



Radiological Protection Institute of Ireland

An Institiúid Éireannach um Chosaint Raideolaíoch

**ADVICE ON SETTING A REFERENCE LEVEL
FOR RADON CONCENTRATIONS IN LONG-
STAY INSTITUTIONS**



**Advice on
setting a reference level for a radon concentrations in long-stay institutions**

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1. Radon is a naturally occurring radioactive gas. Radon is formed in the ground by the radioactive decay of uranium, which is present in small quantities in all rocks and soils. Radon which surfaces in the open air is quickly diluted to harmless concentrations but when it enters an enclosed space, such as a building, it can sometimes build up to unacceptably high concentrations. Long term exposure to high radon concentrations increases the risk of lung cancer.
2. In 1990 the Government set a national Reference Level of 200 becquerels per cubic metre (Bq/m³)¹ for radon exposure in the home. Based on an assumed occupancy of 7000 hours per year, this equates to an annual radiation dose of 5 millisievert (mSv)².
3. The Reference Level for homes is advisory. It represents a level of risk similar to other everyday risks such as fatal accidents on the road or deaths from accidental falls. It is estimated that approximately 91,000 homes, representing 7% of the national housing stock, have radon concentrations in excess of the national Reference Level.
4. The Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000³ introduced legislation governing radon exposure in the workplace. Where the radon concentration in the workplace, integrated over any three-month period, exceeds 400 Bq/m³, the employer is required to assess whether or not remedial measures are required to reduce the concentrations present.
5. The Health and Safety Authority has stated that, in order to comply with health and safety legislation⁴, all indoor workplaces in High Radon Areas⁵ must be measured for radon. S.I. 125 of 2000 also empowers the RPII to direct employers to have radon measurements carried out.
6. The measurement of radon in workplaces is therefore subject to legislation and the workplace Reference Level of 400 Bq/m³ is legally enforceable. Based on an assumed workplace occupancy of 2000 hours per year, the Reference Level equates to an annual radiation dose of approximately 3 mSv.
7. While the majority of radon exposure situations are covered by the Reference Levels for homes and workplaces, there are some instances where much higher occupancy rates may apply. These include, but are not limited to, potentially long-stay institutions such as prisons, nursing homes

¹ The becquerel is the unit of radioactivity, equivalent to one radioactive disintegration per second

² The sievert is the unit of radiation dose. The millisievert is one thousandth part of a sievert.

³ Also known as Statutory Instrument 125 of 2000

⁴ Health and Safety at Work Act, 1989

⁵ High Radon Areas are those areas where the RPII has predicted that more than 10% of dwellings will have radon concentrations above 200 Bq/m³. See county maps on www.rpii.ie/radon

and live-in training centres. Such institutions are effectively workplaces for staff and homes for those who reside there.

8. Radon exposure in long-stay institutions has been considered by international organisations such as the International Commission on Radiological Protection (ICRP)⁶, the International Atomic Energy Agency (IAEA)⁷ and the European Commission (EC)⁸. Both the ICRP and the IAEA recommend that, in the interest of controlling radon exposures of the public, the Reference Level for homes should be applied. The EC recommends the adoption of a Reference Level lower than that for workplaces but falls short of recommending use of the Reference Level for homes.
9. A similar issue has previously arisen with regard to radon exposure in primary and secondary schools. Schools are workplaces for teachers but not for pupils. The RPII has taken the view that the same level of protection should be afforded to children in school as in the home and has advised the Department of Education and Science that the 200 Bq/m³ Reference Level for homes should apply to radon exposure in schools.
10. Taking all factors into account, the RPII advises that the 200 Bq/m³ Reference Level for homes should apply to those areas within long-stay institutions that are clearly used for residential purposes. In areas that are clearly workplaces and generally reserved for staff, the workplace Reference Level of 400 Bq/m³ is applicable. Where there is a doubt as to whether the area is residential or a workplace, it is recommended that the lower Reference Level of 200 Bq/m³ be applied.
11. This approach is consistent with international recommendations and with advice previously offered by the RPII in the specific case of radon exposure in schools.
12. While this Reference Level can only be advisory in nature, it is important that full account be taken of this advice in undertaking radon surveys⁹ and when considering the need for remedial measures to reduce radon concentrations.

⁶ Protection against Radon-222 at Home and at Work (ICRP Publication 65)

⁷ Radiation Protection against radon in Workplaces other than Mines (Safety Report Series No. 33)

⁸ Recommendations for the Implementation of Title VII of the European Basic Safety Standards Directive (BSS) concerning Significant Increase in Exposure due to Natural Radiation Sources (Radiation Protection Report 88)

⁹ Planning Radon Surveys in Workplaces. Guidance Notes (available on www.rpii.ie/radon)



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Mission Statement

“To protect people from the harmful effects of ionising radiation, both natural and man-made, through effective regulation, monitoring of the environment and the provision of accurate and timely advice to the public and to Government”

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