

RADON ($> 200 \text{ Bq/m}^3$) IN BUILDINGS

-from a Swedish point of view-

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**II ERA WORKSHOP
Prague, 15th September 2014**

Independia Group

- Founded in 1996 *“Working to improve indoor environment”*
- Long term measurements Radon
- Short term measurements Radon
- Operational in “Energy performance certificates”. Government controlled certificates.
- Investigating approx. 1 200 annually (one family homes) Radon
- Investigating approx. 150 annually (apartment buildings) Radon
- Investigating approx. 50 – 70 (schools and commercial buildings) Radon
- Performing annually around 600 – 700 mitigating actions to decrease increased levels of radon.

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Issues to consider when performing mitigation actions to lower increased level of radon in dwellings!

- To actually enjoy a satisfying result radon wise?
- To being able to perform cost efficient solutions?
- To being able to perform energy efficient solutions?
- Directive 2002/91/CE, Directive 2010/31/31UE, Directive 2012/27/UE. i.e. "Energy performance certificate".
- Mechanical ventilation?
- One family household houses vs apartment building; cost/energy effectiveness? Doable?

How to enjoy a satisfying result radon wise according to Swedish standards!

- Long term measurement during “heating season”. SWEDAC controlled.
- $> 200 \text{ Bq/m}^3$ = Physical inspection on site. Determining source of radon (water, soil, building materials or a combined source).
- One family houses receives a grant from government to decrease the levels. Government environment goal reaches to 2020 = all buildings in SE $< 200 \text{ Bq/m}^3$
- Commercial buildings is forced to take actions if $> 200 \text{ Bq/m}^3$. if neglected owners risk substantial penalties. Goal all buildings in SE $< 200 \text{ Bq/m}^3$!
- At present Swedish National Board of Housing consider launching a campaign to raise awareness in the general public. This will most likely have a major impact on the volume of people measuring.
- In Sweden mitigation actions varies due to our issue of radon from our building material. We tend to work with ventilation actions rather than sealing. This could have a negative impact on the energy consumption if performed in a incorrect manner.
- After taken actions towards decreasing the Radon level; always verify by measuring.

To being able to perform cost efficient solutions?

Installation cost varies depending on source of radon

From the ground? From Building materials? From household water, a combination of above? From € 150 up to € 20 000 one family house, whereas apartment building “*the sky could be the limit*”. The worst case scenario the cost by far exceeds the market value of the building.

Not just installation cost is essential, also consider:

Durability is a key factor, i.e. the installation has to work for a substantial period of time.

Consider maintenance? How often, to what cost and this is especially of importance when discussing apartment buildings, due to often high costs.

Being able to perform energy efficient solutions

Why is energy something for radon investigators to consider?

(except for moral and ethical reasons that is)

Energy performance certificate

Directive 2002/91/CE, Directive 2010/31/31UE, Directive 2012/27/UE.

These environmental targets set out how we will try to reduce our energy consumption both in terms of per person as well as per household.

When executing an “Energy performance certificate” in Sweden one has to state whether radon has been measured or not. This gives a hint of todays performance and also possible to follow up when actions towards decreasing radon is performed.

Aspects to consider

- Mechanical outlet combined with fresh air inlets creates an non- pre heated airflow indoor, which leads to increased heating costs. Take into consideration that in some parts of Sweden temperature often exceed -20 below zero.
- Mechanical outlet and mechanical inlet with heat exchanger is preferably.
- Geothermal heating pump. Air/water heating pump. Air/air heating pump.
- Tradition with supplementary isolated houses with no mechanical ventilation.

Mechanical ventilation

There are different types of ventilation systems, with different types of pros and cons (*pro et contra i.e. for and against*)?

Mechanical outlet

- PRO** Relatively cheap installation
- CON** Risk of creating under pressure; i.e. risk of $> \text{Bq/m}^3$
- CON** Risk of fresh air inlet; risk of increased heating costs

Mechanical outlet with fresh air inlets

- PRO** Relatively cheap installation
- CON** Risk of creating under pressure; i.e. risk of $> \text{Bq/m}^3$
- CON** Risk of fresh air inlet; risk of increased heating costs

Mechanical outlet with Mechanical inlet combined with heat exchanger

- CON** Relatively expensive installation
- PRO** Minimum risk of under pressure if installed correct
- PRO** Heat recovery which helps energy costs on a reasonable level
- PRO** Minimum risk of failing in decreasing the radon level

Mechanical ventilation in crawling spaces

N.B. Be aware of risk of creating a damp environment

Villas vs. apartments

There are some major differences in taking care of the radon issue in apartments vs one family houses.

- Apartments; Often old houses in need of major overhaul, is radon therefore priority number one?
- Apartments; Access and approval for all attendants, not always easy (time consuming)
- Apartments; Lack of vacancies therefore there is low degree of incentive for private owned apartment buildings to actually solve the problem. The only really incentive is the risk of government penalty
- Apartments and Villas; Owner of both theses categories are aware of the risk of reduction of market value if no action to decrease radon is taken.
- Apartments and Villas; In Sweden, people in general is afraid of radon for health- and for market value reasons.

Work shop – Conflicts between energy, radon, costs and governmental regulations and recommendations?

- Identify further conflicts regarding energy effectiveness and radon prevention?
- What is in the common public prioritized, radon or energy consumption?
- Governmental regulations regarding not energy effective ventilation systems?
- What actions should be taken to further arise general awareness regarding issues concerning radon actions in correlation to energy effectiveness?
- Is there a mechanical ventilation system on the global market today, that do not creates a risk of to high under pressure, that also do not increase energy costs, and above all, affordable in apartment buildings?

Thank you for listening