

Icopal A/S
Snorre Semmingsen
Postboks 55
NO-1472 FJELLHAMAR
Norge

Emission measurement

(1 appendix)

Object

One sample of a radon membrane was delivered to SP.

Sample marking:

Base Radonsperre

Art No: N384561

Batch No: 20120711 14:06

roll of 10 x 1 m

Date of arrival:

2012-09-11

Work requested and method

Emission measurement according to SS-EN ISO 16000-9:2006, "Indoor air – Part 9: Determination of the emission of volatile organic compounds from building products and furnishing – Emission test chamber method" (accredited SP method 0601), regarding volatile organic compounds (VOC), but only after 28 days.

The test was started 2012-09-17. Two pieces of 47 x 47 cm were cut out of the roll. The pieces were placed back-to-back and edges and part of front sides were sealed with aluminium tape. Open surface area was 0.20 m² per side, totally 0.4 m².

The test specimen was stored in a room with controlled climate conditions of 23 ± 2 °C and 50 ± 5 % RH. The specimen was placed in a chamber three days before sampling of VOC. The sampling of VOC was carried out on 2012-10-15.

Test conditions in chamber:

Chamber volume:	1.0 m ³
Temperature:	23 ± 0.5 °C
Relative humidity:	50 ± 5 % RH
Air exchange rate:	0.5 h ⁻¹
Surface area of test specimen:	0.4 m ²
Area specific air flow rate:	1.25 m ³ /m ² h.

Tenax TA was used as adsorption medium for VOC. The Tenax tubes were thermally desorbed and analysed in accordance to ISO 16000-6:2004 (Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS/FID), accredited SP method 0601. This means an analysis in a gas chromatograph and detection with a flame ionisation detector (FID) and mass selective detector (MS). The FID signals are used for compound quantification. The TVOC is quantified

SP Technical Research Institute of Sweden

Postal address
SP
Box 857
SE-501 15 BORÅS
Sweden

Office location
Västeråsen
Brinellgatan 4
SE-504 62 BORÅS

Phone / Fax / E-mail
+46 10 516 50 00
+46 33 13 55 02
info@sp.se

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in toluene equivalents and includes all compounds $ca \geq 1 \mu\text{g}/\text{m}^3$. The mass selective detector is used for identification of single compounds, quantified in compound specific amounts when possible, otherwise in toluene equivalents. Minimum duplicate air samples were taken and the results are mean values.

Results

The results are expressed as area specific emission rates:

$$SER_A = \frac{Conc \times n}{L}$$

SER_a = area specific emission rate, in $\mu\text{g}/\text{m}^2\text{h}$
 $Conc$ = concentration of a VOC in the chamber, in $\mu\text{g}/\text{m}^3$
 n = air exchange rate, in changes per hour
 L = loading factor, in m^2/m^3 (area of sample/volume of chamber)

Volatile organic compounds	Retention time (min)	CAS number	ID ¹	Emission rate after 28 days ($\mu\text{g}/\text{m}^2\text{h}$)
TVOC ($C_6 - C_{16}$)	5.0 - 36.0	--	B	17
Identified substances:				
Butylated Hydroxytoluene	34.4	128-37-0	B	12
Substances outside TVOC ($C_6 - C_{16}$):				
$\sum \text{VVOOC}$ ($< C_6$) ²	3.5 - 5.0	--	--	--
No substances identified	--	--	--	--
$\sum \text{SVOC}$ ($C_{16} - C_{22}$) ³	36.0 - 42.0	--	--	--
No substances identified	--	--	--	--

¹) ID: A = quantified compound specific, B = quantified as toluene equivalent

²) $\sum \text{VVOOC}$ = the sum of very volatile organic compounds, as defined in ISO 16000-6, not accredited

³) $\sum \text{SVOC}$ = the sum of semi-volatile organic compounds, as defined in ISO 16000-6, not accredited

Only VOC-compounds with an emission rate higher than $2 \mu\text{g}/\text{m}^2\text{h}$ are listed in the table. Quantification limit for TVOC is $10 \mu\text{g}/\text{m}^2\text{h}$ and the measurement uncertainty is 15 % (rel).

Background of TVOC in the empty chamber was $< 10 \mu\text{g}/\text{m}^3$, except for one compound that was found both in the empty chamber and in the loaded chamber, in the same amount. See also Appendix 1 for gas chromatograms from chamber with loaded sample and empty chamber. This compound is subtracted in the TVOC emission rate for the sample.

Summary of test results

The emission rate of the total volatile organic compounds (TVOC) after 28 days from the tested product **Base Radonsperre** was very low, 17 µg/m²h.

SP Technical Research Institute of Sweden Chemistry and Materials - Organic Analytical Chemistry

Performed by

Examined by

Maria Rådemar

Marcus Vestergren

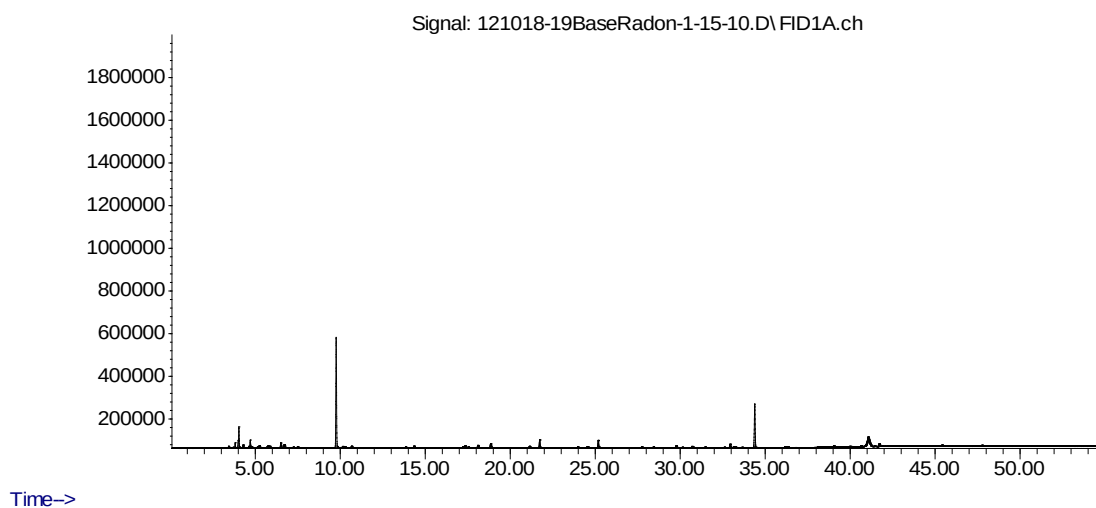
Appendix

1. Gas Chromatogram

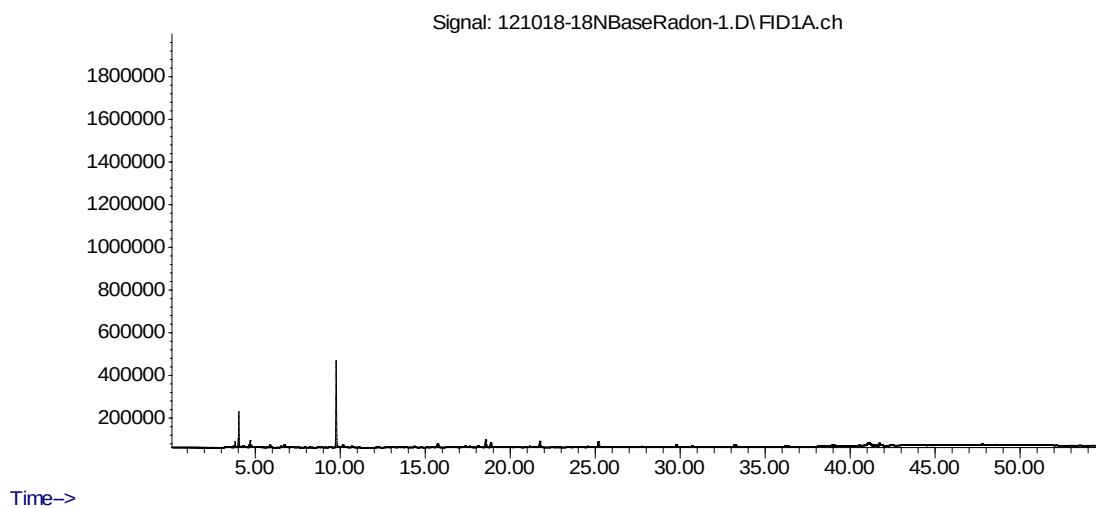
Appendix 1

Gas Chromatogram**Base Radonsperre, after 28 days:**

Abundance

**Empty chamber:**

Abundance



The compounds with retention times 4.0 and 9.8 min are background contaminations.