



# Radon in schools

Raising awareness of a natural radioactive gas in your buildings

## Radon sources and health effects



### 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.’

### What is radon?

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

### The danger

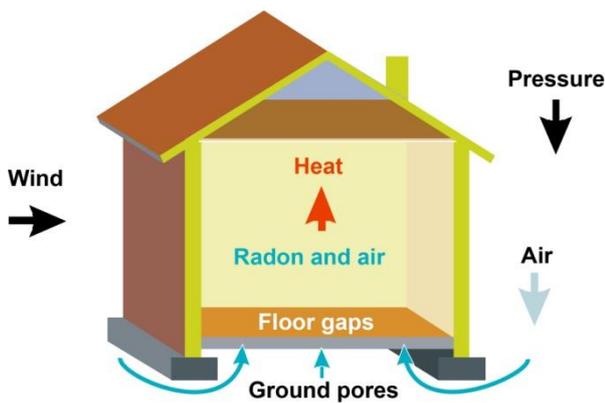
When radon decays, it produces particles that are also radioactive. These can be breathed in, irradiate the sensitive cells in the lungs and increase the risk of lung cancer. Health studies show that radon is responsible for more than 1100 lung cancer deaths each year in the UK, probably the second largest 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, such as electrical cables. Limited ventilation will trap radon in a room where it builds up to high levels.

### Radon is being highlighted in schools to protect staff and students

Some employers have not recognised their duty to assess radon at work. Numerous employees and students are therefore likely to be exposed to unacceptably high levels.



**Figure 1:** Radon is drawn into buildings through gaps in the floor and cavity walls, by warm air rising. Radon levels will vary between neighbouring buildings and from room to room, according to the size, design and usage

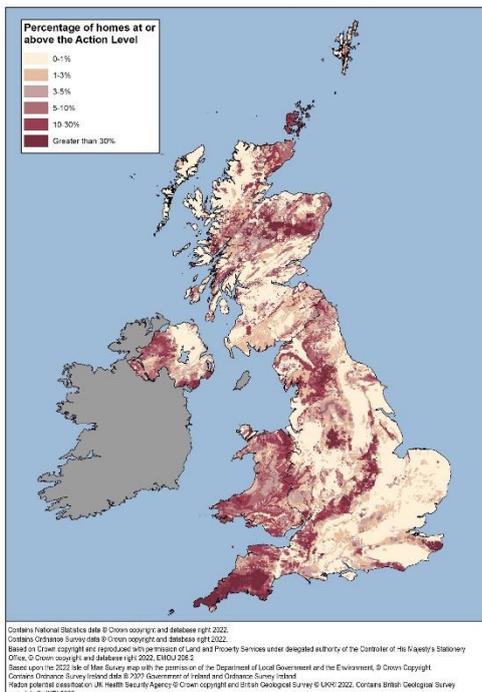
## Health and safety legislation

### Risk assessment

The Management of Health and Safety at Work Regulations 1999 require every employer to make a suitable and sufficient assessment of the risks to the health and safety of employees whilst at work and other people (such as students) on site. This should include radon if the school is in a radon Affected Area (Figure 2) or has an occupied basement.

### The legislation on radon

If the annual average radon level in a workplace exceeds  $300 \text{ Bq m}^{-3}$  (becquerels per cubic metre of air) in any location, the Ionising Radiations Regulations 2017 (IRR17) apply. Usually, minor building works are then required to reduce the radon level and you will need expert advice on how to comply with the IRR17. In addition, the HSE must be notified.



**Figure 2:** The amount of radon in the ground depends on the geology, which helps us to produce a radon potential map by combining geology data with the results from radon measurements in homes. The areas at highest risk are called radon Affected Areas – more detailed maps and information are on [www.ukradon.org](http://www.ukradon.org).

## Actions for schools in radon Affected Areas

Employers should carry out three-month radon measurements in the premises for which they 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. As a guide, 15 monitors may be 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 m<sup>2</sup> (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 m<sup>2</sup>
- 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 UKHSA Radon Group, telephone 01235 822622, or visit our website [www.ukradon.org](http://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.

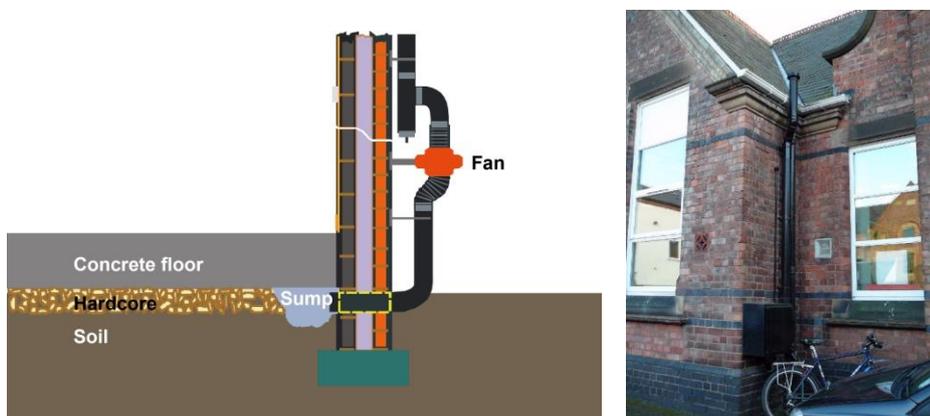
After the monitors have been in place for three months, you should return them to us for processing. We will then report the results within about four weeks and advise on their significance, and any employer requirements under national legislation.

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

### High radon levels

Radon levels (more than 300 Bq m<sup>-3</sup>) can be reduced with mitigation 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.



**Figure 3:** A radon sump and pump is a low-pressure zone under the floor that diverts the radon-laden air away from the room with a pipe and fan, and vents it to the outside. The pipework design can integrate well with the building. Such a system is usually effective for an area of up to 250 m<sup>2</sup>. Other mitigation methods include ventilation under suspended floors.

### Low radon levels

You should review the results after about 10 years. 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: <http://www.ukradon.org/>. The Radon Group at UKHSA can help schools with effective and sensitive communications on radon.

The HSE strongly encourages employers to recommend that employees living in radon Affected Areas test their own homes ([www.hse.gov.uk/radiation/ionising/radon.htm](http://www.hse.gov.uk/radiation/ionising/radon.htm)).

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### United Kingdom Health Security Agency (UKHSA)

The UK Health Security Agency is an executive agency of the [Department of Health and Social Care](#).

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