Ventilation and related measures to reduce airborne transmission of COVID-19 in Schools

This document is a supplement to **Ventilation and related measures to reduce airborne transmission of COVID-19** and includes specific advice for schools. It should also be read in conjunction with advice issued by the Department of Education **Practical Steps for the Deployment of Good Ventilation Practices in Schools**[1]**.**

General Advice

Ensuring adequate ventilation in schools depends on many factors including, the school building, the space available, the occupancy (number of people), occupant activities, the external weather conditions and how the building is operated. Each school should assess local conditions and risks, in order to respond with appropriate mitigations.

It must be emphasized that ventilation should be delivered as part of a layered strategy of protective measures to control the spread of the virus that causes COVID-19. These protective measures include physical distancing and the wearing of well-fitting, multi-layer face-coverings. Along with these preventative actions, ventilation further reduces the risk of COVID-19 transmission in schools.

Specific guidance documents, with advice to schools on the infection prevention and control measures necessary for the safety of staff and pupils in relation to Covid-19 have been provided by the Department of Education and the HSE/HPSC including:

- The Roadmap for the Full Return to School[2]
- COVID-19 Response Plans
    - Primary and Special Schools[3]
    - Post Primary Schools[4]
- Health advice provided by the HPSC for the safe reopening of schools and educational facilities including *Interim recommendations for the reopening of schools and educational facilities* and *COVID-19: Interim Guidance for the use of face-coverings in childcare and educational settings*[5,6].

Applying Good Ventilation Practices

Very good advice is contained in the Department of Education Practical Steps for the Deployment of Good Ventilation Practices in Schools. There are some additional points worth emphasizing:

- Maximise ventilation to ensure that the occupants in a space achieve as much access to outdoor air as possible.

- Maximise both natural and mechanical ventilation in break rooms and canteens which are areas of particular concern, due to risks of close contacts, face to face contact and removal of masks for eating and drinking.
- Ensure optimised ventilation in corridors, staircases, toilets, changing rooms and other enclosed spaces, particularly where there are low ceilings.
- Activities that may generate high levels of respiratory aerosols (shouting, singing, playing wind instruments or physical exercise) are likely to pose the greatest risk and should only be performed in well-ventilated large halls or outdoors.
- Consider moving activities to larger, well-ventilated indoor areas or outdoors if the weather permits.
- In places which rely on natural ventilation, emphasize the importance of cross-ventilation and diagonal air-flow through rooms for maximising ventilation rates.
- External weather conditions (wind speed and direction, temperature) can significantly affect natural ventilation. It is important to remember that a room which is well ventilated on one day may be substantially different the next.
- Mechanical ventilation systems should be checked to ensure that they are working as designed and set to operate on 100% fresh air.
- Ensure the ventilation strategies do not compromise fire safety. Fire doors should not be held open unless fitted with automatic-closing devices.
- Take particular precautions in enclosed spaces that may have higher risks of inadequate ventilation, such as temporary structures and converted buildings that may have been built for another use.

Monitoring Ventilation

- Measurements of carbon dioxide (CO_2) levels in indoor air are an effective method for identifying inadequate ventilation in multi-occupant spaces. Only CO_2 monitors based on non-dispersive infrared (NDIR) technology should be used. The manufacturer's guidelines should be followed during use.
- Consider using a portable carbon dioxide (CO_2) monitor to identify areas of the school with inadequate ventilation. Measurements taken over several days can provide useful information on the impact of occupancy, occupant activity and outdoor weather conditions on ventilation efficiency. This information can be used to inform strategies for improving ventilation.
- In classrooms, CO_2 monitors can provide visual or audible alerts (such as "traffic-light" warnings) to teachers and pupils to indicate elevated concentrations of CO_2 and inadequate ventilation. The measurements can inform ways to optimise ventilation using the guidance provided in Practical Steps for the Deployment of Good Ventilation Practices in Schools, Department of Education.

Additional Measures to reduce transmission risk in poorly ventilated spaces

- In areas with poor ventilation or where CO_2 monitoring has shown ventilation is likely to be inadequate for the number of occupants, structural intervention and measures to increase natural ventilation should be completed[1]. Where such structural interventions or measures are not possible in the short term, consider using stand-alone high efficiency particulate air (HEPA) filter devices to further reduce airborne virus in poorly ventilated spaces. These devices do not require specialist installation and are a cost-effective short term mitigation measure, but in the longer run, permanent improvements to ventilation should be made. HEPA-filter devices should be correctly sized to the room, and consideration should be given to two or smaller more units placed around the room, rather than one large unit. Where possible select units with low noise levels and ensure they are positioned according to manufacturer's instructions, and are not a hazard to students.

- Ensure exhaust fans in toilets are operating at full capacity while the school is occupied. Consider installing exhaust fans in toilets that may have inadequate ventilation.

- Flush toilet with lid down to reduce aerosolization and risk of fecal-oral transmission.

- Ensure that good ventilation is implemented along with other precautions (face-coverings, physical distancing) while travelling to and from school in vehicles.

Future Proofing

Most of the information and advice contained in this document is aimed at supporting short-term mitigations. Where schools have identified specific areas with inadequate ventilation, they should utilise the holiday periods to implement permanent structural improvements to address ventilation needs.

Good indoor air quality has other measurable benefits, including improved performance of children in classrooms, reduced disease spread, and a reduction in other harmful pollutants.

Longer term structural improvements may be needed to ensure that schools achieve a balance between energy efficiency, occupant comfort and ventilation for public health. It is recommended that strategies to deliver these longer term measures are progressed and reflected in the relevant technical guidance, in line with ongoing and emerging research.

References:

[1] Practical Steps for the Deployment of Good Ventilation Practices in Schools V2, Department of Education https://assets.gov.ie/85177/d9643a37-5254-483e-a72e-d2a08ae36d46.pdf

[2] https://www.gov.ie/en/publication/b264b-roadmap-for-the-full-return-to-school/

[3] https://www.gov.ie/en/publication/a0bff-reopening-our-primary-and-special-schools/

[4] https://www.gov.ie/en/publication/7acad-reopening-our-post-primary-schools/

[5] https://www.gov.ie/en/publication/532b6-health-advice-provided-by-the-health-protection-surveillance-centre-hpsc-for-the-safe-reopening-of-schools-and-educational-facilities/

[6] Further specific public health guidance as it pertains to school settings is available at https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/educationguidance/

Further Guidance:

Heating, ventilation and air-conditioning systems in the context of COVID-19 European Centre for Disease Control (ECDC): https://www.ecdc.europa.eu/en/publications-data/heating-ventilation-air-conditioning-systems-covid-19

Ventilation in Schools and Childcare Programs, Centre for Disease Control & Prevention (CDC) https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/ventilation.html

Roadmap to improve and ensure good indoor ventilation in the context of COVID-19, World Health Organisation (WHO) https://apps.who.int/iris/bitstream/handle/10665/339857/9789240021280-eng.pdf?sequence=1&isAllowed=y

Coronavirus (COVID-19): guidance on reducing the risks in schools- Ventilation & Heating, Scottish Government https://www.gov.scot/publications/coronavirus-covid-19-guidance-on-reducing-the-risks-in-schools/pages/scientific-and-public-health-advice/#ventilation

Minguillón MC, Querol X, Riediker M, Felisi JM, Garrido T, Alastuey A, Bekö G, Nehr S, Wiesen P, Carslaw N., 2020. Guide for ventilation towards healthy classrooms. COST Action CA17136 report. CSIC publications *http://hdl.handle.net/10261/225519*.

REHVA Guidance for Schools: https://www.rehva.eu/fileadmin/user_upload/REHVA_COVID-19_Guidance_School_Buildings.pdf.

Harvard T.H. Chan, School of Public Health, Schools for Health: https://schools.forhealth.org/.