

# AIR CONDITIONING AND VENTILATION DURING THE CORONAVIRUS PANDEMIC



## HSE advice is very clear: "IT'S SAFE TO USE HVAC SYSTEMS"

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Heating, ventilation and air-conditioning (HVAC) systems are used to maintain indoor air temperature, humidity and, most importantly now, air quality at healthy and comfortable levels. Employers are required by law to ensure an adequate supply of fresh air and a minimum working temperature in order to provide a healthy working environment. This has not changed.

A well maintained and operated system providing good ventilation can help reduce the spread of coronavirus. The Health and Safety Executive (HSE) advises focusing on improving general ventilation, preferably through fresh air or mechanical systems.

The risk of air conditioning spreading coronavirus (COVID-19) in the workplace is extremely low as long as there is an adequate supply of fresh air and ventilation. Many air conditioning systems not only provide heating and cooling but also distribute fresh air to the occupied areas. HSE suggests distributing outside air using fans or similar to prevent pockets of stagnant air. Air conditioning units by design provide this air distribution.

In short, you can continue using most types of air conditioning system as normal. Some may require adjustments to controls and air distribution. If you use a centralised air conditioning / ventilation system which introduce a percentage of fresh air whilst recirculating air between different rooms, it is recommended that recirculation mode is isolated and the system is switched to full fresh air.

## Safety First

- Preventing contamination and protecting public health is more important than thermal comfort.
- All works shall be undertaken with common protective measures including respiratory protection.
- The maintenance personnel should follow standard safety procedures for dusty work, including wearing gloves and respiratory protection.
- Where users can intervene in the control of the ventilation, make them aware of the benefit of using these for reducing the circulation of infectious material.

## Outside Air

- Maximise the supply of outside air as much as reasonably possible while maintaining or increasing the social distancing (min physical distance 2-3 m between persons) among employees in order to promote the ventilation cleaning effect.
- Maximising fresh air dilutes the concentration of possible contamination in the indoor air.

## Increase Air Supply and Exhaust Ventilation

- Switch air handling units with recirculation to 100% outdoor air if possible.
- In buildings with mechanical ventilation systems, extend operation times.
- Time ventilation to start at normal speed at least 2 hours before the building usage time.
- Switch to lower speed 2 hours after the building usage time.
- Do not switch ventilation systems off in any buildings, even those temporarily vacated, but operate them continuously at reduced speeds.
- In demand controlled ventilation systems: reduce the CO<sub>2</sub> setpoint to a lower 400 ppm value. This will maintain operation at normal speed.
- In buildings with no mechanical ventilation use openable windows, even if this causes thermal discomfort.
- In buildings with mechanical ventilation, window airing can be used to further boost ventilation, but the balance of air within the building must be considered to stop infiltration of foul air from washrooms entering other parts of the building when doors are opened to gain access.
- In buildings equipped with centralised humidification, there is no need to change the humidification systems' setpoints

## Mechanical Heat Recovery Ventilation MHRV

- Some ventilation systems are equipped with heat recovery. These can be thermal wheels or cross plate heat exchangers. Because the supply air is pre-heated (or pre-cooled) using energy recovered from the return air, less energy is required to maintain space temperatures during the heating and cooling seasons.
- Properly designed, installed and maintained heat recovery ventilations systems have almost zero transfer of particle-bound pollutants including airborne bacteria, viruses and fungi. However, under certain conditions, virus particles in extract air can re-enter the building so correct design is a must.
- Heat recovery devices may carry over viruses attached to particles from the exhaust air side to the supply air side via leaks, it is important for equipment to be inspected to be sure that leakages are under control and that the supply and extract air has sufficient separation to prevent exhaust air being drawn back into the building.
- Do not turn off the heat recovery rotors. Normal operation maintains higher ventilation rates.
- Non centralised MHRV units have a typical internal leakage rate of 8-10%. This can be reduced to 5% by adjusting the system pressures so that the supply air system pressure is greater than the extract air system pressure. This is done by changing the supply and extract fan speed or pressure settings.
- Stand alone MHRV units can be fitted to provide local energy efficient supply and extract ventilation where ventilation needs to be boosted or does not exist at present.

## Fan Coil Units - including DX fan coils connected as a single split or part of a multi-split or VRF system

The spread of COVID-19 has been linked to many factors in indoor environments. Research is ongoing to determine the exact mechanisms, this includes the impact of airflows within a space. Terminal units, such as fan coils and DX units, usually provide both local cooling/heating and fresh air and so are often integral to the distribution of fresh air in a building.

During the summer the guidance was to increase outside air by adding mechanical ventilation and/or opening windows. Now the lower outside temperatures have created issues where the indoor temperature has become too cold, frequently dropping below the minimum statutory temperature. This is also creating a heating load that is often unattainable with existing plant or is imposing an energy demand that is unaffordable and wasteful.

The following guidance is provided to:

1. Maximise the introduction of outside air from central plant into the space to dilute any COVID-19 droplets suspended in the air.
2. Reduce potential cross contamination between rooms.
3. Limit the recirculation air volumes and in-room air velocities in shared/open plan spaces to allow any COVID-19 droplets to settle out of the airstream and reduce the radius they might be distributed over.

Whether to switch the unit off depends on the location, use and occupation density of the area it serves.

### **Unit serves an area occupied by just 1 person and the air recirculation is all local to that zone:**

The fan coil can operate as normal. Any contaminated droplets of moisture in exhaled air will only be recirculating to the person who exhaled it in the first place. The fan coil should be switched off when that person leaves the zone in case others enter in their absence. If the area is to be subsequently used by another person, the surfaces should be cleaned down before it is switched back on again.

### **Unit serves a multiple occupied area with limited fresh air being supplied into the zone:**

Switch the fan coil off as the potential for air flow distributing a contaminated air droplet towards other people is higher. If it cannot be switched off, follow the guidance below.

### **Unit serves a multiple occupied area and it cannot be switched off or there is a good supply of fresh air to the zone:**

Care should be taken as to where people are positioned in the area in relation to the air flow emanating from the unit. The fan speed should be turned down to a low speed setting to minimise air throw. Modifications to grille locations or air deflections could be considered.

Fans should be continuously operated to avoid resuspension of virus sediment in filters when the fan is turned on. Continuous operation and exhaust ventilation will remove virus particles. Timer setting can be changed to fan only or lower temperature operation during time of non-occupancy to reduce energy usage.





## Filters

- Central outdoor air and extract air filters must be replaced according to normal maintenance schedules when pressure or time limits are exceeded.
- To minimise risk when filters, and especially extract air filters, are changed, HVAC maintenance personnel should carry out work in line with standard safety procedures.
- Filters should be changed with the system turned off, whilst wearing gloves, with respiratory protection and disposed of in a sealed bag.

## Duct Cleaning

Extra duct cleaning, over and above the normal procedures, is not deemed necessary as ventilation systems are not a contamination source and viruses attached to small particles will not deposit easily in ducts.

## Room Air Cleaners In Specific Situations

Increasing ventilation is more efficient but if this is not possible, room air cleaners with HEPA filter efficiency, can effectively remove particles from the air in a comparable way to ventilation. Electrostatic filtration (not the same as room ionizers!) can be considered. Studies have shown electrically charged hydroxyl radicals to be effective in combatting viruses and contamination in air.

## References

This guidance has been put together using information from Health and Safety Executive (HSE); Building Engineering Services Association (BESA); Chartered Institute of Building Services (CIBSE); Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA).

The information is current at the time of publication. Research is ongoing and may supersede this information at any time.

## Further Reading

[HSE Air Conditioning and ventilation during the coronavirus pandemic](#)

[BESA Summary of Practical Measures For Building Services Operation](#)

[REHVA COVID 19 Guidance](#) - How to operate and use building services / Coronavirus outbreak

[CIBSE COVID 19 Guidance](#) - Guidance for staff, members and visitors

[Workplace Health, Safety and Welfare Regulations 1992](#) - Approved Code of Practice and Guidance



If you're unsure about what system you have and how you can use it, we are here to help.

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