REPORT

issued by an Accredited Testing Laboratory

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Date	Reference	Page
2018-05-28	8P04852	1 (2)

KA Building Products
Fir Tree Cottage
Wheal Rose
SCORRIER, REDRUTH,
CORNWALL TR16 5DF
Storbritannien

Determination of radon transmittance

(2 appendices)

Work requested

RISE was requested to measure the radon transmittance through a membrane in accordance with SP Method no. 3873.

The material sample

The client delivered their product which was named KA Tanking Slurry to RISE Research Institute of Sweden on 2018-02-16. There were no signs of visible damage to the material on arrival. The material thickness was 25.9 mm measured by RISE according to SS-EN 823:2013. The material was tested without joints. See Appendix 2 for a picture of the material.

Method of testing

Radon transmittance was tested in accordance with SP Method no. 3873. The material was mounted between two stainless steel boxes, the lower of which (the source box) contained a radon source. The perimeter was sealed very carefully, in order to ensure gas-tight joints between the boxes and the material, and also between the boxes themselves. The radon concentrations on each side of the test material was measured using an Atmos 33 instrument.

Results

Material	Thickness (average) *d*, m	Radon transmittance *P*, m/s	Radon permeability k, m^2/s	Radon resistance *Z*, s/m
KA Tanking Slurry	0.0259	$1.9 \cdot 10^{-8}$	$4.9 \cdot 10^{-10}$	$5.3 \cdot 10^{7}$

Note that the test results shown above apply only to the particular sample of material that was tested. Detailed results, including uncertainty of measurement, are given in Appendix 1.

Accred. No. 1002
Testing
ISO/IEC 17025

RISE Research Institutes of Sweden AB
Building Technology - Building Physics and Indoor Environment

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Appendices

Test results

Photographs of the tested material

Appendix 1

Test results

Client KA Building Products

Sample for testing KA Tanking Slurry

Date of testing 2018-04-19 – 2018-04-26

Test data
Free volume, source box, V_1: 0.027 m^3
Free volume receiver box, V_2: 0.026 m^3
Total free volume, V: 0.053 m^3

Equipment Atmos 33 (SP no. 202266) for measurement of Polonium-218 concentration. Most recently calibrated 2018-02-03, by Swedish Radiation Safety Authority

Radon source Lightweight concrete emitting Radium Rn-222, with Po-218 as the first decay product.

Ambient temperature 23 ± 3 °C

Ambient RH 50 ± 10 %

Uncertainty of measurement The increased uncertainty of measurement was estimated as ± 21 %, including a coverage factor of k = 2. Uncertainty of measurement for temperature was ± 2 °C, and that for relative humidity was ± 5 % in the test chamber.

Observation No changes in the test material were observed during the tests.

Miscellaneous The test results given in this report relate only to the particular samples of material that were tested.

The following results have been calculated under the conditions as shown in the table below:

Material, name	KA Tanking Slurry
Radon transmittance P, m/s	$1.9 \cdot 10^{-8}$
Radon resistance Z, s/m	$5.3 \cdot 10^{7}$
Radon permeability k, m^2/s	$4.9 \cdot 10^{-10}$
Effective radon sink λ_1 , s^{-1}	$3.7 \cdot 10^{-6}$
Radon exhalation Φ, Bq/s	$2.7 \cdot 10^{-3}$
Exposed area of test material A, m^2	0.25
Thickness of test material d, m	0.0259
Radon concentration at start $C_{0,}$ Bq/m	14

Appendix 1

Theory

Emission of radon from the radon source results in an increase of radon concentration in the source box, leading to a difference in concentration between the source box and the receiver box. This difference causes a flow of radon by diffusion through the test material. Only radon gas (Rn) passes through, and not its decay products (RnD). Radon transmittance is measured by measuring the change in radon concentration on both sides of the test material. Figures 1 and 2 show how the radon concentrations build up in the two boxes.

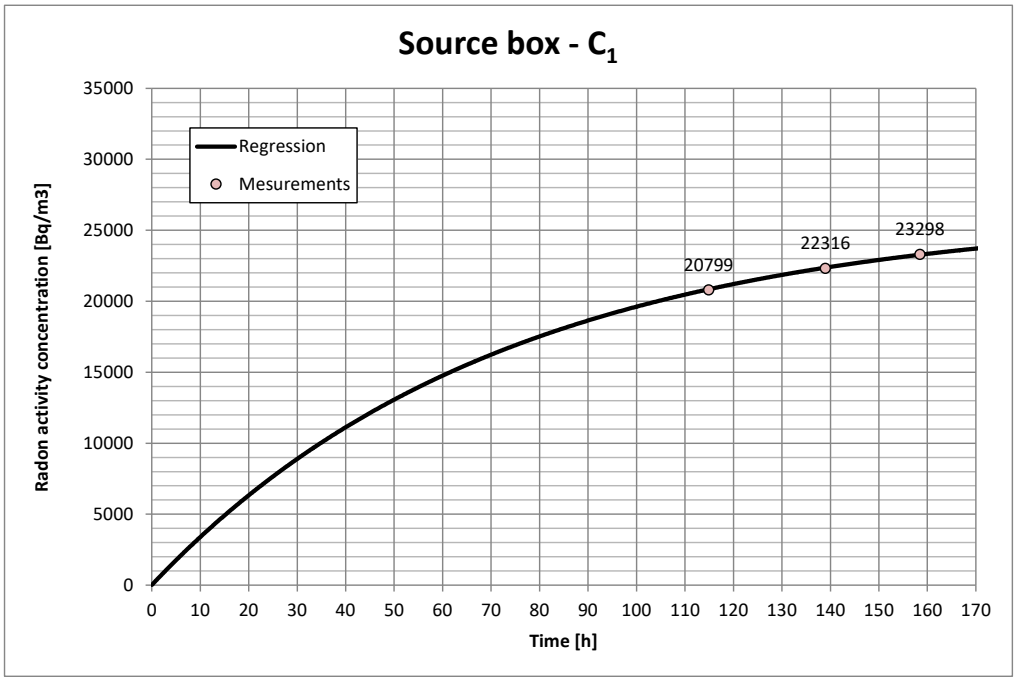

Figure 1 Radon concentration in the primary box: measured daily average values and the regression curve.

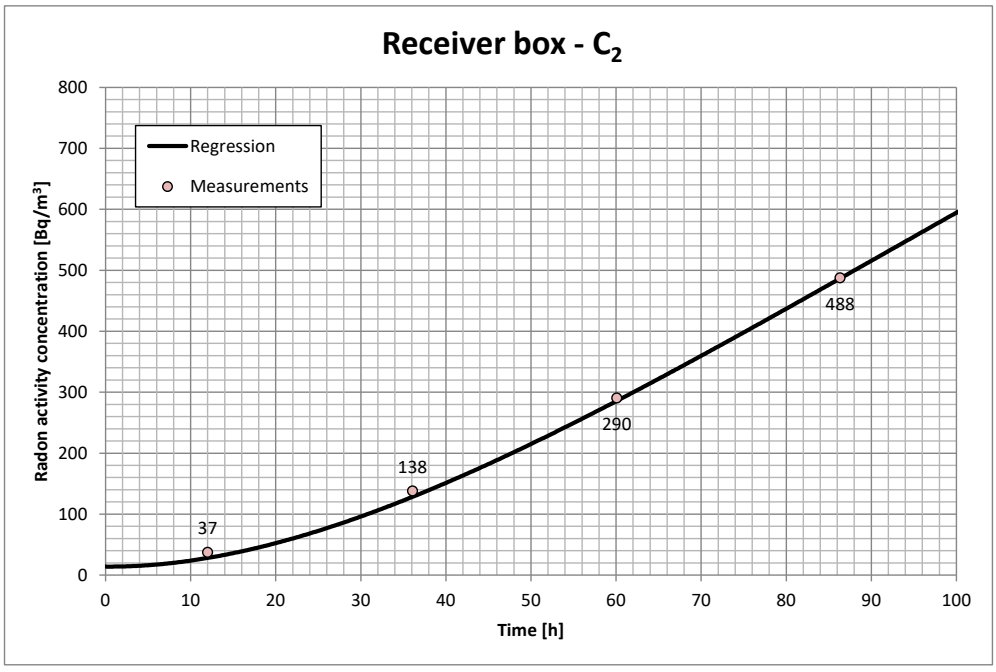

Figure 2 Radon concentration in the secondary box: measured daily average values and the regression curve.

For test specimens made of homogenous materials radon permeability can be determined

$$k = \frac{d}{Z} = P \cdot d$$

where k = radon permeability (m^2/s)
d = test specimen thickness (m)

Thickness measurement

The test specimen was used to measure thickness of the material according to SS-EN 823:2013.

Appendix 2

Photographs of the tested material

KA Tanking Slurry