

Air quality and installation of CO₂ sensors in all classrooms in Québec



Notes

on carbon dioxide (CO₂)

- › Indoors, CO₂ comes largely from air exhaled by occupants.
- › Normal concentrations of CO₂ in indoor air generally **do not affect the health of occupants**. They may vary based on the number of occupants, the size of the room, the type of activity involved, the length of time spent in the room and the effectiveness of ventilation, for example.
- › CO₂ levels are one possible air quality indicator. A high level of CO₂ may suggest that other harmful contaminants are present, meaning that ventilation in rooms may have to be improved. The CO₂ level is also a **comfort parameter**, like relative humidity and temperature.
- › A daily average concentration of CO₂ of **less than 1500 ppm** can be used as an **appropriate comfort parameter**. The ideal threshold is an indoor CO₂ level that is no more than 700 ppm higher than the CO₂ concentration in outdoor air. For new buildings, the average daily CO₂ level must be no greater than 1000 ppm.
- › The exchange of indoor and outdoor air, through both natural and mechanical ventilation, is the primary method used to modify CO₂ concentrations in occupied rooms.

A unique initiative

Installing sensors in learning areas in schools allows for ongoing data collection so that necessary changes can be made more quickly. **Québec is a leader with regard to this large-scale operation, as it is the first of its kind in Canada.** This initiative is part of the program launched by the Ministère de l'Éducation for systematic testing of the following three air quality parameters within school buildings: level of carbon dioxide (CO₂), relative humidity and temperature.

Why continuous readings?

For schools:

Real-time readings allow changes to be made quickly and directly in the affected rooms, if necessary.

For school service centres and school boards:

Data on daily averages can be used to identify trends and target buildings that require broader intervention plans and/or larger scale corrective work, if necessary.

For the Ministère:

This data will provide the Ministère with a report that makes it possible to identify major trends and arrange for the required investments to improve air quality.

Why now?

The Ministère has always considered maintaining good indoor air quality in schools to be an important priority. Each year, various asset management programs related to building maintenance or specific budget measures have been implemented to support educational institutions based on their needs.

The pandemic has reminded us of the importance of certain measures to enhance practices in the network, which is why the Ministère is now making greater active efforts in this regard.

Procedure

- › The CO₂ sensors that will be installed will have a display that shows CO₂ concentrations in real time and any CO₂ levels exceeding the thresholds.
- › Measurements will be taken automatically:
 - Every five minutes during the school day
 - Every hour during the evenings, overnight, and on weekends and statutory holidays
- › Actions must be taken based on the CO₂ levels measured.

Concentration measured*	Actions to be taken
<1000 ppm	Continue standard practices related to opening windows and doors
Between 1000 and 1500 ppm	In addition to the standard practices, open the room's windows and doors wider or more often based on the temperature.
Between 1500 and 2000 ppm	In addition to the standard practices, open the room's windows and doors wider or more often, regardless of temperature. If necessary, consider installing an air exchange system.
> 2000 ppm	Air out the room more frequently by opening the windows and doors wider and more often. If the problem persists despite these actions, inform the school administration so that additional corrective measures can be taken, such as the installation of an air exchange system.

* This table shows direct readings in real-time and the actions required in rooms with natural ventilation.

AUGUST 2020

- › Meeting between the Ministère and representatives of administrators in the school network and reminders of the importance of ongoing maintenance of ventilation systems (including filters and air entry and exit vents)

DECEMBER 2020

- › Phase 1 of the testing campaign: approximately 10% of school buildings throughout the network were tested (330 educational institutions) in order to obtain an initial representative sample

MARCH 2021

- › Letter sent to the directors general of school service centres and school boards to announce the acquisition of air exchange systems by the Ministère and to offer support to school service centres and school boards where test results in all buildings showed that CO₂ levels in some rooms had not been reduced despite the application of the ventilation guidelines

JULY 2021

- › Call for tenders launched by the Ministère with the goal of installing CO₂ sensors in all preschool, elementary school, secondary school, vocational training and adult education classrooms. The call-for-tenders process will end on August 16, 2021.

OVERVIEW OF MINISTERIAL ACTIONS

ONGOING: Ongoing work on asset management and general maintenance (installation or replacement of ventilation systems)

JUNE 2020

- › Communication with the school network to reinforce the importance of ventilation standards

NOVEMBER 2020

- › Creation of a group of multidisciplinary experts (with the participation of the Ministère de l'Éducation) commissioned by the Ministère de la Santé et des Services sociaux to take stock of the state of current scientific information regarding the relationship between the transmission of COVID-19 and air quality as well as the issues related to ventilation in health care and educational institutions.
- › The Ministère de l'Éducation launched a process to measure CO₂ levels in Québec schools

JANUARY 2021

- › Publication of the report written by the group of multidisciplinary scientific and technical experts on ventilation and on the transmission of COVID-19 in schools, and implementation of the short- and medium-term guidelines and actions
- › Phase 2 of the testing campaign (January to March 2021): remaining buildings were tested in order to have a complete overview of CO₂ concentrations in school network buildings
- › Creation of the three-party committee (MEQ, CNESST-IRSST, MSSS-INSPQ) with the mandate of overseeing and authorizing requests from the school network and ensuring more coordinated action on the part of the Ministère regarding indoor air quality

MAY 2021

- › Announcement of the future installation of CO₂ sensors in Québec classrooms
- › Technical demonstration of the equipment at the CSS du Val-des-Cerfs and the CSS des Chênes

FROM SEPTEMBER 2021 TO DECEMBER 2021

- › Distribution and installation of CO₂ sensors in classrooms across Québec

MEMBERS OF THE THREE-PARTY COMMITTEE

MINISTÈRE DE L'ÉDUCATION

- › Jean-Philippe Rancourt, Director, Direction de l'expertise et du développement des infrastructures scolaires
- › Martin Bérubé, Project engineer, Direction de l'expertise et du développement des infrastructures scolaires
- › Darius Tsé, Project engineer, Direction de l'expertise et du développement des infrastructures scolaires

COMMISSION DES NORMES, DE L'ÉQUITÉ, DE LA SANTÉ ET DE LA SÉCURITÉ DU TRAVAIL

- › Caroline Monette, Engineer, Direction de la prévention-inspection – Rive-Nord

INSTITUT DE RECHERCHE ROBERT-SAUVÉ EN SANTÉ ET EN SÉCURITÉ DU TRAVAIL

- › Ali Bahloul, Associate professor and independent researcher in industrial ventilation and indoor air quality

MINISTÈRE DE LA SANTÉ ET DES SERVICES SOCIAUX

- › Christian Roy, Environmental health advisor

INSTITUT NATIONAL DE SANTÉ PUBLIQUE DU QUÉBEC

- › Dr. Stéphane Perron, Physician specializing in public health and preventive medicine
- › Dr. Caroline Huot, Physician specializing in public health and preventive medicine