



Three bedrooms, two bathrooms, one reception ...and a killer gas

Rebecca Kench of specialist property contractor, ProTen Services Ltd explains the dangers of radon gas, and the steps that householders should be encouraged to take to minimise the potential risk

Radon, the naturally occurring radioactive gas is a problem that can affect properties of all types, ages, locations and uses. The gas is formed when uranium in the soil and rocks beneath us decays. When it permeates the ground into open air, it is quickly diluted to low concentrations, however if it rises into a building, it can become trapped and build to dangerous concentrations.

When concentration of the gas is high, the radioactive decay products are unavoidably inhaled, some being deposited in the lungs, where they continue to emit radiation. Each year in the UK approximately 2500 people die from lung cancer, developed as a direct result of exposure to radon. The gas accounts for the second greatest number of lung cancer cases in the UK, second only to smoking.

Affected Areas

In the case of property transactions, the issue of radon will come to the fore in pre-Contract Enquiries (CON 29), where the question: "Do records indicate that the property is in a "Radon Affected Area" as identified by the Health Protection Agency?" is posed. Properties that lie in certain areas of the UK are more likely to contain high levels of radon, due to the underlying geology and varying amounts of uranium present.

Areas where it has been estimated that more than 1% of homes contain high levels of the gas are known as Affected Areas.

Many people mistakenly believe that radon only affects the South West of England and granite-rich areas, however there are many other areas of the UK classified as Affected Areas. For example, in Northamptonshire, built largely on sand, it has been estimated that more than 30% of homes contain high levels of radon. The Peak District, built mainly on limestone has also been estimated to contain a similar proportion of properties affected by the gas. Also worth noting is that even areas in the City of London have been declared as Affected Areas in the latest revision of the Health Protection Agency's (HPA) Indicative Atlas of Radon.

Buildings with basements are also more susceptible to high levels of radon accumulating, as there is a larger surface area in contact with the soil through which the gas can permeate. The HPA recently advised that any property with a basement, regardless of whether it is located in an Affected Area or not, can contain high radon concentrations.

The HPA and the British Geological Survey have recently launched a website, www.ukradon.org which allows visitors to input a postcode to obtain an estimate of the radon level for a specific property or piece of land. The website is constantly updated to give visitors the most up-to-date and accurate information, which may not be the case from a printed map.

It is important to remember that the online dataset and the printed maps are based upon estimates and data extrapolation, and so simply provide an 'educated guess' as to whether a property in a given location will suffer from high radon concentrations. A property could be affected by radon even when the maps

and dataset indicate otherwise. ProTen Services have found high levels of radon in several properties where neither the dataset nor the maps indicated that this was likely.

To Test is Best

Without carrying out a radon test, it is impossible to know whether a property contains high levels of the gas, as it cannot be seen or smelled.

To assess the level of radon in an existing building, a specialist passive detector must be placed in the property for a period of time, before being sent to a laboratory for analysis. As radon levels fluctuate according to seasonal and occupational variances (e.g. amount of ventilation through opening windows), a



External view of property with high radon levels successfully remediated by ProTen Services

three month period is recommended to take such inconsistencies into account. Short term (7 or 10 day) 'screening' tests are also available, and provide a good indication as to whether the property is likely to contain unacceptably high levels of the gas. These tests are ideal for use in the conveyancing process.

The results of the test are expressed in becquerels per cubic metre of air (Bq/m³). The Government has set an Action Level of 200 Bq/m³ as the point at which householders are advised to take remedial action to lower the concentration of the gas. Many believe that even this level is too high; an individual spending 8 hours per day in a building with a radon level of 200 Bq/m³ will, over the course of one year, receive the equivalent radiation dose to having 112 chest x-rays.

Mitigation Methods

Fortunately, lowering the radon concentration in a property is a relatively inexpensive and non-disruptive process.

Radon is drawn into buildings through a process called advection; the pressure inside a building is normally lower than outside, so gases from the soil are literally sucked in. Through the use of specially-calibrated positive pressure machines (often used to deal with condensation problems), this pressure difference can be altered and an undetectable 'pressure buffer' can be formed, preventing the gas from being drawn into the building.

In the absence of a proper understanding of the science of radon, well-intentioned but uninformed measures can make the problem worse, rather than better. Increasing ventilation, particularly through the use of extraction fans, can lower the pressure inside the building further, thus escalating the rate at which radon is drawn in and increasing its concentration. Extraction fans should not be used in an attempt to return radon – they will make the matter worse not better.

ProTen Services recently dealt with a domestic property, where a general contractor had originally been employed to reduce the radon level. ProTen Services

conducted a radon test, which revealed the property contained radon levels in excess of 2100 Bq/m³. (more than ten times the Action Level).



Radon detector



Internal views of a property with high radon levels successfully remediated by ProTen Service



Positive pressure loft unit



Inconspicuous ceiling vent

The non-specialist contractor had previously installed a ventilation system, which ProTen suspected to be exacerbating the problem. When the system was switched off, the radon level halved to 1100 Bq/m³. ProTen Services then designed a specialist positive pressure system to dispel the gas currently trapped inside the property and increase the pressure of the building, preventing any further gas infiltration. A post-remediation radon test revealed the level of radon in the property had been reduced to 63 Bq/m³.

This highlights not only the need to use a specialist contractor, but also the need for radon testing after remedial works have been carried out, as without this, it will be impossible to know if the actions have been effective or indeed detrimental.

When designed by a specialist, a radon mitigation system can also bring secondary benefits to a property, such as improved air quality, condensation reduction and cost-effective heat exchange.

Some newer houses may have a form of radon protection installed, such as a radon barrier (or membrane). It should not be assumed that, because the documentation states that the property has such protection inbuilt, the building is free from radon. A recent study found a staggering 60% of radon membranes installed in new properties had failed to prevent the gas from entering the building. Whilst this was a relatively small

study, it is nevertheless indicative of serious failure. If a membrane is to be successful, effective design, quality of materials and standard of specialist workmanship are paramount.

Unfortunately, Building Regulations in this area have been somewhat slack, and many radon barriers have been installed by untrained contractors, who are not aware of the significance of installing the barrier flawlessly. Post-construction testing is a crucial aspect of radon protection, to confirm that measures have been effective, yet inexplicably is not required under Building Regulations.

Dealing with radon, whether in existing buildings or during the construction phase of newbuilds, is a specialist area, which should therefore only be undertaken by specialist contractors.

With over 20 years experience in the field, ProTen Services Ltd are the nations leading radon remediation and newbuild experts, and are committed to raising awareness of the killer gas and the need to protect building occupants from it.

For more information, a copy of ProTen Services' radon protocol and advice for risk-averse property professionals, or to arrange a CPD seminar on the subject, please contact:

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