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A joint union guide for union reps/ health and safety reps

Good ventilation in schools and colleges and how to achieve it

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Why is ventilation so important?

Aim of this resource

- To promote the importance of good ventilation in schools and colleges.
- To help education trade union representatives work together to improve ventilation across settings to the benefit of all staff and pupils.

Introduction

Ventilation is the process of replacing stale air with fresh air. Effective ventilation reduces CO_2 which impacts concentration, and removes stale air which may contain viruses, bacteria and allergens. Improved ventilation has been shown to improve academic performance and reduce sickness absence. 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 five-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.

Evidence

Recent studies have shown the benefits of ventilation. A 2021 Lancet study on improvements to ventilation and air cleaning in school buildings found clear evidence of additional benefits of improved ventilation (beyond reducing infectious disease transmission), including improved test scores and cognitive function, reduced asthma and respiratory symptoms, and a reduction in missed school days. A study in Bradford trialed air filter technologies across 30 primary schools, and found that schools that had these relatively low-cost air cleaning technologies fitted showed significantly lower absence rates, with the lead author of the study, Professor Cath Noakes, reporting at the World Health Organization's Europe Indoor Air Conference in September 2023 that their data revealed that classrooms with HEPA air filters installed had over 20% fewer pupil absences than those without. Similarly, a study in Milan found that introducing air filters into classrooms reduced pupil absence by 12.5%.

Clean air - a global issue

Many countries have recognised the need to improve ventilation in educational buildings. For example, the US government has provided hundreds of billions of dollars to improve indoor air quality, including $350bn for state and local governments, as well as $122bn for schools. The French government has new air quality standards for school classrooms, Australia has invested in air filters for schools and the Illinois state Government announced the purchase of 60,000 air filters for better air quality in classrooms so students can better think,

learn, and thrive.

In the UK, 2.7 million has been invested in the School Filter Programme in London, while Hertfordshire County Council have introduced their Schools Ventilation Programme to improve air quality in their schools. It has also come to light that both Houses of Parliament, the Dept of Education and the Ministry of Defence have had their ventilation systems upgraded to clean the air.

Health and Safety Regulations

Employers have a legal duty to ensure that workplaces, including schools and colleges, are safe and healthy environments.

Ventilation is a critical part of their duty:

- Health and Safety at Work etc. Act 1974
  Requires employers to ensure, so far as is reasonably practicable, the health, safety, and welfare of employees and others affected by their work.
- Workplace (Health, Safety and Welfare) Regulations 1992
  Regulation 6 states that "effective and suitable provision shall be made to ensure that every enclosed workplace is ventilated by a sufficient quantity of fresh or purified air."
- Control of Substances Hazardous to Health (COSHH) Regulations 2002
  Requires employers to prevent or adequately control exposure to substances hazardous to health, including airborne pathogens.
- BB101 Ventilation, thermal comfort and indoor air quality in schools
  Sets out design standards for ventilation in educational settings, including minimum fresh air rates (typically 8 L/s per person).
- HSE Guidance (HSG258)
  Provides best practice for local exhaust ventilation and general ventilation systems.

Tackling poor ventilation in schools and colleges

A collective approach

Tackling poor ventilation collectively offers the best chance of success. As a starting point, it is essential that all education staff understand why ventilation is so important. This short video from the Health and Safety Executive (HSE) explains the importance of ventilation in straightforward terms.

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.

The best way forward is 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. 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 transmission of airborne viruses 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, details on how to contact unions locally can be found here for NASUWT members; here for NEU members; here for UNISON members; here for GMB members; here for Unite members; and here for UCU members.

Step 1 – Gathering evidence of poor ventilation

Union members/reps/health and safety reps can help draw attention to areas that need improving. Listed below 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?

Step 2 - Workplace ventilation audit

The risk of transmission of respiratory infections from aerosols and droplets, 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, does the system only recirculate air with no outdoor air supply? If so, the area is likely to be poorly ventilated and any microbes in the air will just be moved around rather than removed.
- Are there any indoor areas with fewer than six air changes per hour?

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

Step 3 - Monitoring carbon dioxide levels

The level of CO_2 acts as a proxy for the microbe load as people exhale airborne viruses when they exhale CO_2. 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 CO_2 levels below 800 parts per million (ppm). Indoor air at 600-800ppm carbon dioxide indicates a relatively well ventilated room.

Note that 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.

There are many different types of CO_2 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) CO_2 monitors. 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 in monitoring CO_2 levels across a school or college. In place of one of their termly safety inspections, a safety rep could carry out a CO_2 inspection by logging CO_2 levels in every classroom/office where there is a monitor and generating a spreadsheet for the results. These can be discussed with the head teacher and improvements made to the ventilation in areas where CO_2 readings are above safe levels.

Between 2021 and 2023, the DfE provided all state-funded schools with CO_2 monitors. However, the guidance the DfE issued to accompany the monitors is unhelpful. It states:

"A consistent value under 800ppm will show as green and implies that a space is well ventilated. You can consider opening your windows slightly less wide or closing them. A consistent value of over 800ppm will show as amber/orange and should be seen as an early indicator to increase ventilation.

"A consistent value over 1500ppm CO_2 concentration in an occupied space is an indicator of poor ventilation… You should take action to improve ventilation where CO_2 readings are consistently higher than 1500ppm. There is no need to stop using the room."

This implies that a reading of higher than (>) 800ppm is only an early warning, whereas in fact every effort should be made to keep the reading below this level. Guidance from SAGE, the Scientific Advisory Group for Emergencies, said that in rooms where loud speech, singing etc are taking place (namely many classrooms), the aim should be "to ensure ventilation is sufficient to maintain CO_2 concentrations below 800ppm (typically 10-15 litres per second per person)".

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

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 CO_2 levels and good ventilation practices. This means considering the practical steps set out below to make improvements.

Step 4 - Practical steps to ensure good ventilation

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

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.

Those with systems containing asbestos

should consult 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.
- A minimum of six air changes per hour and a minimum of 10 litres per second per person of outside air are recommended.
- 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_2 sensor switched off or set to 400ppm.
- Windows and internal/external doors should where possible be kept at least slightly open (depending on noise, security/thermal comfort and fire restrictions).
- 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. 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 convector 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 increase aerosol generation, such as aerobic exercise and singing. 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_2 readings consistently exceed the safe levels described above, the room should be temporarily evacuated pending measures being put in place to bring the CO_2 reading down to acceptable levels. This might mean continuing the lesson in, for example, the hall/dining area 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.

These units are not a substitute for ventilation but they can play an important role where ventilation has not proved sufficient. By filtering and trapping tiny particles of virus, pollution or pollen, they improve the air quality in a given space. Research in the USA has shown that because of the improved air quality and the effect this has on cognition, the installation of an air filter in a classroom can improve test scores by as much as cutting the size of the class by a third.

The UK Health Security Agency (UKHSA) has recommended the use of air filters in schools.

The most suitable types to use are:

- high efficiency filters – high efficiency particulate air (HEPA) filters are no less than 99.97 per cent efficient at capturing human-generated viral particles associated with SARS-CoV-2 (Covid-19) 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 ultraviolet-C (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 if you are using HEPA filtration. HEPA filtration units filter out and trap tiny particles, such as viruses, from the air around them and can be very effective, but, as noted below, professional advice should be sought about their purchase and installation to obtain the desired results.

Ultraviolet-based devices are only suitable for high level, upper room UVC germicidal radiation for some rooms above seven 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.

Given the seasonal infections that affect schools, including Covid, flu and the common cold, the Government should be fully funding these devices and at the very least should be helping cash-strapped schools and colleges to get best value for money. The two models in its Marketplace scheme were expensive and beyond the reach of many schools and colleges.

We are not able to endorse any specific models or companies, but this list at Portable Air Cleaner (HEPA filter) Clean Air Crew offers a wider range of options so schools may find it useful to consult 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.

Future proofing and climate hazards

Improving ventilation should not only address immediate concerns but also prepare schools and colleges for long-term resilience and sustainability:

- In schools, new builds and refurbishments should ensure compliance with BB101 (UK government standard specifically for school ventilation and thermal comfort) - new designs must balance air quality and energy use.
- Align ventilation strategies with the UK Government's Net Zero by 2050 commitments and design for extreme weather resilience, ensuring systems can cope with heatwaves and cold snaps without compromising air quality.