

# Radon protection for new dwellings

Chris Scivyer

The overall aim of this Good Building Guide is to give practical advice and guidance on the successful installation of radon-protective measures in new dwellings. It should be read in conjunction with BRE Report BR 211, *Radon: guidance on protective measures for new buildings*<sup>[1]</sup>. This Good Building Guide replaces the guidance published in 2008.

Two companion Good Building Guides<sup>[2,3]</sup> cover radon-protective measures for new domestic extensions and conservatories and new large buildings (eg workplaces).

## What is radon and why consider it for new dwellings?

Radon is a natural colourless, odourless, radioactive gas. It is formed by the radioactive decay of the small amounts of uranium that occur naturally in all rocks and soils. The gas can move through cracks and fissures in the subsoil and eventually to the atmosphere. Most of the radon will disperse harmlessly into the air outside, but some will pass from the ground and collect in spaces under or within buildings.

For most UK residents, radon accounts for half of the annual radiation dose received. Exposure to particularly high levels of radon may increase the risk of developing lung cancer. While it is recognised that the air inside every building contains radon, some buildings in certain defined areas of the UK might have unacceptably high concentrations unless precautions are taken. South-west England is of principal concern, but high concentrations of radon are also found in many other areas.

## Requirements for radon protection

Building regulations covering radon-protective measures for new dwellings in the UK were first introduced for south-west England in the late 1980s, for Derbyshire and Northamptonshire in the early 1990s and for the rest of England, Scotland and



**Figure 1:** Steps and staggers in construction make it difficult to provide a continuous radon barrier

Northern Ireland in the late 1990s. The gradual introduction of measures reflected the way in which the UK was mapped, targeting the worst-affected areas first.

Before the introduction of the requirements, BRE (funded by the Department of the Environment (DOE), which was the UK government department responsible at that time for radon-related issues) undertook an extensive series of field trials to demonstrate the effectiveness of the proposed protective measures. This was supported by a series of training seminars for architects, designers, developers, builders and building control officers. Most of the trials were undertaken in south-west England where DOE, through the National Radiological Protection Board (now Public Health England or PHE), was actively raising awareness of the risks of radon to householders through a major measurement programme. This meant that radon was in the news locally and it was seen as a new issue that the construction industry was willing, within reason, to deal with. The field trials proved successful and the requirements

## Good Building Guide

# Radon protection for new domestic extensions and conservatories with solid concrete ground floors

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The overall aim of this Good Building Guide is to give practical advice and guidance on the successful installation of radon-protective measures in new domestic extensions and conservatories with solid concrete ground floors. The guide will also help house owners and builders in radon-affected areas to assess whether protection is needed for a new extension or conservatory and to determine the level of protection that is required. It should be read in conjunction with BRE Report BR 211, *Radon: guidance on protective measures for new buildings*<sup>[1]</sup>. This Good Building Guide replaces the guidance published in 2008.

Two companion Good Building Guides<sup>[2, 3]</sup> cover radon-protective measures for new dwellings and new large buildings (eg workplaces).

## What is radon and why consider it for new extensions?

Radon is a natural colourless, odourless, radioactive gas. It is formed by the radioactive decay of the small amounts of uranium that occur naturally in all rocks and soils. The gas can move through cracks and fissures in the subsoil and eventually to the atmosphere. Most of the radon will disperse harmlessly into the outdoor air, but some will pass from the ground and collect in spaces under or within buildings.

For most UK residents, radon accounts for half of the annual radiation dose received. Exposure to particularly high levels of radon may increase the risk of developing lung cancer. While it is recognised that the air inside every building contains radon, some buildings in certain defined areas of the UK might have unacceptably high concentrations unless precautions are taken. South-west England is of principal concern, but high concentrations of radon are also found in many other areas.

Extending an existing house will increase the area of the building that is in contact with the ground. The larger the footprint, the more chance there is that radon will enter from the ground. By



Figure 1: A typical conservatory to an existing property

protecting the new extension this effect can be minimised. In addition, if both the existing house and the new extension have a solid concrete ground floor, a means of reducing the radon level across both the new and existing parts of the building can be provided by installing a sump beneath the extension. With careful design and construction, radon-protective measures can be included relatively easily and cost-effectively within new extensions.

## UK building regulations

This Good Building Guide supports building regulation guidance found in the following publications, which relate to specific UK regions:

- England: The Building Regulations 2010 (England). Approved Document C: Site preparation and resistance to contaminants and moisture<sup>[4]</sup>.
- Wales: The Building Regulations 2010 (Wales). Approved Document C: Site preparation and resistance to contaminants and moisture<sup>[5]</sup>.
- Scotland: The Building (Scotland) Regulations 2004. Technical Handbook: Domestic. Section 3: Environment<sup>[6]</sup>.

## Good Building Guide

## Radon protection for new large buildings

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The overall aim of this Good Building Guide is to give practical advice and guidance on the successful installation of radon-protective measures in new large buildings (eg workplaces). It should be read in conjunction with BRE Report BR 211, *Radon: guidance on protective measures for new buildings*<sup>[1]</sup>. This Good Building Guide replaces the guidance published in 2009.

Two companion Good Building Guides<sup>[2,3]</sup> cover radon-protective measures for new domestic extensions and conservatories and new dwellings.

## What is radon and why consider it for new large buildings?

Radon is a natural colourless, odourless, radioactive gas. It is formed by the radioactive decay of the small amounts of uranium that occur naturally in all rocks and soils. The gas can move through cracks and fissures in the subsoil and eventually to the atmosphere. Most of the radon will disperse harmlessly into the air outside, but some will pass from the ground and collect in spaces under or within buildings.

This Good Building Guide should be read in conjunction with the guidance contained in *Radon: guidance on protective measures for new buildings*

For most UK residents, radon accounts for half of the annual radiation dose received. Exposure to particularly high levels of radon may increase the risk of developing lung cancer. While it is recognised that the air inside every building contains radon, some buildings in certain defined areas of the UK might have unacceptably high concentrations unless precautions are taken. South-west England is of principal concern, but high concentrations of radon are also found in many other areas.



Figure 1: General view of a radon barrier laid over fill and sealed to columns

## Requirements for radon protection

### Building regulations

Building regulations covering radon-protective measures in the UK were first introduced for south-west England in the late 1980s, for Derbyshire and Northamptonshire in the early 1990s and for the rest of England, Scotland and Northern Ireland in the late 1990s. Initially, protective measures were only required in new dwellings, but more recently the requirements have been extended to include all building types, extensions, conversions and major alterations in areas affected by radon. The BRE guide *Radon: guidance on protective measures for new buildings* (BR 211)<sup>[1]</sup> was published as supporting guidance to the various UK regional building regulations<sup>[4, 5, 6, 7, 8]</sup>. This guide has been updated several times, with the latest edition due to be published in 2015.