

Test Report
L'ISOLANTE K-FLEX S.r.l.
Product Emissions in
accordance with ISO 16000
K-Flex Solar


November 2011

Client: **L'ISOLANTE K-FLEX S.r.l.**
Via Leonardo da Vinci 36
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Italy

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

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Introduction

On 15 June 2011 Eurofins Product Testing A/S received a sample of insulation named

K-Flex Solar

for emissions testing in accordance with ISO 16000. 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 19 July 2011 the sample had been stored unopened at room temperature.

1 Description of the Applied Testing Method

The applied method complies with the test method as defined in ISO 16000-3, ISO 16000-6, 16000-9, 16000-11, ISO 16017-1. The internal method numbers are: 9810; 9811, 9812, 2808 , 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. 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 ½ per hour. The loading of the test chamber was 1 m² test specimen per m³ air volume (internal method 9811).

1.3 Sampling, Desorption, Analyses

1.3.1 VOC Emissions Testing after 28 Days

The emissions of organic compounds after 28 days were tested by drawing air samples from the chamber outlet through Tenax TA tubes (main tube and backup tube) after 28 days. 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.

The results of the individual substances were calculated in three groups depending on their appearance in a gas chromatogram when analysing with a non-polar column (HP-1):

- Volatile organic compounds VOC: All substances appearing between these limits.
- Very volatile organic compounds VVOC: All substances appearing before n-hexane (n-C₆).
- Semi-volatile organic compounds SVOC: All substances appearing after n-hexadecane (n-C₁₆).

Calculation of the TVOC (Total Volatile Organic Compounds) was done by addition of the results of all substances between C₆ and C₁₆ as toluene equivalent, as defined in ISO 16000-6.

Calculation of the TSVOC (Total Semi-Volatile Organic Compounds) was done by addition of the results of all substances between C₁₆ and C₂₂ as toluene equivalent, as defined in ISO 16000-6.

Calculation of the TVVOC (Total Very Volatile Organic Compounds) was done by addition of the results of all substances appearing before C₆ as toluene equivalent, as defined in ISO 16000-6.

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 28 Days

The presence of aldehydes C₁ – C₄ was tested by drawing air samples from the chamber outlet through DNPH-coated silicagel tubes after 28 days. Analysis was done by solvent desorption, HPLC and UV-/diode array detection (ISO 16000-3, 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 Emissions test of phthalates after 28 days

The emissions of phthalates were tested by drawing air samples from the chamber outlet through XAD-II tubes after 28 days. Analyses were carried out by thermal desorption and gas chromatography / mass spectroscopy (internal methods 9812 / 2616).

1.3.4 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. It is difficult to obtain accreditation for complex mixtures of substances. 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.

1.4 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 28 Days (French VOC label)

K-Flex Solar	Concentration after 28 days, $\mu\text{g}/\text{m}^3$	C	B	A	A+
Formaldehyde	< 3	>120	<120	<60	<10
Acetaldehyde	< 3	>400	<400	<300	<200
Toluene	< 2	>600	<600	<450	<300
Tétrachloroethylene	< 2	>500	<500	<350	<250
Ethylbenzene	< 2	>1500	<1500	<1000	<750
Xylene	< 2	>400	<400	<300	<200
Styrene	< 2	>500	<500	<350	<250
2-Butoxyethanol	< 2	>2000	<2000	<1500	<1000
Trimethylbenzene	< 2	>2000	<2000	<1500	<1000
1,4-Dichlorobenzene	< 2	>120	<120	<90	<60
TVOC	83	>2000	<2000	<1500	<1000

<: Means less than
>: Means higher than

2.2 Emissions Test after 28 Days (4 CMR)

K-Flex Solar	CAS No.	Concentration after 28 days $\mu\text{g}/\text{m}^3$	Emission rate after 28 days $\mu\text{g}/\text{m}^2\text{h}$
Benzene	71-43-2	< 1	< 1
Trichlorethylene	79-01-6	< 1	< 1
Diocetyl phthalate *	117-81-7	< 1	< 1
Dibutyl phthalate *	84-74-2	< 1	< 1

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

3 Interpretation of the results

The emission of the tested product K-Flex Solar corresponds to the emission class A+ of the French regulation on the labeling of product for construction or wall cladding or flooring and paint and varnish on their emissions of volatile pollutants (Arrêté April 2011).

The test product K-Flex Solar meets the requirements of the French directives from 04/30/2009 and 05/28/2009 on the conditions to the marketing of products for construction and decoration containing carcinogens, mutagens or toxic to reproduction category 1 or 2.

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