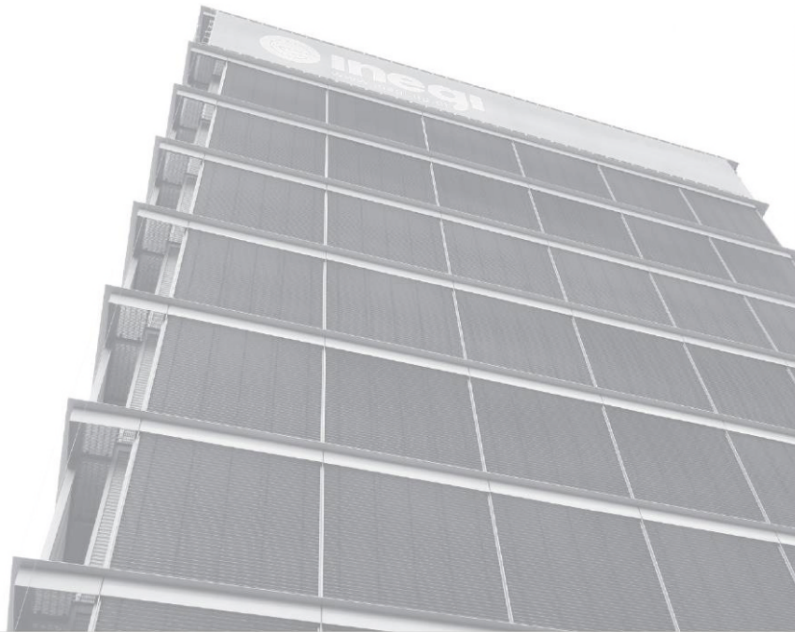


COLLECTION: ORGANIC BLOCKS



since 1986



INSTITUTO DE CIÊNCIA E INOVAÇÃO EM ENGENHARIA MECÂNICA E ENGENHARIA INDUSTRIAL



## LABORATÓRIO DA QUALIDADE DO AR INTERIOR

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Determination of VOC emissions,  
formaldehyde, acetaldehyde and other  
CMR substances from building products  
(French Legislation)

MURATTO

Process: LQAI.MG69/17  
Identification of the Material: ORGANIC BLOCKS



## 0 Documental Control

### 0.1 Identification of Document

Project	---
Name of Document	Determination of VOC emissions, formaldehyde, acetaldehyde and other CMR substances from building products (French Legislation)
Name of file	---

### 0.2 Control of versions

Version	Edition	Revision	Date	Description	Approved by
1	1	0	2018-01-16	Original version	GV

### 0.3 Author(s)

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### 0.5 List of distribution

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I.432.04

Laboratório da Qualidade do Ar Interior  
Process LQAI.M09/17  
4/12

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I.432.04

## 1. Objective

Determination of emitted volatile organic compounds, formaldehyde, acetaldehyde and some CMR substances (carcinogenic, mutagenic and reprotoxic) intending the material classification according to the criteria established by the French legislation.

## 2. Client

Muratto  
Rua Pedro Homem de Melo, n°24A  
4150-598, Porto  
Portugal

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### 3. Methodologies used

The study was conducted on a sample of building product, designated as **ORGANIC BLOCKS**. The sample was delivered at LQAI on 2017/11/23. The selection of the product sample was the sole responsibility of the client.

The test in the test chamber started on 2017/11/29 and was performed according to the internal proceeding IT.403 (based on ISO 16000<sup>1</sup>). This test is accredited in accordance with EN ISO / IEC 17025<sup>2</sup> for the compounds:

Test	Method
Determination of Benzene- method of emission in test chamber	IT.403.04
Determination of Toluene- method of emission in test chamber	IT.403.04
Determination of Ethylbenzene- method of emission in test chamber	IT.403.04

Note: IT.nnn.nn indicates internal laboratory procedure

It should be noted that the remaining compounds determined in this test and are out the scope of Accreditation, are determined using the same quality standards that apply to them.

The VOC samples were collected, in tubes with Tenax TA when the test chamber was empty (2017/11/29, volume: 519 l) and in duplicate after 28 days (2017/12/27, average volume: 6.21l) after starting the test.

Formaldehyde and acetaldehyde were collected in cartridges impregnated with DNPH when the test chamber was empty (2017/11/29, volume: 85.6 l) and after 28 days (2017/12/27, volume: 88.2 l) after starting the test.

The experimental conditions in the chamber during the study were:

Period	T (°C)	HR (%)	v (m/s)	n (hr <sup>-1</sup> )	A/V (m <sup>2</sup> /m <sup>3</sup> )
Test (28 days)	23.4±0.3	48.9±2.0	0.10	0.52	1.06

where  $T$  is the temperature,  $HR$  the relative humidity,  $v$  the air velocity at the surface of the material,  $n$  the air exchange rate and  $A/V$  the ratio of sample area to chamber volume (loading factor). The volume of the chamber used is 0.255 m<sup>3</sup>

For the analysis, thermal desorption on line with gas chromatography coupled to a mass spectrometer detector for VOC identification and quantification (GC/MSD) was used. The GC used is from Agilent Technologies, model 6890N and the mass spectrometer detector is from Agilent also, model 5973. The thermal desorption system is from DANI, model STD 33.50. The analysis was conducted on 2017/12/27 according to the internal proceeding IT.401 (based on ISO 16000<sup>1</sup>). This test is accredited in accordance with EN ISO / IEC 17025<sup>2</sup> for the compounds:

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#### 4. Results

Table 1 shows the concentrations of substances or groups of substances, obtained for a specific ventilation rate of 0.50 m<sup>3</sup>h<sup>-1</sup>m<sup>-2</sup>, as well as the concentration limits (µg/m<sup>3</sup>) for different classes established by the French legislation<sup>5</sup>.

Table 2 lists the concentration limits (µg/m<sup>3</sup>) for CMR substances, imposed by the French legislation<sup>6</sup> and the observed values for the material under study to a specific ventilation rate of 0.50 m<sup>3</sup>h<sup>-1</sup>m<sup>-2</sup>.

Table 1. Limit values established by the French legislation and concentrations observed for the material after 28 days of exposure for a specific ventilation rate of 0.50 m<sup>3</sup>h<sup>-1</sup>m<sup>-2</sup>.

Compound	CAS	Concentration (µg/m <sup>3</sup> )				MC69/17 28 days
		Classes				
		C	B	A	A+	
Formaldehyde <sup>†</sup>	50-00-0	>120	<120	<60	<10	< 1.3*
Acetaldehyde <sup>‡</sup>	75-07-0	>400	<400	<300	<200	< 2.45*
Toluene	108-88-3	>600	<600	<450	<300	< 0.4*
Tetrachloroethylene <sup>†</sup>	127-18-4	>500	<500	<350	<250	< 1.8*
Xylene <sup>†</sup>	1330-20-7	>400	<400	<300	<200	< 0.5*
1,2,4-trimethylbenzene	95-63-6	>2000	<2000	<1500	<1000	< 0.6*
1,4-dichlorobenzene <sup>†</sup>	106-46-7	>120	<120	<90	<60	< 0.4* <sup>†</sup>
Ethylbenzene	100-41-4	>1500	<1500	<1000	<750	< 0.4*
2-butoxyethanol <sup>†</sup>	111-76-2	>2000	<2000	<1500	<1000	< 1.0*
Styrene <sup>†</sup>	100-42-5	>500	<500	<350	<250	< 0.3*
TVOC		>2000	<2000	<1500	<1000	1203

\* LODi Limit of Detection

\*\* LOQ Limit of Quantification

\*<sup>†</sup> Limit of detection calculated for toluene.

\* Out of the scope of accreditation.

Table 2. Limit values established by the French legislation and concentrations observed for the material after 28 days of exposure for a specific ventilation rate of 0.50 m<sup>3</sup>h<sup>-1</sup>m<sup>-2</sup>.

Compound	CAS	Concentration (µg/m <sup>3</sup> )	MC69/17 28 days
		Limit	
Trichloroethylen <sup>†e</sup>	79-01-6	< 1 µg/m <sup>3</sup>	n.d.
Benzene	71-43-2	< 1 µg/m <sup>3</sup>	n.d.*
Bis(2-ethylhexyl) phthalate <sup>†</sup>	117-81-7	< 1 µg/m <sup>3</sup>	n.d.**
Dibutyl phthalate (DBP) <sup>†</sup>	84-74-2	< 1 µg/m <sup>3</sup>	n.d.

n.d. i not detected, which means lower than the limit of detection.

\* Limit of Detection for benzene = 0.39 µg/m<sup>3</sup>.

\*\* Although it has not been evaluated analytically it is considered that this compound is not present in the emissions of the material under study, as stated by the manufacturer in the attached declaration

\* Out of the scope of accreditation.

## 5. Discussion of the results

The results presented in Table 1 and 2 shows that the material **ORGANIC BLOCKS** rated **A** according to the French regulations and meets the criteria established by legislation.

## 6. References

- 1.- ISO 16009 (2006). Determination of the emission of volatile organic compounds from building products and furnishing - Emission test chamber method.
- 2.- NP EN ISO/IEC 17025:2005 Requisitos gerais de competência para laboratórios de ensaio e calibração.
- 3.- ISO 16006 (2011). Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS/FID.
- 4.- ISO 16003 (2011). Determination of formaldehyde and other carbonyl compounds Active sampling method.
- 5.- Arrêté du 19 avril 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils.
- 6.- Arrêté du 30 avril 2009 relatif aux conditions de mise sur le marché des produits de construction et de décoration contenant des substances cancérigènes, mutagènes ou reprotoxiques de catégorie 1 ou 2.

Porto, 16 January 2018

  
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(Head of Laboratory)