CITY OF HAMILTON
PUBLIC HEALTH SERVICES
Communicable Disease Control Division

TO:	Mayor and Members Public Health Committee
COMMITTEE DATE:	August 14, 2024
SUBJECT/REPORT NO:	American Society of Heating, Refrigeration and Air-Conditioning Engineers Standard 241 and Indoor Air Quality (BOH24022) (City Wide) **(Outstanding Business List)**
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Kyle Snooks (905) 546-2424 Ext. 2186
SUBMITTED BY: **SIGNATURE:**	Jordan Walker Director, Communicable Disease Control Division Public Health Services

RECOMMENDATION

That the City of Hamilton Board of Health write a letter to the provincial Minister of Health and Minister of Municipal Affairs and Housing, and federal Minister of Health and Minister of Housing, Infrastructure and Communities, to advocate that they consider relevant engineering standards concerning indoor air quality and control of infectious diseases including American Society of Heating, Refrigeration and Air-Conditioning Engineers Standard 241, Control of Infectious Aerosols, for any future revisions of Ontario Building Code and National Building Code of Canada.

EXECUTIVE SUMMARY

At its meeting on April 2, 2024, the Public Health Committee discussed correspondence from Joy Lachica, the Board of Health Chair for Peterborough Public Health. The correspondence emphasized the need for legislated improvements to indoor air quality in public settings to reduce the transmission of COVID-19 and other airborne pathogens. The Public Health Committee received this correspondence and directed that it be referred to the Medical Officer of Health for analysis and a report back to the Public Health Committee.

This report recommends that the Board of Health send a letter to the Provincial and Federal governments, advocating they consider all relevant American Society of Heating, Refrigeration and Air-Conditioning Engineers standards for indoor air quality,

including Standard 241, Control of Infectious Aerosols, in future revisions of the building code. Ensuring that building codes reflect the latest advancements in indoor air quality standards is relevant for public health, including mitigating the spread of airborne infectious diseases.

American Society of Heating, Refrigeration and Air-Conditioning Engineers Standard 241, Control of Infectious Aerosols is a technical engineering standard that specifies minimum requirements aimed at reducing the risk of disease transmission through exposure to infectious aerosols in new buildings, existing buildings, and major renovations.[1]

The Centre for Disease Control and Prevention highlights that proper ventilation and air filtration can reduce the concentration of airborne pathogens, thereby lowering the risk of transmission.[2] Similarly, the Public Health Agency of Canada emphasizes the role of good indoor air quality in preventing respiratory infections and other health issues.[3] Public Health Ontario also supports the implementation of advanced ventilation and air quality standards to mitigate the spread of illnesses, particularly in the context of the COVID-19 pandemic.[4]

Consideration of all relevant engineering technical standards including those pertaining to indoor air quality and infectious diseases such as American Society of Heating, Refrigeration and Air-Conditioning Engineers Standard 241 in updates to the provincial and federal building code can help to ensure that the building code reflects the best available evidence to mitigate the spread of infectious diseases.

Alternatives for Consideration – Not Applicable

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[1] American Society for Heating, Refrigeration and Air Conditioning Engineers. (2024). ASHREA Standard 241, Control of Infectious Aerosols. Retrieved June 5, 2024 from: https://www.ashrae.org/technical-resources/bookstore/ashrae-standard-241-control-of-infectious-aerosols

[2] U.S. Centers for Disease Control and Prevention. (2023). Ventilation in Buildings – CDC.gov. Retrieved June 6, 2024 from: https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html

[3] Government of Canada. (2022). COVID-19: Guidance on indoor ventilation during the pandemic - Canada.ca. Retrieved June 6, 2024 from: https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-indoor-ventilation-covid-19-pandemic.html#a6

[4] Public Health Ontario. (2023). Focus On: Heating, Ventilation and Air Conditioning (HVAC) Systems in Buildings and COVID-19. Retrieved June 7, 2024 from: https://www.publichealthontario.ca/-/media/Documents/nCoV/ipac/2020/09/covid-19-hvac-systems-in-buildings.pdf?rev=8bf7f27af85e4cffb963113ca6e2c3b1&sc_lang=en

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: Not Applicable.

Staffing: Not Applicable.

Legal: Not Applicable.

HISTORICAL BACKGROUND

Through the COVID-19 pandemic, a multi-layered approach to prevention has been effective in reducing the risk of transmission of COVID-19. This has included vaccination, staying home while ill, respiratory hygiene, masks as well as ensuring adequate ventilation in enclosed spaces.[5]

Air quality has long been known to play a role in human disease whether through transmitting pollutants such as cigarette smoke which causes illnesses such as lung injury, asthma attacks, and cancers; or through transmitting infectious agents such as tuberculosis bacteria and measles virus.[6] From a health equity perspective, interventions to improve indoor air quality are one strategy that should be explored further. Improving indoor air quality can reduce the risk of spread of COVID-19, as well as other infectious diseases and their negative health impacts.

American Society of Heating, Refrigeration and Air-Conditioning Engineers is a diverse organization of professionals in the fields of heating, ventilation, air conditioning, and refrigeration who are dedicated to advancing the sciences in these areas. Membership includes professional engineers or related registrations or licenses issued by a legally authorized body. The American Society of Heating, Refrigeration and Air-Conditioning Engineers is considered a global technical resource in the built environment. They write standards and guidelines in their fields of expertise to guide the industry in delivering goods and services to the public. American Society of Heating, Refrigeration and Air-Conditioning Engineers has 87 active standards and guideline project committees, addressing areas such as indoor air quality. The Ontario building code currently incorporates and references existing American Society of Heating, Refrigeration and

[5] Government of Canada. (2023). Summary of evidence supporting COVID-19 public health measures – Canada.ca. Retrieved June 6, 2024 from: https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/summary-evidence-supporting-covid-19-public-health-measures.html#a3

[6] Government of Canada. (2022). Indoor air quality - Canada.ca. Retrieved June 6, 2024 from: https://www.canada.ca/en/environment-climate-change/campaigns/canadian-environment-week/clean-airday/indoor-quality.html

Air-Conditioning Engineers standards, including American Society of Heating, Refrigeration and Air-Conditioning Engineers 62.1 “Ventilation for Acceptable Indoor Air Quality”.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

Not Applicable.

RELEVANT CONSULTATION

Not Applicable.

ANALYSIS AND RATIONALE FOR RECOMMENDATION

Infectious aerosols, which are microscopic particles exhaled by individuals, can carry disease-causing pathogens. These particles are so small they can linger in the air for extended periods under certain circumstances and pose a risk when inhaled. American Society of Heating, Refrigeration and Air-Conditioning Engineers Standard 241 outlines standards to reduce exposure to various pathogens, including the SARS-COV-2 virus responsible for COVID-19 and other disease-causing agents.[1] The standard encompasses a wide range of requirements covering air system design, installation, operation, and maintenance.

Ventilation and indoor air quality are relevant determinants of transmission of certain infectious diseases, including measles, varicella, and tuberculosis. Evidence shows that SARS-CoV-2 (COVID-19) is spread at short range via respiratory particles (through inhalation or contact with mucous membranes), as well as over longer distances by respiratory particles particularly in settings with poor indoor air quality and ventilation.[5] Improved ventilation is a public health measure to help prevent the spread of COVID-19. Combining improved indoor air quality and ventilation with other important public health measures can reduce risk of transmission of COVID-19 and other infectious diseases.[4]

Evidence from the Centre for Disease Control and Prevention, the Public Health Agency of Canada, and Public Health Ontario underscores the impact of indoor air quality on the transmission of infectious diseases. These organizations outline that when indoors, ventilation mitigation strategies can help reduce the concentration of viral particles in the air. “The lower the concentration, the less likely viral particles can be inhaled into the lungs (potentially lowering the inhaled dose); contact eyes, nose, and mouth; or fall out of the air to accumulate on surfaces.”[2] They state that more research is needed to understand how much the concentration of viral particles in the air needs to be reduced to start reducing the risk of viral infection, however, ventilation mitigation strategies still provide a reasonable approach to reducing risk. Ventilation interventions need to be

carefully evaluated by heating, ventilation, and air conditioning professionals before implementing.

While improved indoor air quality does not eliminate the risk of infectious disease transmission from person to person, for certain infectious diseases it does reduce that risk for members of the public including those at higher risk of serious outcomes. Additionally, improved ventilation and air handling systems allow for minimal operator input or interventions and work in the background while still protecting health.

The American Society of Heating, Refrigeration and Air-Conditioning Engineers Standard 241: Control of Infectious Aerosols, outlines standards for ventilation to reduce infection from airborne pathogens. The Ontario Society of Professional Engineers notes that "incorporating ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) Standard 241 into the Canadian National Building Code will significantly improve indoor air quality and ensure that building designs and systems are optimized to minimize airborne disease transmission."[7] American Society of Heating, Refrigeration and Air-Conditioning Engineers Standard 241 specifically addresses improved indoor air quality as it relates to respiratory viruses, a component currently missing from provincial and federal building codes and regulations. Any further interpretation of American Society of Heating, Refrigeration and Air-Conditioning Engineers standards requires specific expertise that Hamilton Public Health Services does not possess due to the technical nature of these engineering standards. Further input on this topic would be needed from including authorities such as Public Health Ontario and the Public Health Agency of Canada.

ALTERNATIVES FOR CONSIDERATION

Not Applicable.

APPENDICES AND SCHEDULES ATTACHED

Not Applicable.

[7] Ontario Society of Professional Engineers. (2023) OSPE Supports Adoption of ASHRAE Standard 241 in the Canadian National Building Code. Retrieved June 6, 2024 from, https://ospe.on.ca/advocacy/ospe-supports-adoption-of-ashrae-standard-241-in-the-canadian-national-building-code/