

## Test Report

Thermaflex International Holding B.V.

Product Emissions Test  
by using Microchamber

September 2010

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Veerweg 1  
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**Date:** 06-09-2010

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## Introduction

On 09-07-2010 Eurofins Product Testing A/S received a sample named

**Flexalen 600** Batch: PR10-0170 (consisted of PB service pipe, LDPE foam and HDPE outer casing)

**ThermaSmart** Batch: 10292551 (Foam based on Thermoplastic Elastomer)

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 the sample had been stored unopened at room temperature.

# 1 Description of the Applied Testing Method

The test method is based on the published methods: ISO 16000-3, ISO 16000-6, ISO 16000-9, ISO 16000-10, 16000-11. The internal method numbers are: 9810; 9811, 9812, 8400.

## 1.1 Test Specimen

A test specimen with a diameter of 4.5 cm was cut out of each tube including several layers of the sample and was transferred into the Microchamber.

## 1.2 Microchamber

The Microchamber (manufactured by Markes International Ltd.) was made of stainless steel and had a volume of 40 ml. The air clean-up was realised in multiple steps. The air supply was dry air with a temperature of 25°C. The air exchange of the Microchamber was about 100 per hour. Before loading the chamber a blank check of the empty chamber was performed.

## 1.3 Testing of VOC

The emissions of organic compounds were tested by drawing air samples from the Microchamber outlet through a Tenax TA tube. Analyses were done by thermal desorption and gas chromatography / mass spectroscopy (internal methods no.: 9812 / 2808). Analysis was done in accordance with ISO 16000-6. Uncertainty amounted to  $\pm 20\%$ . The expanded uncertainty is equal to  $2 \times \text{RSD}\%$ .

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-C<sub>6</sub>).
- Semi-volatile organic compounds SVOC: All substances appearing after n-hexadecane (n-C<sub>16</sub>).

Calculation of the TVOC (Total Volatile Organic Compounds) was done by addition of the results of all substances between C<sub>6</sub> and C<sub>16</sub> 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 C<sub>16</sub> and C<sub>22</sub> 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 C<sub>6</sub> 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).

The sum of the single substances may differ from the TVOC, if the single substances are specifically calibrated, while the TVOC is calculated as toluene equivalent.

## 2 Results

The results are given in area specific emission rates in  $\mu\text{g}$  per  $\text{m}^2$  tube surface and hour.

### 2.1 Flexalen 600

Flexalen 600	CAS No.	Retention time min	ID- Cat.	Emission rate $\mu\text{g}/\text{m}^2\cdot\text{h}$
<b>TVOC (ISO 16000-6) (<math>\text{C}_6\text{-C}_{16}</math>)</b>				<b>&lt; 40</b>
<b>Single VOC Substances:</b> n.d.	-	-	-	< 40
<b>Total VVOC (&lt; <math>\text{n-C}_6</math>)</b>				320
<b>Single VVOC Substances:</b> Isobutane	75-28-5	1.79	3	320
<b>Total SVOC (&gt; <math>\text{n-C}_{16}</math>)</b>				< 40
<b>Single SVOC Substances:</b> n.d.	-	-	-	< 40

n.d.: Not detected  
<: means less than

### 2.2 ThermaSmart

ThermaSmart	CAS No.	Retention time min	ID- Cat.	Emission rate $\mu\text{g}/\text{m}^2\cdot\text{h}$
<b>TVOC (ISO 16000-6) (<math>\text{C}_6\text{-C}_{16}</math>)</b>				<b>430</b>
<b>Single VOC Substances:</b> VOC Cluster, C10-C12	-	10-12.2	4	430
<b>Total VVOC (&lt; <math>\text{n-C}_6</math>)</b>				< 40
<b>Single VVOC Substances:</b> n.d.	-	-	-	< 40
<b>Total SVOC (&gt; <math>\text{n-C}_{16}</math>)</b>				< 40
<b>Single SVOC Substances:</b> n.d.	-	-	-	< 40

n.d.: Not detected  
<: means less than

#### Categories of identity:

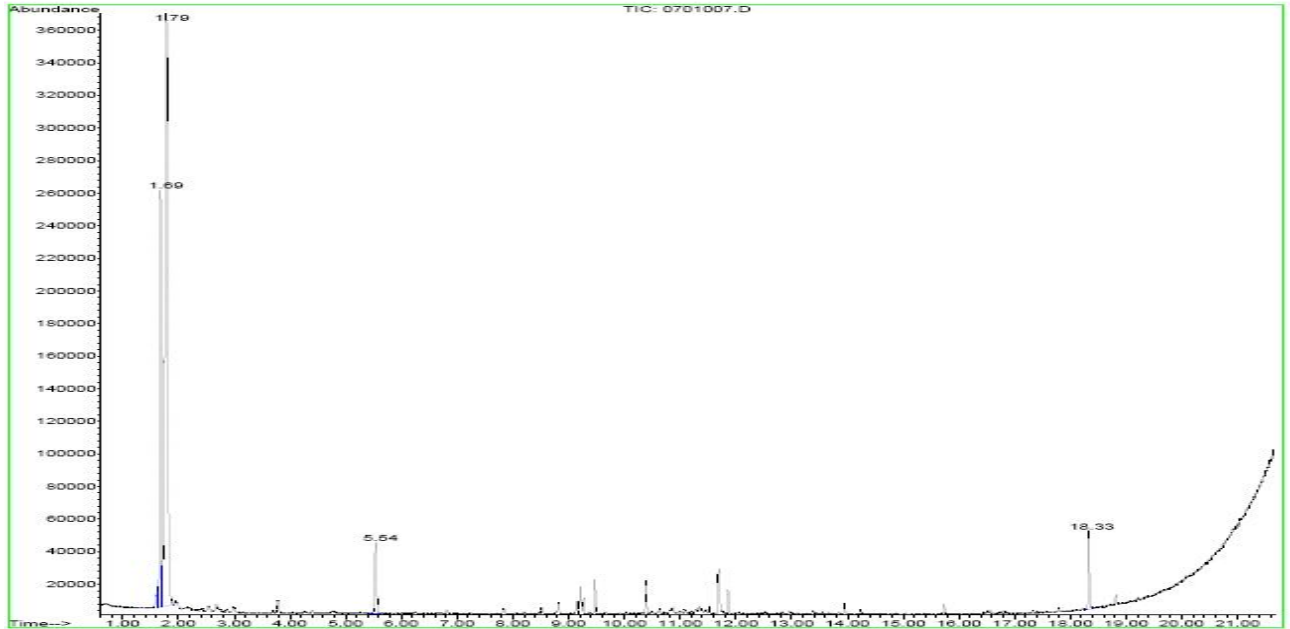
- 1 = definitely identified, specifically calibrated
- 2 = identified by comparison with a mass spectrum obtained from a library, identity supported by other information, calibrated as toluene equivalent
- 3 = identified by comparison with a mass spectrum obtained from a library, calibrated as toluene equivalent
- 4 = not identified, calibrated as toluene equivalent

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

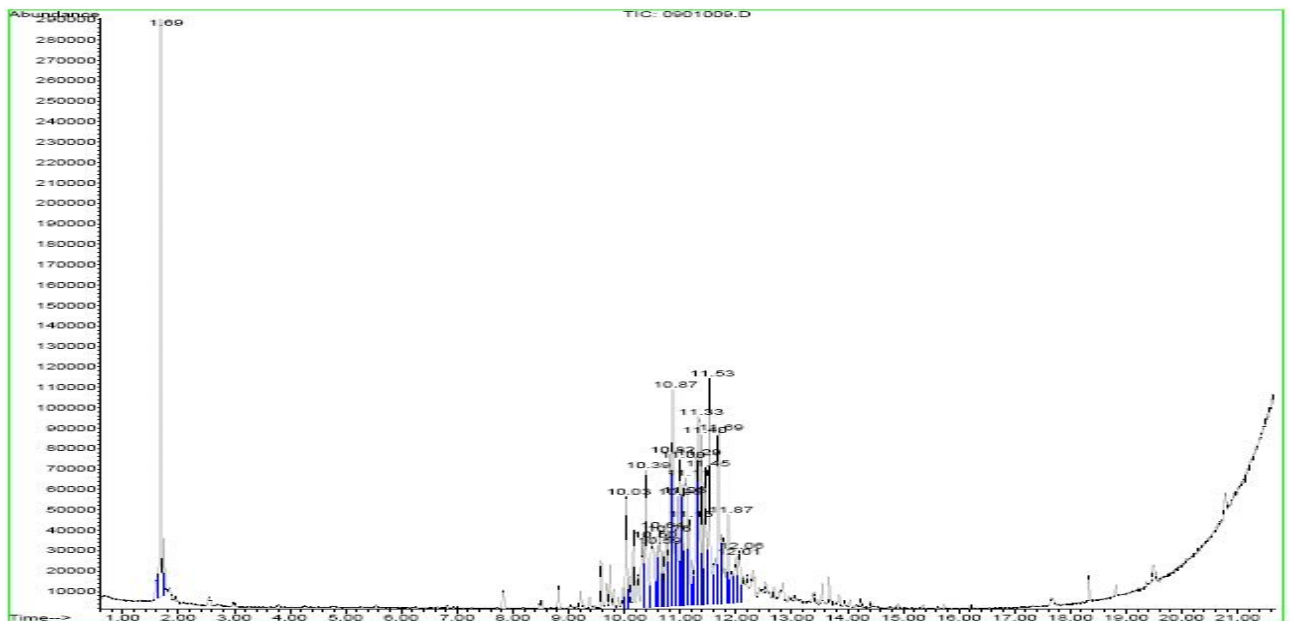
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### 3 Chromatograms

#### Flexalen 600



#### ThermaSmart



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