



Certified according to DIN EN ISO 9001

## Test Report

No. 3113039E

**Client:** FURAL – Systeme in Metall GmbH  
Cumberlandstr. 62  
4810 Gmunden  
AUSTRIA

**Date of commission:** May 18, 2012

**Samples received on:** May 16, 2012

**Nature of commission:** Examination of a ceiling tile regarding the emissions of volatile organic compounds (VOC) in compliance with the principles for the health assessment of construction products (AgBB requirements).

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## 1. Nature of commission

TÜV Rheinland LGA Products GmbH (TRLP) was commissioned to examine the emissions of a ceiling tile on the basis of the principles for health-related evaluation of building products. The LCI list, status May 2010, was used as a basis for data result assessment.

## 2. Sample description

According to manufacturer's information the ceiling tiles are for different applications.

A ceiling tile with a maximum construction height was tested:

1) Ceiling tile out of galvanised steel, powder coating, acoustic fleece, cooling system (copper meander + aluminium profile + aluminium profile with adhesive tape)

Ceiling tile dimensions: 63 cm x 31 cm

In order to prepare the test specimen two delivered ceiling tiles were connected using a clipping rail, all edges and the back surface were covered using an adhesive aluminium tape.

Further potential constructions are listed below:

- 2) Ceiling tile out of galvanised steel, powder coating, acoustic fleece
- 3) Ceiling tile out of galvanised steel, powder coating
- 4) Ceiling tile out of aluminium, powder coating, acoustic fleece, cooling system (copper meander + aluminium profile + aluminium profile with adhesive tape)
- 5) Ceiling tile out of aluminium, powder coating, acoustic fleece
- 6) Ceiling tile out of aluminium, powder coating

## 3. Examination method

### 3.1 Emission test chamber

The examination was performed based on the authorization principles for health-related evaluation of building products published by DIBt (German Institute for Civil Engineering).



Climatic conditions:

Chamber volume: 1 m<sup>3</sup>  
Temperature: (23 ± 1) °C  
Air humidity: 50 % rel. h. ± 3 % rel. h.  
Air velocity: 0.1 to 0.3 m/s  
Air exchange rate: 1.25 m<sup>3</sup>/(m<sup>2</sup> h) ± 0.01 m<sup>3</sup>/(m<sup>2</sup> h)

The samples were placed in the test chamber for preconditioning on May 18, 2012.

Sampling was performed as follows:

Conditioning duration: 3 and 28 days

- VOC, using Tenax tubes, analyzed using thermal desorption /GC-MS
- Aldehydes, DNPH technique, analyzed using HPLC/DAD

GC system description:

- Gas chromatograph, Agilent 6890N, MS Agilent 5973
- Thermal desorption unit, Perkin Elmer ATD 400
- Restek GC column, RTX-200 60 m x 0.32 mm x 1 µm

HPLC system description:

- HPLC, Agilent 1200 system with diode array detector (DAD)
- Column, EC100/4.6 Nucleodur C18 Gravity 1.8 µm of Macherey & Nagel

## 3.2 Testing methods

ISO 16000-3: Indoor air – Part 3: Determination of formaldehyde and other carbonyl compounds  
– Active sampling method

ISO 16000-6: Indoor air – Part 6: 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

EN ISO 16000-9: Indoor air – Part 9: Determination of the emission of volatile organic compounds from building products and furnishing – Emission test chamber method



## 4. Examination results

Detailed examination results can be found in the attached tables.

## 5. Evaluation

The tested ceiling tile meets the requirements of the AgBB test concept in terms of volatile organic compounds (VOC).

A ceiling tile with a maximum construction height 1) was tested:

Based on the current manufacturer's information it must be assumed that all further ceiling tile constructions (refer to 2. Sample description) are in compliance with the requirements of the AgBB evaluation scheme.

Note: No German national approval for ceiling panels is required.

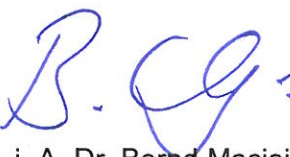
Nuremberg, May 26, 2014

(Translation of test report 3051158, issued on June 20, 2012)

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**Table 1:**  
**Test chamber concentrations<sup>1</sup> of individual components in µg/m<sup>3</sup> (with/without LCI value)**

Parameter	CAS-Nr.	3 days	28 days	LCI value <sup>2</sup>
Methanal	50-00-0	3	n.d. <sup>3</sup>	10
n-Dodecane	112-40-3	2	n.d. <sup>3</sup>	6,000
n-Tridecane	629-50-5	1	n.d. <sup>3</sup>	6,000
n-Tetradecane	629-59-4	2	n.d. <sup>3</sup>	6,000
2-Ethyl-1-hexanol	104-76-7	16	3	1,100
Phenol	108-95-2	1	n.d. <sup>3</sup>	10
Butyl diglycol	112-34-5	2	n.d. <sup>3</sup>	2,500
Acetic acid	64-19-7	39	25	500
Octamethylcyclotetrasiloxane	556-67-2	1	n.d. <sup>3</sup>	1.200
Decamethylcyclopentasiloxane	541-02-6	1	n.d. <sup>3</sup>	1.500
2-Ethylhexyl acetate	103-09-3	2	n.d. <sup>3</sup>	1.400
2-Ethylhexyl acrylate	103-11-7	7	n.d. <sup>3</sup>	380
Not identified (SVOC)	--	3	2	--
Not identified	--	1	n.d. <sup>3</sup>	--
TVOC <sup>4,5</sup>	--	62	25	--
TSVOC <sup>4,5</sup>	--	< 5	< 5	--

**Table 2:**  
**AgBB Evaluation scheme<sup>6</sup> for VOC from building products**

Testing Parameter	Requirements		Measuring results <sup>1</sup>		Evaluation
	3 days	28 days	3 days	28 days	
Total organic compounds within the retention range C <sub>6</sub> – C <sub>16</sub> (TVOC <sup>4,5</sup> )	≤ 10 mg/m <sup>3</sup>	≤ 1 mg/m <sup>3</sup>	62 µg/m <sup>3</sup>	25 µg/m <sup>3</sup>	Pass
Total organic compounds within the retention range > C <sub>16</sub> – C <sub>22</sub> (TSVOC <sup>4,5</sup> )	none	≤ 0.1 mg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>	Pass
Total VOC without LCI <sup>7</sup>	none	≤ 0,1 mg/m <sup>3</sup>	each < 5 µg/m <sup>3</sup>	each < 5 µg/m <sup>3</sup>	Pass
R value <sup>8</sup>	none	≤ 1	0.10	< 0.1	Pass
Cancerogenic compounds <sup>9</sup>	≤ 0.01 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	n.d. <sup>3</sup>	n.d. <sup>3</sup>	Pass
<b>This part gives some additional information</b>					
VVOC <sup>10</sup> (< C <sub>6</sub> )	--	--	each < 5 µg/m <sup>3</sup>	each < 5 µg/m <sup>3</sup>	--

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<sup>1</sup> Limit of consideration 5 µg/m<sup>3</sup>, with exception of all carcinogenic substances, detection limit applies here 1 µg/m<sup>3</sup>; without VVOC<sup>10</sup> and not identified compounds

<sup>2</sup> LCI = Lowest Concentration of Interest, List of LCI values as of 2010

<sup>3</sup> n.d.: not detected, no substance of the corresponding category has been detected, limit of quantification 1 µg/m<sup>3</sup>

<sup>4</sup> TVOC = total volatile organic compounds, TSVOC = total semi volatile organic compounds

<sup>5</sup> All identified and not identified compounds ≥ 5 µg/m<sup>3</sup> are included.

<sup>6</sup> AgBB = Ausschuss zur gesundheitlichen Bewertung von Bauprodukten, Committee for Health-related Evaluation of Building Products

<sup>7</sup> Total of all identified and not identified compounds included in the TVOC<sup>4</sup> ≥ 5 µg/m<sup>3</sup> without LCI value

<sup>8</sup> R value: sum of all R<sub>i</sub> = sum of all ratios (C<sub>i</sub> / NIK<sub>i</sub>)

<sup>9</sup> Carcinogenic substances are compounds which are classified according to Directive 67/548/EEC or TRGS 905 in the current version as category K1 or K2

<sup>10</sup> VVOC = very volatile organic compounds (not evaluated)