European Radon Solutions Database

Prepared by

: ERRICCA 2 *European Radon Research and Industry Collaboration Concerted Action*

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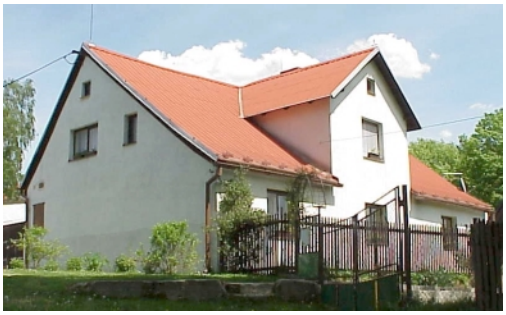
Existing Buildings

Case Study

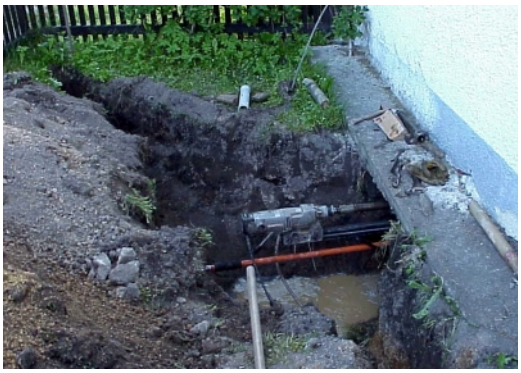
Sheet N° CZ/CS/03

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

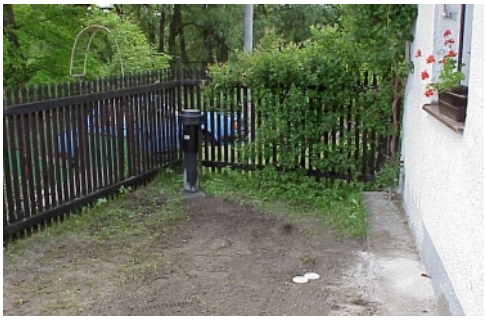
Illustration



Front view of a house



Drilling of perforated tubes into the sub-floor layer from the chase excavated along one side of the house. The chase continues to the corner of the garden, where the fan will be located.



Fan located at the corner of the garden, well away from the nearest window.

Description

Radon remedial measure was installed into a house, which was built approximately 130 years ago. The external dimensions of the house are 15,5 x 8,5 m. Brick and stone bearing walls have the thickness from 300 to 700 mm. The house has no cellar. The ground floor of the house contains three habitable rooms: kitchen, dining room and living room. In all rooms the floors are made of in-situ concrete. In the attic there are three bedrooms.

The soil ventilation system consists of three perforated tubes that were drilled from the external chase excavated along one side of the house into the sub-floor layers beneath the habitable rooms (each tube beneath one room). Horizontal PVC-U pipe connects the drilled tubes to the fan that is located at the corner of the garden.

Selection

Simple sump system is not suitable for this house, because internal foundations divide the underfloor space into five 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)	205 kBq/m^3
Mean permeability of the soil around the house at the depth 0,8 m	high
Radon risk category of foundation soils	high

Changes of soil permeability with depth:

Depth (m)	Soil permeability (m^2)
0,50	$2{,}7.10^{-13}$
0,90	$> 1{,}0.10^{-11}$
1,20	$8{,}4.10^{-12}$
1,50	$6{,}8.10^{-12}$

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
Kitchen	$5{,}0.10^{-12}$	213	8,8
Living room	$> 1{,}0.10^{-11}$	47,2	1,2

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	1872	280	85
Living room	4702	385	92
Dining room	2476	350	86

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 85 and 92 %, which means that indoor concentration decreases to 15 % up to 8 % 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

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