

SPECIAL REPORT

REHVA

3E Federation of
European Heating,
Ventilation and
Air Conditioning
Associations

CORONAVIRUS | COVID-19

OPERATING BUILDING SERVICES DURING COVID-19

REHVA, the Federation of European HVAC Associations, has published the second review of its COVID-19 Guidance. The latest version focusses on the reopening and safe use of buildings and suggests mitigation measures on specific components and building types, including a document on how to reopen schools, the use of fan coils with recirculation, and minimising air-leakages across rotary heat exchangers.



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The update came a few weeks after WHO acknowledged the possibility of airborne transmission, especially in crowded, poorly-ventilated spaces, thanks to the intense advocacy by scientists around the globe, including several REHVA experts. Without doubt, ventilation is the most important engineering control measure within infection control of indoor spaces.

New evidence and the general recognition of the aerosol-based transmission route have evolved recently. To date, there is evidence on SARS-CoV-2 aerosol-based transmission, and this route is now recognised worldwide. Transmission routes remain an important research subject, and it has already been reported that the short-range aerosol-based route dominates exposure to respiratory infection during close contact¹.

Medical literature has started to talk about a new paradigm of infectious aerosols and there is no evidence to support the concept that most respiratory infections are primarily associated with large-droplet transmission. It seems that small particle aerosols are the rule, rather than the exception, contrary to current guidelines. In the context of buildings and indoor spaces there is no doubt that cross-infection risk may be controlled up to 1.5m from a person with physical distancing and beyond that distance with adequate ventilation and effective air distribution solutions. See Figure 1.

Key aspects to consider

In such a pandemic situation at least three levels of guidance are required: (1) how to operate HVAC and other building services in existing buildings right now; (2) how to conduct a risk assessment and assess the safety of different buildings and rooms; and (3) what would be more far-reaching actions to further reduce the spread of viral diseases in future in buildings with improved ventilation systems².

The latest guidance focuses on temporary, easy-to-organise measures that can be implemented in existing buildings which are in use during or after an epidemic with normal or reduced occupancy rates. While there are many possibilities to improve ventilation solutions in future, it is important to recognise that current technology and knowledge already allows the use of many rooms in buildings during a COVID-19 type of outbreak, if ventilation meets existing standards and a risk assessment is conducted³.

The scope of the guidance is limited to commercial and public buildings (e.g., offices, schools, shopping

areas, sports premises, etc.) where only occasional occupancy of infected persons is expected. See Figure 2 (next page).

Practical measures

REHVA lists 15 recommendations (see below and Figure 3) that can be applied in existing buildings at a relatively low cost to reduce the number of cross-infections indoors, focusing on ventilation solutions as main engineering controls.

1. Provide adequate ventilation of spaces with outdoor air;
2. Switch ventilation on at nominal speed at least two hours before the building opening time and set it to lower speed two hours after the building usage time;
3. At nights and weekends, do not switch ventilation off, but keep systems running at a lower speed;

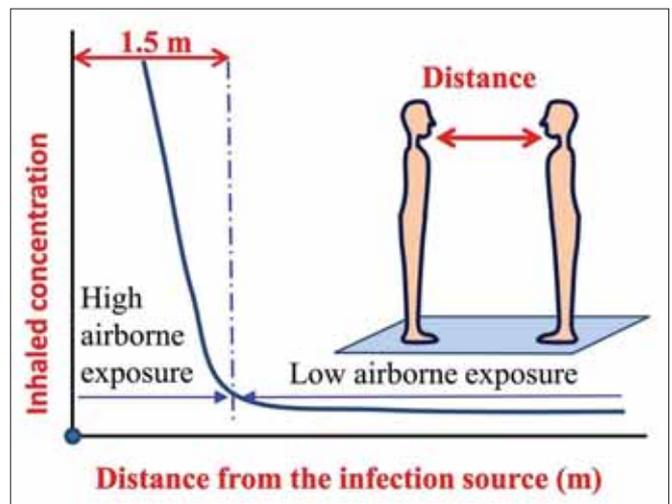
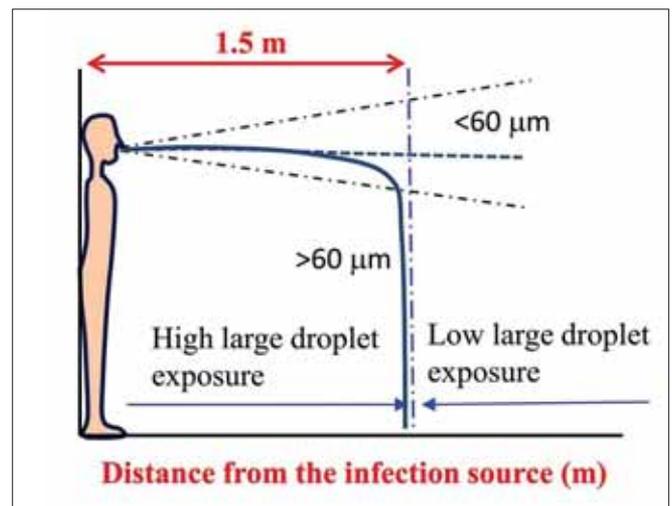


Figure 1 — The distinction between close contact combined droplet and aerosol transmission (left) and long-range aerosol transmission (right) which can be controlled with ventilation diluting the virus concentration to a low level. (Figure courtesy L. Liu, Y. Li, P. V. Nielsen et al.)

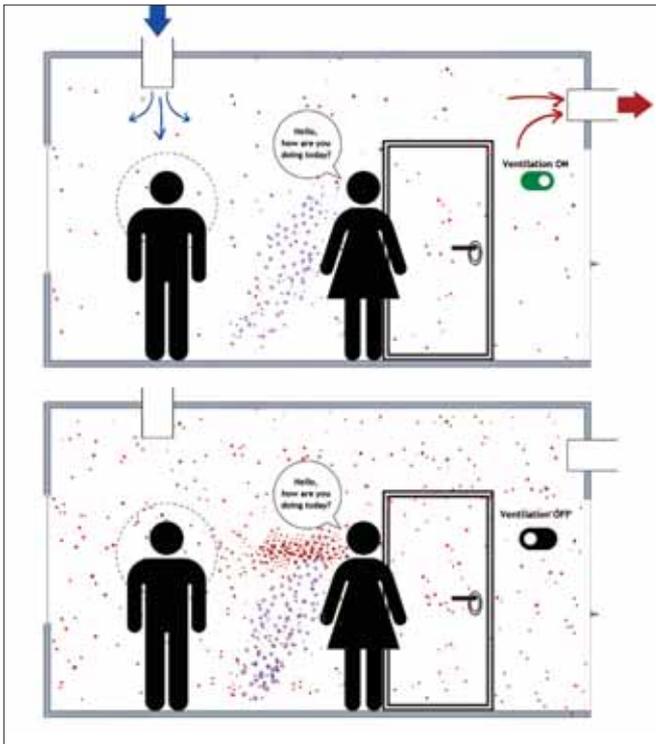


Figure 2 – Top figure: ventilation system on, lower figure: ventilation system off. Illustration showing how an infected person (speaking woman on the right) leads to aerosol exposure (red spikes) in the breathing zone of another person (man on the left in this case). Large droplet exhalation is marked with purple spikes. When the room is ventilated with mixing ventilation system, the amount of virus-laden particles in the breathing zone is much lower than when the ventilation system is off.

4. Open windows regularly (even in mechanically ventilated buildings);
5. Keep toilet ventilation in operation 24/7;
6. Avoid open windows in toilets to maintain the right direction of ventilation;
7. Instruct building occupants to flush toilets with lid closed;
8. Switch air handling units with recirculation to 100% outdoor air;
9. Inspect heat recovery equipment to be sure that leakages are under control;

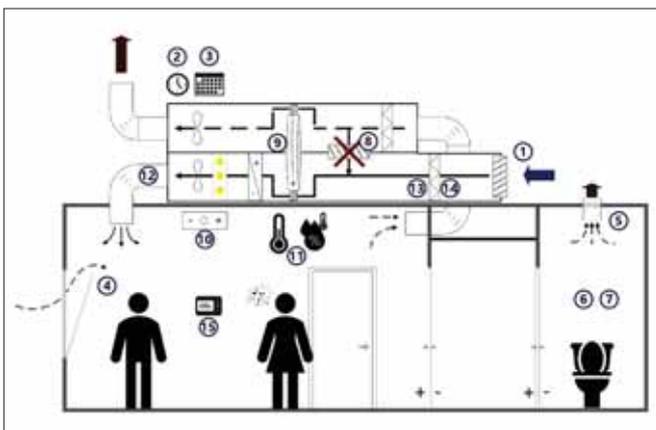


Figure 3 — Main items of REHVA guidance for building services operation.

»» *In the context of buildings and indoor spaces there is no doubt that cross-infection risk may be controlled up to 1.5m from a person with physical distancing and beyond that distance with adequate ventilation and effective air distribution solutions.*

10. Adjust fan coil settings to operate so that fans are continuously on;
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 should be performed with common protective measures, including respiratory protection;
15. Introduce an IAQ sensor network that allows occupants and facility managers to monitor that ventilation is operating adequately.

REHVA course

A REHVA online course explains how to operate buildings and safely use densely-occupied spaces, targeting facility managers, occupational health and safety specialists, and other professionals involved in the management of indoor climate quality. The course provides a deeper knowledge and practical information. See www.rehva.eu ■

References

1. Wenzhao et al, 2020. Short-range airborne route dominates exposure of respiratory infection during close contact. *Building and Environment* 176 (2020) 106859.
2. More information regarding points 2 and 3 are currently under development by REHVA's COVID-19 Task Force.
3. Currently under development by REHVA's COVID-19 Task Force.