

Lintex AB

Madesjövägen 17

382 45 NYBRO

Emission measurements according to M1

(3 bilagor)

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

Product type:	White board
Product name:	Frame mobile / wall
Batch No:	-
Place of testing	Chemistry and Applied Mechanics, Brinellgatan 4, Borås
Manufacturing date:	2023-01-09
Packaging:	One sample 610 x 610 x 50 mm, airtight wrapped in cardboard box.
Arrived at RISE:	2023-01-12
Test specimen preparation:	Small area scenario is used for the testing. Chemical testing: The sample from the customer was used as it is. Surface area is 0.87 m ² . Sensory testing: The sample from the customer was used as it is. Surface area is 0.87 m ² .
Deviation from protocol:	Yes, for sensory test a larger area is used then described in the M1 protocol
Test period started, date:	2023-01-13
Conditions during ageing:	23 ± 2 °C, 50 ± 5 % RH
Emission samplings, date:	2023-02-09

RISE Research Institutes of Sweden AB

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Denna rapport får endast återges i sin helhet, om inte
utfärdande laboratorium i förväg skriftligen godkänt annat.



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Provning
ISO/IEC 17025

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 °C and 50 ± 5 % RH. The specimens were placed in the chambers three days before the measurements of the chemical emission and four days before the sensory evaluation.

Table 2.
Chamber conditions of the test of chemical emissions

Test chamber volume:	1.0 m ³ , stainless steel
Temperature:	23 ± 1 °C
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:	0.87 m ²
Area specific air flow rate:	0.57 m ³ /m ² h

Table 3.
Chamber conditions of the test of sensory acceptability

Test chamber volume:	1.0 m ³ , stainless steel
Temperature:	23 ± 1 °C
Relative Humidity:	50 ± 3 % RH
Supply air flow rate:	0.6 l/s = 2.1 m ³ /h
Area of sample:	0.87 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	2 - 7	RISE 0601 ² / FID quantification	1 µg/m ³
Formaldehyde	ISO 16000-9:2006 ¹	DNPH	45 - 62	ISO 16000-3:2022 HPLC-UV	0.03 µg/sampler
Ammonia	ISO 16000-9:2006 ¹	Treated silica gel	120 - 160	Liquid chromatograph with conductivity detector ³	0.9 µg/sampler
Sensory evaluation	ISO 16000-28:2012 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.

⁴⁾ In accordance with M1 protocol, not accredited method.

Tenax TA was used as adsorption medium for VOC. The tubes were thermally desorbed and analysed in accordance to RISE method 0601, similar to ISO 16000-6:2021 (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). 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 used for identification of compounds.

The capillary column used is coated with 5% phenyl/ 95 % methylpolysiloxane. Tenax TA was also used as adsorption medium for testing of volatile carcinogenic compounds, according to EU Regulation No 1272/2008 Annex VI, cat 1A and 1B), (exclusive formaldehyde), 0.001 mg/m³ 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 – 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 m², floor area is 12 m², small area, like a door, is 1.6 m² and very small area, like sealant, is 0.2 m². Small 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/m³

SER_a = area specific emission rate, in µg/m²h

A = area of sample, in m²

n = air exchange rate, in changes per hour

V = volume of the model room, in m³

Table 5.Results of the chemical testing of the sample **Frame mobile / wall** after 28 days

Compound	Emission rate mg/m ² h	Concentration in model room mg/m ³	Criteria M1 (small/very small area) mg/m ³
TVOC ⁶	< 0.02	< 0.005	< 0.02
Carcinogens	< 0.001	< 0.001	< 0.001
Single VOC (µg/m ³)	--	≤ EU-LCI	≤ EU-LCI
Formaldehyde	0.011	0.001	< 0.01
Ammonia ⁷	< 0.004	< 0.001	< 0.01

⁶) The TVOC is the sum of the individual concentration $\geq 5 \mu\text{g}/\text{m}^3$ in model room.⁷) Not accredited method.**Table 6.**Results of the sensory acceptability evaluation of the sample **Frame mobile / wall**, after 28 days

Evaluator	Sensory evaluation	Criteria M1
1	0.96	
2	0.80	
3	0.86	
4	1.00	
5	1.00	
6	0.96	
7	0.82	
8	0.86	
9	0.82	
10	0.94	
11	1.00	
12	0.90	
13	0.74	
14	0.16	
15	0.94	
Arithmetic mean of acceptability ⁸	0.85	$\geq + 0.0$
Standard deviation	0.21	
90 % confidence interval of arithmetic mean	0.09	≤ 0.2

⁸) Not accredited method.

The empty sensory test chamber acceptability was determined 2023-02-03. The mean acceptability vote of the empty chamber was ≥ 0.8 .

Interpretation of the results

The tested product **Frame mobile / wall** complies with all the requirements of M1 for the tested parameters.

The emissions of products falling into the class small areas och very small areas can be assessed also as concentrations in the reference room. The criteria for such products in the class M1 are for TVOC 0.02 mg/m³, formaldehyde and ammonia 0.01 mg/m³ and carcinogenic compounds 0.001 mg/m³, odour acceptability $\geq + 0.0$.

Detailed results

Table 7.

Detailed results (emission rates) of the chemical testing after 28 days

Sample	TVOC (mg/m ² h) as toluene equivalents between C ₆ -C ₁₆	Formaldehyde (mg/m ² h)	Ammonia (mg/m ² h)	Carcinogens (mg/m ² h) between C ₆ -C ₁₆
1	< 0.01	0.002	< 0.003	< 0.001
2	< 0.01	0.002	< 0.005	< 0.001

Table 8.

Single VOCs above 5 µg/m³ in the model room

Single VOCs	CAS number	Retention time (min)	ID ⁹	Emission rate (µg/m ² h)	Concentration (µg/m ³)
Single VOCs C₆-C₁₆:	--	6.9 - 39			
No single VOC detected	--	--	B	< 5	< 5
TVOC	--	6.9 - 39	B	< 5	< 5
Volatile Carcinogens ¹⁰		6.9 - 39			
No substances detected	--	--	B	< 1	< 1
Single VOC outside C₆ - C₁₆:					
VVOC (< C ₆) ¹¹		5.3 - 6.9			
No single VVOC detected	--	--	B	< 5	< 5
SVOC (C ₁₆ - C ₂₂) ¹²		39 - 52			
No single SVOC detected	--	--	B	< 5	< 5

Single VOCs in the model room (small area scenario), only VOCs above 5 µg/m³ are included in TVOC

⁹⁾ ID: A = quantified compound specific, B = quantified as toluene-equivalent

¹⁰⁾ Volatile carcinogens = VOCs according to EU Regulation No 1272/2008 Annex VI, cat 1A and 1B

¹¹⁾ VVOC = very volatile organic compounds, as defined in ISO 16000-6 (not accredited)

¹²⁾ SVOC = semi-volatile organic compounds, as defined in ISO 16000-6 (not accredited)

TVOC is the sum of all individual substances with concentrations $\geq 5 \mu\text{g}/\text{m}^3$ (in toluene equivalents).

Level of identification of compounds is 100 % for all compounds $\geq 5 \mu\text{g}/\text{m}^3$.

Table 9.

Detected EU LCI-compounds $\geq 5 \mu\text{g}/\text{m}^3$ quantified by compound specific response factor

Single VOCs	CAS number	Retention time (min)	ID ⁹⁾	Concentration ($\mu\text{g}/\text{m}^3$)	EU LCI _i (Dec 2021) ($\mu\text{g}/\text{m}^3$)
Single VOCs C ₆ -C ₁₆ :	--	6.9 - 39			
No single VOC detected	--	--	A	< 5	< 5

⁹⁾ ID: A = quantified compound specific, B = quantified as toluene-equivalent

Measurements uncertainty

The expanded measurement uncertainty of VOC result is 25 % (rel) and formaldehyde is 36 % (rel). For ammonia the measurement uncertainty is estimated to 20 % (rel).

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

RISE Research Institutes of Sweden AB Kemi och tillämpad mekanik - Kemisk produktsäkerhet

Utfört av

Granskat av

Thomas Vaessen

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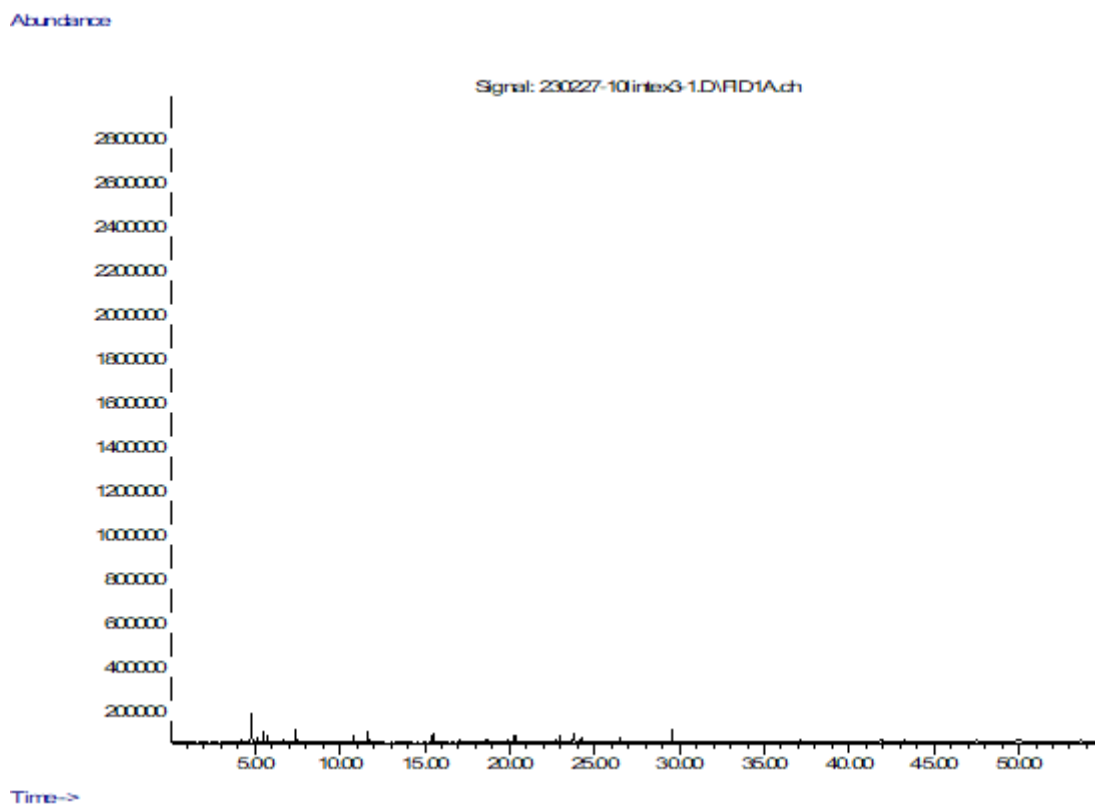
Bilagor

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

Bilaga 1

Gas chromatogram

Frame mobile / wall, after 28 days



TVOC between C₆ and C₁₆, means compounds eluting between 6.9 and 39 minutes.

Bilaga 2

Photo of the test specimen

Bilaga 3

Sampling Report

Sampler (Name, Company, contact info): Lintex AB Sara Gripstrand Madesjövägen 17 382 45 Nybro 0481-799 000	Manufacturer of the product (Company, address): Lintex AB Sara Gripstrand Madesjövägen 17 382 45 Nybro 0481-799 000
Name of product: Frame mobile/wall	Type of product: Whiteboard
Manufacturing Date: 23-01-09	Batch No:
Date of sampling:	Amount/size of material sampled: Glas 63% Trä 22% Metall 15% Packing material: Well
Sample is taken from: Production line ☒ Stock / Storage ☐ Miscellaneous ☐ -where, specify:	How was the product stored before sampling? Levererad direkt för provtagning
If a sub-sample was collected from a larger material amount, describe how the sub-sample was taken:	
Observations and remarks:	
Confirmation I hereby confirm that the sample was selected, taken and packed in accordance with the instructions.	
Date: 2023-03-28	Signature: Ronny Samuelsson

M1 2017

Verification

Transaction 09222115557491310426

Document

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Main document

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