# REPORT

Issued by an Accredited Testing Laboratory

Contact person RISE
Maria Rådemar
Division Materials and Production
+46 10 516 51 65
maria.rademar@ri.se

Date: 2024-02-27

Reference: O100785-1238276



Konto Oy
Mika Laitila
Ylä-Satakunnantie 20
39930 Karvia
Finland

# Emission measurements according to M1

(3 appendices)

## Assignment

Emission measurement according to "M1 Emission Classification of Building Materials: Protocol for Chemical and Sensory Testing of Building Materials", ver 15.11.2017, after 28 days of conditioning regarding volatile organic compounds, carcinogenic compounds (EU Regulation No 1272/2008 Annex VI, cat 1A and 1B), formaldehyde, ammonia and sensory acceptability.

## Product/test specimen

**Table 1.**

| | |
|---|---|
| Product type: | Acoustic board with painted finish |
| Product name: | **Konto acoustics** |
| Batch No: | 231207 |
| Manufacturing date: | 2023-12-07 |
| Packaging: | 4 pcs 119 x 59 cm, thickness 20 mm, packaged with aluminium foil and plastic film in a cardboard box |
| Arrived at RISE: | 2023-12-15 |
| Test specimen preparation: | Chemical testing:<br>One piece was cut in two pieces of 0.25 x 0.40 m and they were placed back-to-back. Edges and parts of front sides were sealed with aluminium tape. Total surface area is 0.17 $m^2$.<br>Sensory testing:<br>Three pieces were used, 10 cm were cut off from edges. Two were placed back-to-back and one was cut and placed back-to-back. Edges and parts of front sides were sealed with aluminium tape. Total surface area is 1.1 $m^2$. |
| Deviation from protocol: | No |
| Test period started, date: | 2024-01-05 |
| Conditions during ageing: | 23 ± 2 ºC, 50 ± 5 % RH |
| Emission samplings, date: | 2024-02-02 |
| Place for test: | Chemistry and Applied Mechanics, Brinellgatan 4, Borås |



This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Accred. No. 1002
Testing
ISO/IEC 17025

Transaction 09222115557511609050 Signed MR, FS

## Methods

The specimens were conditioned outside the testing chambers in separate conditioning containers (with air velocity of ca 0.2 m/s) in a room with controlled climate conditions of 23 ± 2 ºC and 50 ± 5 % RH. The specimens were placed in the chambers three days before the measurements of the chemical emission and three days before the sensory evaluation.

**Table 2.**
Chamber conditions of the test of chemical emissions

| | |
|---|---|
| Test chamber volume: | 0.27 $m^3$, stainless steel |
| Temperature: | 23 ± 1 ºC |
| Relative Humidity: | 50 ± 3 % RH |
| Air exchange rate: | 0.5 $h^{-1}$ |
| Air velocity at specimen surface: | 0.1 – 0.3 m/s |
| Area of sample: | 0.17 $m^2$ |
| Area specific air flow rate: | 0.79 $m^3/m^2h$ |

**Table 3.**
Chamber conditions of the test of sensory acceptability

| | |
|---|---|
| Test chamber volume: | 1.0 $m^3$, stainless steel |
| Temperature: | 23 ± 1 ºC |
| Relative Humidity: | 50 ± 3 % RH |
| Supply air flow rate: | 0.6 l/s = 2.2 $m^3/h$ |
| Area of sample: | 1.1 $m^2$ |

**Table 4.**
Emission sampling and analytical methods

| **Test** | **Sampling method** | **Adsorbent** | **Sampling volume (litre)** | **Analysis method / Quantification** | **Detection limit** |
|---|---|---|---|---|---|
| VOC | ISO 16000-9:2006 [1] | Tenax TA /multisorbents | 3 - 6 | ISO 16000-6:2021 [2] / FID quantification | 1 µg/$m^3$ |
| Formaldehyde | ISO 16000-9:2006 [1] | DNPH | 20 | ISO 16000-3:2022 /HPLC-UV | 0.03 µg/sampler |
| Ammonia | ISO 16000-9:2006 [1] | Treated silica gel | 250, 320 | Liquid chromatograph with conductivity detector [3] | 1 µg/sampler |
| Sensory evaluation | ISO 16000-28:2020 [4] | -- | -- | Acceptability, Untrained panel of min 15 persons | -- |

[1)] In accordance with ISO 16000-9:2006 and M1 protocol.
[2)] In accordance with ISO 16000-6:2021 and M1 protocol.
[3)] Not accredited method. Analysis performed by Sahlgrenska Universitetssjukhuset.
[4)] In accordance with M1 protocol, not accredited method.

Tenax TA and multisorbents were used as adsorption mediums for VOC. The tubes were thermally desorbed and analysed in accordance with ISO 16000-6:2021(Indoor air - Part 6: Determination of organic compounds (VVOC, VOC, SVOC) in indoor and test chamber air by active sampling on sorbent tubes, thermal desorption and gas chromatography using MS or MS FID). 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 as toluene equivalents. The mass selective detector is


Transaction 09222115557511609050 Signed MR, FS

used for identification of compounds. The capillary column used is coated with 5% phenyl/ 95 % methylpolysiloxane. Tenax TA and multisorbents were also used as adsorption mediums for testing of volatile carcinogenic compounds, according to EU Regulation No 1272/2008 Annex VI, cat 1A and 1B), (exclusive formaldehyde), 0.001 mg/m$^3$ and above.

The sampling of formaldehyde was carried out with DNPH samplers. The samplers were analysed according to ISO 16000-3:2022 (Indoor air - Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air– Active sampling method), which means analysis on a liquid chromatograph with absorbance detector.

The sampling of ammonium was carried out with silicagel treated adsorbent tubes and analysis on a liquid chromatograph with conductivity detector.

Minimum two subsequent samples were taken for the VOC determination, for the formaldehyde and for the ammonia respectively.

## Results

The results relate only to the items tested. Decision rule: When comparing the measured results and requirement level, the average value of the measured results has been compared with the requirement level. No account is taken to the measurement uncertainty.

The results of the chemical testing are expressed as area specific emission rates and as concentrations in a model room. The model room has a base area of 3 m x 4 m and a height of 2.5 m, with an air exchange rate of 0.5 h$^{-1}$. The wall area is 31.4 m$^2$, floor area is 12 m$^2$, small area, like a door, is 1.6 m$^2$ and very small area, like sealant, is 0.2 m$^2$. Wall area is used for the calculation of the concentrations.

Calculation of the concentration from the emission rate:

$$Conc = \frac{SER_A \times A}{n \times V}$$

Conc = concentration of a VOC in the model room, in µg/m$^3$
$SER_a$ = area specific emission rate, in µg/m$^2$h
A = area of sample, in m$^2$
n = air exchange rate, in changes per hour
V = volume of the model room, in m$^3$

**Table 5.**
Results of the chemical testing of **Konto acoustics,** after 28 days

| **Compound** | **Concentration in model room** mg/m$^3$ | **Emission rate** mg/m$^2$h | **Criteria M1** mg/m$^2$h |
|---|---|---|---|
| TVOC [5] | 0.062 | **0.030** | < 0.2 |
| Carcinogens | < 0.001 | **< 0.001** | < 0.001 |
| Single VOC (µg/m$^3$) | **< EU-LCI** | **--** | ≤ EU-LCI |
| Formaldehyde | < 0.002 | **< 0.005** | < 0.05 |
| Ammonia [6] | < 0.005 | **< 0.003** | < 0.03 |

[5] The TVOC is the sum of the individual concentration ≥ 5 µg/m$^3$ in model room.
[6] Not accredited method.


Transaction 09222115557511609050 Signed MR, FS

**Table 6.**
Results of the sensory acceptability evaluation of **Konto acoustics**, after 28 days

| Evaluator | Sensory evaluation | Criteria M1 |
|---|---|---|
| 1 | 0.10 | |
| 2 | -0.60 | |
| 3 | 0.10 | |
| 4 | 0.90 | |
| 5 | 0.35 | |
| 6 | -0.10 | |
| 7 | -0.10 | |
| 8 | -0.50 | |
| 9 | 0.65 | |
| 10 | 0.30 | |
| 11 | 0.60 | |
| 12 | 1.0 | |
| 13 | 0.80 | |
| 14 | 0.20 | |
| 15 | 0.35 | |
| Arithmetic mean of acceptability [7] | **0.30** | ≥ + 0.0 |
| Standard deviation | 0.48 | |
| 90 % confidence interval of arithmetic mean | 0.2 | ≤ 0.2 |

[7)] Not accredited method.

The empty sensory test chamber acceptability was determined 2024-01-31. The mean acceptability vote of the empty chamber was ≥ 0.8.

## Interpretation of the results

The tested product **Konto acoustics** complies with all the requirements of M1 for the tested parameters.

## Detailed results

**Table 7.**
Detailed results (emission rates) of the chemical testing after 28 days

| Sample | TVOC ($mg/m^2h$) as toluene equivalents between $C_6$-$C_{16}$ | Formaldehyde ($mg/m^2h$) | Ammonia ($mg/m^2h$) | Carcinogens ($mg/m^2h$) between $C_6$-$C_{16}$ |
|---|---|---|---|---|
| 1 | 0.031 | < 0.002 | < 0.003 | < 0.001 |
| 2 | 0.028 | < 0.002 | < 0.002 | < 0.001 |


Transaction 09222115557511609050 Signed MR, FS

**Table 8.** Single VOCs above 5 µg/m³ in the model room

| Single VOCs | CAS number | Retention time (min) | ID [8] | Emission rate (µg/m²h) | Concentration (µg/m³) |
|---|---|---|---|---|---|
| **Single VOCs $C_6$-$C_{16}$:** | -- | 6.1 - 38 | | | |
| Acetic acid (VVOC) | 64-19-7 | 5.4 | B | 2 | 5 |
| Ethylene glycol | 107-21-1 | 8.0 | B | 4 | 8 |
| Propylene Glycol | 57-55-6 | 9.3 | B | 4 | 9 |
| Furfural | 98-01-1 | 12.8 | B | < 2 | 3 |
| Nonanal | 124-19-6 | 22.7 | B | 2 | 4 |
| Propanol, [(butoxymethylethoxy)-methyletoxy]- | 55934-93-5 | 35.5-35.7 | B | 16 | 33 |
| **TVOC** | -- | 6.1 - 38 | B | 27 | 57 |
| **Volatile Carcinogens** [9] | | 6.1 - 38 | | | |
| No substances detected | -- | -- | B | < 1 | < 1 |
| **Single VOC outside $C_6$ – $C_{16}$:** | | | | | |
| VVOC ( < $C_6$) [10] | | 5.0 – 6.1 | | | |
| No single VVOC detected | -- | -- | B | < 2 | < 5 |
| SVOC ($C_{16}$ – $C_{22}$) [11] | | 38 - 51 | | | |
| No single SVOC detected | -- | -- | B | < 2 | < 5 |

[8] ID: A = quantified compound specific, B = quantified as toluene equivalent
[9] Volatile carcinogens = VOCs according to EU Regulation No 1272/2008 Annex VI, cat 1A and 1B
[10] VVOC = very volatile organic compounds
[11] SVOC = semi-volatile organic compounds

TVOC is the sum of all individual substances with concentrations ≥ 5 µg/m³ (in toluene equivalents).

Level of identification of compounds is 100 % for all compounds ≥ 5 µg/m³.

**Table 9.**
Detected EU LCI-compounds ≥ 5 µg/m³ quantified by compound specific response factor

| Single VOCs | CAS number | Retention time (min) | ID [8] | Concentration (µg/m³) | EU $LCI_i$ (Dec 2022) (µg/m³) |
|---|---|---|---|---|---|
| **Single VOCs $C_6$-$C_{16}$:** | | 6.1 - 38 | | | |
| Acetic acid | 64-19-7 | 5.4 | A | **23** | 1200 |
| Ethylene glycol | 107-21-1 | 8.0 | A | **40** | 3400 |
| Propylene Glycol | 57-55-6 | 9.3 | A | **25** | 2100 |
| Furfural | 98-01-1 | 12.9 | A | **7** | 10 |
| Nonanal | 124-19-6 | 22.7 | A | **7** | 900 |

[8] ID: A = quantified compound specific, B = quantified as toluene equivalent


Transaction 09222115557511609050 Signed MR, FS

## Measurements uncertainty

The expanded measurement uncertainty of TVOC result is 25 % (rel) and formaldehyde is 36 % (rel).

Measurement uncertainty for ammonia is 14 % (rel) according to the test report from Sahlgrenska Universitetssjukhuset: test report 24:2 dated 2024-02-23.

See Appendix 1 for a gas chromatogram from the VOC determination and Appendix 2 for a photo of the test specimen. Appendix 3 is the Sampling report received from the customer.

**RISE Research Institutes of Sweden AB**
**Chemistry and Applied Mechanics - Chemical Product Safety**

| Performed by | Examined by |
|---|---|
| Maria Rådemar | Fredrik Solhage |

**Appendices**

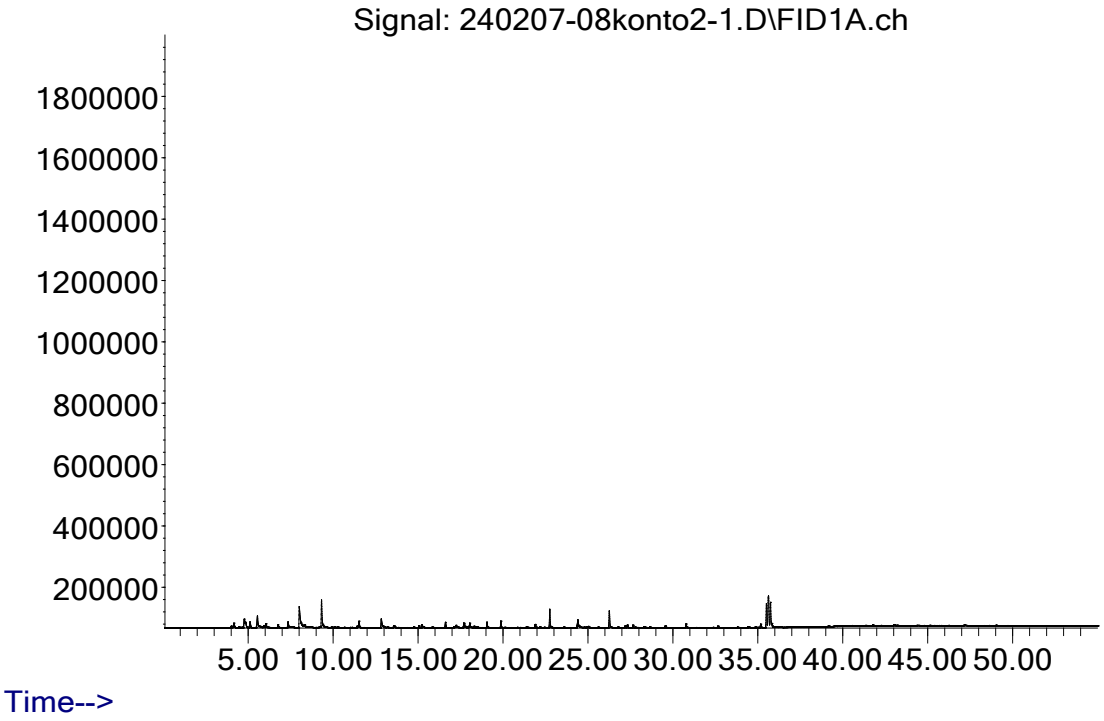
1. Gas Chromatogram
2. Photo of test specimen
3. Sampling report


Transaction 09222115557511609050 Signed MR, FS

Appendix 1

## Gas chromatogram

Sample: **Konto acoustics**, after 28 days

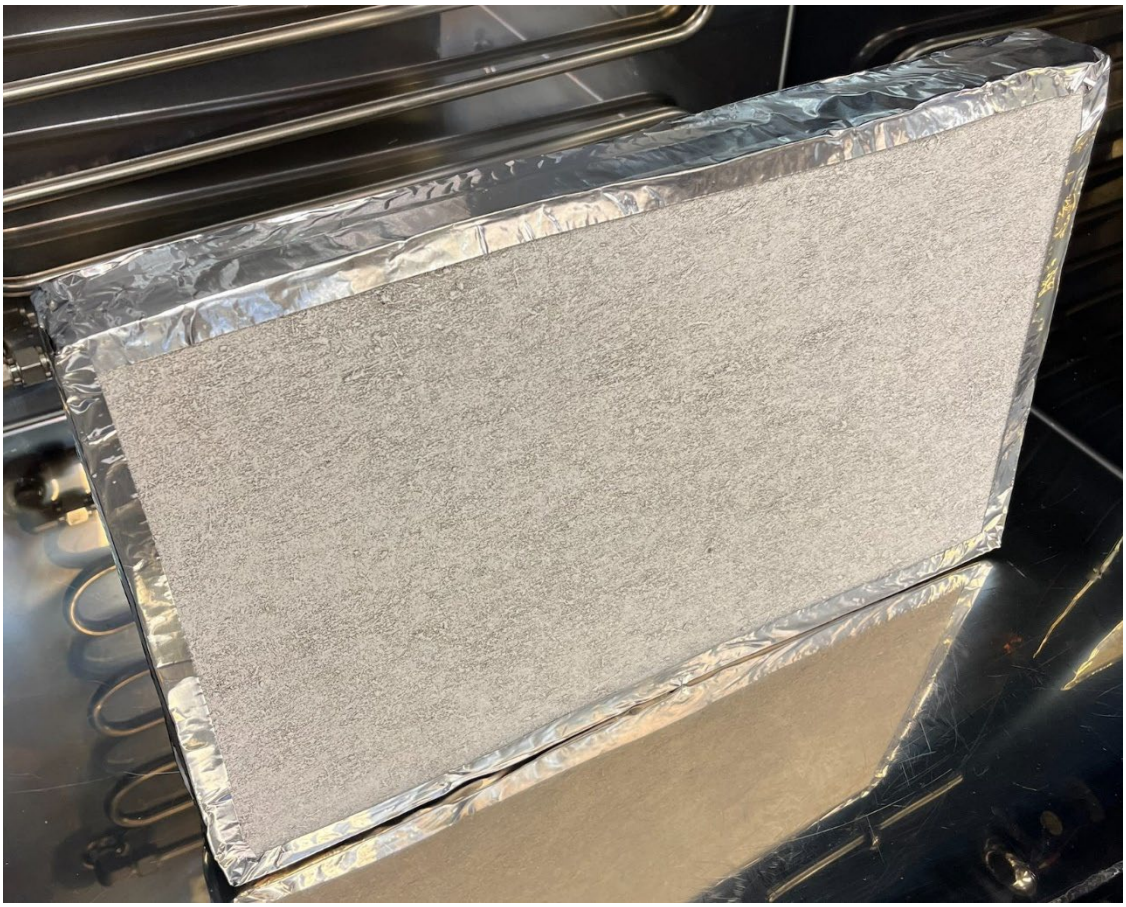



TVOC between $C_6$ and $C_{16}$, means compounds eluting between 6.1 and 38 minutes.


Transaction 09222115557511609050 Signed MR, FS

Appendix 2

# Photo of test specimen



The test specimen of the chemical test.


Transaction 09222115557511609050 Signed MR, FS

Appendix 3

## Sampling Report

| | |
|---|---|
| **Sampler** (Name, Company, contact info): | **Manufacturer of the product** (Company, address):<br>Konto Ltd<br>Ylä-Satakunnantie 20<br>39930 Karvia Finland<br><br>mika.laitila@konto.fi<br>**FI22479702** |
| **Name of product:**<br><br>Konto acoustics | **Type of product:**<br><br>acoustic panel, (absorption panel) |
| **Manufacturing Date:**<br><br>7th Dec 2023 | **Batch No:**<br><br>**231207** |
| **Sample Details:**<br><br>Peat acoustic panel<br>size: 1194x594x20mm<br><br>painted as is the actual commercial product with Fintex tetrakem paint<br>https://fintex.fi/wp-content/uploads/2017/10/FT-5007-Fintex7.pdf | **Date of sampling:**<br><br>**Amount/size of material sampled:**<br><br>**Packing material:**<br>**foil + film + cartboard box** |
| **Sample is taken from:**<br>Production line x<br>Stock / Storage ☐<br><br>Miscellaneous ☐<br>-where, specify: | **How was the product stored before sampling?**<br><br>Panels are piled on a pallet and stored indoors in painting phase they spend the drying time in a specific shelf were the panels are separately stored. |
| **If a sub-sample was collected from a larger material amount, describe how the sub-sample was taken:** | |
| **Observations and remarks:** | |
| **Confirmation**<br>I hereby confirm that the sample was selected, taken and packed in accordance with the instructions. | |
| **Date:**<br>21.2.2024 | **Signature:**<br>Pasi Mäkynen |

# Verification

Transaction 09222115557511609050

## Document

**1238276**
Main document
9 pages
*Initiated on 2024-02-27 08:50:45 CET (+0100) by Maria Rådemar (MR)*
*Finalised on 2024-02-27 10:06:02 CET (+0100)*

## Signatories

**Maria Rådemar (MR)**
RISE Research Institutes of Sweden AB
Company reg. no. 556464-6874
*maria.rademar@ri.se*
*Signed 2024-02-27 08:50:46 CET (+0100)*

**Fredrik Solhage (FS)**
RISE Research Institutes of Sweden AB
*fredrik.solhage@ri.se*
*Signed 2024-02-27 10:06:02 CET (+0100)*

This verification was issued by Scrive. Information in italics has been safely verified by Scrive. For more information/evidence about this document see the concealed attachments. Use a PDF-reader such as Adobe Reader that can show concealed attachments to view the attachments. Please observe that if the document is printed, the integrity of such printed copy cannot be verified as per the below and that a basic print-out lacks the contents of the concealed attachments. The digital signature (electronic seal) ensures that the integrity of this document, including the concealed attachments, can be proven mathematically and independently of Scrive. For your convenience Scrive also provides a service that enables you to automatically verify the document's integrity at: https://scrive.com/verify