

## Members' Library Service Request Form

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Document Title	CO2 Monitoring in Learning and Teaching Spaces

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**REPORT TO:** MEMBERS' LIBRARY SERVICE

**MEETING DATE:** May 2022

**BY:** Executive Director for Place

**SUBJECT:** CO2 Monitoring in Learning & Teaching Spaces

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## **1 PURPOSE**

- 1.1 To note the actions taken in following Scottish Government guidance on reducing the risks from Coronavirus (COVID-19) in schools and to note actions taken for effective CO2 monitoring to support schools to achieve good ventilation balanced with the requirement for user comfort and warmth.

## **2 RECOMMENDATIONS**

- 2.1 Members are asked to note the actions taken by the Head of Education in consultation with the Head of Infrastructure and Head of Finance to utilise Scottish Government funding to provide portable CO2 monitoring equipment to all learning and teaching spaces and to carry out necessary inspections and improvements to support schools in achieving good ventilation.

## **3 BACKGROUND**

- 3.1 The Scottish Government announced in August 2021 that local authorities had to monitor all learning & teaching spaces for CO2 levels for at least one full day prior to October 2021.
- 3.2 An internal short life-working group was set up to discuss and agree the actions to be taken to fulfil the request from The Scottish Government. Officers took cognisance of information shared through the SHOPS (Scottish Heads of Property Services) and ADES (Association of Directors of Education in Scotland) Resources Network groups by other local

authorities and by the Scottish Futures Trust in formulating strategy and guidance. East Lothian Council returned information to the Scottish Futures Trust and Scottish Government on a regular basis, as requested, using the 'Learning Estate CO2 Monitoring Feedback' form.

- 3.3 700 mobile CO2 monitors were procured in September 2021, for distribution to all schools and partner providers for early learning and childcare. Heating and ventilation guidance was provided (Appendix 1) together with manufacturer's guidance on the use of the monitors (Appendix 2) and templates for recording and returning monitoring results. The guidance advised that any concerns be reported to the FES Helpdesk for secondary schools and a CO2 Helpdesk was set up for primary schools. Following return of monitoring information, areas where readings exceeded 1200ppm during the recording period were reviewed and further monitoring requested.
- 3.4 The majority of learning and teaching spaces were found to have good results evidencing that the use of natural ventilation was being effective in reducing CO2 levels below 800ppm. Twelve primary schools indicated one or more spaces where readings had exceeded 1200ppm at some point in the day and these were visited to see if there were any additional measures that could be implemented to improve the situation. Measures taken or considered included freeing off windows, obtaining costs to fit ventilated roof lights, overhauling window mechanisms, giving instruction on the use of trickle ventilation, investigating options for internal rooms and upgrading mechanical ventilation to internal rooms. List of actions taken are noted in Appendix 3.
- 3.5 The Scottish Government's updated reducing risks in schools guidance, was published in December 2021, setting out revised expectations in terms of frequency of CO2 monitoring (including that all spaces should be assessed at least once a week, and more frequently in the case of problematic areas). Additional funding was received to address areas of poor ventilation where CO2 readings were consistently above 1500ppm when measures such as opening windows and doors had already been attempted. Fortunately, no such areas were identified and the funding could be used to purchase further CO2 monitors (to provide one monitor per learning and teaching space) and for general ventilation improvements such as window and roof light upgrades.
- 3.6 A further 600 CO2 monitors were procured and received w/c 28.03.2022 and these were distributed to all primary and secondary schools providing one device per learning and teaching space. When these were placed into learning and teaching spaces, charging via USB became an issue and Mains – USB adaptors were purchased and distributed to all areas to remedy the situation.
- 3.7 East Lothian Council have been proactively working towards improving natural ventilation in learning and teaching spaces through a major window replacement programme. Significant work has taken place over the COVID period in particular at Cockenzie, Ormiston, St Martins and Preston Tower

primary schools with over £500,000 invested in window procurement and replacement.

#### **4 COMMUNITY BENEFITS IN PROCUREMENT (CBIP)**

4.1 Not Applicable.

#### **5 POLICY IMPLICATIONS**

5.1 None.

#### **6 INTEGRATED IMPACT ASSESSMENT**

6.1 The subject of this report does not affect the wellbeing of the community or have a significant impact on equality, the environment or economy.

#### **7 RESOURCE IMPLICATIONS**

7.1 Financial: Funding was made available from Scottish government in two tranches - £205,000.00 in October 2021 and a further £99,000 in January 2022.

7.2 Funding was required for the following items:

- Purchase of 1<sup>st</sup> Batch of 700 CO2 Detectors (September 2021) £82,600.00
- Purchase of 2<sup>nd</sup> Batch of 600 CO2 Detectors (February 2022) £64,170.00
- Purchase of additional USB charging adaptors for the above £13,000.00
- Window replacement contract at Cockenzie PS £142,599.00
- Window replacement contract at Ormiston PS £139,206.00
- Window replacement contract at St Martins PS £144,710.00
- Window replacement contract at Preston Tower PS £84,696.00

7.3 Personnel: It was considered that due to timescales and the urgency of action required, any monitoring, recording and survey for required remedial works to improve ventilation would be best carried out internally due to existing staff knowledge of the property assets. FES staff carried out high school inspections and Engineering Services repairs officers carried out inspections of primary schools. UBS staff resources were used to set up templates for the schools and to provide helpdesk support.

## 8 BACKGROUND PAPERS

- 8.1 <https://www.gov.scot/publications/coronavirus-covid-19-guidance-on-reducing-the-risks-in-schools/>

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<b>DATE</b>	10 May 2022

## **HEATING & VENTILATION GUIDANCE FOR SCHOOLS:**

### **1.0 Introduction**

Good ventilation can help reduce the risk of spreading Coronavirus. Scientific and Public Health advice is that measures to introduce fresh air can have a beneficial impact on virus suppression.

The following guidance is intended to provide a pragmatic approach that balances the need for fresh air in key parts of the school with the maintenance of adequate temperatures during the colder months. It is recognised that keeping doors and windows open during the winter months may have an impact on room temperature and thermal comfort.

In an effort to mitigate this, the following measures are in place for building heating and ventilation systems:

- Heating schedules have been optimised to ensure that the temperature of the building is reached in advance of the start of the school day.
- Properties with underfloor heating have been set to be on 24 hours per day.
- Centralised mechanical ventilation systems have been adjusted so that air is not recirculated between spaces.
- Filters in centralised mechanical ventilation systems are replaced as part of the planned maintenance regime.

### **2.0 Guidance**

The following guidance sets out practical measures that can be carried out using windows and doors, to encourage good ventilation.

There is clearly a balance to be struck between heating and ventilation, using doors and windows. Local weather conditions will have to be taken into account, when using this guide.

#### **2.1 Before the start of the school day:**

- Purge the air in teaching spaces by opening windows and doors prior to the rooms being first occupied in the morning. Spaces should only be purged for a maximum of 15 minutes – this will help retain the heat in the fabric of the building and result in the temperature rising more quickly.
- Open window trickle vents, if present. However, it is important that this does not entail working at height. If trickle vents are present, but cannot be opened safely, then this should be reported. High level trickle vents can remain open to avoid difficulties opening and closing them.

#### **2.2 During the day:**

- Windows and doors should remain partially open, to provide ventilation, whilst reducing draughts. During the colder months, the natural forces that drive air through the window opening are greater so the windows do not need to be opened as wide.
- Open high-level windows rather than low level windows, where possible, to reduce draughts. However, it is important that this does not entail working

at height. High level windows must have a means of being opened/closed from ground level.

- Purge the air in teaching spaces, by opening windows and doors during lunchtime, when the room is unused. Spaces should only be purged for 15 minutes – this will help retain the heat in the fabric of the building and result in the temperature rising more quickly.
- Rooms which are not routinely occupied should be purged regularly, to prevent the build-up of stagnant air.
- In larger spaces, such as assembly or dining halls, external doors (including fire escape doors to the outside) may be partially opened where possible to increase the amount of ventilation into the space. However, it is essential that these doors are monitored whilst open to prevent unauthorised access or strong wind gusts, causing other health and safety related issues within the building.
- Windows should be partially opened, in corridors and cloakrooms, where possible. Where this is not possible, then doors should be partially opened into spaces where windows are open (unless they are internal fire doors in which case the doors must remain closed).
- Tilt & turn windows should only be opened using the tilt function and only, to the point where the built-in restrictor prevents it being opened further.
- All windows should only be opened as far as the built in restrictor.
- Regularly check the temperature in the room and open/close windows as appropriate. It is important that the room thermometer is located away from open windows/doors, direct sunlight or heat sources- to allow accurate temperature readings to be obtained.

### 2.3 After the end of the school day:

- Windows and doors must be closed at the end of the school day to enable heat build-up and security.
- Close trickle vents on windows (if present) However, it is important that this does not entail working at height. High level trickle vents can remain open to avoid difficulties opening and closing them.

### 2.4 Generally:

- Adults and children should come to school with warm clothing, as would be expected at this time of year.
- Fire risk assessments should be reviewed and revised, taking cognisance of doors being left open to increase ventilation.

### 2.5 Temperature Monitoring

- Should the classroom temperature drop below an acceptable level, staff should contact the helpdesk to report this. Specialists should investigate all reasonable options to increase the temperature in the room. If windows are to be closed, it should only be for a short period of time.

## 2.6 General

- Unventilated spaces (i.e. no opening windows or mechanical ventilation in place) should not be used for teaching purposes, unless a risk assessment is in place.
- Window restrictors should remain in place and not be removed.

## 3.0 **Fault/Concern Reporting Methodology**

### Concerns

Any concerns should be reported to your line manager or Janitor for the building. It is envisaged that the majority of concerns will be easily resolved at a local level. If, however the matter cannot be resolved locally the line manager or Janitor should contact:

- Janitor PPP– FES Help Desk for Secondary Schools
- Janitor – Sector Officer/Help Desk for Primary Schools



# HONEYWELL

## Transmission Risk Air Monitor

**A cost-effective monitor for use in schools, restaurants, and other small-to-medium-sized buildings that alerts to the potential increase of exposure to airborne transmission risk based on CO<sub>2</sub> and activity levels in an indoor area.\***

As the world returns to in-person activities, engaging in additional measures to help support the health of the public is vital. Classrooms, restaurants, and buildings with outdated HVAC and ventilation systems can foster environments where the risk of airborne virus transmission could increase.\* Honeywell proprietary technology that monitors CO<sub>2</sub> levels, coupled with user-controlled settings to account for human activity levels in an indoor area, provides users with a portable, cost-effective, and user-friendly solution that alerts to a potential increased risk of airborne viral transmission.

Research conducted by scientists at the University of Colorado<sup>1</sup> has shown that real-time monitoring of indoor ambient air can provide an indicator of increased risk of airborne viral transmission, utilizing different levels of risk-based factors such as CO<sub>2</sub> concentration levels and the type of human activity in the area.\*

Using this guidance and Honeywell algorithms, we developed risk levels based on common activities and average variables such as room size, number of people present, breathing rate, and duration. The device comes with three pre-programmed indoor activity settings: low activity (movie theaters, libraries, and classrooms), medium activity (restaurants, offices, small clinics), and high activity (gyms, indoor arenas, recreation centers) and is recommended for coverage of 800-1000 square feet. For each setting, the monitor provides indications using a traffic light pattern (green, yellow, or red) and a sound alarm so users can be aware of the potential increase of airborne transmission risk based on detectable CO<sub>2</sub> levels.



*The Honeywell Transmission Risk Air Monitor helps you monitor indoor environments in real time for potential increase of exposure to airborne transmission risk.*



Monitor exposure for students in classrooms to indicate transmission risk level.



Monitor airborne transmission risk levels in restaurants to alert of higher risk situations.

## FEATURES AND BENEFITS



The monitor comes with a user manual and USB charging cable. AC adapter sold separately.



Made of alloy and plastic, the monitor's sleek, lightweight design makes it easy to carry for real-time monitoring anywhere.



Red, yellow, and green indicators show at-a-glance the potential airborne transmission risk level of the air you are breathing.

**Honeywell**

# Honeywell Transmission Risk Air Monitor Technical Specifications

SPECIFICATIONS	
CHARACTERISTIC	PARAMETER
Dimensions (H × W × D)	80 mm × 80 mm × 22 mm [3.1 in × 3.1 in × 0.87 in]
Weight	150 g
Housing materials	Aluminum alloy
Display	TFT
Input voltage	5 V
Input current	1 A
Battery	Lithium-ion rechargeable battery 10-hour battery time
Battery capacity	2,600 mAh
Operating temperature & humidity	0°C to 50°C, 0% RH to 90% RH
USB port	Micro USB

In California's 2020 School Reopening Ventilation and Energy Efficiency Verification and Repair Program legislation, the importance of CO<sub>2</sub> monitoring in classroom settings is highlighted,

**“To ensure proper ventilation is maintained throughout the school year, all classrooms shall be equipped with a carbon dioxide monitor.<sup>2</sup>”**

<sup>1</sup> <https://tinyurl.com/FAQ-aerosols>

<sup>2</sup> [https://leginfo.ca.gov/faces/codes\\_displayText.xhtml?lawCode=PUC&division=1.&title=&part=1.&chapter=8.7.&article=3](https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=PUC&division=1.&title=&part=1.&chapter=8.7.&article=3)

Monitors should be placed in the center of activity areas and should be close to breathing height (approximately 1.5 m, depending on the height or age of the room occupants), out of direct sunlight, and not directly located near induction units, floor fans, or heaters.

**\* The Honeywell Transmission Risk Air Monitor is an indicator of potential risk of airborne viral transmission using multiple factors. It cannot prevent or reduce virus transmission, nor can it detect or warn against the presence of any virus, including but not limited to COVID-19.**

SENSOR RANGE	
DESCRIPTION	DETECTION RANGE
CO <sub>2</sub> (NDIR)	400 ppm to 2000 ppm
Temperature	-20°C to 60°C or -4°F to 140°F
Humidity	0% RH to 100% RH

## DEVICE INDICATION



	GREEN	YELLOW	RED
<b>Description</b>	Lower airborne transmission risk	Medium airborne transmission risk	Higher airborne transmission risk
<b>Recommended Action</b>	–	<ul style="list-style-type: none"> <li>Open windows</li> <li>Turn on HVAC fan</li> </ul>	<ul style="list-style-type: none"> <li>Ventilate room immediately</li> <li>Reduce activities</li> <li>Move out of room until light changes to green</li> </ul>
<b>Alarm</b>	–	One beep	Two beeps

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WHAT  
WE  
MAKE IT

### **Measures Taken to Improve ventilation in schools @ March 2022**

- Campie Primary School, Musselburgh – Two windows eased off and sash and case windows serviced to maintain windows in an open position. Works completed January 2022.
- Pinkie St Peters Primary School, Musselburgh – All windows eased off and opening freely. Works completed January 2022.
- Preston Tower Primary School, Prestonpans – 3 classrooms. Quotations being obtained to fit ventilated roof lights to promote cross ventilation. Works Ongoing at time of reporting.
- St Martins Primary School, Tranent – Expenditure of £144,710.00 was incurred upgrading windows at this school over the COVID period to extend life of the asset and improve natural ventilation to the classrooms. Demonstration in correct use of trickle vents carried out and trickle vents enabled throughout. High level opening window operation with telescopic pole demonstrated. 3 existing windows overhauled. Obstructions removed from in front of windows. Works completed January 2022.
- West Barns Primary School – Hardware being sourced to stop windows blowing shut in TU. Works Ongoing at time of reporting.
- Gullane Primary School – Investigating one general teaching space potentially affected by works ongoing in the school. Mechanical Ventilation design being verified. Works Ongoing at time of reporting.
- Athelstaneford Primary School – internal quiet room formed with no windows – Investigating options which are limited being a listed building in a conservation area. Works Ongoing at time of reporting.
- Wallyford Primary School – Investigating upgrade of mechanical ventilation to internal “Rainbow” room. Also damaged window blind may be deterring window opening. Works Ongoing at time of reporting.
- Elphinstone Primary School – All windows checked and functional. Unused high level opening windows to be overhauled and brought back into use. Works Ongoing at time of reporting.
- Yester Primary School – All windows checked and functional. Works completed January 2022.
- Loretto PS – All windows eased off and checked to be opening freely. Works completed January 2022.
- Windygoul Primary School – Instruction given on operation of trickle vents which were closed. Works completed January 2022.
- St Gabriel’s Primary School – awaiting further feedback on monitoring from the school.

In addition to the above:

- Cockenzie Primary School - Expenditure of £142,599.00 was incurred upgrading windows at this school over the COVID period to extend life of the asset and improve natural ventilation to the classrooms.
- Ormiston Primary School - Expenditure of £139,206.00 was incurred upgrading windows at this school over the COVID period to extend life of the asset and improve natural ventilation to the classrooms.
- Preston Tower Primary School - Expenditure of £84,696.00 was incurred upgrading windows at this school over the COVID period to extend life of the asset and improve natural ventilation to the classrooms.