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**Report on the Radon Diffusion of  
ALUTRIX Sealing Foil**

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## 1. General notes

On 10/11/2005, BLEI-INSTITUT GmbH received sample of ALUTRIX sealing foil from Mr. Sochor (PHOENIX Dichtungstechnik GmbH). The sample was to be examined for diffusion of radon radiation in a laboratory test. The ALUTRIX sample (thickness  $d=1.0$  mm) received on 10/11/2005, was examined for diffusion of radon radiation in a 2-chamber system by means of electronic radon monitors in the period from 11-23/11/2005. The test was carried out and the analytical results evaluated on the basis of known standard data (e.g., Radon-Handbuch Deutschland, 2002; Radongeschütztes Bauen, 1994; Keller/Hoffmann, 1998), according to which a material is „radon tight“ if the measured diffusion length,  $L$ , is not larger than the third part of the thickness of the material,  $d$ . „Radon tight“ materials of marketable thickness (e. g., 2.0 mm) are quoted to have diffusion length,  $L$ , of less than 0.67 mm for radon-222, which accounts for diffusion coefficients ( $D=\lambda \cdot L^2$ ) of less than  $10^{-12}$  m<sup>2</sup>/s. Dimension  $\lambda=2.10014 \cdot 10^{-6}$  s<sup>-1</sup> in this connection is in relation to the decomposition constant of radon-222.

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**Test object:** **BI-25405-01:** ALUTRIX sealing web  
thickness:  $d=1.0$  mm

**Test method:** The foil sample was clamped tightly in a double-chamber system; in each chamber the surfaces (foil area  $S$ ) were exposed to a certain atmosphere. In a primary closed circuit, a stabilising radon activity concentration,  $C_1$ , which increases in one of the two chambers, is generated by a source emitting radon-222. The concentration was measured continuously with a radon monitor RM 2000 and saved at time intervals,  $T$ . In the secondary circuit, which was also a closed loop, a radon thoronium monitor RTM 2010-2 documents the radon activity concentration,  $C_2$ , measured in the second chamber. Continuous circulation in both circuits is provided by two integrated pumps.

The measuring data was evaluated by the known diffusion theory (Fernandez et al., 2003).

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**Comments:**

The test results apply only to the samples examined. The publication of this report or of any part, requires the prior written agreement of BLEI-INSTITUT GmbH.

**Annex:**

2 diagrams

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## 2. Test report and evaluation

### General basis of the examination

Measuring period: 11-23/11/2005

Time interval: T=60 min

d	(Thickness of sample):	1.0	$10^{-3}$ m (mm)
f	(Emission rate of the radon source)	0.035106	Bq/s
C1	(Primary radon activity concentration)	> 95,000 <	Bq/m <sup>3</sup>
C1	(Secondary radon activity concentration)	550	Bq/m <sup>3</sup>
S	(Size of the exposed /exhaling surface)	0.785398	$10^{-2}$ m <sup>2</sup> (dm <sup>2</sup> )

Calculated results:

L	(Radon diffusion length)	0.17177	$10^{-3}$ m (mm)
D	(Radon diffusion coefficient)	0.06196	$10^{-12}$ m <sup>2</sup> /s

### Evaluation of radon transmissibility

The radon diffusion coefficient measured in the laboratory test D ( $0.06 \cdot 10^{-12}$  m<sup>2</sup>/s) is much lower than the reference value of 10-12 m<sup>2</sup>/s (Radon-Handbuch Deutschland, 2002; Radongeschütztes Bauen, 1994; Keller/Hoffmann, 1998). The radon diffusion length measured, L (0.172 mm) is less than one third (0.333 mm) of the thickness of the material, d (1.0 mm). This makes the sample material BI-25405-01 „radon right“ in the aforementioned sense.

No responsibility can be assumed for the general correctness and validity in practical application. It was pointed out that where the examined material is used on large areas, such as sealing webs in the basement area of buildings, the intended insulation action to radon depends critically on the way of installation (e.g., the joints between webs).

The material may have superior radon-insulating characteristics than the material tested for this report. The radon diffusion coefficients and the radon diffusion lengths measured in these tests would constitute upper limits in this case.

### 3. References cites

Radon-Handbuch Deutschland. Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, Bonn, und Bundesamt für Strahlenschutz, Berlin (Herausgeber), September 2001.

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