

RADON DIFFUSION COEFFICIENT IN RADON-PROOF MEMBRANES — DETERMINATION AND APPLICABILITY FOR THE DESIGN OF RADON BARRIERS

Martin Jiránek

Czech Technical University in Prague, Faculty of Civil Engineering, Tháková 7, 166 29 Praha 6
Czech Republic

Jiří Hůlka

National Radiation Protection Institute, Šrobárova 48, 100 00 Praha 10, Czech Republic

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ABSTRACT

The selection of effective radon-proof insulation from the total amount of tanking materials is very difficult due to the lack of information about radon diffusion through these materials and the absence of general guidelines for the design of radon barriers. This report describes a method for radon diffusion coefficients determination used in the Czech Republic. Results of radon diffusion coefficients measurements in more than 80 insulating materials are summarized. We have found that great differences exist in diffusion properties. The diffusion coefficients vary within four orders from $10^{-13} \text{ m}^2 \text{ s}^{-1}$ to $10^{-16} \text{ m}^2 \text{ s}^{-1}$. A methodological approach is proposed in order to identify the minimal thickness of radon-proof membranes in dependence on the radon diffusion coefficient in the insulation, radon concentration in the soil and building characteristics. General guidelines for selection of radon-proof insulation and the principles of application are presented.

1. DETERMINATION OF RADON DIFFUSION COEFFICIENT

1.1 Description of the Measuring Method

Determination of radon diffusion coefficients is based on the measurement of the radon flux through the tested material placed between two cylindrical containers (volume 1 – 2 litres). The lower container is connected to the radon source commercially made in the Czech Republic (type RF-2000 containing a special highly emanating Ra-226 compound, activity of 2 MBq) that creates the radon concentration of approximately 100 MBq m^{-3} within this container. Radon may diffuse through the tested material to the upper container that is

permanently ventilated. The system is assumed to be in the steady state after reaching a time much longer than the "relaxation time". In this time the upper container is closed and the growth of radon concentration in it is measured by means of extraction of air samples and introducing them into the Lucas cells. Extraction is provided in the interval of 10 - 15 minutes. Lucas cells are used also for the measurement of radon concentration in the lower container. While in the lower container the radon concentration is typically 100 MBq m^{-3} , in the upper one the typical concentrations within the first hour are in the range 1 - 100 kBq m^{-3} . The whole measurement is made under room temperature. Measuring appliance is shown in Fig. 1.

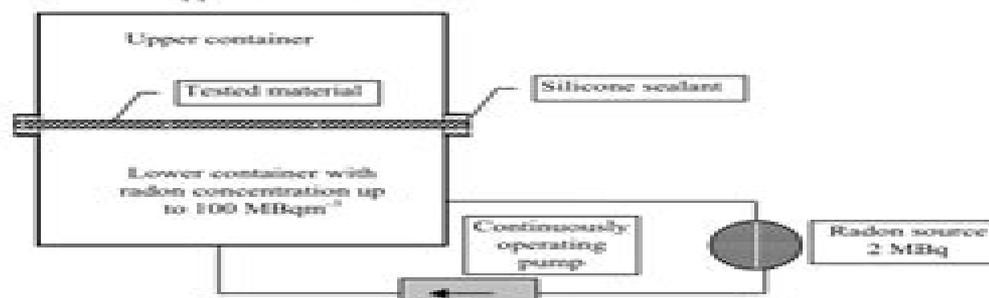


Fig. 1: Arrangement of the measuring appliance

Radon Diffusion Coefficient In Radon Proof Membranes

JR Anderson



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