European Radon Solutions Database

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Existing Buildings

Case Study

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Type	**SUB-SLAB DEPRESSURIZATION BASED ON PERFORATED TUBES DRILLED FROM INTERNAL CHASE**
Country	Czech Republic

Illustration

Front view of a house

Chase excavated in the entrance hall served for drilling of perforated tubes into the sub-floor layers under the adjacent rooms. Horizontal PVC-U pipe connects the drilled tubes to the vertical exhaust from flexible rustless pipe, which is inserted into a free flue.

Vertical exhaust pipe ends with a roof fan above the chimney.

Description

Radon remedial measure was installed into a house, which was built around 1925. The external dimensions of the house are 12,0 x 9,0 m. Brick bearing walls have the thickness from 300 to 450 mm. The house has no cellar. The ground floor of the house contains four habitable rooms: kitchen, living room, bedroom and room for children. In all rooms the floors are made of in-situ concrete. In the attic there are two more bedrooms.

The soil ventilation system consists of four perforated tubes that were drilled from the chase excavated in the entrance hall into the sub-floor layers beneath the adjacent habitable rooms (each tube beneath one room). Horizontal PVC-U pipe connects the drilled tubes to the vertical exhaust from flexible rustless pipe. Vertical exhaust pipe is inserted into a free flue and ends with a roof fan above the chimney.

Selection

Simple sump system is not suitable for this house, because internal foundations divide the underfloor space into four compartments. A possible alternative could be a multi sump system, however we have preferred the system based on perforated pipes, because it is more efficient in decreasing of the moisture content in damp walls.

Pre-installation Diagnosis

Parameters of the soil around the house:

Third quartile of radon concentration in the soil gas (obtained from 15 measurements around the house from the depth 0,8 m)	146 kBq/m^3
Mean permeability of the soil around the house	high
Radon risk category of foundation soils	high

Changes of radon concentration and of soil permeability with depth:

Depth (m)	Soil gas radon concentration (kBq/m^3)	Soil permeability (m^2)
0,50	78	$> 1{,}0.10^{-11}$
0,90	137	$> 1{,}0.10^{-11}$
1,20	219	$4{,}2.10^{-12}$
1,50	233	$1{,}0.10^{-13}$

Permeability of the sub-floor layer and radon concentration in the sub-floor layer:

Sub-floor layer beneath:	Permeability (m^2)	Radon concentration (kBq/m^3)	
		before remediation	after remediation
Bedroom	$> 1{,}0.10^{-11}$	76,6	1,7
Living room	$3{,}9.10^{-12}$	146	8,9

Radon reduction achieved

Radon concentration before remediation has been measured by track detectors with the exposition time of one year. Radon concentration after remediation has been measured by one-week measurements.

Room	Radon concentration (Bq/m^3)		Effectiveness (%)
	Before remediation	After remediation	
Kitchen	922	156	83
Living room	1006	83	92
Bedroom	1254	96	92
Room for children	2746	87	97

Radon concentration has decreased in all rooms below the action level 400 Bq/m^3. The effectiveness of the system varies in different rooms between 83 and 97 %, which means that indoor concentration decreases to 17 % up to 3 % of the initial values.

Problems

No problems occurred during installation.

System enhancements

To minimise negative effects of the soil ventilation the fan is switched to intermittent operation. Operating periods are adjusted according to continuous measurements of indoor radon concentration.

Further Information

For further information contact Martin Jiránek: jiranek@fsv.cvut.cz, or by writing to:
ČVUT, fakulta stavební, Thákurova 7, 166 29 Praha 6, Czech Republic

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