



European Radon Solutions Database

Prepared by
: ERRICCA 2 *European Radon Research and Industry Collaboration Concerted Action*
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Existing Buildings

Case Study

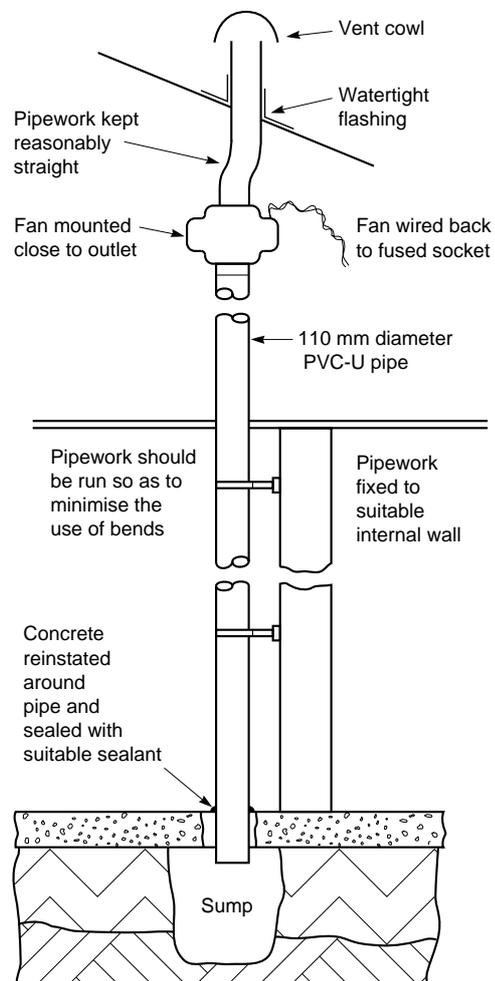
Sheet N°

UK/CS/002

Type Internal mini-sump system

Country United Kingdom

Illustration



Description



This property comprises a detached two bedroom bungalow located in Devon in Southwest England. Constructed with rendered concrete block work cavity walls and in-situ concrete ground floor. It was built in 1988 just prior to the requirements for radon protective measures being introduced.

This project resulted from a comparison study carried out by BRE looking at the effectiveness of radon protective measures in new dwellings. Although radon protective measures were not incorporated within this particular bungalow at the time of construction later houses on the same site were protected. These houses therefore offer a useful comparison for measurements taken in the protected houses.

Selection

At 2842 Bq/m^3 the radon level was relatively high for the UK. (It is estimated that there are only 1000 houses with radon levels exceeding 1500 Bq/m^3 in the UK.) Experience in the UK has shown that for radon levels exceeding $750\text{-}1000 \text{ Bq/m}^3$ and where the soil is capped – either by an in-situ concrete floor or suspended timber floor with concrete capping to the soil sub-slab depressurisation (sump system) provides the greatest reduction in indoor radon levels. This property was ideally suited to the installation of an internally excavated mini-sump system. As a consequence an internally excavated mini-sump system was installed. The sump (approximately $450 \times 450 \times 450 \text{ mm}$) was located beneath the floor of a storey height cupboard located centrally in the bungalow. Pipework from the sump was routed up to a fan in the roofspace and the exhaust taken out through the slope of the roof via a tile vent. The system was powered by a non-stalling 75 Watt centrifugal inline duct fan.

Pre-installation Diagnosis

A visual inspection was carried out and revealed no obvious excessive entry routes for radon. Site inspections carried out on adjacent properties during the construction phase had not revealed anything unusual. The fill used to make up levels prior to laying the concrete floor slab was known to be clean and therefore relatively permeable. No further measurement was deemed necessary.

Radon reduction achieved

Radon level before :

Living room	2987 Bq/m ³
Main bedroom	2724 Bq/m ³
Seasonally corrected annual average	2842 Bq/m ³

Radon level after :

	Test 1 (fan full speed)	Test 2 (fan half speed)
Living room	27 Bq/m ³	17 Bq/m ³
Main bedroom	26 Bq/m ³	22 Bq/m ³
Seasonally corrected annual average	34 Bq/m ³	21 Bq/m ³

As can be seen the sump system proved very effective in reducing the indoor radon level giving a reduction factor of 101.

Problems

Whilst the sump system proved very effective in reducing the indoor radon level the householder was not happy with the system. The householder contacted BRE shortly after the system installed and was running to complain about the noise. We visited the house to see what might be done to reduce the noise, but when we arrived we were surprised at how quiet the system was. In fact it appeared to us to be running far quieter than most of the systems we had seen elsewhere.

However on closer investigation it became apparent that the householder lives alone, in a very quiet environment. To compound the problem the extract pipe from the sump, which runs vertically up through the back of a cupboard in the entrance hall, had been rigidly fixed to a lightweight partition which separates the hall from the living room. It just so happens that the householder usually sits in the living room adjacent to the cupboard - just about the nearest point in the bungalow to the pipework

System enhancements

Some minor modifications were carried out to the system - disconnecting the pipework from the lightweight partitioning, replacing rigid fan couplings with flexible ones, and wrapping the loft mounted fan in insulation quilt. This helped to reduce noise to an acceptable level. In addition, as a trial the fan speed was reduced to half and the radon level re-measured. The result of this trial was interesting in that there was no real change in the radon level but a further reduction in noise was achieved. As a consequence the system has been left running at half speed.

Further Information

For further information contact Chris Scivyer : scivyer@bre.co.uk or by writing to BRE, Bucknalls Lane, Garston, Watford , Herts, UK.

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