An Roinn Turasóireachta, Cultúir, Ealaíon, Gaeltachta, Spóirt agus Meán
Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media

VENTILATION, HEATING AND AIR CONDITION

According to the ECDC poor ventilation in confined indoor spaces is associated with increased transmission of respiratory infections. COVID-19 can spread in poorly ventilated and/or crowded indoor settings, where people tend to spend longer periods of time. This is because aerosols remain suspended in the air or travel farther than 1 metre (long-range). That is why it is important to ensure a) that workers who have symptoms of COVID-19 or are feeling unwell remain out of work, and b) that indoor spaces are kept well ventilated.

The ventilation of enclosed places of work is a requirement under the Safety, Health and Welfare at Work Act (General Application) Regulations, 2007. Natural (via windows and doors) and mechanical ventilation (Heating, Ventilation and Air Condition systems - HVAC) significantly improves hygiene and better air quality. The ability to adequately ventilate an indoor setting including opening windows and doors where possible is a key mitigating measure to reduce the risk of transmission of COVID-19.

Event venues should be ventilated before admittance of patrons, during the event if appropriate and after the event.

Big tops, tents and marquees offer an ideal solution for many events. They provide spaces which can provide protection from the weather, while allowing for free ventilation through a space by the opening or removal of the sides of the tent. Note: for Big Tops, Tents and Marquees to be considered an outdoor venue, not more than 50 per cent of the perimeter walls can be closed.

The primary principle for improving ventilation is to minimise transmission, so that the level of "fresh" outside air should be maximised therefore reducing the level of recirculated air in the workspace, unless high-efficiency particulate filters (HEPA) are installed in the ventilation system.

Indoor venues should where possible:

- Seek the advice of a Heating, Ventilation and Air Conditioning Specialist to carry out an assessment of the current HVAC system.
- Use Carbon Dioxide (CO) monitors in the venue, particularly in high occupancy areas, to identify poorly ventilated areas
- Install HEPA filters if significantly inadequate ventilation is identified

Manual

Windows and doors should be opened on a regular basis to allow for a flow of air throughout the premises.

Mechanical

- Ensure that any mechanical ventilation systems are adequately maintained as per manufacturer's instructions. There is no need for additional maintenance cycles beyond the routine maintenance.

- Where filters are used in the central HVAC system, ensure that these are replaced regularly as per manufacturer's instructions. There is no need for additional cleaning or changing beyond routine maintenance.

- If filters are used as part of a central ventilation system, consideration should be given to installing the most efficient filter for the system Minimum Efficiency Reporting Value – MERV -13 to 16; ISO 16890 ePMl rating 60-90%). HEPA filtration should be considered where air is re-circulated.

- Increase the outdoor air fraction of air inside buildings as much as possible. This can be done by fully opening outside air dampers in mechanical systems or opening windows where available.

- Increase total airflow supply to occupied spaces by increasing number of air exchanges per hour.

- Mechanical fans should only be used where there is a single occupant in a room. If this is not possible, then fans should be directed to exhaust directly to the exterior environment (e.g. open window), to minimise potential spread of pathogens.

- Disable demand controlled mechanical ventilation if possible. These types of HVAC systems are set to only circulate air when a certain threshold is passed, usually the amount of CO_2 build-up in the room, or the ambient room temperature. If it is not possible to bypass this system, then set the threshold to the lowest possible setting (e.g. 400ppm or less of CO_2) so that the system remains ventilating at a nominal speed

- Keep ventilation running at all times (i.e. 24/7), regardless of building occupancy. When unoccupied, ventilation can be reduced to the lowest setting.

- Extend the hours of nominal HVAC operations to begin two hours before the building is occupied, and to only reduce to lowest setting 2 hours after the building has emptied. This ensures that rooms are well ventilated before occupancy each day.

- Ensure extractor fans in bathrooms are functional and running 24/7. When the building is occupied, they should operate at full capacity. As with the central HVAC, they can be set to the lowest speed 2 hours after the building is emptied and ramped up again 2 hours before occupancy if the system allows.

- Avoid directing air flow directly onto individuals or across groups of individuals, as this may facilitate transmission of pathogens between individuals.

- Avoid the use of air-recirculation systems in HVACs as much as possible. Use 100% outdoor air if supported by the HVAC system and compatible with outdoor/indoor air quality considerations. If it is not possible to disable the air recirculation system, then HEPA filtration or the highest efficiency filter possible according to the HVAC manufacturer's specifications should be considered.

- While there is evidence in experimental settings that coronaviruses like the SARS-CoV-2 virus deteriorate faster in high temperatures and humidity, the levels that need to be achieved are not attainable or acceptable in buildings. In addition, indoor humidification is not a common feature in most HVAC systems, and would incur additional maintenance and equipment costs. However, low relative humidity (<20%) is known to increase an individual's

susceptibility to infection. Where such systems do exist, the advice is to maintain a relative air humidity of 20 - 60% if feasible.

- Create "clean" ventilation zones for staff that do not include high-risk areas (e.g. visitor reception). This can be done by re-evaluating the positioning of the supply and exhaust air diffusers and adjusting flow rates to establish measurable pressure differentials.

Carbon Dioxide Monitors

Checking CO2 levels may help determine if ventilation is poor in an area where there are people. Monitoring CO2 will enable the event/venue organiser to determine if the HAVC system is sufficient and working correctly. CO2 outdoor air concentrations are approximately 400-480 parts per million (ppm). CO2 concentrations above 1400-1500 ppm are likely to be indicative of poor ventilation. If CO2 concentrations are noted to increase towards indicative values of poor ventilation, then it is recommended that mitigation measures to either increase ventilation or adjust occupancy are taken. Venue management may also consider installing plug in local air cleaning filters in poorly ventilated areas to clean the air, note local air cleaning filters will clean virus particles from the air but not exhaled CO2.

Always follow the sensor manufacturer's advice and instructions on care and use of the sensor at all times and ensure adequate training is in place on their use and maintenance. The use of CO2 measurements as an indicator of building ventilation when there are CO2 sources other than people, such as fuel combustion (fires and stoves) and cooking is also not recommended.

CO2 monitors should be CE marked and based on non-dispersive infrared (NDIR) technology and have a measurement range up to at least 2,000 ppm. Some sensors have a 'traffic light' display which is a useful visual aid. Do not opt for sensors that measure either a CO2 "equivalent" or indirectly.

Local Air Cleaning

Local air cleaning will be beneficial in reducing risks in some spaces and venues, particularly where it is not possible to increase ventilation using natural or mechanical means as set out above. The most suitable types to use are those with high efficiency particulate air (HEPA filter]. In particular, HEPA filtration systems are generally cheaper, easier to maintain, require minimal training to operate correctly and do not create secondary health concerns. HEPA filtration systems incorporating ultraviolet or other ionising radiation systems are best suited to more specialist applications and settings and require competent advice from qualified personnel prior to their installation.

These devices are usually either stand-alone and they can be deployed in any space or installed in a manner similar to a local air conditioning unit. While these devices can increase the air flow, their effectiveness will depend on the volume of the room/area and the flow rate through the device. Therefore, it is important that if considering this as an option the device should be of a suitable specification for the relevant area.

Other devices such as ozone generating devices and air disinfection devices may present additional chemical related hazards in the workplace and their use should be fully justified by an appropriate risk assessment. It is not recommended to use these devices in occupied spaces.