REPORT

issued by an Accredited Testing Laboratory

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Date	Reference	Page
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SP Testing

MCT AB
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Emission measurements after 28 days

(2 appendices)

Object

One sample of a floor screed was delivered to RISE by the customer.

Product name:	**M85 Projekt Snabbtorkande grovspackel**
Batch:	2018-07-04
Size of sample:	20 kg sack
Date of sampling:	2018-07-11
Date of arrival to RISE:	week 29, 2018
Date of analysis:	week 30 – 36, 2018

Assignment

Emission measurement according to 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).

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 date of moulding was 2018-07-25. The powder was mixed with water according to mixing instructions, to 2.0 kg powder 320 ml water was used. The mixture was applied in a mould with the size of 250 x 250 x 3 mm. The specimen was placed in a separate conditioning container (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 test specimen was placed into the chamber five days prior to air samplings. Air samplings after 28 days of conditioning were carried out on 2018-08-22.

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Test conditions in the chamber:

Chamber volume:	0.25 m^3
Temperature:	23 ± 0.5 ^oC
Relative humidity:	50 ± 5 % RH
Surface area of test specimen:	0.062 m^2
Air exchange rate:	0.5 h^{-1}
Area specific air flow rate:	2.0 m^3/m^2 h.
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 were 3 to 6 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 30 to 50 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 1.6 m^2 and very small area, like sealant, is 0.2 m^2. Floor 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, here 0.5 h^{-1}
V = volume of the reference room, in m^3, here 30 m^3

Table 1.
Emission results of **M85 Projekt Snabbtorkande grovspackel** 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 ($C_6 - C_{16}$)	--	6.5 – 38	B	34	27	--	--
Volatile Carcinogens [2]		6.5 – 38					
No substances detected	--	--	B	< 1	< 1	--	--
VOC with LCI [3]		6.5 – 38					
No substances detected	--	--	A	< 2	< 5	--	--
∑ **VOC with LCI**	--	--	A	< 2	< 5	--	
VOC without LCI [4]							
Possibly: 1,3-Propanediol, 2-ethyl-2-(hydroxymethyl)-	77-99-6	26.7	B	34	27	--	--
∑ **VOC without LCI**	--	--	B	34	27	--	--
SVOC ($C_{16} - C_{22}$) [5]		38 - 51					
No substances detected	--	--	B	< 2	< 5	--	--
∑ **SVOC**	--	--	B	< 2	< 5	--	--
VVOC (< C_6) [6]		4.9 – 6.5					
Formaldehyde [7]	50-00-0	--	A	15	12	100	0.118
Acetaldehyde [7]	75-07-0	--	A	< 2	< 5	1 200	--
∑ **VVOC**	--	--	A	15	12	--	--
R = ∑ C_i / LCI_i [8]	--	--	--	--	--	--	0.12

[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

Only VOC-compounds with an emission rate higher than 2 $\mu g/m^2h$ are listed in Table 1, carcinogenic compounds ≥ 1 $\mu g/m^2h$. Only the compounds with a concentration in the reference room > 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 ≥ 5 $\mu g/m^3$ (in toluene equivalents).

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

See Appendix 1 for a gas chromatogram (FID spectra) and Appendix 2 for a photo of the test specimen. Appendix 3 is the sampling report received from the customer.

Summary of the test results

The test results are summarized in Table 2.

Table 2.
Summary of the emission results after 28 days of **M85 Projekt Snabbtorkande grovspackel**

Compounds	**Emission rate** ($\mu g/m^2h$)	**Concentration in reference room** (floor scenario) ($\mu g/m^3$)
TVOC	34	27
∑ Carcinogenic VOCs	< 1	< 1
∑ VOC with LCI	< 2	< 5
∑ VOC without LCI	34	27
∑ VVOC	15	12
Formaldehyde	15	12
∑ SVOC	< 2	< 5
$R = \sum C_i / LCI_i$	0.1	

Evaluation of the test results

Byggvarubedömningen has criteria regarding Emissions to indoor environment. The emissions are to be measured according to a standard method such as ISO 16000-9 after 28 days regarding VOC and formaldehyde. 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 results of the tested sample are compared to M1.

Table 3.
The test results of **M85 Projekt Snabbtorkande grovspackel** are compared to the relevant requirements in M1

Compounds	**Requirement M1** (mg/m^2h)	**Test Results** (mg/m^2h)	**Pass / Fail**
TVOC	< 0.2	**0.034**	**PASS**
Formaldehyde	< 0.05	**0.015**	**PASS**
CMR 1A+1B	< 0.005	**< 0.001**	**PASS**
Ammonia	< 0.03	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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Chemistry and Materials - Chemistry

Performed by


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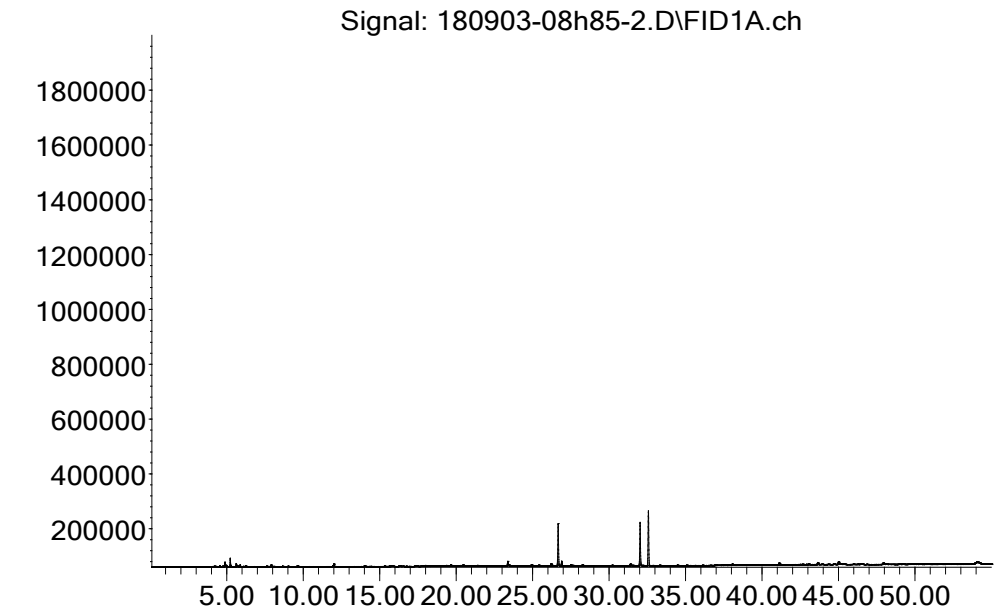
Appendices

1. Gas Chromatogram
2. Photo of the test specimen

Appendix 1

Gas chromatogram

Sample M85 Projekt Snabbtorkande grovspackel, after 28 days:
Sampled volume = 4 L



TVOC between C_6 and C_{16}, means compounds eluting between 6.5 and 38 minutes.

The compounds at 32.0 and 32.6 min are contaminations from analysis system.

Appendix 3

Photo of the test specimen