Radon in Ireland

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What is Radon?

-Colourless, odourless, tasteless, radioactive gas
-Comes from uranium which is present in tiny quantities in all rocks and soil
-Radon is everywhere – outdoors radon is not a problem
-Can enter buildings from the ground through cracks and gaps and can build up to very high levels
How does radon build up in homes?
Why are high radon levels a problem?

- Group 1 carcinogen - same as tobacco and asbestos
- Forms particles that can lodge in the lung resulting in a radioactive dose
- 150-200 deaths annually (10-15%)
- 2nd cause of lung cancer after smoking
- Risk 25 times greater for smokers & ex-smokers
- 56% of total dose to average Irish person
What is the scale of the problem in Ireland?

- 11,319 homes measured 1992-1999
- Percentage of houses above 200 Bq/m³ predicted for each 10 km grid square
- Squares predicted to be above 10% are designated High Radon Areas
Results to date

• Almost 38,000 home measurements (RPII)
• National Radon Survey estimated 91,000 homes above 200 Bq/m$^3$
• So far almost 5,000 of those above 200 Bq/m$^3$ have been identified
• Key challenge is to persuade individuals to measure (4,000/year) and remediate
Measuring radon

• Two detectors posted to the home
• One placed in main bedroom and one in living room
• Left for three months and posted back for analysis
• Results posted back with advice
• Cost: €40 to €80
Measuring radon

Alpha etch-track detectors
(2 part polyporpylene holder)

CR-39 (poly allyl diglycol carbonate) detection plastic
High Radon Areas

“measures should be taken to protect the building from radon in the ground”

- a fully sealed membrane of low permeability over footprint of the building (radon barrier) and

- a potential means of extracting radon from the substructure (standby sump with connecting pipe work)

Other areas

“the building should be provided with a potential means of extracting radon from the substructure”

- standby sump with connecting pipe work
Radon barrier
Radon sump

A Typical External Sump

- Vent cowl
- Pipework cranked around eaves
- Pipework fixed back to brickwork
- uPVC pipework
- Condensate drain in end cap
- Electric fan unit
- Flexible ducting or cranked pipework
- Sealant
- Fan is wired back to a fused socket
Prevention and removal

### Figure 1
Guide to the Likely Effectiveness of Remediation Techniques*

<table>
<thead>
<tr>
<th>Type of Solution</th>
<th>Indoor Radon Concentration (Bq/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200 400 600 800 1000 1200 1400 1600 1800 2000</td>
</tr>
<tr>
<td>Sealing major gaps</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>Improve indoor ventilation</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>Increase natural underfloor</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>ventilation</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>Increase underfloor ventilation</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>with fan</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>Positive pressurisation</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>Passive sump</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
<tr>
<td>Fan-assisted sump</td>
<td><img src="#" alt="Red Bar" /> <img src="#" alt="Olive Bar" /></td>
</tr>
</tbody>
</table>

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Removal of radon

Better ventilation can reduce levels by up to 50%
For higher radon levels, a sump can reduce levels by up to 80%
Effectiveness of Building Regulations

Fig. 3 Arithmetic mean

- Ennis: 192 Bq/m³
- Tralee: 261 Bq/m³
- Kilkenny: 144 Bq/m³

Pre 1998
- Ennis: 192
- Tralee: 261
- Kilkenny: 144

1999-2002
- Ennis: 79
- Tralee: 180
- Kilkenny: 100

92-97
- Ennis: 180
- Tralee: 261
- Kilkenny: 144
Effectiveness of Building Regulations

Fig. 5 Percentage of homes > 200 Bq/m$^3$ measured vs. predicted

- Ennis: 28%
- Tralee: 45%
- Kilkenny: 11%

pre 1998
92-97
1999-02