

Experiment with SPS Radon Block – lubrication membrane.

Case no.:
2018-0256-10

Given:
June 13, 2019

Radon measurement and evaluation of the effect of lubrication membrane. The radon measurements were carried out with closed trace film dosimeters, which were set up and taken down by DMR A/S.

Purpose

The purpose of the measurements is to know the radon level in the building before and after remediation with a lubrication membrane.

Brief information about radon

The radioactive noble gas radon is found naturally in air, water and soil. Radon in homes mainly originates from the soil layers under and around the houses, and finds its way into the houses via cracks and fissures around the floor, foundations and penetrations for installations.

Radon is measured in the unit [Bq/m³]. Current building regulations describe for existing buildings that:

For existing buildings built before 2010, the Danish Transport, Building and Housing Authority recommends that for buildings where people stay, simple and inexpensive improvements are implemented when radon-

the content is between 100 Bq/m³ and 200 Bq/m³, and that more effective improvements are implemented when the radon content exceeds 200 Bq/m³.

The most accurate measurements are obtained in the heating season between 1 October and 1 May, when the heating creates a negative pressure in the home and where, according to experience, ventilation is less.

Project description

First measurement round

Initially, the radon level is measured in the home's living room, in basement and ground floor.

Cf. results below, the radon level is significantly above the recommended upper limit of 100 Bq/m³.

Results: Initial measurement - before correction.

Gauge no.	Measurement location	Floor	Concentration (i Bq/m ³)	Note	Measurement period	
					Start	Final
2464	Living room	St.	304	Open door	20-03-2018	04-05-2018
2479	Bedroom	St.	328	Open door	20-03-2018	04-05-2018
2909	Children's room	St.	308	Open door	20-03-2018	04-05-2018
2460	Room 1	Cld.	443	Open door	20-03-2018	04-05-2018
2406	Room 2	Cld.	332	Open door	20-03-2018	04-05-2018

Average in the ground floor (living room, bedroom and children's room) = 313 Bq/m³ Average in the basement (room 1 & 2) = 388 Bq/m³ The basement is arranged as indicated on the floor plans below. The area with the bathroom and utility room has recently been renovated by excavating the floors, laying new insulation and establishing a new concrete deck with tiling. It is ours

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immediate assessment that the new construction is acceptably secured against radon penetration, and the area is therefore not treated with a lubrication membrane.

Other areas (rooms 1 and 2) are treated with lubrication membrane - SPS Radon Block, and the work was carried out by Tim Warner from TWO Teknik - see floor plan and photos.

Second measuring round

After finishing the repair with a lubrication membrane, new measurements were made over the 1 and 2 months.

The results are as stated below.

Results: Measurement after correction with lubrication membrane. Short-term measurement of approx. 1 month.

Gauge no.	Measurement location	Floor	Concentration (in Bq/m ³)	Remark	Measurement period	
					Start	Final
3138	Living room	st.	317	Open door	02/10/2018	04/11/2018
3145	Bedroom	st.	290	Open door	02/10/2018	04/11/2018
3072	Children's room	st.	286	Open door	02/10/2018	04/11/2018
3054	Room 1	cld.	231	Open door	02/10/2018	04/11/2018
3208	Room 2	cld.	228	Open door	02/10/2018	04/11/2018

Average in the ground floor (living room, bedroom and children's room) =

298 Bq/m³ Average in the basement (room 1 & 2) = 230 Bq/m³

Results: Measurement after correction with lubrication membrane. Measurement of approx. 2 months

Gauge no.	Measurement location	Floor	Concentration (in Bq/m ³)	Remark	Measurement period	
					Start	Final
3251	Living room	st.	308	Open door	02/10/2018	03/12/2018
3146	Bedroom	st.	266	Open door	02/10/2018	03/12/2018
3172	Children's room	st.	302	Open door	02/10/2018	03/12/2018
3101	Room 1	cld.	221	Open door	02/10/2018	03/12/2018
3053	Room 2	cld.	201	Open door	02/10/2018	03/12/2018

Average in the ground floor (living room, bedroom and children's room) =

292 Bq/m³ Average in the basement (room 1 & 2) = 211 Bq/m³

The conclusion of the measurement round is that the radon level in the basement has been reduced by approx. 43% and there has been a reduction in the ground floor by only approx. 6%.

The results indicate that the ground floor is significantly exposed to radon from other penetration routes than the direct air exchange between the basement and ground floor.

Third measuring round

For a closer examination of the effect of the lubrication membrane itself, new measurements have been made, where the doors to the rooms in the basement (room 1 and 2) have been closed during the measurement period.

If there are significant penetration points for radon in or room 1 or 2, it must be expected that the radon level in the measurement round will rise, as the rooms are without usual and daily ventilation and the radon level will thus accumulate and give an elevated result.

On the other hand, it is our expectation that if the most important penetration routes are eliminated, the radon level will fall, even if the rooms are not routinely and daily ventilated.

The results are as below.

**Results: Measurement after correction with lubrication membrane.
Doors to room 1 and 2 kept closed.**

Gauge no.	Measurement location	Floor	Concentration (in Bq/m ³)	Remark	Measurement period	
					Start	Final
3259	Living room	St.	418	Open door	03/12/2018	05/01/2019
3289	Bedroom	St.	381	Open door	03/12/2018	05/01/2019
3271	Children's room	St.	351	Open door	03/12/2018	05/01/2019
3257	Room 1	Cld.	183	Closed door	03/12/2018	05/01/2019
3297	Room 2	Cld.	157	Closed door	03/12/2018	05/01/2019
3426	Utility room	Cld.	347	Open door	03/12/2018	05/01/2019
3377	Bathroom	Cld.	273	Open door	03/12/2018	05/01/2019
3370	Cabinet with well	Cld.	352	Open door	03/12/2018	05/01/2019

Average in ground floor (living room, bedroom and children's room) = 383

Bq/m³ Average in basement (room 1 & 2) = 170 Bq/m³

It should be noted at the outset that the measuring round was carried out in a colder period than the other measuring rounds, which is expected to give a naturally higher radon level. Looking at the measurement results from the ground floor alone, a seasonal increase in the radon level of approx. 30%.

In the two rooms in the basement, there is a reduction in the radon level compared to the second measurement round of approx. 20%, to which must be added the fact that the rooms have not been ventilated during the measurement period, and that the seasonal Conditional radon level has increased by approx. 30% in the same period.

Conclusion

There has been a reduction in the radon level of just over 50% in rooms 1 and 2 in the basement, after improvement with a lubrication membrane. The actual reduction is estimated to be higher, as the rooms are exposed to radon from adjacent rooms after the improvements, as the third round of measurements indicates.

The radon level on the ground floor, in living room, bedroom and children's room, according to the measurement results, are unaffected by measures to reduce radon with a lubrication membrane in the basement. This indicates that the primary radon penetration to the ground floor does not go via the rooms in the basement, but has its origin elsewhere.

Dansk Miljørådgivning A/S

Project manager



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Quality control



Claus Larsen Quality
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Measurement laboratory

The measuring laboratory Track Analysis Systems Ltd (TASL) has undertaken the delivery and analysis of the radon dosimeters used. Their address is: Napier House, Meadow Grove, Shirehampton, BS11 9PJ, Bristol, United Kingdom.

Photos



#1 Floor is cleaned and sanded if necessary before edges are sealed with a brush.



#2 SPS Radon block is applied to the floor surfaces with a roller.



#3 After approx. 24 hours, the membrane is cured and the floor can be further treated.



#4 Terrain tires i crawl space able to be treated accordingly.



#5 Crawl space - larger cracks are sealed with suitable sealant.



#6 Crawl space - larger cracks are sealed with suitable sealant.



Floor plans Shaded areas are treated with lubrication membrane - SPS Radon Block

