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Date
19 June 2013

Test Report in accordance CDPH-IAQ

1   Sample Information

Sample identification	Interface hairtile
Batch no.	955048
Production date	24 April 2013
Product type	Carpet tile
Date when sample was received	22 May 2103
Testing (start - end)	24 May 2013 – 7 June 2013

2   Evaluation of the Results

The tested product complies with the requirements of of the Standard Method for the Testing and Evaluation of VOC Emissions from Indoor Sources using Environmental Chambers, version 1.1 of February 2010 by the California Department of Public Health.

Parameter	Test after 14 Days			
	CAS No. Single compounds	**Concentration in class room** $\mu g/m^3$	**Concentration in office building** $\mu g/m^3$	**Half CREL** Limit value $\mu g/m^3$
TVOC (C_5-C_{17})	-	14	16	-
Single VOC components (with defined CREL)				
None determined	-	< 2	< 2	-
Formaldehyde	50-00-0	< 2	< 2	≤ 9
Acetaldehyde	75-07-0	< 2	< 2	≤ 70

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3   Test Method

Method	Principle	Parameter	Quantification limit	Uncertainty
Standard Method for the Testing and Evaluation of VOC Emissions from Indoor Sources using Environmental Chambers, version 1.1 of February 2010 by the California Department of Public Health				
Internal method numbers: 9810, 9811, 9812, 2803, 2808, 8400	GC/MS	VVOC, VOC, SVOC	1 µg/m³	22% (RSD) $U_m = 2 \times RSD = 45\%$
	GC/MS	TVVOC, TVOC, TSVOC	5 µg/m³	
	HPLC	Volatile Aldehydes	3 µg/m³	

Test chamber parameter					
Chamber volume, l	119	Temperature, °C	23±1	Relative humidity, %	50±5
Air exchange rate, 1/h	0.5	Loading ratio, m²/m³	0.4		

Sample preparation

Edges and back were covered with aluminium foil and the sample was mounted into a frame in accordance with JIS A 1901.

Deviations from the test method:	The air exchange rate was 0.5/h and not 1/h.

For detailed method description see page 6: 5.1 Description of the applied test method

4   Results

4.1   Emissions Test after 11 Days

	CAS No.	Emission rate after 24 hours µg/(m²*h)
TVOC (C$_5$-C$_{17}$)	-	43
Formaldehyde	50-00-0	5.3
Acetaldehyde	75-07-0	3.2

<   Means less than

4.2   Emissions Test after 12 Days

	CAS No.	Emission rate after 48 hours µg/(m²*h)
TVOC (C$_5$-C$_{17}$)	-	47
Formaldehyde	50-00-0	< 4
Acetaldehyde	75-07-0	< 4

<   Means less than

4.3   Emissions Test after 14 days

	CAS No.	Retention time min	ID-Cat.	Emission rate µg/(m²*h)	Concentration class room µg/m³	Concentration office building µg/m³	Half CREL µg/m³
TVOC (C₅-C₁₇)				29	14	16	-
Single VOC Substances:							
2-Ethyl-1-hexanol	104-76-7	9.22	1	2.6	1.2	1.4	-
(-)-Menthol *	2216-51-5	11.17	2	3.5	1.6	1.9	-
Not identified *	-	12.76	4	2.6	1.2	1.4	-
Not identified *	-	14.23	4	4.0	1.9	2.1	-
Butylhydroxytoluene BHT *	128-37-0	14.65	2	19	8.9	10	-
Volatile Aldehydes measured with DNPH-Method (see 5.1.3)							
Formaldehyde	50-00-0	-	-	< 4	< 2	< 2	9
Acetaldehyde	75-07-0	-	-	< 4	< 2	< 2	70

*   Not a part of our accreditation. See 5.1.6 Accreditation
a   The method is not optimal for very volatile compounds. For these substances smaller results and a higher uncertainty in the measurement cannot be excluded.

Categories of Identity:

1:    Identified and specifically calibrated

2:    Identified by comparison with a mass spectrum obtained from library and supported by other information. Calibrated as toluene equivalent

3:    Identified by comparison with a mass spectrum obtained from a library. Calibrated as toluene equivalent

4:    Not identified, calibrated as toluene equivalent

Dr. Arja Valtanen
Analytical Service Manager

4.4   Image of the sample

5 Appendices

5.1 Description of the applied test method

5.1.1 Test Chamber

The test chamber is made of stainless steel. A multi-step air clean-up is performed before loading the chamber, and a blank check of the empty chamber is performed. The operation parameters are 23 °C, 50 % relative air humidity in the supply air.

5.1.2 Sampling, Desorption, Analysis

VOC Emissions Testing

The emissions of organic compounds after 11, 12 and 14 days were tested by drawing air samples from the chamber outlet through Tenax TA tubes (main tube and backup tube). Analyses were done by thermal desorption and gas chromatography / mass spectroscopy (internal methods no.: 9812 / 2808). All single substances were identified if the toluene equivalent in the Total Ion Chromatogram (TIC) exceeded 2 µg/m³. Quantification was done with the respective response factor and the TIC signal, or in case of overlapping peaks by calculating with fragment ions. All non-identified substances were quantified as toluene equivalent if giving more than 2 µg/m³.

Testing for Carcinogens

The presence of carcinogens and reproductive/developmental toxins (Cal/EPA OEHHA) was tested by drawing air samples from the chamber outlet through Tenax TA tubes (main tube and backup tube) after 11, 12 and 14 days. Analyses were done by thermal desorption and gas chromatography / mass spectroscopy (internal methods no.: 9812 / 2808). The absence of a listed carcinogen was stated if the specific combination of fragment ions was lacking at the specific retention time in the chromatogram. Otherwise it was checked whether the required detection limit (1 µg/m³) was exceeded. In this case the identity was finally checked by comparing full scan sample mass spectra with full scan standard mass spectra.

This test covered only substances that can be adsorbed on Tenax TA and that can be thermally desorbed. If other emissions occurred, then these could not be monitored (or with limited reliability only).

5.1.3 Testing of Aldehydes

The presence of aldehydes was tested by drawing air samples from the chamber outlet through DNPH-coated silicagel tubes. Analysis was done by solvent desorption, HPLC and UV-/diode array detection (ISO 16000-3, internal methods no.: 9812 / 8400).

The absence of formaldehyde was stated if the specific wavelength UV detector response was lacking at the specific retention time in the chromatogram. Otherwise it was checked whether the detection limit was exceeded. In this case the identity was finally checked by comparing full scan sample UV spectra with full scan standard UV spectra.

5.1.4 Calculation of the Results

In order to calculate the concentrations in an office building or a classroom, the following formula have been used:

$$C_{Calculated} = \frac{SER_A \cdot A}{n \cdot V}$$

Unit representation		Classroom parameters	Office Building parameters
SER$_A$	Area specific emission rate, µg/(m^{2}h)	As tested	As tested
A	Floor area, m^2	89.2	11.1
n	air exchange, h^{-1}	0.82	0.68
V	Volume of room, m^3	231	30.6

5.1.5 Quality assurance

Before loading the chamber a blank check of the empty chamber was performed and compliance with background concentrations in accordance with ISO 16000-9 was determined. Sampling at the chamber outlet and subsequent analysis was performed in duplicate. For monitoring any breakthrough or overloading of the tubes, two Tenax TA tubes were used in series.

In each sequence stability of GC system was checked by a general function test of device and column, and by use of control charts for monitoring mean values and standard deviations for individual VOCs. Reproducibility of the method was monitored for two selected VOCs per sequence.

5.1.6 Accreditation

The testing methods described above are accredited to EN ISO/IEC 17025:2005 by DANAK (no. 522). Not all parameters are covered by this accreditation. At present the accreditation does not cover the parameters marked with a note *, however analysis was performed for these parameters at the same level of quality as for the accredited parameters.

5.1.7 Uncertainty of the test method

The relative standard deviation of the test method amounts to 22% (RSD). The expanded uncertainty U$_m$ is 45% and equals 2 x RSD%. For further information please visit www.eurofins.dk/uncertainty.

The results are only valid for the tested sample(s).
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