



Radon in schools

Raising awareness of a natural radioactive gas in your buildings



The purpose of this campaign

The radon awareness and measurement campaign for schools aims

‘to improve health protection by giving duty holders in schools the knowledge and awareness to ensure that no individual is exposed to high levels of radon gas’

This campaign is supported and monitored by Department of Health, and the Health and Safety Executive.

Radon sources and health effects

What is radon?

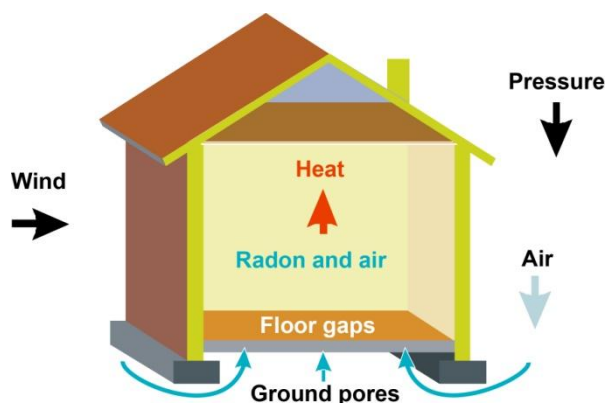
Radon is a natural radioactive gas with no smell, taste or colour. It comes from uranium present in the ground and in materials such as bricks and concrete.

The danger

When radon decays, it produces particles that are also radioactive. These can be breathed in, irradiate the sensitive cells in the lungs and increase the risk of lung cancer. Health studies show that radon is responsible for over 1000 lung cancer deaths each year in the UK, the second largest cause after smoking.

Exposure to radon at school

Radon is drawn into all buildings through contact with the ground (Figure 1). The effect of warm air rising and wind on a building mean that the indoor atmospheric pressure is slightly lower than outside. Radon can find a route into rooms through cavity walls, settlement cracks and service entries. Limited ventilation will trap radon in a room where it builds up to high levels. The amount of radon in the ground depends on the geology, which helps us to produce a radon potential map (Figure 2). The areas at highest risk are called radon Affected Areas.



Radon levels will vary between neighbouring buildings and from room to room, according to the size, design and usage

Figure 1: How radon enters a building

Health and safety legislation and this campaign

The legislation on radon

If the annual average radon level in a workplace exceeds 300 Bq m⁻³ in any location, the Ionising Radiations Regulations 2017 (IRR17) apply. Usually, minor building works are then required to reduce the radon level.

Bq m⁻³ = becquerels per cubic metre of air: the radon concentration

Other advice on radon in schools

In 2010, we advised that the system of radon protection for homes should be applied to all schools. These recommendations sit alongside existing legislation, but are not enforceable.

Radon is being highlighted in schools to protect staff and students

Two reasons prompted this campaign:

- we have a radon potential map of England and Wales that has very high levels of detail (see Figure 2). This identified new radon Affected Areas in addition to those recognised in the past
- some councils may not have recognised their duty to assess radon at work. Numerous employees and students are therefore likely to be exposed to unacceptably high levels



The darker shades show areas of higher radon potential

Figure 2: Radon Affected Areas in England and Wales

Actions for schools in radon Affected Areas

You should carry out three-month radon measurements in the premises for which you are responsible, which have been identified as being in radon Affected Areas. Even with radon potential maps, no one can predict the radon level in an individual building, so the only way to know for sure is to place a number of small radon monitors throughout the school.

Using radon monitors

The 'rules of thumb' for placing radon monitors properly in school buildings are shown below. Typically, 15 monitors are required for a combined primary school and up to 70 for a large secondary school:

- put monitors in ground floor rooms and in regularly used, accessible basements
- leave in them in place for three months
- use one monitor for every 100 m² (10 m x 10 m) of floor area. There is no need to put one in every room
- if rooms are large, such as sports halls, one monitor can cover up to 250 m²
- monitors are ideally placed at breathing height 1 or 2 m off the floor. Put them higher if you need to get them out of harm's way, for instance tied to a whiteboard speaker
- ensure that you have enough monitors to cover all wings and annexes within every block
- ideal rooms include classrooms, offices, receptions, kitchens, gyms and sports halls, and dining areas

Avoid the following locations as they can give anomalous results:

- meter cupboards, locked or understairs stores, unoccupied rooms and corridors, garages, open courtyards, and ceiling voids

More information about placing monitors is available on request as a leaflet.

Caretaker's houses and other residential buildings

These should be monitored as any other house, with one monitor in the living room and one in a bedroom (regardless of storey).

Obtaining radon monitors

We can help you to measure the radon level. Work out how many monitors are required and your employer can order them through the PHE Radon Group, telephone 01235 822622, or visit our website www.ukradon.org (which contains more information on radon in homes and workplaces). Contact us for details of the discounts available for large orders and public sector organisations.

After the monitors have been in place for three months, you should return them to us for processing. We will then report the results within about four weeks and advise on their significance, and any employer requirements under national legislation. If the highest radon level is over 300 Bq m⁻³, you will probably need to reduce it.

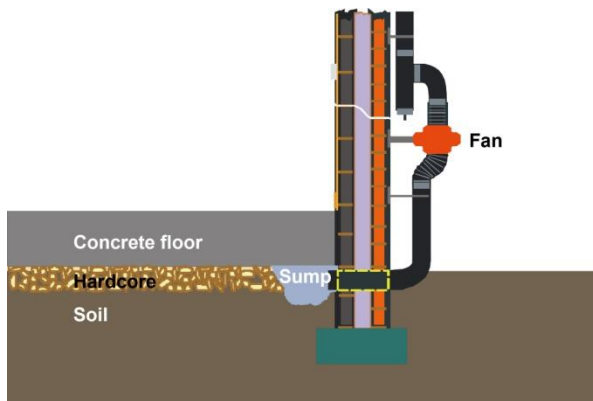
Radon monitors are available from other suppliers, but you should ensure that the service and advice offered are appropriate for workplaces.

Dealing with the results

This will depend on the radon levels for each building in the school.

High radon levels

Radon levels can be reduced with remedial works such as the sump and pump shown in Figure 3, which may cost up to a few thousand pounds to install. Further radon measurements in the locations with high results will be required until effective mitigation has been achieved. An annual radon test is then recommended to ensure that the radon levels remain low.



A low pressure zone under the floor diverts the radon-laden air away from the room

This system is usually effective for an area of up to 250 m²

Figure 3: Radon sump and pump

Low radon levels

You should review the results after about 10 years. However, radon levels may rise if you make major changes to the building, such as new windows, heating systems or extensions. You will need to repeat the radon measurements when any such work is complete.

Keeping parents, governors and staff informed

General information on radon is available on our website: www.ukradon.org. The Radon Group at PHE can help schools with effective and sensitive communications on radon.

Further information on radon and this campaign is available from the following organisations:

Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through advocacy, partnerships, world-class science, knowledge and intelligence, and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

Radon Group: 01235 822622

PHE Centre for Radiation, Chemical and Environmental Hazards

Chilton, Didcot, Oxfordshire OX11 0RQ

email: PF-Radon@phe.gov.uk

www.ukradon.org and www.gov.uk/phe

Health and Safety Executive

The Health and Safety Executive's mission is to prevent death, injury and ill health in Great Britain's workplaces. It does this through research, information and advice, promoting training, new and revised regulations and codes of practice, inspection, investigation and enforcement.

www.hse.gov.uk/radiation/ionising/radon.htm

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