

# Joint union guide to improving ventilation in schools and colleges

**Advice for safe opening**

Revised January 2022

**Coronavirus crisis**  
Workplace checklist



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## Coronavirus: ventilation and temperature

Ventilating indoor work areas is a key control measure in reducing Covid-19 transmission.

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### Why is ventilation so important?

Ventilation is the process of replacing stale air with fresh air. Effective ventilation removes stale air which may contain Covid-19 aerosols and brings in fresh air containing more oxygen, less carbon dioxide (CO<sub>2</sub>) and water vapour and fewer microbes. Achieving good ventilation is all about understanding ventilation systems in the workplace (mechanical, natural or both) and checking how well they are performing in removing stale air and bringing in fresh air. Our 5-step guide below sets out how employers and union reps can work together so that this can be achieved, including practical measures to monitor and improve ventilation. See also the TUC blog [Ventilation, ventilation, ventilation](#).

Government guidance is very clear about the importance of ventilation in relation to Covid-19. We welcome, as an initial step in the right direction, the fact that the Government has finally heeded repeated calls from the joint unions and has been rolling out portable CO<sub>2</sub> monitors to all state-funded schools and colleges since September 2021. Since September, despite high staff vaccination rates, staff have been working alongside pupils of whom many are neither partly nor fully vaccinated. Masks and hygiene measures can help but ventilation is key to a safer work environment. Good ventilation also aids student concentration, so will continue to pay dividends in relation to learning even when the pandemic is over. [See Covid gives us a chance to fix indoor air pollution forever](#). See also [this study](#) from Harvard University which looks at the impact of CO<sub>2</sub> on cognitive function.

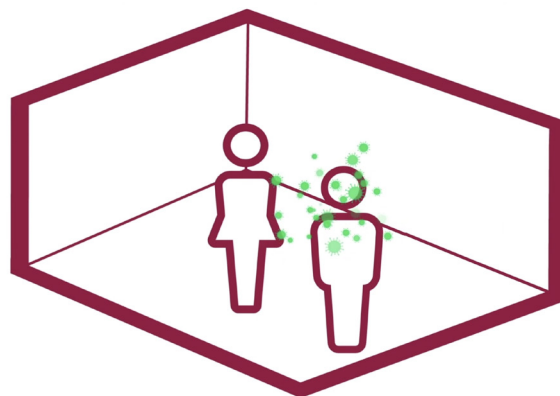
- ❑ In New York City any room that does not meet stringent safety standards is not used for instructional purposes until it is put right. Air filters are being installed in every classroom.

- ❑ In Scotland, all schools must have access to CO<sub>2</sub> monitoring and funding is being made available to local authorities to facilitate this.
- ❑ In Ireland, tens of thousands of CO<sub>2</sub> monitors are being distributed to schools as part of a package of measures to help ensure safety.

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### A collective approach

Tackling poor ventilation collectively offers the best chance of success. As a starting point, it is essential that all colleagues understand why ventilation is so important. This short video from HSE explains why this is the case [Covid-19 Ventilation and air conditioning](#).



In order to ensure the importance of ventilation is understood and effective ventilation achieved, you should:

- ❑ Meet with members to discuss ventilation in the workplace.
- ❑ Identify any concerns and, where possible, solutions.
- ❑ Raise them collectively with your employer.

A joint approach to management, whether written or presented at a meeting, from members of all unions who are recognised at your workplace, setting out steps that you expect to be taken to protect everyone, is the best way forward. The key point is that negotiation between unions and management takes place. Most employers will welcome such a collaborative approach

since improving ventilation should lead to less Covid-19 transmission and therefore less disruption to education.

A step-by-step plan for assessing ventilation levels and bringing about any improvements needed is suggested below. If management is reluctant to engage, go back to members, discuss the position and agree a plan. Members may wish to demonstrate how strongly they feel by signing a letter or raising it with the governing body.

If you need further support, please contact your union for advice and guidance.

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## Step 1 - Gathering evidence of poor ventilation

Union members/ reps/ health and safety reps can help draw attention to areas which need improving. These are all indicators of poor ventilation. Feed any concerns through to management:

- ❑ Do any areas feel stuffy or smell unpleasant?
- ❑ Are there any areas of the premises without either natural ventilation, for example, openable windows and doors or mechanical ventilation such as fans and ducts?
- ❑ Are any airbricks blocked?
- ❑ Are there any windows which require attention?
- ❑ Do ventilation grids appear dirty?
- ❑ Are ventilation facilities blocked by furniture or curtains?



*Air brick (terracotta)*



*Ventilation grid*



*Ventilation duct*

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## Step 2 – Workplace ventilation audit

The risk of transmission of Covid-19 from aerosols and the ventilation strategy needed to reduce the risk should be considered as part of your workplace's overall risk assessment.

- ❑ Ask your employer to undertake a ventilation risk assessment to identify any poorly ventilated areas, including areas such as toilets.
- ❑ If there already is one, ask for a copy to be displayed on the staff noticeboard.
- ❑ Will it be revised at regular intervals?

Here are some key questions to ask your employer, which should be considered as part of the risk assessment process. Individual classroom or workspace occupants should be involved too.

- ❑ Are there any classrooms and other areas where people gather and where there is neither [mechanical ventilation](#), nor [natural ventilation](#) such as open windows, doors, or vents?
- ❑ If there are mechanical systems that provide outdoor air, temperature control, or both then does the system only [recirculate air](#) with no outdoor air supply? If so, the area is likely to be poorly ventilated and any Covid-19 in the air will just be moved around rather than removed.

If the answer to either of these questions is 'yes' or 'we don't know', then improvements are needed.

Good ventilation is paramount as a control measure, but layered preventions are necessary. [The authors of a recent Swiss study](#) said "Natural ventilation, face masks, and HEPA filtration are effective interventions to reduce SARS-CoV-2 aerosol transmission. These measures should be combined and complemented by additional interventions (for example physical distancing, hygiene, testing, contact tracing, and vaccination) to maximise benefit."

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## Step 3 – Monitoring carbon dioxide levels

Many countries have now recognised the need to improve ventilation in educational buildings. Ireland has invested €4m to ensure that classrooms have CO2 monitors. Chile has repurposed CO2 monitors to stop Covid-19 spread indoors. Data on CO2 is uploaded to the cloud and an audio alert. Germany announced (October 2020) a €500m investment to improve ventilation in public buildings including schools and Belgium is imposing requirements. In response to pressure from the education unions, England has finally followed suit and has invested an initial £25m in providing all state-funded schools and colleges with one portable CO2 monitor for every two classrooms.

The level of CO2 acts as a proxy for the Covid-19 risk as people exhale airborne viruses when they exhale CO2. To check the situation in your workplace, ask your school or college to use carbon dioxide monitors to check whether ventilation is sufficient to keep CO2 levels below 800 ppm. Indoor air at 600 to 800 ppm carbon dioxide indicates a relatively well-ventilated room.

**Please note carbon dioxide monitors are not a solution to the problem of poor ventilation. They will indicate a problem but then something has to be done. More on this below.**

In its advice [Identifying poorly ventilated areas](#) ([hse.gov.uk](https://www.hse.gov.uk)) the HSE states that classrooms, meeting rooms and larger offices are often well suited to CO2 monitoring as the higher number of occupants helps ensure that measurements are accurate. It also advises that "where there is continuous talking or singing, or high levels of physical activity (such as dancing, playing sport or exercising), providing ventilation sufficient to keep CO2 levels below 800ppm is recommended."

There are many different types of CO2 monitors available. For independent schools which will need to purchase their own, or where schools/colleges wish to purchase

additional devices, the HSE advises that the most appropriate devices to use in the workplace are portable, non-dispersive infrared (NDIR) CO2 monitors. Detailed HSE guidance is available [here](#). Most models allow the user to set a red light to come on at the threshold figure – 800ppm.

Safety reps can have a useful role to play in monitoring CO2 levels across a school or college. In place of one of their termly safety inspections, a safety rep could carry out a 'CO2 inspection' by logging CO2 levels in every classroom/office where there is a monitor and generating a spreadsheet for the results. These can then be discussed with the head teacher and improvements made to the ventilation in areas where CO2 levels are above safe levels.

As noted above, the DfE is providing all state-funded schools with at least one portable CO2 monitor for every two classrooms. However, [the guidance which the DfE has issued to accompany the monitors](#) is unhelpful. It states that:

- "A consistent value under 800ppm does not require any action and implies that a space is particularly well ventilated. A consistent value of over 800ppm should be seen as an early indicator to increase ventilation.'
- "A consistent value of 1500ppm CO2 concentration in an occupied space is an indicator of poor ventilation. You should take action to improve ventilation where CO2 readings are consistently higher than 1500ppm. There is no need to stop using the room".

This implies that a reading of >800ppm is only an early warning, whereas in fact every effort should be made to keep the reading below this level. [SAGE](#) guidance, describing rooms where loud speech, singing etc are taking place (namely many classrooms) "should aim to ensure ventilation is sufficient to maintain CO2 concentrations below 800ppm (typically 10-15 l/s/ person), and should also include additional mitigations such as face coverings for audiences and restricting the size of

groups and duration of activities". As noted earlier, the [HSE](#) advises that "where there is continuous talking or singing, or high levels of physical activity (such as dancing, playing sport or exercising), providing ventilation sufficient to keep CO2 levels below 800ppm is recommended."

The DfE guidance also suggests that action is only required when a consistent value of >1500ppm is observed. This is contrary to both the SAGE and HSE advice above and [advice published by CIBSE](#) (Chartered Institution of Building Services Engineers) which cites the SAGE advice noted above.

The DfE states that there is no need to stop using the room, pending improvements to ventilation, regardless of how high the CO2 reading is, bringing the whole point of having monitors into question.

Finally, the DfE provides little advice on improving ventilation other than opening windows, and providing links to other organisations.

The joint unions believe that staff and students could find themselves working in poorly ventilated classrooms on the basis of the DfE advice. The joint unions advise schools and colleges to follow the joint unions' guidance on ventilation to maintain safe CO2 levels and good ventilation practices. This means considering the practical steps set out below to make improvements.

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## Step 4 – Practical steps to ensure good ventilation

Where ventilation needs to be improved, here are some practical steps which can be taken, depending on what the specific issue is.

The maintenance team should check that the ventilation is functioning well, whether mechanical or natural. Schools and colleges with complex ventilation systems may need to seek input from a qualified engineer and those with systems containing asbestos from an asbestos consultant who can advise on the potential risk of asbestos disturbance in those areas.

- ❑ Airbricks should not be obstructed.
- ❑ Windows should be able to be safely opened.
- ❑ Ventilation grids need to be kept clean, so that the air supply is not obstructed.
- ❑ Where mechanical ventilation systems are in place, ventilation should start ahead of the working day and continue after classes have finished as cleaners and other maintenance staff will be working in those rooms. Where natural ventilation is relied upon, windows should be opened ahead of the start of the working day.
- ❑ Air handling units should be set to maximise outdoor air over recirculated air, and any automatic CO<sub>2</sub> sensor switched off or set to 400ppm.
- ❑ Windows and internal/external doors should where possible be kept at least slightly open (noise, security/thermal comfort and fire restrictions dependent).
- ❑ To achieve a balance between ventilation and thermal comfort, uniform and dress codes should be relaxed in colder weather to allow staff and students to dress more warmly but, in addition, schools and colleges should, where necessary, have the heating turned up higher and for longer, starting earlier in the morning, to keep the temperature comfortable throughout the working day.
- ❑ Fan convactor heaters can be used provided the area is well ventilated, but they should not be used in poorly ventilated areas.
- ❑ On hot, still days when there is little or no breeze, a fan can be positioned next to an open window to draw in the fresh air from outside and circulate it around the room.
- ❑ Classrooms and other areas should be ventilated properly between classes and uses, including at breaks and at lunchtime. This is one of the most important measures to ensure effective ventilation and involves opening windows fully for a short period of time. Subjecting rooms to periods of no occupancy also allows contaminants to dissipate.
- ❑ Rooms should be cleaned regularly to reduce recirculation of any virus deposited on surfaces and absorbed on dust.
- ❑ Any ventilation is better than none, so, where possible, keeping the windows open a crack will help to reduce the concentration of any virus in the air. Lower temperatures and likely windier conditions in the winter months will increase the natural ventilation through openings. This means that partially opening windows and doors can still provide adequate ventilation at the same time as maintaining a comfortable temperature.
- ❑ Ventilation facilities should not be obstructed or blocked by curtains or furniture. Ceiling fans or desk fans can be used to prevent pockets of stagnant air, provided good external ventilation is maintained. They should not be used in areas of poor ventilation.

- ❑ A maximum capacity should be introduced for smaller rooms to ensure greater dilution – this may mean reducing numbers of students in smaller classrooms. Note that halving occupancy is equivalent to doubling the ventilation rate.
- ❑ Some poorly ventilated areas of the premises may need to be restricted to single occupancy, or very short durations, or put out of use until ventilation is improved.
- ❑ As well as through ventilation, the risk of aerosol transmission can be reduced by limiting activities that have been shown to increase aerosol generation, such as aerobic exercise and singing, so such high aerosol-generating activities may need to be limited in smaller and less well-ventilated classrooms.
- ❑ Toilets should be flushed with the lid down to avoid a 'faecal plume' containing virus particles spreading through the surrounding area.
- ❑ Where, despite mitigations, CO<sub>2</sub> readings consistently exceed the safe levels described above, the room should be temporarily evacuated pending measures being put in place to bring the CO<sub>2</sub> reading down to acceptable levels. This might mean continuing the lesson in, for example, the hall / dining area etc for a short period. In good weather, the lesson could be moved outside.

## Step 5 – What if these measures are put in place but ventilation is still poor?

Air cleaning and filtration units are an effective means of reducing airborne transmission of aerosols where it is not possible to maintain adequate ventilation.

The HSE advises that these units are not a 'substitute' for ventilation. They can, however, play an important role where ventilation has not proven sufficient.

The HSE advises that the most suitable types to use are:

- ❑ High-efficiency filters – High Efficiency Particulate Air (HEPA) filters are no less than 99.97% efficient at capturing human-generated viral particles associated with SARS-CoV-2 according to the Centres for Disease Control and Prevention; Ventilation in Buildings; update 2 June 2021.
- ❑ Ultraviolet-based devices.

Filtration using HEPA filters is recommended, but other systems using ozone, chemicals or low level UVc and calling themselves ionisers/purifiers are not advised and may carry risk of low-level irritating ozone, harmful Volatile Organic Chemicals and low-level exposure to UVc harm. They are also less likely to be effective and are not regulated.

It should be noted that HEPA filters, unlike air conditioning units, are intended to be operated with windows and doors open – in other words existing ventilation measures should be maintained even though you are using HEPA filtration. HEPA filtration units filter out and trap tiny particles, such as coronavirus particles, from the air around them and can be very effective, but, as noted below, professional advice should be sought as to their purchase and installation so as to obtain the desired results.

Ultraviolet-based devices are only suitable for high level, upper room UVc germicidal radiation for some rooms above 7 feet in height and needing professional installation. Proper investigation should be carried out and professional advice sought. Such devices may be ideal for large rooms like gyms, halls and cafeterias.

Any unit should be appropriate for the size of the area in which it is used, to ensure it works effectively. Professional advice should be sought to ensure the most suitable equipment is purchased.

In December 2021 the DfE published its 'Marketplace' to help schools purchase air purifiers. [Air cleaning units for education and childcare settings - Find a DfE approved framework for your school - GOV.UK \(find-dfe-approved-framework.service.gov.uk\)](#) as well as ['how to' guidance on using an air cleaning unit](#). Instead of the DfE's 'Marketplace' we have been calling for the Government to implement an immediate roll out of air purifiers to all schools. In addition, the Marketplace suggests only two expensive models (Dyson and Rexel) when there are other models available at a fraction of the cost. Given the Omicron threat, the Government should be fully funding these devices and at the very least should be helping cash-strapped schools to get best value for money. We are not able to endorse any specific models or companies, but this list [Air Purifier Comparison – \(fullplasticscientist.co.uk\)](#) does offer a wider range of options so schools may find it useful to consult it before making any decisions on purchases.

For further guidance on air cleaning technologies, click [here](#).

Any areas identified as having unsafe levels of ventilation should be taken out of use pending improvements. Remember the layered approach: good ventilation doesn't mean that other Covid-19 controls, such as physical distancing, face coverings, testing, contact tracing, vaccination and a focus on hygiene can be forgotten!

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## Other resources

See resources produced by Imperial College at [coschools.org.uk](https://coschools.org.uk)

These include:

- ❑ 4 videos explaining and motivating the use of CO2 monitors in classrooms,
- ❑ A simple table of the relevant CO2 levels, with a description, suggested actions, and potential consequences for each,
- ❑ An A4 poster which you can print and laminate to sit alongside the monitors in class (editable versions provided),
- ❑ A presentation which you can edit and use as a base for inset training on classroom ventilation in the context of COVID mitigation.



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