (aerosol based) Transmission</b> (> 1.5 m, with droplet nuclei < 10 $\mu\text{m}$ , which can stay airborne for a long time); (released when breathing, talking, sneezing or coughing);	Face Coverings, <b>Ventilation</b>
3/ <b>Surface (fomite) Contact Transmission</b> (hand-hand, hand-surface etc.);	Face Coverings, Hygiene, Disinfection, Behavior
4/ <b>Faecal-oral Transmission</b> Route. (infected droplets and aerosols can be released when flushing toilets, or from dried out water seals in Floor Drains, Sink and Shower Drains etc., particularly if negative pressure in the space due to operation of an Extract Fan or Fumecupboard etc.)	Close Toilet Lid when Flushing, Keep Floor, Sink & Shower Traps full,

1, 2 and 4 are considered airborne transmission mechanisms.

**Where does ventilation fit into the overall protective measures?**



Ventilation is only one element of the overall COVID Infection Control/Preventive measures. Long-Range (>1.5m, which can stay airborne for a long time) aerosol-based transmission, is the only transmission route that can be controlled with **Good Ventilation**. It does this by diluting the virus concentration to a low level.

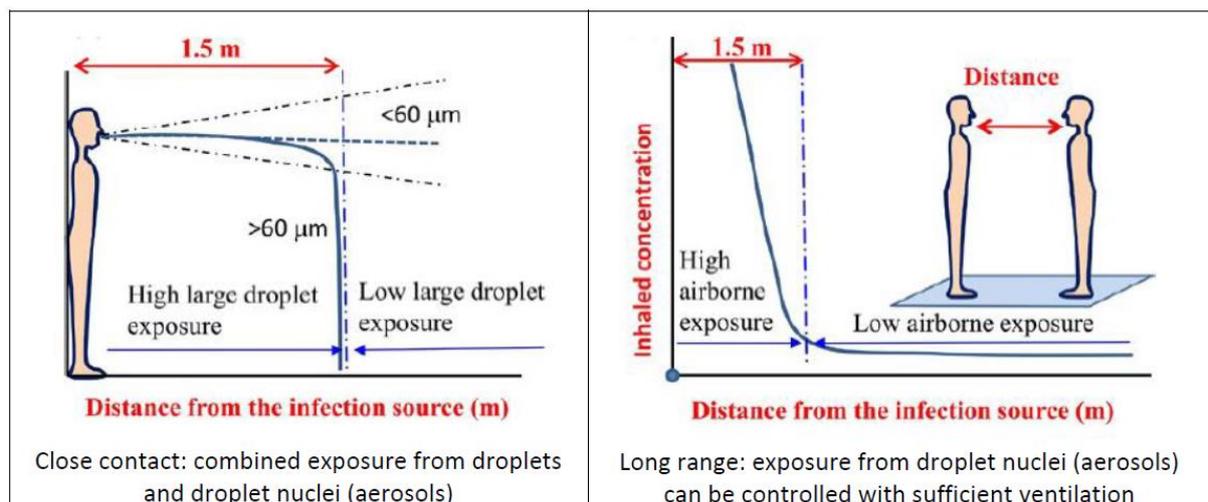


Figure 1. The distinction between close contact combined droplet and aerosol transmission (left) and long-range aerosol transmission (right) which can be controlled with ventilation diluting the virus concentration to a low level. (Figure: courtesy L. Liu, Y. Li, P. V. Nielsen et al.xii). Source: [REHVA COVID Guidance Ver 4.1, April 2021](#), page 5

## MECHANICALLY VENTILATED SPACES FAQ

### What is Mechanical Ventilation and why is it important in preventing the transmission of COVID19 (SARS-CoV-2) Coronavirus?

Mechanical or forced ventilation systems, circulate fresh air to indoor spaces using ducts and fans (sometimes fans only). UCC's buildings are ventilated by means of mechanical ventilation and natural ventilation (openable windows & vents) and sometimes a combination of both.

The majority of mechanical ventilation in UCC, is 'Mixing' ventilation. This means that the incoming fresh air enters the space via a mixing diffuser, and mixes with the air already in the room. The return air leaves the room and is exhausted to outside the building. There is no recirculation of the Return Air with the incoming Fresh Air. This continually dilutes the air in the ventilated space, supplying fresh oxygen in the air to the space, and removing pollutants, including CO<sup>2</sup>, Pathogens (viruses & bacteria etc.) from the space to outside the building.

REHVA state that *"In the context of buildings and indoor spaces, there is no doubt that cross-infection risk may be controlled up to 1.5 m from a person with physical distancing and beyond that distance with ventilation solutions."* [Source: REHVA COVID Guidance Ver 4.1, April 2021](#), page 8

The Buildings & Estates Office schedule the mechanical ventilation systems to provide maximum ventilation in accordance with Covid 19 guidelines - the impact of which is demonstrated in Figure 3 below).

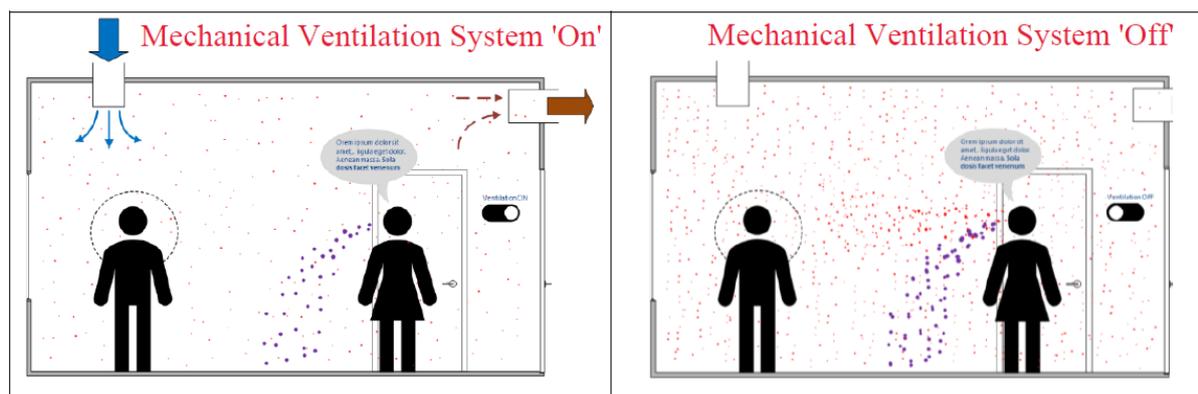


Figure 3. Illustration of how an infected person (speaking woman on the right) leads to aerosol exposure (red spikes) in the breathing zone of another person (man on the left in this case). Large droplet exhalation is marked with purple spikes. When the room is ventilated with mixing ventilation system, the number of virus-laden particles in the breathing zone is much lower than when the ventilation system is off. Left figure: ventilation system on, right figure: ventilation system off. Source: [REHVA COVID Guidance Ver 4.1, April 2021, page 7](#)

The more you increase the ventilation the fewer aerosol exposure (red spikes) on LHS Figure

### What is the optimum level of Ventilation to Indoor Spaces?

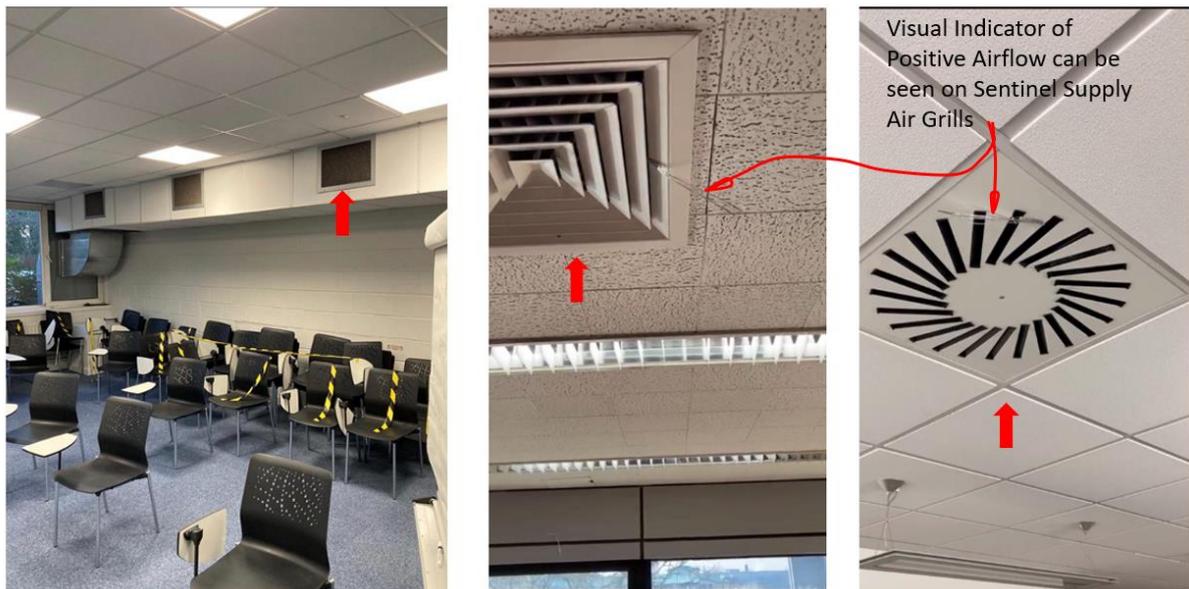
Unlike Naturally ventilated spaces, the Fresh Air volume flow rates of Mechanically Ventilated spaces, can be measured more easily, to ensure that the target fresh air flow rates, with no recirculation, are being met, wherever possible, in line with World Health Organisation (WHO) Guidelines.

All mechanically ventilated spaces have been surveyed, and fresh air supply rates measured, to ensure UCC Target of 10 L/s per person is being met.

### How do I know that my area is Mechanically Ventilated?

Mechanically ventilated spaces have ceiling, floor or duct mounted, Supply Air Grills, supplying Fresh Air to the space, as shown below.

## Examples of Typical Mechanical Supply Air Grills



A matrix of spaces and their occupancy capacities, based on 10 Litres per Second (L/s) per person, will follow shortly.

## What practical measures are being taken, regarding the operation and maintenance of Mechanical Ventilation?

The following practical measures for building services operation, based on current REHVA Guidance, are being followed by UCC:

1. Provide adequate ventilation of spaces with outdoor fresh air
2. Switch ventilation on at nominal speed at least 2 hours before the building opening time and set it off or to lower speed 2 hours after the building usage time
3. Ensure CO<sub>2</sub> demand-controlled ventilation settings, to force the ventilation system to operate at maximum capacity during occupancy;
4. Smart use of windows - Open windows regularly (even in mechanically ventilated buildings)
5. Keep toilet ventilation in operation at nominal speed in similar fashion to the main ventilation system
6. Avoid opening windows in toilets to maintain negative pressure and the right direction of mechanical ventilation air flows
7. Instruct building occupants to flush toilets with closed lid
8. Switch air handling units with recirculation to 100% outdoor fresh air
9. Inspect heat recovery equipment to be sure that leakages are under control
10. Ensure adequate outdoor fresh air ventilation in rooms with Fan Coil units or Split Air Conditioning units
11. Do not change heating, cooling and possible humidification setpoints
12. Carry out scheduled duct cleaning as normal (additional cleaning is not required)
13. Replace central outdoor air and extract air filters as normal, according to the maintenance schedule
14. Regular filter replacement and maintenance works shall be performed with common protective measures including respiratory protection
15. Introduce an IAQ (CO<sub>2</sub>) sensor network that allows occupants and facility managers to monitor that ventilation is operating adequately, e.g. 'Visual Airflow Indicators' on 'Sentinel Supply Air Grills', to indicate positive Airflow, on Mechanical Ventilation Systems, and CO<sub>2</sub> concentration Monitors, complete with facility to give indication of CO<sub>2</sub> levels and when action is to be taken.
16. Give Staff and Students/ local Responsible Persons any necessary information, instruction, training, and supervision on the proper use of ventilation facilities.

## What can I do to keep myself and others Safe in a Mechanically Ventilated Space?

The WHO state that Indoor ventilation is only one important part of a comprehensive package of prevention and control measures, that can limit the spread of certain respiratory viral diseases, including COVID-19. However, ventilation alone, even when correctly implemented, is not sufficient to provide an adequate level of protection. NO SINGLE STEP IS A SOLUTION IN ITSELF. IT IS PART OF AN OVERALL RISK MITIGATION STRATEGY

Correct use of Face Coverings, hand hygiene, physical distancing, respiratory etiquette, local supervision of the foregoing, reporting of Building related Faults, testing, contact tracing, isolation and other infection protection control measures, are critical to prevent transmission of COVID19 (SARS-CoV-2).

How can I tell the mechanical ventilation is working?

Where possible 'Visual Airflow Indicators' have been placed on 'Sentinel Fresh Air Supply Grills', to indicate that the mechanical ventilation is working.

## 'Visual Airflow Indicator' on Sentinel Supply Air Grills

Airflow '**OFF**'



Airflow '**ON**'



Visual Airflow Indicators enable and empower, building responsible persons/ Lead Worker Representatives/ COVID Safety Support (CSS), to satisfy themselves, as far as is reasonably practicable, that there is positive Fresh Air flow, into their area. If not, they must take prescribed appropriate action, to make Safe and request immediate assistance, to have it addressed.

What if I have questions or suspect my HVAC Ventilation System may not be working properly?

Please do not depend on others to report a fault. It is important that you take the initiative and report it yourself.

Staff and Students are asked to report any Ventilation/Building related Issues/Faults, as follows:

- On the Western Gateway and BHS Campus WGB/BHSC: - Please contact the Facilities Office Ex 1567 or email: [carol.cashman@ucc.ie](mailto:carol.cashman@ucc.ie)
- For all other areas, please Phone Ext 2480 or (021) 490 2480 or Email [bereception@ucc.ie](mailto:bereception@ucc.ie)

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