Test Report

BALSAN

Product Emissions in accordance with CRI Green Label Plus

LES BEST DESIGN – DUO/LES BEST

August 2012

Client:	**BALSAN** Usine de Corbilly – BP50 36 330 Le Poinçonnet France
Date:	3 August 2012
Testing Laboratory:	Eurofins Product Testing A/S Smedeskovvej 38, DK-8464 Galten, Denmark

Thomas Neuhaus
Responsable de l'activité Tests d'émission

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Responsable Service d´Analyse

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Introduction

On 5 July 2012 Eurofins Product Testing A/S received a sample of textile flooring named

LES BEST DESIGN – DUO/LES BEST
Batch: 5576033, Date of production: 11/06/2012

for emissions testing in accordance with the method for CRI Green Label Plus. The sample was clearly labelled, properly packaged and not damaged. Testing was carried out in the laboratories of Eurofins Product Testing A/S. Before starting the testing procedure on 11 July 2012 the sample had been stored unopened at room temperature.

1 Description of the Applied Testing Method

The applied method complies with the method of the Carpet and Rug Institute CRI Green Label Plus. This method is based on the test method “Testing of volatile organic emissions from various sources using small-scale environmental chambers” as defined in the California Department of Public Health (CDPH) - Version of February 2010, in combination with CRI supplemental specifications. The internal method numbers are: 9810; 9811, 9812, 2802, 2803 , 8400.

1.1 Test Specimen

A sample was sent by the client to the laboratory of Eurofins Product Testing A/S in an airtight package. The package was opened and a test specimen was cut out. Edges and back were covered with aluminium foil and the sample was mounted into a frame in accordance with JIS A 1901. The test specimen was transferred into a test chamber immediately (internal method no.: 9810).

1.2 Test Chamber

The test chamber was consisting of stainless steel and had a volume of 119 litres. The air clean-up was realized in multiple steps. Before loading the chamber a blank check of the empty chamber was performed. The operation parameters were 23 °C, 50 % relative air humidity (in the supply air) with an air exchange rate of 1 per hour. The loading of the test chamber was 0.4 m² test specimen per m³ air volume (internal method 9811).

1.3 Sampling, Desorption, Analyses

1.3.1 VOC Emissions Testing after 1 and 14 Days

The emissions of organic compounds after 1 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. All VOC listed on the CREL and TAC list were analysed and reported if present.

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).

1.3.2 Testing of Aldehydes after 1 and 14 Days

The presence of aldehydes (formaldehyde and acetaldehyde) was tested by drawing air samples from the chamber outlet through DNPH-coated silicagel tubes after 1 and 14 days. Analysis was done by solvent desorption, HPLC and UV-/diode array detection (internal methods no.: 9812 / 8400).

The absence of the aldehydes 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.

1.3.3 Accreditation

The testing methods described above have been accredited (EN ISO/IEC 17025:2005) by DANAK (no. 522). But some parameters are not yet covered by that accreditation. At present the accreditation does not cover the parameters marked with a note *. But the analysis was done for these parameters at the same level of quality as for the accredited parameters.

1.3.4 Deviations from the Test Method

The chamber had a volume of 119 litres, not between 50 and 100 litres. The test specimen had been stored the whole period of 14 days in the emission test chamber. No other deviations.

1.3.5 Calculation of the Results

In order to calculate the model room concentrations, following formulas have been used:

Calculation of VOC concentration in office buildings:

$$C_{Office} = \frac{SER_A \cdot A}{n \cdot V \cdot 0.9}$$

C_{Office}	Concentration in the office building, µg/m^3
SER_A	Area specific emission rate, µg/m^{2}h
A	Floor area of office = 11.1 m^2
n	air exchange rate in office = 0.75 h^{-1}
V	Volume of office = 30.6 m^3

Calculation of emission factors after 14 days for annual testing after 24 hours:

The emission factor after 14 days can be calculated by using following equation for evaluation of the expected results after 14 days, if only testing after 24 hours was performed as for annual testing:

$$E_{14} = a \cdot t^{-b}$$

with E_{14}= Emission factor after 14 days (t=336 hours) and with

$$b = \frac{\ln E(t_1) - \ln E(t_2)}{\ln t_2 - \ln t_1}$$

$$a = E(t_1) \cdot t_1^{\ b} = E(t_2) \cdot t_2^{\ b}$$

with t_1 = 24 hours (1 day) and t_2 = 336 hours (14 days).

1.4 Uncertainty of the test method

The relative standard deviation of the test method is amounted to 22% (RSD). The expanded uncertainty U_m is 45% and equals 2 x RSD%, see also www.eurofins.dk, search: Uncertainty.

2 Results

2.1 Emissions Test after 1 Day

LES BEST DESIGN – DUO/LES BEST	CAS No.	Emission factor, µg/m²h	Maximum Emission factor, µg/m²h	Office Building concentration, µg/m³	Target Office Building concentration, µg/m³
Target compounds					
Acetaldehyde	75-07-0	< 5	130	< 3	70
Benzene	71-43-2	< 5	55	< 3	30
Caprolactam *	105-60-2	< 5	130	< 3	70
2-Ethylhexanoic acid *	149-57-5	< 5	46	< 3	25
Formaldehyde	50-00-0	8.8	30	4.7	16.5
1-Methyl-2-pyrrolidinone *	872-50-4	< 5	300	< 3	160
Naphthalene	91-20-3	< 5	8.2	< 3	4.5
Nonanal *	124-19-6	< 5	24	< 3	13
Octanal *	124-13-0	< 5	13	< 3	7.2
4-Phenylcyclohexene *	4994-16-5	< 5	50	< 3	27
Styrene	100-42-5	< 5	410	< 3	220
Toluene	108-88-3	15	280	8.1	150
Vinyl acetate *	108-5-4	< 5	190	< 3	100
Other VOC					**Half CREL**
m,p-Xylene *	1330-20-7	5,3	-	2,8	350
Hexylene Glycol *	107-41-5	23	-	12	-
Not identified *	-	8,0	-	4,3	-

n.d. Not detected
< Means less than
* Not a part of our accreditation. See 1.3.3.

2.2 Emissions Test after 14 Days

LES BEST DESIGN – DUO/LES BEST	CAS No.	Emission factor, µg/m²h	Maximum Emission factor, µg/m²h	Office Building concentration, µg/m³	Target Office Building concentration, µg/m³
Target compounds					
Acetaldehyde	75-07-0	< 5	130	< 3	70
Benzene	71-43-2	< 5	55	< 3	30
Caprolactam *	105-60-2	< 5	190	< 3	100
2-Ethylhexanoic acid *	149-57-5	< 5	46	< 3	25
Formaldehyde	50-00-0	< 5	30	< 3	16.5
1-Methyl-2-pyrrolidinone *	872-50-4	< 5	300	< 3	160
Naphthalene	91-20-3	< 5	8,2	< 3	4.5
Nonanal *	124-19-6	< 5	24	< 3	13
Octanal *	124-13-0	< 5	13	< 3	7.2
4-Phenylcyclohexene *	4994-16-5	< 5	50	< 3	27
Styrene	100-42-5	< 5	410	< 3	220
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Other VOC					**Half CREL**
Hexylene Glycol *	107-41-5	14	-	7.5	-
Not identified *	-	8,3	-	4.5	-

n.d. Not detected
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2.3 Determined values for extrapolation and further calculations

LES BEST DESIGN – DUO/LES BEST	CAS No.	Emission factor after 24 hours, µg/m²h	Emission factor after 14 days, µg/m²h	a	b
Acetaldehyde	75-07-0	< 3	< 5	-	-
Benzene	71-43-2	< 3	< 5	-	-
Caprolactam *	105-60-2	< 3	< 5	-	-
2-Ethylhexanoic acid *	149-57-5	< 3	< 5	-	-
Formaldehyde	50-00-0	8.8	< 5	-	-
1-Methyl-2-pyrrolidinone *	872-50-4	< 3	< 5	-	-
Naphthalene	91-20-3	< 3	< 5	-	-
Nonanal *	124-19-6	< 3	< 5	-	-
Octanal *	124-13-0	< 3	< 5	-	-
4-Phenylcyclohexene *	4994-16-5	< 3	< 5	-	-
Styrene	100-42-5	< 3	< 5	-	-
Toluene	108-88-3	15	< 5	-	-
Vinyl acetate *	108-5-4	< 3	< 5	-	-

< Means less than
* Not a part of our accreditation. See 1.3.3.

3 Interpretation of the Results

The results of LES BEST DESIGN – DUO/LES BEST can be summarised as follows:

No individual compound exceeds the maximum emission factor after 24 hours.

No individual compound exceeds the maximum emission factor after 14 days.

The tested product LES BEST DESIGN – DUO/LES BEST complies with the requirements of the CRI Green Label Plus.

Appendix 1: Photo of the sample