

Nordic Society for Radiation Protection  
Ålesund 26-30.5.2008

## New indoor radon mitigation guides in Finland

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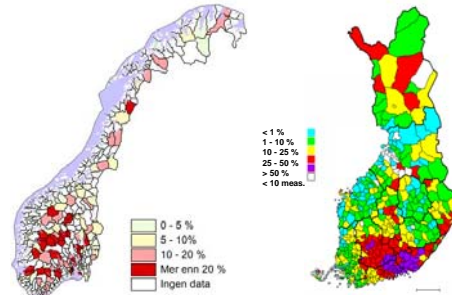


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## Radon in Finland - and Norway

percentage > 200 Bq/m<sup>3</sup>, non-representative survey data  
wide areas where 200 Bq/m<sup>3</sup> is exceeded

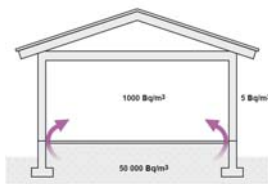


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### Key problem

- flow of radon bearing air from soil into living spaces
- more than 90% of houses are today built using slab-on-grade (platta på marken) which promotes these flows



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### Tampere Pispala

Hill-side houses on gravel eskers  
- increased inflow from soil

### Ålesund Norway

Hill-side houses  
Radon concentration ??



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### Tampere city, Pispala

Slope environment and coarse gravel sets strict requirements for

- radon mitigation
- radon safe new building



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### Apartments

- in the lowest floor need mitigation like single family houses
- risk condition: floor slab in ground contact
- depressure levels high, mechanical exhaust



- but probably not in this case

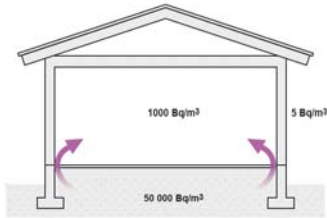
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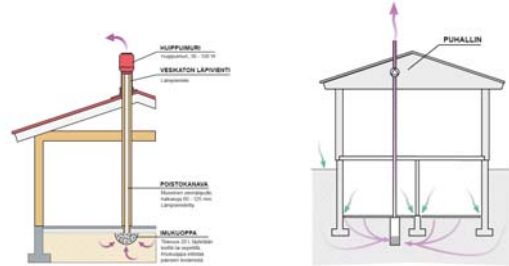
### Indoor radon mitigation

**Key aim:**  
reduction of the flow of radon bearing air from soil into living spaces



### Sub-slab depressurization

- typical reduction factor 70 - 90%  
- deep suction pit (right) improves the air flow extension



### Sub-slab depressurization

- guidance for choosing the locations of suction pits  
- load bearing wall, two suction pits or one deep suction pit required



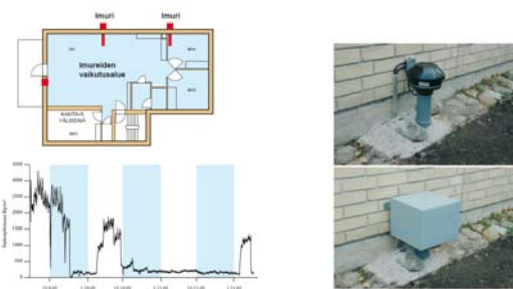
### Sub-slab depressurization, SSD

- practical work instructions for suction pits



### Apartment, sub-slab suction through foundation wall

- two exhaust fans, before 2500 Bq/m³, after below 200 Bq/m³  
- Installation of fresh air vents



### Radon well

- typical reduction factor 70-90%  
- effective to a distance of 20 m ( 50 m ? )  
- decreases soil air radon concentration



## Radon well

- construction, guidance for builders, examples



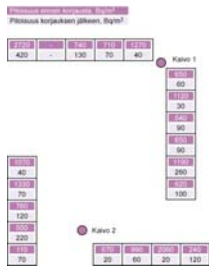
## Radon well



- thermally insulated exhaust ducts

## Radon well

- case study, two radon wells, 20 dwellings  
- average reduction 88 %



## Radon reduction, ventilation based methods

- typically 10 - 40 %  
- best results when original air exchange rate low



• depressure level plays an important role

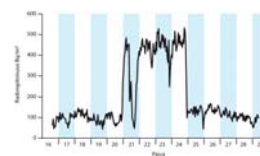
• installation of fresh air vents reduces depressure and radon concentration, however seldom >50%

## Testing of depressure through a gap of window



## Abnormal high effect of fresh air vents

- single family house, mechanical exhaust ventilation  
- exhaust fan coupled to subfloor radon piping



	Fresh air vents open	Fresh air vents closed
Depressure Pa	11	27
Radon Bq/m³	450	100

## Radon reduction, sealing entry routes

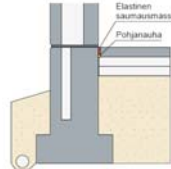
- typically 10 - 50 %
- SSD in most cases a better choice
- porous light weight blocks make the work more difficult or practically impossible



- expensive warranty repair
- comprehensive sealing of floor gaps
- the residents were in a hotel for two weeks
- prevention during construction failed

## Radon reduction, sealing entry routes

- the gaps must be widened and cleaned
- use right elastic sealants by a right way



## Finally

- the STUK guide will be translated also in Swedish
- we will appreciate getting comments and proposals for improvements

[www.stuk.fi](http://www.stuk.fi) [www.radon.fi](http://www.radon.fi)