REPORT

issued by an Accredited Testing Laboratory

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Testing

Fibertex Nonwovens AS
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Tjeckien

Emission measurement after 28 days

(1 appendix)

Test object

One sample of a nonwoven textile was delivered to RISE by the customer.

Product name:	**Fibertex FiberAcoustic 75**
Manufacturer:	Fibertex Nonwovens AS
Manufacturing date:	2017-10-18
Batch No:	WO225460
Roll no:	2517 291 11 002-01
Specification:	PO0167
Date of sampling:	2017-12-20
Size of sample:	2500 x 1300 mm, packed in aluminium foil and PET bag.
Date of arrival:	2017-12-29

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 (≤) a result ≤ the limit complies and a result > the limit does not comply (ILAC G8 section 2.7).

Method

The test was started on January 3 by unwrapping the sample. Four test specimens with a total surface area of 1.0 m^2were cut out from the sample. The specimens were placed in a room with controlled climate conditions of 23 ± 2 ^oC and 50 ± 5 % RH. The test specimens were placed in the emission chamber four days prior to the air sampling.

Air samplings after 28 days of conditioning were carried out on 2018-01-30.

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ISO/IEC 17025

Conditions of the test in the emission chamber:

Test chamber volume:	1.0 m^3
Area of test specimen:	1.0 m^2
Air exchange rate:	0.5 h^{-1}
Area specific air change rate:	0.5 m^3/m^2 h.
Temperature:	23 ± 1 ^oC
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 2.9 – 6.4 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/m^3 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 61 – 67 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 m^2, floor area is 12 m^2, small area, like a door, is 1.5 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:

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

C = concentration of VOC in the reference room, in µg/m^3
E_a = area specific emission rate, in µg/m^2h
A = surface area of product in reference room, in m^2
n = air exchange rate, in changes per hour
V = volume of the reference room, in m^3

Table 1.
Emission results of **Fibertex FiberAcoustic 75** after 28 days

Volatile organic compounds	**CAS number**	**Retention time** (min)	**ID** [1]	**Emission rate** ($\mu g/m^2h$)	**Concentration in reference room** ($\mu g/m^3$)	**LCI_i** ($\mu g/m^3$)	**R_i** (c_i/LCI_i)
TVOC ($C_6 - C_{16}$)	--	6.4 – 38.2	B	< 10	< 20	--	--
Volatile Carcinogens [2]		6.4 – 38.2					
No substances detected	--	--	B	< 1	< 1	--	--
VOC with LCI [3]		6.4 – 38.2					
No substances detected	--	--	A	< 5	< 5	--	--
∑ VOC with LCI	--	--	A	< 5	< 5	--	--
VOC without LCI [4]		6.4 – 38.2					
No substances detected	--	--	B	< 5	< 5	--	--
∑ VOC without LCI	--	--	B	<5	< 5	--	--
SVOC ($C_{16} - C_{22}$) [5]		38.2 – 51.3					
No substances detected	--	--	--	--	--	--	--
∑ SVOC	--	--	B	< 5	< 5	--	--
VVOC (< C_6) [6]		4.0 – 6.4					
Formaldehyde [7]	50-00-0	--	A	< 1	< 1	--	--
∑ VVOC	--	--	A	< 5	< 5	--	--
R = ∑ C_i / 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, Dec 2016
[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 $\mu g/m^2h$).

COMMENT:

Only VOC-compounds with an emission rate higher than 2 $\mu g/m^2h$ are listed in Table 1, carcinogenic compounds $\geq$ 1 $\mu g/m^2h$. Only compounds with a concentration in the model room $\geq$ 5 $\mu g/m^3$ are evaluated based on LCI (= lowest concentration of interest). TVOC expressed in $\mu g/m^3$ is the sum of all individual substances with concentrations $\geq$ 5 $\mu g/m^3$ (in toluene equivalents)

Quantification limit for TVOC is 10 $\mu g/m^2h$. Measurement uncertainty for TVOC is 15 % (rel) and for formaldehyde 30 % (rel). Background of TVOC in the empty chamber was below 50 $\mu g/m^3$ 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 **Fibertex FiberAcoustic 75**

Compounds	**Emission rate** ($\mu g/m^2h$)	**Concentration in reference room** (wall scenario) ($\mu g/m^3$)
TVOC	< 10	< 20
∑ Carcinogenic VOCs	< 1	< 1
∑ VOC with LCI	< 5	< 5
∑ VOC without LCI	< 5	< 5
∑ VVOC	< 5	< 5
∑ SVOC	< 5	< 5
$R = \sum C_i / LCI_i$	< 0.01	

Evaluation of the test results

Byggvarubedömningen has criteria regarding Emissions to indoor environment. The emissions are to 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: Emicode EC1, Emicode EC1^{PLUS}, Blue Angel, M1 (RTS) or GUT.

The tested sample is compared to M1.

Table 3.
The test results of **Fibertex FiberAcoustic 75** are compared to the relevant requirements in M1

Compounds	**Requirement M1** (mg/m^2h)	**Test Results** (wall area) (mg/m^2h)	**Pass / Fail**
TVOC	< 0.2	**< 0.010**	**PASS**
Formaldehyde	< 0.05	**< 0.001**	**PASS**
CMR 1A+1B	< 0.001	**< 0.001**	**PASS**
Single VOC ($\mu g/m^3$)	≤ 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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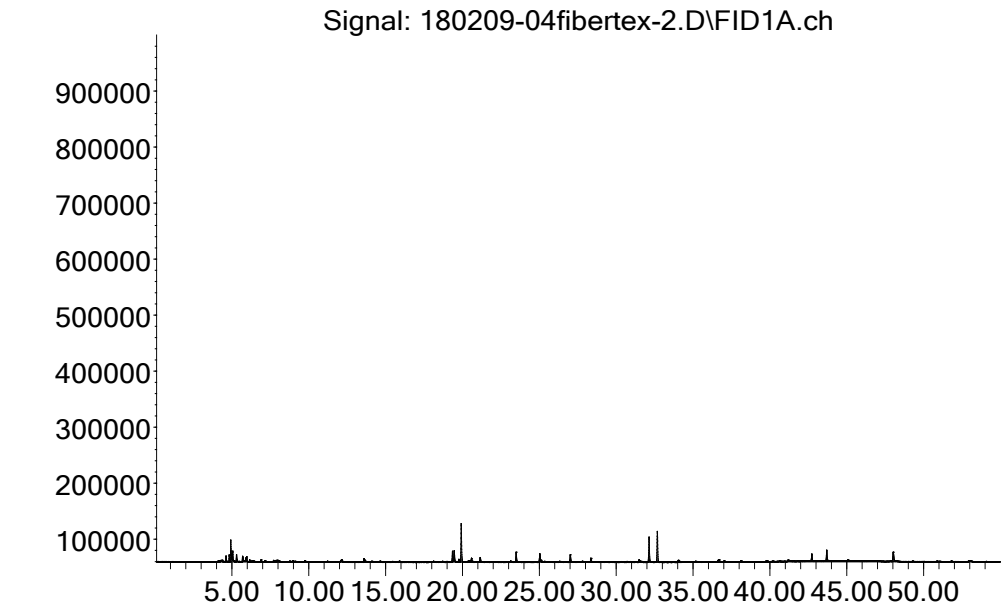
Appendix

1. Gas chromatogram

Appendix 1

Gas chromatogram

Fibertex FiberAcoustic 75 after 28 days
(sampled volume 5.1L)



TVOC between C_6 and C_{16}, means compounds eluting between 6.4 and 38.2 minutes.