

Abstracta AB
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Emission measurement after 28 days

(2 appendices)

Test object

One sample of a sound absorber was delivered to RISE by the manufacturer.

Product name: **Soundfelt Rec med Blazer CUZ28**
Manufacturer: Horda Stans AB
Manufacturing date: 2018-10-08
Batch No: 1
Date of sampling: 2018-10-08
Size of sample: 1000x1000x50 mm, packed in plastic foil.
Date of arrival: 2018-10-25

Assignment

Emission measurements 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) after 28 days regarding volatile organic compounds (VOC and VVOC/SVOC), carcinogenic substances (VOC-substances, EU Regulation No 1272/2008 Annex VI, cat 1A and 1B) formaldehyde and acetaldehyde (ISO 16000-3:2011). Evaluation according to EN 16516:2017 (EU-LCI values).

The results of the measurements will be used for registration to Byggvarubedömningen.

For evaluation of test results the principle of shared risk is applied, i.e. for a max limit (\leq) a result \leq the limit complies and a result $>$ the limit does not comply (ILAC G8 section 2.7).

Method

The test was started on November 1 by unwrapping the sample. A test specimen with the dimension 50 x 50 x 5 cm was cut out from the sample. The cut edges were sealed with aluminium tape leaving an exposed surface area of 0.5 m². The specimen was placed in a room with controlled climate conditions of 23 ± 3 °C and 50 ± 5 % RH. The test specimen was placed in the emission chamber three days prior to the air sampling.

Air samplings after 28 days of conditioning were carried out on 2018-11-29.

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Conditions of the test in the emission chamber:

Test chamber volume:	1.0 m ³
Area of test specimen:	0.5 m ²
Air exchange rate:	0.5 h ⁻¹
Area specific air change rate:	1.0 m ³ /m ² h.
Temperature:	23 ± 1 °C
Relative humidity:	50 ± 5 % RH
Air velocity at specimen surface:	0.1 – 0.3 m/s

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 16000-6:2011 (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 capillary column used is coated with 5% phenyl/ 95 % methylpolysiloxane. The FID signals are used for compound quantification. The total volatile organic compounds (TVOC) means compounds eluting between and including n-hexane to hexadecane, having boiling points in the range of about 70-260 °C. Minimum duplicate air samples were taken and the results are mean values. Sampled volumes are 2.5 – 5.3 L.

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), 1 µg/m³ and above.

The samplings of aldehydes were carried out with DNPH samplers. The samplers were analysed according to RISE method 2302, similar to ISO 16000-3:2011(Indoor air - Part 3: Determination of formaldehyde and other carbonyl compounds – Active sampling method). This means analysis on a liquid chromatograph with absorbance detector. Duplicate air samples were taken and the results are mean values. Sampled volumes were 74 – 94 L.

Results

The results in Table 1 are expressed as area specific emission rates and as concentrations in a reference room (according to EN 16516:2017). The reference 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 2 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:

$$C = \frac{E_a \times A}{n \times V}$$

C = concentration of VOC in the reference room, in µg/m³
 E_a = area specific emission rate, in µg/m²h
 A = surface area of product in reference room, in m²
 n = air exchange rate, in changes per hour
 V = volume of the reference room, in m³

Table 1.
Emission results of **Soundfelt Rec med Blazer CUZ28** after 28 days

Volatile organic compounds	CAS number	Retention time (min)	ID ¹	Emission rate ($\mu\text{g}/\text{m}^2\text{h}$)	Concentration in reference room ($\mu\text{g}/\text{m}^3$)	LCI _i ($\mu\text{g}/\text{m}^3$)	R _i (c_i/LCI_i)
TVOC (C ₆ – C ₁₆)	--	5.6 – 38.8	B	22	< 5	--	--
Volatile Carcinogens ²		5.6 – 38.8					
No substances detected	--	--	B	< 1	< 1	--	--
VOC with LCI ³		5.6 – 38.8					
Nonanal	--	--	A	7	< 5	900	--
Σ VOC with LCI	--	--	A	7	< 5	--	--
VOC without LCI ⁴		5.6 – 38.8					
No substances detected	--	--	B	< 2	< 5	--	--
Σ VOC without LCI	--	--	B	< 2	< 5	--	--
SVOC (C ₁₆ – C ₂₂) ⁵		38.8 – 51.3					
No substances detected	--	--	B	< 2	< 5	--	--
Σ SVOC	--	--	B	< 2	< 5	--	--
VVOC (< C ₆) ⁶		4.0 – 5.6					
Formaldehyde ⁷	50-00-0	--	A	< 1	< 1	100	--
Acetaldehyde	75-07-0	--	A	< 1	< 1	1200	--
Σ VVOC	--	--	A	< 2	< 5	--	--
R = $\Sigma C_i / \text{LCI}_i$ ⁸	--	--	--	--	--	--	< 0.01

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

²⁾ Volatile carcinogens = VOCs according to EU Regulation No 1272/2008 Annex VI, cat 1A and 1B

³⁾ VOC with LCI = identified VOC-compound with LCI-value according to EU-LCI, July 2018

⁴⁾ VOC without LCI = VOC-compound without LCI-value or not identified.

⁵⁾ SVOC = semi-volatile organic compounds, as defined in ISO 16000-6 (not part of accreditation)

⁶⁾ VVOC = very volatile organic compounds, as defined in ISO 16000-6 (not part of accreditation)

⁷⁾ VVOC-aldehydes measured with DNPH samplers (ISO 16000-3)

⁸⁾ All VVOC, VOC, SVOC and carcinogens with LCI
n.d. = not detected (detection limit is approx 1 $\mu\text{g}/\text{m}^2\text{h}$).

COMMENT:

Only VOC-compounds with an emission rate higher than 2 $\mu\text{g}/\text{m}^2\text{h}$ are listed in Table 1, carcinogenic compounds $\geq 1 \mu\text{g}/\text{m}^2\text{h}$. Only compounds with a concentration in the model room $\geq 5 \mu\text{g}/\text{m}^3$ are evaluated based on LCI (= lowest concentration of interest).

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

The emission rate of TVOC ($\mu\text{g}/\text{m}^2\text{h}$) includes all compounds approximately $\geq 1 \mu\text{g}/\text{m}^2\text{h}$ (in toluene equivalents) in the emission chamber.

Quantification limit for TVOC is $10 \mu\text{g}/\text{m}^2\text{h}$. Measurement uncertainty for TVOC is 15 % (rel) and for formaldehyde 30 % (rel). Background of TVOC in the empty chamber was below $10 \mu\text{g}/\text{m}^3$ and is subtracted.

See Appendix 1 for gas chromatograms (FID spectra)

The test results are summarized in Table 2.

Table 2.

Summary of the emission results after 28 days of **Soundfelt Rec med Blazer CUZ28**

Compounds	Emission rate ($\mu\text{g}/\text{m}^2\text{h}$)	Concentration in reference room (small area scenario) ($\mu\text{g}/\text{m}^3$)
TVOC	22	< 5
Σ Carcinogenic VOCs	< 1	< 1
Σ VOC with LCI	7	< 5
Σ VOC without LCI	< 2	< 5
Σ VVOC	< 2	< 5
Σ SVOC	< 2	< 5
$R = \Sigma C_i / LCI_i$	< 0.01	

Evaluation of the test results

Byggarubedömningen has criteria regarding Emissions to indoor environment. The emissions are to be measured according to a standard method such as ISO 16000-9. The requirements for the *Recommended class* is that the requirements to one of the following systems are being met: Emission EC1, Emission EC1^{PLUS}, Blue Angel, M1 (RTS) or GUT.

The tested sample is compared to M1.

Table 3.

The test results of **Soundfelt Rec med Blazer CUZ28** are compared to the relevant requirements in M1

Compounds	Requirement M1 (mg/m ³)	Test Results (small area) (mg/m ³)	Pass / Fail
TVOC	< 0.02	< 0.005	PASS
Formaldehyde	< 0.01	< 0.001	PASS
CMR 1A+1B	< 0.001	< 0.001	PASS
Single VOC (µg/m ³)	≤ EU-LCI	< EU-LCI	PASS
Ammonia	< 0.01	not measured	--
Odour	≥ 0.0	not measured	--

The test results are in compliance with the tested requirements of M1 and meet the requirements for the *Recommended class*.

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Appendices

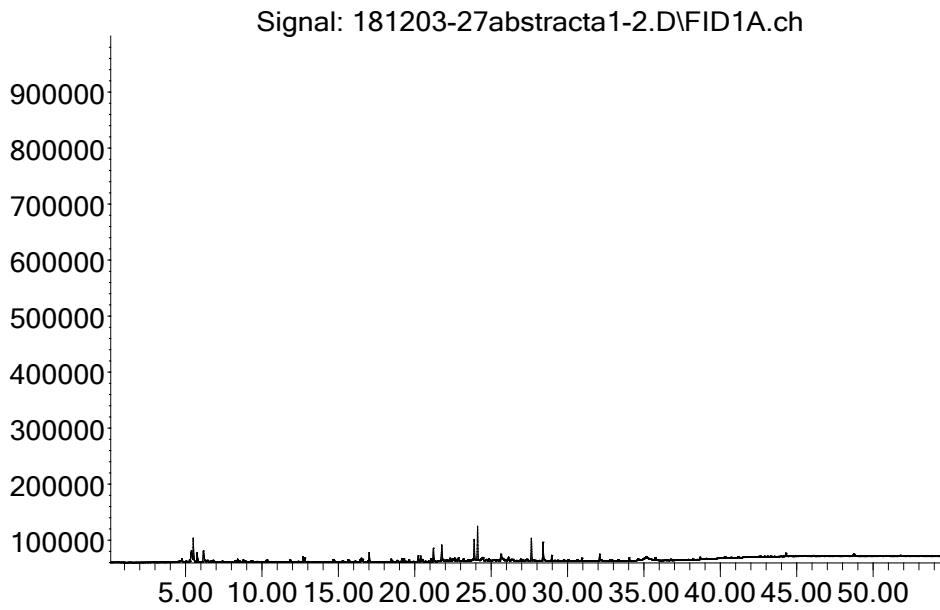
1. Gas chromatogram
2. Photos of test specimen

Appendix 1

Gas chromatogram

Soundfelt Rec med Blazer CUZ28 after 28 days
(sampled volume 5.3L)

Abundance



Time-->

TVOC between C₆ and C₁₆, means compounds eluting between 5.6 and 38.8 minutes.

Appendix 2

Photos of the test specimen:**Soundfelt Rec med Blazer CUZ28, front side****Soundfelt Rec med Blazer CUZ28, back side**