

REPORT
Emission Test Chamber Study
according to AFSSET

Product: 705 C (13/08/10/001/03)

Project-No.: IAL-08-0563

Order-No.: ULY-0549-1-11 / IAL-00573-11

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Date of order: 14.07.2011

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Altenberge, 20.10.2011

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1 Introduction

Laboratoires WESSLING S.A.R.L was contracted by CLIPSO PRODUCTION to perform an emission test chamber study of the product 705 C according to AFSSET-Standard.

The emission chamber test according to the specifications of the AFSSET (Agence Française de Sécurité Sanitaire de l'Environnement et du Travail) is a French method for assessing indoor air relevance of construction products. The emission behaviour is tested with regard to VOC (volatile organic compounds), carcinogens (C1 and C2), mutagens (M1 and M2), sensitizing substances and aldehydes

2 Test data

Product Data:	
Product: 705 C	Production No.: 13/08/10/001/03
Production Date: unknown	Date of Reception: 07.07.2011
Packaging: aluminium	Test Period: 02.09.2011 – 30.09.2011
Test Chamber Specifications:	
Volume: 110 l – Test Chamber (Stainless Steel)	
Temperature: 23 °C	Humidity: 50 % rel. humidity
Exchange Rate: 0,5 h ⁻¹	Volume Flow 917 ml/min
Load factor: 0,11 m ² /m ³	Area-specific Air Exchange Rate: 0,5 m ³ /(m ² h)
Date and duration of air sampling:	
05.09.2011	Tenax: 50 min (0,1 l/min) Multisorbent: 50 min (0,1 l/min) DNPH: 200 min (0,5 l/min)
30.09.2011	Tenax: 50 min (0,1 l/min) Multisorbent: 50 min (0,1 l/min) DNPH: 200 min (0,5 l/min)

3 Test Method

The product was tested according to DIN EN ISO 16000-9 in a 110-liter test chamber made of stainless steel. The chamber was loaded on 02/09/2011. The test was designed for 28 days; the samples were taken on day 3 and on day 28.

According to the AFFSET scheme for wall textiles, the chamber was loaded with 1 m²/m³. According to the set air exchange 0,5 specific m³/ (m²h) – wich correspond to an area of 0,11 m² materials tested.

The chamber was operated with a 0.5-fold change of air, a room air temperature of 23 °C and 50% relative humidity. The supplied air was filtered by activated carbon.

The fist sampling was done 3 days after loading the chamber by means of Tenax TA, Multisorbent and DNPH tubes performed. The resulting samples as well as the blank value were analyzed on VOC, aldehydes and carcinogens

At the end of the emission test on day 28 samples were taken by by means of Tenax TA, Multisorbent and DNPH tubes to check the final values.

4 Results

4.1 VOC

In accordance with DIN EN ISO 16000-6, for the determination of volatile organic compounds in indoor air about 5 litres of the chamber air are passed through a stainless steel adsorption tube filled with Tenax TA by means of a sampling device. In the laboratory, the tubes are thermally desorbed and the released substances identified by GC / MS analysis.

Table 4.1.1: VOC-results (3 d-measurement)

Parameter (CAS Registry Number)	Group	CAS Registry Number	VOC-Concentration Test Chamber (µg/m ³)	Guidance Value (µg/m ³)
n-Decane	VOC	124-18-5	1,5	
n-Undecane	VOC	1120-21-4	2	
Sum of aliphatic hydrocarbons			3,5	
Hexanal	VOC	66-251	1,4	
Sum aldehyde			1,4	
1-Butanol	VOC	71-36-3	1,3	
Isobutanol	VOC	123-42-2	1,3	
Propylène Glycol	VOC	57-55-6	4	
Ethylène Glycol	VOC	107-21-1	69,8	
Diproylèneglycol butylether	mono-n- VOC	29911-28-2	95,7	
Acetic Acid	VOC	64-19-7	4,9	
Sum of oxygenated hydrocarbons			177	
Octamethyl-cyclotetrasiloxane	VOC	556-67-2	1,9	
Triéthylamine	VOC	121-44-8	18,2	
Sum of other compounds			20,1	
VVOC (<C6)	VVOC		-	
TVOC (C6-C16)	TVOC		202	10.000
SVOC (>C16-C22)	SVOC		-	

Table 4.1.2: VOC-results (28 d-measurement)

Parameter (CAS Registry Number)	Group	CAS Registry Number	VOC-Concentration Test Chamber ($\mu\text{g}/\text{m}^3$)	Guidance Value ($\mu\text{g}/\text{m}^3$)
Acetic Acid	VOC	78-93-3	19,6	
Sum of oxygenated hydro- carbons			19,6	
VVOC (<C6)	VVOC		-	
TVOC (C6-C16)	TVOC		20	1.000
SVOC (>C16-C22)	SVOC		-	
R-value			0,08	<1

CLI-value

4.2 Aldehydes

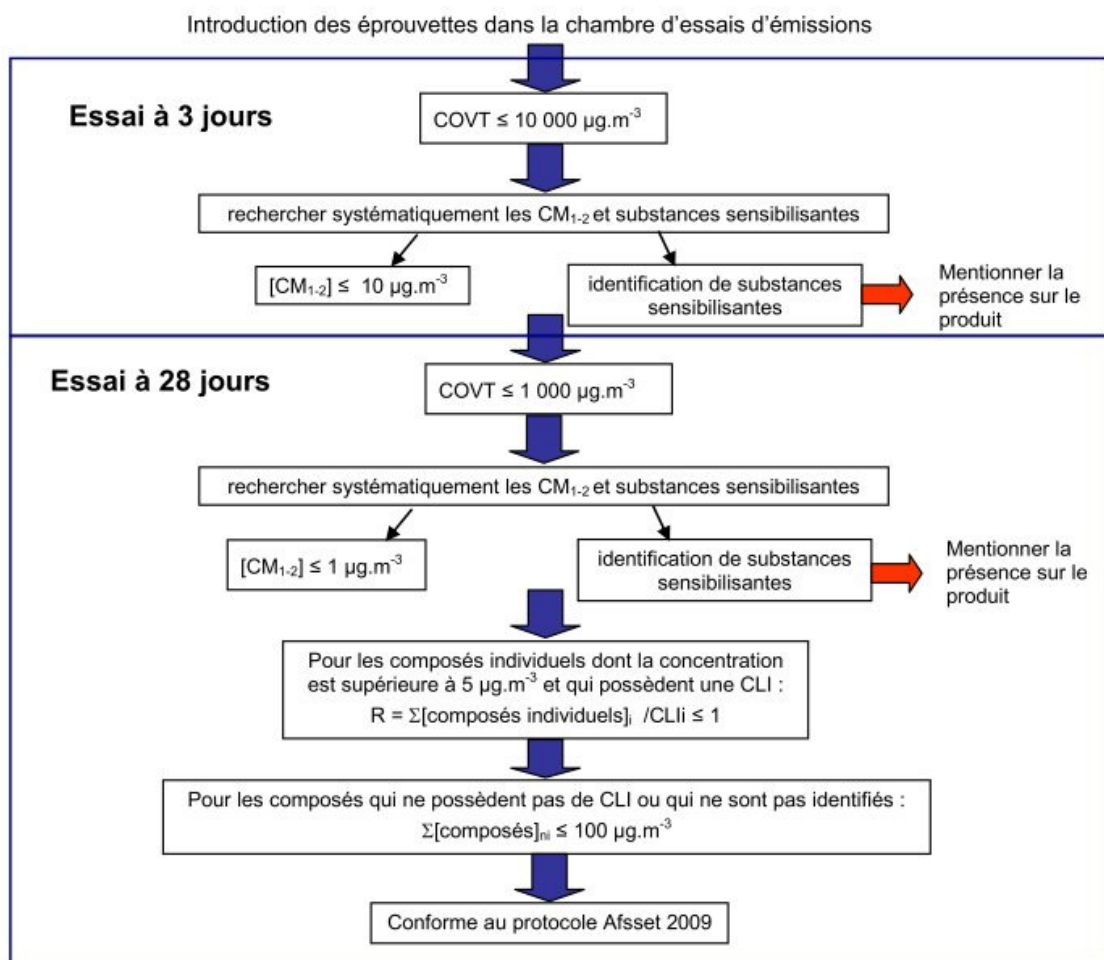
For the detection of aldehydes in indoor air 50 litres of air are directed through a derivatizing absorption medium (2,4-dinitrophenylhydrazine). The aldehydes in the air form corresponding hydrazones. After elution with acetone quality and quantity are determined by HPLC.

Table 4.2.1: Aldehydes-results (28 d-measurement)

Parameter	Concentration Test Chamber ($\mu\text{g}/\text{m}^3$)	R _i (composé _i / CLI _i)
Formaldehyde	<2	
Acetaldehyde	<2	
Propionaldehyde	<2	
Hexanal	<2	
Benzaldehyde	<2	
Decanal	<2	
Furaldehyde	<2	
Heptanal	<2	
Methacrolein	<2	
Nonanal	<2	
Octanal	<2	
Toluolaldehyde	<2	
2-Ethylhexanal	<2	
4-Methyl-2-Pentanon	<2	
2-Butanon u. Butrylal- dehyde	<2	
Acetophenon u. Valeraldehyde	<2	

5 Evaluation

The AFSSET 2009 protocol sets the following criteria for the emission test:



5.1 TVOC₃ and TVOC₂₈

For the TVOC concentration a limit value of $\leq 10,000 \mu\text{g}/\text{m}^3$ after 3 days and $\leq 1,000 \mu\text{g}/\text{m}^3$ after 28 days is defined in the AFSSET protocol (see AFSSET 3.2.3.1).

The TVOC emissions after 3 days are $202 \mu\text{g}/\text{m}^3$ below the defined limit value of $10,000 \mu\text{g}/\text{m}^3$.

The TVOC emissions after 28 days are $20 \mu\text{g}/\text{m}^3$ below the defined limit value of $1,000 \mu\text{g}/\text{m}^3$.

After 3 and 28 days no SVOC's were founded.

5.2 Carcinogens (C1 and C2) and mutagenic substances (M1 and M2)

For carcinogens and mutagenic substances (Cat. C1/C2 and M1/M2 according to EU classification and TRGS 905) a limit value of $10 \mu\text{g}/\text{m}^3$ after 3 days and $1 \mu\text{g}/\text{m}^3$ after 28 days is defined in the AFSSET protocol (see AFSSET 3.1.3.1).

No carcinogens and mutagenic substances were analysed in the samples taken on day 3 and day 28. The product 705 C meets the criterion.

5.3 Sensitizing Substances

If after 3 and 28 days of the substances :

- Glutaraldehyde (CAS No. 111-30-8)
- Hexamethylenetetramine (CAS 100-97-0)

are detected in the chamber, this shall be mentioned in the report (see AFSSET 3.1.3.2).

No sensitizing substances were detected after 3 and 28 days. This criterion is fulfilled by the product 705 C.

5.4 R-value (day 28)

An R-value of ≤ 1 after 28 days is given in the AFSSET protocol (see AFSSET 3.2.3.3). The R-value (CLI-value) is calculated based on the sum of all R_i values. This criterion is fulfilled by the product 705 CS (*R-value: 0,08*)

5.5 VOC without CLI

After 28 days, the total concentration of VOCs without CLI has to be $\leq 100 \mu\text{g}/\text{m}^3$ (see AFSSET 3.2.3.4).

The total concentration of VOCs without CLI after 28 days is lower than the required limit of $100 \mu\text{g}/\text{m}^3$. This criterion is fulfilled by the product 705 C.

6 Summary

Laboratoire WESSLING S.A.R.L. was contracted by CLIPSO PRODUCTION to perform an emission test chamber study of the product 705 C according to AFSSET-Standard.

The TVOC limit values were not exceeded in the emission chamber testing of the product 705 C after 3 and 28 day.

The R-value (CLI-value) and the total concentration of VOCs without CLI after 28 days were under the limit values. Therefore the criterions given in the AFSSET protocol were fulfilled.

No CMR substances were analyzed in the 3-day and 28-day measurements done according to AFSSET 3.1.3.2.

The product 705 C fulfilled the test criteria given in the AFSSET protocol in the emission chamber test.

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