ONTARIO SOCIETY OF PROFESSIONAL ENGINEERS

April 10, 2023

Consultation: Draft Guidance on Improving Indoor Air Quality in Office Buildings

The Ontario Society of Professional Engineers (OSPE) plays a vital role as the advocacy body and voice of the engineering profession in Ontario. Ontario currently has over 85,000 professional engineers, 250,000 engineering graduates, 6,600 engineering post-graduate students and 37,000 engineering undergraduate students, and OSPE serves as a unifying force for the engineering community in the province.

Throughout its history, the engineering profession has consistently demonstrated a commitment to safeguarding the public interest, and this remains a critical priority in today's rapidly evolving landscape. OSPE's advocacy work and engagement with policymakers and stakeholders is crucial in supporting the continued success and growth of the engineering profession, while also ensuring the safety and well-being of the public.

We are delighted to respond to Health Canada's request for information on enhancing indoor air quality in office buildings. This response represents a collaborative effort from experts in our Indoor Air Quality Advisory Group, who have a wealth of knowledge and experience in this field.

As a leading organization in promoting healthy indoor environments, we recognize the vital importance of supporting indoor air quality in office buildings. Our advisory group has carefully considered the challenges and opportunities involved in this area and developed a comprehensive set of recommendations based on the latest scientific research and best practices.

We believe our response provides valuable insights and practical guidance for improving indoor air quality in office buildings, and we look forward to continued collaboration with Health Canada in this critical area.

Cleaning and Diluting Indoor Air

To mitigate the risk of airborne infectious disease transmission, it is essential to achieve a minimum target for cleaning and diluting indoor air through effective ventilation, filtration, and / or germicidal ultraviolet light technologies. OSPE recommends a minimum of six air changes per hour (or 4.5 litres/second/m2) using any of these technologies, either alone or in combination. [1]

These measures have been proven to significantly reduce the concentration of airborne pathogens, thus reducing the risk of transmission in indoor environments. Furthermore, a comprehensive approach that

[1] https://ospe.on.ca/indoor-air-quality/

integrates these technologies can provide an effective strategy for combatting airborne disease transmission.

Given the urgent need to address the ongoing pandemic and the potential for future outbreaks, OSPE believes it is critical to implement these mitigation measures to foster healthy indoor environments and safeguard public health.

Ventilation in Office Buildings

To support effective ventilation in office buildings, it is crucial to monitor indoor air quality with carbon dioxide sensors. OSPE also recommends that offices comply with the current minimum ASHRAE requirement for outdoor air, which is 8.5 litres per second per person and results in steady-state carbon dioxide concentrations at 1000 ppm.

However, to achieve optimal indoor air quality, we suggest offices increase the outdoor air supply rate by up to 30%, which would correspond to a steady-state carbon dioxide concentration at 900 ppm. Studies have shown that this approach can not only improve the overall health and well-being of building occupants, but also increase their productivity[2], leading to a net financial gain for businesses.[3]

By providing effective ventilation with carbon dioxide sensors and increased outdoor air supply rates, offices can create a healthier and more productive work environment for their employees.

Filtration

In addition to ventilation, OSPE recommends using air filters with a minimum rating of MERV-13 to remove fine particulate matter or PM2.5 from both indoor and outdoor sources, particularly when the ventilation rate exceeds the minimum requirement. It is also crucial to monitor air quality for fine particulate matter, as Health Canada has established a policy that PM2.5 levels should be "as low as possible."[4]

In Canada, air pollution contributes to 8% of all- non-accidental deaths with PM2.5 being the most significant contributor to health effects from air pollution (65%).[5] The World Health Organization (WHO)

[2] https://pubmed.ncbi.nlm.nih.gov/26593933/

[3] ASHRAE Journal, vol. 44, no. 5, p. 56-58

[4] https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-fine-particulate-matter-pm2-5-residential-indoor-air.html

[5] https://www.canada.ca/en/health-canada/services/publications/healthy-living/2021-health-effects-indoor-air-pollution.html#a3.3

recommends a maximum average annual exposure to PM2.5 of 5 µg/m^3.[6] If PM2.5 levels consistently exceed this level, additional filtration is necessary, primarily by upgrading the filters in ventilation equipment to MERV-13. In cases where equipment limitations restrict the use of MERV-13 filtration centrally, or if their use does not reduce PM2.5 sufficiently, we recommend using in-room filtration devices such as portable air cleaners with HEPA filters.

It is essential to select portable air purifiers based on Health Canada's recommendations while ensuring that they operate at a noise level of less than 45 dB.[7] By implementing these measures, office buildings can significantly reduce the concentration of harmful pollutants in indoor air, thereby providing a healthier and safer work environment for occupants.

Upper Room UV Systems

To further mitigate the spread of airborne diseases, it is crucial for employers to install upper room UV systems. Research has demonstrated that these systems can effectively reduce the risk of airborne disease transmission.[8]

Upper room UV systems use germicidal UV-C radiation to disinfect the air in the upper portion of a room. This approach is particularly useful in settings where it is challenging to achieve adequate ventilation rates, such as crowded spaces. By installing these systems, employers can take an additional step to safeguard the health and well-being of their employees, reducing the risk of disease transmission in the workplace.

It is important to note that the design and installation of upper room UV systems should be carried out by qualified professionals and tailored to the specific needs of each space.

Disabling All Forms of Additive Air Cleaning Equipment

It is essential to avoid and disable all forms of additive air cleaning equipment, including ionization, bipolar ionization, photocatalytic oxidation, gaseous hydrogen peroxide, hydroxyl generators, and ozone generators. These technologies have not been proven to be effective and can, in fact, create harmful by-products such as formaldehyde or ozone, which can have adverse health effects on occupants.

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[6] https://www.who.int/publications/i/item/9789240034228

[7] https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/choosing-portable-purifier.html

[8] https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/canadas-reponse/summaries-recent-evidence/ultraviolet-germicidal-irradiation-technologies-use-against-sars-cov-2.html

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In addition, the use of such technologies may create a false sense of security, leading to a decreased emphasis on other, more effective measures such as proper ventilation and air filtration. Therefore, it is critical to focus on evidence-based strategies for improving indoor air quality and reducing the spread of airborne diseases. By avoiding and disabling unproven technologies, employers can ensure the health and safety of their employees, providing a safe and healthy working environment.

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We trust that the suggestions we have provided will be valuable in improving indoor air quality in office buildings. We understand the significance of this issue and the impact it has on the health and well-being of occupants, and we appreciate your attention to these recommendations.

OSPE's network of professionals comprises data-driven, practical engineers who thrive in their respective sectors. We welcome the opportunity to meet with you and your office for further discussion regarding this and future matters. Should you need more information, please contact advocacy@ospe.on.ca.

Sincerely,

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